UNESCO International Association of Hydrogeologists IUGS

Philip E. LaMoreaux
Editor-in-Chief

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Hydrology of Limestone Terranes

Annotated Bibliography of Carbonate Rocks, Volume Three

International Contributions to Hydrogeology
Edited by
G. Castany, E. Groba, E. Romijn

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Note:

Annotations of publications considered worthy of inclusion in the next edition of the bibliography of carbonate rocks are requested from the scientific community at large. Submissions should be made to the attention of Dr. Philip E. LaMoreaux at the address given on the front cover.

Samples of the format desired are as follows:

Author; Author; and Author (Date) - Title: Country; Publisher or Journal, Vol:Issue (if Journal), inclusive pages or number of pages.

> Ford, D.C. (1969) - Preliminary review of cavern development in the Rocky Mountains of Canada: Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 2, p. S4/1-S4/8.
>
> > The paper is an introductory study of the carbonate (Rocky Mountain) system. The Canadian Rockies are compared to the well-known Alpine karsts of Europe. Three sharply contrasted sample areas are described as an illustration of the variety of development which exists.

Author (Date) - Title of article or chapter <u>in</u> Editor, Title of work: Country; Publisher, inclusive pages.

> Littlefield, J.R.; Culbreth, M.A.; Upchurch, S.B.; and Stewart, M.T. (1984) - Relationship of modern sinkhole development to large scale photolinear features <u>in</u> Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 189-195.
>
> > An inventory of reported sinkhole occurrences for the past 10 years in west-central Florida reveals that: (1) sinkhole development commonly occurs along linear patterns on a regional scale; and (2) while sinkhole development is more frequent in areas of high water use, there is a lack of obvious concentrations of recent sinkholes in the immediate vicinity of well fields or other major ground-water withdrawal areas.

CONTENTS

FOREWARD

The escalating interest in hydrology of carbonate terranes by the scientific community as well as the general public requires access to published material available on this subject. Responsibility for compiling and publishing a comprehensive list of karst reports was previously accepted by the Work Group on the Hydrology of Carbonate Terranes of the U.S. National Committee for the International Hydrological Decade who worked with the Alabama Geological Survey, USA. As a result of those efforts two reports were published as bulletins: (1) Bulletin 94-A, Geological Survey of Alabama, Hydrology of Limestone Terranes - Annotated Bibliography of Carbonate Rocks, published in 1970; and (2) Bulletin 94-G, Geological Survey of Alabama, Hydrology of Limestone Terranes, Progress of Knowledge About Hydrology of Carbonate Terranes with an Annotated Bibliography of Carbonate Rocks, published in 1975.

The International Association of Hydrogeologists (IAH) is a scientific and educational non-profit international organization established to exchange hydrogeologic information and to advance the science. IAH, which promotes cooperation between scientists who are working on hydrogeologic problems, is affiliated with the International Union of Geological Sciences (IUGS).

The principal activities of IAH are to:

- Promote international interest among scientists in hydrogeologic studies.
- Sponsor hydrogeologic meetings. IAH has held more than 23 scientific conferences in the past 20 years.
- Publish hydrogeologic reports. For example: Karst Hydrogeology, 1977; Hydrogeology of Great Sedimentary Basins, 1976; Hydrogeological Map of Europe, and Methods for Evaluation of Ground Water Resources, 1979.
- Establish commissions to investigate topics of concern to hydrogeologists. The work of IAH is accomplished by several special Commissions.

During a meeting of the Karst Commission of the International Association of Hydrogeologists (IAH) in Cambridge, England, on September 8, 1985, the Association voted to issue the third volume of the Annotated Bibliography in the Spring of 1986, and additional volumes of the bibliography every other year. This bulletin represents the first of this new series of IAH bulletins on karst terranes.

The two previous karst bibliographies, Bulletins 94A and 94G of the Alabama Geological Survey, were published under the direction of Philip E. LaMoreaux who was at that time State Geologist of Alabama. The Alabama Geological Survey was contacted, and by letter, released future rights to publish the bibliography to the Karst Commission of IAH. 1/

1/ July 23, 1985, letter to Dr. P. E. LaMoreaux from Ernest A. Mancini, State Geologist and Oil and Gas Supervisor of Alabama.

The Karst Commission of IAH is made up of scientists from many different research agencies around the world. Coordinating closely with the preparation of this issue of the bibliography was Henri Paloc, France; Andre Burger, Switzerland; David Burdon, Ireland; Vladimir Kovalevsky, Moscow; and Dan Dancau, Romania. Members of the Karst Commission of IAH are as follows:

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INTRODUCTION

Constructive and thorough discussions on karst are carried out by a broad circle of interested scientists and researchers. Various regional symposia and colloquies have been organized worldwideover the past 20 years by IAH, IASH, FAO, and UNESCO within the International Hydrologic Decade (IHD) and International Hydrologic Programme (IHP). The IHD included a Commission for the study of carbonate rocks in Mediterranean countries, and since 1970 a permanent Commission for karst hydrogeology exists within IAH.

The reasons for such an increasing interest in karst lies in: the rapid technologic development of our civilization; problems of water resources and their systematic study, rational utilization, and protection; and management of hydrological and hydrogeological systems. Karst occurs in many parts of the globe (frequently covering a substantial part of the national territory of individual countries), whose water supplies represent the sole or most important natural resource which directly affects their social and economic development. Under such conditions, the problems of study, utilization, and protection of water resources, or using contemporary terminology, management, and control of water resource systems obtain an exceptional importance. This has resulted in an increasing effect on the orientation of research.

Limestone areas comprise approximately one-fifth of the earth's surface. These rocks are extremely complex physically, produce a great variety of topographic and geologic conditions, and have been the subject of much research by geologists, geomorphologists, speleologists, geophysicists, and other scientific disciplines. The literature regarding limestone is diverse and the subject has been published in a wide range of articles in newspapers and scientific and technical journals. During the past few years several major reference and text books have been published on this subject. A few of these are listed as follows:

Back, W.; and LaMoreaux, P.E., editors (1983) - V.T. Stringfield Symposium - processes in karst hydrology. A selection of papers presented at the symposium in honor of V.T. Stringfield during the annual meeting of the Geological Society of America, Atlanta, GA, U.S., 1980: Journal of Hydrology, G1:1-3, 355 p.

Bogli, Alfred (1980) - Karst hydrology and physical speleology [translated by June C. Schmid]: Berlin and New York; Springer-Verlag.

Burger, A.; and Dubertret, L., editors (1975) - Hydrogeology of karstic terrains: Paris; IAH, 190 p.

Dilamarter, R.R.; and Csallany, S.C., editors (1977) - Hydrologic problems in karst regions; international symposium, Bowling Green, KY, U.S., 1976: U.S.; Western Kentucky University, 479 p.

Herak, M.; and Stringfield, V.T., editors (1972) - Karst; important karst regions of the northern hemisphere: Amsterdam; Elsevier Publishing, 551 p.

Jakucs, Laszlo (1977) - Morphogenetics of karst regions [translated by B. Balkay]: U.S.; John Wiley, 283 p.

Jennings, J.N. (1971) - Karst: U.S., Boston; M.I.T. Press, 252 p.

LaMoreaux, P.E.; Wilson, B.M.; and Memon, B.A., editors (1984) - Guide to the hydrology of carbonate rocks [studies and reports in hydrology, no. 41]: UNESCO, 345 p.

Milanovic, Petar (1981) - Karst hydrogeology [translated by J.J. Buhac]: U.S., Colorado; Water Resources Publications, 434 p.

Petrik, M.; and Herak, M., editors (1969) - Krs Jugoslavije (Carsus Iugoslaviae): Zagreb, 622 p.

Sweeting, M.M. (1972) - Karst landforms: U.S., New York; The MacMillan Press Ltd., 363 p.

Yevjevich, V., editor (1981) - Karst water research needs: U.S.; Water Resources Publications.

Yevjevich, V., editor (1976) - Karst hydrology and water resources; proceedings of the U.S.-Yugoslavian Symposium, Dubrovnik, June 1975: U.S.; Water Resources Publications, 2 vol., 873 p.

Zotl, Josef (1974) - Karsthydrogeologie: Wein and New York; Springer-Verlag, 291 p.

Limestone terranes are generally characterized by broad rolling plains; however, in some areas, they are characterized by steep bluffs, canyons, and valleys. Owing to the variability in topography and solubility of limestone under diverse climatic conditions, man's development in limestone areas has often been difficult. In some limestone areas there are fertile soils, valued for the production of large quantities of food; in other areas, the surface of the limestone rocks is eroded and barren. In some areas, ground-water supplies are abundant; in others, supplies are sparse and difficult to locate. It is perhaps this diversity of geologic, topographic, and hydrologic conditions that makes the study of carbonate rock terranes so fascinating, complex, and challenging.

During the past 20 years, under the auspices of the Work Group on the Hydrology of Carbonate Terranes of the International Hydrological Decade, and the Working Group on the Hydrology of Limestone Rocks in the Mediterranean Basin of the FAO/IHD, much emphasis has been placed on the study of carbonate rocks. In addition to individual project activities, there have been over 25 field conferences, formal meetings, and congresses, at which results of research on the hydrology of carbonate rocks have been discussed indicating the interest in this subject since the last bibliography was published in 1975. A list of these follows:

Symposia and Conferences on Hydrology of Carbonate Rocks

Location	Title	Sponsor(s)	Date
Beytepe, Ankara, Turkey	International Symposium on Karst Water Resources	Karst Water Resources Research Center, Hacettepe University and UNESCO	1985
Puerto Rico	Friends of the Karst Meeting		1984
Orlando, Florida (U.S.)	First Multidisciplinary Conference on Sinkholes	Florida Sinkhole Research Institute	1984
Havana, Cuba	International Workshop on Karst Hydrology of the Caribbean Region	UNESCO Division of Water Sciences	1983
Bucharest, Romania	First Symposium on Theoretical and Applied Karstology	Institutul de Speologie "Emil Racovita", Entreprise for Geological and Geophysical Prospecting	1983
Havana, Cuba	International Workshop on Karst Hydrology of the Caribbean Region	UNESCO Division of Water Sciences	1982
Bari, Italy	Utilizazione delle Aree Carsiche - 2 Simposio Internazionale		1982
Neuchatel-Besancon, France	3eme Colloque d'Hydrologie en Pays Calcaires	Univ. Besancon	1982
Bowling Green, Kentucky (U.S.)	8th International Congress of Speleology	International Union of Speleology and National Speleological Society	1981
Besancon, France	1 er Colloque National sur la Protection des Eaux Souterraines Karstiques	la CPEPESC	1981
Trieste, Italy	Utilization of Karst Areas -International Symposium	Union Int. de Speleologie, Societa Speleologica Italiana	1980
	Symposium - Table Ronde Franco - Allemande	Assoc. Francaise de Karstologie	1980

Symposia and Conferences on Hydrology of Carbonate Rocks

Location	Title	Sponsor(s)	Date
Atlanta, Georgia (U.S.)	V.T. Stringfield Symposium - Processes in Karst Hydrology	Geological Society of America	1980
Washington, D.C. (U.S.)	Research Needs in Hydrology and Water Resources of Karstified Carbonate Terranes	The National Science Foundation	1980
Oymapinar, Turkey	International Symposium on Karst Hydrogeology	State Hydraulic Works, United Nations Development Programme	1979
Budapest, Hungary	International Symposium on Karst Hydrology	Hungarian Speleological Society, Hungarian Geological Society, and Hungarian Meteorological Society	1978
Tarbes, France	Le Karst: Son Originalite Physique; son Importance Economique	l'AGSO a Tarbes	1978
Bowling Green, Kentucky (U.S.)	International Symposium on Hydrologic Problems in Karst Regions	Western Kentucky University	1976
Budapest, Hungary	Hydrogeology of Great Sedimentary Basins	Hungarian Geological Institute, International Association of Hydrological Sciences, and UNESCO	1976
Besancon-Neuchatel, France	2eme Colloque d'Hydrologie en Pays Calcaires	Univ. Besancon	1976
Ljubljana, Yugoslavia	Third International Symposium of Underground Water Tracing	Yugoslav Committee for International Hydrological Program	1976
Dubrovnik, Yugoslavia	U.S.-Yugoslavian Symposium on Karst Hydrology and Water Resources	Bilateral U.S.-Yugoslavia Research Project on Karst Hydrology and Water Resources	1975

Symposia and Conferences on Hydrology of Carbonate Rocks

Location	Title	Sponsor(s)	Date
Huntsville, Alabama (U.S.)	12th International Congress of the International Association of Hydrogeologists - Karst Hydrogeology	International Association of Hydrogeologists	1975
Kranj, Yugoslavia	8th Conference of the Slovenia Speleologists and Karst Explorers in Serbo Croat		1974
Hannover, Germany	Sinkholes and Subsidence- Proceedings of a Symposium	International Association of Engineering Geology	1973
Olomouc, Czechoslovakia	6th International Congress of Speleology	International Union of Speleology	1973
Besancon, France	1 er Colloque d'Hydrologie en Pays Calcaires	Univ. Besancon	1971

ORGANIZATION, COMPOSITION, AND AVAILABILITY OF ANNOTATIONS AND INDEXES

The annotated bibliographic citations are listed alphabetically by principal author and numerically by document number.

The annotated citations are followed by secondary author, location, and subject indexes. The Subject Index is preceded by a key to level terms used. The Location Index is by country, and secondarily by individual state. Each index lists the pertinent citations by document number.

The bibliography primarily represents citations for the past decade (1975 through 1985) from the following data sources: a computer controlled search of GEOREF and GEOARCHIVE which contain publications of AGI and the Bibliography of North American Geology; Canadiana; American Book Publishing Record; Library of Congress Subject Catalog; Books in Print and Paperbound Books in Print; Bibliographic Guide to Conference Publications; Index to Scientific and Technical Proceedings; and Libros en Venta. Additional bibliographic searches were performed for the following pertinent bibliographies available through the University of Alabama Library for the indicated periods: Bibliografia Mexicana (1975-1984); World Bibliographic Series--Belize, Brazil, Panama, and Nicaragua (1974-1984); Bibliografia Cuba (1977); Bibliography--Puerto Rico; Jamaican National Bibliography (1964-1974); The Puerto Ricans An Annotated Bibliography; The Complete Caribbean (1900-1975); Anuario Bibliografico Columbiana (1975-1980); and Anuario Bibliografico Venezolano (1975).

To assume that any bibliography on the subject of karst hydrology is comprehensive would be a mistake. However, a concerted effort has been made to compile as many works on the subject matter as possible for the decade 1975 to 1985 for this issue. The omissions of published literature discovered during future work on this project will be included in the next issue to be published in 1988.

A multidisciplined staff of geologists, hydrologists, geophysicists, and geochemists were assigned to the project. The project also benefited from the cooperation of many individual scientists and numerous organizations throughout the world. As a result, this bibliography is primarily composed of references to the geology, the hydrology, the geochemistry, and the geophysics of carbonate rocks.

The bibliographical material is stored on diskettes for an IBM computer at P.E. LaMoreaux & Associates (PELA), Post Office Box 2310, Tuscaloosa, Alabama, 35403. This stored information is available in whole or in part and may be obtained in printout form.

Co-editors for this issue of the Bibliography are M. Tanner, Hydrogeologist; P. ShoreDavis, Librarian; and P. E. LaMoreaux, Sr., Hydrogeologist. Participating PELA staff include T. Beeson, Hydrogeologist; J. Patrick, Geologist; J. Robinson, Geologist; S. Godfrey, Geologist; N. Green, Librarian; B. Metternich, Computer Programer; V. Sanders, Computer Programer; J. Tanner, Computer Programer.

SPECIAL CONTRIBUTORS

The following persons have contributed their time, energy, and interest to compile individual works representative of karst research in their respective countries. The Commission deeply appreciates their efforts and is grateful for their contributions.

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Other valuable contributions were regrettably received too late for inclusion in this volume and will be preserved for incorporation into the next edition.

Philip E. LaMoreaux

DEVELOPMENT OF METHODS AND TECHNIQUES FOR THE STUDY OF KARST AREAS

Methods used to investigate the hydrological regime in carbonate terranes includes a broad spectrum of techniques from the fields of geology, geohydrology, hydrology, physics, chemistry, mathematics, and other disciplines. Some of the methods are simple; others are highly sophisticated. It is important for the investigator to remember that any technique he chooses is no better than the use he makes of it and that limestone terranes and the occurrence of ground water in these terranes is extremely complex and often results obtained may be very misleading unless thoroughly checked and verified by a wide variety of tools and multidisciplined analysis. These tools cannot provide answers beyond either their capabilities or the capability of their users. The adage used in computer work, "Garbage in; Garbage out," applies equally well to investigations of karst terranes. As a first corollary, it is possible to say that a sophisticated method is not a substitute for a careful observer with simple hand tools. The sophisticated tools may serve to augment the information collected by more simple methods, but their use is determined by competent studies of a field hydrologist.

The word "karst" denotes any terrane underlain by carbonate rocks in which circulating water has dissolved the rock, creating such physical features as enclosed depressions, sinkholes, swallow holes, long dry valleys, scarcity of surface streams, and subterranean drainage through solution openings. Karst terranes were first studied in detail in Europe; however, other karst areas of the world have been studied in great detail in the more recent past.

Early in the 1960's a need was realized for clarifying the numerous terms used in discussing the hydrology and geomorphology of carbonate terranes. In 1965, "Vocabulaire Francais des Phenomenes Karstiques" appeared and presented French equivalents of karst terms. Monroe compiled "A Glossary of Karst Terminology" in 1970, and in 1972, a multilingual glossary was published by UNESCO. Unfortunately, Gams' "Slovenska Kraska Terminologija" (1973) has not been translated from the original Slovenian to English. Less comprehensive glossaries have appeared at the conclusion of several books on karst (Sweeting, 1973), Burger and Dubertret (1975), and others.

Stringfield (1966) completed the first extensive synthesis of the karst artesian system in the southeastern United States - the Floridan aquifer. His report brought together valuable information from many detailed local studies and described that hydrologic system, which is one of the most prolific karst aquifers in the world. Stringfield and LeGrand prepared a review on carbonate-rock hydrology, with special reference to the United States (1969a), and brought together many concepts on which individual workers generally agree. They studied the fresh-water and salt-water relationships in four coastal karst areas, and showed that uneven distribution of permeability in coastal karsts causes modification of the normal balance between fresh and salt water that has been conventionally described in coastal sand aquifers (1969a, 1971). A comparison of the arid karsts of western Egypt, the Nullarbor Plain of Australia, the Kaibab Plateau of Arizona, and the Yucatan

Peninsula of Mexico with humid karst regions was made by Stringfield, LeGrand, and LaMoreaux (1974) in order to understand dynamic hydrologic processes in karst regions. To further describe some principles, they published a report (1977) on the development of karst and its effects on permeability and circulation of water in carbonate rocks, with special reference to the southeastern states of the United States.

Regional maps of karst hydrogeologic features are proving to be very useful in Yugoslavia (Mijatovic, 1971), France (Paloc, 1972; Kiraly, 1973), and Italy (Boni and Paratoo, 1969), and in the USSR (Rodionov, 1969; Vladimirov, 1970). Ground-water levels in karst regions vary greatly in local areas and are difficult to measure; therefore, with the exception of the water-level map of the Tertiary limestone system of the southern United States (Stringfield, 1966), and the ground-water basin map of the Mammoth Cave Region, Kentucky (Quinlan and Ray, 1981) almost all regional karst studies show water movement by arrows on maps rather than by water-level contours. Both the regional and local approaches to karst water must be considered, as has been done in the Transvaal, Republic of South Africa (Enslin, 1967), in the coastal areas of Yugoslavia (Komatina, 1965), and in France (Avias, 1968).

A complex of geophysical methods intended for investigation of karst terranes, especially for covered or buried karst, is being widely applied in the USSR (Ogilvy, 1957 and 1948; Golovtsyn and others, 1966). These investigations are intended to clarify geological-structural peculiarities of karstic massifs; to evaluate the degree and the trend of jointing; to locate and determine the extent of karst cavities; to discover concealed discharge areas; and to study the directions and rates of flow of karst waters with depth, changes in temperature, and chemical composition of karst waters. The main methods used for these investigations are seismic and gravimetric surveys, radiowave probing, high-frequency prospecting, gamma-ray neutron logging, resistivity studies, micro-magnetic survey, helium survey, charged-body method, and the refracted waves method. Geophysical studies are combined with hydrogeological investigations.

At the University of Montpellier, Jacques Avias has performed research using surface gravity, resistivity, and seismic methods to delineate solution systems in limestone, and the use of a down-hole television camera to delineate size and shape of solution-cavity development. Multispectral photography is being used to study discharge from submarine springs. This technique has also been used by the FAO and U.S. Geological Survey for the same purpose in Jamaica (Kohout and others, 1981), Sicily, and Hawaii. Considerable additional use of remote sensing has been made in more refined studies of water in limestone and dolomite. For example, the Marine Oceanographic Research Institute in Split, Yugoslavia, has used a sonic-depth finder to map sinkholes in the limestone on the sea floor that discharge water into the open sea. Current meters used by scuba divers off the coast of Florida are being used for discharge measurement of subterranean spring flow. Concentrated submarine discharge of karstic water was studied by means of various geophysical methods by Dakknov (1951), Brashnina (1963), Buachidze and Melivova (1967), and L'vova and Popov (1971). Moore and

Stewart (1983) have used geophysical methods to delineate fracture traces whose general locations were mapped using aerial photographs.

During the past 15 years a great deal of work in karst hydrology has been done with geochemical methods. Of particular interest is the work of Back and Hanshaw (1970) in the Yucatan and Florida, where they found contrasting ground-water geochemistries due to presence or lack of aquifer confinement. Hanshaw and Back (1979) later published a highly instructive paper on the major geochemical processes which contribute to the evolution of carbonate-aquifer systems. Much recent work in carbonate geochemistry such as White (1977), Plummer, et al. (1978), and Nadler, et al. (1980) has concentrated on the kinetics of chemical processes in carbonate aquifers. Drake (1983) has reported on the effects of geomorphology and seasonality on the chemistry of carbonate ground water. Plummer and Busenberg (1982) have reevaluated values for several of the solution constants used in carbonate hydrology.

Harmon's work in north-central Mexico (1971) on solution rates, denudation rates in North America 1972) and application of stable carbon isotope studies (1971) to karst research is also encouraging. Important isotope studies have also been done in the Edwards aquifer, Texas, U.S., by Pearson and Rettman (1976). Back and Zoetl (1976) did a general survey of the use of geochemistry, tracers, and isotopes in karst hydrology.

The use of aerial remote-sensing methods has greatly expanded since Rich (1928) first reported on jointing of limestone mesas in northern Oklahoma, U.S. Perhaps the work of Lattman and Parizek (1964) and Trainer and Ellison (1967) may be considered the most thorough treatments of early photogeologic interpretation and the occurrence of ground water. Sonderegger (1970) put earlier photogeologic techniques to use in one of a series of reports on the hydrology of limestone terranes in north Alabama, U.S. Remote sensing (infrared and thermal infrared) has also been successfully used by Coker (1969), Newton and others (1973), Newton (1976), Warren and Wielchowsky (1973), and LaMoreaux and Newton (1986) for the study of sinkhole-prone areas of the southeastern United States. Brown (1972) used thermal infrared imagery to locate karst springs in Canada. Remote sensing shows great promise in the study of environmental problems in carbonate terranes, such as reservoir-site studies (Powell and others, 1970; Sowers, 1973) and monitoring and management of ground-water recharge areas to prevent contamination (Jamier, 1976; Burger, 1979; and Beck, editor, 1984).

A broad definition of "remote sensing" includes all methods of collecting information about an object without being in physical contact with that object. However, in this section, a more restrictive definition is used; it includes only those methods that employ electromagnetic energy, including light, heat, and radiowaves, as means of detecting and measuring target characteristics (Sabins, 1978). The major types of remote sensing used in carbonate hydrology are aerial photography, satellite imagery, thermography, and radar. Sonar, down-hole television cameras, and other remote sensing techniques are also used by carbonate hydrologists.

The determination of the optimum remote sensing band or band ratios (i.e., range of detected wave lengths) and the type of remote sensing to be employed depends on the objective of the study and what features are sought to be enhanced. This optimum band or band ratio selection can be done by statistical methods (which generally require use of a computer or by manual techniques such as the coincident spectral plot methods described by Shourong (1982).

The steps in aquifer mapping using remote sensing as listed by Moore (1980) are: "image analysis, image interpretation, geologic interpretation, and ground-water interpretation. Image analysis consists of objective detection, classification, delineation, and identification of land cover and physiography. Image interpretation is the visual and subjective mapping of landforms, drainage characteristics, lineaments, and curvilinears. A geologic interpretation begins with surficial lithology and structure, and then proceeds to surficial geomorphic processes, subsurface geologic relationships, and geologic processes. A ground-water interpretation builds on the conceptual geology by inferring aquifer characteristics and water quality."

Remote sensing shows great promise in the study of a great variety of environmental problems in carbonate terranes such as a reservoir-site study (Powell and others, 1970; Sowers, 1973), management of ground-water recharge areas to prevent contamination, and location of vegetation stress and potential areas of subsidence.

Some principal land-use problems studied by remote-sensing techniques include: foundations, water-supply development, mining, agricultural activity, location and construction of dams, highway construction and maintenance, disposal of solid and liquid wastes, underground injection of radioactive waste, and land-use in ground-water discharge areas.

Information derived from the use of these techniques is particularly valuable in the study of carbonate terranes and the problems associated with subsidence and collapse. Moreover, because large areas can be examined in a very short period of time, remote-sensing technology can be viewed as a time-saving tool. Possible applications include: (1) inventory of sinkholes; (2) monitoring sinkhole development; (3) mapping sinkhole alignments; (4) investigating the relationships among sinkhole development, ground-water movement, fracture traces, and lineaments; (5) preparing and updating base maps; (6) delineating incipient collapse zones; (7) detecting areas of abnormal surface drainage; (8) mapping submarine and surface karst springs; (9) locating potential water well sites; (10) mapping regional geologic structures; (11) locating exposures of bedrock; and (12) aiding in general project planning.

Numerous field studies have indicated that the field pumping test methods used in porous formations can be used in fissured formations including karsts to determine the transmissivity and storage coefficients. The results are adequate and within the permissible margin of error in field measurements. The procedures of these tests are available in numerous publications, therefore, it is sufficient in this text to present only the general concept.

First, it should be reiterated that the established expressions are valid for a homogeneous and isotropic medium. The scale consideration is thus important. In practice, the medium affected by the test zone may be assumed to satisfy those conditions. This fact must be verified geologically.

0001 Abashidze, M. (1973) - The rate of solution according to structural symptoms and mineralogical composition of the Jurassic and Lower Cretaceous carbonate rocks of the southern slope of the Caucasus Range: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology: p. 191-197.

The results of experiments on rate of solubility of walls of fissures of various types of carbonate rocks. Mathematical formulas used to determine rates of solution are presented.

0002 Abbott, Patrick L. (1975) - On the hydrology of the Edwards Limestone, south-central Texas: Amsterdam, the Netherlands; Journal of Hydrology, 24:3/4, p. 251-269.

The Edwards Limestone (Albian) is a mosaic of shallow water, back-reef, carbonate lithofacies averaging about 150 m thick, that have been dolomitized, chertified, and calcitized. The Edwards Limestone aquifer has only a few widely separated natural discharge sites which, when viewed in scale, make the confined aquifer appear like a regional master conduit. This cavernous system is known as the Edwards underground reservoir and it supplies the water for most of south-central Texas.

0003 Acevedo Gonzales, M. (1979) - Tipologia hidrogeologica y geomorfologica de las cavidades carsicas hipogeas (Hydrogeological and geomorphological typology of hypogene karstic cavities): Cuba; Voluntad Hidraulica 16:51, p. 16-22 [in Spanish].

0004 Acevedo Gonzales, M. (1974) - El sistema cavernario Majagua-Cantera, Pinar del Rio, Cuba (The cavern system of Majagua-Cantera, Pinar del Rio, Cuba): Venezuela; Soc. Venez. Espeleol., Bol. 5:10, p. 125-142 [in Spanish, summary in English].

0005 Acosta-Gonzales, G.; and Reddell, D.L. (1980) - Optimal use of groundwater and surface water to reduce land subsidence: U.S.; Texas Water Resources Institute, Technical Report 103, 228 p.

0006 Adams, L. (1984) - Buford Cave, Green County, Tennessee: U.S.; Der Fledermaus, 12:7, p. 2-3.

0007 Adams, L. (1984) - Observations on the hydrology and topographic relations of Morrell Cave, Sullivan County, Tennessee: U.S.; Bat Times, 4:2, p. 3-6.

0008 Adams, L. (1982) - Caves of the Rome Formation in Northeast Tennessee: U.S.; Bat Times, 2:1, p. 7-11.

0009 Adams, S.C.; and Levandowski, D.W. (1982) - Topographic and lineament analysis of the Rome bauxite district, Georgia: U.S.; Geological Society of America, Abstracts with Programs, 14:5, p. 253.

0010 Adolphson, D.G.; and LeRoux, E.F. (1974) - Water-supply sites for Wind Cave National Park, Custer County, South Dakota: U.S.; U.S. Geological Survey Open File Report, 28 p.

0011 Agenbroad, L.D.; and Laury, R.L. (1984) - Geology, paleontology, paleohydrology and sedimentology of a Quaternary mammoth site, Hot Springs, South Dakota; 1974-1979 excavations in Oehse, P.H., Lea, J.S., Pomars, N.L., (editors) - On research and exploration projects supported by the National Geographic Society, for which an initial grant or continuing support was provided in the year 1975: U.S.; Research Reports - National Geographic Society, 16, p. 1-32.

0012 Ahmad, Moid U. (1977) - Hydrological problems of Jufra well field, Libya in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 313-322.

An account of the Jufra area of Upper Cretaceous limestone where the aquifer has been intensely fractured by a graben fault zone which limits the aquifer. Overpumping could cause too great a drawdown below the safe yield.

0013 Alabama Highway Department. (1978) - Sinkhole investigation and correction in the I-65 and U.S. 31 interchange near I-65 milepost 231.5: U.S.; Alabama Highway Department Bureau of Materials and Tests Report, Project I-65-2(99), 11 p., 7 test boring records.

0014 Albers, C. (1977) - Cave resources of the Bob Marshall Wilderness: U.S.; Alpine Karst Newsletter, p. 42.

0015 Albrizzio, Carlos. (1974) - Geological photointerpretation of the Paraguana Peninsula using ERTS - A multispectral photography in Third Earth Resources Technology Satellite-1 Symposium; Vol. I; Technical Presentations, Section A; Mineral Resources, Geological Structure and Landform Surveys: U.S.; NASA Special Publication No. 351, p. 883-896.

0016 Alderman, A.R. (1965) - Dolomitic sediments and their environment in the southeast of South Australia: U.S.; American Journal of Science, Vol. 255, p. 561-567.

0017 Aldwell, C.R. (1985) - Groundwater and its use in Ireland: Read at Meeting, June 1985 for Geological Survey; published by Irish Nat. Comm. IHP, p. 5-12.

Zones of high permeability in carbonate aquifers are very localized, while accurate characteristic data are lacking for many areas of Ireland. The figures for overall annual recharge of ground water are given.

0018 Aldwell, C.R. (1984) - Geothermal resources of Ireland: Port Laoise Seminar, Irish Group, IAH, 3/4 April 1984.

All the warm springs of Ireland originate from Carboniferous limestone. An understanding of its lithology, structure, and karstification is essential to efficient geothermal development.

0019 Aldwell, C.R. (1983) - Review of geothermal investigations and potential development in Ireland: Munich; CEC European Geothermal Update, p. 346-349.

Thermal gradients were mainly from logging of boreholes in the Carboniferous limestones of the Midlands. Likewise, all the warm springs issue from Carboniferous limestones-dolomites, subjected to varying degrees of karstification enabling deeper than usual circulation of ground water.

0020 Aldwell, C.R. (1982) - Groundwater development in limestone aquifers: Port Laoise Seminar, Irish Group, IAH, 30/31 March.

Variable karstification of Irish carbonate solid rock aquifers result in ground-water flows at very different densities. The limestone aquifers of eight regions are summarized: Northwest, North, West, Northeast, Midlands and East, Southeast, Midwest, and South.

0021 Aldwell, C.R.; and Burdon, D.J. (1986, in press) - Temperature of infiltration and of groundwater: Second Sci. Ass. I.A.H.S., Budapest, 2-10 July 1986.

Measurement of ground-water temperatures can provide positive information on depths of circulation, time of travel, origin of infiltration to karst aquifers, the efficiency of pumps and water wells, and other characteristics. Temperature measurements are direct, simple, cheap, and interpreted on-the-spot.

0022 Aldwell, C.R.; and Burdon, D.J. (1985) - Energy extraction from Irish groundwaters: Bordeaux; JIGA 85 Meeting, 12/14 March 1985.

There are reasonable possibilities that Ireland will follow the French lead in extracting energy from its cold ground waters. Most Irish ground waters are held at shallow depths in karstified limestones and in gravel deposits composed mainly of carbonate minerals.

0023 Aldwell, C.R.; and Burdon, D.J. (1985) - Energy potential of Irish groundwaters: QJEG, Vol. 18.

Annual infiltration is some 12.5 km^3 and capital reserves of ground water within 100 meters of surface is some 110 km^3. These are contained mainly in karstified limestones and sand-gravel composed of carbonate minerals. Heat extraction from the warm tepid and cool ground waters of Ireland is feasible and under development consideration.

0024 Aldwell, C.R.; and Burdon, D.J. (1982) - Groundwater investigations in Ireland: Read at Meeting, May 1979; Published by the Irish Nat. Comm. IHP, p. 9-70.

Six limestone areas under ground-water investigations are described. The uncertainty regarding time, extent, depth, and control of karstification is outlined. The effect of the 1974-76 drought on limestone aquifers is analyzed.

0025 Aldwell, C.R.; and Burdon, D.J. (1980) - Hydrogeothermal conditions in Ireland: XXVI Inter. Geol. Congress, Paris; Fossil Fuels, Sec. 12.2; 14.0068.21.

Compilation of existing hydrogeothermal data in Ireland is presented; it is small. All the 17 then-known warm and tepid springs issue from karstified Dinantian Limestone, mainly from the Visean. Mallow warm spring is in a region of a strong deformation of Hercynian age.

0026 Aldwell, C.R.; Burdon, D.J.; and Daly, E.P. (1975) - Groundwater - Ireland's hidden resource: Mining Ireland, No. 3.

Sets out the value of the ground-water resources, held mainly in the solid rock limestones-dolomites and in sands and gravels composed mainly of carbonate debris.

0027 Aldwell, C.R.; Burdon, D.J.; and Naughton, M.M. (1986, in press) - Aspects of groundwater and land use in rural Ireland: XIX Congress IAH, Karlovy Vary, Czechoslovakia, 8-15 September 1986.

Only in specific and localized areas are there conflicts of interest between quantity, quality, and management of ground water and agricultural activities. Point discharges of silage effluent, slurry, and some rural industries present the most danger, in particular in areas of uncovered karst limestones.

0028 Aldwell, C.R.; Burdon, D.J.; and Peel, S. (1985) - Heat extraction from Irish groundwaters: Cambridge; XVIII IAH Congress, Part 4, p. 1x, 79-94.

Shallow ground waters in rock and unconsolidated aquifers offer good potential from heat extraction from normal cold ground water. Limestone aquifers cover 31,000 km^2, of the total area of Ireland, 68,900 km^2, and such karstified limestones could supply abundant cold ground water for heat extraction.

0029 Aldwell, C.R.; Burdon, D.J.; and Sherwood, M. (1982) - Impact of agriculture on groundwater in Ireland: Prague Congress IAH, Vol. XVI, p. 99-114, and Environmental Geology, Vol. 5, p. 39-48.

Only 5.3 percent of developable ground water is yet in use; infiltration during summer months, when agriculture peaks, is slight. The karst aquifers have high infiltration and quick put-through. Under these circumstances, agriculture does not pollute ground water, save at some concentrated sites of slurry and silage production.

0030 Aldwell, C.R.; Daly, E.P.; Ede, D.P.; Wright, G.R.; and Burdon, D.J. (1977) - Overcoming obstacles to groundwater development in the Republic of Ireland: Birmingham Congress IAH, Vol. XIII, p. G.1-G.17.

Limestone and limestone gravels are the main aquifers, yielding hard water, sometimes with iron and manganese. There is an urgent

need to study and evaluate the ground-water resources and to popularize their use.

0031 Aldwell, C.R.; Daly, J.B.; and Struckmier, W. (1978) - Explanatory notes for the international hydrogeological map of Europe - sheet B.4: Paris; UNESCO.

Notes on the karstification of the Carboniferous limestone and dolomite aquifers.

0032 Aldwell, C.R.; and O'Kane. (1971) - Groundwater use in Ireland today: A Foras Forbartha Report.

Sets out the general position -- abundant ground water whose quality, quantity, and locations are mainly unknown. Engineers prefer springs, rivers, and lakes for all forms of water supply.

0033 Aldwell, C.R.; and Wright, G.R. (1978) - Groundwater in coastal areas of Ireland (Republic): UN Econ. Comm. for Europe, Malta Seminar, 5-10 June 1978.

With a long indented coastline there are marine influences along much of the coast, especially in the west. Five areas where coastal ground water has been developed are listed: Dungarvan, South County Wexford, Kinvara, Inishmann, and Aranmore Island.

0034 Alexander, C. (1984) - Mystery Cave mapping: U.S.; Minnesota Speleology Monthly, 16:12, p. 191.

0035 Alexander, C. (1983) - Echo Chamber: U.S.; Minnesota Speleology Monthly, 15:2, p. 27-29.

0036 Alexander, C. (1983) - Hog Hollow Cave, Winona County: U.S.; Minnesota Speleology Monthly, 15:7, p. 81-82.

0037 Alexander, C. (1981) - Surficial Geology Cave, Fillmore County: U.S.; Minnesota Speleology Monthly, 13:2, p. 16-19.

0038 Alexander, C. (1980) - Geology of the St. Croix caves: U.S.; Minnesota Speleology Monthly, 12:6, p. 64-67.

0039 Alexander, E.C., Jr. (1982) - Minnesota Caves: U.S.; Rocks and Minerals, 57:3: Minnesota issue, p. 118-122.

0040 Alexander, E.C., Jr.; and Book, P.R. (1984) - Altura Minnesota lagoon collapses in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S.A., October 1984: Netherlands, A.A. Balkema, p. 311-318.

In April 1976 several karst sinkholes opened in the holding lagoon at the waste treatment facility in Altura, Minnesota. Minor sinkhole formation had occurred during the construction of the facility in 1974. Subsequent field mapping revealed 23 new sinkholes. The distribution of the sinkholes as well as post-failure

investigations of the lagoon indicated that catastrophic collapse was related to the presence of a thin sandstone overlying a thick carbonate unit.

0041 Alexander, E.C., Jr.; Shaw, G.H.; and Venkatakrishnan, R. (1979) - The southeast Minnesota karst project in National Speleological Society Convention, U.S., 1979, Selected Abstracts: U.S.; NSS Bulletin, 42:2, p. 35.

0042 Alexander, W.H., Jr. (1961) - Geology and ground-water resources of the northern High Plains of Texas, progress report no. 1: U.S.; Texas Board of Water Engineers Bulletin 6109, 47 p.

Gives information about the geologic formations and their water-bearing properties; gives the occurrence, use, availability, and quality of ground water, together with fluctuations of water levels. Also gives chemical analyses of water from selected wells.

0043 Alexander, W.H., Jr.; Broadhurst, W.L.; and White, W.N. (1943) - Progress report on groundwater in the High Plains in Texas: U.S.; Texas Board of Water Engineers Miscellaneous Publication M120, 35 p.

Brings up to 1943 the information about the fluctuations of water levels and gives estimates of the change in the amount of water in storage.

0044 Alexander, W.H., Jr.; and Lang, J.W. (1945) - Groundwater in High Plains of Texas, progress report no. 5: U.S.; Texas Board of Water Engineers Miscellaneous Publication M122, 41 p.

Brings up to 1945 information about the irrigation development and fluctuations of water levels.

0045 Alexander, W.H., Jr.; Myers, B.N.; and Dale, D.C. (1964) - Reconnaissance investigation of the ground-water resources of the Guadalupe, San Antonio, and Nueces River Basins, Texas: U.S.; Texas Water Commission Bulletin 6409, 118 p.

The authors describe the geologic units and their water-bearing properties. Gives a physical description of the Edwards Formation and associated limestones which form the primary aquifer system of the Edwards Plateau; also describes the recharge, movement, discharge, chemical quality, changes in water levels, availability, potential for development, and existing problems of this ground-water reservoir. Describes secondary aquifers of the area. Contains information on the primary and secondary aquifers of the west gulf coastal plain. Summarizes ground-water withdrawals in the Guadalupe, San Antonio, and Nueces River Basins. Contains geologic maps and sections of the river basins.

0046 Aley, T. (1978) - A predictive hydrologic model for evaluating the effects of land use and management on the quantity and quality of water from Ozark springs: U.S.; Missouri Speleology, 18, p. 1-185.

0047 Aley, T. (1977) - A model for relating land use and groundwater quality in southern Missouri in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 323-332.

A model was designed to form a better conceptual idea of how the karst ground-water system functioned. This allows areas of particular hazard to ground-water quality to be noted.

0048 Aley, T. (1972) - Ground water contamination from sinkhole dumps: U.S.; Caves and Karst, 14:3, p. 17-23.

Ground-water contamination from sinkhole dumps is a common problem in the soluble rocks of Missouri. Three cases of contamination are described. Restoration of sinkholes is difficult, but at West Plains sinkhole dump it was attempted and is discussed. The summary enumerates steps important in the restoration of sinkhole dumps.

0049 Aley, T.J. (1981) - Hydrogeologic mapping of water contamination hazard areas to guide land use decisions in soluble rock landscapes: U.S.; Geological Society of America, Abstracts with Programs, 13:7, p. 394-395.

0050 Aley, T.J.; Williams, J.H.; and Massello, J.W. (1972) - Groundwater contamination and sinkhole collapse induced by leaky impoundments in soluble rock terrain: U.S.; Missouri Geological Survey and Water Resources Engineering, Geological Series No. 5, 32 p.

One effect of leaky impoundments can be to induce catastrophic sinkhole collapse which may endanger life and property. Land collapses in Missouri are significant hazards and pose a serious environmental threat. Technical literature on sinkhole collapse and ground-water contamination is reviewed.

0051 Ali-Mehmed, E.; and others. (1978) - Contributions to the knowledge of structures with thermal waters in the eastern part of the Pannonian Depression (Romania) in Hydrogeology of great sedimentary basins: Hungary; Conference of Budapest, 1976, p. 431-447.

The complex research methodology applied to the study of the Pannonian Depression facilitated the elucidation of hydrogeological and hydrochemical factors which condition the accumulation of thermal waters in reservoirs of economical interest. The delimitation of prospecting zones for thermal waters along the eastern border of the Pannonian Depression has been made.

0052 Allen, Alice, S. (1969) - Geologic settings of subsidence in Reviews in Engineering Geology: U.S.; Geological Society of America, Vol. 2, p. 305-342.

The author reviews the role of geologic processes that contribute to subsidence, both under natural conditions and under conditions modified by man's activities.

0053 Allen, S. (1984) - Clastic sediments of Crystal Cave, Flint-Mammoth cave system, Kentucky in Friends of the Karst Meeting, Puerto Rico, 1984, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

0054 Allison, G.B.; Stone, W.J.; and Hughes, M.W. (1985) - Recharge in karst and dune elements of a semi-arid landscape as indicated by natural isotopes and chloride: Amsterdam, the Netherlands; Journal of Hydrology, 76:1/2, p. 1-25.

The rates and mechanisms of recharge were investigated in an area where ground-water salinities are variable. The two major landscape settings studied were calcrete flats with sinkholes and sand dunes overlying the calcrete. Five minor settings were investigated and identified. Data from a limited series of boreholes were interpreted.

0055 Allison, T.L. (1984) - Modeling sinkhole susceptibility in Dougherty County, Georgia from sinkhole and fracture distribution data: U.S.; NSS Bulletin, 46:1, p. 23.

0056 Allred, K.; and Crawford, R. (1980) - Physical characteristics of Windy Creek Cave: U.S.; The Cascade Caver, 19:3, p. 9-13.

0057 Almy, Charles C., Jr. (1968) - Parquera Limestone, Upper Cretaceous Mayaquez Group, Southwestern Puerto Rico: Trinidad; Transactions of the 4th Caribbean Conference, 1965, p. 229-253.

A study of the Parquera Limestone indicated local, easterly direction from the source of the noncarbonate clastic component of the limestones; a regional, northerly component for sediment supply; and a westerly direction for current movement. Structural deformation was caused by primarily vertical movement of large basement rocks, elongate east-west.

0058 Anderson, W.; and Hughes, G.H. (1975) - Hydrology of the three sinkhole basins in southwestern Seminole County, Florida: U.S.; Florida Bureau of Geology, Tallahassee, Report of Investigations No. 81, 35 p.

The southwestern part of Seminole County in east-central Florida is characterized by sinkholes formed by the subsidence of surficial deposits into solution cavities in the underlying limestone deposits. The area includes three sinkhole basins: Cranes Roost, Palm Springs, and Grace Lake. The recent spread of urban development has tended to encroach on the flood plains of lakes in these sinkhole basins and cause concern over flood hazards. An investigation was made to document the highest known lake levels, to examine possible effects of urbanization, and to appraise the possibilities of controlling lake levels to reduce or limit the flood hazard.

0059 Andrews, A.S.; Wegrzyn, M.; and Perez, J.A. (1984) - Rainstorm related terrain failures in Puerto Rico in Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3, p.

0060 Andrews, J. (1875) - On Burren waterworks, with remarks on the geological form of the district, shewing the cause of the scarcity of water: Trans. Inst. Civil Eng. of Ireland, Vol. II, p. 13-25.

An early description of the rapid infiltration of precipitation on the surfaces of the Burren, and so no surface waters. Notes the Carboniferous geology of the Burren.

0061 Andrieux, C. (1979) - Problèmes soulevés par l'action des circulations d'eau et d'air sur le climat des cavités souterraines dans les massifs karstiques. Colloque international du C.N.R.S. n° 271, in "La fin des temps glaciaires en Europe", 1, pages 127 a 140.

Le bilan des recherches engagées en climatologie souterraine au cours des quinze dernières années a conduit à reposer les problèmes relatifs aux mécanismes de l'évolution du climat souterrain sur des bases nouvelles. En effet, pendant plus d'un siècle, l'air a été considéré comme l'élément déterminant de cette évolution. Les résultats obtenus prennent désormais en compte le rôle joué par l'eau d'infiltration sur la déformation du champ thermique d'un massif karstique et sur le climat des cavités qu'il contient.

0062 Andrieux, C. (1976) - Le système karstique du Baget: géothermie des eaux à l'exutoire principal selon les cycles hydrologiques 1974 et 1975. Actes du 2ème colloque d'hydrogéologie en pays calcaire, in Ann. Sc. Univ. Besançon, 3ème série, fasc. 25, pages 1 à 26.

Les mesures de température effectuées en continu à l'exutoire principal d'un aquifère karstique mettent en évidence les mécanismes de transfert et de transit par "effet chasse". Ceci montre que la température de l'eau est un excellent indicateur des modalités de l'infiltration: elle contribue à une meilleure connaissance de l'histoire des écoulements hydriques dans un massif calcaire.

0063 Apgar, M.A.; and Langmuir, D. (1971) - Ground-water pollution potential of a landfill above the water table: Ground Water, 9:6, p. 76-94.

A study of the character and movement of landfill leachate through unsaturated soil at the State College (Pennsylvania) Regional Sanitary Landfill shows that ground-water pollution can result from improper design of a landfill emplaced above the water table.

0064 Arandjelovic, D. (1977) - Determination of groundwater flow in karst using "geobomb" (abstract) in Tolson, J.S., and Doyle, F.L., editors, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Hunstville Press, p. 399-400.

Experiments are being performed with geobombs to see if they can determine the position of the groundwater flow.

0065 Arandjelovic, D.; Milanovic, P.; Filip, A.; and Ramljak, P. (1976) - Determination of space position of underground karst channels in Yevjevich, V., editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 627-644.

This paper elaborates on the idea that underground karst waterways can be determined by using a suitably timed bomb, inserted through a sinkhole into the underground water courses, where it floats suspended and explodes after a given time. By repeating this procedure with various time intervals between explosions, a sequence of points results, enabling the determination of the positions of a karst underground water course.

0066 Arnow, Ted. (1959) - Ground-water geology of Bexar County, Texas: U.S.; Texas Water Development Board File Report 5911.

This report provides information about the geology and water-bearing properties of the formations and, for the Edwards and associated limestones, the recharge, discharge, movement of water, fluctuations of water levels, and quality of water.

0067 Arnow, Ted. (1957) - Records of wells in Travis County, Texas: U.S.; Texas Board of Water Engineers Bulletin 5708.

This article provides records of wells, logs, and chemical analyses of ground water. The lower Cretaceous Edwards Formation and associated limestones crop out along the Balcones fault zone in this area.

0068 Arzi, Avner A. (1977) - Remote sensing of subsurface karst by micro-gravimetry (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama Press, p. 271-272.

Micro-gravimetric methods were used in Ohio to see if solution cavities could be detected to a depth of 10 meters and with a thickness of less than 1 meter. This is an intermediate method in solution detection. Drilling is still necessary to affirm the findings.

0069 Ash, D.W. (1980) - Karst development in the Mitchell Plain and adjacent Crawford Upland in response to lithologic, structural, and hydrologic constraints in Geological Society of America, 14th annual meeting, North-Central Section, Bloomington, Indiana, U.S., 1980: U.S.; Geological Society of America - Abstracts with Programs, 12:5, p. 218.

Karst features in the Mitchell Plain and Crawford Upland are controlled by lithology, structure, and hydrology. Draining of the St. Louis limestone aquifer by springs where confining shale layers are breached results in reduction of artesian pressure and the formation of sinkholes. Initial cavern development probably occurs in the lower gypsiferous portion of the St. Louis limestone.

0070 Ash, D.W.; and Ehrenzeller, J. (1983) - Geochemical and hydrological analysis of Harrison Springs, Harrison County, Indiana: in Dougherty, P.H., editor, Environmental Karst; Karst Symposium, Lousiville, KY, U.S., April 1980: U.S.; Geospeleo Publications, p. 137-164.

0071 Ashton, K. (1973) - The classification and typology of stratified structures: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 199-209.

A non-mathematical exposition to clarify the notions of classification and typology is presented using examples from the fields of geomorphology and speleology.

0072 Ashton, K. (1971) - The present position of the theory and techniques of pulse wave hydrology: Germany, F.R., Stuttgart; 5 Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY8/1-HY8/3.

The author's work on the problems of pulse-wave hydrology and its speleological applications is summarized and a bibliography given on this topic.

0073 Ashton, K. (1968) - Classification and typological theory of karstic structures: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 13-18.

The minimal criteria the author believes necessary for a classification of karst features are defined.

0074 Astruc, J.G.; et Soule J.C. (1977) - Hydrogéologie du Quercy. Co-édition BRGM-Quercy Recherche, Série "Etudes et travaux", Vol. 3, 110 pages, 8 fig., 4 tabl., 12 planches photo, 2 cartes hors texte (échelle: 1/100,000) en couleur.

Synthèse cartographique de l'ensemble des données (géologiques, hydrologiques, spéléologiques) sur l'unité géomorphologique que constitue la région des Causses mineurs (3500 km^2), et permettant de mettre en évidence les principales caractéristiques de son hydrogéologie.

0075 Atkinson, T.C. (1977) - Diffuse flow and conduit flow in limestone terrain in the Mendip Hills, Somerset (Great Britain): Amsterdam, the Netherlands; Journal of Hydrology, 35:1/2, p. 93-110.

The author describes how conduits are much more effective in transmitting water than diffuse fissure flow but the latter contains the greater amount of storage. Water tracing established recharge areas for 15 major springs. Ground-water flow occurs in two modes: turbulent conduit flow and diffuse Darcian flow in fine fractures.

0076 Atkinson, T.C.; and Smart, P.L. (1977) - Caves and karst of southern England and southern Wales, guidebook for the International Congress of Speleology at Sheffield, 1977: U.K.; British Cave Research Association.

A description of the caves and karst occurring in southern England and South Wales.

0077 Aub, Conrad R. (1969) - Some observations on the karst morphology of Jamaica: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M16/1-M16/7.

Interpretation of tropical karst features and processes is much dependent on the use of air photographs which the author feels gives a seriously distorted picture. A 7 km^2 area was studied by the author who placed a major significance on the role of structural guidance of erosion. He believes that a lot of future quantitative work is needed.

0078 Aub, Conrad R. (1969) - The nature of cockpits and other depressions in the karst of Jamaica: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M15/1-M15/7.

This article discusses how detailed examination of 7 km^2 of cockpit karst in Jamaica was made. It was concluded that at least 60 percent of the depressions were not cavern collapse features and may be self-perpetuating features.

0079 Aubert, Daniel. (1966) - Structure, activité et évolution d'une doline: France; Bull. de la Société Neuchateloise des Sciences Naturelles, Tome 89.

Although dolines are one of the most characteristic features of a karst landscape, their evolution had not been understood. The author studies the structure, development, and evolution of dolines.

0080 Aubrecht, Kurt. (1969) - Excentriques - Probleme, Formen and Wachstum: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S40/1-S40/5.

0081 Autin, W.J. (1982) - Engineering geology of the Jefferson Island Event; November 20, 1980: U.S.; Louisiana Geological Survey, 30 p.

Field trip guidebook for the 1972 annual meeting of the Geological Society of America in New Orleans, LA, Guidebook Series No. 1.

0082 Avias, Jacques, and Dubertret, Louis (1975) - Phénomènes karstique dans les roches non carbonatées in Burger, A., and Dubertret, L., editors, Hydrogeology of Karstic Terrains: Paris; IAH, p.31-40.

Karstic and pseudokarstic phenomena can be observed in non-carbonate rocks, mainly: 1) in detritic or alternation rocks whose cement can easily be dissolved or washed away, i.e., conglomerates, littoral sandstones, lateritic iron capping of ultrabasic rocks; 2) in hypersoluble rocks, i.e., gypsum, salt; 3) in hyposoluble rocks, i.e., marls, crystalline, and metamorphic rocks; 4) in ice or frozen terranes of permafrost areas or high mountain zones, due to thawing during summer season.

0083 Ayzeu, Temucin. (1969) - L'importance de l'hydrologie karstique en Turquie: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY4/1-HY4/2.

Calcareous rocks cover approximately 150,000 km^2 of Turkey. The author discusses why an understanding of the way water moves through them is important if they are to be exploited efficiently.

0084 Babushkin, V.D.; Bocker, T.; Borevsky, B.V.; and Kovalevsky, V.S. (1975) - Regime of Subterranean Water flows in karst regions in Burger, A., and Dubertret, L., editors, Hydrogeology of Karstic Terrains: Paris, IAH, p. 69-78.

The study of the direction and speed of the flow rests on methods taking into account the anisotrophy of the environment and the double porosity due to channels and fissures. Practical data are given on the ways of determining the characteristics of aquifers, such as permeability, storage coefficient, or by the classical methods of non-permanent regime.

0085 Bachman, G.O. (1984) - Regional geology of Ochoan evaporites, northern part of Delaware Basin: U.S.; New Mexico Bureau of Mines and Mineral Resources Circular 184, 23 p.

0086 Back, W. (1982) - Karst terrane in China: U.S.; Geotimes, 27:5, p. 16-17.

Guilan, Guargi, Peoples Republic of China, environmental problems related to developing a viable economy in karst regions.

0087 Back, W.; and Hanshaw, B.B. (1984) - Karst processes in the ground-water mixing zone of coastal aquifers in Friends of the Karst Meeting, Puerto Rico, 1984, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

0088 Back, W.; and Hanshaw, B.B. (1974) - Hydrogeochemistry of the northern Yucatan Peninsula, Mexico, with a section on Mayan water practices in Field Seminar on Water and Carbonate Rocks of the Yucatan Peninsula, Mexico; published for Field Trip 2, 1974 Annual Meeting, Miami, of the Geological Society of America: U.S.; New Orleans Geological Society, p. 45-77.

The flat, low-lying northern Yucatan Peninsula is composed of extensive outcrops of Tertiary limestone. Chemical character of the ground water is controlled regionally by solution of carbonate and sulfate minerals and by mixing with a salt water. Water systems and some problems of salt-water and sewage contamination are described. Aspects of ancient Mayan water systems and the importance of water in the Mayan culture are also discussed.

0089 Back, W.; and Hanshaw, B.B. (1971) - Geochemical interpretations of ground-water flow systems: U.S.; Water Resources Bulletin 7:5, p. 1008-1016.

Proper application of irreversible thermodynamics combines the potential theory of Hubbert with principles of reversible chemical thermodynamics, such as solution of carbonate minerals, to describe and explain controlling chemical reactions and processes of ground-water systems.

0090 Back, W.; Hanshaw, B.B.; Pyle, T.E.; and Plummer, L.N. (1979) - Geochemical significance of groundwater discharge and carbonate solution to

the formation of Caleta Xel Ha, Quintana Roo, Mexico: Washington, D.C.; Water Resources Research, 15:6, p. 1521-1535.

0091 Back, W.; and LaMoreaux, P.E., editors, (1983) - V.T. Stringfield symposium - processes in karst hydrology. A selection of papers presented at the symposium in honor of Victor Timothy Stringfield: processes in karst hydrology during the annual meeting of the Geological Society of America, Atlanta, Georgia, U.S., 1980: Netherlands, Journal of Hydrology, 61:1-3, 355 p.

0092 Back, W.; and Lesser, J.M. (1981) - Chemical constraints of groundwater management in the Yucatan peninsula, Mexico: Netherlands, Amsterdam; Journal of Hydrology, 51:1-4, p. 114-130.

0093 Back, W.; and Lesser, J.M. (1977) - Chemical constraints on ground-water management in the Yucatan Peninsula, Mexico in I.A.H. Memoires: Birmingham Congress, U.K., Vol. XIII, Part 1, p. G18-G29.

A description of the problems related to a constant fresh-water supply in the Yucatan. Secondary solutions in the limestones, with a lack of a soil, could cause precipitation to pass through the system quickly with minimum storage. Chances of contamination are great since there is no filtration activity and salt-water encroachment is a constant threat. To provide an adequate supply of water, all the above factors must be considered and resolved.

0094 Back, W.; and Zoetl, J. (1976) - Application of geochemical principles, isotopic methodology, and artificial tracers to karst hydrology (abstract): Reprint from Hydrogeology of Karstic Terrains, International Union of Geological Sciences, Series B, No. 3, Chapter IX, p. 105-121, 1975: Paris, International Association of Hydrogeologists in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 9:14.

Objectives of the study are: (1) to determine the availability and quality suitability of the water for utilization of municipal and domestic supplies, industrial requirements, or irrigation; (2) to predict temporal and spatial changes that occur as a result of imposing natural or man-made stresses on the system, such as injection of recharge water or wastes, additional withdrawal, diversion of flow by construction of dams or canals, or various activities that would permit encroachment of salt water.

0095 Badescu, D. (1985) - The geology and the tectonic control of the Ciur Ponor cave system (Pădurea Craiului Mountains): Buletin Speologic Informativ, 9, fasc. 1, p. 13-26, 5 figs. [in Romanian with French abstract].

The hydrokarstic system including the caves Ciur Ponor and Ciur Izbuc is developed on a series of shear and tension cracks. The cracks belong to a system of faults. The morphology of Ciur Ponor is controlled both by the nature of the fracture the water used and by the texture of the limestone hosting the different sections of the cavity.

0096 Bagaric, I. (1976) - Simulation of tracer diffusion in underground flow by simple geometry in Yevjevich, V., editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 513-538.

Karst underground water courses are investigated by various tracers as an aid in determining the underground water connections between sinkholes and springs.

0097 Bakalowicz, M. (1984) - Le karst en géologie et en hydrogéologie. Bilan et essai de synthèse des thèses présentées en France entre 1977 et 1983. Bull. BRGM, Hydrogéologie, Géologie de l'Ingénieur, 3, p. 253-257.

Entre 1977 et 1983, plus de 40 thèses ont porté sur le karst. Le bilan est établi de manière à faire apparaitre les points forts de la recherche géologique en matière de karst (hydrogéologie, paleo-karst, approche quantitative) et les points faibles (karsts hydro-thermaux, modélisation de la karstogenèse).

0098 Bakalowicz, M. (1980) - Un précieux informateur hydrogéologique: le système chimique CO2 - H2O - carbonate. Colloque carbonates, soc. géol. de France. Soc. Minéral. de France, Bordeaux, p. 11-23.

L'importance du système calco-carbonique dans l'information hydro-géologique sur les aquifères karstiques. Quelques exemples de traitement par analyse en composantes principales et interprétation.

0099 Bakalowicz, M. (1979) - Contribution de la géochimie des eaux à la connaissance de l'aquifère karstique et de la karstification. Thèse Doct. Sci., Univ. P. et M. Curie - Laboratoire souterrain du CNRS, 260 p.

Les variables hydrogéochimiques et spécialement celles liées au système calco-carbonique, sont utilisées comme traceurs naturels pour informer sur la structure et le fonctionnement des aquifères karstiques. Différents méthodes de traitement des données hydro-chimiques ont été élaborées et adaptées en vue de comprendre le karst. Un schéma structurel et fonctionnel du karst est alors proposé. Il devient alors possible de proposer une théorie cohé-rente et générale, rendant compte de la mise en place de formes karstiques de surface et souterraines, en constituant un ensemble hiérarchisé.

0100 Bakalowicz, M. (1979) - l'anhydride carbonique dans la karstogénèse. Actes Symp. internat. sur l'erosion karstique, Aix-en-Provence, p. 41-48.

Le CO2 est en général étudié dans l'atmosphère souterraine. Ici, les variations des pressions partielles en CO2 sont étudiées dans les écoulements souterrains, soit aux sources d'un aquifère kars-tique, soit dans les eaux d'infiltration. Il est clairement montré que le transfert du CO2 s'accomplit sous forme dissoute, mais avec une phase gazeuse associée à un écoulement diphasique lent et que les écoulements rapides sont seuls capables de provoquer une karstification en profondeur.

0101 Bakalowicz, M.; et Mangin, A. (1978) - L'aquifère karstique. Sa définition, ses caractéristiques et son identification. Mém. hors série Soc. Géol. France, 11, 1980, p. 71-79.

La karstification entraîne l'apparition d'une organisation des écoulements au sein d'aquifères carbonatés fissurés. Cette structure confère à l'aquifère karstique des caractères spécifiques. Deux méthodes sont proposées pour révéler le degré de karstification d'un aquifère carbonaté; l'une est fondée sur l'analyse des récessions, l'autre s'appuie sur l'évolution des variables hydrochimiques.

0102 Baker, R.C. (1977) - Hydrology of karst features in evaporite deposits of the Upper Permian in Texas in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: Bowling Green, Kentucky; Western Kentucky University, p. 333-339.

The course of fresh water through gypsum and salt beds is discussed. Karstification due to solution of evaporites leads to development of conduits and caves. Water from this area contains a high content of salt and efforts are being made to prevent it from discharging into local rivers. Natural and artificial plugging of cave systems may stop discharge, but the effects of an increase in artesian head is not known.

0103 Baker, R.C.; Dale, O.C.; and Baum, G.H. (1965) - Ground-water conditions in Menard County, Texas: U.S.; Texas Water Commission Bulletin 6519, 92 p.

The author presents the results of an investigation of ground-water conditions to serve as a basis for the protection and conservation of fresh-water supplies, and to determine any changes in chemical quality as a result of possible pollution from increasing oil production and exploration. The Edwards and associated limestones are the surface rocks in nearly all the county.

0104 Baker, V.R. (1976) - Hydrogeology of a cavernous limestone terrane and the hydrochemical mechanisms of its formation, Mohawk River basin, New York: U.S.; Empire State Geogram, 12:2, p. 2-65.

A detailed study of the cavernous limestone terrane of the Mohawk River Basin, New York. The karstic area contains dolines, collapse sinks, ponors, and caves. Hydrologic, geomorphic, and speleological investigations are described and origins of the features are analyzed. A model for the development of the ground-water flow is suggested. This is one of the few major karst regions in the U.S. which has undergone the effects of glaciation. Glacial sediments blocked cave resurgences, partially filled cave conduits, and changed free flowing springs into artesian systems. Erosion of the cave conduits was prevented by the Massive Ravena member.

0105 Baker, V.R. (1975) - Flood hazards along the Balcones Escarpment in central Texas, alternative approaches to their recognition, mapping, and management: U.S.; Bureau of Economic Geology, University of Texas, Austin, Geological Circular 75-5, 22 p.

Flood hazards are large along the Balcones fault zone. The author explains why they need to be understood and gives alternatives for lessening these hazards.

0106 Balazs, D. (1973) - Comparative investigations of karst waters in the Pacific: International Speleology, III, subsection Ca, Karst Hydrology, p. 23-32.

A study of the rate of chemical denudation and the intensity of karstification under different climatic conditions. Statistical systematization of data was used to try to interpret the different relationships between the total hardness of water and the factors of karstification.

0107 Balazs, D. (1973) - Karst types in the Philippines: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 19-38.

Due to the great quantity of annual rainfall, karst which covers 10 percent of the total surface of the Philippines has been very intensively developed and all variations of the forms characteristic for the wet tropical karst lands are found.

0108 Balazs, D. (1971) - Tropusi es hazai karsztvizek osszehasonlite vizsgalata: Hidrologiai Kozlony, 1971, p. 376-380.

0109 Balazs, D. (1971) - Comparative morphogenetical study of karst regions in the tropical and temperate zones (abstract): U.K.; International Speleological Union, Meeting on Karst Denudation, September 1971.

The major factor controlling denudation of limestone that differs between temperate and tropical regions is the climate with a consequential increase in the rate of denudation in the tropics.

0110 Balazs, D. (1971) - Intensity of the tropical karst development based on cases of Indonesia: Budapest; Karszt, es Barlangkutatas 1971, Vol. VI, p. 33-67.

From data collected in Indonesia the author notes that the intensity of denudation is three or four times as high as that of a moderate zone. This may, he states, be taken by analogy as valid also for mechanical denudation of karstic regions.

0111 Balazs, D. (1971) - Relief types of tropical karst areas (abstract) in International Geographical Union, European Regional Conference, Symposium on karst-morphogenesis, Hungary, 1971: International Geographical Union, p. 22.

The author suggests a morphogenetical classification for the tropical plateau karst lands since the terminology previously used is ambiguous and often inaccurate.

0112 Balazs, D. (1969) - Nusa Barung - eine karstinsel in der Indonesischen Tuselwelt: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M26/1-M26/7.

0113 Balazs, D. (1969) - Untersuchung der karstqueller in der Indonesischen Inselwelt: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY1/1-HY1/5.

From a study of karst springs in the Indonesian Archipelago it was found that the hardness of the tropical karst waters is lower than found in colder climates. In tropical Indonesia the destruction of karst surface by dissolution is a quicker process, as both amount and coefficient of runoff of precipitations are substantially higher than in Hungary.

0114 Balazs, D. (1968) - Karst regions in Indonesia: Budapest; Karszt - Es Barlangkutatas, 1968, Vol. 5, p. 61.

A descriptive account of karst regions in different parts of Indonesia.

0115 Balazs, D. (1967) - Indonezia Karstbarlangjairol: Budapest; Magyar Karszt - Es Barlangkutato Tarsulat, VI, Gorky fasor 46-48, 1967, I-II, p. 7-10.

0116 Balazs, D. (1966) - Nusa Barung, Egy Tro-pusi Karsztsziget: Budapest; Mazyar Karszt - Es Barlangkutato Tarsulat, 1966, II-VI, Gorkij fasor 46-48, 6 p.

0117 Balazs, D. (1963) - Karstgenetikai Problemak: Kulonnyomat, A Foldrajzi, Ertesito XII, Eup. 4, Fuzetebol. p. 487-494.

0118 Balazs, D. (1961) - A del-kinai karstvidek termeszeti foldrajza: Hungary; Academia Scientiarum Hungarica, Institutum Geographicum, Publication No. 83, p. 327-346.

0119 Balazs, D. (1960) - A del-kinai karsztvidek vizrajza: Hidrologiai Kozlony, 1960, Vol. 6, p. 484-493.

0120 Balkova, L.V. (1984) - Influence of a karst on chemical composition of river waters and the dissolved substances flow (Vliyanie karsta na khimicheskii sostav rechnykh vod i stok rastvorennykh veshchestv): Vestnik Leningradskogo Universiteta Geologiia-Geograffiia, Vol. 24, p. 92-96 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 1985, p. 44.

The formation of the water-salt balance of river basins of the Bashkiria under the conditions of karst formation was studied. Special attention was given to the influence of the lithology of karsting rocks on chemical composition of river waters and the flow of dissolved substances. The chemical composition of river waters in karsting and non-karsting basins was compared.

0121 Barbalic, Z. (1976) - Properties of water resource systems of enclosed karst plains in Yevjevich, V., editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 815-228.

After analyzing components of 20 karst water resource systems, either constructed or planned for construction involving areas of

karst plains, a generalized schematic diagram of water resource systems was developed.

0122 Bardossy, G. (1982) - Karst bauxites, USSR?, Developments in economic geology; 14: New York; Elsevier, p. 406-424.

0123 Barnes, J.R.; Ellis, W.C.; Leggat, E.R.; Scalapino, R.A.; George, W.O.; and Irelan, Burdge. (1949) - Geology and ground water in the irrigated region of the southern High Plains in Texas, progress report no. 7; U.S.; Texas Board of Water Engineers Miscellaneous Publication M175, 56 p.

The authors provide information about the geology, precipitation, recharge, and natural discharge, development, fluctuations of water levels, interference between wells, quantity of water available, and quality of water.

0124 Barr, K.W.; and Saunders, J.B. (1968) - An outline of the geology of Trinidad in Transactions of the 4th Caribbean Geological Conference, 1965: Port of Spain, Trinidad; Transactions, p. 1-10.

An outline of the geology of Trinidad which includes reefal limestones of Tertiary age.

0125 Barraclough, J.T. (1966) - Waste injection into a deep limestone in northwestern Florida: U.S.; Ground Water, 4:1, p. 22-24.

An account of the steps taken to develop a deep well for waste disposal in limestones in Florida. The characteristics of the aquifer and the results of limited waste injections are given.

0126 Barraclough, J.T. (1962) - Groundwater resources of Seminole County, Florida: Florida Geological Survey Report of Investigations 27, p. 9.

A hydrogeologic account of an area in which naturally induced sinkholes occur.

0127 Barrows, L.; Fett, J.D. (1985) - A high-precision gravity survey in the Delaware Basin of southeastern New Mexico: U.S., Geophysics, 50:5, p. 825-833.

0128 Barta, Juraj. (1969) - Die Grundaspekte der urgeschichtlichon Höhlenbeisiedlung in der Slowakei: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. H2/1-H2/10.

0129 Bartel, H. (1981) - Roads in water-procuring regions - water pollution control and safeguarding of water supply, exemplified by the Stuttgart-Singen Autobahn: Wasserwirtschaft, 71:11, p. 313-318 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 15:10, p. 26-27.

A major international highway, Autobahn A81, is under construction in the State of Baden-Wurttemburg. The vulnerability of the ground water in the karstic formations is intensified by highway construction and anticipated petroleum pollution. In highway planning, important water-bearing formations were circumvented insofar as

possible, but collecting regions are traversed over a distance of 24 km. Measures taken to protect the water supply are described.

0130 Basmaci, Yakup. (1977) - Groundwater flow in double porosity media: carbonate rocks: U.S.; Iowa State University, 141 p.

0131 Basmaci, Yakup; and Sendlein, Lyle V.A. (1977) - Model analysis of closed systems in karst aquifers in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 202-213.

Preliminary results of computer simulation of cross sectional models that solve flow in unsaturated and saturated media. The interrelationship between granular and solution channel flow has been shown.

0132 Basset, J.L. (1975) - Hydrology and geochemistry of karst terrain, upper Lost River drainage basin, Indiana (abstract) in Selected Water Resources Abstracts: U.S.; National Technical Information Service, PB-241 714; U.S. Geological Survey, 8:15, p. 6-7.

The upper Lost River drainage basin of south-central Indiana has long been regarded as one of the classic karst areas of the U.S.. Several large sinking streams and two large karst springs are known in the basin. Stream tracing with fluorescent dye proved the existence of two major independent karst drainage systems. Two principal forms of spring flow recharge occur in the basin: (1) direct and rapid recharge from open swallow holes and (2) diffuse infiltration from the sinkhole plain.

0133 Bathurst, R.G. (1975) - Carbonate Sediments and their diagenesis (2nd ed.): Netherlands; Elsevier, 608 p.

0134 Batsche, H.; and Neumaier, F. (1975) - The use of artificial radioactive tracers for the solution of hydrological problems (abstract): Oesterreichische Wasserwirtschaft, 26:3/4, p. 80-89, March-April · 1974 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:1, p. 9.

The practical uses of the radioactive tracer technique according to the single-hole and multiple-hole methods for the solution of hydrological and hydrogeological problems are reviewed. The radioactive tracer technique according to the single-hole method was successfully used for the determination of the flow velocity and the rate of filtration of ground water. The multiple-hole method was used for the identification of karst water and ground water in an area used both for water capture and waste-water disposal.

0135 Baumgardner, R.W.; and Hoadley, A.D. (1981) - The Wink Sink; a case history of evaporite dissolution and catastrophic subsidence in Geological Society of America, 15 annual meeting, South-Central Section, San Antonio, TX, U.S., 1981: U.S.; Geological Society of America - Abstracts with Programs, 13:5, p. 233-234.

0136 Baumgardner, R.W., Jr.; Hoadley, A.D.; and Goldstein, A.G. (1982) - Formation of the Wink Sink, a salt dissolution and collapse feature, Winkler County, Texas: U.S.; Texas Bureau of Economic Geology Report of Investigations 114, 38 p.

0137 Baumgardner, R.W., Jr.; Hoadley, A.D.; and Gustavson, T.C. (1981) - Salt dissolution and the formation of the Wink Sink, Winkler County, Texas in Gustavson, T.C., and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle; a report on the progress of nuclear waste resolution feasibility studies (1980); annual report for period October 1979 - September 30, 1980: U.S., Texas Bureau of Economic Geology Circular 81-3, p. 152-155.

0138 Beaupré, Michel; and Carpentier, Robert. (1976) - Les karsts et les cavernes du Québec: bibliographie inventaire de la littérature spéléologique Québécoise, 1822-1975: Canada, Montreal; Société Québécoise de spéléologie [in French].

0139 Beck, B.F. (1985) - The sinkhole problem in Florida: U.S.; Ground Failure, 2, p. 14.

0140 Beck, B.F. (1980) - An introduction to caves and cave exploring in Georgia: U.S.; Geologic Guide, Atlanta, Georgia, 5, 43 p.

0141 Beck, B.F. (1980) - Karst indices, subsurface lithology and the drainage of Big Slough, Southwest Georgia in Geological Society of America, 29th annual meeting, Southeastern Section, Birmingham, AL, U.S., 1980: U.S.; Geological Society of America - Abstracts with Programs, 12:4, p. 170.

> Big Slough, on the Dougherty Plain, is a complex surficial karst drainage network. It appears to follow the contact of the Suwannee and Ocala Limestones. Coalescing of dolines along the contact produced a linear depression which conducts surface drainage at times of high flow.

0142 Beck, B.F. (1977) - Hydrogeology of a cave utilized for public water supply: Rio Camuy Cave, Puerto Rico, U.S. in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 249-261.

> An update on the drainage network of the Rio Camuy in Puerto Rico. Presently its full potential is not being utilized, but intensive knowledge of the water supply will be needed in the future. Detailed knowledge of the underground network is necessary since there is a complete lack of a surface-water source, also to prevent possible pollution of the aquifer.

0143 Beck, B.F. (1976) - Karst geology and hydrology of the Tertiary Ponce Limestone along the southwest coast of Puerto Rico: U.S., Boulder; Geological Society of America, Abstracts with Programs, 8:2, p. 130-131.

> The Tertiary Ponce Limestone in southwest Puerto Rico is marked by karst features distinct from the classic tropical karst of the north coast. Coastal karst forms due to solution by sea water and spray. Its most prominent feature is the distinct sea level nip.

On vertical faces, rillenkarren mark the spray area. On gently inclined surfaces a sizeable visor of limestone may overhang the nip and its upper surface is usually marked by rinnenkarren interconnecting kamenitzas (tinajitas), with intervening spitzkarren from 1 cm to 1 m tall. The karst surface inland is a limestone pavement of clints and grikes (kluftkarren). The surface is marked by small spitzkarren and kamenitzas.

0144 Beck, B.F. (1974) - Geology and hydrology of the El Convento cave-spring system, southwestern Puerto Rico: Amsterdam; International Journal of Speleology, 6:2, p. 93-107 [in English, summary in Spanish].

0145 Beck, B.F. (1974) - Karst areas of Puerto Rico, exclusive of the north coast (abstract): U.S.; NSS Convention (Decorah, Iowa), p. 7.

0146 Beck, B.F. (1973) - Size-frequency distributions of recent sediments from a cave-spring system in southern Puerto Rico and their significance with respect to hydrology and transportation: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 345-356.

Examines sediments of the El Convento cave-spring system in order to characterize them by parameters developed in sedimentology so that they can be related/compared to other types of sediments. Uses environmental interpretation from sedimentology to gain more information about sediment transport and hydrology within the cave system and caves in general.

0147 Beck, B.F., editor. (1984) - Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, FL, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, 429 p.

0148 Beck, B.F., editor. (1981) - Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S. [in English, summary in German].

0149 Beck, B.F.; and Arden, D.D. (1984) - Karst hydrogeology and geomorphology of the Dougherty Plain, Southwest Georgia: U.S.; Southeastern Geological Society Guidebook to annual field trip, December 8, 1984, published in cooperation with Florida Sinkhole Research Institute, Guidebook 26, 59 p.

0150 Beck, B.F.; Fram, M.; and Carvajal, J.R. (1976) - The Aquas Buenas Caves, Puerto Rico: geology, hydrology, and ecology with special reference to the Histoplasmosis fungus: U.S.; National Speleological Society Bulletin, 38:1, p. 1-16.

A detailed study of the Aquas Buenas Caves of Early Cretaceous limestones in Puerto Rico. Cave passages occur at two levels, an upper, dry level which is connected to a lower, river passage. Cave flora and fauna are discussed, in particular the relationship between the bat population of the caves and a fungus which promotes histoplasmosis.

0151 Beggs, T.F.; and Ruth, B.E. (1984) - Factors affecting the collapse of cavities in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 183-188.

Sinkhole occurrences along state highways in Florida have been documented by the Florida Department of Transportation since 1958. These records were used to establish trends and relationships between those variables considered to have potential influence on the frequency of sinkhole occurrence. The frequency of sinkhole occurrence was found to be related to the depth to limerock. Similarly, the depth to the phreatic surface correlated well with the collapse frequency using a probability function.

0152 Bell, A.M. (1985) - Identification and correlation of fluvial terraces in the upper Shenandoah Valley in Keller, E.C., Jr., editor, the 60th annual session of the West Virginia Academy of Science, Fairmont, WV, U.S., 1985: U.S.; Proceedings of the West Virginia Academy of Science, 57:1, p. 20-21.

0153 Belleville, L. (1985) - Géométrie, fonctionnement et karstogénèse des systèmes karstiques des gorges de l'Ardêche (Ardêche, Gard). Thèse Doct. Univ., Hydrogéologie, Grenoble.

0154 Bennett, J.R.P. (1982) - Hydrogeological conditions in Northern Ireland: Read at Meeting, May 1979; Published by the Irish Nat. Comm. IHP, p. 71-92.

The Carboniferous limestones are important solid rock aquifers. They are almost entirely fissure-flow aquifers, and factors determining control of openings need study.

0155 Bennett, J.R.P.; and Harrison, I.B. (1980) - Explanatory notes for sheet B.3 of the international hydrogeological map of Europe: Paris; UNESCO.

Notes the karstification of the limited limestone and dolomite aquifers in Northern Ireland.

0156 Benson, R.C.; and LaFountain, L.J. (1984) - Evaluation of subsidence or collapse potential due to subsurface cavities in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 201-216.

Though the methodology to provide accurate location and assessment of subsurface cavities exists, the knowledge to properly implement the appropriate methodologies is fragmented. Three key methods that may be used in subsurface investigations are: (1) direct sampling methods such as drilling and observation; (2) indirect methods such as remote sensing and geophysics; and (3) statistical methods.

0157 Benson, Richard (1977) - An overview of cavity detection methods in Symposium on detection of subsurface cavities: U.S.; Army Corps of Engineers, p. 44-79.

Selection of the appropriate techniques for a given situation must be based upon a number of considerations. A wide range of methodology is available to solve the cavity detection problem. Each has its own advantages and limitations. Resolution varies with technique. Cost many times is a major factor in such work. Some simple comparisons are provided as a guideline to such decisions.

0158 Berczi, I.; and Kokai, J. (1978) - Hydrogeological features of some deep-basins in southeast Hungary as revealed by hydrocarbon exploration in Hydrogeology of Great Sedimentary Basins, Conference of Budapest: Hungary; 1976, p. 69-93.

The highly permeable Middle Jurassic fractured, brecciated dolomite and the Miocene and Lower Pannonian conglomerate series form the basal aquifer of the Szeged Basin and are a favorable media for water flow. On the western flank of the basin are areas highly influenced by poor hydrodynamic conductivity. The author discusses the effect on hydrocarbon accumulations in the area.

0159 Berg, Paul. (1969) - Forschungesbericht aus den Hochsystem des Holloches: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. S46/1-S46/4.

0160 Bergado, D.T.; Areepitak, C.; and Prinzl, F. (1984) - Foundation problems on karstic limestone formations in Western Thailand - a case of Khao Laem Dam in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 397-402.

In Western Thailand, near the border with Burma, major difficulties were encountered during the construction of Khao Laem Dam across the Quae Noi River. The dam consists of a rockfill core with its upstream surface protected by a skin of concrete. Investigations have shown that major cavities were present.

0161 Bergeret, P. (1981) - Infiltration et circulation des eaux en milieu calcaire. Hydrogéologie du secteur nord-occidental du massif de la Chartreuse (Savoie). Thèse Doct. Géol. Appl., Grenoble, 177 p., 50 pl., 180 ann.

0162 Bergeron, G. (1981) - Analyse des conditions d'écoulement des eaux souterraines sur le site karstique du futur barrage de Conqueyrac (bassin du Vidourle, Languedoc). Thèse Doct. 3ème cycle, Sci. Eau, Montpellier, 105 p., fig., biblio.

Cette étude a permis, au niveau de l'aquifère général, de mettre en évidence l'existence de plusieurs domaines plus ou moins interdépendents selon l'état de remplissage de l'aquifère.

0163 Berkslresser, C.F., Jr. (1964) - Ground water resources of Waupaca County, Wisconsin: U.S. Geological Survey Water-Supply Paper 1669-U.

0164 Berner, R.A. (1967) - Comparative dissolution characteristics of carbonate minerals in the presence and absence of aqueous magnesium ions: U.S.; American Journal of Science, Vol. 265, p. 45-70.

0165 Bertolani, M.; Tossi, A.; and Garuti, A. (1973) - The speleologic complex "Grotta Grande del Vento-Grotta del Fuime" in the Frasassi Canyon (Ancona, Italy), a petrological and mineralogical study: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 347-366.

Petrological and mineralogical studies of the "Grotta Grande del Vento-Grotta del Fuime" help explain the karst-system genesis problem.

0166 Bertolini, P. (1980) - Etude des aquifères karstiques de la région de Saint-Pons-Minerve (Hérault). Structure des magasins. Organisation des écoulements souterrains. Thèse Doct. 3ème cycle, Hydrogéologie, Montpellier.

0167 Bertrand, J.Y. (1978) - Research on underground waters: 27. Study of an epikarstic aquifer of the Corbieres (Opoul, Pyrennees-Orientales) [in French] (abstract): Ann. Speleol. 30(3): 513-537, 1975 [English summary] in Selected Water Resources Abstraats: U.S.; U.S. Geological Survey, 11:4, p. 5.

Analysis of the data obtained during the hydrological cycle proved the existence of perennial stocks. High mineralization may be the result of evapotranspiration. The heterogeneity of the aquifer was demonstrated. More than 17,000 aquatic invertebrates were collected.

0168 Besbes, M.; and deMarsily, G. (1978) - L'analyse d'une grand reservoir aquifère en vue de sa modélisation in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 94-107.

A digital model was used to determine the ground water resources of the plain of Kairouan, Tunisia. The hydraulic parameters obtained from pumping tests on wells and boreholes were used plus other data to give a preliminary estimate of the water balance of the basin with comparative values which are useful for building the model.

0169 Besbes, M.; deMarsily, G.; and Plaud, M. (1978) - Bilan des eaux souterraines dans le bassin aquitaine in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 294-303.

A model of the entire Aquitaine basin was built to simulate the hydraulic behavior of each sedimentary formation in the basin including the Oligocene detritae carbonates. A complete water balance for the entire basin was estimated using the model, and the magnitude of flow between different aquifers was estimated.

0170 Besse, A.P.; Bruck, P.M.; Feehan, J.; and Murphy, T. (1983) - A silica deposit of possible Tertiary age in the Carboniferous limestone near Birr, County Offaly, Ireland: Geol. Mag., Vol. 120, p. 331-340.

The formation of swallow holes and similar karstic depressions in ancient limestone outcrops has enabled small remnants of Tertiary formations to be preserved from erosion by the Quaternary ice. One such deposit from Birr is described.

0171 Betson, Roger P. (1977) - The hydrology of karst urban areas in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regíons: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 162-175.

A study of the impact of urbanization in karst terrain. Storm runoff is increased where the land is made impermeable by paving. Karst openings act as filters for atmospheric chemical constituents and soil erosion can be promoted due to urbanization.

0172 Bezes, C. (1976) - Contribution à la modélisation des systèmes aquifères karstiques, Etablissement due modèle BLMER: son application à quatre systèmes karstiques du midi de la France. Thèse Doct. 3ème cycle, Hydrogéologie, Montpellier, 222 p., pl., tabl., réf.

Mise au point d'un modèle déterministe à trois niveaux (le 1er permettant de quantifier la pluie efficace, le 2ème permettant de transformer la pluie efficace en hydrogramme, le 3ème permettant d'introduire le comportement de la zone noyée en période de crue) qui rand bien compte du régime de certaines sources de la région méditerranéenne.

0173 Binder, Hans. (1971) - Die entwicklung des schauhöhlenwesens in der Bundesrepublik Deutschland: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 79-83.

0174 Birot, Pierre. (1967) - Etude de l'usure d'un versant calcaire sous un climat trópical humide: Liege-Louvain; Symposium International de Géomorphologie 1966, Vol. 40, p. 69-74.

The author collected water from three micro-environments and found three different saturation levels for each, with acidity being obtained from organic acids or from carbon dioxide in the soil. An accurate hydrological budget is needed so that the rate of limestone solution in the humid tropics may be solved by more accurate measurements.

0175 Birtles, A.B. (1977) - Siting of groundwater abstractions for river regulation: International Association of Hydrogeologists Memoirs, Vol. XIII, Part 1, Birmingham Congress, U.K., p. D32-D41.

A discussion of the optimum sites for boreholes in a groundwater augmentation project for river regulation, with special reference to the Cretaceous chalks and Triassic sandstones.

0176 Bisque, R.E. (1977) - There aren't enough caves to go around (U.S. environmental policy): U.S., Denver; Mines Magazine, 67:10, p. 19-20.

0177 Black, Larry J. (1977) - Hydro-environmental effects of sprayed sewage effluent, Tallahassee, Florida in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama Press, 1975.

An analysis of the effect of sewage effluent disposal on crops and trees with a sandy topsoil, a discontinuous clay layer, and solutionally opened limestones. Water quality and the extent of the contaminated plume were monitored. Discharge was stopped to check the natural recovery rates.

0178 Black, T.J. (1984) - Tectonics and geology in karst development of Northern Lower Michigan in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 87-92.

The Michigan Basin appears to be broken up into many different fault blocks of different but similar low attitudes and generally dipping at less than one degree toward the center. Preferential solution of evaporites and some limestone along a trend of fault extensions has produced numerous collapse sinks and valleys.

0179 Blagojevic, S. (1976) - The contribution to knowledge of effects of open water intake structures on biological production and quality of karst spring water in Yevjevich, V., editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 773-788.

Biological production in the interrelationship of spring water to the water intake structure has been increased several times for these structures.

0180 Blank, H.R.; and Schroeder, M.C. (1973) - Geologic classification of aquifers: U.S.; Ground Water, 11:2, p. 3-5.

A classification of aquifers where dissimilar items of affiliated material are arranged in order. This includes the different types of limestones.

0181 Blank, H.R.; and Tynes, Eugene, W. (1965) - Formation of caliche in siter: U.S.; Geological Society of America Bulletin, Vol. 76, p. 1387-1392.

Field observations show that caliche has formed in place by solution and reprecipitation of calcium carbonate as a result of alternate wetting and drying of the limestone.

0182 Blavoux, B.; Burger, A.; Chauve, P.; et Mudry, J. (1979) - Utilisation des isotopes du milieu à la prospection hydrogéologique de la chaîne karstique du Jura. Revue de Géologie Dynamique et de Géographie Physique, Vol. 21, Fasc. 4, p. 295-306, Paris.

Water from main fissure springs of Jura has been taken at three times in 1977: low-water in winter, flood of snow-melt, and low-water in autumn. Therefore isotopic and chemical "snapshots" of ground-water province can be set up. A good correlation has been found between the temperature of water and the altitude of the spring, which gives a temperature-gradient equivalent to 0.52°C by 100m.

0183 Blavoux, B.; Chauve, P.; Mudry, J.; et Olive P. (1982) Essai d'évaluation du temps de renouvellement des réserves karstiques du Jura à partir de l'évolution des teneurs d'étiage en tritium. Actes 3ème colloque d'hydrologie en pays calcaire, in Ann. Sc. Univ. Besançon, Mém. 1, Geologie, p 133-142.

Les teneurs d'étiage en tritium des principales sources karstiques du Jura sont suivies depuis 1977. La comparaison des teneurs de la campagne 1978 la plus complète permet de classer les sources et d'émettre des hypothèses sur l'hydrodynamique des systèmes karstiques. La situation de ces différentes familles se calque sur les grands ensembles structuraux de la chaîne du Jura. L'évolution sur plusieurs années des teneurs en tritium des sources à l'étiage comparée à celle du signal pluie permet d'approcher le temps de renouvellement des réserves à partir d'un modèle de bon mélange qui sera discuté.

0184 Blavoux, B.; et Mudry, J. (1983) - Séparation des composantes de l'écoulement d'un exutoire karstique à l'aide des méthodes physico-chimiques. Bulletin du B.R.G.M., Hydrogéologie-géologie de l'ingénieur, 4, 1983, p. 269-278.

The very dissimilar reactions of the different karst systems studied in the Jura and the Mediterranean basin are interpreted with the help of the hydrological operation model.

0185 Bleahu, M. (1982) - Karst relief: Bucharest; Editura Albatros, 296 p., 60 fig. [in Romanian].

The book stresses morphological aspects of karst and caves. In addition to the classification of caves and the speleogenetic processes, the forms of the karstic void are discussed in detail.

0186 Bleahu, M. (1974) - Karst morphology: Bucharest; Geologic and Geographic Conditions of Karstification, 560 p., 184 fig., 101 photographs, Editura Ştiinţifică [in Romanian].

The treatise stresses the karst formation processes. Classical karst is presented briefly; karstic phenomenon is defined; and a short history of karstology and specific features of the karstic phenomenon are presented. Each of the four following parts is devoted to one of the factors conditioning the karstic process: physico-chemical, lithological, mechano-tectonic, and hydrogeologic. A list of 1,000 references is included.

0187 Bleahu, M. (1973) - The underground halls: Bucharest; 5th Intern. Congr. Speol. Bd. 3, p. S47/1-S47/7, München and in Revue Roumaine de

Géologie, Géophysique, Géographie, T. 17, No. 1, p. 3-18, 2 fig. [in German].

Twenty-one genetic types of underground halls are established, being divided in the following categories: traction halls, corrosion halls, erosion halls, breakdown halls, and cryogenetic halls.

0188 Bleahu, M. (1971) - The karstic peneplanes in the Romanian Carpathians and their evolution: Krakow; Studia Geomorphologica Carpatho-Balcanice, Vol. V, p. 41-46, 1 fig. [in French].

The correspondence existing between the karstoplains and peneplains in the Carpathians is established. The cave formation and the underground networks are correlated to it. Three main speleogenetic periods are considered to have existed: in the Miocene, in the Pliocene, and in the Pleistocene.

0189 Bleahu, M. (1969) - On the evolution of some karst regions of Romania: München; 5th Intern. Congr. Speol. Bd. 1, p. M39/1-M39/3.

The evolution of the karst regions from the Romanian Carpathians is presented based on the analysis of the karstic leveling surfaces (karstoplanes). It is concluded that there are three main periods in the formation of the karst relief depending on the periods during which the mountain chain arose.

0190 Bleahu, M. (1969) - Sur l'évolution de quelques régions karstiques de la Roumaine: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M39/1-M39/3.

An account of the evolution of karst surfaces in Rumania where erosional platforms can be seen to exist.

0191 Bleahu, M. (1969) - Uber die unterirdischen sale: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. S47/1-S47/7.

0192 Bleahu, M. (1965) - The underground junctions: Weinheim; Intern. Journ. Speology, Vol. I, Part 3, p. 441-459, 16 fig. [in French].

The author classifies underground confluences into three groups: (1) confluences due to the initial intersection of the underground courses; (2) confluences due to the position of the initial ways; and (3) confluences due to hydrodynamic processes.

0193 Bleahu, M. (1957) - Karst piracy and its importance for the morphological evolution of the karst regions: Bucharest; Probleme de Geografie, Vol. V, p. 55-99, 20 figs., [in Romanian with summary in Romanian and French].

The essential role played by the piracy of surface waters in the underground environment for the karst relief in general is pointed out and some general laws are enunciated; also, some specific forms

are defined. A classification of captures in respect to their genesis is provided.

0194 Bleahu, M.; and Ash, D.W., translator (1985) - Subterranean confluences: U.S.; Cave Geology, 1:10, p. 407-419.

0195 Bleahu, M.; Decu, A.; and Decu, V. (1964) - Topolniţa Cave: Ocrotirea Naturii, 8:1, p. 73-98, 13 photographs.

This paper presents the Topolnita Cave when its galleries were 10,700 m long and it was the longest cave of Romania. Today its galleries are 20,500 m long and the cave is ranked the third longest in Romania.

0196 Bleahu, M.; Decu, A.; and Decu, V. (1963) - The Zăton-Ponoare hydrological system (Baia de Aramă): Bucharest; Revue de Géologie et Géographie, T. VII, No. 1, p. 147-156, 7 figs., 1 tab. [in German].

The authors present a study of a complex hydrographic system from the South Carpathians with two closed basins which drain underground through a common drain, the Bulba Cave. The surface and underground elements are described and the underground draining system is deduced.

0197 Bleahu, M.; Decu, V.; Negrea, St.; Plesa, C.; Povara, I.; Viehmann, I.; and co-workers Diaconu, G.; Constantinescu, T.; Goran, C.; Vălenaş, I.; and Boroneant, V. (1976) - Caves of Romania: Bucureşti; Editura Stiinţifică şi Enciclopedică, 41 p., 186 figs., 1 map, 50 photographs [in Romanian].

Part I of the book concerns the history of cave knowledge, the karst geology and geography, palaeozoology and anthropology, living subterranean fauna, the caves and their preservation. Part II gives historical data and descriptions of 141 caves.

0198 Bleahu, M.; and Lascu, C. (1975) - Topolniţa Cave: Bucuresti; Editura Sport-Turism, 75 p., 80 photographs [in Romanian with German, French, and English abstracts].

The text describes the stages of exploration of the cave and the wide range of karstic features along the 16 km of passages. A map is enclosed.

0199 Bleahu, M.; and Povara, I. (1976) - A catalogue of the caves in Romania: Bucuresti; Consiliul Naţional pentru Educatie Fizică si Sport, 53 p. [in Romanian].

Using the decimal system of classification applied to the geographic division of the country, this work makes an inventory of more than 2,000 karstic cavities known in Romania by 1975.

0200 Bleahu, M.; and Rusu, T. (1964) - Proposals for conventional signs to be used in karstic areas cartography: Exokarstic Phaenomena, Studii Tehnice si Economice, Seria F, 5, p. 157-178, 142 figs. [in Romanian].

The work includes 142 cartographic signs that represent exokarstic forms concerning elements of lithology, hydrology, speleology, tectonics, etc.

0201 Bleahu, M.; and Rusu, T. (1964) - The karst of Romania - a brief outlook: Revue Roumaine de Géologie et Géographie, Série de Géographie, 8, p. 193-202, 6 figs.

0202 Bleahu, M.; and Rusu, T. (1964) - The karst of Romania - a brief outlook: Lucrarile Institutului de Spéologie "Emil Racoviţă", 4, p. 59-73, 6 figs. [in Romanian].

These two works are synthesis studies. Data are supplied in connection with the age and the surface of karstifiable rocks, the number of caves and their distribution by large geographic units, and assessments on the types of karst, the exo- and endokarstic morphology, and the evolution of the karst in Romania.

0203 Bleahu, M.; and Serban, M. (1959) - The Padiş-Cetăţile Ponorului Endoreic Basin: Proposals for a Future National Park, Protectia Naturi 4, p. 89-125, 16 figs. [in Romanian].

The Padiş-Cetăţile Ponorului underground drainage basin and surrounding areas are being considered as a national park to be equipped with tourist facilities and a scientific research laboratory to deal with problems related to preventing deterioration of the karstic features of the area.

0204 Blozki, N.A. (1982) - A method for forecasting karst activity on the depth: Abstracts of reports at III Karst Speleology Conference, Moscow, p. 47-48.

0205 Blucker, R.E. (1970) - Geology and treatment of sinkholes in land development, St. Louis area, Missouri and Illinois: U.S.; Missouri Mineral Industry News, 10:7, p. 125-135.

A general discussion on sinkholes with special reference to the St. Louis area with methods for treating the sinkhole given to enable development to occur in the sinkhole area.

0206 Blume, Helmut. (1966) - Problems de la topografía karstica en la Indias Occidentales [Problems of karst topography in the West Indies] in Conferencia Regional Latinoamericana: Tomo III: Mexico; Sociedad Mexicana de Georgrafía y Estadistica, p. 255-266 [in Spanish].

0207 Boatwright, B.A.; and Allman, D.W. (1975) - The occurrence and development of Guest Sink, Hernando County, Florida: Ground Water, 13:4, p. 372-375.

The spectacular occurrence of a sinkhole near the Gulf Coast of Florida engulfed a well drilling rig, a water truck, and a load of PVC pipe on a trailer, all within less than 10 minutes. The sinkhole, which displaced 6,500 cubic yards, began to develop when the drill bit entered a cavity at a depth of 202 feet. Numerous

satellite sinks ranging up to 20 feet in diameter occurred simultaneously with the development of the parent sink.

0208 Bogardi, I.; Duckstein, L.; Schmeider, A.; and Szidarovszky, F. (1980) - Stochastic forecasting of mine water inrushes: Advances in Water Resources, 3:1, p. 3-8, in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 13:17.

An event-based stochastic forecasting approach was used to model water inrushes into underground works under karstic water hazard. Stochastic properties of inrushes are related to the statistical properties of fissures in the karstic rock. The stochastic model was used for design and operation of mine water control facilities in the Transdanubian karstic region of Hungary.

0209 Bögli, Alfred. (1985) - Mixture-corrosion; a contribution to the karstification problem, [translated by E. Elder]: U.S.; Cave Geology, 1:10, p. 393-406.

0210 Bögli, Alfred. (1980) - Karst hydrology and physical speleology, [translated by June C. Schmid]: Berlin and New York, Springer-Verlag.

0211 Bögli, Alfred. (1973) - Der Alpine karst in der zentralcshweiz: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 39-42.

0212 Bögli, Alfred. (1973) - Entstehung von gips in Hollack: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 376-370.

0213 Bögli, Alfred. (1969) - CO2 - Gehalte der Luft in Alpinen karst - Boden and Höhlen: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, Vol. 2, p. S28/1-S28/9.

0214 Bögli, Alfred. (1969) - Poljen alskarstihy drographische Regelfaktoren: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, Vol. 5, p. HY20/1-HY20/8.

Poljes are important factors for regulation of karstic ground water and consequently for forming subterranean karst.

0215 Bögli, Alfred. (1963) - Beitrag zur Entsblung vou karsthöhlen: Die Höhle, Zeitschrift für karst and Höhlenkunde, Sonderdruck aus Heft 3, 14 Johrgang, Wien 1963, Seite 63-68, p. 8.

A discussion of the corrosion of limestone with free carbon dioxide. Near-surface corrosion progresses quickly, but the author deliberates on the development of openings at depth. Mixing the two waters could enable the water to become aggressive and cause corrosion at depth.

0216 Bögli, Alfred. (1960) - Kalklosung und Karrenbilduerg: Zeitschrift für Geomorphologie, Supplementband 2, Internationale Beitrage zur Karstmorphologie, Gottinger, p. 4-21.

Carbonate rocks are, according to the author, dissolved by natural water in four different chemical phases. It is possible to establish a genetic system for the lapie that are formed on the carbonate rocks.

0217 Bogomolov, G.V.; Klematjev, V.P.; and Shpakov, D.N. (1977) - The karst of technogenic saline deposits in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 9-19.

An account of the effects of atmospheric precipitation on a salt waste pit. Characteristic karstic forms are described and quantitative dimensions are given. An equation for the valence of brines in salt dumps is given. The importance of salt brines as ground water contaminants is stressed.

0218 Bohinec, Valter. (1973) - Die erofrschung des Jugoslawischen karstes in ihrer bedeutung für die entwicklung der spelaologie: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 2, p. 85-117.

0219 Bono, P. (1982) - The karst of central-southern Ireland: Impressions and a working hypothesis: Written after field excursions, 21-23 May 1979; Published by Irish Comm. IHP, 180 p.

Advisability to seek for paleokarsts in Ireland. Spectacular karst development where carbonate rocks not covered by Quaternary deposits. Small differences in original carbonate sedimentation may produce very different forms of karstification.

0220 Book, P.R.; Dalgleish, J.B.; and Alexander, E.C., Jr. (1983) - Semiquantitative tracing of groundwater flow through fractured karst and jointed sandstone aquifers (abstract): U.S.; EOS, Transactions, American Geophysical Union, 64:18, p. 229.

0221 Boothe, F.B.; and Kemmerly, P.R. (1982) - Assessment of sinkhole collapse hazards for insurance purposes; a model for Tennessee in Tomlinson, G., editor, Abstracts of research presented at the annual meeting: U.S., Journal of the Tennessee Academy of Science, 57:2, p. 48.

0222 Boreli, M.; and Milivojcevic, M. (1976) - Permeability tests for hydrodynamic simulation model of a rock mass in the foundation of a dam - case study of the Grancarevo Dam in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 575-602.

Identification of characteristics of a hydrodynamic simulation model of a rock mass is based on utilization of different kinds of investigations.

0223 Borelli, E. (1951) - Coefficients d'infiltration et d'évaporation: Etude d'un cas précis dans des calcaires Greseux: UGGI, AIHS, Brussels Meeting, p. 12-15.

0224 Boni, Carlo (1975) - Recherches géologiques et géophysiques in Burger, A., and Dubertret, L., editors, Hydrogeology of karstic terrains: Paris; IAH, p. 91-104.

The possibilities of geological and geophysical investigations in karst hydrogeological research are examined. Basic geological studies are always necessary; they must include specific research on sedimentology, stratification, fissuration, and karstification, which are necessary to evaluate the degree of primary and secondary permeability in different types of rocks. It is possible to build an elementary hydrogeological model where rocks are ranged according to their relative permeability and to the structural features of the area. Geophysical investigation is considered a powerful means for the solution of geological problems, but it cannot yet supply reliable hydrogeological data.

0225 Bortolami, G.C.; Ricci, B.; Susella, G.F.; and Zuppi, G.M. (1980) - Hydrogeochemistry of the Corsaglia Valley, Maritime Alps, Piedmont, Italy: Journal of Hydrology, 44:1/2, p. 57-59, November 1979 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 13:7, p. 6.

This study presented the results of hydrogeochemical investigations in the drainage basin of the Corsaglia Valley (Piedmont, Italy). The problems considered in this investigation were: (1) chemical compositions of rain waters as a function of geographic locations and climatic conditions; (2) crystalline rock hydro-geochemistry; (3) rock-water interactions in karstic systems; and (4) water flow in carbonate rocks and related fluctuations of chemical contents.

0226 Bosch, D.; Camacho, E.; and Ortega Sastriques, F. (1984) - Influencia de las rocas calizas en la genesis de los suelos ferraliticos rojos de las llanuras carsicas de Cuba [Influence of limestone on the genesis of red ferralites in the karstic plains of Cuba]: Cuba; Ciencias de la Tierra y del Espacio 9, p. 125-136 [in Spanish, summary in English].

0227 Bosdoc, T. (1985) - Considerations on the syngenetic waterfall cavities: Buletin Speologic Informativ, 9, fasc. 1, p. 7-12, 4 figs. [in Romanian with English abstract].

The author discusses cavities of reduced dimensions from Metaliferi and Trascau Mountains, occurring under waterfalls from karstic areas. Out of the genetic factors there are mentioned the frontal and lateral displacement of the waterfall, related to travertine deposition and erosion of the bottom of the waterfall.

0228 Bosdoc, T. (1984) - Genetical observations on some gravitational sliding caves in Metaliferi Mountains: Buletin Speologic Informativ, 8, p. 5-11, 4 figs. [in Romanian with English abstract].

The paper discusses the genetic and morphological features of the gravitational sliding caves. The analysis of two caves of Metaliferi Mountains, the origin of which may be ascribed to the phenomenon, is performed.

0229 Bosdoc, T. (1981) - Preliminary observations concerning the drainages in the northern Poieni Plateau: Carst, 1, p. 5-10, 4 figs. [in Romanian].

The discharge of the karstic plateau of Poieni takes place as perched springs at the contact with the underlying crystalline schists. Up to now only short caves, acting as overflow paths, have been discovered.

0230 Botoseneanu, L.; Decu, V.; and Rusu, T. (1964) - The third international speleological expedition in the People's Republic of Bulgaria (August 15-27, 1963): Bucarest; Trav. Inst. Spéol. "Emil Racovita", III, p. 411-430, 13 figs. [in Romanian].

Karstic zones and forms in the western part of Stara Planina (Belogradcic-the Magura Plateau, Ciren-Bozijat Most, Vratza-the Ledenika Plateau, Karlukovo-Projodna, the Isker-Lakadnyk Pass) are presented and several data are supplied in connection with speleological organization in the People's Republic of Bulgaria.

0231 Botoseneanu, L.; Negrea, A.; Negrea, St.; Decu, A.; Decu, V.; Bleahu, M.; and co-workers Balogh, E.; Puscariu, V., Rusu, T.; Sencu, V.; and Viehmann, I. (1967) - Research on the caves of Banat and Oltenia (Romania, 1959-1962): Paris; Editions du CNRS, 397 p., 182 figs., 2 tab., 42 photographs [in French].

The book deals with the exokarst and 173 caves of two of the most speleologically important regions of Romania. Part I presents the exokarst and 73 caves of Banat, while Part II treats the exokarst and 100 caves of Oltenia. The presentation of each cave includes synonymies, analytic bibliography, exploration data, location and way of access, description, deposits, genesis, climate, trophic resources, biospeleology.

0232 Botton, R. (1984) - Etude de certaines modalités du fonctionnement de l'aquifère karstique (zone d'infiltration et zone saturés) sur deux champs de forages nord-montpelliéreins. Thèse Doct. 3ème cycle Sc. de l'eau, Montpellier, 500 pages, 140 fig., 77 tab., biblio.

L'utilisation conjointe de diverses techniques permet d'observer les comportements des zones d'infiltration et de saturation sur deux champs de forages appartenant au bassin karstique de la source du Lez, prés de Montpellier:

- hydrodynamique: évolution des niveaux d'eau à l'échelle de l'épisode pluvieux et du cycle,
- thermique: analyse des profils et des relevés ponctuels,
- hydrogéochimique: les données classiques se trouvant considérablement enrichies par la chimie des carbonates et les traçages isotopiques (oxygène 18 et tritium). Les analyses multidimensionnelles synthétisent les échantillons et aident à révéler les facteurs à l'origine de l'évolution et des relations des variables physico-chimiques.

0233 Boulton, N.S.; and Streltsova, T.D. (1977) - Flow to a well in an unconfined fractured aquifer in Dilamarter, R.R.; and Csallany, S.C.,

editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 214-227.

A new equation is derived for the fissure flow drawdown in a fractured aquifer under water-table conditions. Flow in the blocks is assumed to be vertical and flow in the fissures is horizontal. A discussion of the theory of flow in ground water in fissured rocks is given.

0234 Bounk; M.J.; and Bettis, E.A., III (1984) - Karst development in northeastern Iowa in Hanson, R.W., editor, Iowa's Driftless Area; 95th session of the Iowa Academy of Science: U.S.; The Proceedings of the Iowa Academy of Science, 91:1, p. 12-1.

0235 Bowen, R.; and Williams, P.W. (1972) - Tritium analyses of groundwater from the Gort Lowland of Western Ireland: Verlag, Besel, Switzerland; Experientia, Vol. 28, p. 497-498.

Rates of limestone solution in Gort area vary from 0.05 mm to 0.12 mm per year. Results of four samples tested for tritium show 74.6, 92.2, 100.6, and 79.2 tritium units; samples taken in December 1970.

0236 Boyce, A.J.; Anderton, R.; and Russell, M.J. (1983) - Rapid subsidence and early Carboniferous base-metal mineralization in Ireland: Trans. Inst. M & M, Vol. 92, p. B.55-B.66.

Major massive sulphide deposits are found in the limestones of the Dinantian. They are located around growth faults and all forms of submarine slides due to differential subsidence. To what extent the upwelling hydrothermal ore-bearing fluids would have karstified the limestone is not discussed.

0237 Boynton, Robert S. (1980) - Chemistry and technology of lime and limestone, 2nd edition: New York; John Wiley, 578 p.

0238 Boziceirc, Srecko. (1971) - Examples of possibilities to exploit waters from speleologic sites for the water supply: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY7/1-HY7/6.

From the limited work done on the exploitation of water from karst areas in Yugoslavia it can be seen that the resource can be exploited more fully, but needs a lot of detailed study. Cave springs or pits which supply specific quantities of drinking water are the most suitable for initial exploitation.

0239 Bozonat, J.P. (1980) - Infiltration et circulation des eaux dans les calcaires fissurés: hydrogéologie et bilan hydrique du secteur septentrional du massif de la Chartreuse. Thèse Doct., 3ème cycle, Géol. Appl., Grenoble, 386 pages, 7 pl., 122 ann.

Etude hydrodynamique doublée d'une étude hydrochimique. L'approche des phénomènes d'infiltration et d'évapotranspiration a été grandement facilitée grace à l'installation d'une case lysimétrique.

0240 Bralic, Ivan. (1965) - Über die notwendigkeit und das problem des höhlenschutzes in kroatien: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 85-88.

0241 Bridge, J. (1956) - Stratigraphy of the Mascot-Jefferson City zinc district, Tennessee: U.S.; U.S. Geological Survey Professional Paper 277, 76 p.

0242 Bridge, J. (1955) - Disconformity between Lower and Middle Ordovician Series at Douglas Lake, Tennessee: U.S.; Geological Society of America Bulletin, Vol. 66, p. 725-730.

0243 Brink, A.B.A. (1984) - A brief review of the South African sinkhole problem in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 123-130.

Three ground-water compartments have been dewatered in South Africa during the past 25 years to enable shafts to be sunk through the water-bearing dolomites and down to the gold-bearing conglomerates underlying them. The lowering of the water table, which is the base level of subsurface erosion, initiates a new cycle of subsurface erosion which results in an accelerated development of both sinkholes and dolines.

0244 Brion, M. (1976) - Etude du phénomène de l'anisotropie électrique appliquée au milieu carbonaté fracturé. Thèse Doct. 3ème cycle Géol. Appl., Montpellier, 155 pages, réf.

L'étude de modèles numériques et d'observations sur un site de sondages électriques pluridirectionnels - région karstique de Saint-Maurice de Navacelle - confirme le comportement anisotrope du milieu carbonaté fracturé et la liaison existant entre direction d'anisotropie et direction préférentielle de la fissuration. Le sondage électrique pluridirectionnel peut donc contribuer à une meilleure compréhension des phénomènes karstiques. L'étude sur modèle réduit a permis de prévoir l'influence d'un recouvrement et de l'inclinaison des axes d'anisotropie sur les mesures effectuées avec les dispositifs carré et Schlumberger.

0245 Brizuela Venega, M. (1983) - Geology and evaluation of karst grade of the Boca del Cerro international hydroelectricity project (Chiapas, Mexico): Mexico, Mexico City; Geomimet, 122, p. 31-40.

0246 Broadhurst, W.L.; and Ellseworth, C.E. (1950) - Supplementary report on surface-water and ground-water survey, Nueces River Basin, Texas: U.S.; U.S. Geological Survey Open File Report, 9 p.

General information is provided about surface water and the occurrence and availability of ground water below the Balcones fault zone.

0247 Brock, A.; and Barton, K.J. (1983) - Equilibrium temperature and heat flow density measurements in Ireland: Munich; CEC European Geothermal Update, p. 361-365.

Data are from boreholes drilled for mineral and oil exploration in the Carboniferous limestones. Areas with high gradients are located in Clare and in the NW Limestone Basin; they are due to deep cover of Namurian overlying Dinantian.

0248 Brook, G.A. (1983) - Application of LANDSAT imagery to flood studies in the remote Nahanni karst, Northwest Territories, Canada: Amsterdam, the Netherlands; Journal of Hydrology, 61:1-3, p. 305-324.

The LANDSAT program of earth resource data acquisition provides a means of monitoring hydrologic conditions in the north karst, one of the most complex subarctic karst landscapes known. LANDSAT imagery revealed that spring snowmelt is not the major hydrologic event of the year; heavy rainfall in June-August is.

0249 Brook, G.A. (1978) - The limestone pavements of the Nahanni karst, Northwest Territories, Canada: U.S., Atlanta; Georgia Journal of Science, 36:2, p. 82.

0250 Brook, G.A. (1977) - Surface and groundwater hydrology of a highly karsted sub-arctic carbonate terrain in northern Canada in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII; U.S.; University of Alabama Press, p. 99-108.

A description of a sub-arctic karst landscape. Three poljes are the most prominent feature, and water level rises may be due to the "karst water table" or to the inability of the polje to discharge all of its flood water causing a backup in the polje.

0251 Brook, G.A. (1976) - Geomorphology of the north karst, south Nahanni River region, Northwest Territories, Canada: Canada; McMastor University Ph.D. Thesis.

0252 Brook, G.A.; Cowell, D.W.; and Ford, D.C. (1977) - Discussion of Harmon, R.S.; White, W.B.; Drake, J.J.; and Hess, J.W. - Regional hydrochemistry of North American carbonate terrains (Trans Cave Res Group GB [6:2] 76 p. 43-57) and of Drake, J.J.: and Wigley, T.M.L. - The effect of climate on the chemistry of carbonate ground-water (Water Resources Research [11:6] 75 p. 958-962): Washington, D.C.; Water Resources Research, 13:5, p. 856-858.

0253 Brook, G.A.; and Ford, D.C. (1982) - Hydrologic and geologic control of carbonate water chemistry in the subarctic Nahanni karst, Canada: U.K., Chichester; Earth Surface Processes and Landforms, 7:1, p. 1-16.

0254 Brook, G.A.; and Ford, D.C. (1980) - Hydrology of the Nahanni karst, northern Canada, and the importance of extreme summer storms: Amsterdam; Journal of Hydrology, 46:1-2, p. 103-121.

0255 Brook, G.A.; and Ford, D.C. (1979) - The origin of labyrinth and tower karst and the climatic conditions necessary for their development:

Nature, 275:5680, p. 493-496, October 12, 1978 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 12:5, p. 3.

A new karst style, labyrinth karst, was recognized in climates ranging from humid tropical to subarctic. In the late stages of evolution, labyrinth karst was replaced by limestone towers. This indicates that tower karst is polygenetic and not specific to the humid tropics as was once thought.

0256 Brook, G.A.; and Ford, D.C. (1973) - The Nahanni north karst: a questionmark on the validity of the morphoclimatic concept of karst development: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 43-57.

The author suggests that climate need not be the controlling factor in karstic landform development but other factors -- suitable lithology, structure, topography, and geology -- can allow any single karst landform to develop under a wide range of climatic conditions.

0257 Brook, G.A.; and Sun, C-H. (1983) - Predicting the specific capacities of wells penetrating the Ocala aquifer beneath Dougherty Plain, southwest Georgia: Georgia Institute of Technology, Atlanta, Environmental Resources Center, Report Number ERC 09-82, September 1982, 86 p., 19 fig., 24 tab., 22 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 16:6, p. 3-4.

Within the Dougherty Plain region of Georgia, well specific capacities in gpm/ft are significantly higher when wells are located within a zone extending for 97 feet on either side of a fracture trace. Two models are recommended for predicting fracture trace and non-fracture trace well specific capacity.

0258 Brooks, Harold Kelly. (1967) - Rate of solution of limestone in the karst terrain of Florida: U.S., Gainesville; Florida Water Resources Research Center, University of Florida, Publication 6.

0259 Broughton, Paul L. (1972) - A new calcite structure from Thorn Mountain Cave, West Virginia: U.S.; Caves and Karst, Research in Speleology, 14:1, 1972, p. 3.

A single side passage in Thorn Mountain Cave, West Virginia, contains several thousand calcite crystals projecting from the wall. Each scalenohedron's terminal face is characterized by a spherulitic form of radiating micro-faceted calcite fibers with concentric growth layers. Comments on the crystal growth habit and its relationship to trace-element chemistry and unit cell parameters are presented.

0260 Brown, C.E. (1977) - Multivariate analysis of petrographic and chemical properties influencing porosity and permeability in selected carbonate aquifers in central Pennsylvania: U.S.; Pennsylvania State University Ph.D. dissertation, 220 p.

0261 Brown, M.C. (1982) - Karst hydrology of the lower Maligne Basin, Jasper, Alberta (Canada): U.S., California; Cave Research Association, Cave Studies No. 13.

0262 Brown, M.C. (1973) - On the use of spectral analysis in karst studies: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 59-63.

0263 Brown, M.C. (1973) - Mass balance and spectral analysis applied to karst hydrologic networks: Water Resources Research, 9:3, p. 749-752.

Underground karst drainage systems can be studied by the input-output relations of rivers that flow through them. Tracers enable the quantity of water at a sink that flows to a specific spring, and the fraction of a given spring derived from a sink, to be calculated. When tracer methods are not applicable, cross-covariance and cross-spectral transfer function analysis can be used to examine input-output stage records. These give information about the vadose and/or phreatic nature of the system.

0264 Brown, M.C.; and Ford, D.C. (1974) - Caves and ground water patterns in a tropical karst environment; Jamaica, West Indies: Guacharo, 7:1, p. 43-47 (reprint from American Journal of Science, 273:7, summer, p. 622-633).

0265 Brown, M.C.; and Marshall, P. (1973) - Ice in Covethard Cave: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 371-373.

The authors suggest that the cave is eroded by sublimation. The ice is thought to be not Pleistocene age, but probably post-Hypsithermal.

0266 Brown, M.C.; and Wigley, T.M.L. (1969) - Simultaneous tracing and gauging to determine water budgets in inaccessible karst aquifers: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY3/1-HY3/5.

The author discusses how the use of simultaneous dye tracing and gauging will help give maximum information about inaccessible karst hydrologic systems, especially in their response to flood regimes, pollution studies, and sewer systems.

0267 Brown, M.P.; Spangler, D.P.; and Upchurch, S.B. (1977) - An integrated geophysical survey over a water-filled sink system in Marion County, Florida: U.S.; Geological Society of America, Abstracts with Programs, 9:2, 125 p.

0268 Brown, R.F.; and Signor, D.C. (1973) - Artificial recharge experiments and operations on the southern High Plains of Texas and New Mexico: U.S. Geological Survey Water Resources Investigations 10-73, 54 p.

Data are presented on the major artificial-recharge experiments and operations that have been undertaken on the southern High Plains prior to 1968.

0269 Bruck, P.M.; Cooper, C.E.; Duggan, K.; Goold, L.; and Wright, D.J. (1983) - Geochemistry and geothermal potential of the warm springs of Munster, Ireland: Munich; CEC European Geothermal Update, p. 369-375.

Warm springs were located and investigated at Mallow, Kilmallock, and Newcastle West; all issue from limestones. Their hydrochemistry was studied, and original aquifer temperatures estimated. Modelling of structures indicates karstification of the limestones.

0270 Brucker, E.E. (1970) - Treatment and development of karst areas: U.S.; Society of Mining Engineering, American Institute of Mining Engineers Preprint No. 70-1-346, p. 16.

0271 Bruington, A.E. (1972) - Salt-water intrusion into aquifers: Water Resources Bulletin, 8:1, p. 150-160.

The author gives a discussion on salt-water intrusion in fresh ground-water aquifers, the mechanism of occurrence, its effects, with examples plus methods of control which are at present in operation.

0272 Brune, Gunnar. (1975) - Major and historical springs of Texas: U.S.; Texas Water Development Board Report 189, 94 p.

Information on the geologic setting, quality, decline, and importance of springs is included, as is detailed information on individual springs by county. Of the 281 springs studied, 139 issue from two underground reservoirs, the Edwards (Balcones fault zone) and the Edwards-Trinity (Plateau) aquifers. Includes maps and hydrographs.

0273 Brunzel, U. (1973) - Karstgeologische Entwicklungsforman und Besonderheiteu des Bexirkes sulre unter einscheluss der Gebiete Kittlesthal Friderickroda und Schmiedelfeld: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 211-218.

0274 Bucknef, A.W. (1973) - Availability and quality of ground-water in the Edwards-Trinity aquifer in the trans-Pecos region of Texas: U.S.; Texas Water Development Board File Report.

The author updates previous detailed ground-water reports for the area, with additional field study. The author emphasizes water quality and outlines areas suitable for future development.

0275 Budinciuc, I. (1985) - Hydrological and speleogenetic observations in Valea Seaca Cave (Poiana Rusca Mountains): Buletin Speologic Informativ, 9, fasc. 1, p. 47-51, 1 fig. [in Romanian with English abstract].

Based on two tracing experiments and morphological and sedimentological observations, a tentative evolution scheme of the most important cave of Poiana Rusca Mountains is proposed.

0276 Bulgar, Al.; Diaconu, V.; and Cancea, V. (1984) - Modern methods in karst hydrological research - application to some principal karst system

from the Southern Carpathians: Theoretical and Applied Karstology, 1, p. 215-224, 4 figs.

The high price and technical difficulties related to the use of the direct methods in the karst water circulation study allow for a prioritary use of the indirect methods, especially of the hydrological methods. A case study carried out for two of the main karst zones of the Southern Carpathians points out the possibilities afforded by the hydrological methods.

0277 Bulgar, Al.; Povara, I. (1978) - Separation of karstic thermal springs discharge components as based on the analysis of discharge and temperature variations measured at exsurgence: Bucharest; Trav. Inst. Spéol. "Emile Racovitza", T. XVII, p. 209-214.

Determination of the existing relation between deep karstic circulation and infiltration waters taking a more direct and rapid course represents a current concern in karstic hydrology. Karstic spring component separation may be approached as based on correlative analysis of discharge and temperature variations recorded at exsurgence, by reading continuity equations of liquid and caloric discharge.

0278 Bulgareanu, V-A.C.; Bogorodita, A.; Olteanu, E.; Comanescu, A.; Feurdean, V.; Balaban, A.; and Hannich, D. (1981) - Geodynamic processes in the Ocna Sibiului lake area; causes and effects: Bucharest; St. Cerc. Geol, Geofiz., Geogr., Geologie, 26:1, p. 147-157, 13 figs., 1 pl., 2 tab., 7 ref. [in Romanian, English res.].

The geodynamic evolution of the lake area determined by the salt solving processes and by the gravitational slope processes is analyzed by statistical means in connection with 11 limnochemical parameters referring to the waters of 9 lakes and their circumlacustrine area.

0279 Bulgareanu, V-A.C.; and Feurdean, V. (1982) - Hydroisotopic pattern of water circulation in salt lakes Baile Verzi-Slanic (Prahova County): Bucharest; St. Cerc. Fiz., 36:4, p. 351-361, 4 figs., 6 tab., 6 ref. [in Romanian, English res.].

The hydroisotopic pattern of water circulation proposed is based on the statistical analysis of the spatial distribution of natural deuterium contents both in lake waters and in those of circumlacustrine areas. The pattern includes water circulation through a halokarstic syphon 1 km long and having a difference of about 185 m between the waters influx and the resurgence.

0280 Bulgareanu, V-A.C.; and Feurdean, V.; Gutu, Al.; Olteanu, E.; Bogorodita, A.; and Hannich, D. (1984) - Relations between the fresh- and salt waters circulation and the geodynamics of the Ocna Sugatag karstosaline and anthroposaline lake area (Maramures district): Bucharest; Theoretical and Applied Karstology, 1, p. 165-171, 4 figs., 1 tab., 10 ref. [in English].

The paper deals with the statistical interpretation of the distribution of natural deuterium contents, proposing a circulation pattern of fresh and saline water (ground, lake, and surface water) in relation to the terrane sinking rates, in context of existence of rather developed gaps system, now flooded and partially endokarstic modeled, belonging to the old salt mines.

0281 Bulgareanu, V-A.C.; Ionescu-Teculescu, V.; Nastasescu, M.; Raclaru, P.; Cehlarov, A.; Hannich, D.; and Moza, D. (1978) - On the limnology of the hypersaline lake Baia Miresii (Slanic-Prahova): Bucharest; Acta Botanica Horti Bucurestiensis (1977-78), p. 67-87, 14 figs., 14 ref. [in Romanian, English res.].

The geobotanical, physico-chemical, biological, and mineralogical data regarding the circumlacustrine area and the ecosystem Baia Miresii-Grota Miresii are supplemented by those referring to the anthropo- and karstosaline morphology and to the existence of some relative fresh-water inputs along endokarstic conduits through the salt of "Muntele de sare".

0282 Burdon, D.J. (1985) - Hydrogeological aspects of agricultural drainage in Ireland: Read at meeting, June 1984; published by Irish Nat. Comm. for IHD, p. 185-249.

Drainage does not deplete the abundant ground-water resources of Ireland. Areas affected by low or nil infiltration and areas of excessive ground-water discharge are described. Some unusual concepts are summarized as the molding of Irish topography by solid ice rather than by liquid water, and permafrost sealing under glacial lakes.

0283 Burdon, D.J. (1985) - Temperature of groundwater: Taorimina, Sicily; Fifth Inter. Sym. of Groundwater, 17-21 November.

The simple direct-reading thermometer tends to be under-rated and under-used in modern ground-water investigations. Four examples are given of recent Irish use, on the Kilbrook Spring, with earth tides influence; as evidence of deep ground-water circulation in karstified limestones; medium-deep ground-water circulation; and potential of energy extraction from Irish ground waters.

0284 Burdon, D.J. (1984, in press) - Groundwater in the Republic of Ireland: Dept. of Co-operation for Development, United Nations, New York.

Carboniferous limestones receive some 65 percent of annual infiltration, while fluvio-glacial aquifers receive some 55 percent. The latter are composed mainly of limestone sands and pebbles. The limestones are noted as "strongly karstified."

0285 Burdon, D.J. (1984) - Future of Groundwater in Ireland: Port Laoise Seminar, Irish Group IAH, 3/4 April.

Attention is drawn to the application of hydrogeological knowledge gained to new fields of use, as to agricultural and arterial

drainage problems, to selection of landfill sites, and to pollution.

0286 Burdon, D.J. (1983) - Irish geothermal project - phase I: June 1981 - March 1983: Report to the Director, Geological Survey of Ireland, 2 Vols.

All the warm, tepid and control springs studied intensively issue from limestone-dolomite aquifers. Section III-4 deals with paleokarsts, recent karsts, and the karstification of non-carbonate rocks.

0287 Burdon, D.J. (1983, Dec.) - Irish groundwater resources in relation to geothermal energy investigations: Internal report, Geological Survey of Ireland, 276 p.

The aquifers which hold most of the Irish ground waters are karstified Carboniferous limestones and unconsolidated sands and gravels composed mainly of limestone fragments.

0288 Burdon, D.J. (1978) - Groundwater resources of the Upper Suir Basin, Tipperary North Riding: Minerex Ltd. Report No. 359209/1 to Sanitary Services of Tipperary North Riding County Council, 71 p.

The ground waters are held in solid rock limestone and unconsolidated gravels derived from limestone. Swallow holes and related karst features were studied. Location of ground water in rock aquifers is controlled by structure - folding, faulting, jointing, and existence of some aquiclude beds.

0289 Burdon, D.J. (1977) - Influence of karst on engineering in Ireland in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 419-431.

Brings together 30 earlier Irish references to interactions between engineering works and karstification of limestones and dolomites. Covers quarrying of calcite and dolomite, ground limestone for agriculture, mining of evaporites and ores, sand and gravel extraction, coasts, lakes and rivers, and drainage operations.

0290 Burdon, D.J.; Burns, D.J.; and Peel, S. (1983) - Geothermal energy investigations in Ireland: Munich; CEC European Geothermal Update, p. 350-360.

Much of the work was concentrated on the warm and tepid springs of Leinster, all issuing from limestone-dolomite aquifers. Detailed study of some springs, including Kilbrook, showed that deep confined aquifers in the limestone were subjected to strong earth tidal variations in discharge.

0291 Burger, A. (1982) - Brief report on hydrogeology of karstic terrains in Ireland: Written after field excursions, 21-23 May 1979; published by the Irish Comm. IHP, p. 179.

Short note on shallowness of ground water in the karst, effects of Quaternary cover on infiltration, and need for special prospection methods, as outcrops of uncovered limestone are rare.

0292 Burger, A. (1975) - Chimisme des roches et de l'eau karstiques in Burger, A., and Dubertret, L., editors, Hydrogeology of karstic terrains: Paris, IAH, p. 79-90.

A review of the chemical composition of carbonate rocks is followed by the description of the equilibrium systems between atmosphere, water, and rock and their modification factors. The kinetic of the reactions, which remains still little known, plays an important role in the explanation of the evolution of karst.

0293 Burger, A., and Dubertret, L., editors (1975) - Hydrogeology of karstic terrains: Paris; International Association of Hydrogeologists, 190 p.

0294 Burger, A., and Dubertret, L., editors (1984) - Hydrogeology of karstic terrains, case histories (International Contributions to Hydrogeology, Castany, G., Groba, E., and Romijn, E., editors, IAH, Vol. 1): Hannover; Heise, 264 p.

0295 Burke, F. (1984) - An approach to ground water development in County Meath: Port Laoise Seminar: Irish Group IAH, 3/4 April (6 Fig.).

A ground-water resource survey of County Meath identified two major rock aquifers, the upper and lower limestones of the Carboniferous, as well as many Quaternary aquifers; a map shows their location. Successful tapping of a limestone aquifer at Meath Hill Group Scheme has much encouraged the switch to ground water as the basis of domestic supply.

0296 Burke, K.; Coates, A.G.; and Robinson, E. (1968) - Geology of the Benbow Inlier and surrounding areas, Jamaica: Trinidad; Transactions of the 4th Caribbean Conference, 1965, p. 299-307.

0297 Burkhurdk, R. (1973) - Einige neue erkenntnisse aus der geologischen kartierung der höhlen des mahricshen karstes: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 219-226.

0298 Burne, R.V.; and Cant, R.V. (1972) - The limestones of the North Negril area, Hanover, Jamaica: Jamaica; Geological Society of Jamaica Journal (Geonotes), 12, p. 7-12.

0299 Burns, D.J. (1966) - The formation of bauxite and karst topography in Eufaula district, Alabama, and Jamaica, West Indies: U.S., Economic Geology, 61:8, p. 1458-1459.

0300 Butcher, A.L.; and Railton, C.L. (1966) - Cave surveying: U.K.; Transactions of the Cave Research Group of Great Britain, July, 1966, 8:2, p. 37.

Methods and equipment needed to survey a cave are carefully outlined in the text with a section on why a caver should survey a cave.

0301 Butler, D.K. (1977) - Geophysics versus the cavity detection problem in Symposium on detection of subsurface cavities: U.S., Army Corps of Engineers, p. 27-43.

Geophysical methods applicable to the cavity detection problem can be categorized as passive or active. Similarly the methods can be classed as aerial, surface, or subsurface in their mode of application. Geophysical methods which have been applied to the cavity detection problem are gravity, seismic, electrical, magnetic, electromagnetic, and subsurface counterparts to the preceding.

0302 Butterlin, Jacques; and Bonet, Federico. (1960) - Découverte d'une séri éocène dans la Presqu'ile du Yucatan (Mexique): Ses rélations avec les serils du même age dans les Grandes Antilles: Puerto Rico; Transactions of the 2nd Caribbean Geological Conference, 1959, p. 33-39.

Included are accounts of the limestones which occur in the area.

0303 Byrd, T.M.; and Helmick, W.R. (1980) - Development of gypsum karst features of La Hoya Alardin area, Zaragoza Nuevo Leon, Mexico: U.S.; NSS Bulletin, 41:4, p. 117-118.

0304 Cabrol, P. (1984) - Calcite shields; additional information on the occurrence and development of calcite shields in the karst network in National Speleological Society Convention, U.S., 1984, Abstracts: U.S.; Geo 2, 12:1, p. 3-5.

0305 Calembert, L.; and others. (1975) - Engineering geological problems in karstic regions: Bulletin of the International Association of Engineering Geology, No. 12, p. 93-132.

0306 Campbell, N. (1979) - Alpine karst of the Scapegoat-Bob Marshall Wilderness and adjoining areas, north-central Montana: U.S.; NSS Bulletin, 41:3, p. 66-69.

Alpine karst of the Scapegoat-Bob Marshall Wilderness is found in three main locations: Sawtooth Range thrust belt, Lewis Overthrust, and Silvertip syncline. Karst occurs on ridge tops and high plateaus elevated by thrust faulting or folding and is limited to rocks of Cambrian, Devonian, and Mississippian ages. Synclines tend to have cave systems located along their axes. Steeply dipping rocks may have moderately well developed surface karst, but are less likely to contain caves. Cave systems are usually found at the base of the carbonate section and are rarely connected to surface pits. Most of the karst and caves are considered to be no older than the last glacial stage.

0307 Campbell, N. (1973) - Scapegoat alpine karst, Montana: U.S., National Speleological Society Bulletin, 35:2, p. 49-58.

The Scapegoat Mountain alpine karst area is a high plateau lying in the center of the Scapegoat Wilderness, 75 miles west of Great Falls, Montana. The plateau is underlain by more than 1,700 feet of Cambrian rocks, part of the upper plate of a large thrust sheet. Nearly 1,000 feet of Middle Cambrian carbonates cap the 8,000 foot

plateau and solution features are widely scattered over the plateau surface. All of the karst is developed along three joint sets, N20E, N35W, and N65W.

0308 Campbell, N.P. (1976) - Geohydrology of the Scapegoat alpine karst, Montana: U.S.; Geological Society of America, Abstracts with Programs, 8:6, p. 802.

0309 Canace, R.; and Dalton, R. (1984) - A geological survey's cooperative approach to analyzing and remedying a sinkhole related disaster in an urban environment in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 343-348.

A sinkhole resulting from the break of an underground water main severely undermined the foundation of a private residence in densely populated Phillipsburg, New Jersey. A remedial plan was designed in concert with the engineer and other geotechnical firms experienced in the grouting of voids. The remedial approach attempted to strike a balance between the magnitude of the void problem, the town's responsibility to public safety, and cost.

0310 Cappa, G. (1973) - La genesi selle concrezoni anomali: Alcuni confronti con la formazione dei macrocristalli in metallurgia: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 375-381.

A discussion of the origin of some anomalous formations of thread-like stalactites in the "Grotta del Bue Marino" (Sardinia).

0311 Carlier, E. (1983) - Influence de la fracturation sur le comportement hydrodynamique et hydrodispersif des calcaires paléozoiques de l'Avesnois (Nord). Thèse Doct. 3ème cycle Géol. Appl., Lille, 244 pages, 35 pl., réf.

Rappel des lois d'écoulement en milieu fissuré et étude de la fracturation permettant de déterminer le tenseur de perméabilité.

0312 Caron, Daniel. (1976) - Karstification de l'île d'Anticosti: reconnaissance 1976: Canada, Montreal, Société Québécoise de Spéléologie, 42 p. [in French].

0313 Cartwright, L.D., Jr. (1932) - Regional structure of Cretaceous on Edwards Plateau of southwest Texas: American Association of Petroleum Geologists Bulletin, Vol. 16, p. 691-700.

Comparison of regional contour maps shows clearly that the regional structure of the Fredricksburg Division is controlled by the topography of the pre-Cretaceous surface and downwarping of the south and east margins into the Balcones fault zone.

0314 Cata, W. (1973) - The cycle of solution: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 227-229.

Present day springs in the state of Florida seem to represent caves in previous times since vadose conditions and human habitations are found probably dating to the last glacial period.

0315 Cavanaugh, T.D. (1977) - Finite difference wave models and the detection of caves: U.S.; University of North Carolina at Chapel Hill Ph.D. dissertation, 174 p.

0316 Cayeux, L. (1969 repr.) - Carbonate rocks, limestone and dolomites, sedimentary rocks of France [translated by A.V. Carozzi]: U.S.; Hafner.

0317 Cendrero, Antonio. (1975) - Environmental geology of the Santander Bay area, northern Spain: Environmental Geology, 1:2, p. 97-114.

An account of the development of land use units taking in environmental factors, looking at present and future land use and developing a "system" setup where specific land use activities are favorable or unfavorable in that system.

0318 Chabotarev, I.I. (1952) - Reporting, interpretation, and utilization of water analyses: Water and Water Engineering, Vol. 56, p. 132-137.

0319 Chalumeau, G.; Crampon, N.; Lachaise, S.; et Maubeuge P.L. (1975) - Vulnérabilité et protection des ressources en eau des calcaires bajociens dans le bassin ferrifère lorrain in Bull. BRGM, Série 3, N°2, 1975, pages 137-144.

L'exhaure des mines de fer qui draine le réservoir aquifère des calcaires du Bajocian de Lorraine sert de plus en plus largement à l'alimentation en eau potable. Des mesures de protection contre la pollution, notamment l'adoption de périmètres de protection et la mise en place d'un dispositif d'alerte et d'intervention rapide, devraient permettre d'améliorer la protection des eaux utilisées par les collectivités.

0320 Chambers, W.J. (1976) - Aspects of the limestone geomorphology, hydrology and water chemistry of the Gower Peninsula: U.K.; University of Wales, Swansea, Unpublished Ph.D. thesis.

0321 Chambers, W.J. (1974) - Limestone springs and individual flood events (with special reference to the Gower Peninsula, Wales): Transactions of the Cave Research Group of Great Britain, 15:2, p. 91-97, June 1973, 7 fig., 1 tab., 14 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 7:7, p. 5.

All springs in the Gower Peninsula of Wales show a positive relationship with precipitation in field capacity conditions. Intensive hourly or two-hourly automatic water sampling is a useful technique in the understanding of the chemical variation of springs. Short interval sampling also means that short-lived chemical effects are not missed.

0322 Chappuis, P.A.; and Jeannel, R. (1951) - A list of visited caves, 1927-1949 (the eighth series): Archives of Experimental and General Zoology, 88, p. 81-230, 28 figs. [in French].

Geographic location, general description, and a list of groups of cave animals, accompanied by assessments concerning thermohygrometric conditions and food supplies for 177 caves in Romania, Algeria, Spain, France, Italy, Switzerland, and Yugoslavia.

0323 Chauve, P.; Blavoux, B.; Mignot, C.; and Mudry, J. (1982) - Les éléments chimiques extérieurs au système karstique indicateurs de la qualité des eaux des réserves des calcaires jurassiens in 3ème Colloque d"Hydrologie en pays calcaire, Octobre 1982 à Neuchatel (Suisse): Annales Scientifiques de l'Université de Besançon, Géologie, Mémoire, No. 1, p. 23-38.

Des campagnes annuelles de prélèvements effectuées pendant des périodes d'étiage comprises entre 1977 et 1982 donnent des indications sur les compositions chimiques des eaux des principales sources karstiques jurassiennes. Les concentrations en éléments extérieurs aux systèmes karstiques tels que Cl-, NO3-, K+, et Na+ permettent une approche du degré de contamination de leurs réserves. Une classification est établie à partir des données de l'étiage de Novembre 1978; elle est reconductible d'année en année.

0324 Chen, C.S. (1965) - The regional lithostratigraphic analysis of Paleocene and Eocene rocks of Florida: U.S.; Florida Geological Survey Bulletin, No. 45, p. 105.

0325 Chernyshov, S.N. (1979) - The movement of water in fissure networks: Moscow, Nedra.

0326 Cherry, R.N.; Stewart, J.W.; and Mann, J.A. (1970) - General hydrology of the middle Gulf area, Florida: U.S.; Florida Department of Natural Resources Bureau of Geology Report of Investigations No. 56, 96 p.

A detailed account of the hydrology of the middle Gulf area, Florida, to build up a knowledge of the water budget, plus a description of water movement and chemical characteristics. The Floridan aquifer supplies 80 percent of the annual stream flow.

0327 Chery, J.L. (1983) - Etude hydrochimique d'un aquifère karstique alimenté par perte d'eau (la Loire): le système des calcaires de Beauce sous le Val d' Orléans: Thèse Doct. 3ème cycle Géol., Appl, Orléans, 268 p.

Etude thermique et hydrochimique de l'aquifère karstique des calcaires de Beauce.

0328 Chess, D.L.; and White, W.B. (1983) - Clastic sediments and sedimentatin in the Butler Creek cave system, Virginia in Rea, G.T., editor, Proceedings of the National Speleological Society Annual Meeting: U.S.; NSS Bulletin, 45:2, unpaginated.

0329 Chikishev, A.G. (1974) - Methods of karst investigation (Metody izucheniya karsta): Izdatel'stvo Moskovskogo Gosudarstvennogo Universiteta, 1973, 92 p. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 7:1, p. 24.

Methods commonly employed in the study of karst are analyzed, and new methods are proposed. These include geological, geomorphological, topogeodetic, hydrological, biological, quantitative, aerial photographic, cartographic, and landscape-indicator methods.

0330 Chikishev, A.G. (1973) - Quantitative evaluation of the intensity of karst denudation: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 65-70.

Using the Corbel technique with modifications by the author based upon the flow volume and calcium carbonate content in water, one can quantitatively determine the intensity of karst processes in carbonate rocks.

0331 Chikishev, A.G. (1973) - Speleological regionalization of the USSR: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 71-76.

The author has divided the karst regions of the USSR based on the geographical and geological conditions of karst caves, intensity and direction of karst processes.

0332 Chillingar, G.V.; Bissell, H.J.; and Fairbridge, R.N. editors. (1967) - Carbonate rocks: New York; American Elsevier Publishing Co., 471 p.

This textbook contains the following chapters: Modern carbonate sediments; petrology and petrography of carbonate rocks; classification of sedimentary carbonate rocks; origin and occurrence of limestones; origin and occurrence of dolostones; carbonate oil reservoir rocks; and carbonate rocks and paleoclimatology in the biochemical history of the planet. Includes extensive list of references and a glossary.

0333 Chin, H. (1979) - Surface water resources in Jamaica: Jamaica, Kingston; Journal of the Geological Society of Jamaica, 18, p. 27-53.

0334 Chinese Academy of Geological Sciences. (1976) - Karst in China: China, Shanghai; Institute of Hydrogeology and Engineering Geology, Chinese Academy of Geological Sciences, Shanghai People's Publishing House.

The text, a well-illustrated book on karst features in China, is more philosophic than technical.

0335 Choppy, J. (1973) - Note préliminaire sur les formations de gypse dans les cavernes: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 383-392.

A discussion on formation of gypsum in caves in France, Germany, Italy, U.S., Great Britain, Spain, Switzerland, and Arba.

0336 Chow, V.T., editor. (1969) - Advances in hydroscience: U.S., New York; Academic Press, 305 p.

A textbook dealing with specific hydrologic problems.

0337 Chow, V.T., editor. (1964) - Handbook of applied hydrology: U.S., New York; McGraw-Hill Book Co.

A comprehensive textbook on applied hydrology, much of which is very relevant to karst studies.

0338 Chow, V.T.; and Karebotis, S.T. (1970) - Analysis of stochastic hydrologic systems: U.S.; Water Resources Research, 6:6, p. 1569-1582.

A mathematical model of the stochastic hydrologic system for the upper Sangamon River of east-central Illinois was developed using precipitation, runoff, storage, and evapotranspiration as components. This system model could be used elsewhere in the analysis of water resources systems.

0339 Cigna, A.A. (1969) - Some considerations on the formation of the limestone caves: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S36/1-S36/8.

A discussion of cave formation where the author emphasizes the role of mixture corrosion and the erosion process in the development of caves.

0340 Cigna, A.A. (1967) - An analytical study of air circulation in caves: International Journal of Speleology, Vol. III, p. 41-54.

Particular emphasis is given to the quantitative solutions of the air circulation problems.

0341 Clark, B.E. (1961) - Geologic exploration and foundation treatment, Barkley Lock, Cumberland River, Kentucky: U.S.; Geological Society of America Engineering Geology Case Histories No. 1-5, Vol. 4, p. 203.

Barkley Lock is founded on massive Mississippian Limestone that contains two principal systems of vertical joints. Enlargement of the joints by solution is the source of nearly all the bedrock foundation problems. A very deep solution-channel zone was discovered which crossed the river diagonally and passed under the lower gate of the lock as initially located. To minimize the foundation problems, the lock and dam were shifted upstream. To prevent piping under the lock of Coffer Dam, its perimeter was grouted using cement and cement-sand grout pumped into holes drilled at a 45 degree angle parallel to Coffer Dam.

0342 Clark, L. (1983) - Pumping tests and their uses: Port Laoise Seminar, Irish Group IAH, 192/20 April.

Distinguishes well test from aquifer test. As fissures-joints decrease in number and size with depth, even in karstified limestone, there is a maximum depth in such aquifers below which drilling is a waste as far as increased water production is concerned.

0343 Clayton, R.N.; Muffler, L.J.P.; and White, D.E. (1968) - Oxygen isotope study of calcite and silicates of the River Ranch No. 1 well, Salton

Sea, geothermal field, California: U.S.; American Journal of Science, Vol. 266, p. 968-979.

The effect of temperature variation on isotopic fractionation has been studied in rock samples from a well in the Salton Sea geothermal area. A vertical profile of oxygen isotopic composition of where rock and separated minerals shows extensive exchange between hydrothermal solutions and the country rock.

0344 Coates, A.G. (1968) - The geology of the Cretaceous central inlier around Arthur's Seat, Clarendon, Jamaica: Trinidad; Transactions of the 4th Caribbean Geological Conference, 1965, p. 309-315.

The study includes descriptions of several formations composed of limestone.

0345 Cocean, P. (1985) - The karstic level surfaces of the Apuseni Mountains: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 24, p. 97-104, 2 figs. [in French].

From a morphogenetic point of view, the karstic areas in the Apuseni Mountains are grouped into three karstoplains: the Ciumerna-Scarisoara (1,200-1,400 m) of Paleogenic age; the Vascau-Zece Hotare (600-800 m) of Miocene age; and the Dumbravita (400-500 m) of Pliocene age. They may be correlated with the cave levels of the karstic systems or with the gallery levels in multifloored caves.

0346 Cocean, P. (1984) - Elements of detailed morphology of the Ursilor Cave (the Bihor Mountains): Crisia, Oradea, 14, p. 581-586, 6 figs. [in Romanian].

The contribution of gours and of the plane-horizontal roof, which are considered particular elements, to the overall morphology of the cavity is underscored.

0347 Cocean, P. (1984) - The economic potential of the karst in the Apuseni Mountains: Bucharest; the Publishing House of the Academy of the Socialist Republic of Romania, 38 figs. [in Romanian].

Present interactions between man and karst are discussed. Morphological, hydrographic, climatic, and pedological conditionings are highlighted and emphasis is placed on ways of capitalizing the karst (farming, industrial works, forestry, tourism, water supply).

0348 Cocean, P. (1984) - The location of the caves in the Apuseni Mountains according to altitude: Studies and Research of Geology, Geophysics and Geography, the Geography Series, 31, p. 81-84, 2 figs. [in Romanian].

The single floor caves cannot be correlated with erosion platforms and the only possible correlation is that between these platforms and the caves that make up the endokarstic systems or the galleries that form multifloored caves.

0349 Cocean, P. (1981) - Population and settlements in the Apuseni Mountains Karst: Studies and Research of Geology, Geophysics and Geography, the Geography Series, 28, p. 57-58, 8 figs. [in Romanian].

The distribution of human settlements in the karstic areas of the Apuseni Mountains is of three types: scattered, dispersed, and concentrated. At present, a process of depopulation of the karstic areas, entailed by complex causes, is in full progress.

0350 Cocean, P. (1980) - Morphogenetic types and the distribution of sinkholes in the Apuseni Mountains Karst: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 19, p. 253-260, 4 figs. [in French].

The three types of sinkholes (solution, crumbled, and complex) occurring in the Apuseni Mountains are analyzed as is their territorial grouping as alignments or fields of sinkholes.

0351 Cocean, P. (1979) - The agricultural capitalization of the karstic relief in the Apuseni Mountains: Studies and Research of Geology, Geophysics and Geology, the Geography Series, 26, p. 89-96, 4 figs. [in Romanian].

Four major zones of agricultural capitalization of karsts are distinguished - depressions, plateaus, valleys, and slopes. The analysis of the salient features of these areas relies on an approach to the physico-geographic causes that highlight a certain type of agriculture, practiced in the respective areas.

0352 Cocean, P. (1979) - Plane-horizontal roofs and the karstic base level: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 18, p. 219-224, 2 figs. [in French].

This work outlines the particularities of action of the base level in the underground and analyzes base level types (gravitational, lithological), as well as the extent to which they influence the genesis of the plane-horizontal roof.

0353 Cocean, P. (1978) - The gours, morphological and functional aspects: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 17, p. 199-208, 11 figs. [in French].

With a view to explaining the morphological variety of gours, an analysis is made of the role of: (1) the morphology of the initial obstacle; (2) the particularities of the hydrological conditions; (3) the complementary factors; and (4) the stage of evolution of the gours. The gours are morphologically grouped in four types.

0354 Cocean, P. (1975) - On the genesis of the plane-horizontal roof of the Pestera cu Apa Cave in Les Valley: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 14, p. 189-196, 5 figs. [in French].

An original hypothesis is put forth concerning the genesis of the plane-horizontal roof, which implies the satisfaction of compulsory conditions: lack of infiltrations in the roof plane; absence of

underground stream deepening in the period of sculpture; maintenance of a relatively constant stream discharge.

0355 Cocean, P.; and Rusu, T. (1984) - Genetic types of gorges in the Apuseni Mountains karst: Bucharest; Theoretical and Applied Karstology, 1, p. 91-98 [in French].

There are four categories of gorges in the Apuseni Mountains karst: epigenetic; of underground karstic capture; antecedent; and of peripheral subsidence. Contributions are also made to the definition of the gorges of underground karstic capture and of peripheral subsidence.

0356 Cocean, P.; and Rusu, T. (1984) - The karstic plateaus of the Codru-Moma Mountains: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 23, p. 81-88, 2 figs. [in French].

This work demonstrates that the karstic plateaus of Vascau and Dumbravita de Codru in the Codru-Moma Muontains were modeled like karstoplains in Miocene and Pliocene, respectively, and places emphasis upon the great density and variety of exo- and endokarstic forms which characterize their present morphology.

0357 Cojocaru, M.; and Diaconu, G. (1973) - Method of graphic interpretation of data obtained by cave bearing with theodolite with the help of digital computer: Bucarest; Trav. Inst. Spéol. "Emil Racovita", Tome XII, p. 357-368 [in French].

A method is outlined whereby the bearing of caves is achieved with the help of a digital computer. This method is illustrated in a gallery segment of the Topolnita Cave, the Mehedinti Plateau, Romania.

0358 Coker, A.E. (1968) - Applications of remote sensing to occurrence of collapse sinkholes in the Alafia and Peace River Basins, Florida: U.S.; NASA Earth Resources Aircraft Program Status Review, Vol. III, p. 22A-1-14.

0359 Coleman, J. (1969) - Some marine and lacustrine karst features in Ireland: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M4/1-M4/6.

The major portion of the carboniferous limestone area of Ireland lies between 0 and 100 meters. Coastal exposures exhibit typical forms from pinnacles to spray zone pitting. Limestone lake shores in the central lowland show cylindrical drilling and hemispherical pitting of rock surfaces. Scalloped cave and fissure walls occur in some lakeside sites.

0360 Coleman, J. (1969) - Part natural caves in Ireland: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S18/1-S18/4.

The author discusses natural caves, not necessarily in limestone, where there is evidence that the cave or cavity has been modified

by human intervention. In some cases a souterrain type passage has been added. Others appear to have been mined or enlarged from a natural fissure or cave.

0361 Coleman, J.L. (1979) - Factors controlling karst development in the Vicksburg Limestone of Mississippi: U.S.; Mississippi Academy of Science, Journal 24, supplement, 42 p.

0362 Colorado Lievan, D. (1981) - Advice on mineral resources paleokarst deposits: Mexico, Mexico City; Geomimet, 113, p. 53-64.

0363 Coman, D. (1984) - The karst - biogeochemical aspects: Bucharest; Theoretical and Applied Karstology, 1, p. 23-28.

Arguments supporting the idea that the process of karst and cave formation is a result of phenomena of biogeochemical alteration of rocks, with the main role played by the heterotrophic and chemolithotrophic micro-flora. Stress is placed on the biochemical reactions of very rapid oxidation of certain minerals which lead to the formation of carbonic and sulfuric acid, essential factors in the genesis of karst and caves.

0364 Coman, D. (1979) - Essay on the ecological interpretation of the origin of caves: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 18, p. 191-199 [in French].

On the basis of bibliographic studies and individual research work, the author ascribes the origin of the karst and of the caves to a system of ecological relations in which the major part is played by the heterotrophic and chemolithotrophic microflora.

0365 Coman, D.; and Craciun, V. (1978) - The Vintului Cave: Bucharest; the Sport-Turism Publishing House, 44 p., 81 photographs [in Romanian, with French and German versions].

The authors report the discovery and exploration of the largest cave in Romania (33 km long) and outline morphological aspects of this cavity which features spectacular labyrinthic meanders that are considered unique in the world.

0366 Comer, J. B. (1974) - Genesis of Jamaican bauxite: U.S., Lancaster; Economic Geology Bulletin of the Society of Economic Geologists, 69:8, p. 1251-1264.

0367 (1974) - Conference on Karst Geology and Hydrology Proceedings: U.S., Morgantown, West Virginia; Conference on Karst Geology and Hydrology, Proceedings, 4, 1974.

0368 Congar, Behic. (1977) - Determinability of production capacity for Malya karstic springs (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 23-24.

An account of the development of a spring, with an estimation of the annual safe yield by correlations of withdrawal from the

spring, changes in water levels, and precipitation value of the basin.

0369 Constantinescu, T. (1986) - The evolution of the hydrographic network in the Dimbovicioara Chute, the genesis and evolution of the Dimbovicioara Valley, Note 1: Theoretical and Applied Karstology, 2, 3 figs. [under print].

The Dimbovicioara Chute and the Dimbovicioara Valley are discussed with emphasis on the important role played by tectonics and by karstic processes in the evolution of the hydrographic network and, naturally, in the organization of the hydrographic basin of the Dimbovicioara River.

0370 Constantinescu, T. (1984) - The Piatra Craiului Massif, the genesis and evolution of the torrents on the north-western and northern slopes, Pleistocene glaciation: Theoretical and Applied Karstology, 1, p. 99-106, 3 figs. [in French].

The torrents on the northwestern and northern slopes are shown to be features of relief specific to the massif. The author suggests the term "vladusca" ("vladusti" in the plural) - a torrent formed of limestone with the drainage basin a former cirque and the drainage channel very deep, widely open in the upper part and narrow and vertical in the lower part; polygenetic character.

0371 Constantinescu, T. (1984) - A map of underground water circulation in the Piatra Craiului Massif: Bucharest; Trav. Inst. Spéol. "Emil Racovita" Tome XXIII, p. 75-79 [in French].

The major aspects of underground water circulation in the Piatra Craiului Massif in the Southern Carpathians are presented. Two hydrogeological basins are shown to exist. A morphohydrographic map is included.

0372 Constantinescu, T. (1980) - The karst in the Piatra Craiului, the particularities of the genesis and evolution of the karst: Bucharest; Note 1, Trav. Inst. Spéol. "Emil Racovita", Tome XIX, p. 203-217, 2 figs., 3 tab. [in French].

In consideration of the fact that the Piatra Craiului Massif (in the Southern Carpathians) contains a karst that boasts a number of particularities, this first note is devoted to aspects specific to the genesis and evolution of the karst, with reference to structural implications, the overall morphology of the massif, and weather conditions.

0373 Constantinescu, T. (1977) - The evolution of the hydrographic network in the Prapastiile Zarnestilor karstic area: Bucarest; Trav. Inst. Spéol. "Emi Racovita", Tome XVI, p. 217-228, 8 figs. [in French].

The evolution of the hydrographic network is outlined and three stages of transformations are shown to have occurred in parallel with the major morphological and sculptural stages in the Southern

Carpathians. The complexity of the respective phenomena is shown by stages in sketches.

0374 Constantinescu, T. (1976) - The karst of Petricica (the Piatra Craiului Massif - the Southern Carpathians): Bucarest; Trav. Inst. Spéol. "Emil Racovita", Tome XV, p. 233-245, 5 figs., 2 tab. [in French].

A presentation of the karst of Petricica, emphasizing the fact that the exokarst (sinkhole areas, lapies, and gorges) is poorly represented and the endokarst (caves and underground circulation) is more interesting.

0375 Constantinescu, T. (1975) - Remarks on the caves situated between the rivers Susita Verde and Sohodol (the Vilcan-Southern Carpathian Mountains): Bucharest; Trav. Inst. Spéol. "Emil Racovita", Tome XIV, p. 169-188, 7 diagrams and 3 tab. [in French].

Thirty caves, from 8 to 750 m long, are presented and their significance as indices in deciphering the paleogeography of the region is underscored. Tables and maps show the main karstic springs and water losses, and include general considerations on underground drainage directions.

0376 Constantinescu, T. (1973) - Geomorphological and speleological remarks on the northern part of the Piatra Craiului Massif: Bucarest; Trav. Inst. Spéol. "Emil Racovita", Tome XII, p. 279-302, 18 figs., 2 tab. [in French].

After a brief geomorphological presentation, 29 small caves on the northwestern and northern slopes are presented. Because of stratification, the position of the slopes, and the marked inclination of the slopes, the waters infiltrated into the mass of limestone and re-emerged to the surface after a short underground route.

0377 Cooke, H.J. (1970) - The cave systems of the Tanga Limestone in northeast Tanzania and the influence of former sea levels on their formation: U.K., London; Studies in Speleology, Vol. 2, Part 2, p. 69-80.

The caves developed in the Tanga Limestone are at a low altitude and close to the coast. They show a sequence of development which appears to be related to fluctuating sea levels as revealed by river terraces and benches in the same area. An attempt is made to draw up a tentative scheme of cave evolution linked to these fluctuating sea levels.

0378 Cooper, R.G.; Ryder, P.F.; and Solman, K.R. (1976) - The North Yorkshire windy pits; a review: U.K.; Transactions of the British Cave Research Association, 3:2, p. 77-96.

All known windy pits in the Rydedale and Hambleton Hills area of North Yorkshire are described. New surveys of some are presented. "Windy pits," a local term, are holes in the ground from which draughts of air are limited. They are not caves but are formed by gravitational sliding of detached Carallian rock masses, Upper

Jurassic, with water erosion and deposition only playing a minor role.

0379 Cooper, S.S. (1983) - Cavity detection and delineation research; Report 3, Acoustic resonance and self-potential applications; Medford Cave and Manatee Springs site, Florida: U.S.; U.S. Army, Technical Report GL 8301, 21 p.

0380 Corbel, Jean. (1971) - Notes sur les plus grandes grottes du monde: Ljubljana, Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 19-24.

A generalized account of the major caves of the world with specific dimensions given of some.

0381 Corbel, Jean. (1969) - Karsts océaniques Britanniques: Extrait de Recherches Méditerranéennes, études et travaux de Méditerranée No. 7, 1967, p. 211-226.

Study of karst in peaty environments in Ireland, in Yorkshire, and in the Mendips where organic acids are not important in erosion but where the concentration of carbon dioxide in the soil is important. Morphological types of landscapes were noted.

0382 Corbel, Jean. (1969) - Les karsts des régions chaudes: Germany, F.R., Stuttgart; 5th International Kongress für Spelaologie, 1969, Vol. 1, p. M12/1-M12/3.

An account of karstic reaction in hot and dry environments and in hot and humid environments.

0383 Corbel, Jean. (1960) - Nouvelles recherches sur les karsts arctiques Scandinaves: Germany, F.R.; Zeitschrift für geomorphologie, supplementband 2: Internationale Beitrage zur Karstimorphologie, p. 74-78.

The cold waters of northwestern Europe are stable and remain aggressive with little redeposition of calcium carbonate whereas the warmer waters of Florida dissolve calcium carbonate but redeposit it quickly to form stalactites and stalagmites. Thus cold waters are very aggressive and hold the dissolved material in solution.

0384 Corbel, Jean. (1957) - Les karsts du Nord-Ouest de l'Europe: Lyon; Mém., Docum. Inst. Etude Rhodan, Vol. 12.

Erroneously considered that the Waulsortian mounds of the Buttevant region were "cockpit karst" evolved under past conditions of tropical weathering.

0385 Corbel, Jean. (1954) - Les Phénomènes karstique dans la Région de Cork, Irlande du Sud: Norois, Vol. 2, p. 129-140.

First report on the erroneous theory that the Waulsortian mounds of the limestones in the Buttevant region were a type of "cockpit karst" formed under past conditions of tropical weathering.

0386 Corbel, J.; and Gallo, G. (1970) - Ayokarsts et chimie des neiges en zone polaire: Revue Géographique des Pyrénées et du Sud-Ouest, Toulouse, 41:2, p. 123-138.

A comparison is made between karstic features and features formed by glaciers. There is found to be a clear resemblance in the features from each environment.

0387 Corgan, J.X.; and Parks, J.T. (1979) - Natural bridges of Tennessee: U.S.; Tennessee Division of Geology, Bulletin 80, 102 p.

0388 Cotecchia, V.; Tadolini; and Tulipano (1978) - Karst water use and protection (abstract) in International Symposium on Karst Hydrology, Proceedings, Vol. II, Budapest, Hungary, 1978: Hungary; Proceedings, p. 18 [in English].

0389 Cotecchia, Vincenzo (1974) - The huge aquifer and the marine intrusion into the fissured and karst mesozoic limestones of Apulia (southern Italy): recent studies and investigations by employing modern methodologies: Belgium; Centenaire de la Société Géologique de Belgique, Colloque Géologie de L'Ingénieur, Liege, p. 291-312.

Cretaceous calcareous and dolomitic rocks, bedded, jointed and karstified, and hence generally very permeable, form the basement of Apulia (Southern Italy). These rocks constitute a huge aquifer with fresh and brackish groundwaters which float on groundwaters of marine origin. Sea level constitutes the base level of the groundwaters.

0390 Cortine, F.F.; and Buguelskiy, Y.Y. (1974) - Iron-nickel laterites redeposited on limestone, Cuba: Cuba; Publ Espec Acad Cienc Cuba Inst Geol Paleontol, 2, p. 117-139 [in Spanish].

0391 Couturaud, A. and Benderitter, Y. (1985) - Essais de mise en évidence et étude de l'environnement de drains karstiques par des techniques géophysiques in Karstologia, No. 5, p. 17-22.

Geophysical techniques (electric and electromagnetic) tested on two underground rivers of the nivernais karst (Bourgogne, France) are discussed. The first site is in a dry valley and the second on the border of a plateau. Results of the testing provide limited interpretive data; however anomalies have been interpreted to reflect the presence of cross-fractures. Some discussions are presented on the theory and methodology of geophysical testing.

0392 Coward, J.M.H. (1975) - Paleohydrology and streamflow simulation of karst basins in southeastern West Virginia, U.S.: Canada; McMaster University Ph.D. dissertation.

0393 Cowell, D.W. (1983) - Karst hydrogeology within a subarctic peatland: Attawapiskat River, Hudson Bay Lowland, Canada: Netherlands, Amsterdam; Journal of Hydrology, 61:1-3, p. 169-175.

There are two karst hydrogeological zones: (1) a vadose fluviokarst zone in the exposed limestone along the river represented by

disappearing lakes and streams, and (2) an organo-karst zone represented by sinkholes on or next to limestone bioherms within the peat mantle.

0394 Cowell, D.W.; and Ford, D.C. (1983) - Karst hydrology of the Bruce Peninsula, Ontario, Canada: Netherlands, Amsterdam; Journal of Hydrology, 61:1-3, p. 163-168.

Five small fluvio-karst basins with regular surface flow but sinkhole drainage exist in the deeply scoured dolomite plain of the Bruce Peninsula. Near the Niagara Escarpment on the eastern boundary of the plain is a zone of holokarst dominated by vertical drainage and lacking normal surface channels.

0395 Cowell, D.W.; and Ford, D.C. (1982) - Hydrochemistry of a dolomite karst: the Bruce Peninsula of Ontario: Canadian Journal of Earth Sciences, 17:4, p. 520-526, 1980, 5 fig., 2 tab., 20 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 15:1, p. 14.

The characteristics of waters of the Bruce Peninsula, a low-lying, karstified dolomite surface at latitude 45 N, were investigated. A total of 250 samples representing six hydrochemical environments were collected. Surface recharge and conduit-flow springs were generally saturated with respect to calcite and dolomite. Only diffuse-flow springs, which are among the hardest of waters, are commonly undersaturated. Results of a linear discriminant function analysis suggest that other waters of the peninsula represent a single class.

0396 Cowell, D.W.; and Ford, D.C. (1974) - The karst sinkholes and springs of Wodehouse Creek, Beaver Valley, Ontario: U.S.; Proceedings of the 4th Conference on Karst Geology and Hydrology, West Virginia Geological and Economic Survey, p. 81-89.

Karren, sinkholes, primitive caves, and spring formation were initiated on the Niagara Escarpment, Ontario, after the Wisconsin glacier trimmed the escarpment. Joint sets control the flow of ground water mainly in the phreatic zone. The controlling factors for water quality are till types and seasonal variations.

0397 Cox, G.C., III (1984) - Siting study for aluminum plant in central Kentucky in PraKash, S., editor, International conference on case histories in geotechnical engineering, Proceedings, Vol. 2: St. Louis, Missouri, May 6-11, 1984: U.S.; University of Missouri-Rolla, p. 885-894.

0398 Craciun, V. (1984) - Phenomena of endokarstic condensation in the Eocene limestone of the Manastireni-Bica area (Cluj): Bucharest; Theoretical and Applied Karstology, 1, p. 139-145, 1 fig. [in French].

A presentation of the morphological, lithological, and structural characteristics of an island of Eocene limestone and comments upon the particularities of a karstic spring at its edge, whose source of supply may be endokarstic condensation to a large extent.

0399 Craciun, V. (1975) - Granulometric analyses of the accretions in several caves of the Iad Valley Basin: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 393-399, 1 fig. [in German] and (1973) - Bucharest; Trav. Inst. Spéol. "Emil Racovita", 12, p. 349-355, 2 figs. [in French].

A brief description of sedimentation conditions and the interpretation of the results of the granulometric analysis of the accretions in four caves in the Iad Valley karst (the Padurea Craiului Mountains).

0400 Craciun, V. (1973) - Several considerations on the accretions in the caves of the Apuseni Mountains: Bucharest; Livre du cinquantenaire de l'Institut de Spéléologie "Emil Racovita", the Publishing House of the Academy of the Socialist Republic of Romania, p. 643-646, 2 figs. [in French].

A comparative presentation of the granulometric characteristics of the accretions in seven caves in the Padurea Craiului, Bihor, and Rodna Mountains.

0401 Craciun, V.; and Racovita, G. (1975) - The Pojarul Politei Cave: Bucharest; the Sport-Turism Publishing House, 108 p., 71 photographs [in Romanian with French and German versions].

An album including images from a cave that has been made a nature monument because of its rich and diversified calcitic crystallizations.

0402 Crawford, N.C. (1984) - Sinkhole flooding associated with urban development upon karst terrain: Bowling Green, Kentucky in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 283-292.

Sinkhole flooding is a serious problem for Bowling Green, a city of 50,000 built entirely upon the classic Sinkhole Plain of south-central Kentucky. Since storm drains are prohibitively expensive because of the karst topography, the city relies upon the Lost River and other caves to serve as natural storm sewers. An investigation of storm water runoff from primarily commercial landuse revealed that, although it is contaminating some of the smaller cave streams with lead, chromium, iron, oil and grease, and fecal coliform, it is sufficiently diluted upon flowing into the large Lost River.

0403 Crawford, N.C. (1984) - Toxic and explosive fumes rising from carbonate aquifers: a hazard for residents of sinkhole plains in Beck, B.F., editor, Sinkholes; their geology, engineering and environmental impact; the first multidisciplinary conference on sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands, A.A. Balkema, p. 297-304.

A spill or leak of hazardous chemicals upon a sinkhole plain may quickly sink into underlying cave streams and become a threat to water supplies and aquatic life. Upon vaporizing, it may become

concentrated in the cave atmosphere and rise into homes on the surface. The following investigations are recommended: (1) methods of storing and transporting hazardous chemicals in karst regions; (2) emergency response techniques for spills and leaks of hazardous chemicals in karst regions; (3) identification of major traps for floating chemicals in the caves under Bowling Green.

0404 Crawford, N.C. (1982) - Sinkhole flooding in urban areas and injection of stormwater runoff into karstified carbonate aquifers: U.S.; Geological Society of America Abstracts with Programs, 14:7, p. 468-469.

Possible correlations between precipitation, flow in the underground Lost River, and flooding in karst depressions were investigated in Bowling Green, Kentucky. Stormwater runoff is injected into caves and solutionally enlarged joints in addition to natural recharge. Problems associated with injection of stormwater include siltation, point-source pollution, sinkhole collapse, and resurgence of injected water. Restricting development of flood prone areas and use of stormwater retention basins appear to be the best methods of dealing with stormwater flooding in karst areas.

0405 Crawford, N.C. (1978) - Subterranean stream invasion, conduit cavern development and slope retreat: a surface-subsurface erosion model for areas of carbonate rock overlain by less soluble and less permeable caprock: U.S.; Clark University Ph.D. dissertation, 505 p.

0406 Creed, E.J. (1985) - Groundwater development at Port Laoise: Port Laoise Seminar, Irish Group, IAH, 22/23 April.

Three stages of ground-water development from limestone aquifers near Port Laoise city, and extended to Mountmellick and Portarlington are noted; requirements would amount to 25,000 m^3/day by 2025. These amounts can be gotten from Darkin Well, Derrygarron Aquifer, Portarlington Treatment Works, and minor sources, and from new boreholes to be drilled into the limestone aquifers of the Derrygarron area.

0407 Creed, E.J. (1983) - Pumping options and cost factors: Port Laoise Seminar, Irish Group, IAH, 19/20 April.

Drawdown and specific capacity determine costs and pumping options. Even with high-yielding limestone aquifers, stand-by capacity is desirable. Instrumentation is essential and will quickly repay high cost of full instrumentation recording well and pump behavior.

0408 Crestin, B.M.; and Svistunov, N.I. 1982, Conceptual modelling of karst processes in Moscow: Abstracts of reports at III Karst Speleology Conference, Moscow, 51 p.

0409 Crochet, P.; Lesage, P.; and Blum, P.A.; and Vadell, M. (1983) - Extensometric deformations linked with rainfalls <u>in</u> Ann. Geophy. France, 1:4-5, p. 329-334.

0410 Cronin, J.G. (1964) - A summary of the occurrence and development of ground water in the southern High Plains of Texas, with a section on

artificial recharge studies by B.N. Myers: U.S.; U.S. Geological Survey Water-Supply Paper 1693, 88 p.

The author evaluates and summarizes the ground water resources of part of the southern High Plains, with a description of geology, movement of ground water, and gives a discussion of recent attempts at artificial recharge.

0411 Cronin, J.G. (1961) - A summary of the occurrence and development of ground water in the southern High Plains of Texas: U.S.; Texas Board of Water Engineers Bulletin 6107, 110 p.

The author provides information on the geologic units and their water supply. For the Ogallala Formation, gives information about the occurrence, use, recharge, and movement of ground water, hydraulic properties, fluctuations of water levels, water in storage, and quality of water. Also gives the outlook for the future.

0412 Cronin, J.G. (1959) - Availability of ground water in the south plains of Texas: U.S.; U.S. Geological Survey Open-File Report, 16 p.

The report provides information on the ground-water supplies in the Ogallala Formation, including an estimate of the amount of water in storage. Also gives information about the limitations of artificial recharge.

0413 Cronin, J.G.; and Wells, L.C. (1963) - Geology and ground-water resources of Hale County, Texas: U.S.; U.S. Geological Survey Water Supply Paper 1539-U, 38 p.

The author describes the geologic formations and their water-bearing properties and the ground water, including hydraulic properties of the aquifer, movement, recharge, natural discharge, withdrawal from wells, water in storage, and the quality of water. Discussion is also provided on the outlook for the future.

0414 Crowther, J. (1984) - Hydrology of autogenic percolation systems in some tropical karst outcrops, West Malaysia: Journal of Hydrology, 60:1-4, p. 227-242, January 1983, 5 fig., 2 tab., 31 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:12, p. 13.

Flow regimes of underground seepages in three tower-karst outcrops and in the Setul Boundary Range, West Malaysia, are reported. The autogenic percolation systems of the tower-karst hills and the Setul Boundary Range may be clearly distinguished.

0415 Cruden, D.M.; Leung, Y.W.; and Thomson, S. (1981) - A collapse doline in Wood Buffalo National Park Alberta, Canada: Germany, Krefeld; Bulletin of International Association of Engineering Geologists, 24, p. 87-90.

0416 Cseko, Arpad K. (1969) - Low-level radioactivity telemetering arrangement for monitoring of thermal karstic water: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY10/1-HY10/2.

A low-level radioactive telemetering instrument was developed for the Budapest thermal karstic water to continue a monitoring program for radioactivity from the nuclear research reactors and isotope plants situated in the Budapest hills. Specific activities down to 10-10/litre can be detected.

0417 Cser, F.; and Maucha, L. (1968) - Contribution on origin of excentric concretions: Karszt, es Barlangkutatos, Vol. V., p. 83-100.

A discussion with laboratory test results on the development of excentric concretions (helictites).

0418 Cullen, K.T. (1985) - Hydrogeology of the Port Laoise Limestone Aquifer: Port Laoise Seminar, Irish Group, IAH, 22/23 April.

Covered karst predominates in the Port Laoise region. Methods of ground-water investigation, including resistivity and trial drilling, have given satisfactory results. The main aquifer is some 100 meters thick, overlain by glacial deposits and karstified in many ways, mainly by sub-glacial and post-glacial meltwaters.

0419 Cullen, K.T. (1984) - Groundwater development at Kinvarra for Galway County Council: Port Laoise Seminar, Irish Group, IAH, 3/4 April.

Drilling at Loughcurra South revealed the presence of two distinct and separate karst aquifers, separated by some 70 meters of unfractured and unkarstified limestone. The deeper aquifer is protected from pollution and sharp fluctuations, but its ground water is more heavily mineralized.

0420 Cullen, K.T. (1982) - Aspects of the Hydrogeology of South County Wexford: Read at meeting, May 1979; published by the Irish Comm., IHP, p. 136-155.

The study area included limestone-dolomite aquifers, many below sea level in the coastal zone. Transmissivities ranged from 25 to 600 m^2/day. Quality is excellent, but hardness as CaCO3 exceeds 300 mg/liter.

0421 Cullen, K.T. (1982) - Importance of pumping data analysis: Port Laoise Seminar, Irish Group, IAH, 30/31 March.

Proper use and interpretation of pumping test data can maximize yields and ensure optimum extraction. A graphical procedure is presented that avoids involved mathematics, but permits full use of the test pumping data.

0422 Curl, R.L. (1974) - Cave conduit competition: nonautonomous systems (abstract) in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 109.

Cave conduit flow and dissolution were studied by the author to try to understand the "maze caves" which develop. His conclusions are given.

0423 Currens, J.C.; and McGrain, P. (1979) - Bibliography of karst geology in Kentucky: U.S.; Kentucky Geological Survey Special Publication XI:1, 59 p.

0424 Curro, J.R., Jr. (1983) - Cavity detection and delineation research; Report 2, Seismic methodology; Medford Cave site, Florida: U.S., U.S. Army Technical Report GL 83-1, 35 p.

0425 Custodio, E.; Bayo, A.; and Batista, E. (1977) - Sea water encroachment in Catalonian coastal aquifers: International Association of Hydrogeologists Memoirs, Vol. XIII, Part 1, Birmingham Congress, U.K.

A discussion of the problem of sea water encroachment which is magnified by the presence of karstic features.

0426 d'Aramengo, Carlo Balbiano. (1969) - Possibilité de différer l'analyse des fluocapteurs dans les expériences avec fluoresceine come traceur: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY11/1-HY11/3.

The methods outlined in the paper for tracing underground routes are semi-quantitative but could be useful as initial indicators of water movement.

0427 Dalgleish, J.B.; and Alexander, E.C., Jr. (1984) - Geologic atlas of Winona County, Minnesota; Sinkholes and sinkhole probability: U.S.; Minnesota Geological Survey, County Atlas Series, scale 1:100,000, 1 sheet.

0428 Dalgleish, J.B.; and Alexander, E.C., Jr. (1984) - Sinkhole distribution in Winona County, Minnesota in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 79-85.

Winona County, located in southeastern Minnesota, is part of a karst region in the upper Mississippian Valley. A 1:100,000 scale map showing sinkhole locations and sinkhole probability was prepared. The sinkhole density, while low compared to many karst regions was much greater than anticipated.

0429 Dalton, Richard F. (1976) - Caves of New Jersey: U.S.; New Jersey Geological Survey Bulletin 70, 51 p.

0430 Daly, D. (1985) - Groundwater in County Galway with particular reference to its protection from pollution: Read to West Region Branch, Inst. Engineers Ireland, on 16 January 1985.

The objective of the paper is the protection of ground water from pollution. Some emphasis is placed on fissured limestone aquifers karstified to varying degrees. Such karst features as swallow holes, dry valleys, bare rock, deep water tables, and large springs are noted, and forms of protection described.

0431 Daly, D. (1985) - Groundwater quality and pollution in Ireland: Read at meeting, June 1984, for Geological Survey; Published by Irish Nat. Comm. IDH, p. 66-86.

Notes natural hardness of ground water due to widespread limestone aquifers. Problem constituents are iron, manganese, and sulphate. Fissure permeability, high water tables, and rapid infiltration render Irish limestone aquifers very liable to pollution by all forms of farm waste. Better knowledge of ground water and improved farm practices are recommended.

0432 Daly, D. (1984) - Groundwater quality and vulnerability to pollution - a national study: Port Laoise Seminar; Irish Group, IAH, 3/4 April.

Pollution of both solid rock and Quaternary unconsolidated aquifers can occur since the aquifers are mainly unconfined, are shallow with a shallow water-table, and most of them are limestones with fissure flow. Ground-water travel time is used to classify vulnerability to pollution. The most at risk is T4B, cavernous limestone with little or no overburden.

0433 Daly, D. (1982) - A groundwater supply for Shannonside, Ballaghadereen: pumping tests on Lung Borehole and Lissan Spring: Ireland; Geological Survey Internal Report No. 2.2.20.

Lissan Spring has a most reliable yield, approximately 3,270 m^3/day. The Lung Borehole was tested at 2,650 m^3/day. Both are from fissured limestone aquifers, but hydraulic connections between the spring, the borehole, and the Lung River are slight or nil.

0434 Daly, E.P. (1982) - Geophysical well logging in limestones: Port Laoise Seminar; Irish Group IAH, 30/31 March.

Use of a Gearhart-Owen Porta-Logger for analyzing boreholes drilled in limestones-dolomites. Six geophysical methods used - spontaneous potential, single-point resistance, natural gamma, caliper, fluid velocity, and temperature.

0435 Daly, E.P. (1982) - The principle aquifers of the Nore River Basin: Read at meeting, May 1979; Published by the Irish Comm. IHP, p. 106 and 183-204.

Ground-water productivity from the Dinantian limestones is a function of lithology and topography. Permeability is secondary and variable. Deep karst is due to glacial drainage levels much deeper than those of today.

0436 Daly, E.P. (1981) - Nitrate levels in the aquifers of the Barrow River Valley: Ireland; Geological Survey Internal Report No. 2.11.1

The hydrogeology of the dolomites as well as the recharge, intermediate, and discharge zones of the Upper Cullahill Limestones are described. The sources of nitrates (diffuse and point) are described, and the ways in which nitrates enter the ground water in the limestone and dolomite aquifers.

0437 Daly, E.P. (1977) - A hydrogeological investigation on Inishmaan, Aran Islands: Ireland; Geological Survey Internal Report No. 3.

Describes the Carboniferous limestones, with solution hollows or kamenitzas on all surfaces. There is vertical fluting. The karstification does not extend to depth, as in the nearby Burren. Karstification is slight below some 10 meters depth. Blasting was used to increase yield of boreholes.

0438 Daniel, T.W., Jr.; and Coe, W.D. (1973) - Exploring Alabama caves: U.S.; Geological Survey of Alabama Bulletin 102, 99 p.

0439 Daoxian, Yuan (1981) - A brief introduction to China's research in karst: China; Institute of Karst Geology, Ministry of Geology, People's Republic of China [in English, reference in Chinese], 35 p.

0440 Da Silva, A.B. (1983) - Results of a hydrogeological study of a semi-arid Precambrian karst aquifer in Minas Gerais, Brazil: Australia, Canberra; Conf Ser Aust Water Resourc Counc, 8:3, p. 283-293.

0441 Da Silva, A.B.; Custodio, E.; and Cruz, W.B.J. (1982) - Hidrogeoquimica de un aquifero carstico en Minas Gerais, Brasil [Hydrogeochemistry of a karstic aquifer in Minas Gerais, Brazil] in Quinto Congresso Latino-americano de Geologia, Buenos Aires, Argentina, 1982; Proceedings, Vol. 1, p. 585-600.

0442 Davies, Graham R. (1977) - Carbonate-anhydrite facies relations in Otto Fiord Formation (Mississippian-Pennsylvanian), Canadian Arctic archipelago: U.S.; American Association of Petroleum Geologists Bulletin, 61:11, p. 1929-1949.

The author discusses of the relationship of the Otto Fiord Formation which is a major evaporite deposit with alternating limestone and anhydrite. The complex facies relations demonstrated by the Otto Fiord rocks may serve as guides for modeling evaporite-reef relations and major carbonate to evaporite-facies transitions in subsurface studies related to hydrocarbon exploration.

0443 Davies, W.E.; Simpson, J.H.; Ohlmacher, G.C.; Kirk, W.S.; Newton, E.G. (1976) - Map showing engineering aspects of karst in the United States: U.S.; U.S. Geological Survey Open File Report 76-0623, 1 sheet, scale 1:7,500,000.

0444 Davis, D.G. (1981) - Hypotheses of cavern development in the Guadalupe Mountains: NSS Bulletin, 42:42-48.

Three conflicting mechanisms have been proposed involving large scale production of sulfate in the development of Carlsbad Cavern and other Guadalupe caves. The observed features appear most consistent with creation of the larger caves by ascending water charged with sulfuric acid, produced by oxidation of hydrogen sulfide.

0445 Davis, D.G. (1980) - Geology and speleogenesis of Ogle Cave, discussion: U.S.; NSS Bulletin, 41:1, p. 21-22.

0446 Davis, G.H. (1964) - Another possible origin of Mississippi Valley-type lead-zinc deposits: U.S.; Geological Society of America Special Paper 76, p. 242.

The author presents a new system explaining the genesis of southeast Missouri lead deposits. The system incorporates descending ground water, existing sediments as source of metal, and facies changes as primary porosity.

0447 Davis, G.H.; et al. (1963) - Land subsidence related to decline of artesian pressure in the Ocala Limestone at Savannah, Georgia: U.S.; Geological Society of America Engineering Geology Case Histories, Vol. 4, p. 1-8.

Precise leveling by the Coast and Geodetic Survey from 1918 to 1955 has shown surface subsidence of 4 inches in the Savannah area. At the same time ground-water withdrawals have increased gradually. It is postulated that the artesian pressure supports part of the load of the confining bed and overlying deposits; therefore, the decrease in artesian pressure caused a corresponding subsidence in the overlying sediments.

0448 Davis, N.W.; and Hess, J.W. (1982) - Hydrogeology of the drainage system, Burnsville Cave, Virginia: NSS Bulletin, 44:78-83.

A six-year study was conducted to determine the recharge areas for the four major springs in the Bullpasture Gorge, west-central Virginia. A total of 22 sink-to-spring dye tracings and seven internal traces to the Butler Cave-Sinking Creek System were conducted to determine spring recharge boundaries. Interrelations between the basins and the spring flow characteristics were observed; changes in the flow regimes under flood and base flow conditions were described.

0449 Davis, N.W.; and Hess, John W. (1976) - Hydrogeology of the drainage system, Burnsville Cove, Virginia (abstract): U.S.; West Virginia Geological and Economic Survey Conference on Karst Geology and Hydrology, 6th, Proceeding 1976, p. 93.

A description of a study to determine the recharge areas using dye tracing for four major springs in the Bullpasture Gorge, West-Central Virginia.

0450 Day, M. (1984) - Carbonate erosion rates in southwestern Wisconsin: U.S.; Physical Geography, 5:2, p. 142-149.

0451 Day, M. (1984) - Distribution of slope unit types and erosion rates within cockpits in Belize (abstract) in Friends of the Karst Meeting, Puerto Rico: U.S.; Geo 2, 11:3.

0452 Day, M. (1984) - Predicting the location of surface collapse within karst depressions, a Jamaican example in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 147-151.

Shallow, extensive karst depressions in northern Jamaica are punctuated by collapse pits that pose a threat especially to livestock. To identify high risk sites, the locational attributes of 108 collapses within 37 depressions were analyzed. In particular, 55 percent of collapses occur between 20m and 50m from depression bases and 57 percent occur in internal topographic lows. By contrast, only 25 percent of collapses occur within centripetal drainage channels and only 22 percent occur along depression long axes. Such analysis provides a simple, useful index of site hazardousness.

0453 Day, M. (1983) - Doline morphology and development in Barbados: U.S.; Annals of the Association of American Geographers, 73:2, p. 206-219.

0454 Day, M. (1976) - The morphology and hydrology of some Jamaican karst depressions: U.K., Chichester; Earth Surface Processes & Landforms, 1:2, p. 111-129.

0455 Day, M.J. (1979) - The hydrology of polygonal karst depressions in northern Jamaica: Berlin; Zeltschrift fuer Geomorphologie Supplementband, 32, p. 25-34.

0456 Day, M.J. (1978) - Morphology and distribution of residual limestone hills (mogotes) in the karst of northern Puerto Rico: U.S., Boulder; Bull Geol Soc Am, 89:3, p. 426-432.

0457 Day, P.W.; and Wagener, F.v.M. (1984) - Investigation techniques on dolomites in South Africa in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 153-158.

The investigation techniques used on dolomites are, of necessity, different to those employed on other geological strata. The investigation techniques used in South Africa include photograph interpretation, thermal line scanning, LANDSAT imagery, gravimetrics, seismic and resistivity surveys, percussion drilling, backactor trenching, and variable frequency vibration, among others. This paper discusses the above methods and presents case studies of two investigations conducted by the authors.

0458 deBecker, J.P. (1971) - De la prevention ou comment ordre les jeuires spéléologues: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 9-18.

A guide to the development of a proper safety service for caverns.

0459 deBecker, Jean-Perre. (1969) - Recherches sur l'histoire du mouvement spéléologique Belge: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 6, p. D1/1-D1/8.

An account of the speleological movement in Belgium.

0460 De Bellard, P.E. (1973) - A speleological study of the Los Monjes archipelago: Venezuela, Caracas; 2 Congresso Latinoamericano de Geologia, Proceedings, p. 168-169.

0461 Decamps, H.; and Laville, H. (1977) - Invertebrates and organic matter swept along during spates, at the inlet and outlet of the karstic system of Baget [in French]: Ann Limnol 1975, 11:3, p. 287-296 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 10:12.

More than 90 percent of the invertebrates swept along at the inlet of the system remain trapped inside the subterranean environment. The most important input appears during the first days of the spate; it is the same with the total organic matter per liter of water. The large and medium particles of organic matter form the most abundant fraction at the inlet of the system; dissolved organic matter is the most abundant fraction at the outlet.

0462 Deevey, E.S.; et al. (1979) - Mayan urbanism impact on a tropical karst environment: Washington, D.C.; Science, 206:4416, p. 298-306.

0463 deGiocoechea, Nestor. (1969) - El karst de Itxina: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M11/1-M11/7.

0464 deGiocoechea, Nestor. (1969) - Formas karsticas de Itxina: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M3/1-M3/7.

0465 Deike, G.H., III. (1976) - Geometry of cavern passages (abs): U.S.; West Virginia Geological and Economic Survey Conference on Karst Geology and Hydrogeology, 4th, Proceedings, p. 137.

Linear regressions were done on caves in central Kentucky karst in an attempt to develop general characteristics of cave passages, to assist in correlating dissected fragments, to identify continuity or discontinuity of passages through breakdowns, and to help understand paleohydrology.

0466 Deires, Gyorgy. (1969) - Die höhle als örtliche untere erosionsbasis und die entwicklung der assteleker baradlahöhle: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. S41/1-S41/5.

0467 De Kock, W. (1964) - The geology and economic significance of the West Wits Line, the dolomite water and its attendant problems in The Geology of Some Ore Deposits of Southern Africa: South Africa; Geological Society of South Africa, 1964, Vol. 1, p. 375-381.

0468 Delannoy, J.J. (1981) - Le Vercors septentrional: le karst de surface et la karst souterrain: France; Thèse Doct: 3ème cycle Géographie, Grenoble, 517 p.

Etude de la karstification superficielle et souterraine et du processus de dissolution du calcaire et de formation des réseaux

souterrains du Vercors en rapport avec la lithologie et la structure du réservoir.

0469 Delbrouck, Robert (1969) - De l'influence des acides humiques sur la corrosion des roches calcaires: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. S52/1-S52/7.

Carbon dioxide is the principal compound in the corrosion of carbonates, but sulfate, chloride, and humic acids play an important role also.

0470 Delcourt, H.R.; Delcourt, P.A.; Spiker, E. (1982) - Holocene paleohydrologic changes in the southern Ridge and Valley Province of Alabama: U.S.; Geological Society of America Abstracts with Programs, 14:1-2, p. 14.

0471 Demangeot, J. (1974) - Dissolution and karstification on Devon Island (arctic Canada): Paris; Mém Doc Serv Doc Cartogr Géogr, 15, p. 111-119 [in French].

0472 de Marsily, G.; and Durousseau, M. (1977) - Recherche de la meilleure implantation des forages poier buralimenter une rivière par injections dans la nappe: International Association of Hydrogeologists Memoirs, Vol. XIII, Part 1, Birmingham Congress, U.K., p. C1-C13.

Artificial recharge in the chalk aquifer in northern France is considered in order to increase the natural flow of the river "La Lys" at minimum stream flow. Depending upon when water for injection is available and when it is desirable to have water flowing into the river, linear programming is used to find the optimal location for the injection well and to determine the efficiency of the recharge.

0473 deMartynoff, Alexis. (1971) - Le Grottes Touristiques Belges: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 115-118.

A description of the types of caves occurring in Belgium.

0474 Denes, Gy. (1971) - Die roffe allmablich abgetrageneu wasserund-urchlassigen decke in der morphologischen entwicklung des karstes: International Geographical Union, European Regional Conference, Symposium on Karst-Morphogenesis, Proceedings, p. 13.

0475 Derosier, P. (1984) - Approche du fonctionnement hydraulique et physicochimique des aquifères karstiques littoraux: exemple du karst de la Gardiole: France; Thèse Doct., 3ème cycle Hydrogéologie, Montpellier, 130p.

0476 Derruau, M. (1960) - Une hypothèse sur les rapports de la vitesse de plissement et de l'hydrologie dans la genèse de certains poljes: Germany, F.R.; Zeitschrift für geomorphologie, Supplementband 2, Internationale Beitrage zur Karstmorphologie, p. 79-80.

The author discusses folding, evaporation, dissolution, and fluvial erosion conditions that dictate where a polje is likely to form.

0477 de Vera, M.R. (1984) - Rainfall-runoff relationships of some catchments with karstic geomorphology under arid to semi-arid conditions: Journal of Hydrology, Vol. 68, p. 85-93, 1984, 3 fig., 2 tab., 10 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:9, p. 1.

Review of available consultant reports on water resources studies in the northeastern zone of Libya shows that 14 catchments have good data on rainfall and runoff for analysis, but only eight wadis have sufficient flood data of at least 11 events for linear regression analysis. The prevailing surface geology of practically all the catchments is marly limestone, which is conducive to karstification processes.

0478 Diaconu, G. (1985) - A graphic representation of the elementary cell of calcite and of the coordination octahedron: Travaux de l'Institut de Spéologie "Emile Racovitza", 25, (in press) [in French].

The work gives a graphic representation in elevation, profile plane, and space of the elementary cell of calcite. Furthermore, an image is conveyed of the coordination octahedron of calcium and oxygen.

0479 Diaconu, G. (1985) - The list of minerals that form speleothems: Theoretical and Applied Karstology, 2, (in press) [in French].

The work offers a list of the minerals described in natural caves grouped in classes and sub-classes according to their chemical composition. The list is accompanied by a selective bibliography, each mineral being assigned a number(s) that refers it to the work(s) that deal with it.

0480 Diaconu, G. (1984) - Considerations on the genesis of the clays on the limestones of "Closani Area", Mehedinti Mountains: Theoretical and Applied Karstology, 1, p. 13-22 [in French].

Relying upon chemical and spectral analyses, the hypothesis is put forth that the clays on limestone in the Closani Area are allochtonous. Assessments are made on the role of the "piezoelectric field" in clay fixation on limestone.

0481 Diaconu, G. (1984) - Graphic assessments on the coordination polyhedron of the crystalline structure of aragonite: Travaux de l'Institut de Spéologie "Emile Racovitza", 23, p. 57-65 [in French].

In his note the author starts from the values of the x, y, and z coordinates of the elements Ca, C, and O and makes a graphic representation of the elementary cell of aragonite and the coordination polyhedron CaO9.

0482 Diaconu, G. (1983) - On the gypsum-argonite mineralogical paragenesis in several caves from Romania: Travaux de l'Institut de Spéologie "Emile Racovitza", 22, p. 81-90 [in French].

A viewpoint is put forth on the gypsum-aragonite mineralogical paragenesis in several caves from Romania, with emphasis on the role played by hydronium (H3O+) ions in the genesis of aragonite.

0483 Diaconu, G. (1980) - Closani Cave, remarks on the current chemism of infiltration waters, its relationship with local thermal values in the endokarstic cavity: Travaux de l'Institut de Spéologie "Emile Racovitza", 19, p. 219-225 [in French].

A number of conclusions are set forth concerning the current chemism of infiltration waters in the passages of Closani Cave from Mehedinti Mountains. Vaterite was identified in the clay of several water influxes.

0484 Diaconu, G. (1979) - A classification of speleothems: Travaux de l'Institut de Spéologie "Emile Racovitza", 18, p. 215-218 [in French].

The author classifies speleothems according to a single criterion, their morphology.

0485 Diaconu, G. (1978) - Closani Cave, genesis and evolution: Travaux de l'Institut de Spéologie "Emile Racovitza", 18, p. 185-191 [in French].

An interpretation of the genesis and evolution of the cave from Closani is made after complex observations of karstic morphology, hydrography, geology, and tectonics.

0486 Diaconu, G. (1976) - Considerations on the genesis of calcite mondmilch in caves: Travaux de l'Institut de Spéologie "Emile Racovitza", 15, p. 227-230 [in French].

Discussing the genesis of mondmilch, the author distinguishes two main types: primary mondmilch, formed directly by the generating solution; and secondary mondmilch, formed by former concretionary crusts or even by the supporting rock, i.e., limestone.

0487 Diaconu, G. (1974) - Considerations on the presence of anhydrite in the Diana Cave, Baile Herculane, Romania: Travaux de l'Institut de Spéologie "Emile Racovitza", 13, p. 191-194 [in French].

By means of infrared analysis, calcium sulfate in the form of both gypsum and anhydrite is identified in the Diana Cave, Baile Herculane.

0488 Diaconu, G.; Bulgar, Al.; and Oancea, V. (1984) - The use of transfer function in establishing the water circulation characteristics in the karst: Theoretical and Applied Karstology, 1, p. 225-230.

The interpretation of the response of a karst system to an instantaneous tracer release (fluorescein or potassium dichromate) in terms of the transfer function - determined as the Fourier

transform of the output tracer concentration variation - allows the use of the data resulting from tracing operations in determining the attenuation factor and the time lag for transmission of the discharge variation between the input and output points.

0489 Diaconu, G.; and Hann, H.P. (1974) - Remarks on conic stalactites in the Muierilor Cave, Baia de Fier: Livre du Cinquantenaire de l'Institut de Spéologie "Emile Racovitza", Editura Academiei RSR, p. 621-632 [in French].

The structure and the mineralogical composition of several stalactites sampled from Muierilor Cave are described. A hypothesis is put forth concerning the genesis of aragonite crystals identified in the channel of stalactites.

0490 Diaconu, G.; and Medesan, Al. (1975) - Dahllite speleothems in the Muierilor Cave, Baia de Fier, Romania: Travaux de l'Institut de Spéologie "Emile Racovitza", 14, p. 149-156 [in French].

Dahllite, a mineral responsible for the numerous morphologically different speleothems in the Muierilor Cave, Baia de Fier, is identified by means of x-ray, infrared, differential thermal and chemical analyses.

0491 Diaconu, G.; and Medesan, Al. (1973) - On the presence of Pickeringite in Diana Cave (Baile Herculane, Romania): Travaux de l'Institut de Spéologie "Emile Racovitza", 12, p. 303-309 [in French].

By means of x-ray, infrared, differential thermal, and chemical analyses, pickeringite, a mineral in the hallotrichite-pickeringite series, is detected in a natural cavity for the first time.

0492 Diaconu, G.; Medesan, Al.; and Viehmann, I. (1977) - A new mineralogical paragenesis in Fagului Cave, Bihor County (huntite, aragonite, calcite): Travaux de l'Institut de Spéologie "Emile Racovitza", 16, p. 203-210 [in French].

A mondmilch sample taken from Fagului Cave, Bihor County, proved to be an interesting mineralogical association of huntite, hydromagnesite, aragonite, and calcite determined by means of x-ray and infrared analyses.

0493 Dieres, Gyorgy. (1969) - Karsthydrologische untersuchungen am ostflugel des assteleker karstgebietes: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY21/1-HY21/6.

0494 Dijon, Robert. (1977) - Etudes sur les eaux souterraines en pays de roches karstiques effectuées par les Nations Unis in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 3-8.

An account of the ground-water investigations in karstic areas studied by the United Nations in different areas of the world where hydrologic problems vary markedly from site to site.

0495 Dilamarter, R.R.; and Csallany, S.C., editors. (1977) - Hydrologic problems in karst regions: Proceedings of Symposium on Hydrologic Problems in Karst Regions, Western Kentucky University, Bowling Green, Kentucky, U.S., 1976: U.S., Western Kentucky University, Department of Geography and Geology, 481 p.

Articles in this volume called attention to the close surface-subsurface relationships in karst regions and to a wide array of problems, approaches, study techniques, and possible solutions. Articles included geophysical techniques for study, computer simulation of surface watersheds, and karst aquifer investigations.

0496 Dill, R.C. (1977) - The Blue Holes; geologically significant submerged sinkholes and caves off British Honduras and Andros, Bahama Islands: U.S.; Proceedings - International Coral Reef Symposium, 3; Vol. 3, p. 237-242.

0497 Dincer, Turget; and Payne, B.R. (1967) - An isotopic survey of lakes in the karst region of southern Turkey in Hydrology of Fractured Rocks, Proceedings Dubrovnik Symposium, October 1965, Vol. 2, p. 654-661.

A survey of stable and radioactive isotopes of hydrogen and oxygen was made in lakes in the karst region of southern Turkey. From the chloride concentrations observed, it is seen that the shallow lakes behave as well-mixed reservoirs, and it is possible to estimate the turnover time by comparing actual tritium concentration curves with theoretical curves based on tritium fallout in the region.

0498 Direv, Ljubomir. (1971) - Entwicklung und aufgaben des höhlentourismus in Bulgarien: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 97-99.

0499 Dodge, D. (1983) - Hydrogéologie des aquifères karstiques du Causse Comtal: France; Thèse Doct., Sc. Géol. Min, Bruxelles, 621 p.

Monographie et synthèse cartographique de la partie nord-occidentals (Causse Comtal, 350 km2) des Causses Majuers, prenant en compte les données de géologie, de spéléologie et d'hydrologie acquises sur cette région pour degager les principales caractéristiques de son hydrogéologie.

0500 Doehring, D.O.; and Vierbuchen. (1971) - Cave development during a catastrophic storm in the Great Valley of Virginia: U.S.; Science, Vol. 174, p. 1327-1329.

Observations made before and after a catastrophic storm support the conclusion that caves receiving storm recharge may be significantly developed in the vadose zone by the process of viaso transfer. These processes are greatly accelerated during times of major floods. Evidence indicates that in ancient times floods of similar magnitude have occurred.

0501 Doerr, Arthur H.; and Hey, Don R. (1957) - Karst landscapes of Cuba, Puerto Rico and Jamaica: Scientific Monthly, 85:4, p. 178-187.

The authors describe and differentiate landscape features in western Cuba, north-central Jamaica, and northwestern Puerto Rico. They discuss each karst area separately and expound on obvious comparisons and contrasts within the three regions.

0502 Domenico, P.A. (1972) - Concepts and models in ground-water hydrology: U.S., New York; McGraw-Hill Book Co.

A textbook on concepts and models in ground-water hydrology which would be directly applicable to karst hydrogeologists.

0503 Done, A. (1984) - The cave in the Cuciulat Quarry: Bucharest; Buletinual CSER, 8, p. 82-92, 2 maps, 3 pages with photographs [in Romanian].

A historical survey of exploration and the description of a 1,707 m cavity which contains the first paleolithic paintings discovered in Romania.

0504 Dougherty, P.H. (1985) - An overview of the geology and physical geography of Kentucky in Dougherty, P.H., editor (1985) - Caves and karst of Kentucky: U.S., Kentucky Geological Survey Special Publication 12, p. 5-17.

0505 Dougherty, P.H., editor. (1985) - Caves and karst of Kentucky: U.S., Kentucky Geological Survey Special Publication 12, 196 p.

0506 Dougherty, P.H. (1984) - The impact of the agricultural land-use cycle on flood surges and runoff in a Kentucky karst region in Beck, B.F., editor, Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S., Bowling Green, p. 267-269.

0507 Dougherty, P.H., editor. (1983) - Environmental karst; Karst symposium, Louisville, KY, U.S., April 1980: U.S.; Geospeleo Publications, 178 p.

0508 Dougherty, P.H. (1983) - Valley tides; a water balance analysis of land use response floods in a karst region, Sinking Valley, Kentucky in Dougherty, P.H., editor, Environmental Karst: Karst Symposium, Louisville, Kentucky, U.S., April 1980: U.S.; Geospeleo Publications, p. 25-36.

0509 Dougherty, P.H., editor. (1982) - 1982 National Speleological Society Convention abstracts: U.S.; Geo 2, 10:1.

0510 Downes, D. (1982) - The Dempewolfe's temporary sinkhole: U.S.; Minnesota Speleology Monthly, 14:8, p. 69-70.

0511 Downing, R.A.; Smith, D.B.; Pearson, F.J.; Moukhouse, R.A.; and Otlet, R.L. (1977) - The age of groundwater in the Lincolnshire Limestone, England, and its relevance to the flow mechanism: Journal of Hydrology, 33:314, p. 201-216.

An investigation using tritium, C13, and C14 sought to determine the age of water in the Jurassic limestones of Lincolnshire and to investigate the replenishment/storage ratios.

0512 Doyle, F.J.; and Holmes, C.W. (1984) - Shallow structure and carbonate sedimentation of West Florida upper continental slope (abstract): U.S.; AAPG Bulletin, 68:4, p. 471.

0513 Doyle, F.L. (1974) - Geologic and hydrologic constraints in land use of limestone terrane in north Alabama [abstr.]: U.S.; American Association of Petroleum Geologists Society of Economic Paleontologists and Mineralogists, Annual Meeting Abstracts, Vol. 1, p. 28.

0514 Drake, J.J. (1974) - Hydrology and karst solution in the southern Canadian Rockies [microfilm]: Canada, Ottawa; National Library of Canada, 3 sheets, microfiche [Ph.D. Thesis, McMaster University, 1974].

0515 Drake, J.J.; and Ford, D.C. (1971) - Karst research in Canada--Part 1 (abstract): International Speleological Union, Meeting on Karst Denudation, Oxford, England, September 1971.

An account of the four major regions of research in Canada are given.

0516 Drake, J.J.; Wigley, T.M.L.; Harmon, R.S.; and White, W.B. (1977) - Regional hydrogeochemistry of North American carbonate terrains, and the chemistry of carbonate ground water. Reply to discussion by Brook, G.A.; Cowell, D.W.; and Ford, D.C. (Water Resour Res [13:5] p. 856-858): Washington, D.C.; Water Resour Res, 13:5, p. 859.

0517 Dratnal, E.; and Kasprzak, K. (1982) - The response of the invertebrate fauna to organic pollution in a well oxygenated karst stream exemplified by the Pradnik stream (south Poland): Acta Hydrobiologica, 22:3, p. 263-278, 1980, 9 fig., 2 tab., 6 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 15:6, p. 33.

Results of three studies made on the benthic invertebrate communities of the Pradnik stream affected by waste waters from a dairy are presented. The three studies were conducted in 1968, 1969, and 1973-74. Samples were taken from the stream above the influx of wastes and below it as well, from the whole stretch of the stream affected by pollution.

0518 Dreiss, S.J. (1984) - Effects of lithology on solution development in carbonate aquifers: Journal of Hydrology, 70:1-4, p. 295-308, 1984, 2 fig., 5 tab., 10 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:11, p. 21.

In karst aquifers, ground-water flow is extremely difficult to predict because of the presence of solution-enlarged fractures and conduits in the bedrock. The joints act as discrete pathways for rapid ground-water movement. Because the geometry, location, and quantity of the conduits are almost always unknown, rates and directions of ground-water movement and contaminant transport cannot be detected reliably with standard monitoring wells nor described adequately with commonly used models.

0519 Dreiss, S.J. (1983) - Linear kernels for karst aquifers: Water Resources Research, 18:4, p. 865-867, August 1982, 19 fig., 16 ref. in

Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 16:5, p. 7.

A method for characterizing karst aquifers is based on the use of single linear kernel functions. The kernels are identified with a deconvolution technique proposed by Neuman and deMarsily (1976) by using estimated ground-water recharge during isolated storms as the system input and the rapid storm reponse of spring flow as the system output. The study was conducted on four springs in Mark Twain National Forest, Missouri.

0520 Dreiss, S.J. (1983) - Linear unit-response functions as indicators of recharge areas for large karst springs: Netherlands, Amsterdam; Journal of Hydrology, 61:1-3, p. 31-44.

The potential utility of spring discharge kernel functions in the identification of recharge areas of large springs is examined. The effectiveness of kernel function properties in delineating recharge boundaries would depend on the size of the spring relative to the areal extent of the monitor storm, the homogeneity of soil and vegetation conditions, and the areal distribution of the precipitation stations. Examples from southeastern Missouri, U.S.A., are given.

0521 Dreiss, S.J. (1980) - An application of systems analysis to karst aquifers: U.S.; Stanford University Ph.D. dissertation, 209 p.

0522 Dreiss, Shirley. (1974) - Lithologic controls on solution of carbonate rocks in Christian County, Missouri: U.S.; West Virginia Geological and Economic Survey Conference on Karst Geology and Hydrology, 4th, Proceedings; p. 145-152.

Sixty-five samples from the Mississippian and Ordovician limestones and dolomites of Christian County, Missouri, were analyzed, using statistical methods, to understand what lithological variables make any area of a cave more or less resistant to solution. Methods of analysis and results are given.

0523 Dreves, C. Fred (1977) - Case histories, Problems of buried karst and caverns, Florida and Puerto Rico (abstract) in Symposium on detection of subsurface cavities: U.S.; Army Corps of Engineers, p. 21-22.

The rock is highly solution-riddled, sometimes cavernous and often interbedded with or underlain by clean sand or other unconsolidated materials. The occurrence, thickness, hardness, and other engineering characteristics of the limestones change rapidly over short distances. The water-filled cavern systems are difficult to trace using known techniques. Seepage control, foundation design, dewatering provisions, and protection of the aquifer require detailed knowledge of the cavern systems.

0524 Drew, D.P. (1984) - The Burren karst and limestone lowlands of Co. Galway: Notes for field excursion of 14 June; Published by Irish Nat. Comm. IHP, p. 159-166.

0525 Drew, D.P. (1984) - The effect of human activity on a lowland karst aquifer in Burger, A. and Dubertret, L., editors, Hydrogeology of Karstic Terrains - Case Studies: IAH Karst Commission, Vol. 1, p. 195-201.

Major drainage works to alleviate winter floods has affected the natural ground-water regime in an area of lowland karst in County Galway in western Ireland. Diminished ground-water recharge and storage has aggravated the problem of water shortages in summer.

0526 Drew, D.P. (1983) - Accelerated soil erosion in a karst area: the Burren, western Ireland: Journal of Hydrology, 61:1-3, p. 113-124.

Investigation of palesols and of karren forms on ancient structures support the idea of an extensive cover of mineral soil, removed by forest clearance initiated erosion over a relatively short period of time. The present day karst landscape of the Burren may represent an example of man induced destabilization of a sensitive environment.

0527 Drew, D.P. (1982) - Limestone hydrology in Clare and Galway: Read at meeting, May 1979; Published by Irish Comm. IHP, p. 107-112.

The Carboniferous limestones are mainly uncovered. The lowland limestones are partially karstified, and many rivers go underground in summer. Artificial drainage is common. The upland limestone, as in the Burren, is also karstified and glaciated.

0528 Drew, D.P. (1973) - Ballyglunin Cave, Co. Galway, and the hydrology of the surrounding area: Irish Geog., Vol. 6, p. 610-617.

This area, on the edge of the Burren, has a hydrology regime typical of these karstified limestones.

0529 Drew, D.P. (1970) - The significance of percolation water in limestone catchments: U.S.; Groundwater, 8:5, p. 8-11.

An account of percolation water in limestones, stressing its importance in a water budget and a discussion of Pyranine concentrate as a dye used to trace percolation water.

0530 Drew, D.P.; and Plunkett, E. (1982) - Guide and field notes for the Burren: Excursion of 23 May 1979; Published by the Irish Comm. IHP, p. 157-168.

Outlines the hydrogeology of the 12 karst limestone sites visited. Expands on the Burren, where 1400 mm annual precipitation results in rapid fluctuations of surface and ground-water runoff.

0531 Dreyer, B.V.; and Schulz, C.E. (1984) - Evaluation, repair and stabilization of the Boling Sinkhole FM 442, Wharton County, Texas in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 353-358.

Abrupt ground subsidence occurred along FM 442, approximately 3 miles east of Boling, in Wharton Cuonty, Texas, in August 1983. An investigation was conducted in the immediate area of the sinkhole to determine the cause of the subsidence and also to determine the feasibility of dewatering. A total of six million gallons of saline water were removed and disposed of from the sinkhole. The sinkhole was filled and the roadway reconstructed.

0532 Drogue, C. (1985) - Geothermal gradients and groundwater circulation in fissured and karstic rocks: the role played by the structure of the permeable network: Journal of Geodynamics:4, p. 90-94.

In fissured and karstic rocks the general movement of underground waters (forced convection) can modify geothermic gradients. This depends on the discontinuous structure (channels and fissures) and on hydrodynamic conditions which vary with the weather. An experimental analysis has been carried out in the broken and karstified Mesozoic limestone in the South of France on shallow boreholes (60m) grouped in a closely-spaced network.

0533 Drogue, C. (1983) - Circulations d'eau souterraine et gradients géothermiques dans les magasins karstiques in IUGG General assembly Hamburg Sumposium "Heat Flow and Geothermal Processus": Germany; IUGG, p. 12.

0534 Drogue, C. (1982) - L'aquifère karstique: un domaine perméable original: France; Courrier du C.N.R.S., 44, p. 18-22.

Les roches calcaires karstifiées, très répandues à la surface du globe, renferment fréquemment des ressources en eaux souterraines d'un grand intérêt économique, mais dont les mécanismes d'écoulement sont complexes. Cette complexité est due à la structure interne particulière de ces aquifères. On peut actuellement en proposer une représentation géométrique simple, qui permet de mieux comprendre les principaux caractères de leur fonctionnement.

0535 Drogue, C. (1980) - Essai d'identification d'un type de structure de magasins carbonatés: France; Mém. h. Sér. Soc. Géol. France, No. 11, p. 101-108.

A representative diagram of the karstic aquifer structure is drawn out from works dealing with the differential karstification of fractures and with underground hydrology in carbonated media. This diagram, which situates the hypodermic runoff's importance in the decompressed zone, shows the juxtaposition of networks of fissures with low karstic development and networks of very karstified conduits in this type of aquifer. This structure is applied in analyzing this kind of aquifer's properties, permitting in particular the interpretation of some specific physical phenomena.

0536 Drogue, C. (1978) - Activités de recherche en hydrogéologie karstique: France; P.H.I. Réunion de Rome, rapp. MED/FRA/7, p. 62-81.

Présentation des résultats acquis sur un bassin expérimental des karst méditerranéens français.

0537 Drogue, C. (1977) - Propagation d'une solution vers un forage dans un aquifère fissuré et karstique. Rôle de la structure du milieu in Actes Coll. Nat. Eaux souterr. captées pour aliment. hum: France; Orléans La Source, BRGM, Vol. 2, p 151-162.

Dans un affleurement carbonaté, fracturé et aquifère, on étudie expérimentalement, dans la zone saturée, les vitesses de déplacement d'une solution, entre plusieurs forages. Le rôle hydrogéologique des joints de stratification est mis en évidence. Il apparaît que les vitesses d'écoulement sont plus importantes dans les directions des maxima de fraturation, qui sont également les directions de drainage sur la carte piézométriques. Les valeurs des vitesses pondérées par les gradients piézométrique sont 1,000 fois plus faibles que celles obtenues lors des traçages à l'échelle de l'aquifère. Dans les problèmes posés par la contamination de certains aquifères karstiques, il faudra donc tenir compte de l'importance géographique de ces zones, dont l'anisotropie hydraulique apparaît clairement, et dans lesquelles les circulations sont relativement lentes.

0538 Drogue, C. (1963) - Méthode de détermination de la capacité de rétention par fissures et microporosité des massifs karstiques à partir des variations saisonnières des données hydrométriques: C.R. Acad. Sci., Vol. 256, p. 5377-5379.

0539 Drogue, C.; Gdalia, L.; and Razack, M. (1982) - Application of rainfall-runoff mathematical model to compute karstic aquifers outflows, Research of the model parameters and significant functions in Applied modeling in catchment hydrology: U.S.; Water Resources Pubications, p. 232-336.

Conceptual models which allow computation of basin discharges, taking into account rainfall, simulate principal hydrological processes by means of parameters and mathematical functions. One of the questions which then arises is related to the significance that could be attached to the model's parameters regarding the real phenomena and features they represent in theory. Such an investigation has been carried out in this paper dealing with, in particular, modeling of karstic basins in which runoffs are entirely underground.

0540 Drogue, C. and Grillot, J.C. (1977) - Structure géologique et premières observations piézométriques à la limite du sous-système karstique de Terrieu (périmètre expérimental): France; 2 ème Colloque d'Hydro., Besançon, Ann. Sc. Univ. de Besançon, fasc. 25, 3 ème sér., p. 195-210.

Dans ce modèle, un aquifère ou système karstique, est formé de sous-systèmes (domaines peu perméables) drainés vers l'exutoire par un réseau de conduits à écoulements rapides. Le périmètre de Terrieu atteindrait donc essentiellement une zone drainante (12 forages sur 19 sont sur une telle zone), à la limite d'un secteur peu perméable (atteint par sept forages: P4, P6, P8, P10, P14, P18, et P19) qui serait, dans l'hypothèse formulée, la limite d'un sous-système. Ce modèle permet donc: a) d'expliquer, dans un contexte logique, les premières observations hydrauliques; b) de

situer le périmètre expérimental, par rapport à l'organisation globale de l'aquifère dans lequel il est installé (le bassin de la source du Lez).

0541 Drogue, C.; Grillot, J.C.; Razack, M.; and Pitard, J. (1980) - Analyse des relations entre structure géologique (fracturation, karstification, faciès) et propriétés hydrauliques, dans un aquifère karstique, en zone méditerreanéenne: France; DGRST, Action concertée: Maîtrise de l'eau dans les bassins méditerranéens, 166 p.

Résultats obtenus au cours d'une opération de recherche concernant l'hydrogéologie du milieu karstique. Analyse de la fracturation d'une zone témoin: le Causse du Larzac oriental. Analyse d'essais par pompage sur le périmètre expérimental du terrieu.

0542 Drogue, C. and Guilbot, A. (1982) - Results of studies carried on the reference basin of Saugras in Application of results from representative and experimental basins: France; UNESCO Press, p. 205-223.

Karstic carbonate rocks are widely spread over the world (more than 15% of land area) and contain a large part of the undeveloped water resources, particularly in arid and semi-arid zones. Knowledge concerning the basic functioning of this kind of aquifer is insufficient in order to allow optimal rational exploitation of groundwater, so the development of fundamental studies about karst hydrogeology is interesting. The Hydrogeology Laboratory of Montpellier has equipped the Saugras basin as a reference basin in calcareous terrain. This basin, located in the South of France, nearly 40 km from the coast, was equipped during 1965-66. It is a completely calcareous terrain and produces no surface runoff.

0543 Drogue, C. and Guilbot, J.C. (1977) - Représentativité d'un bassin témoin en hydrogéologie karstique: application à la modèlisation des écoulements souterrains d'un aquifère de grande extension: Netherlands, Amsterdam; J. Hydrol., Vol. 32, p. 57-70.

In karstic hydrogeology we suggest studying the representivity of an experimental basin that covers an area of 0.5 km2 in relation to an aquifer found in the same region covering an area of 200 km2. The region has a Mediterranean climate (southern France). A mathematical model that relates precipitation to outflow (CREG model) was applied to the experimental basin. The output of this model was then transposed to the basin with the larger dimensions using monthly and daily time intervals. The simulation of the outflows were of a satisfactory precision; however, the low water levels were overestimated. These results show the good representivity of the experimental basin and give evidence, within the limits of this study, that the general behavior of the karst is remarkably homogeneous.

0544 Drogue, C.; Laty, A.M.; and Paloc, H. (1983) - Les eaux souterraines des karsts méditerranéens. Exemple de la région pyrénéo-provençale (France méridionale): France; Hydrogéologie-Géologie de l'ingénieur, 4, p. 293-311 [in French, abstracts in English].

The Pyreno-Provencal area appears as a pilot area for Mediterranean karstic hydrogeology on account of methodological studies and development works that have been accomplished. The present state of knowledge makes it possible to describe aquifer systems and to begin to estimate renewable groundwater resources.

0545 Drogue, C.; Razack, M,; and Girona, J.M. (1982) - Natural tracers and hydrodynamics of karstic aquifers: a sample application for pumping test interpretation in Beitrage zur geologie der Schweiz-hydrology, Symposium on Tracers Techniqes in Hydrology, Berne, Oct. 1982: Switerland; Bd. 28 I, p. 201-212.

Carrying out pumping tests to yield aquifers' hydrodynamic properties has become a basic technique in Hydrogeology. Aquifer test interpretation, however, originates from analyses of flows in porous media and therefore can only incompletely be suitable for understanding fissured aquifers functioning, due to underground flows proper forms in such media and the flow net organization. Paper examines whether observing and analyzing some natural tracers' behavior, together with pumping tests, could improve these tests' interpretation in order to get a better knowledge of the fissured aquifer's hydrodynamics. Such natural tracers can be water chemistry, water temperature, or water fauna peopling.

0546 Drogue, C.; Razack, M.; and Krivic, P. (1984) - Survey of a coastal karstic aquifer by analysis of the effect of the sea-tide: example of the kras of Solvenia, Yugoslavia: Environmental Geology and Water Science, 6:2, p. 103-109.

A hydrodynamic study of a coastal karstic aquifer is attempted by analyzing the effect of sea-tide on its water table. Under certain conditions, this approach, which involves quite easy data processing, may yield the hydrodynamic parameters of the aquifers, diffusivity, in particular.

0547 Dromar, B.; Hysek, J.; and Rehak, J. (1973) - Investigation of the underground karst spaces by means of geophysical methods in the locality Ponikla: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 273-278.

From a variety of geophysical studies it was found that geothermic and induced potential methods are the most promising in discovering karst features below the surface.

0548 Droppa, Anton. (1969) - Die wachstuerrsges cere indigkeit der sinterrohrchen en den höhlen der niederen tatra: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S15/1-S15/6.

In the study area the rate of growth of stalactites which originate from infiltrating water is relatively fast with an estimated 2 mm in length being added in only 10 years.

0549 Dubliansky, V.N.; and Kiknadze, T.Z. (1984) - Hydrogeology of the karst Alpian folded zone in the south of the USSR: Moscow; Nauka, 126 p.

0550 Dubliansky, V.N.; and Lomaev, A.A. (1980) - Karstic caves of the Ukraine: Kiev; Naukova Dumka, 180 p.

0551 Dubljanskij, V.N. (1968) - On the role of snow in the karstification and the alienation of karst waters: Niltany Grotto News, 16:7, p. 126-133.

The author studies the effect of snow in the Crimean Mountains upon the formation of different karst forms and the feeding of water into karst fissures.

0552 Dubljanskij, V.N.; and Smol'nikov, B.M. (1969) - Investigation of karst cavities with use of geophysical methods in the Dniester of Podolia and Pokutye: Kiev, Akad. Nauk. Ukr. SSR, Inst. Geofiz., 151 p.

0553 Dubois, Paul. (1969) - Sur les karstifications tertaires et quaternaire du Bas Languedoc: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M37/1-M37/7.

A study of karstification processes that have developed landforms since the Tertiary in the Bas Languedoc.

0554 Duckstein, L. (1983) - Managing existing water supplies in droughts in Yevjevich, V. and others, editors, Coping with Droughts: U.S.; Water Resources Publications, p. 111-125.

0555 Duckstein, L.; Bogardi, I.; and Szidarovszky, F. (1982) - Reliabiilty of underground flood control system: Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, Vol. 107, No. HY7, p. 817-827, July 1981, 3 fig., 1 tab., 13 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 15:2, p. 97.

A reliable model of an underground hydraulic engineering system for protecting mines against inflows or inrushes of water is presented. Two alternative protection methods are evaluated: INSTANTAN (which provokes inrushes before full-scale mining starts) combined with artificial sealing (moderate and high), and passive control (a drainage system). Results, depicted on bar graphs, can be used in design of the protection scheme.

0556 Duckstein, L.; and Simpson, E.S. (1976) - Uncertainties of karstic water resources systems in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 793-814.

A discrete system framework is used to establish a two-way classification of five system elements versus six types of uncertainties. Typical system elements are rainfall (input), cavity size (state), rainfall discharge relationship (state transition function), benefit-cost (output), and loss curves (output function). The uncertainty types are natural, model, sample, economic, technological, or strategic.

0557 Dudich, E. (1974) - Remarks on cone karst genesis in Cuba: Budapest; Altalanos Foldt Sz, 6, p. 33-40 [in Hungarian].

0558 Duley, J.W. (1985) - Hydrogeologic assessment of dioxin-contaminated sites in eastern Missouri karst using spectrofluorometric dye tracing methods: U.S.; Geological Society of America, Abstracts with Programs, 17:3.

0559 Dusseault, M.B.; Scott, J.D.; and Moran, S. (1984) - Sinkhole development in reclaimed smectitic spoil in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 425-429.

Sinkholes are observed to develop on reclaimed strip mine spoil in Alberta for several years after releveling. Subsidence is triggered by rewetting of the smectitic over-consolidated sediments, and, where subsidence is large (1 to 1.5m) sinkholes develop. The article describes the differential subsidence and presents the mechanism for the sinkhole development. Possible mitigating procedures are discussed.

0560 Dyas, M.; Forsythe, P.; Forsythe, S.; Colman, M.; Grace, J.; and Speed, M. (1984) - Lisanby Cave (Caldwell County, Kentucky), in Annual Report - Western Kentucky Speleological Survey 1982-1983: U.S., Western Kentucky Speleological Survey, p. 25-42. Includes map, scale 1:20,000.

0561 Dyas, M.; Mylroie, J.; Powers, J.; and Hulse, R. (1978) - Caves and karst features of western Kentucky as compiled May 1, 1978: U.S.; Annual Report - Western Kentucky Speleological Survey 1978, p. 11-55.

0562 Ebaugh, W.F.; Parizek, R.R.; and Greenfield, R. (1976) - Channel detection by geothermal methods: in Yevjevich, Vujica, editor, Karst Hydrology and Water Resoruces, Vol. 2: U.S.; Water Resources Publications, p. 645-662.

An attempt was made to determine if shallow soil temperature measurements obtained 1 to 2 meters below land surface could be used to detect the presence of known dry and partly water filled caves located 10 to 33.3 m below surface.

0563 Eberentz, P. (1975) - Apport des méthodes isotopiques a la connaissance de l'aquifère karstique: France; Thèse Do. 3 ème cycle, Géol. Dyn., Paris, 22 p.

0564 Ecock, K. (1984) - The White Ridge; Vancouver Island (abstract) in Friends of the Karst Meeting, Puerto Rico: U.S.; Geo 2, 11:3.

0565 Edmunds, W.M.; and Walton, N.R.G. (1983) - Lincolnshire Limestone - hydrogeochemical evolution over a ten-year period: Journal of Hydrology, 61:1-3, p. 201-211.

In the Lincolnshire (Jurassic) Limestone of eastern England a sequence of hydrogeochemical processes along a 28-km flow line was defined in 1969. These processes include solution, redox and ion-exchange reactions, sulfate reduction, and mixing with saline formation water. Resampling in 1979 showed an almost exact replication of the hydrochemical profiles for pH, O2, HCO3(-), Na(+),

Mg(2+), Sr(2+), F(-), and total mineralization. The NO3(-), SO4(2-), Cl(-), and Ca(2+) levels have all increased significantly downgradient, while the redox boundary has become less distinct. The principle changes in the hydrogeochemical controls can be attributed to over-development of the aquifer.

0566 Ege, J.R. (1984) - Formation of solution-subsidence sinkholes above salt beds: U.S.; U.S. Geological Survey Circular 0897, 11 p.

0567 Ek, Camille M. (1973) - La dissolution du carbonate de calcium, Essai de mise au point: France; Bull. de la Société Géographique de Liege, No. 9, p. 55-87.

An account of the parameters involved in the dissolution of calcium carbonate.

0568 Ek, Camille M. (1973) - Les phénomènes karstiques du bassin du Rio Aragon Subordan (Pyrénées); Leur étagement attitudinal: France; Bull. de la Société Géographique de Liege, No. 9, p. 117-122.

An account of the karstic features found in the three zones into which the author divided the study area.

0569 Ek, Camille M. (1969) - Abondance du gaz carbonique dans des fissures de grottes: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S14/1-S14/3.

The content of carbon dioxide is studied in different micro-environments of caves. Its origin is biological. This makes the water aggressive.

0570 Elliott, L.P. (1976) - Potential gas accumulation in caves in Bowling Green, including relationship to water quality: U.S.; National Speleological Society Bulletin, 38:2, p. 27-36.

Seven caves in Bowling Green, Kentucky, were monitored for the physical, chemical, and biological characteristics of their water and air. The caves are being used to dispose of waste and this study shows that the caves are already polluted. Continued pollution could lead to a build up of methane which could cause explosions.

0571 Embleton, C., editor (1984) - Geomorphology of Europe: U.S.; John Wiley and Sons.

0572 Engelen, G.B. (1974) - Hydrogeology of the Sasso Lungo Group, a dolomitic reef stock in the Alpine dolomites of north Italy: Journal of Hydrology, 21:2, p. 111-130, February 1974, 10 fig., 2 tab., 5 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 7:14, p. 5-6.

The hydrogeological characteristics of the formations of the Sasso Lungo Group, Italy, are discussed.

0573 Engelen, G.B. (1969) - Genesis and transformation of staircase karst at Fanes Piccola (NW. Dolomites, N. Italy): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M1/1-M1/5.

An area with well-developed staircase karst in an alpine karst region in the southern Alps (NW. Dolomites, N. Italy) is described. Its mode of origin and the transformation by minor morphological processes in the Holocene are discussed.

0574 Ennabli, M. (1977) - Dévelopment des ressources en lau grace à un champ de forajes: cas de la Plaine de Mateur (Tunisie): International Association of Hydrogeologists Memoirs, Vol. XIII, Part 1, Birmingham Congress, U.K., p. A36-A47.

A plan to recover a large part of the water resources of an alluvial aquifer through the concentrated exploitation of the good characteristics of a buried limestone of limited extent.

0575 Enslin, J.F. (1951) - Sinkholes in dolomite: South Africa; Transactions S.A. Inst. Civ. Engrs., Vol. 1.

0576 Enslin, J.F.; and Smit, P.J. (1955) - Geophysical surveys for foundations in South Africa, with special reference to its sinkholes in the dolomite south of Pretoria: South Africa; Trans. S.A. Inst. Civ. Engrs., Vol. V, No. 9.

0577 Enslin, J.F.; Kleywegt, R.J.; Beukes, J.H.T.; and Gordon-Welsh, J.F. (1976) - Artificial recharge of dolomitic ground-water compartments in the Far West Rand gold fields of South Africa in Proceedings of the Anaheim Symposium on Land Subsidence, December 1976: Netherlands; International Assoc. of Hydrological Sciences, Pub. 121, p. 495.

The disposal of ground water pumped to the surface by gold mines underlying the Dolomite Series on the Far West Rand in the past is outlined. The problem of selecting sites for boreholes capable of accepting large quantities of water for recharge purposes was solved after intensive gravity surveys and drilling had been conducted in compartments which had already been dewatered and as a result of which the dolomitic aquifer and its main conduits were better understood. A recharge case-history is included.

0578 Environmental Analysis Department, HRB-Singer, Inc., State College, Pennsylvania. (1977) - Annotated bibliography of references related to subsidence over mines, in karst terrane and in coastal organic wetlands: U.S.; Department of Housing and Urban Development, Office of Policy Development and Research, 46 p.

0579 Eraso, A. (1975) - Considerations on the genesis of the caves of Palancares and Canada del Hoyo (Cuenca): Madrid; Bol R Soc Esp Hist Nat Secc Geol, 73:1-4, p. 148.

0580 Eraso, A. (1969) - La insaturacion del agua en la zona freatica del karst y sus fundamentos termodinamicos: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY17/1-HY17/11.

The author shows how the corrosion of limestone in the water table zone of the karst caused by a water mixture as defined by Bogli is in fact an example of a more general law based on the thermodynamic considerations in an infinitesimal upsetting of a state of equilibrium.

0581 Erdelyi, M. (1978) - Hydrodynamics of the Hungarian Basin in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, Proceedings, 1976, p. 146-162.

The interdisciplinary approaches in the evaluation of lithologic, structural, pressure, geothermal, and hydrochemical data are indispensable for the understanding of the ground-water flow under large sedimentary basins. The study was done in the Hungarian Basin where Tertiary limestones occur.

0582 Erre, H. (1979) - Contribution à l'étude de l'hydrogéologie des Corbières orientales karstiques et pseudokarstiques et des émergences littorales des côtes calcaires du Languedoc-Roussillon (Aude - Pyrénées Orientales): France; Thèse Doct. 3 ème cycle Hydrogéol., Montpellier, p. 213.

L'étude hydrogéologique de ces unités naturelles est précédée de donnes climatiques et sur les eaux superficielles. Méthodologie classique fondée sur la géologie et la géomorphologie. Etude comparative des caractères hydrologiques et physico-chimiques analogues avec ceux des autres sources karstiques côtières du Languedoc-Roussillon. Synthèse des informations acquises au niveau de l'ensemble de ces exutoires karstiques littoraux. Interprétation générale de l'évolution de leurs caractères principalement à l'aide d'arguments paléokarstiques et tectoniques.

0583 Espey, W.H., Jr.; Morgan, C.W.; and Masch, F.E. (1966) - A study of some effects of urbanization on storm runoff from a small watershed: U.S.; Texas Water Development Board Report 23, 110 p.

Evaluates the effects of urbanization on the hydrologic characteristics of Waller Creek, a small urban watershed within Austin, Texas. The approach to this study may be useful in other areas.

0584 Evaldi, R.D.; and Lewis, J.G. (1984) - Base flow and ground water in upper Sweetwater Valley, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 83-4068, 1983, 30 p. 18 fig., 8 tab., 14 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:10, p. 8.

Base flow measurements showed interbasin transfer of water among sub-basins of upper Sweetwater Valley. A water budget study indicated that during dry years approximately three-fourths of the annual flow to Sweetwater Creek may be derived from ground-water sources.

0585 Ewers, R.O. (1985) - Patterns of cavern development along the Cumberland Escarpment in southeastern Kentucky in Dougherty, P.H., editor, Caves

and Karst of Kentucky: U.S.; Kentucky Geological Survey Special Publication 12, p. 63-77.

0586 Ewers, R.O. (1984) - Cavern development in the dimensions of length and breadth [microform]: Canada, Ottawa; National Library of Canada, 6 sheets microfiche [Ph.D. Thesis - McMaster University, 1982].

0587 Ewers, R.O. (1977) - A model for the development of broad scale networks of Groundwater flow in carbonate aquifers (abstract only) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 401-402.

0588 Ewers, R.O. (1974) - The patterns of speleogenesis in the midwestern U.S. karst: U.S.; West Virginia Geol. and Econ. Survey, Conference on Karst Geology and Hydrology, 4th, Proceedings, p. 139-143.

A discussion of the ideas to date on the development of caverns in relation to input/output, pressure fields, low resistance sinks, joints and bedding planes, leading to a hypothesis on the development of underground cave networks.

0589 Ewers, R.O.; Ford, D.C.; and Quinlan, J.F. (1978) - The origin of distributary and tributary flow within karst aquifers: U.S.; Geological Society of America, Abstracts with Programs, 10:7, p. 398-399.

Laboratory analogue experiments, computer simulations, and field evidence from the midwestern U.S., western Canada, and central Europe support a comprehensive model for the development of the networks of solution tubes which are responsible for high volume flow in carbonate aquifers. The model proposes that broad scale networks (networks draining more than 100km^2) are established by the integration of smaller networks which propagate from discrete input sources as separate and parallel distributary systems.

0590 Exley, S. (1978) - The Tarpon Triumph: U.S.; Underwater Speleology, 5:2, p. 17-18.

0591 Fabian, C. (1984) - The karst phenomena study from the theory of systems point of view: Theoretical and Applied Karstology, 1, p. 29-34, 5 figs.

The author attempted to demonstrate that the karst system is an available one. It is argued that the petrographic subsystem inside a karst system plays an important part in the evolution of the latter. For example, the state of stress and strain of the limestone, especially the strike of the tension joints, decides on the development of the cave.

0592 Fabian, C.; and Viehman, I. (1979) - The morphogenesis of the limestone balls in the Tausoare Cave (the Rodna Mountains, Romania): Bucharest; Proceedings of the "Emil Racovitza" Speleological Institute, XVIII, p. 209-214, 5 figs. [in French].

A presentation is made of the two types of limestone balls discovered in the Tausoare Cave endokarst: free balls, lying on the cave floor at a depth of 200 m; and balls inlaid in the limestone wall

of the cave. The authors conclude that the balls were formed through a process of paleokarstic alteration.

0593 Fabre, G. (1980) - Les karsts du Languedoc Oriental. Recherches hydrogéomorphologiques: France; Thèse Doct. d'Etat Géograph, l'AFK, Muséum Hist. Nat. Nimes: Mémoirie No. 2, p. 470.

Synthèse des données géomorphologiques, hydrologiques et spéléologiques sur le domaine calcaire des garrigues nimoises.

0594 Fabre, J.P. (1983) - Etude hydrogéologique de la partie sud-ouest du Causse de Martel (Quercy): France; Thèse 2 ème cycle, Géol. Toulouse, p. 344.

Description de l'état géologique et morphologique de milieu solide. Etude des caractéristiques hydrologiques. Schéma de fonctionnement du drainage. Elaboration d'un modèle physique.

0595 Faillat, J.P. (1984) - Utilisation de l'oxygène dissous comme indicateur de structures hydrogéologiques: exemple d'application aux aquifères karstiques: France; C.R. séances Acad. Sci., Sér. 1: 298:9, p. 418-422.

0596 Fantasny, D. (1973) - Einige bemerkuergeu zur bestandskarte der karsterscheinrengeu in gebeit zwishceu leine--und thyratal mit besenderer berucksicktigung der höhlformen: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 102-120.

0597 Farmer, J.H. (1973) - Karst development in Barbados: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 131-140.

A tectonic-climatic history may explain the lack of cockpit karst in Barbados which would have been expected because of the latitudinal location.

0598 Faulkner, G.L. (1977) - Hydrogeologic relations of a karst area and a proposed navigation canal in Florida (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 301-302.

The 177-km canal would extend in part through the carbonate Floridan aquifer which has been karstified and a dynamic inflow-outflow relationship would exist between the canal and the Floridan aquifer where they are in contact.

0599 Faulkner, G.L. (1976) - Flow analysis of karst systems with well developed underground circulation in Yevjevich, V., editor, Karst Hydrology and Water Resources, Proceedings of the U.S.-Yugoslavian Symposium, Dubrovnik, Yugoslavia: U.S.; Water Resources Publications, p. 6/1-6/28.

Flow-net techniques may be a practical and economical way to analyze the flow regime of a cavernous carbonate aquifer with well developed circulation.

0600 Feder, G.L. (1975) - Hydrology of the large karst springs in the Missouri Ozarks, U.S.A. - L'hydrologie des grandes sources karstiques dans les

Ozarks du Missouri, USA (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 46.

0601 Feder, G.L. (1975) - A conceptual model of the hydrologic system supplying the large springs in the Ozarks: Open-file report, December 1973, 148 p., 14 fig., 12 tab., 44 ref., 2 append. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:5, p. 11.

Spring flow recession curves combined with carbonate saturation data can be used to semi-quantitatively separate the local drainage to springs from the ground water contributed by the regional artesian aquifer system.

0602 Fekete, Karoly. (1977) - The development and management of karst water resources in the city of Pecs and its vicinity, Hungary in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 279-285.

An account of the high water karst system of Pecs, its quality and its variability. The problems related to damming a karst system to regulate the water is discussed.

0603 Fenelon, P. (1974) - Karsts of a tropical type under a temperate climate: Paris; Mem Doc Serv Doc Cartogr Geogr, 15, p. 95-103 [in French].

0604 Fenelon, P. (1973) - Niveaux de base géographiques et niveaux de base karstiques: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 121-129.

The author regards the basic karstic level as the surface of the insoluble and impermeable stratum where corrosion ceases to act.

0605 Fenelon, P. (1972) - Thèmes de recherches: dissolution et precipitation du CO^3CA: Montreal; Recherches géographiques en France, 1972, No. 9, p. 63-71.

The disintegration of limestone by water depends on the percentage of carbon dioxide in the water. It is by means of laboratory experiments and of observations in karstic surroundings that difficulties concerning the disintegration and the precipitation of calcium carbonate can thus be elucidated with greater accuracy.

0606 Fenelon, P. (1969) - Observations sur l'évolution des versants en roche calcaire: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M27/1-M27/7.

The valley-sides in rocks of limestones are abraded by rainwash, solution, freeze and thaw, root growth and decay, and more. So clints, solution pits, niches, rock-shelters, pinnacles, and towers grow below. These landforms are principally structures often unknown. These accidents cause the valley-sides to draw back and the landforms to decrease to a peneplain.

0607 Fenelon, P. (1968) - Sur l'origine des argiles de decalcification: Paris; Mémoires et documento, centre de recherches et documentation cartographiques et géographiques, phénomènes karstiques, 1967, Vol. 4, p. 143-148.

A discussion on the origin of decalcified clays in the Massif Central in France.

0608 Ferguson, A. (1976) - Gravity surveys to locate the Onondaga Escarpment and a buried solution channel in southwestern Ontario: Canada; Thesis.

0609 Ferguson, W.B. (1974) - Sinkholes in Geology of the Piedmont of southeastern Pennsylvania: U.S.; Field Conference Pennsylvania Geological Society Guidebook 39, p. 28-32.

0610 Fernandez, Rubi F. (1973) - Dolines in the gypsum of the Atuel and Salado river valleys, Mendoza (Argentina): Madrid; Bol R Soc Esp Hist Hat Soc Geol, 71:1-2, p. 29-41 [in Spanish].

0611 Feru, M.U. (1971) - Thermomineral waters in the western part of the Central Dobrogea and the possibilities of their turning to account: Studii Tehnice si Economice IGG, Seria E, Nr. 9, p. 79-94.

Hydrogeological investigations carried out along the Dobrogean slope of the Danube led to the statement that two important lines of thermomineral springs with temperatures ranging from 20°-26° and 35°-50°C are widespread between the Capidava and Vadu Oii localities. It was concluded that these waters are conditioned by the presence of Jurassic limestones.

0612 Fezer, Fritz. (1969) - Karbonattraubhalt und verkarstung in ciraunalpinen terrassenschottern: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M28/1-M28/9.

Water infiltrating a gravel containing limestone pebbles dissolves a lot of carbonate and increases the porosity of the gravel with calcite and iron oxide being precipitated.

0613 Fields, David E.; and Raridon, Richart T. (1977) - Numerical simulation of watershed response using the Unified Transport Model - part 1, model structure in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 140-150.

A Unified Transport Model which simulates hydrologic and trace element transport through the hydrologic cycle has been applied to Walker Branch Watershed, Oak Ridge, Tennessee.

0614 Fieseler, R.G.; Jasek, J.; and Jasek M. (1978) - Selected cave descriptions in Fieseler, R.G., Jasek, J., and Jasek, M., editors, An Introduction to the Caves of Texas: U.S.; Annual Convention Guidebook - National Speleological Society, 19, p. 73-115.

0615 Figueiras, R.R. (1975) - Contribution to the speleological glossary of Brazil: Brazil, Ouro Preto; REM-Rev Escola Minas, 32:5, p. 60-61 [in Portuguese].

0616 Fincham, A.G. (1977) - Jamaica underground; a register of the caves, sinkholes and underground rivers of the island: Jamaica; Geological Society of Jamaica, 247 p.

0617 Fincham, A.G. (1973) - The Sinking Hope River (Jamaica): Jamaica, Kingston; Journal of the Geological Society of Jamaica, 13, p. 41.

0618 Fink, M.H. (1973) - Polygenetische formen in karst der Ostalpen: Olomouc, CSSR; Proceedings of the International Congress of Speleology, p. 141-150.

0619 Fink, Max H. (1969) - Studien uber canous in Alpinen Höhlen: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. §45/1-S45/3.

0620 Fischer, Alfred G.; et al. (1967) - Electron micrographs of limestones and their nannofossils [Monographs in Geology and Paleontology Series]: U.S.; Princeton University Press.

0621 Fischer, J.A.; and Greene, R.W. (1984) - New Jersey sinkholes; distribution, formation, effects, geotechnical engineering in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 159-166.

The existence of voids in the residual soils above cavernous limestone is perhaps more critical than cavity formation or cavity enlargement in 500 million year old rock. In limestone areas a number of viable alternatives are available to the owner/planner/design team. The simplest is the "no build" alternative. The next is to "move the critical facilities of the site to the good" area. The third alternative is to provide engineering solutions to the site conditions.

0622 Fischer, J.A.; Szymanski, J.S.; and Fox, R.H. (1983) - Foundation design for a cavernous limestone site in Buu, T., editor, Proceedings of the twentieth annual engineering geology and soils engineering symposium, Boise, Idaho, April 7-8, 1983: U.S.; Proceedings, p. 239-255.

Construction in this instance was compounded by the fact that a portion of the new construction is an addition to an adjacent structure whose foundations were designed without regard to the cavernous nature of the site locale. The paper describes the geologic and social history of the site.

0623 Fish, J.E. (1980) - Calculation of source flows from geochemical mixing models of variable-flow karst systems (Mexico): U.S.; Geological Society of America, Abstracts with Programs, 12:7, p. 426.

The method of calculating mixing proportions of source flows from geochemical mixing models for simple porous media was applied to

variable flow at the Choy and Coy springs in northeastern Mexico. The mixing model indicated that both springs have regional and local sources. Differences in flow behavior may be caused by an unconfined local source for the Choy as opposed to a confined local source for the Coy.

0624 Fish, J.E. (1978) - Karst hydrogeology and geomorphology of the Sierra de el Abra and the Valles-San Luis Potosi region, Mexico: Canada; McMaster University Ph.D. dissertation.

0625 Fish, J.E. (1977) - The Circum-Gulf karst belt (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 113-114.

0626 Fish, J.E. (1974) - Dynamics of a high relief tropical karst aquifer, the Valles-San Luis Potosi platform, Mexico: U.S.; Geological Society of America, Abstracts with Programs, 6:7, p. 736.

The Valles-San Luis Potosi platform is a Cretaceous carbonate province in northeastern Mexico. Various reef and lagoonal facies, including sulfate rocks, about 2,000 meters thick were deposited. During the Laramide the area was folded and subsequently uplifted. A high-relief tropical karst has developed. Nearly all the groundwater discharge occurs at large springs along the eastern margin of the province. The hydrographs and field observations in the eastern part of the region suggest a relativley short transit time in the vadose zone and drainage through large open conduits in the phreatic zone. Chemical studies indicate: (1) the discharge has a local and a regional component; (2) the local component has a rapid transit time; and (3) the regional component circulates deeply and likely has a much longer residence time.

0627 Fish, J.E.; and Ford, D.C. (1973) - Karst geomorphology and hydrology of the Sierra de el Abra, San Luis and Tamps, Mexico: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 151-156.

A brief report on a dissertation to describe and relate aspects of the surface and subsurface hydrology and geomorphology of a high relief tropical karst.

0628 Fish, J.E.; and Ford, D.C. (1971) - Karst research in Canada part II (abstract): Oxford, England; International Speleological Union, Meeting on Karst Denudation.

A description of the geologic and geohydrologic studies by the karst research group in Canada is given.

0629 Fisher, W.L.; and Rodda, P.V. (1969) - Edwards Formation (Lower Cretaceous), Texas: Dolomitization in a carbonate platform system: U.S.; American Association of Petroleum Geologists Bulletin, Vol. 53, p. 55-57.

The Edwards Formation is characterized by rudist bioherms, carbonate grainstone and mudstone, and evaporites which were deposited on an extensive, shallow-water marine platform bounded by deeper

water basins in which chiefly carbonate muds were deposited. Includes numerous cross sections and maps.

0630 Fisher, W.L.; and Rodda, P.V. (1966) - Nomenclature revision of basal Cretaceous rocks between the Colorado and Red Rivers, Texas: Texas, U.S.; Texas University Bureau of Economic Geology Report of Investigation 58, 20 p.

Based on need for convenient, small-scale cartographic units, the basal Cretaceous rocks in Texas from Red River to Burnet County and on the Lahan Divide are herein divided into three lithologic sequences: (1) north-central Texas Sequence; (2) North Texas and West-Central Texas Sequence; and (3) Central Texas Sequence.

0631 Fisk, David W.; and Exley, I.S. (1977) - Exploration and environmental investigation of the Peacock Springs cave system in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 297-302.

The cave was mapped in detail; passages occurred mostly at the Suwannee-Ocala contact. Ground-water movement was observed, and it was noted that large quantities of water are being recharged to the underlying Floridan aquifer.

0632 Flandrin, J.; and Paloc, H. (1969) - Etude d'une source de karst: La Fontaine de Vaucluse (France), méthodes et résultats: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY13/1-HY13/15.

The results of development of the karstic reservoir at the Fontaine de Vaucluse.

0633 Flawn, Peter T. (1970) - Environmental geology: conservation, land-use, planning and resource management: U.S.; Harper's Geoscience Series, p. 227-251.

An account of how geology would affect the environmental development of Austin, Texas, where the limestones of the Glen Rose, Walnut, and Edwards crop out.

0634 Fleugel, Erik (1982) - Microfacies analysis of limestones: Germany, F.R.; Springer-Verlag, 550 p.

0635 Focke, J.W. (1978) - Limestone cliff morphology on Curacao (Netherlands Antilles), with special attention to the origin of notches and vermetid/coralline algal surf benches ('cornices', 'trottoirs'): Germany, F.R., Stuttgart; Z Geomorphol Neue Folge, 22:3, p. 329-349.

0636 Fodor, Istuan. (1969) - Analytische untersuchurgen uber die luftbewegungsnerhaltnisse der höhlen von barodla und abaliget en ungarer: Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 2, p. S31/1-S31/8.

The air current system of caves and their meteorological character were examined in two caves of different types. Studying all

elements of the micro-climate, it was evident that in two caves of different character the air current conditions show strong differences.

0637 Folk, R.L. (1977) - Calcite and aragonite fabrics, Carlsbad Caverns (New Mexico). Reply to discussion to Kendall, A.C.; and Broughton, P.L. (J Sed Petrol [47:3] 77, p. 1397-1400): U.S., Tulsa; Journal of Sedimentary Petrology, 47:3, p. 1400-1401.

0638 Folk, R.L.; and Assereto, R. (1976) - Comparative fabrics of length-slow and length-fast calcite and calcitized aragonite in a Holocene speleothem, Carlsbad Caverns, New Mexico: U.S., Tulsa; Journal of Sedimentary Petrology, 46:3, p. 486-496.

0639 Folk, R.L.; Roberts, H.H.; and Moore, C.H. (1973) - Black phytokarst from Hell, Cayman Islands, British West Indies: Geological Society of America Bulletin, 84:7, p. 2351-2360, July 1973, 12 fig., 39 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:20, p. 19.

Phytokarst is a distinctive landform resulting from a curious type of biologic erosion.

0640 Follett, C.R.; and George, W.O. (1945) - Ground-water resources in the vicinity of Kyle, Hays County, Texas: U.S.; U.S. Geological Survey Open-File Report, 19 p.

Gives information about the occurrence and quality of ground water in the area. Also gives records of wells, logs, and chemical analyses of ground water.

0641 Foose, R.M.; and Frohlich, R.K. (1983) - Cause and results of catastrophic collapse in karst areas and geophysical approaches to the detection of subsurface cavities in Herschman, A., editor, Abstracts of papers of the 149th national meeting of the American Association of Science, Detroit, Michigan, May 26-31, 1983: U.S.; AAAS Pub. 83-1, p. 30.

0642 Foose, R.M.; and Humphreville, J.A. (1979) - Engineering geological approaches to foundations in the karst terrain of the Hershey Valley in Selected papers; engineering geology, karst terrain, geological engineering in karst regions, Hershey, Pennsylvania, October 19, 1978: U.S.; Association of Engineering Geologists Bulletin, 16:3, p. 355-381.

0643 Ford, D.C. (1984) - Karst reconnaissances in the northern Mackenzie Mountains (abstract) in Friends of the Karst Meeting, Puerto Rico: U.S.; Geo 2, 11:3.

0644 Ford, D.C. (1983) - Alpine karst systems at Crowsnest Pass, Alberta - British Columbia, Canada: Journal of Hydrology, 61:1-3, p. 187-192.

Modern active cave systems, which are largely inaccessible, are known by their springs or function as flood overspill channels. Regional prediction of karstic flow in alpine terrains is problematic; simple model predictions are unlikely to apply.

0645 Ford, D.C. (1983) - Effects of glaciations upon karst aquifers in Canada: Netherlands, Amsterdam; Journal of Hydrology, 61:1-3, p. 149-158.

Nine distinct effects of glacial action upon karst aquifer are recognized. The differing effects make general predictions difficult.

0646 Ford, D.C. (1983) - Karstic interpretation of the Winnipeg aquifer (Manitoba, Canada): Netherlands, Amsterdam; Journal of Hydrology, 61:1-3, p. 177-180.

The aquifer is interpreted as preglacial limestone pavement karst preserved intact because glacial ice frozen at the base could neither scour nor infill it. Glacial action enhanced the aquifer's capability.

0647 Ford, D.C. (1983) - The physiography of the Castleguard karst and Columbia icefields area, Alberta, Canada in Ford, D.C., editor, Castleguard Cave and karst, Columbia icefields area, Rocky Mountains of Canada; a symposium, Kentucky, U.S., 1981: U.S.; Arctic and Alpine Research, 15:4, p. 427-436.

0648 Ford, D.C. (1980) - On karst hydrologic systems in glaciated terrains of Canada: U.S.; Geological Society of America, Abstracts with Programs, 12:7, p. 428.

Effects of glaciation on karst hydrological systems have been highly variable. Shallow karst has been erased, deeper systems have been filled, and tills rich in carbonate clasts have shielded the bedrock from dissolution. Other effects are discussed.

0649 Ford, D.C. (1979) - A review of Alpine karst in the southern Rocky Mountains of Canada: U.S.; NSS Bulletin, 41:3, p. 53-65.

At Crowsnest Pass in the Front Ranges of the Rocky Mountain Thrust Zone, Upper Paleozoic carbonates are thrust over Mesozoic clastics and volcanics forming a cuesta. Alpine glaciation has dissected the cuesta. Fragmentary and relic karst features indicate that the valley was drained karstically in the past. Approximately 50 percent of the valley is presently karstically drained.

0650 Ford, D.C. (1977) - Cave systems and groundwater hydrologic organization in limestones (abstract only) in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 403-404.

0651 Ford, D.C. (1976) - A classification of limestone solution caves: U.S., Morgantown, West Virginia; West Virginia Geological and Economic Survey, Conference on Karst Geology and Hydrology, 4th, Proceedings, p. 183-185.

A classification of caves with relation to their position in either the vadose or the phreatic zone.

0652 Ford, D.C. (1976) - Review of alpine karst morphology and groundwater systems in the southern Rocky Mountains of Canada: U.S.; Geological Society of America, Abstracts with Programs, 8:6, p. 871-872.

Karst landforms of all scales are well developed though geographically scattered within massively bedded limestone formations of the Front and Main ranges, Alberta, B.C. There is also karst ground-water circulation in mixed formations and local penetration of apparent aquicludes of shale. Surficial karst forms are not developed or preserved above limits of Wisconsinan ice cover and little developed where more than 3m of Wisconsinan drift is present. Forms range from wholly karstic in origin such as karren and many sinkhole assemblages to glacial forms modified by karstification to karstic modified by glacier scour.

0653 Ford, D.C. (1969) - Preliminary review of cavern development in the Rocky Mountains of Canada: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S4/1-S4/8.

The paper is an introductory study of the carbonate (Rocky Mountain) system. The Canadian Rockies are compared to the well-known Alpine karsts of Europe. Three sharply contrasted sample areas are described as an illustration of the variety of development which exists.

0654 Ford, D.C.; and Brook, G.A. (1974) - The south Nahanni karst, MacKenzie Mountains, N.W.T., Canada (abstract): U.S.; Geological Society of America, Abstracts with Programs, 6:7, p. 740-741.

This is the most accentuated karst terrain yet reported from high latitudes. It contains many landforms of type or scale previously known only in tropical regions, plus others that are unique. Karst features are developed in the mid-Devonian Nahanni Formation, massively bedded, crystalline limestone 200m thick; to lesser extent in underlying dolomites. Principal karst forms are fracture-located solution corridors and sinkhole features at fracture intersections. It is shown that (1) the karst was not glaciated during the past 300,000 years; (2) limestone solution rates compare to those of temperate regions; and (3) mountain uplift is active today.

0655 Ford, D.C.; and Quinlan, J.F. (1975) - Karst of Canada--Karst du Canada (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 49.

0656 Ford, D.C.; and Stanton, W.I. (1968) - The geomorphology of the south-central Mendip Hills: U.K.; Proceedings of the Geologists Association, Vol. 79, Part 4, p. 401-427.

The geomorphology of the Mendip Hills, composed of cavernous carboniferous limestone where karstic features have developed, is discussed.

0657 Ford, T.D.; and Cullingford, C.H.D., editors (1976) - The Science of Speleology: London and New York; Academic Press, 593 p.

0658 Ford, Trevor D. (1981) - Limestone and caves of the Peak District: United Kingdom; Geo Abstracts England, 469 p.

0659 Ford, Trevor D. (1970) - Notes for guidance in the preparation of a cave survey for publication: U.K.; Transactions of Cave Research Group of Great Britain, 12:3, p. 241-243.

A step by step account of how a cave survey report should be prepared for publication.

0660 Forde, G. (1982) - Development of water supply and groundwater resources in County Wexford: County Engineer at Irish Group IAH Meeting.

In 1959 a plan to provide all residents, urban and rural, with domestic water was initiated. There was a switch from traditional surface sources to ground-water development. Parts of Wexford are underlain by good limestone-dolomite aquifers, but advanced planning of such development is essential.

0661 Forney, Gerald G. (1972) - Caves and karst of the Argolic Peninsula, Greece: Deltion, Ellenikis Spelaiologikis Etoirias, 11:7, p. 150-159.

A description of caves and karst landforms in the study area.

0662 Fortey, R.A. (1980) - Ordovician trilobites of the Spitsbergen: Universitet, p. 163.

0663 Foster, S.S.D.; and Milton, V.A. (1975) - The permeability and storage of an unconfined chalk aquifer: Hydrological Sciences Bulletin, 19:4, p. 485-500, December 1974, 9 fig., 18 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:12, p. 12

No strong lateral anisotropy of hydraulic properties is apparent in the area of the Chalk, the most important British aquifer, but vertical heterogeneity is very marked, with the main permeability development probably being along horizontal discontinuities in two layers of restricted thickness.

0664 Franco, Rubani P. (1969) - Notas preliminares sobre el carso Venezolano: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M29/1-M29/2.

0665 Francois, J.M. (1980) - Contribution à l'étude de la structure profonde des magasins fissurés: France; Thèse 3ème cycle, Sc. Eau Montpellier, p. 88.

Contribution à la connaissance de la géometrie des magasins fissurés. Méthodes d'étude les plus appropriées à la connaissance de la fracturation profonde. Relations régissant l'évolution de la fracturation avec la profondeur.

0666 Frank, R. (1969) - The history and sediment of the Borenore Caves, New South Wales, Australia (abstract): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S3/1.

A study of the Borenore Caves in New South Wales.

0667 Frank, R.M. (1973) - Sedimentary and morphological development of the Borenore Caves, New South Wales, 11: Australia; Helictite, Journal of Australasion Cave Research, 11:2, p. 27-44.

Changes of climate and stream capture have shaped the Borenore Caves throughout their history.

0668 Frank, R.M. (1973) - The effects of non-climatic factors on flowstone deposition: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 418-419.

Speleothems are usually associated with wet climate eras but the author has found the relationship is not a simple one with the accumulation of certain types of speleothems being non-climatically related.

0669 Franke, Herbert W. (1969) - Neue resultate der radiokahlenstoffdatieriung von stalagmiteu: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S19/1-S19/5.

0670 Frankland, S.C. (1979) - Los Tayos (cave expedition, Equador): Wells; Descent, 40, p. 26-31.

0671 Freeman-Lynde, R.P.; Chayes, D.N.; Chezar, H.; Miller, E.L.; et al. (1979) - Defacement of the Bahama escarpment (CABS [75-5/28 6/1] 79): Washington, D.C.; EOS Trans Am Geophys Union, 60:18, p. 286.

0672 Fretwell, J.D.; and Stewart, M.T. (1982) - Resistivity study of a coastal karst terrain, Florida: Ground Water, 19:2, p. 156-162, March-April 1981, 6 fig., 1 tab., 24 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 15:2, p. 8.

Results from the resistivity method for locating a fresh-salt water interface agreed with known hydrologic data. The study site was the west-central Gulf coast area of Florida, where 28 vertical electrical soundings were done.

0673 Friedman, G.M. (1964) - Early diagenesis and lithification in carbonate sediments: U.S.; Journal of Sedimentary Petrology, Vol. 34, p. 777-813.

0674 Friends of the karst meeting, Puerto Rico, 1984 - Friends of the karst, Puerto Rico meeting abstracts: U.S., Geo 2, 11:3.

0675 Frohlich, R.K. (1975) - Geoelectrical possibilities of detecting stream channels in carbonate rocks: Arkansas Academy of Science Proceedings, Vol. 26, p. 71-72, 1972, 3 fig., 3 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:17, p. 12.

Several geoelectrical resistivity methods that may be used to determine the position and flow characteristics of underground water associated with carbonate bedrock and karst development are considered. The most promising method studied employs depth soundings patterned after Schlumberger.

0676 Frohlich, R.K.; and Smith, G.P. (1977) - Geophysical investigations over karst water in southeastern Missouri in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 96-106.

An account of geoelectric depth soundings and gravity profiles in determining the depth of alluvial deposits, cavernous limestone, and compact limestone. Gravity is most sensitive in areas of intensive karstification. It was also noted that karstification is most intense in fault zones.

0677 Fuchs, Frederun. (1969) - "Subsequente" karstwannen in den Venerianischen Veralpen: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M17/1-M17/6.

The steep slopes of the Nenetian Prealps (Northern Italy) show, as a typical feature, "subsequent" karst basins which follow the strike of the calcareous Southern Alps. Three types of karstic basins were found depending on the horizontal or vertical course of the karst process.

0678 Furrer, M.A. (1968) - Paleontology of some limestones and calcphyllites of the northern range of Trinidad, West Indies: Trinidad; Transactions of the 4th Caribbean Geological Conference, 1965, p. 21-24.

From a study of the fossil evidence, a shallow-water environment of deposition is postulated for the Rio Seco-Grande Riviere complex in contrast to the previous belief that the environment was deep geosynclinal.

0679 Gadoros, Miklos. (1971) - A complex investigation of the Nagytohonya Spring of Josvafo: Hungary; Karst-es BarlangKutatas, Vol. VI, Annual course 1968-71, p. 79-102.

0680 Gadoros, Miklos. (1971) - Temperaturfernmessung nut hoher genauigkait: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 25-31.

0681 Gadoros, Miklos. (1969) - Analyse der tagesschwankung ud jahresschwankung der lufttemperatur in der höhle "Vass Imre": Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 544/1-544/5.

Observations on temperature were made. A function was found for calculating the annual vacillation of temperature in the cave.

0682 Gadoros, Miklos. (1969) - Beta und gamma aktivitat in wenigen karsthöhlen: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 543/1-543/3.

According to the studies made in eight caves in three areas, radiation levels are 0.5 to 2.5 times greater than background levels. The caves with well-streaming winds have low levels. In caves without these winds the radioactive material is accumulated.

0683 Gadoros, Miklos. (1969) - Eine interessaute karstquelle mit warmem wasser und einein saugheberoystem: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY15/1-HY15/6.

The author gives part of the results of the observations and analysis of the Nagytohonya Spring of Josvafo. In the subterranean water system of the spring, the karst water is mixing with lukewarm water (14.7°C, 30 l's).

0684 Gadoros, Miklos. (1969) - Registreirung der littroklasenbewegung unter den lunisolaren einflusson: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, Vol. 3, p. 542/1-542/4.

The author discusses studies of seismic movements at the main joints of the Vass Imre Cave.

0685 Gadoros, Miklos. (1969) - Uber die wasserbewegung in liefen karst: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY14/1-HY14/3.

Theoretical and experimental analyses were made at the Speleological Research Center at Josvafo. The analyses proved that the waters of the deep karst are flowing and are part of the hydrological circuit.

0686 Gale, S.J. (1984) - Hydraulics of conduit flow in carbonate aquifers: Journal of Hydrology, 70:1-4, p. 309-327, 1984, 1 fig., 5 tab., 54 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:10, p. 21.

The movement of ground water through fissured media, particularly those in which non-Darcian flows prevail, is not well understood. The aquifers with perhaps the greatest proportion of flow along non-Darcian flow lines are probably those composed of limestone, where fissures may be enlarged by solution to form conduits ranging in size from 0.001 to 10 m in diameter. In order to establish the hydraulic conditions under which conduit flows occur, bedform-erosional features and fluid-transported sediments were studied in a variety of carbonate aquifers in different environments.

0687 Gams, Ivan. (1973) - Forms of subsoil karst: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 169-179.

The author describes subsoil features as the initial forms for the development of some surface and underground karst phenomena.

0688 Gams, Ivan. (1973) - Some speleological characteristics of the Dinaric karst: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 2, p. 147-149.

A general description of the Dinaric karst of Yugoslavia.

0689 Gams, Ivan. (1972) - Geografsko reziskovanjc krasa V sloveniji: Yugoslavia, Ljubljana; Geografski Vestnik, XLIV, 1972, p. 57-74.

0690 Gams, Ivan. (1969) - Problems of the karst denudation: Brno, 1969.

0691 Gams, Ivan. (1969) - Varstvo jamskik kapnikov v luci novik raziskovanj: Yugoslavia, Ljubljana; varstvo narave (nature conservation), 1969, Vol. VI, p. 15-23.

0692 Gams, Ivan. (1969) - Zur erganzung der vergleicheuden forschungen der karstkonssionsintensitat: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 525/1-525/9.

The author stresses the influence of lithology, soil, vegetation, and various methods of calculation on calculated corrosion intensity and annual oscillations of water hardness.

0693 Ganter, J. (1984) - Fort Hill fissure caves: U.S.; The Baltimore Grotto News, 19:10, p. 80-81.

0694 Ganter, J. (1984) - Turner Valley: U.S.; The Baltimore Grotto News, 19:12, p. 99-100.

0695 Gardiner, M.J.; and Ryan, P. (1962) - Relic soil on limestone in Ireland: Irish Jour. Agric. Research, Vol. 1, p. 181-188.

Describes the rates of solution and the evolution of the soils on some limestones; possible identification of terra rossa.

0696 Garlanger, J.E. (1984) - Remedial measures associated with sinkhole-related foundation distress in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 335-341.

Sinkholes in central Florida result from the phenomenon known in geotechnical engineering as "piping". Piping occurs when a subterranean conduit is eroded backward from a location where seepage is discharging from an unconsolidated soil deposit. When the subsurface erosion finds its way through an opening in the bedrock surface into the overlying soils, a void is created within the overburden resulting in surface subsidence or collapse. To arrest the subsidence and restore foundation support, the geotechnical engineer must locate the opening in the rock surface and plug it with grout.

0697 Garner, L.E.; and Young, K.P. (1976) - Environmental geology of the Austin area, an aid to urban planning: Bureau of Economic Geology, University of Texas, Report of Investigations, No. 86, p. 39.

A discussion of the environmental geology of the Austin (Texas) area where the Edwards Limestone crops out.

0698 Garton, R.E., Jr. (1977) - Hydrogeologic environment at Bowden, West Virginia in Dilamarter, R.R. and Csallany, S.C., editors, Hydrologic problems in karst regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 439-449.

0699 Garton, Ray E., Jr. (1977) - The effects of highway construction on the hydrologic environment at Bowden, West Virginia in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 439-449.

Water supply from karst springs was drastically decreased due to silting of caverns because of highway construction. Turbidity increased and fish at a fish farm in the area asphyxiated because of silt clogging their gills. An evaluation was made of the potential damage if construction continued.

0700 Gascoyne, M. (1983) - Trace-element partition coefficients in the calcite-water system and their paleoclimatic significance in cave studies: Journal of Hydrology, 61:1-3, p. 213-222.

Timing and intensity of past climates may be inferred from the mineral content of calcium carbonate precipitates formed in caves. These deposits, called speleothems, include stalactites and stalagmites.

0701 Gascoyne, M. (1978) - Discussion of Harmon, R.S., and Curl, R.L. Preliminary results on growth rate and paleoclimate studies of a stalagmite from Ogle Cave, New Mexico (NSS Bull [40] 78 p. 25-26): U.S., Huntsville; NSS Bull, 40:4, p. 123.

0702 Gascoyne, M. (1977) - Hydrogeology and solution chemistry of north Venezuelan karst in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 553-568.

0703 Gascoyne, M. (1976) - New depth record in Guatemala: U.K., Bridgewater; Bull Br Cave Res Assoc, 2, p. 8-9.

0704 Gascoyne, M.; and Schwarcz, H.P. (1978) - Uranium series dating of submerged speleothems: Evidence of Illinoian low sea stand: U.S.; U.S. Geological Survey Open File Report 78-701, p. 129-130.

0705 Gascoyne, M.; et al. (1979) - Sea-level lowering during the Illinoian glaciation evidence from a Bahama 'Blue Hole': Washington, D.C.; Science, 205:4408, p. 806-808.

0706 Gaspar, E. (1986) - New trend in tracer hydrology: U.S., Boca Raton, Florida; CRC-Press (in press).

This work deals with artificial tracer selection criteria; tracer behavior in the underground in interaction with water, rocks, and the biological medium; mathematical flow patterns; tracer-based investigations in wells; the study of hydrokarstic structures and tracer cave hydrology; and investigation of geothermal waters.

0707 Gaspar, E. (1981) - A critical analysis of radioactive tracer-based research work performed in karsts: Bucharest; Studii si Cercetari de Fizica, 33:3, p. 311-320 [in Romanian].

The way in which a tracer is labeled and measured has a deciding influence on the results of field experiments as they establish the input and output functions. The mode using data obtained with the help of tracers is analyzed.

0708 Gaspar, E. (1980) - A radiometric projection of radioactive tracer-based investigations in hydrokarstic structures: Bucharest; Studies and Research in Physics, 32:9, p. 949-955 [in Romanian].

The flow pattern for a hydrokarstic structure may be a conduit or a labyrinth of conduits. Counting frames are given to project and plan labellings with radioactive tracers.

0709 Gaspar, E. (1972) - A quantitative method of hydrological investigation of karst: Hidrotehnica, 17:6, p. 319-327 [in Romanian].

Complex studies were conducted with the help of radioactive and fluorescent dye tracers to assess the characteristics of underground flow in karstic areas. Five types of karstic networks are analyzed. The methodology provides for an estimation of flow characteristics (laminar or turbulent flow).

0710 Gaspar, E.; Farcasiu, O.; Stanescu, P.; and Spiridon, S. (1984) - Nuclear methods for karst hydrology investigation in Symposium Proceedings, Theoretical and Applied Karstology, 1, p. 207-214.

Two nuclear methods for the investigation of hydrokarstic structures with the help of tracers are outlined. One method uses radioactive tracers and allows for simultaneous labeling of several sinkholes; the second uses indium in an In-EDTA complex form.

0711 Gaspar, E.; and Oraseanu, I. (1986) - Natural and artificial tracers in the study of karst hydrodynamics in Theoretical and Applied Karstology, 3 (in press).

This paper reviews usable tracers, labeling methods, methods of in-situ measurement, sample taking, and the use of ion exchange filters. Flow patterns applicable to karsts are outlined.

0712 Gaspar, E.; and Simion, G. (1986) - Tracer-based research in the dynamics of the underground waters in the Cerna Valley Basin in Theoretical and Applied Karstology, 3 (in press).

This work is a synthesis of the labelings with tracers affected in the Cerna Valley karst, which contributed to the elaboration of a hydrogeological map.

0713 Gaspar, E.; and Simion, G. (1982) - Tracer-based research work in the Cerna Valley karst to assess the influence of river-development operations on thermal waters: Hidrotehnica, 27:8, p. 233-246 [in Romanian].

Labelings with artificial tracers contributed to the establishment of the origin, genesis, and area of supply of the thermal waters in the Cerna Valley. The hydrogeological connections and the transit velocities set through labelings with tracers allowed for a delimitation of the area of influence of the storage lake.

0714 Gaspar, E.; Stanescu, P.; Oraseanu, I.; Farcasiu, O.; and Spiridon, S. (1986) - The behaviour of indium as a tracer for karst water research in Theoretical and Applied Karstology, 2, (in press).

Results of labelings using In-EDTA as a tracer in various hydrokarstic structures provided for the establishment of a computation formula and the elaboration of a counting frame to assess the amount of tracer needed for one labeling. Tracer extraction and measurement methods are outlined.

0715 Gazelle, F. and Favory, M. (1980) - Modèle karstique et comportement hydrologique des calcaires primaires dans de Sud du Massif Central: France; Travaux Labo. Géogr. Phys. Appli. Bordeaux, Num. 4, p. 1-31.

0716 Gavich, I.K. (1980) - The theory and practice of application of modelling to hydrogeology: Moscow; Nedra, 358 p.

0717 Gdalia, L. (1980) - Application d'un modèle mathématique conceptuel à plusieurs aquifèrs karstiques de la bordure méditerranéenne française: correspondances entre les paramètres du modèle et les caractères physiques des bassins versants: France; Thèse 3 ème cycle, Sci, Eau Montpellier, 118 p.

Analyse des possibilités de généralisation de la technique de modèlisation dans le karst. Recherche de correspondances éventuelles entre certaines fonctions du modèle et des paramètres physiques.

0718 Genser, H.; and Mehl, J. (1977) - Einsturzloecher in silikatischen Gesteinen Venezuelas und Brasiliens [Sinkholes in silicate rocks of Venezuela and Brazil]: Germany. F.R.; Z Geomorphol, 21:4, p. 431-444 [in German, summaries in English].

0719 George, A.I. (1985) - Caves of Kentucky in Dougherty, P.H., editor, Caves and karst of Kentucky: U.S.; Kentucky Geological Survey Special Publication 12, p. 18-27.

0720 George, A.I. (1977) - Evaluation of sulfate water quality in the north-central Kentucky karst in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S.; Western Kentucky University, p. 340-356.

Sulphate-rich waters occur in north-central Kentucky. Their source is from natural evaporites, mainly gypsum. Water type and hydrofacies were used to differentiate the origin of water by the author. Some sulphates may be the result of paleokarstic solution activity.

0721 George, A.I. (1974) - Preliminary index of gypsum speleothems in the caves of Kentucky, Indiana, and Tennessee: U.S.; West Virginia Geological and Economic Survey, Conference on Karst Geology and Hydrology, 4th, Proceedings, 1974, p. 169-177.

A discussion of caves and gypsum speleothems found in Indiana, Kentucky, and Tennessee. Most are developed in Upper Mississippian rocks. The distribution and frequency of speleothem types is given.

0722 George, A.I. (1973) - Pollution of karst aquifers: Water Well Journal, 27:8, p. 28-32, August 1973, 4 photo., 7 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:21, p. 59.

Cesspools, seepage pits, septic tanks, waste treatment plants, and ill-maintained municipal sewer lines are prime soruces of viral-bacteriological and chemical contamination of water resources in a limestone terrane.

0723 George, A.I. and Schmidt, J.B. (1977) - Cave development North of the Green River at Mammoth Cave National Park is Strongly Influenced by Recharge from a filled Pennsylvania paleo-valley in Tolson, J.S. and Doyle, F.L., editors, Karst hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 415-430.

0724 George, W.O. (1952) - Recharge of Texas underground water reservoirs: U.S.; U.S. Geological Survey Open-File Report.

Summarizes the methods of artificial recharge and their applicability to ground-water reservoirs in Texas.

0725 George, W.O.; and Bennett, R.R. (1942) - Ground-water resources in the area between Buda and San Marcos: U.S.; U.S. Geological Survey Open-File Report, 8 p.

Describes the general occurrence of ground water and gives sites for three project test wells.

0726 Geraghty, J.J.; Miller, D.W.; Leeden, V.D.W.; and Troise, F.L. (1973) - Water atlas of the United States: U.S., Port Washington, New York; 122 plates with text.

One hundred twenty-two maps illustrating a variety of water related topics of the U.S.

0727 Gere, Bernard. (1969) - Le principe de l'inversion de relief en région karstique: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, pm M20/1-M20/4.

0728 Gerteuhauer, A. (1960) - Der tropische kegelkarst in Tabasco (Mexico): Germany, F.R., Gottingen; Zeitschrift für Geomorphologie, Supplementband 2, Internationale Beitrage zur Karstmorphologie, p. 22-48.

0729 Geyh, M.A.; Groschopf, P.; and Scholz, W. (1982) - Hydrogeological study with environmental isopotes of karst waters of the eastern Swabian Alb and the Danube Ried: Archiv für Hydrobiologie, 95:1/4, p. 81-91.

By means of geological parameters the values of mean residence time (MVZ) are used for estimating the catchment area of each karst spring. The authors succeeded in grouping the karst waters according to origin and age by using the C-14, H-3, and delta C-13 values.

0730 Geze, B. (1968) - La espeleologia cientifica: Martinez Roca, 192 p.

0731 Geze, B.; and Mangin, A. (1980) - The karst of Cuba: Paris; Rev Geogr Phys Geol Dyn Ser 2, 22:2, p. 157-166 [in French].

0732 Ghita, D.; Naulea, N.; and Banu, I. (1979) - A study concerning the pothole from Piciorul Boului-Muchea Coti (Fagaras Mountains): Buletin Speologie, 1, 2 figs. [in Romanian].

A vadose and collapse origin cave, developed in crystalline limestone interbedded with amphibolites, is described.

0733 Gilboy, A.E. (1985) - Hydrogeology of the Southwest Florida Water Management District: U.S.; Southwest Florida Water Management District, Technical Report 85-01.

0734 Ginesty, J.M. (1983) - Etude d'un réservoir à double perméabilité, évaluation de ses ressources en eau. Synclinal calcaire de Castries-Beaulieu (Hérault): France; Thèse Doct. 3ème cycle Hydrogéologie Montpellier.

0735 Girona, J.M. (1978) - Introduction à l'étude de la zone non saturée d'un milieu carbonaté fissuré: forme des écoulements, thermométrie: France; These Doct. 3 ème cycle, Sci. Eau Montpellier, 95 p.

Mise au point d'une méthode originale de mesures thermiques en milieu non saturé fissuré et karstifié: observations de plusieurs types d'écoulement et proposition d'un schéma global explicatif. Les résultats bruts ou traités statistiquement permettent de donner une explication semblant cohérente des phénomènes observés et mettent en relief l'importance de la fracturation dans le domaine étudié.

0736 Giurgiu, I. (1985) - Caves in salt in the Vrancea SubCarpathians: Bucharest; Buletinul CSER, 9, p. 5-35, 28 maps, 1 sketch, 14 photographs [in Romanian].

A comprehensive description of the exo- and endokarst in salt in the Meledic Plateau, the Jgheabu Valley, and at Sarile. A presentation of the largest cavity in salt in the world (cave 6S at Minzalesti, 1,257 m).

0737 Giurgiu, I. (1984) - The pothole at Dosul Lacsorului (the Sebes Mountains), explorations over 1973-1983: Bucharest; Buletinul CSER, 8, p. 197-203, 1 sketch, 2 maps, 1 photograph [in Romanian].

Data concerning the history of explorations and items of information in connection with the new discoveries made in a pothole with a level difference of 268 m.

0738 Giurgiu, I.; Ceara, E.; and Roman, C. (1976) - New discoveries in the cave at Limanu, (Dobrogea): Bucharest; Buletinul CSER, 4, p. 170-172, 1 map [in Romanian].

A new sector is presented of one of the most interesting caves in Romania from an archaeological point of view, a cave which is 3,400 m long.

0739 Giurgiu, I.; Done, A.; Vadeanu, T.; and Roman, C. (1982) - Zalion minus 226: Bucharest; Buletinul CSER, 7, p. 7-22, 2 maps, 1 fig., 4 photographs [in Romanian].

A description of a cavity which is 2,121 m long and -226 m deep.

0740 Giurgiu, I.; and Muraru, A. (1977-1978) - The Frasin potholox (Obcina Mare Mountains): Bucharest; Buletinul CSER, 5, p. 26-30, 2 maps [in Romanian].

A pothole in sandstone, the deepest in Romania (-60 m).

0741 Giurgiu, I.; and Silvasan, G. (1979) - New speleological discoveries in the Rodna Mountains: Bucharest; Buletinul CSER, 6, p. 22-52, 10 maps, 1 fig. [in Romanian].

Eight new cavities in the north-western part of the massif are presented. The most important of them is Grota Zinelor (4,269 m long, 110 m deep), which developed in Eocene limestones.

0742 Giurgiu, I.; Vadeanu, T.; Done, A.; Negru, M.; Sandeschi, N.; Silvasan, G.; Codescu, M.; Ciuculescu, O.; Sfasie, M.; and Cucu, P. (1984) - Speleological discoveries and explorations in the Somes Plateau: Bucharest; Buletinul CSER, 8, p. 11-81, 53 maps, 4 fig., 2 photographs [in Romanian].

A speleological inventory of the area which includes 104 cavities. Noteworthy among them are: the cave in the Cuciulat Quarry (1,707 m) where the first paleolithic paintings in Romania were discovered; the pothole at Gura Cerului where a 52-m waterfall was lowered; and the cave at Cetatea Ciceului, the longest cavity in sandstone in Romania (273 m).

0743 Giurgiu, Mihaela. (1977-1978) - Contributions to the study of cave climate in the Ponorici-Cioclovina cu Apa Cave in view of its therapeutical utilization: Bucharest; Buletinul CSER, 5, p. 257-278, 14 tables [in Romanian].

A graduation paper read at the Medical Institute of Bucharest. The conclusions of the study show that the cave is suitable for the treatment of complaints of the respiratory system.

0744 Giusti, E.V. (1978) - Hydrogeology of the karst of Puerto Rico: U.S.; U.S. Geological Survey Professional Paper 1012.

About one-fifth of Puerto Rico is covered by a tropical karst formed on a series of six limestone formations. All stages of karstification are present: from the incipient, found at the western end of the belt to the residual, found at the eastern end.

0745 Giusti, E.V. (1977) - Hydrogeology and "geoesthetics" applied to land use planning in the Puerto Rican karst in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 149-168.

0746 Giusti, E.V.; and Bennett, G.D. (1977) - Water resources of the north coast limestone area, Puerto Rico: Water-Resources Investigations 42-75, February 1976, 42 p., 27 fig., 4 tab., 13 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 10:13.

The north-coast limestone area, about 600 square miles, is one of the few sparsely populated parts of Puerto Rico, and is the island's last large and underdeveloped source of ground water.

0747 Glazek, J. (1973) - Fossil karst in the paleogeographic development of Poland: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 423-426.

Fossil karst identification is a controversial subject. The author discusses how proper interpretation of fossil karst requires paleogeographic interpretation of marine and lacustrine deposits.

0748 Glazek, J. (1970) - Remarks on the development of karst morphology in the tropics and on the role of factors controlling karst development: Bull. de L'Academie Polonaise des Sciences, 18:2, 1970.

The author determined that climate is a major controlling factor based on comparisons between karsts in Poland and North Vietnam.

0749 Glazek, J.; and Markowicz-Lohinowica, M. (1973) - Dependence of karst denudation on geological structure in the southwest part of the Holy Cross Mountains (Central Poland): Acta Geologica Polonica, 23:3, p. 529-546.

Chemical analyses of karst waters in the southwest part of the Holy Cross Mountains revealed seasonal variations. The analyses also enabled the index of karst denudation and the dependence of the composition on lithology of soluble formations to be determined.

0750 Godfrey, A.E. (1985) - Karst hydrology of the south slope of the Uinta Mountains, Utah in Picard, M.D., editor, Geology and energy resources, Uinta Basin of Utah: U.S.; Utah Geological Association Publication 12, p. 277-294.

0751 Gomberg, David N. (1977) - Neogene karst in the Florida Straits in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 213-226.

The Pourtales Terrace is composed of submerged phosphatic limestone which has been above sea level during part of its history. Lithologic information is given to help identify fresh-water diagenetic features which are 200 to 400 meters deep.

0752 Gomez-Gomez F. (1984) - Sinkhole development in limestone areas as related to rainfall and ground-water development in Puerto Rico in Gori, P.L., and Hays, W.W., editors; Kitzmiller, C.J., and Downer, L.N., compilers, Proceedings of Conference XXIV; a workshop on geologic hazards in Puerto Rico, San Juan, Puerto Rico, April 4-6, 1984: U.S.; U.S. Geological Survey Open-File Report, 1978, p. 101-103.

0753 Gooding, P.J. (1984) - The Knox unconformity in the subsurface in south-central Kentucky: U.S.; Geological Society of America, Abstracts with Programs, 16:3, p. 141.

0754 Goolsby, D.A. (1971) - Hydrogeological effects of injecting wastes into a limestone aquifer near Pensacola, Florida: U.S.; Groundwater, 9:1, p. 13-19.

An account of the development of a well for the disposal of acidic waste in limestones in Florida, and the effects this waste had on the aquifer's geochemistry and pressure.

0755 Goran, C. (1984) - The relationship between the cave extent and vertical range - a relevant speleometric index: Theoretical and Applied Karstology, 1, p. 83-90, 3 figs. [in French].

The author suggests a new speleometric index - the extent index - and demonstrates its usefulness in the classification of caves and the interpretations of karst geomorpholoy.

0756 Goran, C. (1983) - Types of karstic relief in Romania: Travaux de l'Institut de Spéologie "Emile Racovitza", 22, p. 91-102, 5 figs. [in French].

The author suggests a classification of karstic relief based on a genetic-evolutive criterion. As a result of post-sarmatian evolution, nine types of karstic relief were created from the three genetic classes (plateaus, calcareous bars, and isolated massifs).

0757 Goran, C. (1982) - The systematic catalog of the Romanian caves: Bucharest; Cons. National pt. Ed. Fiz. Sport, 496 p. [in Romanian].

This work catalogues 6,816 caves in Romania. The decimal catalogue inventories caves in each territorial (karstic) unit according to the decimal system of classification, which is subdivided by lithological specification (01 - caves in salt, 02 - in gypsum, etc.). The alphabetical catalogue includes all the names of the caves and their synonyms with their respective number.

0758 Goran, C. (1981) - The karst of the Mehedinti Plateau, II, the central-northern part, note 1: Travaux de l'Institut de Spéologie "Emile Racovitza", 20, p. 217-226 [in French].

The author presents morphological and hydrographic aspects of the exokarst in the central-northern part of the Mehedinti Plateau with emphasis on the conditions of karst formation, on the compartmentation and current distribution of karstic forms.

0759 Goran, C. (1978) - The karst of the Mehedinti Plateau, I, the northern part: Travaux de l'Institut de Spéologie "Emile Racovitza", 17, p. 165-183, 2 figs., 2 plates [in French].

This work, using a 1:20,000 color map, analyzes the morphology of surface and underground relief of the Mehedinti Plateau in correlation with various drainage directions. A detailed study of the genesis of the Zaton-Bulba karstic complex led to a general model of underground network organization in relation to the morphological evolution of different karstic valleys.

0760 Goran, C. (1976) - The evolution of the hydrographic network in the Topolnita-Epuran karstic area (the Mehedinti Plateau): Travaux de l'Institut de Spéologie "Emile Racovitza", 15, p. 197-206, 6 figs. [in French].

A regional study of paleogeographic and geomorphological evolution from the moment of limestone emersion until the current configuration of the relief of one of the most interesting and representative underground karstic complexes in Romania.

0761 Gorbunova, D.A. (1973) - Geological preconditions of the development of gypsum and halite karst on the territory of the USSR: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 241-248.

An account of the distribution of halogen rocks in the USSR and paleogeographical, geological, and hydrogeological data from the regions.

0762 Gospodaric, R.; and Habic, P. (1976) - Underground water tracing, investigations in Slovenia 1972-1975: Yugoslavia, Ljubljana; Institute Karst Research, 312 p.

An account of experiments using different methods of underground water tracing in the karst region of Ljubljana, Yugoslavia and in the Quaternary sediments of Savinja Valley, Yugoslavia.

0763 Goue, B. (1983) - Contribution a l'utilisation de la méthode des éléments finis en hydrogéologie: essai d'application au milieu fissuré carbonaté: exemple du bassin de Saugras (Montpellier-France): France; Thèse Doct. Ing., Géol. Appl. Montpellier, 59 p.

Simulation numérique des écoulements souterrains en milieux fissurés a l'aide de la méthode des éléments finis.

0764 Gouisset, Y. (1981) - Le karst superficiel: genèse, hydrodynamique et caractéristiques hydrauliques. Application à un karst du Languedoc: France; Thèse Doct. 3 ème cycle, Sci. Eau Montpellier, p. 227.

Résultats de recherches effectuées sur le site expérimental de Corconne, mise en place et géré par le Laboratoire d'Hydrogéologie de l'Université des Sciences et Techniques du Languedoc. Introduction à l'étude du karst superficiel. Approche tridimensionnelle de la fissuration du massif calcaire de Corconne. Analyse du fonctionnement hydrodynamique et des caractéristiques hydrauliques du karst superficiel de Corconne.

0765 Grabert, H. (1978) - The presence of 'karst' in quartzite in the Roraima Formation in Venezuela: Germany, F.R., Dusseldorf; Munsterche Fersch Geol Paleontol, 44-55, p. 87-98 [in German].

0766 Gradzinski, R.; and Radomski, A. (1963) - Types of Cuban caves and their development on factors controlling karst development: Bulletin de L'Academie Polanaise des Sciences, Vol. XI, No. 3, p. 151-160.

The authors classified the factors involved in the development of karst morphology into three groups: the character of limestone subject to karst processes, the spatial situation of the limestone complex, and the climatic conditions. Samples from Cuban caves are used to describe the dependence of development on the three factors.

0767 Graupe, D; Isailovic, D.; and Yevjevich, V. (1976) - Prediction model for runoff from karstified catchments in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 277-300.

0768 Grant, L.F. (1956) - Solution in bedrock at the Calhoun, Tennessee plant of Bowaters, Southern Paper Corporation: Bull. Geol. Soc. Amer., Vol. 67, p. 1751.

The area of study is on Knox Dolomite. Many cores have shown that certain zones are extremely dissolved. A large part of the solution has been controlled by lithology. The extent to which fracturing and recent erosion in the area has affected the size, position, and depth of some cavities is discussed.

0769 Grant, S.C.; Finkenbinder, D.L.; and Eilders, D.B. (1977) - Photogrammetric mapping of sinkhole development in Floyd County, Iowa: U.S.; Iowa Geological Survey Newsletter, 1:2, p. 22-23.

0770 Gray, H.H. (1977) - Geologic story of McCormicks Creek State Park: U.S.; Indiana Geological Survey, State Park Guide 3.

0771 Greenfield, R.J.; Lavin, P.M.; and Parizek, R.R. (1976) - Geophysical Methods for location of voids and caves in Proceedings of the Anaheim Symposium on land subsidence, December 1976: Netherlands; International Association of Hydrological Sciences, Pub. 121, p. 465.

The application of microgravimetric surveying, subsurface temperature measurements, electrical resistivity surveying, and seismic surface waves to the location of underground voids and caves are discussed. Examples of field studies in carbonate terrains of central Pennsylvania, U.S.A., are presented. Microgravimetric

procedures for determining soil thickness variations related to subsurface cavities as well as direct detection of cavities are described.

0772 Gressel, Walter. (1969) - Zur ablagerung von schwebestoffen aus der luft und ausbildung von sinterformen in alpinen höhlen und bergiverken: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, Vol. 2, p. 537/1-537/7.

0773 Griffiths, P. (1980) Caves of White Ridges Vancouver Island, B.C., Canada: U.S., Huntsville; NSS Bull, 41:4, p. 122.

0774 Grillot, J.C. (1982) - Sur la structure des aquifères karstiques: correlations interrégionales; schématisation générale dans le sud-est de la France: France; Eclogae Geol. Helv. Bâle, Mars, Vol. 51/1, p. 77-92.

0775 Grillot, J.C. (1979) - Structure des systèmes aquifères en milieu fissuré. Contribution méthodologiques à cette connaissances: France; Thèse Doct. Sci., Montpellier, 227 p.

Etude des techniques de traitement des mesures ayant trait à l'organisation fissurale du milieu qui permettent de définir de nouvelles méthodes d'approche dans la connaissance du mode de circulation des eaux souterraines. Etude de la structure des magasins carbonatés karstiques qui conduit à des hypothèses genetiques sur l'organisation des systèmes aquifères en milieu fissuré carbonaté.

0776 Grillot, J.C. and Bayer, F. (1976) - Sur les possibilités de stockage à l'air libre, en pays karstique, d'ordures ménagères traitées par broyage et compactage: un exemple d'analyse et de contrôle des risques de pollution biologique des eaus souterraines: France; Centre Belge d'Etude et de Documentation des Eaux, Mars, No. 388, p. 94-103.

0777 Grillot, J.C. and Razack, M. (1985) - Fracturing of a tabular limestone platform: comparison between quantified microtectonic and photogeological data: France; Tectonphysics, 113:3/4, p. 327-348.

0778 Groschopf, Paul (1971) - Karstydrographische probleme der Schwaleis - Chen Alb: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY6/1-HY6/4.

0779 Groschopf, Paul. (1969) - Altersfragen der verkarstung der Schwabischen Alb: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M18/1-M18/3.

The age of karst features in the Schwabische Alps is discussed.

0780 Ground Water Newsletter. (1982) - Concrete conical stopper plugs sinkhole problem in Florida: U.S., Port Washington; Ground Water Newsletter, 11:19, p. 6.

0781 Grubbs, A. (1980) - The caves of Acatlan: U.S., Huntsville; NSS Bulletin, 41:4, p. 120.

0782 GUA. (1977) - Field trip of general nature to Bonaire (Netherlands, West Antilles): Utrecht; GUA, Papers of Geology Ser. 1, 10, p. 69-75.

0783 Guendon, J.L. (1979) - Le paléokarst du Coulon (Vaucluse). Morphologie et évolution d'une karstification sous couverture: France; Mém. CERGH, Fra., Num. 20, p. 17-31.

L'étude de la morphologie karstique, de la structure du remplissage des dépressions, et de l'altération du mur calcaire, laisse penser que le paléokarst du Coulon résulte d'une karstification sous - "couverture perméable", consécutive a des paléo-altérations continentales crétacées.

0784 Guilbot, A. (1975) - Modèlisation des écoulements d'un aquifère karstique (liaison pluie-débit). Application aux bassins de Saugras et du Lez: France; Thèse Doct. Université Montpellier, 110 p.

0785 Guimaraes, Jose Epitacio Passos (1974) - Espeleotemas e perolas das cavernas: Brazil, Sao Paulo; Secretaria da Agricultura, Coordenadoria da Pesquisa de Recursos Naturais, Instituto Geografico e Geologico, 24 p. [summary in Portuguese and English].

0786 Gunay, G. (1980) - International seminar on karst hydrogeology: Turkey; State Hydraulic Works Printhouse, 385 p.

0787 Gunn, J. (1983) - Point-recharge of limestone aquifers - a model from New Zealand karst: Journal of Hydrology, 61:1-3, p. 19-29.

The mechanisms by which depressions concentrate near surface waters and transmit them to underlying aquifers has been investigated through the use of a depression hydrology model.

0788 Guozdetsky, N.A. (1952) - The experience in karst regioning of the Greater Caucasus: Geograph. Col. Papers, Vol. 1, Geografgiz.

0789 Guozdetsky, N.A.; and Harinnin, A.M. (1973) - The Altar karst and caves: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 181-187.

A descriptive account of karst in the Altar and of the caves found in the area.

0790 Guozdetsky, N.A.; and Mateo, K.H. (1973) - Reflection of jointing in the relief of a karst tropic region: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 249-257.

A startling relationship between strike and jointing demonstrates a close relationship between the two parameters.

0791 Gurnee, R.; and Gurnee, J. (1984) - The Rio Camuy cave system; the last twenty years in Friends of the karst meeting, Puerto Rico, 1984 - Friends of the karst, Puerto Rico meeting abstracts: U.S.; Geo 2, 11:3.

0792 Gurnee, Russell H. (1971) - Conservation through commercialization: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 109-114.

Caves are being discovered and explored at an accelerated rate which exceeds efforts to provide conservation and protection. Both factors should be considered to preserve the caves for future generations.

0793 Gustavson, T.C.; Alhades, A.; Hoadley, A.; and Simpkins, W.W. (1980) - Karstification of the Rolling Plains of the Texas Panhandle due to dissolution of Permian evaporites: U.S.; Geological Society of America, Abstracts with Programs, 12:1, p. 4.

Over 100 collapse sinks and depressions occur in the northern half of Hall County, Texas. Of these, as many as 27 sinks and 6 depressions formed between 1950 and 1964. Karst features are forming as a result of regional dissolution of Upper Permian evaporites--primarily halite and secondarily gypsum from the Queen, Grayburg, and Upper and Lower San Andres Formations.

0794 Gustavson, T.C.; and Finley, R.J. (1979) - Timing and rates of regional dissolution of bedded Permian salts in the Texas Panhandle: U.S.; Geological Society of America, Abstracts with Programs, 11:7, p. 436.

Regional dissolution of bedded Permian salts (halite) has occurred in the Dalhart, Anadarko, and Palo Duro basins. Cumulative thicknesses up to 180 m (600 ft) of salt have been dissolved resulting in collapse of overlying beds to form folds, sinkholes, and numerous breccia chimneys. Timing and rates of dissolution are discussed.

0795 Gustavson, T.C.; Hoadley, A.D.; and Simpkins, W.W. (1980) - Salt dissolution and collapse along the margin of the southern High Plains in Gustavson, T.C.; and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle; a report on the progress of nuclear waste isolation feasibility studies (1980); annual report for period October 1979 - September 30, 1980: U.S.; Texas Bureau of Economic Geology, Geological Circular 81-3, p. 130-137.

0796 Gustavson, T.C.; Simpkins, W.W.; Alhades, A.; and Hoadley, A. (1982) - Evaporite dissolution and development of karst features on the Rolling Plains of the Texas Panhandle: U.K.; Earth Surfaces Processes & Landforms, 7:6, p. 545-563.

0797 Gustavson, T.C.; and Finley, R.J. (1982) - Geomorphic development of eastern New Mexico and the Texas Panhandle; a product of subsidence due to regional dissolution of Upper Permian salts: U.S.; Geological Society of America, Abstracts with Programs, 14:7, p. 504.

0798 Gutierrez, A.A. (1981) - Geomorphology and hydrology of the Carlsbad gypsum plain, Eddy County, New Mexico in Beck, B.F., editor, Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S.; Proceedings, p. 45-47.

0799 Guyot, C.A. (1984) - Collapse and compaction of sinkholes by dynamic compaction in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 419-424.

The dynamic compaction technique consists of repeated applications of high energy impacts onto the ground surface. This results in the collapse and consequent improvement of the loose ground structure. The technique can also be used to precisely locate cavities in "sinkhole" areas and to provide high bearing capacities and minimum long-term settlements of the proposed foundations.

0800 Guyot, J.L. (1983) - La zone non saturée dans l'aquifère karstique: analyse des écoulements hypodermiques sur périmètre expérimental; rôle de la zone non saturée dans la différenciation des régimes de deux sources karstiques (Monts de Pardailhan-Montagne Noire): France; Thèse 3 ème cycle, Sic. Eau Montpellier, 305 p.

Vérification expérimentale de l'existence de circulations horizontales importantes dans la zone non saturée de l'aquifère karstique à la suite d'observations sur les 47 forages du site expérimental de Corconne et caractérisation hydrodynamique du milieu étudié. Définition des régimes d'écoulement de deux sources situées dans un autre secteur (Monts de Pardailhan) permettant d'expliquer leur différence de comportement par les caractéristiques hydrodynamiques de leurs réservoirs aquifères.

0801 Habe, France. (1969) - Eis-und schneehöhlen Jugoslawiens: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 356/1-356/6.

0802 Halasi, G. (1981) - Ponor Cave (Drocea Mountains): Buletin Speologic Informativ, 5, p. 29-34, 2 figs. [in Romanian].

Variability of the yield and the breakthrough times of a karstic drainage system are discussed.

0803 Halasi, G. (1980) - The endokarstic system Caprelor pothole - the cave from Izbucul Pescariei (Caprioara limestone area): Buletin Informativ, 4, p. 66-71, 4 figs. [in Romanian].

A little limestone surface hosts a complex karst system with several springs, the yields of which are discussed correlatively with those of the swallets. In spite of the reduced yields (a few liters per second), a 12-m rise of the water was observed in the pothole leading to the underground stream.

0804 Halasi, G. (1979) - The morphology of Cimpeneasca Cave (Codru Moma Mountains): Nymphaea, 7, p. 265-272, 3 figs., 1 plate [in Romanian with French abstract].

The disposition of the cave along the main fracture systems as well as its evolution from a phreatic to a vadose morphology are examined.

0805 Halasi, G. (1978) - Contributions to the knowledge of the karst of Moneasa Area: Nymphaea, 6, p. 373-382, 6 figs. [in Romanian with French abstract].

A complex karst area, including classical drainage features such as poljes, dry perched valleys, and overflow cavities, is described.

0806 Halasi, G.; Enodi, I.; Lascu, C.; and Serban, S. (1985) - An archaeological discovery in the Izbucul Toplitei Cave: Bucharest; Trav. Inst. Spéol. "Emil Racovita", Tome XXIV, p. 105-110.

A recent discovery beyond a sump of a Bronze Age necropolis containing a variety of cult objects, human skeletons, tools, and pottery is under research.

0807 Halasi, G.; and Ponta, G. (1984) - Subterranean drainage in the upper part of the Sighistel Valley (Apuseni Mountains): Theoretical and Applied Karstology, 1, p. 239-242.

The Sighistel karst area is about 15 km^2 and contains several springs and swallets and more than 6,000 m of mapped cave passages in 160 caves. The relation between two main caves of the right side of Sighistel Valley is presented. The drainage network is revealed by a dye tracing experiment which demonstrated the connection between two caves with entrances having a 410-m difference.

0808 Hales, Jiri. (1971) - The methods of photodocumentation in subterranean karstic cavities: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 33-38.

A discussion of the problems and some possible solutions for documenting inaccessible subterranean features using photographic equipment.

0809 Hales, Jiri. (1969) - A methodology of karstic stereophotodocumentation: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 6, p. D2/1-D2/6.

Stereophotography allows for the presentation of forms in three dimensions. Methodical rules for this technique of karst documentation are presented.

0810 Hall, P.L. (1977) - Groundwater exploration in the Cul-de-Sac Plain, Republic of Haiti <u>in</u> Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs XII: U.S.; University of Alabama in Huntsville Press, p. 131-148.

0811 Hall, R.D. (1973) - Stratigraphy and sedimentation of a sinkhole in south central Indiana: U.S.; Geological Society of America, Abstracts with Programs, 5:4, p. 319.

One of the sinkholes characteristic of the karst area of south-central Indiana was selected for a detailed study of its geomorphology, hydrology, pedology, stratigraphy, and sedimentation. Recognition of stratigraphic zones and sedimentation patterns

argues strongly against the long-held idea that "terra rossa" represents the in situ accumulation of insoluble residue released by dissolution of limestone.

0812 Hall, R.D. (1976) - Investigations of sinkhole stratigraphy and hydrogeology, south-central Indiana: U.S.; NSS Bulletin, 38:4, p. 88-102.

0813 Hall, R.D. (1976) - Stratigraphy and origin of surficial deposits in sinkholes in South-Central Indiana: U.S.; Geology, 4:8, p. 507-509.

0814 Hallberg, G.R. (1984) - Karst carbonate aquifer studies: U.S.; Iowa Geological Survey, Geology 9, 25 p.

0815 Hallberg, G.R.; Hoyer, B.E.; Bettis, E.A.; Libra, R.; and Mitchem, P.S. (1983) - Ground-water contamination and land management in a karst area of northeastern Iowa in Hannan, D.L., chairperson, Engineering geology today and tomorrow, Association of Engineering Geologists 26th annual meeting, San Diego, CA, October 2-7, 1983: U.S.; p. 67-70.

0816 Hallberg, G.R.; Hoyer, B.E.; Bettis, E.A.; and Libra, R.D. (1983) - Contamination of carbonate aquifers: U.S.; Iowa Geology 8, p. 20-23.

0817 Hallberg, G.R. (1982) - Sinkholes and ground water in northeast Iowa: U.S.; Iowa Geology, 7, p. 4-8.

0818 Halliday, W.R. (1983) - Further observations on the Spirit Lake pseudo karst: U.S.; Geo 2, 10:3, p. 49-51.

0819 Hansel, A. (1983) - Form as an indicator of origin of karst landscapes in Indiana in Dougherty, P.H., editor, Environmental karst; Karst Symposium, Louisville, Kentucky, U.S., April 1980: U.S.; Geospeleo Publications, p. 109-118.

0820 Hansel, A.K. (1980) - Sinkhole form as an indicator of process in karst landscape evolution: U.S.; University of Illinois Doctoral Thesis, 175 p.

0821 Hanshaw, B.B.; and Back, W. (1979) - Major geochemical processes in the evolution of carbonate aquifer systems in Back, W.; Stephenson, D.A. (guest editors), Contemporary Hydrogeology, The George Burke Maxey Memorial Volume: Journal of Hydrology, Vol. 43, p. 287-312.

0822 Hanshaw, B.B.; Brown, D.; Cushing, E.; Konikow, L.; and Peterson, J. (1977) - Hydrogeologic study of a regional carbonate-rock aquifer system in International Association of Hydrogeologists Memoirs, Vol. XIII, Part 1, Birmingham Congress: U.K., p. A24-A35.

A guide to a detailed study of the Mississippian Madison Limestone to evaluate it as an aquifer. A coordinated study of many fields of geology with the use of a digital model is necessary to evaluate its potential.

0823 Haq, Izharul; and Altaf-ur-Rehman, Ch. (1984) - Sinkholes at Tarbela Dam project in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on

Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 255-260.

Tarbela Dam in Pakistan is located on a 125 to 215 m deep permeable alluvium layer containing extensive open work gravels. In order to control seepage and hydraulic gradients, an impermeable blanket (an extension of the dam core) was laid on the upstream side of the dam. During the first drawdown, the formation of a number of sinkholes was observed in the blanket. The author describes the method used to deal with the sinkholes.

0824 Harasimuik, M.; and Henkiel, A. (1973) - Karst features in East Poland: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 189-193.

A brief description of karst features occurring in East Poland.

0825 Harasimuik, M.; Henkiel, A.; and Pekala, K. (1969) - Development of karst processes in the vicinity of Frampol during the Pliocene and the Quaternary: Lublin Polonia; Annales Universitatis Mariae--Curie--Sklodowska, Vol. XXIV, 4, Section B, p. 149-193.

The authors discuss studies on the interdependencies between the consecutive generations of karst forms. The relations of karst to various Quaternary and pre-glacial sediments at the Roztocza escarpment were studied.

0826 Harden, S. (1982) - Valdina Farms Sinkhole: U.S.; Texas Caver, 27:4, p. 74-79.

0827 Harmon, R.S. (1979) - An isotopic study of groundwater seepage in the central Kentucky karst: Water Resources Research, 15:2, p. 476-480, April 1979, 3 fig., 2 tab., 24 ref. in Selected Water Resoruces Abstracts: U.S.; U.S. Geological Survey, 12:16, p. 8.

Ratios of 180/160 were determined for meteoric precipitation and vadose seepage at Great Onyx Cave in Mammoth Cave National Park from March through July 1973. Results of the study indicate that (1) the delta 180/dT for precipitation at the site is 0.38 parts per thousand/deg C, (2) short-term fluctuations in the 180/160 ratio of seepage water in the vadose zone above the cave do not affect the oxygen isotopic composition of the speleothem calcite precipitated in the cave, and (3) the residence time of seepage water in the vadose zone is about 2 weeks.

0828 Harmon, R.S. (1980) - Late Pleistocene geology and sea level history of Bermuda: Paris; 26 Int. Geol. Congr., July 1980, p. 659.

0829 Harmon, R.S. (1979) - U-series dating of speleothems and A-glacial chronology for western North America: NSS Bulletin 41, p. 102-104.

TH 230 and U 234 ages for calcite speleothems from four alpine karst areas of western North America cluster into four distinct groups. Attributing periods of speleothem deposition to interglacial or interstadial episodes and vice-versa, times of warm

climate in western North America are observed at about 320,000 to 280,000 years BP, 220,000 to 180,000 years BP, 155,000 to 99,000 years BP, and from 10,000 years BP to the present.

0830 Harmon, R.S. (1974) - Submerged stalagmites as indicators of former low sea level stand in Bermuda: U.S.; NSS Conv. (Decorah, Iowa), abstracts, p. 8.

0831 Harmon, R.S.; and Curl, R. (1978) - Preliminary results on growth rate and paleoclimate studies of a stalagmite from Ogle Cave, New Mexico. Reply to discussion by Gascoyne, M. (NSS Bull. [40:4] 78, p. 123): U.S.; NSS Bulletin, 40:4, p. 123-124.

0832 Harmon, R.S.; and Ford, D.C. (1976) - Sea level changes in Bermuda during the past 200,000 years: Sydney; 25 Int. Geol. Congr., 1976, p. 501-502.

0833 Harmon, R.S.; and Hess, J.W. (1982) - Ground water geochemistry of the Burnsville Cove area, Virginia in White, W.B., editor, Burnsville Cove symposium: U.S.; The National Speleological Society Bulletin, 44:3, p. 84-89.

0834 Harmon, R.S.; Schwarcz, H.P.; and Aley, T. (1978) - Isotopic studies of speleothems from a cave in southern Missouri, U.S.: U.S.; U.S. Geological Survey Open File Report 78-701, p. 165-167.

0835 Harmon, R.S.; Schwarcz, H.P.; and Ford, D.C. (1974) - Late Pleistocene history of Bermuda as recorded by presently submerged speleothems: Geological Society of America, Abstracts with Programs, 6:7, p. 778.

The low relief, carbonate islands of Bermuda contain caves abundant in speleothems and often fully or partially submerged by sea water. The authors discuss two submerged stalagmites, each about 10 cm. in diameter, recovered in the growth position from Crystal Cave at a depth of nearly 8 meters of sea water.

0836 Harmon, R.S.; Schwarcz, H.P.; Thompson, P.; and Ford, D.C. (1978) - Discussion of Thompson, G.M.; Lumsden, D.N.; Walker, R.L.; and Carter, J.A., Uranium series dating of stalagmites from Blanchard Springs Caverns, Arkansas, U.S. (Geochim Cosmochim Acts [39] 75 p. 1211-1218): U.K., Oxford; Geochimica et Cosmochimica Acta, 42:4, p. 433-437.

0837 Harmon, R.S.; White, W.B.; and Ewers, R.O. (1974) - Secondary mineralogy of Castleguard Cave, Banff National Park, Alberta and Grotte Valerie, Nahanni National Park, Northwest Territories, Canada: U.S.; NSS Conv (Decorah, Iowa), abstracts, p. 10.

0838 Harmon, R.S.; and others. (1974) - Late Pleistocene glacial chronology as inferred from speleothem age determinations: U.S.; West Virginia Geological and Economic Survey, Conference on Karst Geology and Hydrology, 4th, Proceedings, 1976, p. 165-168.

The authors discuss the use of speleothems in absolute age dating of a carbonate region. An area covered by or adjacent to a glacier would contain little flowing water and speleothems would not be

formed. The cyclic nature of deposition and non-deposition due to the presence or absence of glacial cover can give an absolute time scale for the Quaternary using Th 230 and U 234.

0839 Harmon, R.S.; and others. (1971) - Denudation processes in carbonate terrains of North America (abstract): U.K., Oxford; International Speleological Union, Meeting on Karst Denudation, Proceedings, 1971.

Chemical analyses of 230 samples of water collected from Pennsylvania to Mexico were performed to produce saturation indexes and theoretical carbon dioxide partial pressures. The results reinforce the hypothesis that most karst aquifers contain two chemically distinct types of water: the shallow, fast-throughout time water and the deeper, diffuse-flow water.

0840 Harris, J. (1984) - A new pit-cave in Catoosa County, Georgia: U.S.; Georgia Underground, 20:4, p. 40-42.

0841 Harris, L.D. (1973) - Areas with abundant sinkholes in Knox County, Tennessee: U.S.; U.S. Geological Survey Misc. Investigations Series I-767-F.

0842 Harris, L.D. (1973) - Basins drained by sinkholes in Knox County, Tennessee: U.S.; U.S. Geological Survey Misc. Investigations Series I-767-G.

0843 Harris, L.D. (1960) - Drowned valley topography at beginning of Middle Ordovician deposition in southwest Virginia and northern Tennessee: U.S.; U.S. Geological Survey Professional Paper, No. 400-B, p. B186-B189.

0844 Harris, W.H. (1973) - Groundwater-carbonate rock chemical interactions, Barbados, West Indies: U.S., Michigan; Michigan University Microfilms, 348 p. [Ph.D. dissertation, Brown University, 1971].

0845 Harrison, R.S. (1974) - Near-surface subaerial diagenesis of Pleistocene carbonates, Barbados, West Indies: U.S.; Brown University, Ph.D. dissertation, 350 p.

0846 Hart, S.W.; and Arora, R. (1982) - Waste disposal siting in the carbonate terrane of southwest Georgia: U.S.; Geological Society of America Abstracts with Programs, 14:1-2, p. 23.

Twenty-three proposed landfill sites in the Albany/Dougherty County, Georgia, area were studied on a case-by-case basis. The study area is an area of recharge for the Ocala Limestone aquifer. In Dougherty County the aquifer is generally unconfined, and, due to irrigation, fluctuates considerably making it difficult to determine ground-water flow direction and sinkhole potential. Only three potentially acceptable sites were identified.

0847 Hartenberger, F.; and Sige, B. (1984) - Lower Oligocene rodent faunules in Lircay (Andes, central Peru): age dating of a karst episode; paleobiogeographical importance of Cenozoic fissure fillings in South

America: C.R. Hebd Seances Acad Sci Ser 2 Phy Chim Sci Ter, 299:9, p. 565-568 [in French].

0848 Hartwell, D.J.; Jordan, P.G.; and Gutmanis, J.C. (1982) - A hydrogeological study of the Aughinish Island Carboniferous Limestone: Read at meeting, May 1979; Published by the Irish Comm. IHP, p. 113-128.

Describes the preferential dolomitization and subsequent solution and karstificaion of these zones in the Waulsortian limestones. Dolomitization follows northeastern Hercynian fracture trends. This was followed by uplift and karstification now represented by caves, channels, and sinkholes extending down to 60 meters below present sea level.

0849 Harvey, E.J. (1981) - Ground water in the Springfield-Salem Plateaus of southern Missouri and northern Arkansas: U.S. Geological Survey Water-Resources Investigations 80-101, December 1980, 66 p., 25 fig., 6 tab., 38 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 14:20, p. 3.

Average ground-water conditions have not changed significantly in the past 25 years except in the vicinity of well fields. Ground-water recharge is variable and occurs through sinkholes by infiltration in upland areas of good permeability, and through streambeds that lose flow. Cavernous connections from ground surface to depths as great as 1,500 feet occur in the West Plains area, Missouri, and result in deep circulation of water. Ground-water movement is generally north and south from the crest of the Springfield-Salem Plateaus.

0850 Harvey, E.J.; and Emmett, L.F. (1981) - Hydrology and model study of the proposed Prosperity Reservoir, Center Creek basin, southwestern Missouri: U.S. Geological Survey Water-Resources Investigation 80-7, June 1980, 50 p., 16 fig., 4 tab., 17 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 14:10, p. 2.

A reservoir has been proposed on Center Creek, Jasper County, southwestern Missouri. Ground-water levels in the limestone uplands adjacent to the reservoir will rise when the impoundment is completed. The site is a few miles upstream from the Oronogo-Duenweg belt in the Tri-State zinc district. Grove Creek joins Center Creek downstream from the reservoir separating it from the mining belt. A significant rise in the water table adjacent to the reservoir could increase mine-water discharge if Grove Creek is not an effective drain. The increase in ground-water discharge to Grove Creek will have the beneficial effect of diluting mine-water discharge from the Oronogo-Duenweg belt during periods of low flow.

0851 Harvey, E.J.; Williams, J.H.; and Dinkel, T.R. - (1978) - Application of thermal imagery and aerial photography to hydrologic studies of karst terrane in Missouri: Water-Resources Investigations 77-16, September 1977, 58 p., 26 fig., 5 tab., 12 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 11:12, p. 75.

Thermal imagery and color infrared photography aid in identifying losing streams, sinkholes, and hydrologic conditions encouraging collapse. Spring and autumn are poor times to collect thermal data for this purpose while midday in late summer may be a very good time.

0852 Hayes, William C. (1972) - Engineering geology in urban karst environment, Springfield, Missouri [abstr.]: U.S.; Association of Engineering Geologists Annual Meeting, Program Abstracts No. 15, p. 25.

0853 Heller, S.A. (1984) - The hydrogeologic study of the Greenbrier limestone karst of central Greenbrier County, West Virginia (abstract): U.S.; NSS Bulletin, 46:1, p. 21-22.

0854 Heller, S.A. (1980) - A hydrogeologic study of the Greenbrier limestone karst of central Greenbrier County, West Virginia: U.S.; West Virginia University Ph.D. dissertation, 204 p.

0855 Hempel, J.C. (1976) - A preliminary study of the effects of lithology on cave-entrance locations within the Union Limestone Formation of the Greenbrier Group, Monroe County, West Virginia in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, 1976, p. 55-60.

A study of the distribution of caves in the Union and Pickaway Formations indicates that lithology is influential in determining cave entrance location.

0856 Hempen, Gregory L. (1977) - Case history of Meramec Park Lake cavity detection in Symposium on detection of subsurface cavities: U.S.; Army Corps of Engineers, p. 10-20.

Seismic and resistivity methods were utilized to explore for detrimental rock conditions including solution openings and other passages which might make grouting difficult. Uphole shooting was used extensively in the uplands, Cross shooting was deployed in the valley. Analysis techniques of the shooting were predominately by seismic refraction methods, minimum-distance velocity interpretation, and Meissner wavefront diagrams. Resistivity exploration was limited.

0857 Hendy, C.H. (1971) - The isotopic geochemistry of speleothems, I, the calculations of the effects of different modes of formation on the isotopic composition of speleothems and their applicability as paleoclimatic indicators: U.K.; Geochimica et Cosmochimica Acta, 5, p. 801-824.

0858 Herak, M.; Magdalenic, A.; Bahun, S. (1981) - Karst hydrogeology in Halasi-Kun, G.J., editor, Hydrogeology and other selected papers: pollution and water resources, Columbia University seminar series 14, Vol. 1: U.K.; Pergamon Press., p. 163-178.

0859 Herrera, C.G. (1973) - Geological and geohydrological studies for Angostura Dam, Chiapas, Mexico: Geological Society of America Bulletin,

84:5, p. 1733-1742, May 1974, 4 fig., 14 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:13, p. 111.

Study of the leakage potential along the future reservoir's banks was by means of pressure tests in core holes. Packers were used to isolate sections undergoing investigation. Tests were conducted from the bottom of each hole by progressive intervals upward.

0860 Hess, J.W. (1984) - Isotope hydrology of Lilburn Cave in Friends of the karst meeting, Puerto Rico, 1984 - Friends of the karst, Puerto Rico meeting abstracts: U.S.; Geo 2, 11:3.

0861 Hess, J.W. (1977) - The Butler Cave - Sinking Creek System and the Butler Cave Conservation Society in Aley, T.; and Rhodes, D., editor, National cave management symposium; proceedings, Mountain View, Arkansas, October 26-29, 1976: U.S.; Speleobooks, p. 22-26.

0862 Hess, J.W. (1974) - Hydrochemical investigations of the central Kentucky karst aquifer system: U.S.; Pennsylvania State University Ph.D. dissertation, 234 p.

0863 Hess, J.W.; and White, W.B. (1975) - Hydrograph analysis of carbonate aquifers: Pennsylvania Institute for Research on Land and Water Resources, University Park, Research Publication Number 83, June 1974, 63 p., 7 tab., 22 fig., 25 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:2, p. 31.

An evaluation of the feasibility of controlled storage of storm runoff in a karsted limestone aquifer was carried out using the aquifer of the Central Kentucky Karst as an example.

0864 Hess, John W., Jr.; and Davis, Nevin W. (1969) - Butler Cave-Sinking Creek system: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 57/1-57/7.

A study of the Sinking Creek system which is primarily a trunk channel developed along the axis of the plunging Burnsville Syncline.

0865 Hess, John W., Jr.; and White, William B. (1974) - Water balance in the karst aquifer of south-central Kentucky [abstr.]: U.S.; EOS, 55:4, p. 257.

0866 Heusser, G. (1984) - An early man site, Warm Mineral Springs, Florida: U.S.; Lapidary Journal, 38:7, p. 1008-1010.

0867 Hevly, R.H. (1975) - Recent paleoenvironments and geological history at Montezuma Well: Journal of the Arizona Academy of Science, 9:2, p. 66-75, June 1974, 9 fig., 3 tab., 28 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:4, p. 25.

Montezuma Well is a limestone sink containing water supplied by artesian springs and drained by a cave connected to an adjoining creek. Results include a description of climatic and vegetation changes over the history of the well as indicated by analysis of

pollen data. The pollen record shows that the climate in the area of the well has essentially been the same for the past 2000 years.

0868 High, Colin; and Hanna, Keith. (1971) - Measuring solutional erosion rates in northwest Co. Clare, Ireland (abstract): U.K., Oxford; International Speleological Union, Meeting on Karst Denudation, Proceedings, 1971.

Different methods for measuring the rate of solution erosion were used in three micro-environments to determine their relative merits. Using the micro-erosion meter it was confirmed that the caves studied are of post-glacial origin.

0869 Hill, C.A.; Depaepe, D.; Eller, P.G.; and Hauer, P.M. (1981) - Saltpeter caves of the United States: U.S., Huntsville; NSS Bulletin, 43:4, p. 84-85.

0870 Hill, Chris; Sutherland, W.; and Tierney, L. (1976) - Caves of Wyoming: U.S.; Geological Survey of Wyoming Bulletin 59.

0871 Hill, V.G.; Goldsmith, W.; and Terrier, C.O. (1979) - Contact phenomenon in the karst bauxite deposits of Jamaica: Jamaica, Kingston; International Bauxite Association Quarterly Review, 4:4, p. 29-32.

0872 Hiscock, P. (1976) - A resistivity survey over Stoke Lane, Shocker: U.K.; Transactions British Cave Research Association, 3:2, p. 110-111.

The author summarizes electrical resistivity work over large cave chambers. He gives the main criteria for selecting the site and lists the field work executed.

0873 Hobbs, H.H., III (1983) - Pre- and post-glacial influences on the present distribution of troglobitic isopods in Ohio in King, C.C., editor, Teays-age drainage effects on present distributional patterns of Ohio biota; an Ohio biogeography conference; abstracts and supplements: U.S., Ohio Biological Survey, Information Circular 11, p. 5-6.

0874 Hodek, R.J.; and Johnson, A.M. (1984) - Soil cavities formed by piping in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 249-254.

This paper reports both case histories of occurrences of subsidence in the western portion of the Menominee Iron Range in the upper peninsula of Michigan and a combined field and laboratory investigation into the problem.

0875 Hoffelt, J. (1985) - Karst hydrology expedition to the Sierra Madre Oriental of Mexico: U.S., Geo 2, 12:2, p. 26-27.

0876 Hoffmeister, J. Edward; and Ladd, Harry S. (1945) - Solution effects on elevated limestone terraces: U.S.; Bulletin of the Geological Society of America, Vol. 56, p. 809-818.

Limestone terraces on a number of islands in the southwest Pacific show a well-developed wall or rampart along their seaward edge that apparently formed by solution. Rimmed terraces indicate island uplift, seemingly accompanied by tilting.

0877 Holland, P.G. (1984) - Groundwater development in Northern Ireland: Port Laoise Seminar; Irish Group, IAH, 3/4 April.

The Geological Survey of Ireland advises the Executive Body for water supplies on aquifer exploration and evaluation, on performance monitoring and on refuse tip assessment. Ground-water use totals 30 Ml/day from boreholes and 20 Ml/day from springs. Individual Carboniferous limestone wells can exceed 3 Ml/day.

0878 Hollingshead, J.J. (1984) - A contour map, volume estimate, and description of Teague's Sinkhole in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 105-109.

A contour map of Teague's Sinkhole was produced on February 18, 19, 25, 26, 1984, using a plane table and alidade.

0879 Holsinger, J.R. (1982) - A preliminary report on the cave fauna of Burnsville Cove, Virginia in White, W.B., editor, Burnsville Cove symposium: U.S.; National Speleological Society Bulletin, 44:3, p. 98-101.

0880 Holsinger, J.R. (1975) - Descriptions of Virginia caves: U.S.; Virginia Division of Mineral Resources, Bulletin 85, 450 p.

0881 Holzer, T.L., editor (1984) - Man-induced land subsidence: U.S.; Reviews in Engineering Geology, 6.

0882 Homann, Wolfgang. (1969) - Experimentelle ergebnisse zum wachstum rezeuter höhlenperlen (spelaeoide): Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 2, p. 55/1-55/20.

A study of spelaeoides which form in caves.

0883 Hopkins, Richard (1977) - TVA philosophy and methodology for site investigation (abstract) in Symposium on detection of subsurface cavities: U.S.; Army Corps of Engineers, p. 25-26.

There are two main points in TVA's foundation exploration philosophy. First is the role that the geologist plays in using all available information in order to coordinate with the geophysicist as to the type and possible location of solution features or other adverse foundation conditions. The second point is the zone investigation approach. Most solution problems are caused by a series of small joint-controlled and/or bedding plane features. The zone investigation approach, which acknowledges the possibility for treatment of these small features after opening the foundation, has caused no major redesign of a TVA structure, except in the case of Normandy Dam, where a cutoff trench had to be added.

0884 Horowitz, J. (1980) - Black holes (Mexican shafts): U.S.; NSS Bulletin, 41:4, p. 120.

0885 Hosterman, J.W. (1984) - White clays of Pennsylvania: U.S.; U.S. Geological Survey Bulletin 1558-D, p. D1-D38.

White clay deposits are found in eastern, south-central, and central Pennsylvania. The clay deposits are composed chiefly of kaolinite and various amounts of illite, quartz and chert, and goethite is present in some deposits. Most of the deposits are the result of katamorphic alteration and some are the result of weathered debris accumulations in sinkholes and caverns. The presence of alunite in one deposit suggests the possibility that the clay may have been formed, in part, by hydrothermal alteration.

0886 Howard, A.D. (1964) - Processes of limestone cave development: International Journal of Speleology 1, p. 47-60.

0887 Howard, Alan D.; and Howard, Barbara Y. (1972) - The application of stable isotope studies to karst research, discussion: U.S.; Caves and Karst, Research in Speleology, 14:2, p. 5.

It had previously been suggested that the measurement of stable carbon isotope ratios of dissolved carbonates in karst groundwaters may help to determine the sources of dissolved ions and the history of the groundwater. The authors also discuss other factors involved, in particular the natural processes affecting the ratios.

0888 Hoxie, D.T. (1976) - Post-Laramide karst development in the Bighorn Mountains, Wyoming: U.S.; Geological Society of America, Abstracts with Programs, 8:6, p. 931.

Karst features of post-Laramide age occur in the Bighorn Mountains throughout the area of outcrop of the Mississippian Madison Limestone and the Ordovician Bighorn Dolomite. The author divides these features into three groups according to their morphology and origin.

0889 Hruska, Boris. (1968) - Geochemi zeutravacich procesu no vapencich Ceskeho Masivu (Geochemistry of the weathering processes on limestones in the region of Bohemina Massif): Ceehosloveniz, Brno; Acta Universitatis Agricultural Facultas Silvivulturas, 31 p.

The paper is a detailed study in geochemistry of the weathering processes taking place on limestones in the region of the Bohemian Massif.

0890 Hsu, K.J. (1963) - Solubility of dolomite and composition of Florida groundwater: Netherlands, Amsterdam; Journal of Hydrology, 1, p. 288-310.

0891 Hubbard, D.A., Jr. (1984) - Sinkhole distribution in the central and northern Valley and Ridge province, Virginia <u>in</u> Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the

First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 75-78.

Sinkholes caused by the dissolution of Paleozoic limestones and dolomites are present in the Valley and Ridge physiographic province of Virginia (USA). Situated in the northwestern section of the state, the Valley and Ridge province is bounded on the southeast by the clastic, volcanic, and plutonic rocks of the Blue Ridge province.

0892 Hubbard, D.A., Jr. (1981) - Karst development in the Front Royal 7.5 minute quadrangle of Virginia in Beck, B.F., editor, Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S.; Proceedings [in English, summary in German], p. 511-514.

0893 Hubbard, D.A., Jr.; and Holsinger, J.R. (1981) - The karst development of Rye Cove, Virginia in Beck, B.F., editor, Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S.; Proceedings [in English, summary in German], p. 515-517.

0894 Hughes, G.H. (1980) - Analysis of water-level fluctuations of Lakes Winona and Winnemissett--two landlocked lakes in a karst terrane in Volusia County, Florida: U.S. Geological Survey Water-Resources Investigations 79-55, 1979, 24 p., 16 fig., 5 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 13:3.

The water levels of Lakes Winona and Winnemissett in Volusia County, Florida, correlate reasonably well during dry spells but only poorly during wet spells. The lack of correlation is attributed to the uneven distribution of the storm rainfall. The total-annual rainfall at times may differ between rainfall gages by as much as 15 to 20 inches. Such differences tend to balance over the long term but may persist in the same direction for two or more years, causing apparent anomalies in lake-level fluctuations.

0895 Hull, L.; Deines, P.; and Langmuir, D. (1977) - Seasonal and discharge controls on the chemistry of a conduit spring in the central Pennsylvania karst: U.S.; Geological Society of America Abstracts with Programs, 9:7, p. 1030.

Differentiation between season and discharge as controls on the chemical variations in waters from conduit type limestone springs is complicated by a seasonal variation in discharge itself. Spectral time series analysis and factor analysis were applied to the chemical, isotopic, and hydrologic data to separate the interactions.

0896 Hull, L.C. (1980) - Mechanisms controlling the inorganic and isotopic geochemistry of springs in a carbonate terrane: U.S.; Pennsylvania State University Ph.D. dissertation, 275 p.

0897 Hunn, J.D. (1975) - Hydrology of Lake Tarpon near Tarpon Springs, Florida in Hydrogeology of West-Central Florida: U.S.; Southeastern Geological Society Field Conference Guidebook 17, p. 43-47.

0898 Huntoon, P.W. (1985) - Gradient controlled caves, Trapper-Medicine Lodge area, Bighorn Basin, Wyoming: U.S.; Ground Water, 23:4, p. 443-448.

0899 Huntoon, P.W. (1975) - The hydro-mechanics of the ground water system in the southern portion of the Kaibab Plateau, Arizona: University Microfilms, Ann Arbor, Michigan, No. 70-22, 111, Ph.D. dissertation, 1970, 251 p., 55 fig., 9 tab. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:6, p. 10.

Although the occurrence of water is certain, the large supplies are more than 2,800 feet below the land surface and exist in finite channels along the fault zones. These could be difficult to penetrate with conventional drilling methods.

0900 Huppert, G. (1980) - Cave conservation in the United States: U.S., Huntsville; NSS Bulletin, 41:4, p. 116.

0901 Huppert, G.; Knox, L.; and Wheeler, B. (1983) - Suburban expansion and sinkhole flooding; a case study from Putnam County, Tennessee in Dougherty, P.H., editor, Environmental karst; Karst Symposium, Louisville, Kentucky, U.S., April 1980: U.S.; Geospeleo Publications, p. 15-23.

0902 Hutton, J.G.; Hine, A.C.; Evans, M.W.; Osking, E.B.; and Belknap, D.F. (1984) - Influence of a karstified limestone surface on an open-marine, marsh-dominated coastline, west central Florida in Beck, B.F., editor, Sinkholes; Their Geology, Engineering, and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 35-42.

Rising Holocene seas flooding a sediment-starved, low gradient (1:6000), exposed karstified limestone surface has produced an extremely complex, highly digitate, open-marine, marsh-dominated coastline along a portion of the West Central Florida coast. This irregular rock surface, lying beneath an organic-rich, peaty veneer, coupled with numerous, large, fresh-water springs discharging from the Floridan aquifer, is the primary factor controlling the regional, modern coastal geomorphology and sedimentation.

0903 Hyatt, R.A.; Brook, G.A.; and Carver, R.E. (1982) - The importance of groundwater in the hydrology of the Okefenokee Swamp: U.S.; Geological Society of America Abstracts with Programs, 14:1-2, 28 p.

0904 IASH/AIHS - UNESCO. (1970) - Land subsidence: Proceedings of the Tokyo Symposium, 1969, 2 Vols., 661 p.

Papers concerning subsidence in many environments throughout the world.

0905 Iles, D. (1977) - Variations in the geometry and density of dolines, Allamakee County, Iowa: U.S.; Geological Society of America, Abstracts with Programs, 9:5, p. 609.

A field study of 30 randomly selected quarter sections within two townships indicates that 5,928 dolines may exist within the area with a mean doline density per quarter section of 19.5.

0906 Iliffe, T. (1980) - Speleothem growth rate measured from a stalagmite in Admiral's Cave, Bermuda: U.S.; NSS Bulletin, 41:4, p. 115.

0907 Iliffe, T. (1979) - Bermuda's caves a non-renewable resource: Switzerland, Lausanne; Environmental Conservation, 6:3, p. 181-186.

0908 International Association of Scientific Hydrology. (1967) - Hydrology of fractured rocks, proceedings of the Dubrovnik symposium, October 1965: IASH, Publications 73 and 74, 689 p.

0909 (1973) - International Congress of Speleology, 6th, Proceedings of; Olomouc, Czechoslovakia, 1973: Praha; Congr Int Speleol, Actes (1976), 6:4 [English, French, German, Italian, Russian, or Spanish].

0910 (1976) - International symposium on land subsidence, second; Anaheim, California, U.S., 1976: International symposium on land subsidence, symposium program 2, unpaginated.

0911 (1979) International workshop on land subsidence (Mexico City), September 1979: Paris, IUGG Chron, 142, p. 236-237.

0912 Iosof, V.; Coman, D.; and Ianc, R. (1974) - Notes on the presence of allophane in the Vintului Cave in the Apuseni Mountains: Bucarest; Trav. Inst. Spéol., Emil Racovita, 5 fig. [in French].

This is the first work to pinpoint the presence of allophane in caves on the basis of chemical, x-ray, infrared, and thermal (DTA, TG, DTG) analyses. The process of formation of this mineral in the Vintului Cave, the largest underground cavity in Romania, is explained.

0913 Irish National Committee for IHP. (1982) - Hydrology in Ireland; Contribution to UNESCO IHD Programme: ISBN 0 906120.85.3, 49 pages.

Overall hydrological position, including bibliography and list of these in hydrology from 1960. Attention is drawn to major springs from limestone aquifers, as the Dower Spring, Castlemartyr, Clonberne in Co. Galway and Taughmaconnell in Co. Roscommon.

0914 Isphording, W.C. (1983) - Karst development in Coastal Plain sands; a "new" problem in foundation engineering in Hannan, D.L., chairperson, Engineering Geology Today and Tomorrow, Association of Engineering Geologists 26th annual meeting, San Diego, California, October 2-7, 1983: U.S.; Program - Association of Engeneering Geologists, National Meeting 26, p. 76-77.

0915 Isphording, W.C. (1977) - Geomorphic evolution of tropical karst terranes in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 115-130.

0916 Iurkiewicz, A.; and Mitrofan, N. (1984) - On karstic cavities vertical distribution regularities in southern and south-western Padurea Craiului Mountains in Theoretical and Applied Karstology 1, 1984, p. 77-82, 2 fig., 2 tab. [in English with Romanian abstract].

In most caves, development and vertical extent of potholes are controlled by local base level. Taking into account some 50 major caves and potholes from southern and southwestern Padurea Craiului Mountains, a correlation is proposed between pit bottoms, cave floors, and karstic spring elevations, and the erosional levels derived from surface drainage network evolution.

0917 Ivankovic, T. (1976) - Hydrogeologic estimation of groundwater storage connected with the surface water storage in Yevjevick, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 193-206.

0918 Ivanov, B.N. (1973) - Principles of karst regionalization: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 195-198.

The development of criteria dividing karstic areas into feasible districts for industrial exploitation.

0919 Ivanov, V.V.; and Raikhman, E.S. (1978) - Utilisation des échangeurs de chaleur souterrains dans les puits d'eaux carboniques afin d'éviter la formation de travertin in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 750-755.

A discussion of factors which are found that prevent the precipitation of travertine in a health-spa area.

0920 Jacobson, R.L. (1973) - Controls on the quality of some carbonate groundwaters: dissociation constants of calcite and singly positive calcium-bicarbonate ion from 0 to 50 degrees C: U.S.; Pennsylvania State University Ph.D. dissertation, 140 p.

0921 Jacobson, R.; and Langmuir, D. (1970) - The chemical history of some spring waters in carbonate rocks: U.S.; Groundwater, 8:3, p. 5.

0922 Jakeman, A.J.; Greenaway, M.A.; and Jennings, J.N. (1984) - Time-series models for the prediction of stream flow in a karst drainage system: Journal of Hydrology, 23:1, p. 21-33.

Time-series methods are used to predict values for numerous missing daily flow records from rainfall in the Cave Creek drainage system Cooleman Plain, New South Wales. The discharge estimates obtained are used to ascertain the temporal distribution of limestone solution, the dominant geomorphic process here.

0923 Jakucs, Laszlo (1977) - Morphogenetics of karst regions [translated by B. Balkay]: U.S., New York; John Wiley, 283 p.

A textbook dealing with the parameters which affect karst development and the effect of climate throughout the world on karst development.

0924 Jakucs, Laszlo. (1970) - The role of climate in the quantitative and qualitative control of karstic corrosion: Hungary, Szegod; Acta Geographica, Acta Universitates Szegediensis, Tomus X, Fasc. 1-8, 1970, p. 3-19.

The author classifies five distinct climatic zones which can be readily distinguished from one another quantitatively (rate of karstification) and qualitatively (variety of karstic forms). The author states that the most important result he obtained was that "the natural karstic corrosion of calcareous rocks is genetically nothing else than the phenomena of the biological and chemical evolution of the rock-covering top soil as reflected by the soluble bedrock."

0925 James, J.J.M. (1973) - Cave sediments in a Bunzonian Cave B24: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 445-456.

The origin and age of sediments in a cave with high carbon dioxide in the cave atmosphere and low O2 in the cave waters are discussed.

0926 Jameson, W.C.; and Schiel, J.B., Jr. (1975) - Possible man-made sinkholes at Southard, west-central Oklahoma; a case-study in landscape modification: U.S.; Oklahoma Geology Notes, 35:5, p. 187-195.

0927 Jamier, Daniel. (1976) - Pollution et protection des aquifères karstiques: Université de Neuchatel, Institute de Géologie, Bulletin du Centre d'Hydrogéologie, No. 1, p. 67-76.

0928 Jammal, S.E. (1984) - Maturation of the Winter Park sinkhole in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 363-369.

The Winter Park sinkhole developed between May 8-13, 1981, as a conical hole in overburden, with central aven leading to a deep subsurface cavity. Initially it was dry and about 106 meters (348 feet) in diameter and 30 meters (98 feet) deep. It destroyed various facilities and utilities and caused major problems for the city of Winter Park. Since 1981 the hole has stabilized and its surroundings have been restored to a useable state. It contains a small lake.

0929 Jax, Daniel W.; and Wolfe, Thomas E. (1974) - Detection of sewage flow in the karst regime in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 19-23.

In the Greenbrier River Basin, fluorescein dye-tracing techniques established the underground connection between the Lewisburg River and the Davis Spring. Sewage is disposed of in the Lewisburg sink. Available wells and springs between the sink and the spring, to a maximum depth of 544 feet, were sampled and tested for Escherichia coli to define the underground route. The results proved negative. Reasons for the absence of the Escherichia coli were suggested.

0930 Jeannel, R.; and Racovita, E. (1929) - A list of visited caves, 1918-1927 (7th Series): Archives of Experimental and General Zoology, 68(2), p. 293-608, 67 fig., II diagrams [in French].

Geographic location, a general description, and a list of groups of cave animals with thermohygrometric conditions and food supplies often pinpointed, for 283 caves explored in Romania, Algeria, Spain, France, Madagascar, Portugal, Switzerland, Turkey, and Yugoslavia.

0931 Jekelius, E.; (1964) - Karstic regions between the Dragan and Iad Valleys: Bucharest; Lucr. Inst., de Spéol., Emil Racovita, T. III, p. 201-213 [in Romanian].

The results of the karstic hydrological research work conducted in the basins of the Dragan and Iad Valleys to detect and follow up underground courses are outlined. The conclusion reached is that there is no link between the underground waters of the two basins which developed in two different tectonic units and where the recent processes of karst formation were independent from one another.

0932 Jenkins, D.T.; Beck, B.F.; Kuo, S.S.; and Littlefield, J.R. (1985) - Induced sinkhole formation due to groundwater pumping in the Plant City-Dover area, January 1985 in Windsor, J.G., editor, 1985 program issue; Forty-ninth annual meeting of the Florida Academy of Sciences: U.S.; Florida Scientist, 48, Suppl 1, p. 40-48.

0933 Jennings, J.N. (1983) - Karst landforms: U.S.; American Scientist, 71:6, p. 578-586.

0934 Jennings, J.N. (1973) - History of a dry valley on Cooleman Plain, N.S.W. Australia: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 199-206.

Mudflow and fluvial file on Cooleman Plain blocked a karst blind valley and restored surface flow temporarily down a dry valley. This occurred most probably during a periglacial period about 30,000 to 15,000 B.P., which favored increased slope instability and surface runoff.

0935 Jennings, J.N. (1972) - The Blue Waterholes, Cooleman Plain, N.S.W., and the problem of karst denudation rate determination: Australian National University, Canberra in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 5:17, p. 13.

Erosion was studied in Cooleman Plain, an upland, grassland, karstic plain in Australia. High discharges involve more rapid transit of water through cave systems, reducing time of contact during which solution may take place. There is a significant difference between the mean surface flow hardness (57 mg/l) and that of the ground water (86 mg/l).

0936 Jennings, J.N. (1968) - Syngenetic karst in Australia: Australia; Australian National University, Department of Geography, Contributions to the Study of Karst, Pub. G/5, p. 41-110.

Karst features in dense limestone of the southwest of Western Australia are described. The karst features are produced simultaneously with the lithification of the carbonate dense sands. A detailed discussion on the origin of solution pipes, gullies, closed depressions, drainage and caves includes reference to many parameters including percolation, secondary cementation by calcite and root penetration. A comprehensive bibliography is included.

0937 Jennings, J.N. (1967) - Further remarks on the Big Hole, near Braidwood, New South Wales: Helictite, Journal of Australasian Cave Research, October 1967, 6:1, p. 3-9.

Revised data on a paper presented by the author in 1966.

0938 Jennings, J.N. (1966) - Murray Cave, Cooleman Plain, New South Wales: Helictite, Journal of Australasian Cave Research, October 1966, 5:1, p. 3-11.

Murray Cave is an almost horizontal former outflow cave, which is now on the brink of inactivity. There have been three phases of outlets. Evidence of free surface stream action dominates in the cave but shallow phreatic conditions must have contributed to its development.

0939 Jennings, J.N. (1966) - The Big Hole near Braidwood, New South Wales: Australia; Journal and Proceedings, Royal Society of New South Wales, 1966, Vol. 98, p. 295-319.

The Big Hole is interpreted from field studies to be a subjacent karst doline. Sudden collapse of a cave roof in the limestone is suggested as the cause.

0940 Jennings, J.N.; and Jones, B.N. (1967) - Underground water movements in the Lobster Rivulet-Mole Creek Divide, Tasmania: Australia; The Australian Journal of Science, September 1967, 30:3, p. 2.

The drainage systems of the Lobster Rivulet and the Mole Creek were discovered using water tracing tests where a breach in the divide between the two drainage systems was discovered.

0941 Jimenez, A.N. (1976) - Los Cayos de Sau Felipe: Un valle carsico intramontano anular: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 277-289.

A description of a karstic intermontane valley, the mogotes found within the valley, and the valley floor level.

0942 Jimenez, A.N. (1975) - Hoyada de la Catalina: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 291-297.

Unlike other karstic intermontane valleys, drainage in the Hoyada is through vertical sinkholes in the limestone surface of the valley.

0943 Jimenèz, A.N. (1973) - Las formactiones fungiformes y su importancia para conocer las fluctuaciones del mar: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 519-527.

A speleo-chronological study of the fungiform formations occurring at the caves in Cayo Caguanes, Cuba. They occur at water table level and are now 4.52 meters above mean sea level, indicating the level of the sea at the time of their formation 15,000 years ago.

0944 Jimenez, Antonio Nunez; Panos, Vladimir; and Stelcl, Otakar. (1969) - The differentiated development of the karst of the Cuban Isles and its causes: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M10/1-M10/10.

Geomorphological and hydrological differentiation of the karst in various parts of Cuba was distinguished. Basic causes for the development of these differences were discussed.

0945 Jishkariany, V.M. (1973) - Speleological properties of limestone Massif Asklri: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 83-87.

The author deals with basic speleological properties of Ashki Massif, its genetic types of cave deposits, and hydrodynamic peculiarities of underground waters.

0946 Johnson, A.I. (1980) - International workshop on land subsidence held in Mexico, 1979: St. Johns; 23, p. 19-21.

0947 Johnson, M.L. (1981) - Hydrochemical facies; a method to delineate the hydrology of inaccessible features of karst plumbing systems in Beck, B.F., editor, Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S.; Proceedings, p. 627-629.

0948 Johnson, W.C. (1983) - The physical setting; northern Belize and Pulltrouser Swamp in Turner, B.L., III; and Harrison, P.D., editors, Pulltrouser Swamp; ancient Maya habitat, agriculture and settlement in northern Belize: U.S.; University of Texas Press, p. 8-20.

0949 Jones, B. (1985) - Fossilized rockhounds: U.S.; Rock & Gem, 15:10, p. 32-34.

0950 Jones, G.L.I.; and Gunn, J. (1982) - Flood alleviation in the lowland karst area of Mullinahone, County Tipperary, Ireland: Jour. Earth Sci., RDS, Dublin, p. 37-42.

Following investigations of the ground-water regime in lowland karst, plans were made for a tunnel through which flood water would escape at 700 m/hr, as compared with natural discharge at 12 m/hr.

0951 Jones, J.L. (1980) - Unusual sinkhole occurrence at Rudy County Park, York County, Pennsylvania: U.S.; Pennsylvania Geology, 11:4, p. 2-3.

0952 Jones, R.C.; and Pickering, S.M. (1973) - Examples of geologic hazards in Georgia: U.S.; Georgia Academy of Science, Bulletin 31:2, 79 p.

0953 Jones, W.B.; and Varnedoe, W.W., Jr. (1980) - Caves of Morgan County, Alabama: U.S.; Geological Survey of Alabama, Bulletin 112, 205 p.

0954 Jones, W.J. (1973) - A karst hydrology study in Greenbriar County, West Virginia: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, Proceeings 6, Vol. 4, p. 121-124.

0955 Jones, W.K. (1973) - Hydrology of limestone karst in Greenbrier County, West Virginia: U.S.; West Virginia Geological and Economic Survey, Bulletin 36, 49 p., 23 fig., 3 plate, 2 map, 5 tab., 26 ref.

Karst drainage is dominant over surface drainage. Subsurface drainage basins and flow directions were determined by dye-tracing techniques and by utilizing maps of underground conduits. The dye-tracer studies showed that contaminated waste water could easily enter the karst aquifer and be transmitted through it.

0956 Jones, W.K. (1974) - Karst hydrology in West Virginia - A review of research in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, 1974, p. 11-17.

Karst features are developed on marine limestones and dolomites in eastern and southeastern West Virginia. Flow conditions in the carbonate aquifers range from predominantly diffuse to generally channeled. Obtaining adequate water supply and the possibility of ground-water pollution are major problems in the large karst plateaus.

0957 Jones, W.K.; and Rauch, H.W. (1977) - Discharge characteristics of karst drainage basins in Greenbrier County, West Virginia, U.S.A. [Les traits characteristiques des bassins karstiques de Greenbrier County, West Virginia, U.S.] in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 57.

0958 Jordan, D.G. (1977) - Drainage patterns and subsurface flow of an isolated karst basin in the Rio Tanama drainage, Puerto Rico in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 177-192.

0959 Judson, D.M. (1976) - Los Tayos, Ecuador, July-August 1976: U.K, Bridgewater; Bulletin of the British Cave Research Association, 14, p. 26-30.

0960 Jukes, J.B. (1962) - On the mode of formation of some of the river-valleys in the south of Ireland: QJGS, Vol. 18, p. 378-403.

Classic paper on geological control of river evolution. Describes the erosion of the Carboniferous limestones, with residual synclines of limestone in the valley bottoms.

0961 Jungmann, W.L. (1982) - Cable-tool drilling in limestones, Port Laoise Seminar: Irish Group, IAH, 30-31 March.

Outlines percussion methods of drilling in limestones. Data on why all limestone wells are not dry - cracks, fissures, tommy-knockers, the limestone connection, and "hitting the water-bearing vein".

0962 Jurcsak, T.; Polis, R.; Ignat, D.; Serban, M.; and Popa, E. (1981) - Data on the fossil fauna in the Ursilor Cave, Nymphaea: Folia naturae Bihariae, 8-9, p. 161-257, Oradea [in Romanian].

As many as 3,744 paleonthologic remains were studied in the Ursilor Cave after its discovery in 1975. Thus 39 animal species, mammals in particular, being identified, with Ursus spelaeus - which gave the cave its name - and Capra ibex carpathorum holding a larger share. An inventory was made of 116 bear lairs.

0963 Kallergis, G.; and Leontiadis, I.L. (1984) - Isotope hydrology study of the Kalamos Attikis and Assopos riverplain areas in Greece: Journal of Hydrology, 60:1-4, p. 209-225, January 1984, 7 fig., 3 tab., 22 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:12, p. 13.

Variations in the isotopic composition of water were used to define the mechanism of recharge of the Assopos riverplain and the Kalamos Attikis coastal brackish karst springs.

0964 Kang, J.M.; Ruth, B.E.; and Degner, J.D. (1984) - Lineaments for locations of subsurface cavity zones in American Soc Photogramm Am Congr Surv and Mapping, Technical Papers, 1984 ACSM-ASP fall convention, San Antonio, Texas, September 9-14, 1984: U.S.; Technical Papers, p. 501-510.

0965 Karolyi, M.S.; and Ford, D.C. (1985) - The Goose Arm karst, Newfoundland, Canada: Netherlands; Journal of Hydrology, 61:1-3, p. 181-185.

Goose Arm karst development is mature and well integrated. Groundwater drainage is extremely disordered. Glacial till has effectively buffered post-glacial runoff to inhibit the renewal of solutional attack upon the bedrock.

0966 Karst Research Group. (1979) - Research of China karst: China; Institute of Geology, Academia Sinica, Academia Press, 17 p [in English].

0967 Kashef, Abdel-Aziz I. (1977) - On the management of karst aquifers in Saudi Arabia in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 303-312.

Paleo-karstification of limestones can increase the porosity and permeability of limestones and hence their capacity to store water. In Saudi Arabia salt water intrusion may be a threat and will need to be noted when karst water is developed.

0968 Kassai, M.; Lorberner, A.; Ronaki, L.; and Szederkenyi, T. (1978) - Hydrogeological data from southeast Transdanubia as a part of marginal area of the Great Hungarian Plain and Drava Basin in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 401-414.

Hydrogeological data from the Great Hungarian Plain and Drava Basin including local pressure, temperature, and hydrochemical anomalies can only be explained by hydrodynamic communication between basin deposits and deeper thermal water reservoirs.

0969 Kastning, E.H., Jr. (1983) - Geomorphology and hydrogeology of the Edwards Plateau karst, central Texas: U.S.; University of Texas at Austin, Ph.D. dissertation, 714 p.

0970 Kastning, E.H. (1977) - Faults as positive and negative influences on ground-water flow and conduit enlargement in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 193-201.

Faults are generally regarded as zones of higher permeability and of greater dissolutional enlargement of conduits. However, faults can also act as impermeable fault planes diverting ground-water movement and forcing the water to surface as a spring. Thus the role of faults in karst should be dealt with on a one-to-one basis, as generalities about faults may lead to misconceptions with regard to ground-water movement.

0971 Kastning, K.M.; and Kastning, E.H. (1981) - Fracture control of dolines, caves, and surface drainage; Mississippian Plateau, western Kentucky, U.S. in Beck, B.F., editor, Proceedings of the 8th International Congress of Speleology, Bowling Green, Kentucky, July 18-24, 1981: U.S.; Proceedings, p. 696-698.

0972 Kaufman, M.I. (1967) - Hydrologic effects of ground-water pumpage in the Peace and Alafia River Basins, Florida, 1934-1965: U.S.; Florida Geological Survey Report of Investigations 49.

Accelerated industrial and agricultural growth in the Peace and Alafia River Basins, Florida, is causing a progressive decline of artesian water levels resulting in environmental changes including the formation of sinkholes.

0973 Kaufman, M.I.; Rydell, H.S.; and Osmond, J.K. (1969) - U234/U238 disequilibrium as an aid to hydrologic study of the Floridan aquifer: Netherlands, Amsterdam; Journal of Hydrology, 9:4, p. 374-386.

0974 Kaufman, W.J.; and Todd, D.K. (1962) - Application of tritium tracer to canal seepage measurements: Vienna; Tritium in the Physical and Biological Sciences, Vol. 1, IAEA, p. 83-84.

0975 Kaurishuili, K.V. (1976) - Karst phenomena of the intermontane lake basin Ritza (the Greater Caucasus): Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 207-210.

A discussion of the karstic phenomena found in this area.

0976 Kearney, M.; and Keltch, B. (1981) - Passage configuration and sedimentology of Bakers Cave, Kentucky: U.S.; Ohio Valley Caver, 2:1, p. 1-5.

0977 Keller, W.D.; and Stevens, R.P. (1983) - Physical arrangement of high-alumina clay types in a Missouri clay deposit and implications for their genesis: U.S.; Clays and Clay Minerals 31:6, p. 422-434 [in English, summaries in German].

0978 Kelley, Vincent C. (1972) - Geology of the Santa Rosa area: U.S.; New Mexico Geological Society, Annual Field Conference Guidebook No. 23, p. 218-220.

0979 Kemmerly, P.R. (1981) - Clues to doline population genesis in southern Kentucky and northern Tennessee: U.S.; Geological Society of America, Abstracts with Programs, 13:7, p. 485.

0980 Kemmerly, P.R. (1980) - A time-distribution study of doline collapse; framework for prediction: U.S.; Environmental Geology, 3:3, p. 123-130.

0981 Kemmerly, P.R. (1980) - Sinkhole collapse in Montgomery County, Tennessee; an overview for the planning process: U.S.; Tennessee Division of Geology, Environmental Geology Series 6, 42 p.

0982 Kemmerly, P.R. (1977) - Karst depressions in a time context: U.S.; Tennessee Academy of Science, Journal, 52:2, p. 66.

0983 Kempers, R. (1981) - A hydrogeological reconnaissance study of the River Araglin catchment, Co. Cork, Republic of Ireland: Netherlands; Thesis, Inst. Earth Sci., Dept. Geographic Hydro. and Hydrogeol., Free University, Amsterdam.

The stream flows mainly over Devonian sandstones, with limited inliers of Carboniferous limestone. This limestone is too small to have any significant effect on the hydrology or hydrogeology, but has some effect on the hydrochemistry.

0984 Kendall, A.C.; and Broughton, P.L. (1977) - Discussion of Folk, R.L.; and Assereto, R. Calcite and aragonite fabrics, Carlsbad Caverns (New Mexico) (Journal Sedimentary Petrology [46] 76 p. 486-496): U.S., Tulsa; Journal of Sedimentary Petrology, 47:3, p. 1397-1400.

0985 Kendall, D.L. (1960) - Ore deposits and sedimentary features, Jefferson City Mine, Tennessee: Economic Geology, 55:5, p. 985-1003.

0986 Kermode, L.O. (1973) - New Zealand karst mantels: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 457-466.

Geological changes during the Pleistocene have produced various extensive mantles that have been modified by the wet climate.

0987 Kermode, L.O. (1969) - Speleogenesis and karst in New Zealand: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 511/1-511/6.

A description of the caves and karst in the central western portion of North Island near the Waitome Caves. Particular reference is given to cave origin and the origin of cave fills.

0988 Kiknadze, T.Z. (1973) - Karst of the Arabika Massiv (Karst Massiva Arabika): Izdatel 'stvo "Metsniyereba', Tbilisi, 1972, 248 p. (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:20, p. 21.

Data on chemical erosion in the region are tabulated and mapped, and karst landforms and factors controlling development of karst (tectonics, chemical composition of rocks, lithology, and soil-vegetal cover) are described.

0989 Kimmel, R.E. (1983) - Karst lakes of northeastern lower Michigan in Kimmel, R.E., editor, Tectonics, structure, and karst in northern lower Michigan: U.S.; Michigan Department of Natural Resources Geological Survey Division, p. 82-90.

0990 Kimmel, R.E., editor. (1983) - Tectonics, structure, and karst in northern lower Michigan: U.S.; Michigan Department of Natural Resources Geological Survey Division.

0991 Kimrey, J.O.; and Fayard, L.D. (1984) - Geohydrologic reconnaissance of drainage wells in Florida: U.S. Geological Survey Water-Resources Investigations Report 84-4021, 67 p.

Interaquifer connector wells are used in the phosphate mining areas of Polk and Hillsborough Counties to drain mines and recharge the Floridan aquifer. Water quality data available from 13 connector wells indicate that samples from most of these wells exceed standards values for iron concentration and turbidity. One well yielded a highly mineralized water, and samples from 6 of the other 12 wells exceed standards values for gross alpha concentrations.

0992 Kinsky, Y.; Friedman, S.; and Dickman, J. (1972) - Stimulation of wells by acidization: Technion, Mekoroth Work No. 2397/70.

0993 Kipiani, S. (1969) - Principales étapes de l'étude géographique du karst de la Georgia et problèmes actuels dans ce domaine: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M9/1-M9/6.

A brief summary of the work done on karst topics in Georgia, USSR.

0994 Kipiani, S. (1969) - Types et régions géomorphologiques du karst georgien: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M38/1-M38/7.

A description of the geomorphological types and regions of karst in Georgia, USSR.

0995 Kiraly, L. (1969) - Statistical analysis of fractured rocks (orientation and density): Geol. Rundschan, 59:1, p. 125-151.

0996 Kiraly, L. (1975) - Rapport sur l'état actuel des connaissances dans le domaine des caractères physiques des roches karstique in Burger, A. and Dubertret, L., editors, Hydrogeology of karstic terrains: France; IAH, p. 53-68.

The problem of estimating the field of the physical characteristics (permeability, porosity, storage coefficient) is approached within the framework of a conceptual diagram showing the relationship between physical characteristics (necessary to solve hydrodynamic equations), distribution of the voids and geological factors. Some empirical permeability values showing the scale effect on the permeability in karstic rocks are presented. In order to facilite the extrapolation and the interpolation of the measured permeability values, certain possible causal or statistical relationships have been sought.

0997 Kirk, K.G. (1974) - Resistivity and gravity surveys applied to karst research in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 61-71.

The author studied caves in West Virginia and Pennsylvania using gravity and resistivity surveys to obtain location, orientation, depth, and size. A description of the methods used and a critical analysis of these methods is included.

0998 Kirk, K.G.; and Rauch, H. (1977) - The application of the tri-potential method of resistivity prospecting for groundwater exploration and land use planning in karst terrains in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 285-300.

0999 Kirk, K.G.; and Snyder, E.R. (1977) - A preliminary investigation on seismic techniques to locate cavities in karst terrains in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 79-91.

Shallow hammer reflection seismology is inexpensive and can locate cavities to depths of 500 meters. Shallow hammer waves locate cavities better than P waves. Bedding planes cause confusion in seismic records; however, the use of multi-trace units will negate this problem.

1000 Kirkinskaya, V.N.; and Smekhov, E.M. (1981) - Carbonate rock collector of oil and gas: USSR, Leningrad; Nedra, 255 p.

1001 Kirkland, D.W. (1982) - Origin of gypsum deposits in Carlsbad Caverns, New Mexico: U.S.; New Mexico Geology, 4:2, p. 20-21.

1002 Kirlay, Laszlo; Mathey, Bernard; and Tripet, Jean-Pierre. (1969) - Fissuration et orientation des karstes souterraines région de la grotte de milandre (Jura Tabulaire): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 551/1-555/11.

It was proven that the development of the cave is anisotropic. The genetic interpretation for cave development proposed is "the intensity of karstification is proportional to the vector velocity of the ground-water flow."

1003 Klemt, W.B.; Knowles, T.R.; and Elder, G.R. (1979) - Groundwater resources and model applications for the Edwards (Balcones fault zone) aquifer in the San Antonio region, Texas: U.S.; Texas Department of Water Resources Report No. 239.

1004 Knapp, R.W.; and Steeples, D.W. (1981) - Investigation of salt dissolution collapse using high resolution MiniSOSIE reflection seismology: U.S.; EOS, Transactions, American Geophysical Union 62:45, p. 954-955.

1005 Knebel, R.M.; and Jones, F.C. (1957) - Edwards Limestone field of Atacosa County, Texas: U.S.; Gulf Coast Association Geological Society Transactions, Vol. 7, p. 35-44.

The known Edwards Limestone fields of Atacosa County, Texas, produce from the upthrown block of an up-to-the-southeast fault. This report contains subsurface information about the Edwards Formation downdip of the line of bad water.

1006 Knezevic, E. (1976) - Optimization of parameters of discharge hydrograph models under karst conditions in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 259-266.

1007 Knowles, D.B. (1952) - Ground-water resources of Ector County, Texas: U.S.; Texas Board of Water Engineers Bulletin 5210.

Lower Cretaceous limestones crop out in this northern Edwards Plateau county. The records of wells, driller's logs, and chemical analyses of water from wells are included.

1008 Knox, O. (1980) - The exploration of Sotano de Joya de Salas: U.S.; NSS Bulletin, 41:4, p. 119-120.

1009 Koch, H.F. (1984) - Sinkholes in southeastern North Carolina; a geologic phenomenon and related engineering problems in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 243-248.

Sinkholes in southeastern North Carolina generally are found in an area underlain by shell-limestone deposits of Upper Cretaceous and Tertiary Age. The occurrence of sinkholes is closely tied into the development of the natural drainage pattern of the area. The single most important factor for preventing or greatly reducing the undesirable occurrence of sinkhole development and subsidence is directed areal management and maintenance of the existing ground-water table.

1010 Koenig, L. (1960) - Survey and analysis of well stimulation performance: U.S.; American Water Works Association Journal, 52:3, p. 333-350.

1011 Kohout, F.A. (1975) - Upwelling of geothermally heated ground water; a factor in archaeological preservation at Warm Mineral Springs sinkhole, southwest Florida: U.S.; Florida Science, 38, Supplement 1, 19 p.

1012 Kohout, F.A.; Leve, G.W.; Smith, F.T.; and Manheim, F.T. (1975) - Red Snapper Sink and ground water flow, offshore northeastern Florida [Puit de Barbiers (Lutjan) et ecoulement d'eaux souterraines au large nord-est de Florida] (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 60.

A brief account of the sources of fresh water available offshore and of sinkholes where sea-water incursions may occur.

1013 Kohout, F.A.; Wiesnet, D.R.; Deutsch, Morris; Shanton, J.A.; and Kolipinski, M.C. (1979) - Applications of aerospace data for detection of submarine springs in Jamaica in Deutsch, Morris; Wiesnet, Donald R.; and Rango, Albert (editors), Satellite hydrology: U.S., Minneapolis, Minnesota; American Water Resources Association, p. 437-445.

1014 Kolodyazshnaya, A.A.; Suntsov, M.A.; Ogilvy, A.A.; and Hmelevky, V.K. (1961) - The origin of groundwater of the Northern Urals bauxite deposits: Lab of Hydrogeol. Problems of F.P. Savarensky Treatise, Vol. 31.

1015 Komarova, M.V.; and Shtengelor, E.S. (1978) - The influence of neotectonic joints upon the hydrogeological conditions of south Ukraine in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 386-391.

The discovery and mapping of joint zones of different permeability is important to all aspects of the hydrogeological and engineering-geological investigations and to ground-water recovery. Limestone in the South Ukraine was used in this study.

1016 Komatina, M. (1977) - A contribution to the study of the problem of karst regionalization in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 32-40.

In Yugoslavia there are two types of regional karst, those of platforms and those of geosynclinal regions. Regionalization of

karst is viewed in the light of a quantitative treatment of a medium and its water.

1017 Komatina, M. (1977) - Artificial works and efficient interception of ground water in karst in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 286-296.

To artificially control water in karst regions by curtain grouts, it is necessary to have a thorough study of the geology, geomorphology, hydrogeological, and hydrological factors of each particular area. Yugoslav examples are cited.

1018 Komatina, M. (1975) - Development, conditions, and regionalization of karst in Burger, A.; and Dubertret, L., editors, Hydrogeology of Karstic Terranes: Paris; IAH, p. 190.

1019 Komatina, M. (1975) - Hidrogeoloske odlike slivova centralnodinarskog karsta: Beograd; Rasprave Zavoda Geol. Geofiz. Istraz., 16, 105 p.

1020 Kopper, John S.; and Young, Christopher. (1976) - The relationship between prehistoric man and karst: National Speleological Society Bulletin, 38:2, p. 17-26.

Ninety-five percent of hominid fossils found are in karst and other soluble bedrock terrains which occupy 12 to 13 percent of the terrestial surface. Karst areas must have provided a special econiche.

1021 Korzhuev, S.S. (1976) - Ancient karst and cycles of karst formation in the Siberia: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 211-216.

Cycles of karst formation coincide with the major geomorphological cycles of development of the platform relief which formed under conditions of arched uplifts and block shifts.

1022 Korzhuev, S.S. (1965) - Permafrost karst and its types: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 217-222.

Permafrost in soluble karsting rocks can retard the karst formation but does not exclude it. Karstification occurs above permafrost, inter-permafrost, and under-permafrost.

1023 Kovalevsky, V.S. (1983) - Long-term variability of groundwater resources: Moscow; Nauka, 205 p.

1024 Kovalevsky, V.S. (1977) - Prospects of forecasting the karstic water regime in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 73-82.

1025 Kovalevsky, V.S. (1973) - The formation conditions and forecasts of the natural regime of groundwater: Moscow; Nedra, 152 p.

1026 Kral, Z. (1973) - Der einfluss des hydrostatischen druckes auf kie fosung vom kalkstein und auf den entstand der tropfstein-formationen: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 259-267.

1027 Kral, Z. (1973) - Die bedingungen der farbigkeit von tropfstein formationer: Olomouc, CSSR; Proceedings of the 6th International Congress of Speloelogy, p. 269-271.

1028 Krause, R.E. (1980) - Stream-aquifer relations in the karst region of the Valdosta area, Georgia: U.S.; Geological Society of America Abstracts with Programs, 12:7, p. 465.

The Valdosta area in south Georgia is a typical karst region with little surface drainage and numerous sinkholes and losing streams. North of Valdosta the aquifer is recharged by the Withlacoochee River via solution enlarged joints and caves. Ground-water quality at Valdosta is attributed to recharge from the river.

1029 Krebs, W. (1969) - Early void-filling cementation in Devonian bore-reef limestones (Germany): Sedimentology, 12:3-4, p. 279-299.

A study of Devonian reef limestones around Kassel.

1030 Kreutzer, H.G.F. (1970) - Some considerations on the value of high quality water from nuclear desalting in agriculture: Vienna; IEAE Panel, November 1967.

1031 Krieg, Walter. (1973) - Exzossives wachstum von sinterrohrchen unter besonderen bedingungen: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 467-471.

1032 Krieg, Walter. (1969) - Seichter, hochkarst am Hohen Ifenein beispiel von allgemeiner: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M34/1-M34/8.

The author gives a description of a karstic region near the Hohen Ifen. The area is an example of high alpine karstification where there has been no glacial interference.

1033 Krothe, N.C. (1976) - Factors controlling the water chemistry beneath a floodplain in a carbonate terrane, central Pennsylvania: U.S.; Pennsylvania State University Ph.D. dissertation, 292 p.

1034 Krothe, N.C.; and Libra, R.D. (1983) - Sulfur isotopes and hydrochemical variations in spring waters of southern Indiana, U.S.: Netherlands; Journal of Hydrology, 61:1-3, p. 267-283.

Water chemistry studies suggest two flow systems: (1) a shallow system dominated by surface water entering through fractures, and (2) a deeper regional system recharged by diffuse flow.

1035 Kruger, Paul. (1971) - Principles of Activation Analysis: U.S.; Wiley-Interscience.

1036 Kruic, Z. (1973) - Some aspects of the application of geophysical, particularly geoelectrical, methods in speleology and karst hydrogeology: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 279-289.

Geoelectrical methods of detecting caves are not being used sufficiently to solve many hydrogeological problems.

1037 Krumbein, W.C.; and Sloss, L.L. (1963) - Stratigraphy and sedimentation: U.S., San Francisco; W.H. Freeman and Co., 660 p.

1038 Krynine, D.P. (1948) - The megascopic study and field classification of sedimentary rocks: Journal of Geology, 56:3, p. 28-33.

1039 Kubickova, J. (1978) - The problem of the pollution of karst waters (in Czech): Scr. Fac. Sci. Nat. Univ. Purkynianae Brun Biol. 7(3), p. 143-152, 1977 (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 11:17, p. 48.

Potential sources of drinking waters of the Moravian Karst (Czechoslovakia) are permanently polluted by waste water. The pollution rate exceeds the self-purification ability of spring rivulets. Increasing pollution of the spring areas can gradually deteriorate the quality of water.

1040 Kudelin, B.I. (1970) - A short outline of the status of research in karst hydrology of the USSR. Rapport elabore en rue de la premiere conference de la Commission du Karst de l'AIH, Neuchatel, p. 22.

1041 Kuhns, Roger J. (1975 [1982]) - The speleology of Lewis and Clark Caverns State Park, Montana: U.S.; Montana Bureau of Mines and Geology Open File Report 88, 49 p.

1042 Kujawa, F.; Beck, B.F.; and Jones, M. (1985) - Sinkholes induced by groundwater withdrawal in Pierson, Florida: U.S.; Florida Scientist, 48, Supplement 1, p. 47.

1043 Kunaver, J. (1976) - Kotlic--a specific depression form of subnival alpine karst: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 223-230.

The author presents the phenomenon of kotlic, its distribution, complex morphology, and its relationship with dolines.

1044 Kung, H. (1984) - Drainage density and rock solubility in a karst area, east Tennessee: U.S.; Geo 2, 11:3, p. 39-42.

1045 Kuniansky, Nelson. (1974) - Correlation of surface stream and cavern passage meander geometry (abstract) in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 187.

The hydraulic geometry of cavern passage meanders, extensively modified by vadose waters, tentatively corresponds to the geometric meander parameters for surface streams.

1046 Kuscer, I. (1950) - Kraski izviri ob morski obali: Yugoslavia, Ljubljana; Rasprave Slov. akad znan. umetn. Vol. 1, p. 91-147.

1047 Kwader, T. (1982) - Interpretation of borehole geophysical logs in shallow carbonate environments and their application to ground water resources investigations: U.S.; Florida State University Ph.D. dissertation, 337 p.

1048 Lahann, R.W.; and Siebert, R.M. (1982) - A kinetic model for distribution coefficients and application to Mg-calcites: Geochimica et Cosmochimica Acta, 46:11, p. 2229-2238.

1049 Lal, D.; Nijampurkar, V.N.; and Rama, S. (1970) - Silicon-32 hydrology in Isotope Hydrology 1970: Vienna; IAEA, p. 847-868.

1050 Lal, D.; Suess, H.E. (1968) - The radioactivity of the atmosphere and hydrosphere: An. Rev. of Nuclear Science, Vol. 18, p. 407-437.

1051 Lallemand, A.; Grison, G. (1970) - Contribution a la selection de traceurs radioactifs pour l'hydrologie: Isotope Hydrol., Proc. Symp. 1970, p. 823-832.

1052 Lambert, T.W. (1977) - Water in a limestone terrane in the Bowling Green area, Warren County, Kentucky: Kentucky Geological Survey, Lexington Series 10, Report of Investigations 17, 1976, 43 p., 20 fig., 4 plates, 8 tab., 45 ref., append. (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 10:13.

The Bowling Green area illustrates some of the water problems in a karst plain. The karst plain is fairly flat to gently rolling, contains numerous closed depressions, and is underlain by a thick sequence of limestone.

1053 LaMoreaux, P.E. (1984) - Catastrophic subsidence, Shelby County, Alabama in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 131-136.

1054 LaMoreaux, P.E. (1979) - Connector wells, a mechanism for water management in the central Florida phosphate district in Back, W.; Stephenson, D.A. (guest editors), Contemporary Hydrogeology - The George Burke Maxey Memorial Volume: Amsterdam; Journal of Hydrology, 43:469-490.

1055 LaMoreaux, P.E. (1979) - Remote sensing techniques and the detection of karst: Bulletin of the Association of Engineering Geologists, Vol. 16, p. 383-392.

1056 LaMoreaux, P.E.; LeGrand, H.E.; and Stringfield, V.T. (1975) - Progress of knowledge about hydrology of carbonate terranes in Burger, A. and Dubertret, L., editors, Hydrogeology of Karstic Terrains: France, Paris; IAH, p. 41-52.

A survey of the early geologic literature on carbonate rocks followed by a critical review of progress in the development of

methods and techniques for the study of karst areas. Lists are given of the Symposia and Conferences on the hydrology of carbonate rocks and of selected references.

1057 LaMoreaux, P.E.; LeGrand, H.E.; Stringfield, V.T.; and Tolson, J.S. (1975) - Hydrology of limestone terranes (progress of knowledge about hydrology of carbonate terranes) with an annotated bibliography of carbonate rocks by Warren, W.M., and Moore, J.D.: U.S.; Alabama Geological Survey Bulletin 94E, 168 p.

Brief section on development of methods and techniques and typical limestone terrane. The major portion of this bulletin is devoted to a 795-entry annotated bibliography of carbonate rocks by William M. Warren and James D. Moore.

1058 LaMoreaux, P.E.; and Newton, J.G. (1986) - Catastrophic subsidence: an environmental hazard, Shelby County, Alabama: Environmental Geology, 8:1-2, p. 25-40.

1059 LaMoreaux, P.E.; and Warren, W.M. (1973) - Sinkhole: U.S.; Geotimes, 18:3, p. 15.

A sinkhole crater formed on December 2, 1972, in Alabama. The collapse occurred in residual clay, in an area that may be affected by extensive ground-water withdrawal.

1060 LaMoreaux, P.E.; Wilson, B.M.; and Memon, B.A., editors. (1984) - Guide to the hydrology of carbonate rocks [studies and reports in hydrology, No. 41]: UNESCO, 345 p.

1061 Land, L.F. (1971) - Annual compilation and analyses of hydrologic data for urban studies in the San Antonio, Texas, metropolitan area 1969: U.S.; U.S. Geological Survey Open-File Report, 109 p.

1062 Land, L.F. (1970) - Seepage investigation of Medina Canal, Bexar-Medina-Atascosa Counties, Texas, water improvement district number 6, canal system, August 15, 1969: U.S.: U.S. Geological Survey Open-File Report 145, 5 p.

An investigation of possible water loss in a 24-mile reach of the canal.

1063 Lang, Sandor. (1971) - Quelques questions de la denudations des karsts et de leur entourage en Hongrie (abstract) in International Geographical Union European Regional Conference, Symposium on Karst-Morphogenesis, Hungary, 1971, Proceedings: IGU, Proceedings, p. 6

The rate of denudation of karst topography and the topographic features which are related to this erosional process are discussed.

1064 Lang, Sandor. (1969) - Entwicklungsprobleme des tropischeu karstes: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M14/1-M14/4.

1065 Langelier, W.F. (1946) - Effect of temperature on the pH of natural waters: American Water Works Association Journal, 38:2, p. 179-185.

1066 Langmuir, Donald. (1971) - Eh-pH determination in Carver, Robert E. (editor), Procedures in Sedimentary Petrology: New York; John Wiley and Sons, Inc., p. 597-634.

1067 Langmuir, Donald. (1971) - The geochemistry of some carbonate ground waters in central Pennsylvania: U.K.; Geochim. et Cosmochim. Acta, 35:10, p. 1023-1045.

1068 Langmuir, Donald. (1968) - Stability of calcite based on aqueous solubility measurements: U.K.; Geochim. et Cosmochim. Acta, 32:8, p. 835-851.

1069 Langmuir, Donald; and Jacobson, R.L. (1970) - Specific-ion electrode determination of nitrate in some fresh waters and sewage effluents: Environmental Science and Technology, 4:10, p. 834-838.

1070 Lapajue, J. (1973) - Some remarks about the geophysical exploration of the karst: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 291-295.

1071 Lapointe, P. (1981) - Critères de reconnaissance des paléokarsts, application aux sondages carottés: France; Thèse Doct. 3 ème cycle, sédimentologie, Paris, 308 p.

Determination of the various standards of karst identification applicable to use in the form given. This review contains identification standards distributed in three groups according their technical implementation. In future investigations, it would be interesting to make correlations between cores known as karstic and logs recorded in the same well.

1072 Larew, H.G.; and Gooch, E.O. (1984) - Engineering problems associated with sinkholes in the Valley of Virginia in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 359-361.

The Valley of Virginia lies between the Blue Ridge Mountains on the east and the Appalachian Province on the west and is underlain by highly deformed sedimentary rocks of the Cambrian, Ordovician, Silurian, Devonian, and Mississippian periods. The authors describe how sinkholes and solution features are identified and have been dealt with on a number of engineering projects.

1073 LaRiccia, Marilyn P.; and Rauch, Henry W. (1977) - Water well productivity related to photo-lineaments in carbonates of Frederick Valley, Maryland in Dilamarter, R.R., and Csallany, C.S., editors, Hydrologic Problems in karst regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 228-234.

Photo-lineaments are areas where high-yielding wells tend to occur. These lineaments are probably related to fracture zones or

secondary openings. The closer the well is to the lineament, the higher the yield.

1074 Larsen, K.G. (1977) - Sedimentology of the Bonneterre Formation, southeast Missouri: U.S.; Economic Geology, Vol. 72, p. 408-419.

The Bonneterre Formation is host for southeast Missouri's numerous lead deposits. The author shows the sedimentological influence on individual ore bodies. The stratigraphic succession found in each mine is correlated to give the regional picture of stromatolite reef development, facies changes, and depositional environments of Bonneterre time.

1075 Larson, C. (1974) - Man's impact on caves: U.S.; NSS Convention (Decorah, Iowa), Abstracts, p. 15.

1076 Larson, T.E. (1950) - Groundwater in the Peoria Region, part 3, chemistry: U.S.; Illinois State Water Survey Bulletin, Vol. 39, p. 113-128.

1077 Lascu, C.; and Bleahu, M. (1985) - The Bulba Cave: Bucharest; The Sport-Turism Publishing House, 38 p., 97 photographs [in Romanian].

An illustrated monograph which shows one of the most representative caves of the karstic area of the Mehedinti Plateau. The text (abstracted in German, English, and French) outlines the exceptional geographic location of the 5 km of galleries - the natural bridge at Ponoarele, the lapies field, and Lake Zaton.

1078 Lascu, C.; and Povara, I. (1980) - Notes on the sapte isvoare reci karstic emergences (the Cerna Valley): Bucarest; Trave. Inst. Spéol., Emil Racovita, Tome XIX, p. 247-251 [in French].

The work outlines the particular hdyrological situation of a group of karstic springs situated in the Cerna Valley graben which, though originating in various sources, are grouped as the analyses of temperature, discharge, and chemism prove.

1079 Lascu, V. (1984) - Ciur Ponor - a cave as yet unconquered: Bucharest; Buletinul CSER, 8, p. 125-133, 5 maps, 1 sketch [in Romanian].

Pages of delicate exploration in a cavity which is 10,500 m long and has a level difference of 191 m.

1080 Latham, A.; Schwarcz, H.P.; Ford, D.C.; and Pearce, G.W. (1982) - The paleomagnetism and U-th dating of three Canadian speleothems: Evidence for the westward drift: Canada, Ottawa; Canadian Journal of Earth Science, 19:10, p. 1985-1995.

1081 Latham, A.G.; Schwarcz, H.P.; Ford, D.C.; and Pearce, G.W. (1981) - Westward drift in secular variation 1.3 Ka BP to present in Mexico from a stalagmite paleomagnetic record: U.S., Washington, D.C.; EOS Trans Am Geophysical Union, 62:45, p. 852.

1082 Laurence, R.A. (1944) - An early Ordovician sinkhole deposit of volcanic ash and fossiliferous sediments in east Tennessee: Jour. Geol., 52:4, p. 235-249.

1083 Laureti, Lamberto. (1969) - Carte des phénomènes karstiques du Plateau de Serle (Brescia, Italia): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 6, p. 3/1-3/8.

A map of the Plateau of Serle with short accounts of the tectonics, morphology, hydrology, and climate of the area.

1084 Laury, R.L. (1980) - Paleoenvironment of a late Quaternary mammoth-bearing sinkhole deposit, Hot Springs, South Dakota: U.S.; Geological Society of America, Bulletin, 91:8, p. I465-I475.

1085 Laury, R.L.; and Kempton, D.D. (1980) - Late Quaternary landscape evolution of the southern Black Hills, South Dakota in American Quaternary Association, sixth biennial meeting, Proceedings, Orono, Maine, U.S., 1980: U.S.; Am Quaternary Assoc Natl Conference Abstract 6, p. 126.

1086 Lawrence, F.W. (1976) - Identification of geochemical patterns in ground water by numerical analysis: U.S.; University of South Florida Master's Thesis, unknown p.

1087 Leary, R.L. (1984) - Topography and geology of the early Pennsylvania erosional surface on the northwest margin of the Illinois Basin, U.S. in Sutherland, P.K., and Manger, W.L., editors, Biostratigraphy, International Congress on Carboniferous Stratigraphy and Geology, Proceedings: U.S.; Proceedings, p. 391-398.

1088 Lebedeva, N.A. (1978) - Characteristics of the development of ground water flow and regional estimation of natural ground water resources in open-type artesian basins in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1967, p. 426-430.

The author draws conclusions concerning the characteristics of hydrodynamic conditions and the methods of regional estimation of natural ground water resources in artesian basins similar to the Moscow artesian basin.

1089 Leggat, E.R. (1954) - Summary of ground-water development in the southern High Plains, Texas: U.S.; Texas Board of Water Engineering Bulletin 5402, 23 p.

Summary of the ground-water development, use, and fluctuations of water levels to 1954.

1090 LeGrand, H.E. (1982) - Brief note on the hydrogeology of Irish karsts: Written after field excursions, 21-23 May 1979; published by Irish Nat. Comm. IHP, p. 181.

The effects of heavy Pleistocene cover on the karst of the Munster Synclines and the lack of Pleistocene cover on the Burren limestones made a dramatic impression on all the excursionists. The

varied influences of the Pleistocene, including changes of sea level on karstification, need study.

1091 LeGrand, H.E. (1979) - Evaluation techniques of fractured rock hydrology in Back, W.; and Stephenson, D.A. (editors), Contemporary Hydrogeology - The George Burke Maxey Memorial Volume: Journal of Hydrology, Vol. 43, p. 333-346.

1092 LeGrand, H.E. (1977) - Karst hydrology related to environmental sensitivity in Dilamarter, R.R.; and Csallany, S.C. (editors), Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 10-18.

A characteristic great range in permeability of karst regions gives rise to many significant problems, including (1) scarcity and poor predictability of ground-water supplies, (2) scarcity of surface streams, (3) instabiilty of the ground, (4) leakage of surface reservoirs, and (5) an unreliable waste-disposal environment.

1093 LeGrand, H.E.; and LaMoreaux, P.E. (1975) - Hydrogeology and hydrology of karst in Burger, A.; and Dubertret, L. (editors), Hydrogeology of Karst Terrains: Paris; International Association of Hydrogeologists, p. 9-19.

A description of the many parameters interrelated in the development of permeability in karst terranes with special reference to water levels and stream flows. The range of hydrologic conditions is generally broad limiting the development of generalizations on karstic terranes.

1094 LeGrand, H.E.; Stringfield, V.T.; and LaMoreaux, P.E. (1976) - Hydrologic features of United States karst regions in Tolson, J.S.; and Doyle, F.L., editors, Karst Hydrology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 31-46.

Gives a brief description of the prominent exposed karst regions of the United States, including the Edwards Plateau and the Balcones Fault Zone area of Texas, underlain by Lower Cretaceous limestones. General features of karst development and problems related to hydrology are discussed.

1095 Lehman, H. (1960) - La terminologie classique du karst sous l'aspect critique de la morphologie climatique moderne: France; Revue de Géogr. de Lyon, 35:1.

1096 Lehman, O. (1932) - Die hydrographie des karstes (The hydrology of the karst) in Kende, O. (editor), Enzyklopadie der Erdkunde: Leipzig; Deuticke, 212 p.

1097 Lemordant, Y. (1977) - Infiltration et transfert des eaux souterraines en pays karstique, le plateau du Mont Revard (Savoie): France; Thèse Doct., Géol. Appli. Grenoble, p. 203.

1098 Lenda, A.; and Zuber, A. (1970) - Tracer dispersion in groundwater experiments: Vienna; IAEA, Isotope Hydrology 1970, p. 619-641.

1099 Leontiadis, J.; Dimitroulas, Ch. (1971) - The use of radioisotopes in tracing karst groundwater in Greece. I. Further investigation on the possible interconnection between Partheni sinkhole and various springs of the near area. II. Investigation on the possible interconnection between Skotini sinkhole and springs of the Argos area: Greece, Athens; Greek Atomic Energy Commission, Reports 71/10E and 71/14E.

By using Cr51-E.D.T.A. as a tracer in two different experiments, the interconnection between Milea sinkhole and the springs Kiveria (submarine) and Xovrios Achladokampos was proven, as well as between the Taka Lake sinkhole and the submarine spring Big Anavalos.

1100 Leontyev, O.K.; Ignatov, E.I.; and Busto, P.A. DEL (1976) - Geomorphology of the Pinas Island (Cuba): Moscow; Geomorfologiya, 4, p. 86-91 [in Russian].

1101 Lepiller, M. (1982) - La capacité de stockage dans la zone non saturée des aquifères karstiques, estimation et conséquences pour la localisation de la dissolution dans les systèmes in actes du 3ème Colloque d'hydrogie en pays calcaire: France; Ann. Sci. Univ. Besançon, No. 1, p. 147-157.

Proposition d'une méthode graphique pour l'évaluation de volume d'eau stockée en zone non saturée par rapport à celui de la zone saturée.

1102 Lerihan, J.M.A.; and Thomson, S.J. (editors). (1965) - Activation analysis: Proceedings of the NATO Advanced Study Institute held in Glasgow: Academic Press.

1103 Lerman, A. (1965) - Paleoecological problems of Mg and Sr in biogenic calcites in light of recent thermodynamic data: U.K.; Geochim. et Cosmochim. Acta, Vol. 29, p. 977-1002.

1104 Lessing, P. (1981) - The monitor lineament: U.S.; Mountain State Geology, 1981, p. 40-41.

1105 Lessing, P.; Dean, S.L.; Kulander, B.R.; and Reynolds, J.H. (1979) - Karst subsidence and linear features, Greenbrier and Monroe Counties, West Virginia: U.S.; West Virginia Geological and Economic Survey Environmental Geology Bulletin 17, Map, scale 1:50,000.

1106 Letheren, John R. (1971) - A photographic method of cave surveying: Yugoslavia, Ljubljana; 4th International Congress of Speleology, 1965, Vol. 6, p. 39-43.

1107 Leve, G.W. (1983) - Relation of concealed faults to water quality and the formation of solution features in the Floridan aquifer, northeastern Florida, U.S.: Netherlands; Journal of Hydrology, 61:1-3, p. 251-264.

Isolated occurrences of relatively high chloride concentration water may be associated with buried faults. The upward movement of mineralized water along the faults may also have formed some of the solution features.

1108 Leveque, P.Ch. (1977) - Etude du karst, en Grèce et en Crète, a l'Aide de la Télédection et du Tritium in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 461-476.

1109 Lind, C.J. (1970) - Specific conductance as a means of estimating ionic strength: U.S.; U.S. Geological Survey, Professional Paper No. 700-D, p. 272-280.

1110 Lion, T.E. (1983) - Engineering geology and the relative stability of ground for hillside development in part of Springfield Township, Hamilton County, Ohio: U.S.; University of Cincinnati Master's Thesis, 157 p. [includes geological map, scale 1:316,800].

1111 Liszkowski, J. (1973) - Liltrologie und chronologie der fossileu Terrae Calcis-Boden der karstgebiete des Mittelpolnischeu hochlandes: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 473-481.

The paper deals with lithology, chemistry, chronology, and origin of fossil Terrae calcis-soils from karst areas of the Middle-Polish Highland.

1112 Littlefield, J.R.; Culbreth, M.A.; Upchurch, S.B.; and Stewart, M.T. (1984) - Relationship of modern sinkhole development to large scale photolinear features in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 189-195.

An inventory of reported sinkhole occurrences for the past 10 years in west-central Florida reveals that: (1) sinkhole development commonly occurs in linear patterns on a regional scale; and (2) while sinkhole development is more frequent in areas of high water use, there is a lack of obvious concentrations of modern sinkholes in the immediate vicinity of well fields or other major groundwater withdrawal areas.

1113 Lloyd, J.W.; Chidley, T.R.E.; and Dumbleton, B.M. (1977) - The investigation and development of fresh water lenses in Grand Cayman Island: I.A.H. Memoirs, Vol. XIII, Part 1, Birmingham Congress, U.K., p. E40-E47.

An example of the use of borehole conductivity profiling and surface resistivity surveys to interpret the geometrical relationship between salt and fresh water lenses.

1114 Lo, R.C. (1984) - Sinkhole problem related to dam engineering in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 267-272.

The formation of sinkholes in a dam-reservoir environment can be attributed to one or more of the following factors: (1) presence

of natural and/or man-made surficial and subsurface voids; (2) presence of incompatible gradations at boundaries of different materials; (3) presence of cracks; (4) presence of soluble, dispersive or collapsible materials; and (5) increase of hydraulic gradients across critical zones associated with the impounding reservoir.

1115 Logan, John. (1961) - Estimation of electrical conductivity from chemical analyses of natural waters: Journal of Geophys. Research, 66:8, p. 2479-2483.

1116 Lorberner-Szentes, I.; and Lorberner, A. (1978) - A study of the relationship between ground-water resources and subsurface geological structure in the northwestern part of the Great Hungarian Plain in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 203-224.

In the northwestern part of the Great Hungarian Plain subsurface waters of different types (karst water, deep and shallow groundwater) form a closely related flow system. An upward movement of karst thermal waters directed toward the porous basin sediments takes place at the south-southeast boundary of the carbonate rock formations of the Hungarian Central Mountains Trough, along the so-called "Balaton Line."

1117 Loucks, R.G. (1976) - Pearsall Formation, lower Cretaceous, south Texas: Depositional facies and carbonate diagenesis and their relationship to porosity: U.S.; University of Texas at Austin Ph.D. dissertation, 387 p.

1118 Louis, C. - Etude des écoulements d'eau dans les roches fissures et de leurs influences sur la stabilité des massifs rocheux: France; Thèse. Bull. de l'Electricité de France, No. 3, p. 5-132.

1119 Louw, J.M.; Goedhart, P.H.; and van Zyl, F.J. (1984) - A model study of a proposed concrete road pavement over a potential sinkhole area: in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 391-396.

One-tenth scale models simulating the behavior of strips of a proposed specially treated concrete road pavement over a sinkhole reasonably substantiated the proposed design.

1120 Love, G.W. (1983) - Relation of concealed faults to water quality and the formation of solution features in the Floridan aquifer, northeast Florida, U.S.A. in Back, W.; and LaMoreaux, P.E. (guest editors), V.T. Stringfield Symposium - Processes in Karst Hydrology: Netherlands; Journal of Hydrology, Vol. 61, p. 251-264.

1121 Lowenstam, H.A. (1964) - Coexisting calcite and aragonites from skeletal carbonates of marine organisms and their strontium and magnesium contents in Recent Research in the Field of Hydrosphere, Atmosphere, and Geochemistry: Tokyo, Marzen Co., p. 303-404.

1122 Lowry, D.C.; and Jennings, J.N. (1981) - The Nullarbor karst Australia [reprinted p. 39-49, 73-81, Zeitschr. Geomorphologie 18:35-81 (1974)] in Sweeting, M.M., editor, (1981), Karst Geomorphology, Benchmark papers in Geology, Vol. 59: U.S.; Hutchinson Ross Publishing, p. 329-349.

Karst in dry climate is distinctive, especially where its character depends only modestly on inheritance from former more humid climatic phases in its history. The Nullarbor karst falls into this category and with a compact, conterminous area of about 200,000 km^2 is one of the largest karstlands in the world.

1123 Lozo, F.E.; and others. (1959) - Symposium on Edwards Limestone in central Texas: U.S.; Bureau of Economic Geology, The University of Texas Publication No. 5905, 235 p.

A series of papers on the Edwards Limestone in central Texas.

1124 Lucas, P.C. (1977) - Relationship between the hydrology of Blowing Cave and Cowpasture River: U.S.; NSS Bulletin, 39:3, p. 67-72.

1125 Lukovic, M. (1959) - Some observations relating to the groundwater conditions in karst areas made during the construction of certain large structures in Yugoslovia: Paris; IAH Memoirs, Vol. II, p. 87.

1126 Lumsden, D.N.; Walker, R.L.; and Carter, J.A. (1978) - Uranium series dating of stalagmites from Blanchard Springs Caverns, Arkansas, U.S.. Reply to discussion by Harmon, R.S.; Swarcz, H.P.; Thompson, P.; and Ford, D.C. (Geochim Cosmochim Acta [42/4] 78 p. 433-437): U.K., Oxford; Geochimica et Cosmochimica Acta, 42:4, p. 437.

1127 Lundquist, C.A.; Reckmeyer, V.H.; and Varnedoe, W.W. (1981) - Newsome Sinks cave system: U.S., Huntsville; The Huntsville Grotto Newsletter, 22:7, p. 55-56.

1128 Luparini, V. (1975) - Etude hydrogéologique de Massif du Devoluy (Hautes Alpes): France; Thèse Doct. 3 ème cycle Sci. Terre, Grenoble, 142 p.

1129 Lyokhov, A.V. (1981) - Modeling of karst process, vol. I, construction of a theoretical model of the karst process: Ingenernaya Geologia, N. 1.

1130 Lyokhov, A.V. (1981) - Modeling of karst process, vol. II, theoretical study of models of mass yield of karst rock fissures: Ingenernaya Geologia, N. 1.

1131 Lyseuko, V. (1966) - The geomorphological development of the northern part of the Slovak karst dependent on the tectonic structure: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 231-236.

1132 Mac, I.; and Leontaris, N.S. (1981) - The polje in Skourta (Greece): Bucarest; Trav. Inst. Spéol., Emil Racovita, T. XX, p. 207-212 [in French].

The polje in Skourta in the Beotia Province, Greece, is a typical example of mixed genesis - river-karstic and tectonic - of these features of relief. An important role in the formation of the polje was played by conditions of bigger pluviosity in the Pleistocene. At present, the polje is partially operational, only in the rainy season, when drainage is achieved through lateral swallow holes and central sinkholes.

1133 MacIntyre, I.G. (1984) - Extensive submarine lithification in a cave in the Belize Barrier Reef platform: U.S., Tulsa; Journal of Sedimentary Petrology, 54:1, p. 221-235.

1134 Mackiewicz, M.C. (1976) - Pothole formation: U.S., Colorado Springs; Earth Science, 28:1, p. 4-5.

1135 Mackovjak, D. (1983) - Occurrence and origin of jasperoids on Lone Mountain, Independence Range, Elko County, Nevada: U.S.; Bowling Green University (Ohio) Master's Thesis, 122 p.

1136 MacLachlan, D.B. (1979) - Geology and mineral resources of the Temple and Fleetwood quadrangles, Berks County, Pennsylvania: U.S.; Pa Bureau Topographic and Geologic Survey, Atlas ab, 71 p.

1137 MacLachlan, David B.; Buckwalter, Tracy, V.; and McLaughlin, Dean B. (1975) - Geology and mineral resources of the Sinking Spring Quadrangle, Berks and Lancaster Counties, Pennsylvania: U.S.; Pennsylvania Geologic Survey, 4th Series, Atlas 177d.

The Great Valley, Pennsylvania, is a very thick carbonate and shale section of Cambrian and Ordovician age. A discussion on the potential hazards present in carbonate rocks is given in order that proper testing and planning will precede construction.

1138 Maclay, R.W.; and Rettman, P.L. (1973) - Regional specific yield of the Edwards and associated limestones in the San Antonio, Texas area: U.S.; U.S. Geological Survey for Edwards Underground Water District, San Antonio, Texas.

A specific yield of about 0.025 was estimated for the Edwards recharge area. This was based on annual difference between recharge and discharge, and on averages of annual water-level changes in ten observation wells.

1139 Maclay, R.W.; and Small, T.A. (1983) - Hydrostratigraphic subdivisions and fault barriers of the Edwards aquifer, south-central Texas, U.S.A. in Back, W., and LaMoreaux, P.E., guest editors, V.T. Stringfield Symposium - Processes in Karst Hydrology: Netherlands; Journal of Hydrology, 61:1-3, p. 127-146.

At places fault barriers probably cause partial to almost complete blockage of ground-water flow normal to the fault. This kind of discontinuity is very common in the Edwards aquifer, and it may exert a major control on the direction of ground-water flow within it.

1140 Maclay, R.W.; and Small, T.A. (1976) - Progress report on geology of the Edwards aquifer, San Antonio area, Texas, and preliminary interpretation of borehole, geophysical and laboratory data on carbonate rocks: U.S.; U.S. Geological Survey Open File Report 76-0627, 94 p.

A description of the geology and porosity of the rocks in the Edwards aquifer. The aquifer is subdivided into eight units to increase the detail and allow for a greater understanding of the aquifer.

1141 Madeyska-Niklewska, T. (1969) - Upper Pleistocene deposits in caves of the Cracow Upland: Warszawa; Acta Geologica Polonica, Vol. XIX, No. 2, 1969, p. 341-392.

Deposits in the caves of the Cracow Upland may be divided into two sets of strata. The lower one, composed of clay and sand, is aqueous. The upper one is composed of limestone debris. The upper set results from Upper Pleistocene sedimentation processes in dry caves. Animal remains and some traces of human occupation are common in the upper set. The investigation of this set allows reconstruction of climatic changes during its sedimentation.

1142 Magaritz, M.; and Issar, A. (1973) - Carbon and oxygen isotopes in epigenetic hydrothermal rocks from Hamam el Farum, Sinai: Chemical Geology, 12:2, p. 137-146.

1143 Magdalenic, A. (1971) - Hidrogeologija silva Cetine (The hydrogeology of the River Cetina drainage basin, Yugoslavia): Yugoslavia, Zagreb; Krs. Jugosl. Jugosl. akad. znan. umjet., 7:4, p. 89-169.

1144 Maher, S.W. (1971) - Regional distribution of mineral deposits beneath the pre-middle Ordovician unconformity in the southern Appalachians: U.S.; Economic Geology, 66:5, p. 744-747.

1145 Mairhofer, H. (1963) - Bestimmung der Stromungsrichtung des Grundwassers in einem einzigen Bohrloch mit Hilfe radioaktiver elemente: Atompraxis, Vol. 9, p. 2-4.

1146 Makkaveev, A.A. (1971) - Dictionary on hydrogeology and engineering geology, (2nd edition): Moscow; Izd. Nedra, 216 p.

1147 Maksimovich, G.A. (1974) - Fundamentals of karst science, vol. 2: Perm State University (USSR), Institute of Karst Studies and Speleology, 1969, 530 p. (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 7:10, p. 6-7.

The book is divided into three parts: (1) problems of karst hydrogeology (general, applied, and regional hydrogeology of karst); (2) rivers and lakes of karst regions; and (3) some special types of karst (chalk karst and hydrothermokarst). An extensive bibliography of Soviet and foreign literature is included.

1148 Maksimovich, G.A. (1962) - Karst expansion and regioning in the USSR: Perm; Coll. Papers Hydrogeology and Karstology, Issue 1.

1149 Malatino, A.M.; and Lloyd, N.A. (1977) - Monitoring for environmental protection in Huntsville, Alabama, U.S.A. (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 307-308.

An account of the monitoring system of water quality around a sanitary landfill in a karstic region, Huntsville, Alabama.

1150 Maleev, M.N.; and Philipov, A.P. (1973) - Dislocation growth mechanism of calcite filamentary crystals forming "moon milk" from the Nodopada Cave, Bulgaria: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 449-508.

1151 Maler, Mirko. (1969) - Sandalja bei Pula- eiul bedeutende ansiedlung der jungpalaolittuschen jager in istrien: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. H1/1-H1/7.

1152 Malinar, Hrvoje. (1969) - Appearance of the noxious gases in some caves in Croatia (summary): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY12/1.

A noxious gas (carbon dioxide) was found in two caves because of the presence of rotten pieces of grass, branches, and leaves. Ventilation was impossible so the gas concentration built up with seasonal variations in concentration.

1153 Mancy, K.H.; and Jaffe, T. (1966) - Analysis of dissolved oxygen in natural and waste waters: PHS Publ. No. 999-WP-37, 94 p.

1154 Mandel, S. (1957) - Investigation of the geohydrology of the Taninim catchment area: Tel Aviv, Tahal.

1155 Mander, Richard J.; and Greenfield, Brian J. (1977) - Storage and discharge: unconfined aquifers: I.A.H. Memoires, Vol. XIII, Part 1, Birmingham Congress, U.K., p. D42-D60.

A groundwater stage-discharge relationship is developed to try to understand the relationship of groundwater discharge in a river to river flow. The Thames Basin is used as an example.

1156 Mangin, A. (1984) - Ecoulement en milieu karstique: France; Ann. des Mines, 5-6, p. 135-142.

L'originalité du milieu karstique est analysé par rapport aux autres milieu poreux et fissurés et une proposition est faite sur l'approche de ce milieu pour tenir compte de son hétérogénéité soit dans un but de reconnaissance, soit en vue de son exploitation.

1157 Mangin, A. (1984) - The use of autocorrelation and spectral analyses to obtain a better understanding of hydrological systems: Journal of Hydrology, 67:1-4, p. 25-43, 1984, 8 fig., 1 tab., 37 ref. (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:8, p. 2.

Using the correlogram and variance spectral density, the time series of rainfall and discharge of a hydrological system are analyzed in a descriptive way differing from the traditional method. Applied to three karstic systems in the Pyrenean Mountains (France-Spain), these analyses permitted a comparison and a study of the different reactions of these three sytems.

1158 Mangin, A. (1982) - Détermination du comportement hydrodynamique des aquifères karstiques à partir de l'étude des informations fournies par leurs exutoires: France; Actes Coll. Nat. les milieux discontinus en hydrogéologie, Orléans-la-Source, Doc. BRGM, No. 45, p. 397-403.

1159 Mangin, A. (1982) - L'approche systémique du karst, conséquences conceptuelles et méthodologiques: France; Réunion monografica sobre el Karst, Lana, 82, p. 141-157.

Une approche du karst, de sa genèse et de son évolution est proposée en faisant appel à des concepts énergétiques (approche thermodynamique). Ces concepts énoncés permettent de rendre compte des morphologies karstiques et de l'originalité de son fonctionnement hydrodynamique.

1160 Mangin, A. (1982) - Mise en évidence de l'originalité et de la diversité des aquifères karstiques: France; 3 ème colloque d'hydrologie en pays calcaires, Neuchâtel, Ann. Scient. Univ. Besançon, 1, p. 159-172.

A partir du traitement des séries chronologiques de pluies et de débits, il est montré que les aquifères karstiques étaient très diversifiés entre deux pôles dont l'un est proche des aquifères fissurés, alors que l'autre a un comportement comparable au ruissellement de surface. Des critères sont proposés pour établir une classification.

1161 Mangin, A. (1975) - Contribution à l'étude hydrodynamique des aquifères karstiques: France; Thèse Doct. ès Sci., Université de Dijon; Ann. Spéléol., 1974, 29:3, p. 283-332; 1974, 29:4, p. 495-601; 1975, 30:1, p. 21-124.

Dans une première partie sont étudiées les propriétés aquifères des réservoirs carbonatés avec mise en évidence des particularités introduites par la karstification ainsi que la validité des méthodes hydrodynamiques classiqes dans ce cas. Une deuxième partie met en place des méthodes fondées sur l'analyse systémique avec une présentation des différents karsts servant de support a l'étude. La troisième partie concerne une proposition du fonctionnement des aquifères karstiques avec une représentation de sa structure.

1162 Mangin, A. and Bakalowicz, M., editors (1985) - Le Karst. Manuel franco-québécois de modèlisation hydrologique: France; INRS eau (Québec) et Ecole des Mines de Paris.

1163 Mania, J. (1976) - Modèle transitoire de la nappe du calcaire carbonifère de la région de Lille (Nord) à Tournai (Belgique), Simulation de l'alimentation artificielle: France; Bull. BRGM, S. 3, P. 45-59.

Mise au point du modèle transitoire de la nappe du calcaire carbonifère de la région lilloise et tournaisienne à l'aide d'un calage inter-annuel (1899 à 1973) puis mensuel (janvier 1973 à janvier 1974). On a testé les hypothèses de travail suivantes: drainance de la nappe de la craie vers la nappe du calcaire carbonifere; drainance de la nappe alluviale de l'Escaut; pertes de la Deule; pertes de la Marque; aquifère d'une épaisseur utile de 30 m, puis de 50 m. Certaines hypothèses de travail, nécessaires au calage du modèle mathématique restent toutefois à contrôler de manière plus précise sur le plan quantitatif. Le modèle s'avère, malgré ces restrictions, un outil de réflexion qui permet d'orienter les nouvelles voies.

1164 Manley, Thomas R.; and Garton, E. Ray, Jr. (1977) - The A, B, C's of finding and delineating caves with apparent resistivity measurements in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 92-95.

A study of the Greenbrier Limestone shows that apparent resistivity measurements can be used to find air filled or partially water filled caves in limestone. Findings from resistivity are confirmed by boreholes.

1165 Mansfield, R. (1984) - Speleology in Southeast Asia; an historical background in Friends of the Karst Meeting, Puerto Rico, 1984 (abstracts): U.S.; Geo 2, 11:3.

1166 Margrita, R.; Evin, J.; Flandrin, J.; and Paloc, H. (1970) - Contribution des mesures isotopiques à l'étude de la Fontaine de Vaucluse: Vienna; IAEA, Isotope Hydrology 1970, p. 333-347.

1167 Marin, C. (1984) - Hydrochemical considerations in the lower Cerna River Basin - theoretical and applied karstology: (1), p. 173-182, 5 fig.

The paper deals with data concerning the chemism of Cerna, karstic waters, and main thermomineral sources from the area of Baile Herculane spa. The karstic springs are compared with limestone surface streams.

1168 Marin, C. (1981) - Chemical composition of carbonate waters in Padurea Craiului, Romania: Trav. Inst. Spéol., Emile Racovitza, T. XX, p. 139-155, 9 fig.

Water samples collected from the karstic area of Padurea Craiului Mountains have been analyzed to detect their main chemical characteristics.

1169 Marin, C. (1979) - Ion pairs in karst waters: Trav. Inst. Spéol., Emile Racovitza, T. XVIII, p. 249-258, 5 fig.

A method of calculating the concentrations and activities of ion pairs formed in karst waters with a specified ionic strength and pH. The results were obtained from calculations using 56 water samples from the karst areas situated in the middle basin of the

Cerna River (Banat), and the Sebesh Mountains, as well as from the Zaton-Bulba hydrokarstic basin (South Carpathians).

1170 Marosi, P. (1959) - Contributions to the question of genesis of the salt lakes in Ocna Mures: Cluj-Napoca; Studia Univ. Babes-Bolyai, Ser. II, Fasc. 1, p. 81-95, 3 figs., 33 refs. [in Romanian, Russian and German Res.].

The paper deals with the analysis of the haloexokarst and the genesis of salt lakes originated from old salt mines, affected by karst processes, in direct relation to the relative fresh-water inputs and to mining operations.

1171 Martel, E.Z. (1921) - Niveaux traits des eaux souterraines: Paris; 838 p.

1172 Martin, W.E.; and Archer, T. (1971) - Cost of pumping irrigation water in Arizona: 1891 to 1967: U.S.; Water Resources Res., Vol. 7, p. 23-31.

1173 Martini, J.E.J. (1980) - Sveite, a new mineral from Autana Cave, Territorio federal Amazonas, Venezuela: S. Africa, Johannesburg; Trans Geological Society S Africa, 83:2, p. 239-241.

1174 Maruashvili, L.I. (1974) - Classification of speleomorphogenetic medium and short cycles: Akad. Nauk Geuz. SSR, Soobshch., 73:3, p. 629-632.

1175 Maslyn, R.M.; and Davis, D.G. (1979) - Karst development on the White River Plateau, Colorado: U.S.; National Speleological Society Bulletin, Vo. 41, p. 95-101.

Mississippian age Leadville Limestone is exposed over large areas of the White River Plateau and possesses a wide variety of karst features, including the state's four largest caves. There is an approximate zonation of the karst features by altitude. Where shale is present, major caves are developed. Where the shale has been removed, in the central area of the plateau, alpine karst exists.

1176 Mason, D.; McDowell, D.; and Mylroie, J.E. (1984) - Meander cutoffs in the Glover's Cave area, Christian County, Kentucky: U.S.; Annual Report - Western Kentucky Speleological Survey 1982-1983, p. 7-10.

1177 Matalas, Nicholas C.; Landwehr, Jurate Maciunas; and Wolman, M. Gordon. (1982) - Prediction in water management in National Research Council, Geophysics Study Committee: Scientific Basis of Water-Resources Management: Washington, D.C.; National Academy Press.

1178 Matalucci, R.V.; and Abdel-Hady, M. (1969) - Surface and subsurface exploration by infrared surveys in Remote Sensing and its Application to Highway Engineering: Washington, D.C.; Highway Research Board Special Report, No. 102, p. 1-12.

1179 Matonickin, I.; Pavletic, Z.; Tavcar, V.; and Krkac, N. (1977) - The limnological investigations of reicotops and phenomenon of current

travertinisation in Plitvicka Jezera (Plitvice Lakes, Yugoslavia) [in Serbo-Croatian]: Prirodosl Istraz Acta Biol. 40, p. 5-68, 1971 (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 10:3.

Exceptional hydrological conditions such as a large influx of water and karstic terrane have produced unique ecological conditions in the running water biotopes of the area. The waters have high alkalinity and bicarbonate hardness. The complex of living communities in the Plitvice Lakes is very distinct and depends on ecological factors and the degree of development of travertine forms. These communities are briefly described and their flora and fauna discussed.

1180 Matyasi, S.; Stefan, G.; Csak, T.; and Matyasi, L. (1979) - Study of the topographic and genetic aspects of the multilevelled cave in the Toplita Valley (Padurea Craiului Mountains): Nymphaea, 7, p. 273-284, 1 fig., 1 plate [in Romanian with English abstract].

An analysis of the fracture systems and their control on the development of cavities is performed. A striking feature of this resurgence cave system is the occurrence of a deep (-62 m) pit, seasonally flooded, in the proximity of the outflow. The phreatic versus tectonic origin of this pit is also discussed.

1181 Maucha, L. (1971) - System of speleological interactions; results of the Josvafo Karst Research Station in its first decade: Budapest; Karszt-Es Barlangkutatas, 1971, Vol. VI, p. 13-32.

The author summarizes the research in geodesic cavegenetics, zoology, botany, paleontology, and archaeology in Hungary.

1182 Maucha, L. (1968) - Answers der Gereiteu-Erscheinungen des karstwasserspeigels: Karsat-es barlangkutatosband V, p. 101-116.

The author assesses the order of magnitude of the lunisolar influence, its mechanism, and main consequences. It was found that the tidal phenomenon of the karst water table is directly caused by tidal deformations of the solid crust due to microlectronic void volume pulsation.

1183 Mautort, J. de; and Paloc, H. (1979) - Exemples d'évaluation de la capacité d'absorption des eaux pluviales par le sous-sol calcaire: France; Doc. BRGM, No. 8, p. 793-804.

Examen des possibilités diverses que peut offrir un sous-sol de nature calcaire, selon le degré de son alteration profonde et ses proprietés aquifères, pour tenter de resoudre, de façon économique, les problèms que pose, dans certains cas, l'évacuation des eaux pluviales.

1184 Mawer, P.A.; and O'Kane, J.P.J. (1971) - Economic feasibility of artificial recharge in Proceedings of the Conference on Artificial Recharge, Reading, U.K. (September 1970): U.K.; Water Research Association.

1185 Maximovich, G.A. (1973) - The limestone pools (gours) and genesis of calcite dams in caves: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 491-497.

1186 Maxwell, J.C. (1973) - The "sinks" of Logan Creek, southeast Missouri: U.S.; Geological Society of America, Abstracts with Programs, 5:4, p. 335.

Near the community of Dagonia the perennial flow of Logan Creek sinks into its channel bottom. Solution-pocketed outcrops, a natural arch and a gravel filled sinkhole occur within the gravel-floored channel. Dye tests have shown that the water which sinks in this reach of Logan Creek resurges 9 miles to the south at Blue Spring on the Current River.

1187 Maxwell, J.C. (1960) - Quantitative geomorphology of the San Dimas Experimental Forest, California: U.S.; Columbia University Department of Geology Technical Report 19, 95 p.

Used digital computers to relate stream discharge characteristics to elements of drainage basin geometry in San Dimas Experimental Forest, California.

1188 Mazor, E.; and Jakal, J. (1976) - Basic principles of the typological division of karst in the western Carpathians: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 237-248.

The authors give insight into the difficulties which occur when one tries to classify karst areas.

1189 Mazor, E.; and Jakal, J. (1969) - Grundsatze der typologischeu Gliederung des karstes der slowakischeu karpater: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M21/1-M21/7.

1190 Mazor, E.; Van Everdingen, R.O.; and Krouse, H.R. (1983) - Noble-gas evidence for geothermal activity in a karstic terrain: Rocky Mountains, Canada: U.K., Oxford; Geochimica et Cosmochimica Acta, 47:6, p. 1111-1115.

1191 McCrady, Allen D. (1974) - Late Pleistocene vertebrate faunas from Appalachian karst (abstract), Conference on Karst Geology and Hydrology, 4th, Proceedings: U.S.; West Virginia Geological and Economic Survey, 1974, p. 163.

Caves in the Appalachian karst have been excavated and a distinct change has been noted in the morphology of the flora and fauna older than 10,000 years B.P. A detailed explanation of the phenomenon has not yet been done.

1192 McDonald, R.C. (1979) - Discussion of Day, M.J., Morphology and distribution of residual limestone hills (mogotes) in the karst of northern Puerto Rico (Bull Geol, 7, p. 426-432): U.S.; Bulletin of the Geological Society of America, 90:4, p. 414.

1193 McDonald, R.C. (1979) - Tower karst geomorphology in Belize: Berlin; Z Geomorphol Suppl, 32, p. 35-45.

1194 McDonald, R.C. (1976) - Hillslope base depressions in tower karst topography of Belize: Berlin; Z Geomorphological Supplement, 26, p. 98-103.

Hillslope base depressions 3 to 6 m wide and as much as 4 m deep are found at the base of lower karst landforms in Belize. During most of the year the depressions are disintegrated segments composed of small sink basins and spring rises, but during heavy rainfall they carry ephemeral torrents parallel to the bases of the hillslopes. Hillslope base depressions are formed by mechanical erosion during intense rainstorms.

1195 McDonald, R.C. (1976) - Limestone morphology in South Sulawesi, Indonesia: Berlin, Stuttgart; Zeitschrift fuer Geomorphologie Neue Folge Supplement Bande 26, p. 79-91.

An investigation of isolated hills set in alluviated plains in South Sulawesi. Information concerning the initiation of limestone relief, and the processes of lateral planation is presented.

1196 McDonald, R.C. (1975) - Observations of hillslope erosion in lower karst topography of Belize: U.S.; Geological Society of America Bulletin, 86:2, p. 255-256.

Tower karst topography of coastal Belize is in the process of changing from a landscape characterized by rapid talus removal and undermining to a landscape characterized by slow talus removal and little slope undermining.

1197 McGee, K.A.; and Hostetler, P.B. (1975) - Studies in the system MgO - SiO2, CO2 - H2O (IV); The Stability of MgOH+ from 10° to 90° C: American Journal of Science, 275:3, p. 304-317.

1198 McGlade, William G.; and Geyer, Alan R. (1976) - Environmental geology of the greater Harrisburg metropolitan area: U.S.; Pennsylvania Geological Survey, 4th Series, Environmental Geology Report 4, 42 p., detailed maps.

An explanatory report accompanies a series of plates illustrating environmental geology parameters. Included in the study area are 14 limestone and dolomite units.

1199 McLean, J.S. (1976) - Factors altering the microclimate in Carlsbad Caverns, New Mexico: U.S., U.S. Geological Survey Open File Report 76-0171, 59 p.

An analysis using least-squares equations indicated that part of the evaporation at four of the nine evaporation pans can be correlated with energy consumption and may represent an average of 23 percent of total evaporation at these locations.

1200 Medinskii, G.M.; Ladnyi, I.D.; Bichul, K.G.; Goncharov, A.G.; and Kiseleva, V.I. (1978) - A case of contamination of karst water-bearing strata by Cholera vibrio [in Russian]: Gig Sanit 12, p. 12-15, 1976 in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 11:15, p. 40.

Sources of infection could be carriers of vibrio among numerous tourists visiting this region from various countries, including those affected with cholera. The ecological conditions prevailing in the underground strata with sulfide waters proved to be favorable for long survival and multiplication of cholera vibrio.

1201 Medville, D.M. (1977) - Karst hydrology in the upper Elk River Basin, West Virginia: U.S.; NSS Bulletin, 39:1, p. 19-26.

1202 Medville, D.M.; Hempel, J.C.; Plantz, C.; and Werner, E. (1979) - Solutional landforms on carbonates of the southern Teton Range, Wyoming: U.S.; NSS Bulletin, Vol. 41: p. 70-79.

Well developed karst landforms occur on the western and southern flanks of the Teton Range at two stratigraphic levels: the Mississippian Mission Canyon and Cambrian Death Canyon limestones. Karstification is controlled by local structural setting, lithology, and nature of recharge to the carbonate aquifers. Karst development differing significantly in four types of settings is discussed.

1203 Medville, D.M.; and Werner, E. (1977) - Karst hydrology and water chemistry in a mixed sedimentary terrain in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 443-457.

1204 Medville, D.M.; and Werner, E. (1974) - Hydrogeology of the Death Canyon Limestone, Teton Range, Wyoming, Conference on Karst Geology and Hydrology, 4th, Proceedings, 1974: U.S.; West Virginia Geological and Economic Survey, p. 95-102.

Solution features and subsurface flow characteristics are described and preliminary water-chemistry data are presented for two terrains composed of Death Canyon Limestone of Middle Cambrian age from the Teton Range in western Wyoming.

1205 Megnien, C. (1976) - Hydrogéologie du centre du bassin de Paris: Contribution a l'étude de quelques aquifères principaux: France; Thèse Doct. Etat Sci. Nat., 2 vols, 709 p.

Etude de quelques-unes des principales nappes de la région parisienne de la Brie et de la Beauce, et notamment nappe des calcaires de Beauce (estension des principaux facies et mise en place de différents éléments du système multicouche; volume des réserves interannuelles) - nappe des calcaires de Champigny (aquifère complexe de type karstique) - nappe des sables du Soissonnais et du calcaire grossier contenue dans un aquifère multicouche comprenant les formations perméables de l'Ypresien et du Lutetien.

1206 Meinzer, O.E.; and White, W.N. (1931) - Survey of the underground waters of Texas: U.S.; U.S. Geological Survey Press Release, 31 p.

Detailed and summary results of investigations in southwest Texas (Winter Garden), Glen Rose (Sommerwell County), and west Texas - Toyah Basin areas.

1207 Merlak, Enrico. (1969) - Analisi comparata delle deformazioni tettlniche e del carsismo nel sattore di aurisina (Trieste): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p..M24/1-M24/8.

In most cases there is a correlation between tectonic deformation and karst morphology.

1208 Merlak, Enrico. (1969) - Rapporti di carstific abilita fra le piccole draclasi (little joints) e le grandi draclasi (large joints): Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 1, p. M5/1-M5/5.

This work represents a study of karst morphology. The author recognizes two types of joints: "large joints" and "small joints" and with this distinction studies a karst zone.

1209 Mero, F. (1958) - Hydrological investigations of the Na'am Spring Region: Tel Aviv; Tahal, P.N. 45.

1210 Mert Matyasi, J. (1979) - Hydrochemical observations on the karst region Dumbravita de Codru (Mountains Codru Moma): Nymphaea, 7, p. 251-264, 9 figs., 1 tab [in Romanian with English abstract].

An underground drainage scheme is proposed, considering the correlation between the chemical composition of the water and the geological and lithological structure peculiarities of the region.

1211 Metcalfe, S.J.; and Hall, L.E. (1984) - Sinkhole collapse induced by groundwater pumpage for freeze protection irrigation near Dover, Florida, January 1977 in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 29-34.

When west-central Florida experienced a period of subfreezing temperatures in January 1977, growers irrigated crops with warm ground water to prevent freeze damage. Simultaneous withdrawals of large quantities of water from the artesian Floridan aquifer resulted in declines in the potentiometric surface.

1212 Methods of karst studies - abstracts of the Permian conference. (1985) - Abstracts: Perm; 160 p.

1213 Metz, Harold L. (1968) - Stratigraphic and geologic history of extreme northeastern Serrania del Interior, State of Sucre, Venezuela: Trinidad; Transactions of the 4th Caribbean Geological Conference, 1965, p. 275-292.

An in-depth study of the stratigraphy and geologic history of the study area in Venezuela where Cretaceous limestones occur.

1214 Mijatovic, B.F. (1984) - Hydrogeology of the Dinaric karst [International Contributions to Hydrogeology, IAH, Vol. 4]: Hannover; Heise, 255 p.

1215 Mijatovic, B.F. (1977) - Current problems in the rational exploitation of karst water in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 262-278.

Karstic aquifer water yields often vary dramatically with the seasons. There is a need to regulate the water supply and underground storage reservoirs. To be successful, in-depth studies of all aspects of the geology, hydrology, etc. of the area must be understood. Examples from Yugoslavia are given.

1216 Mijatovic, B.F. (1977) - Sur les conditions d'émmagasinement dans les aquifères karstiques captifs: I.A.H. Memoires, Vol. XIII, Part 1, Birmingham Congress, U.K., p. A71-A85.

From a study of a confined karstic aquifer near Beograd, Yugoslavia, the coefficient of storage is variable and does not reflect the elastic properties of the aquifer. Realization of this factor allows one to be more accurate in an evaluation of groundwater reserves.

1217 Mijatovic, B.F. (1975) - Exploitation rationnelle des eaux karstiques in Burger, A.; and Dubertret, A., editors, Hydrogeology of Karstic Terrains: Paris; IAH, p. 123-136.

The balance and regime of surface water have been well studied in all karstic regions of the world. But the geometrical and hydrodynamical characteristics of karst aquifers are not so well known in general, being more difficult to define, in spite of progress in investigation methods. At present, research is focussed on operations destined to modify natural conditions with the view to regularizing the underground regime.

1218 Mijatovic, B.F. (1971) - Hydrogeoloska kartasireg podrucja herceg novi-marinjski zaliv: Beograd, Azvod za Geoloska, Geofuzika Istazivanja.

1219 Mijatovic, B.F. (1970) - Method of studying the hydrodynamic regime of karst aquifers by analysis of the discharge curve and level fluctuations during recession: Bull. Inst. Geol. and Geophys. Research, Ser. B., No. 8, p. 41-74.

1220 Mikulec, S. (1973) - L'utilization des forces hydrauliques dans la région du karst Yougoslave: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 2, p. 141-145.

Underground water in karstic regions is a major natural resource. Development of resources needs much interdisciplinary cooperation to be successful.

1221 Mikulec, S.; and Trumic, A. (1976) - Engineering works in karst regions of Yugoslavia in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publication, p. 443-476.

This paper is a review of general characteristics of the major karst region of Yugoslavia, a continuous karst zone along the Adriatic Sea, known as the Dinaric Karst, and its principal hydrologic and water resources properties.

1222 Mikulec, S.; and Trumic, A. (1969) - Akumuliranje vode na krsu i problem njena optimalnog iskoristavanja (Accumulation d'eau dans le karst et le probleme de son utilisation optimum): Zagreb; Krs Jugosl. Jugosl. Adad. Znzn. Umjet., 6, p. 279-301.

1223 Milanovic, P.T. (1981) - Karst hydrogeology [translated by J.J. Buhac]: U.S., Colorado; Water Resources Publications, 434 p.

1224 Milanovic, P.T. (1979) - Hidrogeologija Karsta: Trebinje, Yugoslavia; Hidroeletrane na Trebisnjici, 302 p.

1225 Milanovic, P.T. (1977) - On some specific features of karst groundwater circulation (abstract only) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville, p. 357-358.

1226 Milanovic, P.T. (1976) - Water regime in deep karst; case study of the Ombla Drainage Area in Yevjevich, V. (editor), Karst Hydrology and Water Resources: Proceedings of the U.S.-Yugoslavian Symposium, Dubrovnik; U.S., Fort Collins, Colorado; Water Resources Publications, p. 165-191.

1227 Milashev, Y.A.; and Sokolova, V.P. (1984) - Megajointing of the cover and localization of erosion karst depressions in the Anabar-Udzha region (northern Siberian Platform): U.S., Soviet Geology and Geophysics, 25:3, p. 24-29 [in English].

1228 Milatovic, D.; Melosivic, L.; and Skopljak, E. (1976) - A capacitance method for level measurement of liquids in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 419-440.

1229 Milicevic, M. (1976) - Influence of reservoirs on changes in natural flooding of upstream karst plains in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 387-408.

1230 Milici, R.C. (1967) - The physiography of Sequatchie Valley and adjacent portions of the Cumberland Plateau, Tennessee: U.S.; Southeastern Geology, 8:4, p. 179-193.

1231 Miller, C.H.; Ege, J.R.; Odum, J.K.; and Golob, J.J., Jr. (1984) - Preliminary seismic-velocity and magnetic studies of a carbonate rock-

sinkhole area in Shelby County, Alabama: U.S.; U.S. Geological Survey Open File Report 84-0409, 24 p.

1232 Miller, T.E. (1984) - Hydrochemistry, hydrology, and morphology of the Caves Branch karst, Belize [microform]: Canada, Ottawa; National Library of Canada, 4 sheets microfiche [Ph.D. Thesis - McMaster University, 1982].

1233 Miller, T.E. (1983) - Hydrology and hydrochemistry of the Caves Branch karst, Belize: Netherlands, Amsterdam; Journal of Hydrology, 61:1-3, p. 83-88.

The hydrologic system combines allogenic surface water from an invasion polje with authigenic karst water. Dynamic mixing produces three climatically induced discharge phases: base flow, normal, and high stage flow.

1234 Miller, T.E. (1980) - Hydrology and hydrochemistry of the Cave Branch karst, Belize: U.S.; Geological Society of America, Abstracts with Programs, 12:7, p. 484.

1235 Mills, H.H. (1982) - Karst depressions and their drainage basins: A morphometric study in Tomlinson, G., editor, Abstracts of research presented at the annual meeting; 91st annual meeting of the Tennessee Academy of Science, Clarksville, Tennessee, U.S., 1981: U.S.; Journal of the Tennessee Academy of Science, 57:2, p. 43.

1236 Mills, H.H.; and Starnes, D.D. (1983) - Sinkhole morphometry in a fluviokarst region; eastern Highland Rim, Tennessee, U.S.A.: Germany, F.R.; Zeitschrift fuer Geomorphologie, 27:1, p. 39-54.

1237 Milojevic, N. (1960) - Hidrogeoloska terminologija: Beograd.; Gradjevinska Knjiga, 55 p.

1238 Minet, Andre. (1969) - Hydrogeologie et geomorphologie karstique du sud de l'entre-Sambre et Meuse: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M8/1-M8/8.

The author presents the initial results of a hydrogeological and geomorphological study of the region.

1239 Miod, J. (1970) - Les dolomites de la Brenta (Italie), Karst haut-alpin typique et le problème des cuvettes glacio-karstiques: Berlin-Stuttgart; 2, Geomorph. N.F., Suppl., Bd. 26, p. 35-57.

The dolomites of the Brenta Massif are typical high altitude alpine karst. The orientation of flat shoulders and sinkholes of the karstified fjell of Grostedi form remarkable schichttreppenkarst. The karstifying of treccia of early Quaternary at Monte Spinale gives us information on how high altitude karst has evolved.

1240 Miola, W. (1975) - Report of a trip to the Pedro Leopoldo caves (19-21 April 1975): Brazil, Ouro Preto; REM-REV Escola Minas, 32:5, p. 51-57 [in Portuguese].

1241 Miotke, F.-D. (1976) - Baselevel and structural control on the karst hydrology and the genesis of karst geomorphology: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 249-260.

The author explains that the most important factor in the development of the drainage pattern and the physiography is the existence of developing local relief energy, created by tectonic uplift or other changes of the local baselevel.

1242 Miotke, F.-D. (1975) - Der karst im zentralen Kentucky bei Mammoth Cave: Germany, Hannover; Geograph Ges, 360 p.

1243 Miotke, F.-D. (1974) - Carbon dioxide and the soil atmosphere (abstract): Karst. u. Hohlenkunde, Reihe A, Heft 9, p. 49.

The author describes the occurrence of carbon dioxide in the soil, its origin and its importance in karst processes. Comparisons of carbon dioxide concentrations in different climates and soil atmospheres of America are given.

1244 Miotke, F.-D. (1972) - Comparison of littoral karren with other karren in 22nd International Geographical Congress, Proceedings: Canada; International Geography, 1972, University of Toronto Press, p. 1324-1326.

The author emphasizes the flow dynamics of water as the causal agent for the karren. Littoral karren are classified, according to their mean sea level elevation, into four gradational and overlapping zones. In non-littoral karren development is less complex than littoral karren. The rate of flow of water is very important in karren development.

1245 Miotke, F.-D. (1969) - Gipskarst ostlich Shamrock/Nordtexas: Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 1, p. M22/1-M22/16.

1246 Miotke, F.-D.; and Palmer, A.N. (1972) - Genetic relationship between caves and landforms in the Mammoth Cave National Park Area: Hannover; Geographischen Institut der Technischen Universitat, p. 69.

Cavern development in Mammoth Cave National Park has been controlled by the erosional and depositional history of the Ohio River drainage system during late Tertiary and Pleistocene. Geologic structure and lithology influence passage trends. The water that reaches the phreatic zone is unsaturated.

1247 Miotke, F.-D.; and Papenberg, H. (1972) - Geomorphology and hydrology of the Sinkhole Plain and Glasgow Upland, central Kentucky karst; preliminary report: Caves and Karst, 14:4, p. 25-32 [summary in German].

1248 Miserez, J.J. (1969) - Utilisation d'une électrode speciale pour la mésure de PCO2 dans les eaux et l'atmosphere-application à l'étude des phénomènes karstiques du Jura seusse: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 555/1-555/11.

The use of a special electrode to measure the concentration of carbon dioxide in the water and the atmosphere of a karstic environment is discussed.

1249 Mistardis, G.G. (1969) - Investigations upon submarine and coastal springs in south Greece: Germany, F.R., Stuttgart; Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY5/1-JH5/8.

1250 Mistardis, G.G. (1969) - Recherches sur le karst du nord-est de l'Attique: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M30/1-M30/8.

A descriptive account of the results of a study on underground karstic features in the northeast of Attique.

1251 (1985) - Mitchell Caverns Natural Preserve in the Providence Mountains State Recreation Area, San Bernardino County: U.S., California Geology, 38:2, p. 34-38.

1252 Mitchell, R.W.; and Russell, W.H. (1976) - Physiography and geology of the Huastecan Province of Mexico: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 261-268.

The author reports on the physiography and geology of that part of the Huastecan Province of Mexico which contains some of the longest and most complex cave systems in Mexico.

1253 Mitrofan, H. (1984) - Contributions of a resistivity survey to karstic aquifers discontinuity investigation: Travaux de l'Institut de Spéologie, Emile Racovitza, 23, p. 67-73, 4 figs. [in English).

The water table of some karstic areas with rough topography was contoured by means of a resistivity survey. It appears that water table continuity across draining faults is generally not insured, since large permeability contrasts between the faults and the rock matrix determine the formation of important seepage faces.

1254 Mitrofan, H. (1983) - Recent information concerning the hydrogeology of the area of Techirghiol Lake, furnished by electrometric and thermometric measurements: Hidrotehnica, 28:6, p. 161-164, 5 figs., 2 tab. [in Romanian with English abstract].

The fresh-water/salt-water interface in a highly fractured limestone area and the ground-water salinities were established by means of a resistivity survey. They indicate different drainage modalities: between superimposed aquifers; from the shallow aquifer toward the lake; as well as from the lake landward.

1255 Mitrofan, H. (1982) - Note concerning some morphological clues to the genesis of the vertical cavities of the karstic areas of Romania: Travaux de l'Institut de Spéologie, Emile Racovitza, 21, p. 77-86, 10 figs. [in French].

The occurrence of potholes seems to be controlled by strike-slip fault intersections, their horizontal development by the associated

extension cracks, their deepening by the successive base levels. The constitutive pits themselves seem to follow a hydrodynamic control, since each of them "ascends" an equal height above its own base level.

1256 Mitrofan, H. (1981) - Current opinions on potholes genesis: Buletin Speologic Informativ, 5, p. 10-13 [in Romanian].

The theories stressing either the vadose, phreatic or tectonic origin of the potholes are reviewed. The difficulties that these theories encounter in explaining some peculiar features of the potholes are also emphasized.

1257 Mitrofan, H. (1979) - Observations on the tectonic conditioning of the distribution of the voids of the Ponorici - Ciclovina-cu-Apa Cave System (Sebes Mountains): Travaux de l'Institut de Spéologie, Emile Racovitza, 18, p. 225-231, 3 figs. [in French].

Limestones occurring in a structure consisting of a closely folded syncline with converging plunges and a salient anticline host a cave system with several major strike changes at almost right angles. It is shown that these bends occur where the direction of the compressional stress is supposed to change (for instance where a passage running along the plunge of the fold crosses the neutral surface).

1258 Mitrofan, H. (1978) - Contributions to the speleological knowledge of the Ponoare area (Padurea Craiului Mountains) based upon the complex interpretation of the geophysical measurements: Nymphaea, 6, p. 251-264, 6 figs. [in Romanian with English abstract].

Water circulating radially through the fissures of the decompressed zone surrounding a cave passage may produce an electric field, giving rise to a detectable anomaly of natural polarization. The potential of a cylindrical anomalous body of this type decreases with the logarithm of the distance to its axis. Such a log-shaped NP signal, recorded in a borehole that had passed through a karstic cavity is discussed.

1259 Mitrofan, H.; Lascu, V.; Boloveschi, I.; Roman, C.; and Andreescu, S. (1984) - Vertical cavities in south-eastern Vilcan Mountains (Gorj Distric): Theoretical and Applied Karstology, 1, p. 69-76, 7 figs. [in English with Romanian abstract].

Main cavities in southeastern Vilcan Mountains are primarily of vertical development. Pothole distribution related to old erosion levels was examined and the depths of the shafts were considered as a function of the surface drainage network frequency.

1260 Mladenovic, J. (1976) - Hydrogeologic methodology for investigation of a karst polje in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 109-120.

1261 Mohring, E. (1980) - Underground stream tracing in Fillmore County: U.S.; Minnesota Speleology Monthly, 12:1, p. 3-15.

1262 Molitvin, P.V. (1962) - The methods of hydrogeological investigations in karst regions of the northern and southern Urals and the Onego-North Dvina Basin divide in Special Problems of Karstology: Akad. Nauk. SSR Izv. Ser. Geol.

1263 Molleson, Theya. (1976) - Remains of Pleistocene man in Pairland and Pontnewydd Caves, Wales: U.K.; Transactions of British Cave Research Association, 3:2, p. 112-116.

Goat's Hole, Pairland, is a cave in the Gower Peninsula, south Wales. Upper Paleozoic artifacts and a skeleton which has been radiocarbon dated to the last glacial maximum have been found. The contemporaniety of the artifacts with the skeleton is questioned.

1264 Monroe, W.H. (1980) - Some tropical landforms of Puerto Rico: U.S.; U.S. Geological Survey Professional Paper 1159, 39 p.

1265 Monroe, W.H. (1977) - Geomorfologia de Puerto Rico [Geomorphology of Puerto Rico] in De Galinanes, M.T., editor, Geovision de Puerto Rico; aportaciones recientes al estudio de la geografia: Puerto Rico; University of Puerto Rico, Centro Investigaciones Sociales, p. 3-43 [in Spanish].

1266 Monroe, W.H. (1977) - Origin of karst depressions in northern Puerto Rico in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 169-176.

1267 Monroe, W.H. (1976) - The karst landforms of Puerto Rico: a discussion of a solution landscape formed in a tropical climate of moderately high rainfall: U.S.; U.S. Geological Survey Professional Paper 899, 69 p.

A detailed description of the karst landforms in the Oligocene and Miocene limestones of north-central and northwestern Puerto Rico. Climate, especially precipitation and wind, joints, and different rock types all control the development of karstic features. It is a systematic study with landform types discussed individually as to their probable origin and distribution. A map showing the limestone areas and karst landforms in Puerto Rico is included.

1268 Monroe, W.H. (1974) - Dendritic dry valleys in the cone karst of Puerto Rico: U.S.; U.S. Geological Survey Journal Res, 2:2, p. 159-163.

1269 Monroe, W.H. (1973) - A possible origin of clay fills in caves: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 509-512.

Clay in caves is formed by replacement of limestone by clay on a molecule-to-molecule basis.

1270 Monroe, W.H. (1969) - The relation of zanjoves to caves and rivers in Puerto Rico: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M36/1-M36/6.

Comparison of the trends of joint controlled trenches (zanjoves) with those of cave systems and rivers that cross the karst belt suggests that there has been very little structural control in the area.

1271 Monroe, W.H. (1966) - Stratigraphic relations and sedimentation of the Oligocene and Miocene Formation of northern Puerto Rico: Jamaica; Transactions of the 3rd Caribbean Geological Conferences, 1962, p. 54-59.

The study includes descriptions of a series of limestones of Miocene and Oligocene age.

1272 Monroe, W.H. (1965) - Dendritic dry valleys in the cave karst of Puerto Rico: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 269-275.

The alignment of karst depressions in dry valleys which form a dendritic pattern suggests that the valleys are superposed from drainage on a former cover of elastic material.

1273 Montgomery, Hugh B. (1977) - Karstic institutional conflicts and opportunities in Dilamarter, R.R.; and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 19-31.

1274 Moore, C.H. (1967) - Stratigraphy of the Edwards and associated formations, west-central Texas: U.S.; Gulf Coast Association Geol. Socs. Transactions 17, p. 61-75.

The Cretaceous of west-central Texas consists of a basal quartz sand, the Antlers, and an overlying carbonate sequence. The carbonate sequence above the Antlers can be divided into two geologcally distinct areas: a northern area, generally coincident with the Callahan Divide, and a southern area which is the northern part of the Edwards Plateau proper. In the northern Edwards Plateau, the Edwards replaces the Walnut-Comanche Peak facies and constitutes the entire Fredricksburg interval.

1275 Moore, C.H. (1964) - Stratigraphy of the Fredericksburg Division, south-central Texas: U.S.; Texas University Bureau Economic Geology Report of Investigation 52, 48 p.

The author describes the stratigraphy of the Lower Cretaceous Fredricksburg Division of south-central Texas. Synopsis of nomenclature, stratigraphic relationships, petrographic analyses, facies distribution and geologic history are discussed.

1276 Moore, D.L.; and Stewart, M.T. (1983) - Geophysical signatures of fracture traces in a karst aquifer (Florida, U.S.A.): Netherlands; Journal of Hydrology, 61:1-3, p. 325-340.

Several surface geophysical techniques can be used to delineate zones of higher yield within the wider surface expression of photolinears. Seismic refraction, direct current electrical

resistivity, and microgravimetry proved to be the most useful. Studies conducted in Pasco County, Florida.

1277 Moore, F.M.; and Mylroie, J.E. (1979) - Influence of master stream incision on cave development, Trigg County, Kentucky: U.S.; Annual Report, Western Kentucky Speleological Survey 1979, p. 47-68.

1278 Moore, G.C. (1966) - Introduction to limestone hydrology: U.S.; National Speleological Bulletin, 28:3, p. 109-117.

1279 Moore, H.L. (1984) - Geotechnical considerations in the location, design, and construction of highways in karst terrain; "the Pellissippi Parkway extension", Knox-Blount Counties, Tennessee in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 385-389.

The extension of a limited access, four-lane highway facility, "The Pellissippi Parkway," involves the possible location of corridors in active karst areas of Knox and Blount Counties in East Tennessee. Innovative design concepts and construction methods used in the Pellissippi Parkway Project include rock pads and rock fills, rock backfill, paved ditches, curbs and flumes, overflow channels, and swallet improvement/protection.

1280 Moore, J.D. (1980) - Ground-water applications of remote sensing: U.S.; U.S. Geological Survey Open File Report 82-240, Eros Data Center, 55 p.

1281 Moore, J.D.; Hinkle, F.; and Moravec, G.P. (1977) - High-yield wells and springs along lineaments interpreted from LANDSAT imagery in Madison County, Alabama in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 477-486.

An account of the occurrence of high-yield water wells and large springs in carbonates. Lineaments were used to help indicate where high-yield water sources were available.

1282 Moore, J.D.; Moravec, G.F.; and Hinkle, F. (1975) - The relationship between lineaments and ground water hydrology using ERTS images [abstr]: U.S.; Geological Society of America, Abstracts with Programs, 7:4, p. 519.

1283 Moore, J.D.; Moravec, G.F.; and LaMoreaux, P.E. (1975) - Hydrology of limestone terranes: Quantitative studies: U.S.; Alabama Geological Survey Bulletin 94-F, 91 p.

A study to develop quantitative techniques applicable to the location and evaluation of sites for the development of high-yield water wells in limestone terranes. Thirty wells were drilled and tested to determine the coefficient of storage of the Muddy-Swan Creek drainage basin in north-central Limestone County, Alabama.

1284 Moore, J.E. (1979) - Contribution of groundwater modeling to planning in Back, W.; and Stephenson, D.A. (guest editors), Contemporary

Hydrogeology - The George Burke Maxey Memorial Volume: Amsterdam; Journal of Hydrology 43:121-128, p. 121-128.

1285 Moravec, G.F. (1975) - The development of karren karst forms on the Newala Limestone in Dry Valley, Shelby County, Alabama: U.S.; University of Alabama Master's Thesis, 81 p.

A study to identify karren forms and to evaluate factors affecting their development in an area representative of folded limestone of the Valley and Ridge physiographic province in the southern Appalachians.

1286 Moravec, G.F. (1974) - Development of karren karst forms on the Newala Limestone in the Cahaba Valley, Alabama: U.S., West Virginia; West Virginia Geological and Economic Survey, Conference on Karst Geology and Hydrology, 4th, Proceedings, p. 113-121.

A description of karren and solution sculptured forms in the Newala Limestone of the Cahaba Valley, Alabama, with a discussion on the factors affecting their formation. Geologic structure, lithology, stratigraphy, soil cover, climate, and local hydrology control the uneven distribution of these forms.

1287 Moreau, R.B. (1983) - A review of the limnological characteristics of Alpena, Michigan area flowing wells and sinkholes in Kimmel, P.E., editor, Tectonics, structure, and karst in northern lower Michigan: U.S.; Michigan Department of Natural Resources, p. 91-118.

1288 Moreland, J.A.; and Van Voast, W.A., compilers (1984) - 13th annual Rocky Mountain ground-water conference, Great Falls, Montana, U.S., 1984, Abstracts from: U.S.; State of Montana Bureau of Mines and Geology, Special Publication 91.

1289 Moret, L. (1946) - Les sources thermominerales; hydrogéologie, géochimie, biologie: Paris; Masson et Cie, 146 p.

1290 Morisawa, Marie. (1959) - Relation of quantitative geomorphology to stream flow in representative watersheds of the Appalachian Plateau Province: U.S.; Columbia University, Department of Geology Technical Report No. 20, 94 p.

Revised Potter's T factor, using relief ratio, circularity ratio and frequency of first order streams.

1291 Morisawa, Marie. (1959) - Relation of morphometric properties to runoff in the Little Mill Creek, Ohio, drainage basin: U.S.; Columbia University, Department of Geology Technical Report No. 17, 10 p.

Established significant regressions for average runoff and peak runoff on stream length, relief ratio, and shape ratio within subdivisions of a small watershed.

1292 Morrow, D.W. (1975) - The Florida aquifer; a possible model for a Devonian paleoaquifer in northeastern British Columbia: Canada; Canada

Geological Survey, Paper 75-1B, Report of Activities, Part B, p. 261-266.

1293 Mortier, F. (1961) - Les eaux des calcaires du Lias au Maroc: UGGI, AIHS, Athens Meeting, p. 132-144.

1294 Morton, Robert A. (1974) - Delineation and environmental application of active processes mapped in recharge area of the Edwards aquifer in Approaches to Environmental Geology: Texas, U.S.; Bureau of Economic Geology, Austin, Report of Investigations No. 81, p. 204-220.

Results of studies of active processes can be used by the land use planner as an aid when making decisions about land development.

1295 Morton, W.H. (1976) - Enkofteu Mohu and other Ethiopian Discoveries: U.K.; Transactions British Cave Research Association, 3:2, p. 55-61.

A description of caves discovered since 1973 in southeastern Ethiopia. A detailed description is given of Enkoftu Mohu, a 192-meter deep pothole in southeastern Ethiopia, containing stalactites and stalagmites.

1296 Moser, H.; Neumaier, F.; and Rauert, W. (1963) - New experiences with the use of radioactive isotopes in hydrology in Radioisotopes in Hydrology: Vienna; IAEA, p. 283-295.

1297 Moser, H.; Neumaier, F.; and Rauert, W. (1957) - Die anwendung ratioaktiver isotope in der hydrologie: Atomkernenergie, Vol. 2, p. 225-231.

1298 Moser, P. (1977) - The correlations and significance of some solution, structural and weathering features in northwest Alabama: U.S.; Alabama Academy of Science Journal, 48:3, p. 75.

1299 Moser, P.H.; and others. (1971) - Environmental geology and hydrology, Madison County, Alabama - Meridianville Quadrangle: U.S.; Alabama Geological Survey Atlas Series 1, 72 p.

1300 Moser, P.H.; and Warren, W.M. (1974) - Sinkholes in Alabama, their formation and associated problems: U.S.; Geological Society of America, Abstracts with Programs, 6:7, p. 1050.

Sinkholes in Alabama are either natural or anthropogenic. Among those occurring naturally, the best known are due to the collapse of roofs of caves in limestone or dolomite. Another type is caused by regolith collapse that occurs when water levels fall below the bedrock surface under certain natural conditions. Solution sinkholes are formed naturally by chemical erosion of the bedrock surface causing gradual and shallow subsidence. Anthropogenic sinkholes occur in the regolith and result from man's activities. Any activity allowing water access to sediments overlying cavities may lead to mechanical erosion and eventual regolith collapse in areas of pumpage or under natural conditions.

1301 Mosetti, Carlo. (1969) - La Grotta Arnaldo Germoui no. 4429 V.G. Nuova Gavita Sperimentale: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 532/1-532/9.

1302 Mosetti, F. (1966) - Lo stato delle attuali conoscenze sulla idrologia carsica e relative ripercussioni sul problema dell'alimentazione idrica di Trieste [Present knowledge of the hydrology of Italian "carso" in relation to the water feeding problems of Trieste (northeast Italy)]: Italy; Atti Museo Civico Storia Naturale, 25:4.

1303 Mostafa, Hassan; and Lloyd, Nelson. (1977) - Hydrochemical evaluation of ground water in a limestone aquifer in Huntsville, Alabama, U.S. in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 537-552.

1304 Motiu, A.; Viehman, I.; Strusievici, R. (1979) - Discovery of new minerals in the Tausoare Cave (The Rodna Mountains). Bucarest; Trav. Inst. Spéol., Emile Racovitza, XVI, p. 211-216, 7 figs. [in French].

The article refers to the discovery of mirabilite and epsonite in the Tausoare Cave. The results highlighted are yielded by optical analyses, x-ray spectroscopy, atomic absorption, infrared absorption, differential thermal analysis, thermogravimetric analysis, as well as diffractometric analysis.

1305 Mudry, J. (1982) - Etude du fonctionnement hydrodynamique de l'aquifère karstique de la Fontaine de Vaucluse (S.E. de la France) à partir des analyses physico-chimiques hebdomadaires (cycle 81-82): France; 3 ème colloque d'hydrologie en pays calcaire, Octobre 1982 a Neuchâtel (Suisse), Annales Sci. de l'Univ. de Besançon, Géologie, Mém. No. 1, p. 133-142.

Les prélèvements effectués de caractériser les famille d'eaux transitant à l'emergence: eaux de la matrice capacitive et de ses drains noyes lors du tarissement et en début de crue par effet-piston; eaux d'infiltration rapide riches en Cl, Mn, and Fe attestant le lessivage des sols enrichis en ces éléments par l'évapotranspiration; eaux d'infiltration retardée par l'épikarst, moins concentrées, sauf en nitrates et thermiquement deséquilibrées avec l'encaissant.

1306 Mudry, J. (1981) - Origin of isotopic and geochemical ratio gradients in karst water of the Jura Mountains: Journal of Hydrology, 50:1-3, p. 167-178.

Titration of isotopic and geochemical ratios in karst water of the Jura Mountains shows gradients at the groundwater province scale. Climatic gradients are displayed under consideration of the emergence water temperature and its 180 content. Geochemical gradients are connected to the intake area lithology (limestones, marls, and dolomites) but are also influenced by pollution. Gradients connected to the hydrodynamics of this area (ionic activity, silica-tritium) oppose quick transit to long stay aquifers. Further, they copy closely the geological structure (folded area with a high structural gradient and table-land with a weak incline).

1307 Mudry, J. (1983) - Hydrologie de la Fontaine de Vaucluse et de son bassin d'alimentation: France; Etudes Vauclusiennes, 30, p. 9-14, Fac. de Lettres, Avignon.

The physico-chemical analyses of the waters of La Fontaine de Vaucluse undertaken by the Hydrogeology Department of the University of Avignon since 1981 fill in the gaps in the previously established data by specifying the average altitude of the karstic catchment area, how long the waters at their lowest level remain in the aquiferous strata, and the origins of the various species of water released by La Fontaine de Vaucluse in the course of one hydrological year; ground level and epikarst (rapid or slow seepage), flooded areas. This study compares the results of hydrochemical tests and the rates of flow.

1308 Mudry, J.; Kiraly, L.; Muller, I. (1979) - Analyse multivariée du chimisme de quelques sources karstiques du Jura suisse et franc-comtois: France; Bull. Centre Hydrogeol. Neuchâtel, No. 3, p. 181-221.

La comparaison des analyses multidimensionnelles des données chimiques (ACP et AFC) acquises lors des campagnes de prélèvements simultanes des principales sources karstiques, demontre que la province hydrogéologique jurassienne présente à un instant donné les mêmes phénomènes hydrodynamiques qu'une source suivie au cours de son cycle hydrologique. L'impact des crues sur la chimie des eaux de réserves est également mis en évidence.

1309 Muennich, K.O. (1957) - Messung des Carbon 14 Gehaltes von hartem Grundwasser: Naturwiss., Vol. 44, p. 32.

1310 Mukqueen, J. (1984) - Hydrology and drainage of peat: Read at meeting, June 1984, for An Foras Taluntais; published by Irish Nat. Comm. IHP, p. 249-280.

Describes some interactions between ground water in bogs and in the underlying limestones, as at Lullymore in Barrow Basin and Creagh in River Robe Basin. Many interactions between water drained from peat and water in the underlying formations are described.

1311 Mulkewich, J. (1984) - Uranium dating of speleothems as a means of determining global paleoclimates in Friends of the Karst Meeting, Puerto Rico, 1984 (abstracts): U.S.; Geo 2, 11:3.

1312 Muller, D.A.; and Couch, H.E. (1971) - Water well and ground-water chemical analysis data, Schleicher County, Texas: U.S.; Texas Water Development Board, Report 132, 76 p.

The intent of this investigation was twofold: first, to provide the people of Schleicher County with basic data on ground-water conditions in the county; and second, to provide data for an investigation of the underground water resources of the Edwards Plateau region. Most examples were taken from the Edwards and associated limestone aquifers.

1313 Multer, H.G. (1977) - Field guide to some carbonate rock environments: Florida Keys and western Bahamas: U.S.; Kendall-Hunt, unknown p.

1314 Muraru, A. (1984) - Contributions to the study of the karstic system from Luna Hill (Baia, Tulcea District): Buletin Speologic Informativ, 8, p. 37-47, 1 fig. [in Romanian with English abstract].

A 1.7 m deep dig in Cave No. 1 from Luna Hill deposits outlined three layers, the two lower ones including only blocks of arenitic material, originated from the host rock and testifying that no transport took place, while the third upper layer, only 10 cm thick, included scarce fragments of the host rock, disseminated in a mass of mostly humic matter.

1315 Muraru, A. (1984) - Preliminary data on the caves from Luna Hill: Buletin Speologic Informativ, 8, p. 19-35, 8 figs. [in Romanian with English abstract].

The caves from this area are developed in a single level, along a direction concordant with the local topographic slope. Since no dissolution or calcite deposition traces are found and the underground deposits do not give evidence of transport, it is concluded that the present-day appearance of the voids is due exclusively to the rocks trying to achieve their mechanical equilibrium.

1316 Muraru, A. (1983) - Sedimentological considerations concerning Cioclovina Cave deposit: Buletin Speologic Informativ, 7, p. 56-68, 2 figs. [in Romanian with English abstract].

The deposits of Cioclovina Cave, formerly exploited for phosphate extraction, were studied from a sedimentological point of view. Results showed that the bottom arenitic layer, with cross deposition, was due to a flow of 1.1 m/sec velocity and 0.12 m deep, while the subsequent lutitic layer is ascribed to the fossilization of the passage, when the deposited organic matter increased, leading to the formation of the phosphates.

1317 Murphy, A. (1982) - Design considerations in the use of groundwater in County Wexford: Executive engineer at Irish Group IAH meeting.

Wexford is underlain by two main aquifers, Carboniferous limestones and Ordovician volcanics; locally Quaternary sand and gravels are good aquifers. Cost of ground water is much lower than surface-water development. To date, total ground-water yield is estimated at 4.3 million gallons per day.

1318 Murphy, T. (1966) - Deep alteration of Carboniferous strata in the Middleton Co. Cork district, as detected by gravity surveying: Proc. Royal Irish Acad., Vol. 64B, p. 323-334.

The Carboniferous limestone has been dissolved and removed at depth, creating strong, localized gravity lows. Karstification and removal by solution of large amounts of carbonate minerals is probable.

1319 Murphy, T. (1962) - Some unusual low Bouquer anomalies of small extent in central Ireland and their connection with geological structure: Geophys. Prospecting, Vol. 10, p. 258-270.

Aligned, small Bouquer anomalies are due to solution caves or caverns in the Carboniferous limestone along possible major fault lines. Solution of carbonate minerals gave rise to these openings. Most of them have been infilled by gravels, possibly brought in by subterranean streams or large volumes of flowing ground water.

1320 Murray, John W. (1975) - Additional data on the mineralogy of the New River Cave: National Speleology Society Bulletin, 37:4, p. 79-82.

There is no indication that the concentration of Sr is the controlling factor favoring the growth of aragonite under the conditions in New River Cave. In all but one instance, the minor elements are excluded to some extent in the growth of speleothems of calcite and aragonite.

1321 Myers, P.B., Jr.; and Perlow, M., Jr. (1984) - Development, occurrence, and triggering mechanisms of sinkholes in the carbonate rocks of the Lehigh Valley, eastern Pennsylvania in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 111-115.

The southern half of the Lehigh Valley in eastern Pennsylvania contains over 1,500 meters of Cambro-Ordovician carbonate rocks, most of which are susceptible to the development of sinkholes. Approximately 2,000 sinkholes in the Lehigh Valley have been catalogued as to principal triggering mechanism, rock and soil type. These statistical data greatly facilitate the prediction, prevention, and/or mitigation of this problem.

1322 Mylroie, J.E. (1980) - Speleogenesis in the Bermuda Islands: U.S.; NSS Bulletin, 41:4, p. 116.

1323 Mylroie, J.E. (1979) - Glaciation and karst geomorphology in Schoharie County, New York in Abstracts of papers; 1978 NSS convention, New Braunfels, Texas, U.S., 1978: U.S.; NSS Bulletin, 41:4, p. 112-113.

1324 Mylroie, J.E. (1977) - Speleogenesis and karst geomorphology of the Helderberg Plateau, Schoharie County, New York: Rensselaer Polytechnic Institute Ph.D. dissertation, 356 p.

1325 Mylroie, J.E.; and Dyas, M. (1985) - Western Kentucky region in Dougherty, P.H., editor, Caves and Karst of Kentucky: U.S.; Kentucky Geological Survey, Special Publication 12, p. 119-145.

1326 Nadler, Arie; Magaritz, Mordeckai; Mazor, Emanuel; and Kafri, Uri. (1980) - Kinetics of chemical processes in a carbonate aquifer; a case study of water-rock interaction in the aquifer of western and central Galilee (Israel): Journal of Hydrology, Vol. 45, p. 39-56.

1327 Nagel, Gunter. (1969) - Des CO2 gehalt der bodenheft in spitzbergen messergebnisse und untersuchungsmethode: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 549/1-549/9.

1328 Nagy, I. (1980) - The Haline karst of Ocna Mures exploitation area: Bucuresti; Bul. Club. Spéol., E. Racovita, 7, p. 87-90, 1 plate [in Romanian with French abstract].

The interaction between the salt exploitation by water injection followed by the flooding of the mining cavities and the karstic hydrology and morphology is discussed in detail.

1329 Naprstek, V. (1978) - Engineering geology problems of the Mexican basins: Prague; Cas Mineral Geol, 23:3, p. 301-319 [in Czechoslovakian].

1330 National Speleological Society. (1948) - The caves of Texas: U.S.; National Speleological Society, 137 p.

The caves of Texas are discussed in a series of articles having hydrologic, geologic, and biologic interest.

1331 National Water Well Association. (1981) - The water well industry: a study: U.S.; Water Well Journal, January 1981, p. 79-97.

1332 Naughton, M.M. (1983) - Pollution at Tessan Springs, Co. Sligo: Dublin; An Foras Forbartha, Irish Jour. Environmental Sci., Vol. II, p. 25-56.

Common salt tracer established the connection between the Teesan Springs and farmyard pollution some 500 meters distant. The spring had to be abandoned after 40 years of satisfactory use. Such pollution of shallow karst ground water is a potential threat in many areas of Ireland.

1333 Naughton, M.M. (1981) - Groundwater resources in the north-east (Monaghan-Cavan-Lough) development region: Ireland; An Foras Forbartha and Geological Survey Internal Report, 3 Volumes.

Deals with the limestone aquifers, which include areas with lenses of gypsum-anhydrite. Many of these are karstified, and high yields are obtainable, but the water has an objectionable sulphate content.

1334 Naughton, M. (1978) - A hydrogeological study of the upper Kilmanagh River Basin, Republic of Ireland: Unpublished M.S. Thesis, University of Alabama, U.S.

The hydrogeology of the limestone aquifer is described and analyzed.

1335 Naylor, D.; Phillips, W.E.A.; Sevastopoula, G.D.; and Synge, F.M. (1980) - An introduction to geology of Ireland, field guide for XXVI Inter. Geol. Congress Irish Nat. Comm. for Geology: Ireland; T Royal Irish Academy, 49 p.

Brief note on water resources. Carboniferous limestones are very variable aquifers. Yields up to 200 lit/sec from southern synclines. In Nore and Barrow basins, yields up to 40 lit/sec. In western Ireland, limestone springs exceed 1 m^3/sec.

1336 Negrea, A.; and Negrea, S. (1979) - The caves in the Danube Pass and terrestrial fauna: Speologia, Grupul "Portile de Fier", Edit. Acad. RSR, p. 30-73 [in Romanian].

Twenty-three caves and potholes in the four limestone areas in the Danube Pass are studied, with emphasis on earth fauna. Almost 150 tasconi are determined and two species that are new in Romania and two species that are world firsts are discovered.

1337 Negrea, S.; Negrea, A.; Sencu, V.; and Botosaneanu, L. (1963) - Caves in Banat (Romania) explored in 1963: International Journal of Speleology, 1:4, p. 397-439 [in French].

Twenty-three caves are studied (mapping, genesis, evolution, speleothems, biospeleology) in the context of limestone lithology and tectonics. Exokarstic forms are also studied.

1338 Nejand, S. (1972) - Geologie und hydrogeologie des Maharlu-See und seiner umgeburn bei Schiraz, Iran: Teheran; Diss. Fakultät für Bergbau und Hüttenwesen der Rheinisc-Westfalischen. Techn. Hochschule Aachen, 194 p.

1339 Nelson, Henry F. (1959) - Deposition and alteration of the Edwards Limestone, central Texas in Symposium on Edwards Limestone in Central Texas: U.S.; University of Texas Publication No. 5905, p. 21-25.

A study of the lithology of the Edwards Limestone in central Texas and the changes which have occurred since deposition.

1340 Newberry, B. (1968) - The perched water table in the upper limestones aquifer of Malta: J. Inst. Water Engineers, 22:8, p. 551-570.

1341 Newton, J.G. (1976) - Induced sinkholes: a continuing problem along Alabama highways (abstract) in Proceedings of the Anaheim symposium on land subsidence, December 1976: Netherlands; IAHS pub. 121, p. 453.

Sinkholes are divided into two categories defined as "induced" and "natural." Induced sinkholes are those related to man's activities, whereas natural sinkholes are not. An estimated 4,000 induced sinkholes or related features have formed in Alabama since 1900. In contrast, less than 50 natural collapses have been reported in Alabama and a significant number of these may have been related to man's activities.

1342 Newton, J.G. (1984) - Case histories, Alabama, U.S.A. in Poland, J.F., chairman, Guidebook to Studies of Land Subsidence Due to Ground-Water Withdrawal: International Studies and Reports in Hydrology, p. 245-251.

1343 Newton, J.G. (1984) - Review of induced sinkhole development in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental

Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 3-10.

Induced sinkholes are those caused or accelerated by man's activities. They are divided into two types: those resulting from a decline of water level due to pumpage and those resulting from construction. Almost all occur where cavities develop in unconsolidated deposits overlying openings in carbonate rocks. The author briefly discusses triggering mechanisms.

1344 Newton, J.G. (1984) - Sinkholes resulting from ground-water withdrawals in carbonate terranes; an overview in Holzer, T.L., editor, Man-Induced Land Subsidence: U.S.; Reviews in Engineering Geology, 6, p. 195-202.

Numerous sinkholes have occurred due to lowering of the water table. The downward migration of material into openings in bedrock and the formation and collapse of resulting cavities are caused by a decline in the water table. Damage from sinkhole activity generally occurs in lowland areas with water tables above or near the top of bedrock and exhibiting little karstification.

1345 Newton, J.G., investigator. (1983) - Active subsidence in carbonate terranes in the eastern United States: U.S.; U.S. Geological Survey Professional Paper 1375, p. 240.

1346 Newton, J.G. (1981) - Induced sinkholes; an engineering problem: U.S.; Journal of the Irrigation and Drainage Division, 107:IR2, p. 175-185.

1347 Newton, J.G. (1977) - Induced sinkholes; a continuing problem along Alabama highways (abstract) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 303-304.

A brief outline of the factors involved in the development of induced sinkholes.

1348 Newton, J.G. (1976) - Early detection and correction of sinkhole problems in Alabama, with a preliminary evaluation of remote sensing applications: U.S.; U.S. Geological Survey, for State of Alabama Highway Department, HPR Report No. 76, 83 p.

Recent sinkhole activity in Alabama has resulted in costly damage to highways and other structures, major pollution, and accidents. The author provides a good discussion of the two categories of sinkholes, "natural" and "induced", and how photographs and other remote sensing data are useful in the location and evaluation of potential sinkhole problems along planned highway corridors. This information coupled with that on geologic and topographic maps and from available water records allows an evaluation of potential highway corridors with a minimum of field work.

1349 Nicholas, Brother G. (1974) - Biology and ecology of the El Convento Cave-Spring system (Puerto Rico): Internatinal Journal of Speleology, Vol. 6, p. 109-114.

A description of the flora and fauna found in the El Convento cave-spring system. Due to numerous entrances and frequent flooding, the possibility of the presence of troglodites is minimal.

1350 Nicod, J. (1976) - Gypsum karsts and associated evaporites: Paris; Ann Geogr, 471, p. 513-554 [in French].

1351 Nicod, J. (1969) - Sur l'évolution des formes karstiques dans les dolomies en Provence: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M25/1-M25/12.

The massive dolomites of the Provence area are discussed, also lapies, dolines, and polje which are the result of active corrosion of the dolomites and lime.

1352 Nieto, A.S.; and Russell, D.G. (1984) - Sinkhole development in Windsor-Detroit solution mines and the role of downward mass transfer in subsidence: U.S.; In Situ, 8:3, P. 293-327.

1353 Nir, A. (1964) - On the interpretation of tritium "age" measurements of groundwater: Journal Geophysical Research, Vol. 69, p. 2589-2595.

1354 Nogret, Mr. (1981) - Géochimie des nappes du Maine, Etude hydrogéologique et hydrochimique de Jurassique de la Sarthe. Essaie de cartographie de la vulnérabilité des aquifères: France; Mém. Géol. Appl., CNAM, 211 p.

Confirmation ou mise en évidence par les cartes hydrogéologiques et hydrochimiques de zones effondres ou soulevées du socle sous la couverture jurassique du département de la Sarthe (France). Les couches du Jurrassique inférieur et moyen forment un seul aquifère reposant sur le Toarcien et ayant pour limite supérieure le Callovien. Il existe d'autre part des nappes perchées formées de lentilles sableuses soutenues par des horizons argileux et dont la communication avec la nappe sous-jacente varie en fonction de la fluctuation de la surface piézométrique. Les eaux sont dans leur majorité carbonatées calciques. Cet aquifère dont l'origine est due à la karstification paraît vulnérable a la pollution, ce qui se traduit par des anomalies dans les formules chimiques.

1355 Noguchi, T.; and Takino, M. (1958) - Phenomena of surface subsidence due to underground water flow: Journal of Mining Institute of Kyushu, 26:6.

1356 Nordlie, F.G. (1973) - Thermal stratification and annual heat budget of a Florida sinkhole lake: U.S.; Hydrobiologia, 40:2, p. 183-200, 1972, 8 fig., 6 tab., 8 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:10, p. 63.

The small annual heat budget of Lake Mize, Florida, is due to a number of factors. Gorham's regression equations relating annual heat budgets to various morphometric parameters of large temperate zone lakes are not useful for predicting the annual heat budget of a lake such as Lake Mize where the highest annual heat budget was roughly 1.6 times that for the lowest of the three years. Since an

extremely small annual heat budget is under consideration, small changes are magnified when viewed on a percentage basis.

1357 Nordstrom, D.K.; and others. (1979) - A comparison of computerized chemical models for equilibrium calculations in aqueous systems in Jenne, E.A., editor, Chemical Modeling in Aqueous Systems: U.S.; American Chemical Society Symposium Series 93, p. 857-892.

1358 Norris, C.R. (1982) - Buried karst and geology in north-central Ohio: U.S.; Kent State University Master's Thesis, 41 p., includes map, scale 1:12,500.

1359 Novak, Grga. (1973) - Spilje no otocima srednjeg jadrana kao prebivalista, sklonista i svetista u prethistoryi: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, p. 119-140.

1360 Nunn, P.D. (1984) - Evidence for late Quaternary sea level change around Saint Helena Island, South Atlantic: Germany, F.R.; Catena (Giessen), 11:2-3, p. 187-195.

1361 Nutter, L.J. (1973) - Hydrogeology of the carbonate rocks, Frederick and Hagerstown Valleys, Maryland in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:20, p. 38.

The Frederick and Hagerstown Valleys in western Maryland are underlain predominantly by Cambrian and Ordovician limestones and dolomites and contain many karst features (sinkholes, large springs, subsurface drainage, and closed depressions) characteristic of carbonate rock terranes.

1362 Oancea, V.; Diaconu, V.; and Bulgar, Al. (1984) - The application of the numerical filters in the determination of the hydrological parameters of the karst system. Theoretical and Applied Karstology, 1, p. 231-234, 1 table.

The transfer function of the karst system can be expressed analytically as a transfer function for a multistage filter. This approach allows the determination of some characteristic parameters of the karst system considered as a subsystem, each of them representing a stage of the filter. Thus a much more detailed structure of the karst system can be obtained.

1363 O'Dwyer, K. (1985) - Port Laoise groundwater development project - water well drilling and testing programme: Ireland; Port Laoise Seminar, Irish Group, IAH, 22-23 April.

Five production wells and eight test wells were drilled in limestone. Eight pumping tests were carried out on the production wells, and four pumping tests on the test wells. All wells obtain water from highly karstified limestone aquifers.

1364 Oedl, Franz Robert. (1969) - Konkreitionen und wassermarken in der eisriesenwelt in tennengebirge und in den dechsteinhöhlen: Germany,

F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 554/1-554/2.

1365 Ogden, A.E. (1984) - Methods for describing and predicting the occurrence of sinkholes in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 177-182.

This paper summarizes the various techniques that can be utilized to describe the morphology and spatial occurrence of sinkholes for the purpose of determining sinkhole origin and predicting future subsidence.

1366 Ogden, A.E. (1982) - A morphometric analysis of the Monroe County karst, West Virginia with comparison to Kentucky, Tennessee and Indiana in Dougherty, P.H., editor, 1982 National Speleological Society Convention Abstracts: U.S.; Geo 2, 10:1,, p. 12.

1367 Ogden, A.E. (1976) - The hydrogeology of the central Monroe County karst, West Virginia: U.S.; West Virginia University Ph.D. dissertation, 324 p.

1368 Odgen, A.E. (1976) - The relationship of cave passages to lineaments and stratigraphic strike in central Monroe County, West Virginia in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, 1974, p. 29-32.

The relationships between cave passage orientation and the orientation of lineaments, stratigraphic strikes, and joints taken in Monroe County, West Virginia, were tested using the chi-square test and the Kolmoergorov-Smirov test. The lack of association between any two distributions emphasizes that no single structural factor controls the orientation of cave passage.

1369 Ogden, A.E.; and Rauch, H.W. (1977) - The effects of hydrogeologic setting on the storm reponse of karst springs in Monroe County, West Virginia, USA in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 363-376.

1370 Ogden, A.E.; and Reger, J.P. (1977) - Morphometric analysis of dolines for predicting ground subsidence, Monroe County, West Virginia in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 130-140.

Morphometric analysis of dolines shows promise as a useful tool in identifying ground subsidence potential for land use planning.

1371 Ogilvy, A.A. (1948) - Karst and its role for coal development of the Podmoscivie coal basin and the ways of its studies in Conference on Karst, Perm 1948, Transactions: Perm; Transactions, Issue 4.

1372 Ohler, E.L., Jr. (1959) - Some considerations in determining the origin of ore deposits of the Mississippi Valley type: U.S.; Economic Geology, Vol. 54, p. 769-789.

1373 O'Kiely, P. (1985) - Silage in Ireland: Read at meeting, June 1984, for An Foras Taluntais; published by Irish Nat. Comm. IHP, p. 87-122.

Liquid effluent from Irish silage is larger than in other drier countries, though proper wilting reduces water content and makes for better feed. Feed potential of wilted and unwilted silage is analyzed. The BOD of silage effluent is some 75,000 mg O2/liter compared to 500 mg O2/liter for domestic sewage. Consequently, it is a most dangerous pollutant when it enters the ground water.

1374 Olivon, P.; and Salayre, H. (1976) - Sur quelques anciens temours de la karstification de la région méridionale des Grands Causses: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 299-311.

1375 Olsen, B.M. (1984) - Geologic atlas of Winona County, Minnesota; data base map: U.S.; Minnesota Geological Survey, County Atlas Series, C-2, scale 1:100,000, 1 sheet.

1376 Olson, C.G.; and Ruhe, R.V. (1978) - A mechanism for the origin of terra rossa in humid karst, southern Indiana, U.S.: U.S.; Geological Society of America, Abstracts with Programs, 10:6, p. 280.

In southern Indiana, the view that terra rossa is a solution product of limestones is inadequate. Insoluble residues from limestones are 3 to 16 percent. Converting available limestones to residues yields less thickness of terra rossa than is actually present.

1377 Olson, S.L.; and McKitrick, M.C. (1981) - A new genus and species of emberizine finch from Pleistocene cave deposits in Puerto Rico (Aves: Passeriformes): U.S.; Journal Vertr Paleontol, 1:3-4, p. 279-283.

1378 Olsson, I.U. (1968) - Modern aspects of radiocarbon datings: Earth-Science Review, 4:3, p. 203-218.

1379 Omnes, G. (1977) - High accuracy gravity applied to the detection of karst cavities in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 273-284.

1380 O'Neill, Bernard J., Jr. (1976) - The distribution of limestones containing at least 90 percent calcium carbonate in Pennsylvania: U.S.; Pennsylvania Geological Survey, Mineral Resources Report 50, Part 4.

Data showing the distribution, chemistry, and thickness of geologic units containing a minimum of 90 percent calcium carbonate for Pennsylvania is provided on a map, two tables, and in a list of references.

1381 Opdyke, N.D.; Spangler, D.P.; Smith, D.L.; and Jones, D.S. (1984) - Origin of the epeirogenic uplift of Pliocene-Pleistocene beach ridges in Florida and development of the Florida karst: U.S., Boulder; Geology, 12:4, p. 226-228.

1382 Oraseanu, I. (1986) - Considerations on the hydrogeology of Vascau Plateau in Theoretical and Applied Karstology, 2 (in press).

Morphological and hydrogeological investigations, results of tracing experiments, hydrologic data, and chemical analysis of the karst cold and thermal waters and of the gas outflowing from certain springs are used in drawing a unitary hydrogeological image of the Vascau karstic plateau.

1383 Oraseanu, I. (1986) - Partial captures and diffluence surfaces, examples from the northern karst area of Padurea Craiului Mountains in Theoretical and Applied Karstology, 2 (in press).

Starting from the examples furnished by the Padurea Craiului Mountains karst, methodological considerations needed for drawing up the hydrogeological balance of karstic areas lead the author to define the concept of karstic basin diffluence and the notion of diffluence surface, with specification of their role and place in the structure of the hydrogeological karstic systems.

1384 Oraseanu, I.; Anghel, E.; Gaspar, E.; and Dinescu, L. (1978) - Experimental studies by means of radioactive tracers in view to establish more precisely the hydrogeological conditions of the Ghelar and Teliuc ore deposits in Studii tehnice si economice, IGG, seria E, N° 13, p. 44-52 [in Romanian].

The paper emphasizes the efficiency of utilizing radioactive tracers when studying mining hydrogeology. Through marking the surface waters with a radioactive tracer, their connection with underground waters from the mine is proved. Concomitantly valuable data regarding the velocity and the circulation of waters may be obtained.

1385 Oraseanu, I.; Bulgar, Al.; Gaspar, E.; and Terteleac, N. (1984) - Hydrogeological study of Dimbovicioara Passage: Bucharest; Theoretical and Applied Karstology 1, p. 153-154.

A comprehensive hydrogeological study was performed in a 230 km^2 carbonate area of Piatra Craiului Massif. Based on the classical hydrogeologic research, the microtectonic observations, the radioactive and chemical tracers, and the hydrometeorological data, the surface and ground-water balance is calculated, the hydrogeological basins of the main springs are delimited, the relation between infiltration and runoff is established, and the underground water resources are calculated.

1386 Oraseanu, I.; and Gaspar, E. (1981-1982) - Radioactive tracer-based research concerning the establishment of the area of supply of the underground river in the Vintului Cave (Padurea Craiului Mountains) in Nymphaea, VIII-IX, p. 379-386 [in Romanian].

The research work conducted with the help of radioactive tracers showed a hydrological relationship between the waters infiltrated through the Recea sinkhole and ground water of the Vintului cave, furnishing for the first time information on the contribution of subaerial course to the recharge of the underground flow that traverses the longest cave in Romania (31.5 km).

1387 Oraseanu, I.; and Iurkievicz, A. (1982) - Phenomena of karstic capture in the eastern part of the Padurea Craiului Mountains: Trav. Inst. Spéol.,·Emile Racovitza, T. XXI, p. 69-76, 2 maps, 4 fig. [in French].

In this work, which is markedly theoretical, the authors start from observations made on karsts in Romania and suggest the introduction of two new concepts: basin karstic diffluence and karstic diffluence area. Also, a new model is outlined concerning the succession of the processes that accompany the underground capture phenomenon and which may eventually lead to the formation of karstic capture depressions.

1388 Oraseanu, I.; Iurkievicz, A.; Gaspar, E.; and Pop, I. (1984) - On the hydrogeological conditions of bauxite accumulations in the Racas-Sclavul Ples karstic plateau (Padurea Craiului Mountains): Theoretical and Applied Karstology, 1, p. 147-152, 1 map, 2 fig.

On the basis of hydrogeological studies, complemented by tracer labelings, as well as of hydrometeorological observations, the major flow directions of the underground waters in the Racas-Sclavul Ples karstic plateau were set. Solutions were suggested for exploitation of the bauxite deposits in the area at a minimum hydrogeological risk.

1389 Orban, T.; and Mitrofan, H. (1981) - Possibilities of identifying the tectonic fractures by means of resistivity and seismic measurements: Studii si Cercetari de Geologie, Geofizica si Geografie, seria Geofizica, 19, p. 123-128, 6 figs. [in Romanian with English abstract].

The paper makes an analogy between the results of geophysical measurements in a karst area of Aninei Mountains and the experimental photoelastic model of compressional stress variation around a fault, presented by DUDA, 1965.

1390 Otkun, G. (1977) - More about Paleocene karst aquifer in Saudi Arabia in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 25-38.

1391 Owen, M.; Connerton, B.T.; and Robinson, V.K. (1977) - The hydrogeology of the Thames groundwater scheme: I.A.H. Memoires, Vol. XIII, Part 1, Birmingham Congress, U.K., p. D20-D31.

The chalk aquifer in Berkshire is used to augment flow in the Thames. The scheme is described including geological parameters. A digital model was developed to monitor the water in the aquifer.

1392 Owen, T.E.; and Suhler, S.A. (1980) - Subsurface void detection using surface resistivity and borehole electromagnetic techniques in Technical

Papers, fiftieth annual international meeting and exposition, Houston, Texas, U.S., 1980: U.S.; Technical Papers - Annual International Meeting and Exposition, Society of Exploration Geophysicists, 50, p. 3427-3440.

1393 Ozis, U. (1976) - Some features of mathematical analysis of karst runoff in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 1: Proceedings of the U.S.-Yugoslavian Symposium, Dubrovnik, June 2-7, 1975: U.S., Fort Collins, Colorado; Water Resources Publications, p. 221-236.

1394 Ozis, U.; and Yanar, H. (1985) - Turkish dam impounds world's largest karst spring: International Water Power and Dam Construction, 36:12, p. 44-49, December 1984, 8 fig., 13 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 18:8.

The Oymapinar reservoir, Turkey, impounds Dumanli, the world's largest karst spring issuing from a single orifice, and required unusually extensive geological investigations and treatment to prevent leakage.

1395 Ozoray, G. (1977) - The Athabasca carbonate and evaporite buried karst (Alberta, Canada) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 85-98.

A rich oil sand resource is present in northeastern Alberta, but it is underlain by actively developing karst limestone. Causes of its development must be understood and its extent mapped before the oil sands are developed or serious environmental problems could ensue.

1396 Ozoray, G. (1977) - Groundwater potential of the karst regions of Alberta, Canada in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 235-240.

An introductory discussion of the occurrence of ground water and general estimates of the water resources in karstic areas of Alberta.

1397 Paige, Sidney. (1912) - Llano-Burnet folio, Texas: U.S.; U.S. Geological Survey, Geologic Atlas, Folio 183.

Geologic units, structure, water-bearing beds and mineral resources are discussed for rocks ranging in age from early Cretaceous limestones to Recent fluvial deposits. Includes 7.5-minute geologic and topographic maps.

1398 Palmer, A.N. (1981) - A geological guide to Mammoth Cave National Park: U.S., New Jersey; Zephyrus Press, 196 p.

1399 Palmer, A.N. (1977) - Effect of continental glaciation on karst hydrology, northeastern U.S. (abstract only): in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 109-112.

1400 Palmer, A.N. (1977) - Influences of geologic structure on groundwater flow and cave development in Mammoth Cave National Park, Kentucky, U.S. in Tolson, J.S., and Doyle, F.R., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 405-414.

1401 Palmer, A.N. (1975) - The origin of maze caves: NSS Bulletin, 35:3, p. 56-76.

The author discusses maze caves that consist of a network or irregular pattern of solution passages containing several closed loops of contemporaneous origin. There are two common settings, noted from field observations, under which nearly all maze development occurs: (1) where soluble rocks receive diffuse ground-water recharge from the overlying surface or through an adjacent formation; (2) where ground water in a cavernous region undergoes great variations in discharge and in hydraulic head owing to flood-water recharge.

1402 Palmer, A.N. (1974) - Geologic influence upon cave-passage orientation in Ludington Cave, Greenbrier County, West Virginia in Proceedings of the 4th Conference on Karst Geology and Hydrology, 1976: U.S.; West Virginia Geological and Economic Survey, p. 33-40.

Ludington Cave, West Virginia, developed along a prominent monocline having a locally overthrust upper limb. Contact between the Mississippian Hillsdale Limestone and the MacCrady Shale Formation initiated cave development. Ground-water flow is strongly vadose descending along the stratigraphic dip but it is deflected, in places, by high angle faults and joints.

1403 Palmer, A.N. (1972) - Dynamics of a sinking stream system; Onesquethaw Cave, New York: U.S.; NSS Bulletin, 34:3, p. 89-110.

Onesquethaw Cave, in Albany County, New York, formed as the direct result of the subsurface diversion of a perennial surface stream. The underground courses of sinking streams, often considered simple in plan and development, actually can involve the most complex flow dynamics and conduit geometry of any ground-water setting.

1404 Palmer, A.N.; and Moore, M.C. (1976) - Geomorphology and hydrology of the Indiana and Kentucky karst: A Symposium: U.S.; NSS Bulletin, 38:4, p. 73.

An introduction to the types of limestone and distribution of karst topography in Indiana and Kentucky.

1405 Palmer, M.V. (1976) - The Mitchell Plain of southern Indiana: U.S.; NSS Bulletin, 38:4, p. 74-79.

The author gives a topographic study of the Mitchell Plain with brief interpretation as to its mode of origin. Included is a karstic region where karstic landforms are controlled mainly by the drainage from non-soluble landforms.

1406 Palmer, M.V. (1974) - Head loss in a floodwater cave system (abstract): in Proceedings of the 4th Conference on Karst Geology and Hydrology, 1974: U.S.; West Virginia Geological and Economic Survey, p. 107-108.

A discussion of how head losses, pressure head, and velocity head due to constrictions in cave passages may have developed the present outline in the Onesquethaw Cave of Albany County, New York. Former flow characteristics may be interpreted using head loss data.

1407 Palmer, M.V.; and Palmer, A.N. (1975) - Landform development in the Mitchell Plain of southern Indiana; origin of a partially karsted plain: Germany, F.R.; 2 Geomorphology, 19:1, p. 1-39.

The events and processes that produced the present landscape of the Mitchell Plain are discussed. Problems related to the interpretation of geomorphic events given are listed.

1408 Palmquist, R.C. (1977) - Distribution and density of dolines in areas of mantled karst in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 117-129.

Multiple regression analyses of major doline density in Iowa are discussed as they indicate an inverse relationship with local relief and extent of surface drainage, but directly with Fayette soil. Thus the amount of ground-water recharge, permeability, and lithology is important in the development of dolines.

1409 Palmquist, R.C.; Madenford, G.A.; and Van Driel, J.N. (1976) - Doline densities in northeastern Iowa: U.S.; NSS Bulletin, 38:3, p. 59-67.

Three counties underlain by karst in northeastern Iowa were studied. The authors discuss how four mathematical models explain the variation in doline density. It was found that dolines are clustered in zones where the overburden is less than 25 feet thick, in lower order drainageways, and that they increase in number through time at a decreasing rate. Soil maps of the area were used to locate the dolines.

1410 Paloc, H. (1977) - Karsts anciens et eaux actuelles in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 229-238.

1411 Paloc, H. (1972) - Carte hydrogéologique de la région des Grand Causses: Orleans, France; Bureau Recherches Geol. et Minieres, 82 p.

1412 Paloc, H. (1975) - Cartographie des eaux souterraines en terrains calcaires in Burger, A. and Dubertret, L., editors, Hydrogeology of Karstic Terrains: Paris, IAH, p. 137-150.

Hydrogeological maps of limestone areas require special signs in order to properly show the hydraulic characteristics of the rocks. General hydrogeologic cartography and types of maps which can be elaborated are discussed, followed by selection criteria for data.

A brief catalogue of existing hydrogeologic maps of limestone areas is given.

1413 Paloc, H.; Bonin, H.; Bonnet, M.; Guizerix, J.; Lallemand-Barres, A.; Margat, J.; and Thiery, D. (1981) - Résultats des observations conduites sur le site expérimental de la grotte du Lamalou (Causse de l'Hortus, France méridionale) in Beck, B.F., editor, Proc. Eighth International Congress of Speleology, 1981-07-18, Bowling Green, Kentucky: U.S.; Vol. 2, p. 461-465.

Détermination sur la base d'observations de terrain aussi précises que possibles, des lois physiques permettant de réaliser une modèlisation déteministe des écoulements en système karstique en zone saturée et en zone non saturée.

1414 Paloc, H. and Potie, L. (1974) - Etat des connaissances sur les sources littorales et sous-marines (contrat CNEXO-BRGM No. 73/809 du 3 decembre, 1973): France; Rapport BRGM 74 SGN 249 AME, jullet 1974, 103 p.

Rassemblement et synthèse des principales informations recueillies par voie documentaire (167 publications consultées) sur les sources littorales et sous marines de divers pays du monde en vue de préciser l'état de leur connaissance et de tenter de mieux évaluer leur intérêt économique et les possibilités de leur exploitation.

1415 Panart, Pedro Plana. (1969) - Exposition des travaux topographiques de "complijo carstico de ojo guarena" (Burgos-Expana): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. S38/1-S38/5.

A description of the present methods used in a topographic study of a complex karst area with recommendations for a way to approach future work.

1416 Panos, V.; Jimenez, A.N.; and Stelcl, O. (1971) - The karst of Cuban inland and coastal plains: Acta Universitatis Palackianal Olomucensis Facultas Rerum Naturalium, Tom. 35, Geographica Geologica XI, p. 5-46.

The authors discuss how the influence of certain climatic conditions is believed to produce certain sets of landscape forms pertaining to individual climageomorphologic zones. Inside uniform climageomorphologic zones there are differentiations due to geological factors and also many physiographic ones with variable reciprocal relations.

1417 Panos, Vladimir, editor. (1973) - Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; Czechoslovakia Academy of Sciences.

Contains the papers presented at the 6th International Congress of Speleology.

1418 Panos, Vladimir. (1972) - A brief analysis of problems in karst erosion studies: U.K.; British Cave Research Group, Transactions, 14:2, p. 49-51.

The author briefly describes the history of the development of study in karst erosion, the discrepancies in the approach to the study, and suggestions for remedies to these failings.

1419 Parate, N.S. (1984) - Sinkhole and subsidence damage and protective measures in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 379-383.

Ground subsidence, a major problem in middle and east Tennessee, consists of downward and lateral movement of the ground surface, and is a result of loss of support within the low level subsurface materials.

1420 Parfit, M. (1983) - Ground water proves a hidden element whose time has come: U.S.; Smithsonian, 13:12, p. 50-61.

1421 Parizek, R.R. (1976) - On the nature and significance of fracture traces and lineaments in carbonate and other terranes in Yevjevich, V., editor, Karst Hydrology and Water Resources, Proceedings of the U.S.-Yugoslavian Symposium, Dubrovnik, June 1975: U.S.; Water Resources Publications.

The author reviews the utility of fracture traces and lineaments for demonstrating zones of increased permeability for carbonate and other rocks. With the added platforms of observation afforded by U-2 overflights, LANDSAT (ERTS-1), and Skylab II, it has been possible to map lineaments in excess of 5,150 km in length on a consistent basis in all terranes. Evidence is presented for establishing the analogous relationship between fracture traces and major lineaments in defining increased zones of permeability and porosity development for carbonate and other rocks.

1422 Parizek, R.R.; White, W.B.; and Langmuir, Donald. (1971) - Hydrogeology and geochemistry of folded and faulted rocks of the central Appalachian type and related land use problems: U.S.; Earth and Mineral Sciences Experimental Station, Pennsylvania State University Circular 82, 184 p.

An account of many land use problems related to carbonate rocks, including references to subsidence.

1423 Park, D.G. (1984) - The origin and nature of brecciation of Devonian strata in Wood Buffalo National Park: Canada; University of Alberta Master's Thesis, 365 p.

1424 Parker, G.G. (1977) - Water-resources management in the Florida peninsula buried karst (abstract only) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 337-338.

1425 Parker, G.G. (1973) - Highlights of water management in the Southwest Florida Water Management District: U.S.; Ground Water, 11:3, p. 16-25.

1426 Parker, J.W.; and McCain, T.S. (1985) - VLF resistivity signature of a fingered plume in a karstic aquifer in Windsor, J.G., editor, 1985

program issue; forty-ninth annual meeting of the Florida Academy of Sciences, Saint Leo, Florida, U.S., 1985: U.S., Florida Scientist, 48, Supplement 1, p. 42.

1427 (1975) - Parts of the U.S. are sinking: U.S., Port Washington; Ground Water Newsletter, 4:20, p. 4-5.

1428 Paterson, Keith. (1971) - Some aspects of limestone solution in the Oxford Region (abstract) in International Speleological Union, Meeting on Karst Denudation, Oxford, England, September 1971, Proceedings: U.K.; Proceedings.

The author describes some physico-chemical features characteristic of spring and river waters in the limestone tracts of the Oxford Region. Measurements of pH and water temperature are outlined together with calcium hardness values. The significance of the results for landform studies is discussed.

1429 Pavlovic, M. (1976) - An approach to a qualitative description of the water permeability states in karst fluvial valleys in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publication, p. 559-570.

The paper presents a particular method for the qualitative description of the general water permeability state, its changes as well as the changes of the relationship of certain states.

1430 Pearson, F.J., Jr. (1965) - Use of 13C/12C ratios to correct radiocarbon ages of materials initially diluted by limestone in Proceedings of the 6th International Conference on Radiocarbon and Tritium Dating: U.S., Pullman, Washington; Proceedings, p. 357-366.

1431 Pearson, F.J., Jr.; and Fisher, D.W. (1971) - Chemical composition of atmospheric precipitation in the northeastern United States: U.S.; U.S. Geological Survey Water Supply Paper 1535-P, 23 p.

1432 Pearson, F.J., Jr.; and Hanshaw, B.B. (1970) - Sources of dissolved carbonate species in groundwater and their effects on carbon-14 dating in Isotope Hydrology 1970: Vienna; IAEA, Proc. Ser., p. 271-286.

1433 Pearson, F.J., Jr.; and Rettman, P.L. (1976) - Geochemical and isotopic analysis of waters associated with the Edwards Limestone aquifer, central Texas: U.S.; U.S. Geological Survey Report, 35 p.

The authors tabulate results of analysis of 14 common chemical species dissolved in 92 samples of water collected from the Edwards Limestone aquifer. Field collection and field and laboratory analytical techniques were designed to make these analyses useful for geochemical studies.

1434 Pearson, F.J., Jr.; Rettman, P.L.; and Wyerman, T.A. (1975) - Environmental tritium in the Edwards aquifer, central Texas, 1963-1971: U.S.; U.S. Geological Survey Open File Report 74-362, 32 p.

Tritium analyses were made in the water of the Edwards aquifer to confirm the patterns of flow within the aquifer that had been suggested. The relative age of water in the aquifer can also be estimated.

1435 Peck, Stewart B. (1976) - Mud stalagmites and the conulite: discussion: U.S.; National Speleological Society Bulletin, 38:3, p. 69-70.

Conulites, according to the author, are pits drilled in clastic material with secondary mineral impregnation of the pit walls. Conulites are described in three caves to show how they can vary.

1436 Pelisek, J. (1973) - Pedesedimente in deu karstgelieteu der tscheshoslowakei: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 529-534.

1437 Pencher, Simeon; and Miter, Ihija. (1969) - Some regularities of the growth of monocrystal tubilike stalactites: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 513/1-513/5.

Statistical studies were used by the author to show the growth periods of different stalactites. There are linear equations of first order which show that the tubilike formations grow with time and give the possibility of approximately prognosing its elongation in the near half-year periods.

1438 Penck, A. (1900) - Geomorphologische studien aus der hercegovina: Z. Deut. Osterreich, Alpenvec, Vol. 31, p. 25-41.

1439 Perna, G. (1973) - Giacimeuti minerari carsici: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 529-543.

The author gives a classification of the karstic mineral deposits related to the karstic cycle.

1440 Pessel, G.H. (1977) - Probable karst topography near Jade Mountains, southwestern Brooks Range in Short notes on Alaskan geology - 1977: U.S.; Alaska Division of Geological and Geophysical Surveys Geologic Report 55, p. 3-6.

1441 Peters, H.J. (1972) - Groundwater Management: U.S.; Water Resources Bulletin, 8:1, p. 188-197.

1442 Peterson, Gilbert M. (1976) - Pollen analysis and the origin of cave sediments in the central Kentucky karst: U.S.; National Speleological Society Bulletin, 38:3, p. 53-58.

Pollen analysis is discussed by the author as being a possible means to distinguish cave sediments from different source areas. Pollen is presently transported into cave passages for distances of at least one-half mile, although no pollen is preserved in older cave sediments.

1443 Petrik, Milivoj. (1976) - Characteristics of water quality in the Dinaric karst in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 1: U.S.; Water Resources Publications, p. 665-675.

The velocity of flow in the channels in Dinaric karst is high and water filtration absent, which causes subterranean water to appear at springs as turbid, with a high concentration of bacteria, especially after heavy rains. The bulk of extraneous matter in karst water is represented by a hardness which consists mainly of calcium and magnesium bicarbonates.

1444 Petrik, Milivoj; and Herak, Milan, editors. (1969) - Krs Jugoslavije (Carsus Iugoslaviae): Zagreb, Yugoslavia; Akad. ja znanosti, 622 p.

1445 Petrochiess, Anno. (1971) - Amenagement touristique de Grottes: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 119-121.

A description of the development of caves (written for tourists).

1446 Pettijohn, F.J. (1957) - Sedimentary rocks: U.S., New York; Harper & Row, 718 p.

1447 Pfeffer, K.H., editor. (1977) - Festschrift für Alfred Bogli: Germany, F.R.; Blaubeuren, Mangold, in Komm., 172 p. [contributions in English, French, or German].

1448 Pfeffer, K.H. (1969) - Erfahrungsbericlit uber korngrossenbestimmungen von verwitterungsresiduen aus karstgebieten: Notizblatt des Hessischeu Landesamtes für Bodenforschung zu Wiesbaden, Band 97, 1969, p. 275-282.

1449 Pfeiferova, A.; and Vacek, M. (1973) - Vorkommeu von apatit in deu Sinterausfullungen der Javoricko--Hobleu (Mahreu, Tschechoslowakei): Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 545-550.

A discussion of phosphorous and fluorine in some sinter samples found in the Javoricko caves. The authors suggest they originated in sedimentary limestones and also in organic matter decomposed either on the earth surface or directly in the caves.

1450 Pfeiffer, S.; Wadewitz, S.; and Sternisko, H. (1976) - Darstellung einiger gipskarstformen: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 313-323.

1451 Picard, L.; and Wakshal, E. (1977) - Evolution of fossil karst aquifers in Israel (abstract only) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 21-22.

1452 Picknett, R.G. (1971) - Some studies on the chemistry of limestone solution (abstract) in International Speleological Union, Meeting on Karst Denudation, Oxford, England, September 1971, Proceedings: U.K.; Proceedings.

Alternate methods for studying the calcium content of water samples are given; the effect of magnesium and heavy metals on calcite solubility is also discussed.

1453 Pinder, G.F.; and Jones, J.F. (1969) - Determination of ground-water component of peak discharge from chemistry of total runoff: U.S.; Water Resources Research, Vol. 5, p. 438-445.

1454 Pinzaru, T.; and Mac, I. (1973) - Morphohydrographic observations south of Cluj: Bulletin of the Society of Geographic Sciences of the Socialist Republic of Romania, III, p. 122-131 [in Romanian].

Micro-modeling is an important part of the relief features on the right-hand slope of the Somesul Mic Valley, south of the town of Cluj. Noteworthy among the features are the lacustrine folds. The micro-sinkholes are an outcome of the dissolution of gypsum intercalated with tortonian-sarmatian depositions.

1455 Pisota, I.; Trufas, V.; and Ciumplileac, Gh. (1969) - The lakes from Slanic-Prahova and Telega: Hidrobiologia, 10, p. 243-254, 9 figs. [in Romanian with English abstract].

A set of 14 salt lakes situated in the flooded excavations of ancient salt mines are considered with respect to genesis, water budget, salinity temperature, and hydro-optical properties.

1456 Pitard, J. (1976) - Contribution à l'interprétation des essais par pompages dans les roches fissurées: France; Thèse Doct. Géol. Appli. Montpellier, 124 p.

Cette étude illustre la possibilité d'application d'une nouvelle méthode d'interprétation de pompages d'essai en milieu fissuré et permet de vérifier la validité dans le cas d'un massif calcaire karstique. Les premiers résultats de l'interprétation par le modèle mathématique utilisé concordent avec l'analyse de la fissuration effectuée sur le site. Duex difficultés apparaissent. L'absence de certaines courbes théoriques qui ne permet pas d'interprêter les courbes piézométriques expérimentales; le modèle utilisé n'envisage pas une dissymétrie entre la courbe de descente et de remontée.

1457 Pitieva, K.E.; and others. (1978) - On the possibility of using artesian basin deep-seated horizon for industrial discharge dumping in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 765-773.

The factors which should be taken into consideration before deep waste disposal is used are discussed with reference to different rock types including carbonates.

1458 Pitman, J.I. (1979) - Carbonate chemistry of groundwater from tropical tower karst in south Thailand: Water Resources Journal, 14:5, p. 961-967, October 1978, 2 fig., 4 tab., 39 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 12:9, p. 7.

Recent work has suggested that marked latitudinal gradients exist in the carbonate chemistry of ground water in limestone, the principal control being the partial pressure of oil carbon dioxide (PCO2). The wide variation of springwater PCO2 is best explained by a predominantly closed system evolution from the initial PCO2 of the soil.

1459 Pitty, A.F. (1968) - Calcium carbonate content of karst water in relation to flow-through time: U.S.; Nature, 217:5132, p. 939-940.

1460 Pitzer, K.S. (1973) - Thermodynamics of electrolytes, I. Theoretical basis and general equations: U.S.; Journal of Physical Chemistry, 77:2, p. 268-277.

1461 Pitzer, K.S.; and Kim, J.J. (1974) - Thermodynamics of electrolytes, IV. Activity and osmotic coefficients for mixed electrolytes: U.S.; Journal of American Chemical Society, 96:18, p. 5701-5707.

1462 Pitzer, K.S.; and Mayorga, G. (1973) - Thermodynamics of electrolytes, II. Activity and osmotic coefficients for strong electrolytes with one or both ions univalent: U.S.; Journal of Physical Chemistry, 77:1, p. 2300-2308.

1463 Plesa, C. (1981) - The cave at Magura: Bucharest; the Sport-Turism Publishing House, 66 p., 60 photographs [in Romanian with English, French, and German versions].

An album of and guide to one of the most beautiful caves in Romania, which was turned into a nature monument. The work contains a historical survey of the cave, data concerning the inhabitants and the Sighistelului Valley, a detailed description of the cave, and data on the rich fossil and current terrestrial and aqueous fauna.

1464 Plesa, C. (1978) - Original data on several caves in the Padurea Craiului Mountains: Nymphaea, Oradea, VI, p. 265-278, 12 figs. [in Romanian].

Six caves are described for the first time and their maps supplied. A seventh cave, not previously mapped, is described. All are small-size caves. Noteworthy is a cave containing a gallery with a difference of elevation of roughly 4 m below the surface stream bed. The biospeleological importance of the caves is analyzed.

1465 Plesa, C. (1966) - The Crisul Repede Pass - a guide: Bucharest; the Meridiane Publishing House, 35 p., 12 figs. [in Romanian].

A complex guide to the Crisul Repede Pass (the Padurea Craiului Mountains) which has been turned into a nature monument. The work describes several caves. The most important among which is the cave at Vadu-Crisului, one of the oldest caves to have been opened to tourism.

1466 Plotnikov, I.I.; and Milovidov, E.D. (1961) - The genesis of the bauxite deposits of the northern Urals: USSR: Soviet Geology, No. 7, p. 134-141.

1467 Plummer, L.N. (1975) - Mixing of sea water with calcium carbonate ground water: U.S.; Geological Society of America Memoir, No. 142, p. 219-236.

1468 Plummer, L.N. (1974) - Chemical modeling of groundwater from central Florida: U.S.; Abstracts, Mtg. Amer. Geophy. Union.

1469 Plummer, L.N.; and Busenberg, E. (1982) - The solubilities of calcite, aragonite and vaterite in CO[2]-H[2]O solutions between 0° and 90°C, and an evaluation of the aqueous model for the sytem CaCO[3]-CO[2]-H[2]O: U.K.; Geochim. et Cosmochim. Acta, Vol. 46 p. 1011-1040.

1470 Plummer, L.N.; and Mackenzie, F.T. (1974) - Predicting mineral solubility from rate data; application to the dissolution of magnesium calcites: U.S.; American Journal of Science, 274:1, p. 61-83.

1471 Plummer, L.N.; Vacher, H.L.; Mackenzie, F.T.; Bricker, O.P.; and Land, L.S. (1976) - Hydrogeochemistry of Bermuda; A case history of groundwater diagenesis of biocalcarenites: U.S.; Geological Society of America Bulletin, 87:9, p. 1301-1316.

1472 Plummer, L.N.; Wigley, T.M.L.; and Parkhurst, D.L. (1978) - The kinetics of calcite dissolution in carbon dioxide water systems at 5° to 60°C and 0.0 to 1.0 atm. carbon dioxide: U.S.; American Journal of Science, Vol. 278, p. 179-216.

1473 Pokrajcic, Bozidar. (1975) - Hydric epidemics in karst areas of Yugoslavia, caused by spring water contaminations in Yevjevich, V., editor, Karst Hydrology and Water Resources, U.S.-Yugoslavia Symposium, Dubrovnik, June 1975, Proceedings: U.S.; Water Resources Publications, Vol. 2, p. 703-718.

Because of large rock and soil permeabilities of karst formations, their spring waters are easily contaminated. The author provides a historic account of how this was the cause, during and after World War II, of several severe epidemics of typhoid fever. Preceding these epidemics heavy rains occurred in the catchments of springs from which the water supply was delivered.

1474 Poland, J.F., chairman. (1984) - Guidebook to studies of land subsidence due to ground-water withdrawal: International Studies and Reports in Hydrology - Etudes et Rapports d'Hydrologie - Estudios e Informes de Hidrologia - Issledovaniya i Doklady po Gidrologii, 40.

1475 Poland, J.F. (1972) - Land subsidence in the western states (of the U.S.) due to groundwater overdraft: U.S., Urbana; Water Resources Bulletin, 8:1, p. 118-131.

1476 Poland, J.F. (1958) - Land subsidence due to ground-water development: American Society of Civil Engineers Proceedings, Journal Irrigation and Drainage Development, Paper 1774, 11 p.

1477 Polska, Akademia. (1972) - Studies on Raj Cave near Kielce (Poland) and its deposits: Poland, Krakow; Folia Quaternaria, Polska Akademia Nauk Oddzial W Krakowie Komisja Biologiczna, 1972, Vol. 41, p. 148.

Included are papers on the history of the discovery of the Raj Cave, stratigraphical and sedimentological studies of the deposits, fossil fauna, archaeological material, chronology, and paleoecology.

1478 Ponta, G.; Aldica, Gh., Badescu, D.; Panaiotu, C.; and Solomon, A. (1984) - Speological research of Juil de Vest-Cernisoara area: Buletin Speologic Informativ, 8, p. 77-118 [in Romanian].

This paper reviews the geologic and tectonic factors influencing the geohydrology of the Juil de Vest-Cernisoara karst area of the western part of South Carpathians (Retezat, Godeanu, and Vilcan Mountains).

1479 Ponta, G.; Strusievicz, R.; and Simion, G. (1984) - Subterranean stream piracy in the Juil de Vest-Cernisoara karst area, Romania: Theoretical and Applied Karstology, p. 235-238.

The authors present the geologic and tectonic factors influencing the karst hydrogeology of the Juil de Vest-Cernisoara karst area of the western part of South Carpathians, Godeanu, and Vilcan Mountains. A trace experiment with In-EDTA of 13,350 m straight line length across limestone is presented.

1480 Pontoriero, P.; and Schmidt, V.A. (1981) - Magnetic characteristics of clastic sediments at Mammoth Cave, Kentucky, U.S.: U.S., Washington, D.C.; EOS Trans Am Geophysical Union, 62:17, p. 273.

1481 Pool, J.R. (1972) - Water well and ground-water chemical analysis data, Irion County, Texas: U.S.; Texas Water Development Board Report 146, 38 p.

Contains chemical analysis of water well and ground-water samples, some of which were taken from the Edwards and associated limestones.

1482 Pop, E. (1949) - Nitrified bacteria in the Scarisoara Cave: Scientific Bulletin, Series A, 1(9):899-907, the Academy of the Socialist Republic of Romania, 1 fig. [in Romanian].

Two free stones inside the "Ghetarul de la Scarisoara" ice, lying in a warm meroclimatic area with a constant temperature of 2°C were sampled: one a smooth stone covered with a black film, and the other a cauliflower-shaped, gray stone. This research attests to the role played by autotrophic bacteria in the formation of the first layer of organic detritus in caves.

1483 Pop, E.; and Ciobanu, I. (1950) - Pollen-analyses in the ice at Scarisoara: Annals of the Academy of the People's Republic of Romania, the Geology-Geography Series, Technical and Agricultural Sciences, 3(2):23-50, 4 figs., 3 diagrams [in Romanian].

Pollen analyses were performed on 29 samples taken from the layers of impurities which alternate with ice layers in the ice deposition conserved in the descending cave of Scarisoara. There is a

historical parallelism between the ice bodies at Scarisoara and the Focul Viu Cave, Bihor County, and the oligotrophic sphagnacetes in Romania, which indicates that they were formed in the sub-Atlantic post-glacial period.

1484 Pop, G.; and Marza, I. (1977) - The eocretaceous paleokarst of the Padurea Craiului Mountains (the Socialist Republic of Romania) and its significance in the mechanism of bauxite genesis: Strasbourg; Sci. Geol. Bull., 30 30(1):51-58.

A study of the eocretaceous paleokarst of the Padurea Craiului Mountains and of the textural peculiarities of the bauxite ore contained within, which suggests new elements of interpretation of the indirect genesis and double evolution of these ore deposits.

1485 Pop, Gh.; and Racovita, Gh. (1973) - Contributions to the problem of the genesis of conic karsts in Sierra de los Organos (Cuba), Livre de cinquantenaire de l'Institut de Spéologie "Emil Racovita": Bucharest; the Publishing House of the Academy of the Socialist Republic of Romania [in French].

After a critical survey of theories of the formation of the relief of mogotes characteristic of the karst in the western part of Cuba, the authors argue that this relief should be regarded as the outcome of vertical fragmentation of calcareous massifs through corrosion, a process which appears to be specific to tropical karst modeling.

1486 Popenoe, P.; Kohout, F.A.; and Manheim, F.T. - (1984) - Seismic-reflection studies of sinkholes and limestone dissolution features on the northeastern Florida shelf in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 43-57.

High resolution seismic reflection profiles show that the shelf off northern Florida is underlain by solution deformed limestone of Oligocene, Eocene, Paleocene, and late Cretaceous age. Dissolution and collapse features are widely scattered.

1487 Postma, Dieke. (1977) - The occurrence and chemical composition of recent iron-rich mixed carbonates in a river bay: U.S.; Journal of Sedimentary Petrology, 47:3, p. 1089-1098.

A model for the formation of the iron carbonate from a study in Denmark is presented based on mixing of ground water with different origin and composition, but processes occurring within the bay will be of importance.

1488 Potie, L.; Tardieu, B. (1977) - Development of submarine springs in limestone formations in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 39-45.

1489 Potie, L. and Ricour, J. (1978) - Le captage de la résurgence sous-marine de la rivière "Port-Miou" près de Cassis (région de Marseille - France): Paris; Revue "Chantiers de France", No. 104, Paris, 8 p.

Description des travaux exécutés par le G.I.E. FRANKARST dans le conduit karstique d'une rivière souterraine développée en-dessous du niveau de la mer en vue d'accroitre, au moyen d'un barrage immergé, la charge d'eau douce dans le karst et de tenter d'en réaliser le captage.

1490 Potter, H.C. (1968) - A preliminary account of the stratigraphy and structure of the eastern part of the Northern Range, Trinidad: Port of Spain, Trinidad; Transactions of the 4th Caribbean Geological Conference, 1965, p. 15-20.

In the study area the Rio Seco Formation is a massive unit of limestone separated by thin bands of phyllites. The stratigraphy and structure of the formation is discussed.

1491 Povara, I. (1984) - Speleologic topography and cartography in Elements of Scientific Speleology, 1, 46 p., 30 figs. [in Romanian].

Starting from introductory notions of topography and cartography, the successive stages are outlined for organizing, performing field measurements, processing values, and cartographic material for drawing karstic cavities. A detailed description is given of the measuring instruments as well as the processing and representation methods.

1492 Povara, I. (1980) - Notes on underground water circulation in the limestone of the Cerna Basin: Travaux de l'Institut de Spéologie "Emile Racovitza", 19, p. 237-241 [in French].

A presentation is made of the general features of the underground waterflow through the limestones from the hydrographic basin of Cerna River situated in the southwestern part of Romania. Five large structural units with different hydrogeologic behaviors are distinguished.

1493 Povara, I. (1976) - Notes on the origin of the waters of Izvorul Cernei Resurgence, the Southern Carpathians, Romania: Travaux de l'Institut de Spéologie "Emile Racovitza", 15, p. 207-216, 6 figs. [in French].

Through discharge measurements and fluorescein tracing, the author determined the hydrogeological catchment area of one of the largest karstic emergences in Romania, developed in the upper basins of the rivers Cerna and Juil de Vest.

1494 Povara, I. (1973) - Contributions to the investigation of the thermomineral sources of Baile Herculane: Travaux de l'Institut de Spéologie "Emile Racovitza", 12, p. 337-348, 7 figs. [in French].

The discharge conditions and the termperatures are analyzed of seven thermomineral emergences in the northern part of Baile

Herculane spa which are supplied cold water from a karstic aquifer store in Jurassic-Cretaceous limestones.

1495 Povara, I.; Cosma, R.; Lascu, C.; and Bulgareanu, V.A.C. (1982) - A particular case of karst in salt deposits (Slanic-Prahova, Romania): Travaux de l'Institut de Spéologie "Emile Racovitza", 21, p. 87-93, 3 figs. [in French].

The paper deals with the karst and the pseudokarst developed on the salt massif from Slanic-Prahova. An underground water circulation through salt became obvious when traced with fluoresceine.

1496 Povara, I.; and Diaconu, G. (1974) - The course of the process of gelifraction in the underground medium: Travaux de l'Institut de Spéologie "Emile Racovitza", 13, p. 139-146 [in French].

This work sets forth the authors' remarks on the effects of the gelifraction on the limestone and on the speleothems in underground cavities. The genesis of a particular form of stalactite, the "stalactite with facets", as a result of the gelifraction process, is explained.

1497 Povara, I.; Diaconu, G.; and Goran, C. (1972) - Preliminary remarks on the caves influenced by the thermo-mineral waters in the Baile Herculane area: Travaux de l'Institut de Spéologie "Emile Racovitza", 11, p. 355-365 [in French].

Several particular hydrological and mineralogical aspects which were observed in five caves influenced by thermo-mineral waters are described.

1498 Povara, I.; Gutt, W.; and Zakarias, A. (1981) - Epuran Cave: Bucuresti; Editura Spor-Turism, 24 p., 86 photographs [in Romanian with English, French, and German abstracts].

An illustrated album showing one of the most beautiful caves in Romania. It pinpoints the major stages of exploration and research of this cave which is 4.5 km long.

1499 Povara, I.; and Lascu, C. (1978) - Notes on underground water circulation in the graben of Cerna: Travaux de l'Institut de Spéologie "Emile Racovitza", 17, p. 193-197, 2 figs. [in French].

A particular type of deep drainage along the faults delimiting the graben of Cerna is presented. There are two karstic aquifers separated by a granitic body. The southern compartment, where an influx of thermo-mineral waters exists (Baile Herculane), is supplied by a northern compartment with predominantly cool waters.

1500 Povara, I.; and Marin, C. (1984) - Hercule thermo-mineral spring: Hydrogeological and Hydrochemical Considerations, Theoretical and Applied Karstology, 1, p. 183-194, 8 figs. [in English with Romanian abstract].

The authors present the variations in temperature, discharge, and chemism of the Hercule thermo-mineral spring (Baile Herculane), the main discharge of an extensive syncline structure developed in Jurassic-Cretaceous limestone. These variations are explained.

1501 Povara, I.; Schmidt, N.; and Petcu, A. (1970) - Morphospeleological observations in an area situated between Oravita and Ciclova Montan (Banat): Bucuresti; Livre du Centenaire "Emil G. Racovita", Editura Academiei R.S.R., p. 621-626 [in French].

The authors present 11 karstic cavities developed in two Jurassic-Cretaceous limestone bars (syncline flanks) in the Banat Mountains. Several morphological and speleogenetic considerations are made.

1502 Powell, R.L. (1977) - Joint patterns and solution channel evolution in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 255-269.

1503 Powell, R.L. (1977) - Lateral unloading of isotropic rock as a process of solution channel enlargement in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 433-442.

1504 Powell, R.L. (1976) - Some geomorphic and hydrologic implications of jointing in carbonate strata of Mississippian age in south-central Indiana: U.S.; Purdue University Ph.D. dissertation, 204 p.

1505 Powell, R.L. (1976) - Theories of the development of karst topography in Melhorn, W.N.; and Flemal, R.C., editors, Theories of Landform Development, Proceedings of the Sixth Annual Geomorphology Symposium Series: U.S.; Proceedings.

1506 Powell, R.L. (1968) - The geology and geomorphology of Wyandotte Cave, Crawford County, Indiana in Proceedings of the Indiana Academy of Science for 1967: U.S.; Proceedings, Vol. 77, p. 236-244.

1507 Powell, R.L.; and Forbes, J.R. (1982) - Karst drainage basins in central southern Indiana: U.S.; Geological Society of America, Abstracts with Programs, 14:5, p. 268.

The Crawford Upland and Mitchell Plain in central and southern Indiana are in places extremely karstified. All low flows and some storm water from two major streams are diverted to subterranean routes. Storm-water discharges from springs are commonly 100 times greater than the low discharge.

1508 Powell, W.J.; Copeland, C.W.; and Drahovzal, J.A. (1970) - Delineation of linear features and application to reservoir engineering using Apollo 9 multispectral photography: U.S.; Alabama Geological Survey Information Series 41, 37 p.

1509 Pray, Lloyd C.; and Murray, Raymond C., editors - Dolomitization and limestone diagenesis: A symposium [Society of Economic Paleontologists

and Mineralogists, Special Publication No. 13]: U.S.; UMI Books on Demand.

1510 Preka, Nikola; and Lipold, N.P. (1976) - A contribution to study of self purification capability of karst underground water-courses in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 719-729.

The speed of self-purification was computed for the reach Pivka Cave - Planina Cave, 3.0 km long, with the average travel time of 96 hours. Based on the registered pollution load at the upstream and downstream cross sections, the degree of self-purification of 62 percent and the coefficient of oxygen consumption kl(r) - 0.105 have been determined.

1511 Preka, Nikola; and Lipold, N.P. (1976) - A contribution to treatment of drinking water of karst origin in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 731-741.

Investigations with water at the Radobolja Spring were done by studying the chemical characteristics of karst waters for optimal results in their treatment by use of the standard coagulant, aluminum sulfate (alum).

1512 Pribyl, Jan. (1973) - Paleohydrography of the caves in the Moravsky kras (Moravian karst): Czechoslovak Academy of Sciences, Institute of Geography, Brno, Studia Geographics 28, 87 p.

An outline of the paleohydrographic conditions in the northern part of the Moravian karst in the youngest geological period (Quaternary). The processes under which the cave systems developed and the study of the processes of sedimentation on the basis of sedimentological research of sedimentary fillings of caverns are discussed.

1513 Price, D.J. (1984) - Karst progression in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 17-22.

The author studied two areas in Florida with different rates of karst activity: a slight to moderately paleo-karst area in Madison County, and a more active karst area in Suwannee County.

1514 Priesnitz, K. (1976) - The problem of surface modelling by solution, a case study: in Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; p. 335-340.

In addition to Corbel's solution rate calculations, the author introduces a surface lowering/surface modelling ratio to characterize the morphological effects of solution on different rocks and to characterize the actual situation of karst morphology.

1515 Priesnitz, Kuno. (1969) - Das karstrelief des südlichen harzvorlandes in Lichte neuerer arbeiten zum system $CaSO_4$-NaCl-H_2O: Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 1, p. M35/1-M35/9.

A study of the karst relief of the southern border of the Harz Mountains in light of recent papers about the system $CaSO_4$-NaCl-H_2O. Also the well known pressure-temperature conditions permit the geomorphological and geological facts to be deduced consistently from the factors.

1516 Prince, D. (1975) - The Cave of Swords - a natural wonder of Mexico: U.S., San Diego; Lapidary Journal, 29:4, p. 846-849.

1517 Proctor, Paul Dean; Kisvarganyi, Geza; and Garrison, Ed. (1977) - Heavy metal additions to waters of the Joplin area, Tri-state mining district, Missouri in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 369-387.

An account of the quality of water in the near surface Mississippian and the deeper Cambro-Ordovician aquifers of the zinc producing Joplin area. A thorough knowledge of the geological setting is necessary in selecting well sites to insure a reliable quality source.

1518 Proctor, P.D.; Spreng, A.C.; and Harris, T. (1982) - Sinkhole model simulation and field analogs, central Missouri: U.S.; Geological Society of America, Abstracts with Programs, 14:5, p. 344.

Geologic structures which might develop in flat-lying beds subject to extensive solution action were studied by the authors in the laboratory. Model conditions simulated solution activity under: (1) a thin cover of competent and incompetent insoluble sediments, and (2) competent and incompetent layers with penecontemporaneous sedimentation in the sinking trough area.

1519 Prokopovich, N.P. (1984) - Hydrocompaction sinkholes in the San Joaquin Valley, California in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 237-241.

Karst processes are the main, but not sole, source of sinkhole development. Sinkholes also may be developed by melting of buried ice blocks, mining, geothermal activity, subsurface nuclear explosions, etc. One of the least known, and fortunately not widespread, type of sinkholes is that created by hydrocompaction.

1520 Prox, A. (1984) - On the genesis of the Piatra Craiului: Naturwissenschaftliche Forschungen uber Siebenburgen, Vol. 2, p. 337-354, 7 figs., Bohlau Verlag Koln Wien [in German].

The author has explored the potholes in the Piatra Craiului massif (Transylvania, Romania) hoping to discover an access route to a

hypothetical network of caves that might have been located deep inside the permeable mesocretaceous conglomerates. He concludes that strong orogenetic forces produced numerous faults which cross the whole mesocretaceous complex. The swallow holes are merely large, deep, and half-open faults.

1521 Puente, Celso. (1976) - Statistical analysis of water-level, springflow, and streamflow data for the Edwards aquifer in south-central Texas: U.S.; U.S. Geological Survey Report, Edwards Underground Water District, San Antonio, Texas.

Water-level, springflow, and streamflow data were used to develop simple and multiple linear regression equations for use in estimating water levels in wells and the flow in three major springs in the Edwards aquifer in the eastern San Antonio area. The results compare favorably with observed data.

1522 Puente, Celso. (1975) - Relation of precipitation to annual ground-water recharge in the Edwards aquifer, San Antonio area, Texas: U.S.; U.S. Geological Survey Open-File Report 75-298, 31 p.

A simple linear regression equation used to estimate annual recharge to the Edwards aquifer was outlined from historical records and mean-annual precipitation data computed from rainfall records. The results compared favorably with observed stream flow and precipitation data.

1523 Puente, Celso. (1973) - Ground-water discharge from the Edwards and associated limestones, San Antonio area, Texas, 1972: U.S.; Edwards Underground Water District Bulletin 31, San Antonio, Texas.

An account of the distribution of discharge both in amounts and areally in the San Antonio area.

1524 Puente, Celso. (1972) - Records of precipitation, water levels, and ground-water recharge to the Edwards and associated limestones, San Antonio area, Texas, 1971: Edwards Underground Water District Bulletin 30 (out of print).

An account of the amount and origin of recharge into the Edwards.

1525 Puente, Celso. (1969) - Ground-water discharge from the Edwards and associated limestones, San Antonio area, Texas, 1968: Edwards Underground Water District Bulletin 20.

An account of the occurrence and amount of discharge from the Edwards underground reservoir.

1526 Purdue, A.H. (1907) - On the origin of limestone sinkholes: Science, Vol. 26, No. 565, p. 120-122.

A discussion on the origin of naturally induced sinkholes.

1527 Puscariu, V.; Rusu, T.; and Viehmann, I. (1964) - Caves in the Caras karst: Bucharest; Trav. Inst. Spéol. "Emil Racovita", III, p. 83-129, 32 figs. [in Romanian].

After a brief historical survey of research work, the physico-geographic conditions of the area in which the Caras Gorge evolved are outlined and assessments made on its genesis and evolution. Exokarstic forms are presented and nine underground cavities are described in full.

1528 Queen, J.M. (1980) - Evidence of a sea level low stand during the Guadalupean, Upper Permian rocks of the Guadalupe Mountain, New Mexico: U.S.; Geological Society of America, Abstracts with Programs, 12:7, p. 504-505.

Permian karst features discovered in recent work are collectively equivalent in scale and development to a mature karst surface. Features include terra rosa soil, caliche, and collapse breccias. These features demonstrate considerable exposure during Guadalupean time.

1529 Quinlan, J.F. (1982) - Groundwater basin delineation with dye-tracing, potentiometric surface mapping, and cave mapping, Mammoth Cave region, Kentucky, U.S.A.: Switzerland, Bern; Beitr Geol Schweiz Hydrol, 28:1, p. 177-189.

1530 Quinlan, J.F. (1981) - Hydrogeology of the Mammoth Cave region, Kentucky: U.S.; Geological Society of America, Abstracts with Programs, 13:7, p. 534.

More than 25 ground-water basins in the Mammoth Cave area were delineated. The depth of ground-water circulation is greater in the Mammoth Cave area than in adjacent areas because of greater local relief and steeper dips limiting the width of the limestone outcrop belt.

1531 Quinlan, J.F., Jr. (1978) - Types of karst, with emphasis on cover beds in their classification and development: U.S.; University of Texas at Austin Ph.D. dissertation, 342 p.

1532 Quinlan, J.F. (1974) - Origin, distribution, and detection of development of two types of sinkholes in an anthropogenic karst, South Africa (abstract): U.S.; Proceedings of the 4th Conference of Karst Geology and Hydrology, West Virginia Geological and Economic Survey, p. 161.

The development of voids and arches due to dewatering and its consequences are discussed for the dolomitic karst in Transvaal where there is a residuum cover. Gravimetrics has been used to measure depth to bedrock but only a series of closely spaced drilling sites gives a reliable account of the subsurface voids.

1533 Quinlan, J.F. (1972) - Karst, related mineral deposits and possible criteria for the recognition of paleokarsts: a review of preservable characteristics of Holocene and older karst terranes: International Geological Congress, 24th Proceedings, Vol. 6, p. 156-158.

Ore-grade deposits of many mineral commodities are associated with modern karst terranes that range in age from Tertiary through Holocene. Prospecting in paleokarsts for mineralized zones is economically justifiable and the author discusses possible means of recognizing paleokarsts.

1534 Quinlan, J.F.; McCann, M.R.; Andrews, W.M.; and Branstetter, J.A. (1977) - Heavy metals and optical brighteners as groundwater tracers in the central Kentucky karst: implications concerning regional hydrology (abstract only) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 535-536.

1535 Quinlan, J.F.; and Ray, J.A. (1981) - Groundwater basins in the Mammoth Cave region, Kentucky (map): Friends of the Karst, Mammoth Cave, Kentucky.

Dye tracing and potentiometric surface maps were used to delineate ground-water basins and flow routes in the Mammoth Cave, Kentucky, area. Most flow in headwaters and mid-reaches is through a dendritic system. A distributive flow pattern is characteristic of lower reaches.

1536 Quinlan, J.F.; and Rowe, D.R. (1978) - Hydrology and water quality in the central Kentucky karst, Phase II, Part A, preliminary summary of the hydrogeology of the Mill Hole sub-basin of the Turnhole Spring groundwater basin: Research Report No. 109, March 1978, 42 p., 9 fig., 1 tab., 1 plate, 14 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 11:17, p. 48-49.

Ten sinking streams have been traced to a high-order stream, Brown River, within Parker Cave. Flow routes within this cave system are highly variable and determined by changes in flood stage. An understanding of their variability, obtained by cave mapping and leveling, is essential for interpreting how water or pollutants can travel through limestone aquifers in seemingly erratic ways. More than 200 tracer tests have been run. Fluorescein, Rhodamine WT, and other dyes have been used.

1537 Quinlan, J.F.; and Rowe, D.R. (1977) - Hydrology and water quality in the central Kentucky karst, Phase I: U.S.; Kentucky Water Resources Research Institute, Research Report 101, 93 p., 22 fig., 12 tab., 46 ref.

Water tracing over distances of as much as 15 miles has made it possible to delineate 13 ground-water basins, 11 of them characterized by distributary flow. Recommendations are made for: (1) the use of drainage basin maps for regional planning and protection of water supplies, (2) protection of other water supplies, and (3) development of specific springs as potential public water supplies.

1538 Quinlan, J.F.; and Rowe, D.R. (1977) - Review of the physical hydrology of the central Kentucky karst: in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 50-63.

Dyes are used to trace and delineate major ground-water basins. The dendritic nature of the system is revealed by mapping underground openings. Water levels respond dramatically to rainfall. This has been done for 13 basins in Kentucky.

1539 Quinlan, J.R. (1984) - Litigious problems associated with sinkholes, emphasizing recent Kentucky cases alleging liability when sinkholes were flooded in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 293-296.

No Kentucky statutes specifically apply to damages to structures which are affected as a consequence of flooding of sinkholes. None of the relevant case law decisions have been published, so the few decisions that have been made are neither binding nor citable in litigation. In cases that went to trial, juries have found for the plaintiffs.

1540 Racovita, E. (1927) - Remarks on the natural glacier called "Ghetarul de la Scarisoara": Bulletin of the Society of Sciences of Cluj, 3, p. 75-108, 10 figs., 4 diagrams [in French].

After a brief historical survey, the geographic location of the ice cave is shown and each cavity sector described in detail.

1541 Racovita, G.; and Craciun, V. (1970) - Considerations on seasonal variations in the ice formations of the "Ghetarul de la Scarisoara" Cave, Livre de centenaire "Emil G. Racovita": Bucharest; the Publishing House of the Academy of the Socialist Republic of Romania, p. 587-616, 10 figs. [in French].

A balance sheet of five annual cycles of monthly measurements of the dynamics of ice stalagmites. A comparison of the periodic variations that characterize permanent and seasonal ice formations.

1542 Racovita, G.; and Craciun, V. (1970) - Notes on topoclimate in the Vadu-Crisului Cave: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 9, p. 61-80, 10 figs. [in French].

The authors present the annual topoclimatic balance in a cavity with bidirectional aeration established on the basis of a complete series of measurements performed in 24-hour cycles. They present an approach to daily and seasonal variations in the temperature of the air, relative humidity, aeration velocity, and water vapor pressure.

1543 Racovita, Gh. (1979) - Current requirements for the protection of the Apuseni Mountains Caves: Nature and Environmental Protection, 23:2, p. 127-134, 8 figs. [in Romanian].

A synthesis of the scientific considerations which should underlie the protection of the major speleological features in the Apuseni Mountains karst, containing hydrogeological, morphological, crystallographic, and biological elements.

1544 Racovita, Gh. (1973) - On the physical characteristics of the medium of the caves in Cuba, Résultats des expéditions biospéléologiques Cubano-Roumaines à Cuba: Bucharest; the Publishing House of the Academy of the Socialist Republic of Romania, 1, p. 55-68, 18 figs. [in French].

A brief analysis of topoclimatic factors in correlation with the genetic and morphological elements characteristic of 21 caves explored in Cuba and a presentation of the thermohygrometric measurements performed in the respective caves.

1545 Racovita, Gh. (1972) - On the correlation between the evolution of the climate and the dynamics of the underground ice depositions in the Scarisoara Cave: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 9, p. 373-392, 11 figs. [in French].

The establishment of quantitative relationships between the dynamics of the ice formations and the topoclimatic factors of the cave and between the latter and outside meteorological factors. The correspondences between the microstratigraphic elements of the underground ice deposition and the climatic fluctuations of the past 250 years are reconstituted.

1546 Racovita, Gh. (1967) - New contributions to the study of the topoclimate of the "Ghetarul de la Scarisoara" Cave: Annales de Spéléologie, 22(4) p. 757-786, 7 figs. [in French].

A study is given of the topoclimatic characteristics of the cave, set according to three annual cycles of periodical measurements. An analysis is given of the influence exerted by outside meteorological factors on the underground climate.

1547 Racovita, Gh.; and Cocean, P. (1977) - Climatological research in the Valea Lesului Cave: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 16, p. 183-201, 13 figs. [in French].

The authors present the topoclimatic balance of a cavity with unidirectional aeration on the basis of monthly measurements performed for one and a half years. They give a mathematical analysis of the results and establish the theoretical curves which model annual and seasonal thermometric variations.

1548 Racovita, Gh.; and Craciun, V. (1981) - A topoclimatic study of the Fata Apei Cave: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 20, p. 157-178, 14 figs. [in French].

The authors present a survey of the results scored during two annual cycles of measurements and an approach to the specific aspects of underground topoclimatic factors, including a mathematical modeling of temperature variations.

1549 Racovita, Gh.; and Rusu, T. (1968) - The use of the self-reducing tacheometer in cave mapping: Bucarest; Trav. Inst. Spéol. "Emil Racovita", VII, p. 233-242, 5 figs. [in Romanian].

The particularities of the use of this device in underground topography and a new method of graphic representation, specific to the profiles that can be obtained with its help, are outlined.

1550 Racovita, Gh.; and Viehmann, I. (1984) - On the role of underground condensation in the genesis of ice stalagmites: Bucarest; Trav. Inst. Spéol. "Emil Racovita", 23, p. 89-97, 4 figs. [in French].

The share of condensation water in the genesis and dynamics of the ice stalagmites in the cave at Scarisoara (the Bihor Mountains) is assessed and the factors responsible for the strict location of these formations in the glacial zone of the cave are discussed.

1551 Racovita, Gh.; and Viehmann, I. (1966) - Observations on the dynamics of ice stalagmites at the "Ghetarul de la Scarisoara - Sala Biserica": Bucarest; Trav. Inst. Spéol. "Emil Racovita", 5, p. 43-65, 15 figs. [in Romanian].

The authors present the results of a series of periodic measurements concerning the dynamics of ice stalagmites in the cave at Scarisoara (the Bihor Mountains).

1552 Raghu, D.; Lifrieri, J.J.; and Rhyner, F.C. (1984) - Use of percussion probes for the design and construction of foundations in and on carbonate formations in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 171-176.

A technique of designing foundation in karst regions using percussive probe penetration rates is presented through case histories.

1553 Raghu, D.; and Tiedeman, C. (1984) - Sinkhole risk analysis for a selected area in Warren County, New Jersey in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 167-169.

For the design and construction of structures in and on carbonate formations, a sinkhole risk analysis provides valuable data. In this paper, a method of performing a sinkhole risk analysis for a selected area in Warren County, New Jersey, is presented. This method is based on field reconnaissance and review of geologic maps to provide a probability base for additional site specific investigation.

1554 Rakviashvili, K. (1976) - On the karst phenomena of the Racha Range (Western Georgia): in Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; p. 341-346.

A description of a classical type of mountain karst in the Racha Range, western Georgia.

1555 Ramljak, P.; Filip, A.; Milanovic, P.; and Arandjelovic, D. (1976) - Establishing karst underground connections and responses by using tracers in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 237-258.

1556 Randazzo, A.F.; and Hickey, E.W. (1979) - Dolomitization in the Floridan aquifer: American Journal of Science, Vol. 278, p. 1177-1184, October 1978, 2 fig., 2 plates, 2 tab., 21 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 12:4, p. 4.

Dolomitization continued with time as rocks of supratidal and other environments of the area were subjected to repeated lateral migrations of a salt-water/fresh-water interface and phreatic ground water.

1557 Randazzo, A.F.; and Spangler, D.P. (1983) - Environmental aspects of karst hydrology in Florida in Herschman, A., editor, Abstracts of Papers of the 149th National Meeting of the American Association for the Advancement of Science: U.S.; AAAS Publication 83:2, p. 30.

1558 Rankama, K.; and Sahama, T.G. (1950) - Geochemistry: U.S.; University of Chicago Press, 912 p.

1559 Rappmund, R.A. (1974) - Ground-water discharge from the Edwards and associated limestones, San Antonio area, Texas, 1973: Edwards Underground Water District Bulletin 32 (out of print).

An account of the occurrence and amount of discharge from the Edwards and associated limestones.

1560 Raridon, Richard J.; and Fields, David E. (1977) - Numerical simulation of watershed response using the Unified Transport Model - Part II, validation studies in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 151-161.

In order to validate the Unified Transport Model, it was necessary to compare simulated results with those of collected data.

1561 Rauch, H. (1974) - The effects of silty streaks and bedding partings on cave development in central Pennsylvania in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 153-160.

Size and frequency of the silty streak seems to control the development of caves and bedding planes. However, above a thickness of 5 mm they are associated with little solutional activity.

1562 Rauch, H.W. (1972) - The effects of lithology and other hydrogeologic factors on the development of solution porosity in the middle-Ordovician carbonate of central Pennsylvania: U.S.; Pennsylvania State University Ph.D. dissertation, 547 p.

1563 Rauch, H.W.; and Werner, E., editors (1974) - Proceedings of the fourth conference on karst geology and hydrology: U.S.; West Virginia Geological and Economic Survey, 192 p.

1564 Raudkivi, A.J.; and Callander, R.A. (1976) - Analysis of groundwater flow: London; Edward Arnold.

1565 Razack, M. (1978) - Contribution à l'étude de la structure des aquifères en roches fissurées numérisation et analyse quantitative de la fracturation relevée sur clichés aériens: France; Thèse Doct. Ing. Hydrogéol. Montpellier, 124 p.

Mise au point d'une méthodologie d'étude numérique des champs de fractures (écriture d'un programme de traitement automatique en Fortran IV. Analyse de la fracturation en fonction de paramètres quantitatifs rigoureusement définis. Analyse du tracé plan représentant la fracturation. Le site faisant l'objet des recherches est localisé sur une zone tabulaire du Causse du Larzac (région de Saint Maurice de Navacelles).

1566 Razack, M. (1980) - Approche quantitative de l'effet d'échelle sur le relevé de la fracturation par photo-interprétation dans l'étude de la géométrie des réservoirs fissurés: France; Mém. Soc. Géol. France, No. 11, p. 49-58.

1567 Razack, M. (1980) - Méthode informatique pour l'étude sur clichés aériens de la fracturation des aquifères en roches fissurées: France; Rev. Géogr. Phys. et Géol. Dyn, Paris, Vol. 23, Fasc. 2, 1981/1982, p. 131-142.

1568 Rea, G.T., editor, (1984) - Proceedings of the National Speleological Society annual meeting, Sheridan, Wyoming, U.S., 1984: U.S.; NSS Bulletin, 46:1, unpaginated.

1569 Rea, G.T., editor, (1983) - Proceedings of the National Speleological Society annual meeting, Elkins, Wyoming, U.S., 1983: U.S.; NSS Bulletin, 45:2, unpaginated.

1570 Read, J.F.; and Grover, G.A., Jr. (1977) - Scalloped and planar erosion surfaces, middle Ordovician limestones, Virginia: Analogues of Holocene exposed karst or tidal rock platforms: U.S., Tulsa; Journal Sedimentary Petrology, 47:3, p. 956-972.

Scalloped and planar erosion surfaces found in the Middle Ordovician of Virginia are believed to have formed initially as exposed karst on supratidal, prograded, early lithified tidal flat limestones. They may occur in other places and could be used to define paleoshorelines in the absence of tidal flat deposits.

1571 Reams, Max W. (1974) - Rate of carbon dioxide loss and calcite-ceragonite deposition in caves in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economical Survey, p. 179-182.

Laboratory analysis was done by the author to determine the factors which affect the precipitation of aragonite. Rapid loss of carbon dioxide, agitation of solution, the presence of vegetation are factors favorable to the precipitation of aragonite. Dolomitic sources give more aragonite than a similar solution of limestone.

1572 Reams, Max W. (1965) - Laboratory and field evidence for a vadose origin of foibe (Dourepits): International Journal of Speleology, Vol. 1, Part 3, Weinheim, 1965, p. 373-389.

The purpose of the paper is to present a body of evidence drawn from laboratory model studies, field observations, and water analyses in support of the lateral extension theory for the development of foibe.

1573 Reardon, E.J. (1974) - Thermodynamic properties of some sulfate, carbonate and bicarbonate ion pairs: Ph.D. Thesis, Penn State University, 93 p. (Diss. Abstr. Int., 35:11, p. 5486B, 1975).

1574 Reardon, E.J.; and Langmuir, Donald. (1976) - Activity coefficients of $MgCO3^{\circ}$ and $CaSO4^{\circ}$ ion pairs as a function of ionic strength: Geochim. et Cosmochim. Acta, 40:5, p. 549-554.

1575 Reardon, E.J.; and Langmuir, Donald. (1974) - Thermodynamic properties of $CaCO3^{\circ}$ and $MgCO3^{\circ}$ ion pairs from 10°-50°C: American Journal of Science, 274:6, p. 599-612.

1576 Rechtien, Richard D. (1977) - Seismic surface wave investigations of near-surface cavities; a comparison of field results with finite-difference computer model data in Symposium on detection of subsurface cavities: U.S.; Army Corps of Engineers, p. 105-111.

Surface waves are concluded to be the most effective probe in the detection and delineation of voids. There are four reasons: 1) surface wave energy dominates the seismogram precisely in the record time when near surface reflections, down to depths of 3,000 feet or more, would occur; 2) surface wave energy is confined to propagate in the shallow layers within which the cavities reside; 3) surface waves are easy to generate; and 4) the interference of surface waves with subterranean voids can readily be studied by the Finite-Difference Method of computer modeling.

1577 Reeder, H.O.; Wood, W.W.; Ehrlich, G.G.; and Sun, R.J. (1976) - Artificial recharge through a well in fissured carbonate rock, West St. Paul, Minnesota: U.S.; U.S. Geological Survey Water Supply Paper 2004, 59 p.

The Prairie du Chien Group (primarily dolomite) was injected with 2,754,000 gallons (10.6 million liters or 10,426.3 cubic meters) of treated city water which was later detected only in the lower part of the nearest observation well. Tests demonstrated the hydrologic feasibility of artificially recharging the Prairie du Chien and the Jordan Sandstone through a well in the Prairie du Chien.

1578 Reeves, R.D. (1976) - Chemical and bacteriological quality of water at selected sites in the San Antonio area, Texas, August 1968-January 1975: Edwards Underground Water District, San Antonio, Texas.

1579 Reeves, R.D. (1967) - Ground-water resources of Kendall County, Texas: Texas Water Development Board Report 60, 100 p.

Describes the stratigraphic units and their water-bearing properties. Includes sections on source and occurrence of ground water, recharge, movement, discharge, availability of, development of, and chemical quality of ground water. Lower Cretaceous limestones dominate the lithology of the area. Report includes driller's logs, chemical anlaysis tables, water-level maps, and geologic maps and sections.

1580 Reiff, Winfried; and Strobel, Winfried. (1969) - Karsterscheinungen in Raume non Stuttgart: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M40/1-M40/4.

A description of the karst which occurs in the southwest of Germany.

1581 Reitz, Henry M.; and Eskridge, Donald S. (1977) - Construction methods which recognize the mechanics of sinkhole development in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 432-438.

Surging action in soil in the sinkhole prone area of St. Louis County, Missouri, is regarded as an important factor in subsidence development. Engineering constructions must make provisions for subsidence and solution occurrences. The dynamic nature of sinkholes must be realized so that the area will remain under strict monitoring.

1582 Render, F.W. (1973) - Estimating the yield of the upper carbonate aquifer in the metropolitan Winnipeg area by means of a digital model: International Geological Congress Publication, p. 36-45, 1972, 6 fig., 8 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:16, p. 6-7.

A digital model of the upper carbonate aquifer was constructed with a storage coefficient of 0.001. The storage coefficient was altered to 0.00001, and increased vertical recharge was simulated as being proportional to the drawdown. The revised model simulated a more realistic aquifer response to long-term pumpage.

1583 Reuter, F. (1976) - Bemerkungenzu senkungsund erdfallerscheinunzeau in salzkarstgebieten der DDR: in Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; p. 347-352.

1584 Rexroad, C.B.; and Gray, L.M. (1979) - Geologic story of Spring Mill State Park: U.S.; Indiana Geological Survey State Park Guide 7, 4 p.

1585 Reynolds, J. (1979) - Swallow holes and Turloughs in O'Gorman, editor, The Irish Wildlife Book: Dublin; Ormond Prin., p. 58-60.

Describes the seasonal filling of Turloughs by ground water upwelling through swallow holes in spring water and draining dry when ground-water levels fall. Data on flora and fauna of the Turloughs.

1586 Rhodes, D.; Lantos, E.A.; Lantos, J.A.; and Webb, R.J. (1984) - Pine Point orebodies and their relationship to the stratigraphy, structure, dolomitization, and karstification of the Middle Devonian barrier complex: U.S., Lancaster; Econ Geol Bulletin Society Econ Geologists, 79:5, p. 991-1055.

1587 Richter, W. (1977) - Aspects in the establishment of groundwater protection areas in karst regions (abstract only) in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, IAH Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 305-306.

1588 Ridjanovic, M. (1976) - Capacity of karst reservoirs for absorption of heat flux of solar radiation in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 545-556.

Differential equations of heat transfer in reservoirs were derived, assuming that the water heating in reservoirs was mainly due to solar radiation and molecular diffusion.

1589 Rigg, R.; Benedict, B.; and Ingram, M. (1984) - Thailand karst hydrogeologic survey in Rea, G.T., editor, Proceedings of the National Speleological Society Annual Meeting, Sheridan, Wyoming, U.S., 1984: U.S.; NSS Bulletin, 40:1, unpaginated.

1590 Rightmire, C.T.; Pearson, F.J., Jr.; and Back, W. (1974) - Distribution of sulfur isotopes of sulphates in ground waters from the principal artesian aquifer of Florida and the Edwards aquifer of Texas: I.A.E.H., Proc. Ser. No. STI/Pub. 373, Vol. 2, p. 191-207.

1591 Rinker, J.N. (1974) - An application of air photo analysis to a cave location study: U.S.; American Society Photogrammetry Proceedings No. 40, p. 281-289.

1592 Rinker, Jack N. (date unknown) - Infrared thermal detection of caves: U.S.; U.S. Army Engineer Topographic Laboratories, Photographic Interpretation Research Division, 10 p.

The problems encountered in a research project concerned with remote sensing and environmental analysis in Puerto Rico are described.

1593 Ristic, D.M. (1976) - Water regime of flooded karst poljes in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 301-318.

1594 Roberge, Jean (1976) - Quelques phénomènes karstique sur la côte ouest de Terre-Neuve: reconnaissance 1975: Canada, Montréal; Société Québécoise de Spéléologie, 42 p. [in French].

1595 Roberge, J.; and Ford, D.C. (1983) - The upper Salmon River karst, Anticosti Island, Quebec, Canada: Netherlands; Journal of Hydrology, 61:1-3, p. 159-162.

No evidence was found in this area of glacial interference with the ground-water circulation system. The system and landforms are most probably of post-glacial age.

1596 Roberson, C.E.; Feth, J.H.; Seber, P.R.; and Anderson, Peter. (1963) - Differences between field and laboratory determinations of pH, alkalinity and specific conductance of natural water in Geological Survey Research 1963: U.S. Geological Survey Professional Paper 475-C, p. 212-215.

1597 Roberts, S. (1981) - Carlsbad Caverns (New Mexico): U.S.; Plymouth Miner Min Club Journal, 12:1, p. 15.

1598 Robie, R.A.; and Hemingway, B.S. (1973) - The enthalpies of formation of nesquehonite and hydromagnesite: U.S. Geological Survey Journal of Research, 1:5, p. 543-547.

1599 Robinson, R.A.; and Stokes, R.H. (1959) - Electrolyte solutions, 2nd edition: U.K., London; Butterworth & Col. Publ. Ltd., 571 p.

1600 Robl, T.L. (1977) - Factors controlling the geochemistry of vadose and stream waters in a carbonate terrain: U.S.; University of Kentucky Ph.D. dissertation, 216 p.

1601 Roda, Stefan; and Rajman, Ladislav. (1969) - Bericht uber die tätigkeit des spelao-laboratoriums des ostslowakischen museums in Kosice (Tschechoslowakei): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 3, p. 558/1-558/6.

1602 Rodda, P.V.; Fischer, W.L.; Paynes, W.R.; and Schofield (1966) - Limestone and dolomite resources, Lower Cretaceous rocks, Texas: U.S.; Texas University Bureau of Economic Geology Report of Investigations 56, 286 p.

Study of Lower Cretaceous limestone and dolomites from approximately 250 localities in 49 counties in Texas. Chemical analysis of approximately 1,000 samples delineates the occurrence, distribution, quality, reserves, and availability of rocks as industrial raw materials. Includes geologic maps and sections, and tables of chemical analysis.

1603 Rodet, Jr. (1981) - Contribution à l'étude du karst de la Craie; l'exemple normand et quelques comparaisons: France; Thèse Doct. 3 ème cycle Géogr. Paris, 427 p.

Etude des formes superficielles et souterraines, et de leur genèse, dans les formations de craie du Nord-Ouest du bassin de Paris (Pays de Caux).

1604 Rodriguez, N.; Cesar, O.; and de Monroy, Cecilia Briceno. (1980) - Interamerican symposium on isotope hydrology: Bogata, Columbia, Institute de Asuntos Nucleares, 447 p.

1605 Roger, M. (1978) - Liverpool (University party) discover Jamaica's longest caving system: Wells; Descent, 39, p. 18-23.

1606 Roglic, J. (1981) - Les caractères spécifiques du karst dinarique [reprinted from Mémoires et Documents 15:269-278 (1974)] in Sweeting, M.M., editor, Karst Geomorphology, Benchmark papers in Geology, Vo. 59: U.S.; Hutchinson Ross Publishing, p. 292-302.

Deepness of the karst in the large sequence (up to 5000 m. of pure limestone is the peculiarity of Dinaric karst. The cyclic evolution of karst features cannot be proven. Lithologic differences modify water circulation and influence the relief's moulding and besides a deep karst in the coastal zone, there is a fluviokarstic belt on the continental side. In the impermeable rocks, surrounded by the karst, the basins of poljes were laid down. In stable and favorable ecological conditions corrosional plains originated from contact between impermeable rocks and limestones. Diversity of Dinaric karst results from lithological differences and climatic changes. Scientific research and technical works contribute to a better understanding of this classic karst.

1607 Romero, A.E. (1973) - Nuevo metodo en la investigacion del karst, los models naturales y la convergencia de formas in Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; p. 89-108.

A study of karst needs a team of experts from many fields to allow for a full understanding of the methods involved. With the use of models, interpretations can become clearer and more accurate.

1608 Roques, H.; and Ek, C. (1973) - Etude expérimental de la dissolution des calcaires par une eau chargée de CO2: Ann. Apeleol., 28:4, p. 549-563.

A mathematical model of solution is proposed. The differential solution of heterogenous samples is experimentally studied, as well as the respective rates of solution and granular disintegration. The test could be used to determine a standard conodibility index.

1609 Rose, P.R. (1968) - Edwards Formation of Texas: The evolution of an early Cretaceous carbonate bank complex (abstract): U.S.; Geological Society of America Abstracts with Programs, 1968 Annual Meeting, p. 255.

Surface mapping in the Edwards Plateau of west-central Texas and subsurface mapping in south-central Texas permits the correlation of Lower Cretaceous carbonate rocks called Edwards in both areas. This mapping allows the entire central Texas region to be viewed as one large depositional complex.

1610 Rose, Peter, R. (1972) - Edwards Group, surface and subsurface, central Texas: U.S.; The University of Texas at Austin, Bureau of Economic Geology Report of Investigations 74.

An in-depth study of the units which make up the Edwards Plateau in different geographical areas of the plateau.

1611 Rosen, C.J. (1984) - Karst geomorphology of the Door Peninsula, Wisconsin: U.S.; University of Wisconsin Master's Thesis, 119 p.

1612 Rossum, J.H. (1949) - Conductance method for checking the accuracy of water analyses: Analytical Chemistry, Vol. 21, p. 631.

1613 Roth, E.; Merlivat, L.; Courtois, G.; Cornuet, R.; Guizerix, J.; Margrita, R.; Molinari, J.; and Gras, R. (1971) - Application of stable and radioactive isotopes to hydrology and sedimentology: Publ. A Conf. 49/P/634 of 4th UN Intern. Conf. on the Peaceful Uses of Atomic Energy, Genf.

1614 Rouch, R. (1980) - Les Harpacticides indicateurs naturels de l'aquifère karstique: France; Mém. h. sér. géol. France, 11, p. 109-116.

La microfaune récoltée par filtrage des exutoires karstiques nous renseigne sur la structure et le fonctionnement du karst noyé ainsi que sur les échanges avec la surface.

1615 Rouch, R.; Gourbault, N.; and Fernandez-Rubio, R. (1983) - Aportacion del diltrado biologico al estudio de la procedencia del agua en la mina de Reocin (Santander): Spain, Madrid; III Symposio de Hydrogeologia, p. 91-101.

La microfaune qui peuple les eaux souterraines peut être considérée, au même titre que d'autre paramètres, physiques ou chimiques, comme un indicateur naturel pouvant apporter des renseigements sur la structure et le fonctionnement des aquifères et, notamment, sur les échanges avec la surface.

1616 Rouse, Colin. (1976) - An interpretation of valley slopes in South Wales: Cambria, 3:1, 1976, p. 11-32.

An interpretation of valley slopes in Wales composed of sandstones and limestones to determine instability and to determine properties of the slope important for engineering projects.

1617 Rousset, Ph. (1982) - Carte d'hydrogéologie du Vercors et notice explicative: France; Thèse 2 ème cycle Géol. Appl. Grenoble, 72 p.

Synthèse cartographique de l'ensemble des données (géologiques, hydrologiques, spéléologiques) sur l'unité géomorphologique que constitue le massif du Vercors (1,600 km2), et permettant de mettre en évidence les principales caractéristiques de son hydrogéologie.

1618 Router, F. (1973) - Untersuchungen in salzund gipkarstgebiten eine wichkige aufgabe der ingenieurgeologic in der DDR in Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; p. 313-318.

1619 Rubin, P.A. (1985) - Dynamics of karst speleogenesis in the Onondaga Limestone; with emphasis on the Indian Cave system, Mt. Marion, New York: U.S.; The Northeastern Caver, 16:2, p. 37-41.

1620 Ruhe, R.V. (1977) - Summary of geohydrologic relationships in Lost River watershed, Indiana, applied to water use and environment in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 64-78.

A study was made of ground-water and surface-water system interrelationships in order to understand the quantitative hydrology of karst systems. Geomorphology, surficial deposits, soil, and bedrock were studied for the entire area and for sample sections.

1621 Ruhe, R.V. (1975) - Geohydrology of karst terrain, Lost River watershed, southern Indiana: completion report: U.S., Bloomington; Indiana University, Water Resources Research Center, Report of Investigation No. 7, 91 p., 28 fig., 7 tab., 45 ref.

A detailed account of the geomorphology, surficial materials, soil, bedrock, climate, and surface- and ground-water hydrology of the karst terrane of Upper Lost River Watershed in south-central Indiana. Models are constructed for sample parts of the area and the area as a whole and are subjected to systems analysis. Problems in planning for watershed protection and flood prevention are identified.

1622 Runnells, D.D. (1969) - Diagenesis, chemical sediments, and the mixing of natural waters: U.S.; Journal of Sedimentary Petrology, 39:3, p. 1188-1201.

1623 Russel, M.J. (1978) - Downward-excavating hydrothermal cells and Irish-type ore deposits; importance of an underlying thick Caledonian prism: Trans, Inst. M. & M., Vol. 87, p. B168-B171.

Metal ions are leached from Lower Paleozoic sediments exceeding 6 km in thickness. Rising ground-water temperatures induce upward flow and deposition of metals in the limestone sediments deposited on the ocean floor. Forms of karstification are not expected, since the rising fluids are low in carbon dioxide.

1624 Russell, W. (1984) - Caves, karst and city: U.S.; The Texas Caver, 29:6, p. 6-7.

1625 Rusu, T. (1984) - A study of karstic relief: Cluj-Napoca; The Cave, 1, Bulletin of the "Emil Racovita" Student Speleological Group, p. 7-13 [in Romanian].

The work is intended for amateur speleologists and is a handbook for all those who wish to approach research into a karstic region. It includes recommendations on: collection of information items and bibliographic data, extensive research, processing of experiment results, and the proper evaluation of a study.

1626 Rusu, T. (1983) - An introduction to karstology II: Cluj-Napoca; Karst Bulletin, the CEPROMIN Club of Amateur Speleologists, 3, p. 26-46, 5 figs. [in Romanian].

Reference is made to karst-formation processes and water circulation in the karst. The factors which determine the development of karsts are analyzed, and the major exokarstic forms are described. The work concludes with a concise glossary of specialty terms.

1627 Rusu, T. (1982) - An introduction to karstology I: Cluj-Napoca; Karst Bulletin, the CEPROMIN Club of Amateur Speleologists, 2, p. 2-19, 1 fig. [in Romanian].

This work is intended for amateur speleologists and all those wishing to enrich their knowledge of karstology and speleology. After a brief historical survey of the development of karstology, a number of notations are advanced in connection with karstifiable rocks. The types of karst in Romania are analyzed and a glossary of specialty terms is given.

1628 Rusu, T. (1981) - The underground drainages of the Padurea Craiului Mountains: Bucarest; Trav. Inst. Spéol. "Emil Racovita", XX, p. 187-205, 6 figs. [in French].

The major stages of the evolution of the hydrographic network in the Padurea Craiului Mountains are outlined and general considerations are made on underground water circulation. Forty-four known underground drainages and 49 presumed drainages are analyzed.

1629 Rusu, T. (1981) - The Ursilor Cave at Chiscau (the Apuseni Mountains): Revue Roumaine Geology, Geophysique et Geographie, Geographie, 25:2, p. 193-204, 6 figs. [in French].

The work includes a brief historical survey and refers to the morphohydrography of the cave. The genesis and evolution of the karstic system to which it belongs are analyzed according to the paleogeography of the region.

1630 Rusu, T. (1979) - The karst in the Padurea Craiului Mountains, an abstract of a Doctor's Thesis: Litography, the "Babes-Bolyai" University of Cluj-Napoca, 25 p. 6 figs., 1 diagram [in Romanian].

This work is one of the most comprehensive studies on a karstic region in Romania. On the basis of data collected from 1961 to 1978, the author presents his conclusions on the karst in this geographic unit.

1631 Rusu, T. (1978) - General considerations on the karstic capture depressions in the Padurea Craiului Mountains: Bucarest; Trav. Inst. Spéol. "Emil Racovita", XVII, p. 157-164, 3 figs. [in French].

Starting from the examples offered by this geographic unit, the author surveys the major particularities of karstic capture depressions and underscores differences as to poljen and other types of karstic depressions.

1632 Rusu, T. (1978) - The genesis and evolution of the depression at Acre (the Padurea Craiului Mountains): Bucarest; Trav. Inst. Seeol. "Emil Racovita", XVII, p. 145-156, 10 figs. [in French].

Several physico-geographic aspects are surveyed, the genesis and evolution of the depression at Acre are analyzed, and the main karstic forms in this geographic area are described.

1633 Rusu, T. (1977) - The karstic capture depression at Carmazan-Zecehotare (the Padurea Craiului Mountains): Bucarest; Trav. Inst. Spéol. "Emil Racovita", XVI, p. 229-242, 9 figs. [in French].

After a survey of the major physico-geographic aspects, the genesis and evolution of this karstic depression are analyzed, the morpho-hydrological sub-units in its composition are described, and the karstic forms it includes are outlined.

1634 Rusu, T. (1976) - The genesis and evolution of the karstic capture depression at Ponoare (the Padurea Craiului Mountains): Bucarest; Trav. Inst. Spéol. "Emil Racovita", XV, p. 217-232, 6 figs. [in French].

Several physico-geographic aspects are outlined and an analysis is made of the genesis and evolution of the hydrographic network and, implicitly, of the depression at Ponoare. Several more important stages are set according to paleoclimatic conditions: ante-Pleistocene, Pleistocene, Holocene Recent.

1635 Rusu, T. (1975) - The karstic capture depression of Pusta Calatea (the Padurea Craiului Mountains): Bucarest; Trav. Inst. Spéol. "Emil Racovita", XIV, p. 157-168, 6 figs. [in French].

The author refers to the genesis and evolution of the depression at Pusta Calatea, which he considers a peculiar form created under the impact of an underground-captured stream round the swallet of the Mniera Valley. Consequently, the term "karstic capture depression" is suggested to define such features of relief.

1636 Rusu, T. (1973) - The evolution of the karstic valleys in the Padurea Craiului Mountains: Bucarest; Trav. Inst. Spéol. "Emil Racovita", XII, p. 311-335, 15 figs. [in French].

An analysis is made of the factors involved in the general evolution of the valleys in the karst. The author reaches the conclusion that the evolution of karstic valleys registered four important stages: (1) active or primary valleys, (2) temporary active valleys, (3) dry valleys, and (4) sinkhole-like valleys.

1637 Rusu, T. (1973) - The genesis and evolution of the hydrographic network of the Padurea Craiului Mountains, Livre du cinquantenaire de l'Institut de Spéologie "Emil Racovita": the Publishing House of the Romanian Academy, p. 575-589, 3 figs. [in French].

The author hypothesizes the genesis and evolution of the hydrographic network in that geographic unit. Three important stages are distinguished: a primary stage of organization of the hydrographic network; a neogenic stage of bending of the valleys toward peripheral sedimentation basins; and a Pleistocene-Holocene stage of rebending of valleys in the direction of water withdrawal from those basins.

1638 Rusu, T. (1968) - Research of karstic morphology and hydrography in the upper basin of Valea Rosia (the Padurea Craiului Mountains): Bucarest; Trav. Inst. Spéol. "Emil Racovita", VII, p. 11-44, 25 figs. [in Romanian].

After a survey of the genesis and evolution of the hydrographic network, 39 caves, swallow holes, potholes, and springs are described. Results of the fluorescein labellings performed by the author are outlined.

1639 Rusu, T. (1967) - The Caras Gorge: Nature Protection, 11:1, p. 37-50, 8 figs. [in Romanian].

After a brief physico-geographic characterization of the area in which the gorge evolves, the gorge is described and assessments are made concerning its genesis and evolution and the caves on its slopes.

1640 Rusu, T.; Bleahu, M.; Dan, J.; and Mantea, Gh. (1957) - Research of karstic morphology in the "Groapa de la Barsa" (the Bihor Mountains): Cluj; Studies and Research, the Geology-Geography Series, 3-4, VIII, p. 399-419, 5 figs. [in Romanian].

On the basis of topograpic surveys, the work presents the connection between exo- and endo-karstic forms in this geographic unit and approaches the relation between them and local tectonics.

1641 Rusu, T.; and Racovita, Gh. (1981) - The Ursilor Cave at Chiscau: Nature and Environmental Protection, 2:1, p. 57-71, 14 figs. [in Romanian].

A brief description of the physico-geographic features and the morphology of the Ursilor Cave at Chiscau underlies an analysis of the major aspects related to the genesis and evolution of this cavity. The topoclimatic, biospeleological, and paleonthologic particularities of this cave are outlined.

1642 Rusu, T.; and Racovita, Gh. (1971) - The Damis-Ponoras karstic complex (the Padurea Craiului Mountains): Bucarest; Trav. Inst. Spéol. "Emil Racovita", X, p. 15-42, 23 figs. [in French].

The work analyzes the genesis and evolution of the hydrographic network, highlights the role of karstic captures in its disorganization, describes the mode of formation of two karstic capture depressions (Damis and Ponoras), and outlines the major karstic forms in the respective area.

1643 Rusu, T.; Racovita, Gh.; and Coman, D. (1970) - Contributions to the study of the karstic complex at Scarisoara: Ann. de Spéol., 25:2, p. 383-408, 16 figs. [in French].

The work outlines the evolution of the Ghetar-Ocoale karstic system and defines the notions of "system" and "karstic complex". The morphometric parameters of the underground ice deposition are assessed.

1644 Rusu, T.; Racovita, Gh.; and Craciun, V. (1981) - The Meziad Cave: Bucharest; the Sport-Turism Publishing House, 39 p., 68 photographs [in Romanian with abstracts in English, French, and German].

An album of photographs dealing with one of the best known tourist caves in the Apuseni Mountains. The introduction to this work includes a brief historical survey of research work, a description of geographic location, and a presentation of the cave.

1645 Rusu, T.; Racovita, Gh.; and Craciun, V. (1974) - The cave at Meziad - physico-geographic aspects, the genesis and evolution of the cavity: Bucarest; Trav. Inst. Spéol. "Emil Racovita", XIII, p. 147-173, 8 figs. [in French].

The presentation of physico-geographic aspects is followed by a description of the karstic forms in the Meziad Valley basin and a reconstitution of the genesis and evolution of this cavity. On the basis of detailed tacheometric surveys, the morphohydrography of the cave, the main topometric parameters, and the connections with exokarstic forms are discussed.

1646 Rusu, T.; Racovita, Gh.; and Craciun, V. (1970) - The Toplita-Ciur-Tinoasa karstic system (the Padurea Craiului Mountains), Livre de centenaire "Emil Racovita": the Publishing House of the Academy of the Socialist Republic of Romania, p. 627-650, 16 figs. [in French].

The genesis and evolution of the elements that make up this karstic system are outlined and stress is laid on the Ciur-Izbuc Cave (where several footprints of prehistoric man were discovered) and on the Ciur-Ponor Cave.

1647 Rusu, T.; Viehmann, I., Racovita, Gh., and Craciun, V. (1969) - Footprints of prehistoric man in Romania's caves: Nature Protection, 12:2, p. 191-200, 10 figs. [in Romanian].

A brief presentation of the morphology of the Toplita-Ciur-Tinoasa karstic system (in the Padurea Craiului Mountains), which includes the Ciur-Izbuc Cave, the first underground cavity where footprints of paleolithic man were found.

1648 Rutherford, John M.; and Handley, Robert H. (1976) - The Greenbrier Caverns: U.S.; National Speleological Society Bulletin, 38:3, p. 41-52.

The effects of geologic structures on the development of passages and caverns and the hydrology which consists of two parallel drainage lines developed along a structurally complex syncline are discussed.

1649 Ryan, C.R. (1984) - High-volume grouting to control sinkhole subsidence in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 413-417.

Key issues in designing a grouting program for sinkhole subsidence are: grout strength requirements, appropriate grout consistencies, and drilling techniques. Grout materials must be economical yet fit the technical requirements.

1650 Ryan, D. (1985) - Agricultural drainage practices in Ireland: Read at meeting, June 1984, for An Foras Taluntais; published Irish Nat. Comm. IHP, p. 167-184.

1651 Saleem, Zubair A. (1977) - Road salts and quality of ground-water from a dolomite aquifer in the Chicago area in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 364-368.

Continued use of salts to de-ice roads leads to an increase in salt content of surface water. Sensitive species are endangered, especially by the sodium ion. Increases occur in ground water also as the depths of wells and overburden decreases; and it persists over long periods of time due to the slow rate of diffuse flow of ground water.

1652 Salihovic, Alija. (1971) - Quelques observations à propos de la projection des canaux de Grotte sur la surface topografique: Ljubljana; 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 45-51.

A description of the methods used to survey underground passages using geodetic equipment. A relationship between subsurface formations and surface topography appears to exist.

1653 Salomone, W.G. (1984) - Part 1, the applicability of the Florida Mandatory Endorsement for Sinkhole Collapse Coverage - legal aspects in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 319-328.

Florida Statute §627.706 was enacted to provide sinkhole collapse coverage - to protect the property owner from the unexpected damage to structures and personal property arising from the occurrence of sinkholes. This paper addresses the role of the engineer, geologist, and hydrologist in the technical interpretations of the Statute.

1654 Salomone, W.G. (1984) - Part 2, the applicability of the Florida Mandatory Endorsement for Sinkhole Collapse Coverage; case history, foundation settlement of a residential structure - Was it a sinkhole? in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 329-332.

To receive payment on a sinkhole claim, the homeowner must have sustained "sinkhole loss" according to the definition presented in Florida Statute §627.706. The author concluded that although the

residence was generally within an ancient sinkhole, the foundation settlement appeared to be influenced by compression of a peat layer found under part of the residence. Consequently, the Florida Mandatory Endorsement for Sinkhole Collapse Coverage clause was not applicable.

1655 Salvayre, Henri. (1971) - Etude comparée des hydrogrammes aux résurgences de la sorgues, de la vis et de l'esperella (Grands Causses-Causse de Larrac) (Aveyron-Hérault): Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY9/1-HY9/7.

A discussion on the passage of a flood in underground cavities where the author distinguished three stages and was able with the use of semi-logarithms to calculate the coefficient of each component.

1656 Sander. (1936) - Contributions to the study of depositional fabrics - rhythmically deposited Triassic limestones and dolomites: U.S. (Tulsa, Oklahoma); American Association of Petroleum Geologists, 207 p.

1657 Sando, W.J. (1974) - Ancient solution phenomena in the Madison Limestone (Mississippian) of north-central Wyoming: U.S.; Journal Research U.S. Geological Survey, 2:2, p. 133-141.

1658 Sares, S.W. (1984) - Hydrologic and geomorphic development of a low relief evaporite karst drainage basin, southeastern New Mexico: U.S.; University of New Mexico Master's Thesis, 123 p.

1659 Sarin, Ante; and Urbiha, Hrvoje. (1977) - Cartographic novelty in a hydro-geologic map of Croatia in I.A.H. Memoires: Birmingham Congress, U.K., Vol. XIII, Part 1, p. B29-B38.

A hydrogeologic map series of Croatia where carbonate or cavernous rocks have five classes.

1660 Sarvary, Istvar. (1969) - Flowing velocity of the karstic "Beta" waters: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. HY2/1-HY2/5.

The water of karstic springs is composed of two components. One of them, the "Alpha" component, goes toward the spring through sinkholes and large cavities. The other "Beta" component infiltrates the open rock surfaces and goes toward the caves through much smaller fractured openings. The paper compares in analogy the flowing velocities in the vicinity of the mine openings and caves.

1661 Saunders, J.J. (1977) - Late Pleistocene vertebrates of the Western Ozark Highland, Missouri: U.S.; Illinois State Mus, Report of Investigation, 33, 118 p.

1662 Saunders, J.W. (1985) - Pine Mountain karst and caves in Dougherty, P.H., editor, Caves and Karst of Kentucky: U.S.; Kentucky Geological Survey Special Publication 12, p. 86-96.

1663 through 1674 - reserved entries.

1675 Saunders, J.W. (1974) - Paleohydrology of Crump Spring Cave, central Kentucky karst in Conference on Karst Geology and Hydrology, 4th, Proceedings: U.S.; West Virginia Geological and Economic Survey, p. 129-135.

A description of the development of passages in Crump Spring Cave, central Kentucky. The passages represent the headwaters of an abandoned drainage system. Downcutting of the caves has led to ground-water piracy and to development of lower level passages.

1676 Sauro, U. (1976) - Observations on some great solution runnels with nested solution pans of the Venetian Prealps: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 353-361.

Three groups of solution pan runnels were studied in the southern Adige Valley, Italy. These solution forms have been conditioned in their development by the climatic vicissitudes of the post-glacial and could be useful as morphoclimatic and morphochronological indicators.

1677 Savu, Al. (1967) - The relief in the Cheile Turzii Region and its economic usefulness: Studia Universitatis Babes-Bolyai, the Geologia-Geographia Series, Fasciclum 2, p. 115-119, 1 fig. [in Romanian].

Economic aspects, as well as the controversial genesis of the Turzii Gorge are discussed, and new arguments are set forth in support of epigenesis and the role played by underground karstic relief.

1678 Savu, Al.; and Haidu, I. (1984) - On the genesis and evolution of limestone klips in the Trascaului Mountains: Studia Universitatis Babes-Bolyai, the Geologia-Geographia, p. 30-36, 1 fig. [in Romanian].

A critical approach to research concerning the genesis of the alignment of Jurassic calcareous islands in the mass of cretaceous flysch. The opinion that the islands are remains of an overthrust nappe, overthrust folds, and olystolites is invalidated. The idea is offered that the islands are klips.

1679 Savu, Al., and Zagreanu, I. (1976) - Karstic waters and cardiovascular complaints, Romanian contributions to the 23rd International Congress of Geography, Moscow, 1976: Revue Roumaine de Geology, Geophysique et Geographie, p. 121-125, 1 fig. [in French].

An analysis is made of the calcium content of several Vauclusion-type springs in Mesozoic limestone and Eocene limestone. Two groups of apparently healthy individuals who drink calcium-free water and water with a high calcium content are investigated. In the latter case a high incidence of lithiasis and cardiopathy is noted.

1680 Scanlon, B.R. (1983) - A hydrogeological study of the Maine River Basin, Republic of Ireland: U.S.; University of Alabama, Unpublished M.Sc. Thesis.

The hydrogeology of a limestone synclinal basin in Co. Kerry is described and analyzed.

1681 Schillat, Bodo. (1969) - Erscheurungs formen von gebrochenen sinter: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 533/1-533/12.

The author gives information on broken sinters, in particular stalagmites/stalactites which were broken by earthquakes. Included is a discussion of the works and views of other authors which deviate from those given in the paper.

1682 Schindler, J. Stephen. (1982) - Karst of China: Ground Water, Vol. 20, p. 226-230.

1683 Schmalz, R.F.; and Swanson, F.J. (1969) - Diurnal variations in the carbonate saturation of seawater: Journal of Sedimentary Petrology, 39:1, p. 255-267.

1684 Schmidl, A. (editor). (1854) - Zur höhlenkunde des karstes - Die Grotten und Höhlen von Adelsberg: Vienna; Planina und Lass.

1685 Schmidt, V.A. (1980) - Magnetostratigraphy of clastic sediments in the Flint-Mammoth cave system of Kentucky, U.S. - a new high resolution field record extending back one million years: Washington, D.C.; EOS Transactions, American Geophysical Union, 61:17, p. 215.

1686 Schmidt, V.A. (1974) - The paleohydrology of Laurel Caverns, Pennsylvania in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S., West Virginia Geological and Economic Survey, 1974, p. 123-128.

Laurel Caverns, Pennsylvania, is 50 feet thick Mississippian Limestone which is composed of 50 percent clastics and is enclosed by aquicludes. Ground water flows through the limestone. Faults and joints control passage growth but sediment fill which slows down the rate of flow gives a series of maze passages. Trunk passages are formed along the dip with free surface streams. Paleohydrological development of the cavern seems similar to the present hydrologic setting.

1687 Schmidt, W.; and Clark, M.W. (1980) - Geology of Bay County, Florida: U.S.; State of Florida, Bureau of Geology Bulletin 57, 96 p.

1688 Schmidt, W.; and Scott, T.M. (1984) - Florida karst; its relationship to geologic structure and stratigraphy in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 11-16.

Florida is well known for its abundant karst features including sinkholes, springs, and caverns. These landforms are most common in two areas: the north-central portion of the panhandle and a broad area in the central and northwestern peninsula. Within these

regions sinkhole abundance and morphology are directly related to the geologic structure and resulting stratigraphy.

1689 Schoeller, H. (1969) - L'acid carbonique dans les eaux souterraines (Carbonic acid in ground water): France; Bur. Rech. Géol. Minières Bull. (Ser. 2), Sect. 3, No. 1, p. 1-32.

1690 Schoeller, H. (1962) - Les eaux souterraines: Paris; Mason et Cie, 642 p.

1691 Schoeller, H. (1959) - Arid zone hydrology, recent developments: Paris; UNESCO, 125 p.

1692 Schoeller, H. (1955) - Hydrogéologie: Institute Français du Petrol, Ref. 442-I and II, p. 198-202.

1693 Schoeller, H. (1949) - La température des eaux souterraines: Bordeaux, Univ., Lab. Geol., Trav., No. 1, 187 p.

1694 Schoeller, H. (1948) - Le régime hydrogéologique des calcaires Eocene du synclinal du Dyr El Kef (Tunisie): Bulletin de la Société Géologique de France, 5° Serie, T. XVIII, p. 167-180.

1695 Scholle, Peter A. (1978) - A color illustrated guide to carbonate rock constituents, textures, cements, and porosities: AAPG, Memoir 27, p. 241.

This book makes available to geologists who may not be specialists in carbonate petrography a volume which illustrates the major grains, textures, cements, and porosity types found in carbonate rocks.

1696 Schroeder, J., editor (1980) - Le karst de plate-forme de Boischâtel et le karst barré de la Rédemption: état des connaissances: livret de l'excursion de l'Association Québécoise pour l'étude du quaternaire préparée par la Societe Québécoise de Spéléologie: Canada, Montreal; La Société, 133 p. [in French and English].

1697 Schroeder, J. (1979) - Development of cavities of mechanical origin in a cold karst (Nahanni, NWT, Canada): Belgium, Liege; Ann Society Geol Belg, 102:1, p. 59 [in French].

1698 Schroeder, J.H. (1969) - Experimental Dissolution of Calcium, Magnesium and Strontium, from recent biogenic carbonate. A model of Diagenesis: U.S.; Journal of Sedimentary Petrology, 39, p. 1057-1073.

1699 Schroeder, J.; and Arseneault, S. (1978) - Discussion d'un karst dans le gypse d'Hillsborough, Nouveau-Brunswick [Discussion of a karst in the Hillsborough Gypsum, New Brunswick]: Canada; Geogr Phys Quat, 32:3, p. 249-261 [in French, summary in English].

1700 Schulte, A. (1982) - Land of sinkholes; that's Florida: U.S.; The Conglomerate, 43:2, p. 8-10.

1701 Scott, Harold W. (1947) - Solution sculpturing in limestone pebbles: Bulletin of the Geological Society of America, Vol. 58, p. 141-152.

A complex system of sculpturing in pebbles that consists of impure limestone which has original convex surfaces and goes through youth, mature, and old age stages is called solution morel.

1702 Sekerka, I.; and Lechner, J.F. (1973) - Some characteristics of ion-selective electrodes: Canada; Tech. Bull. 72, Inland Waters Directorate, Canada Centre for Inland Waters, Burlington, Ontario, 6 p.

1703 Seleťskii, Yu.B.; Pribluda, V.D.; Polyakov, V.A.; Isaev, N.V.; and Yakubovskii, A.V. (1984) - Use of heavy oxygen isotope concentrations when studying groundwaters of karstified carbonate rocks of the Crimean Mountains: Water Resources, 9:4, p. 404-408, July-August 1982, 1 fig., 2 tab., 11 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 17:7, p. 9-10.

The results obtained from this study allowed the establishment of altitudinal isotope gradients for precipitation of the southern and northern slope; the confirmation of the dominant role of groundwater recharge at high elevations; the establishment of a greater residence time of ground water in the hydrogeological systems of the southern slope compared to the northern slope; and the observance of a predominantly winter recharge of all investigated types of ground waters and its greater role for the southern slope than for the northern slope.

1704 Sencu, V. (1982) - Remarks on the chemism of karstic waters in the Anina Mountains: Geology, Geophysics, Geography, the Geography Series, Vol. XXIX, p. 42-49 [in Romanian].

The calcium carbonate load in the waters that flow through limestone, the hardness of water in karstic exurgences, and the aggressiveness of karstic waters are studied on a calcareous area of 600 km^2.

1705 Sencu, V. (1979) - The karst in the Danube Pass: Bucharest; the "Iron Gages" Group, Speleology, the Publishing House of the Academy, p. 11-28 [in Romanian].

The influence of limestone on the Danube River bed, the karstic morphology of the four calcareous areas in the pass, karstic captures and the age of the karst are studied.

1706 Sencu, V. (1977) - Conventional signs for the map of the karst: Olamanc; Actes du 6 Congrés International de Spéléologie, Vol. VII, p. 107-114 [in French].

The caption of the map of the karst adapted to Romania's territory according to the International Convention signs for karsts.

1707 Sencu, V. (1977) - The karst in the Anina mining field: Geology, Geophysics, Geography, the Geography Series, XXIV:2, p. 199-212 [in Romanian].

The limestone is up to 1,200 m thick and covers the highgrade coal (pit coal) deposit which is exploited at Anina, the Banat Mountains, at the deepest mine in Romania and in Europe (1,100 m deep). Various karstic forms are presented on a color 1:30,000 map.

1708 Sencu, V. (1976) - Die eigenschaften des karstes in dem Anina-gebirge: in Proceedings of the 6th International Congress of Speleology: Olomouc, CSSR; p. 363-366.

1709 Sencu, V. (1975) - The karst of the Mehedinti Mountains, Romanian review: Geology, Geophysics, Geography, the Geography Series, XIX:1, p. 35-47 [in French].

The karst is situated at an altitude of roughly 1,300 m and is strongly influenced by tectonics. A wide range of forms are mentioned. A color 1:50,000 map shows karstic forms.

1710 Sencu, V. (1973) - The karst, scale 1:1,500,000; Nera Gorge, scale 1:50,000; the Vilcan Mountains, scale 1:50,000; and the loess sinkholes in the Mostistea Plain, scale 1:100,000 in Atlas of the Socialist Republic of Romania, Sheet III-4, the Karst: Bucharest; the Publishing House of the Academy of the Socialist Republic of Romania [in Romanian].

A color map of the karst in Romania shows that karstifiable rocks total 49,527 km^2 (20.85% of Romania) of which 4,602 km^2 (1.94%) are crystalline limestone and dolomite, 150 km^2 (0.06%) are salt, and 975 km^2 (0.41%) are sandstone and calcareous conglomerates, 43,800 km^2 (18.44%) are loessial depositions.

1711 Sencu, V. (1973) - The karstic waters in the mining area of the town of Anina (Banat): Livre du cinquantenaire de l'Institut de Spéléologie "Emil Racovita", p. 591-604 [in French].

Colorings with fluorescein highlight the routes of underground karstic water and their areas of supply.

1712 Sencu, V. (1972) - The Comarnic and Popovat Caves: the Publishing House of the Academy, 60 p., 118 photographs [in Romanian].

Exokarstic forms and their evolution, the genesis, hydrography and evolution of caves, as well as speleothems are approached. Eight figures and a color 1:25,000,000 map show karstic phenomena. Abstracts in French and German.

1713 Sencu, V. (1972) - The map of the karst in the Lacva Mountains (Banat), according to the international list of conventional signs: Romanian Review, Geology, Geophysics, Geography, the Geography Series, XVI:1, p. 41-42 [in French].

A color 1:50,000 map of the karst drawn up on the basis of international conventional signs adapted to Romania's territory.

1714 Sencu, V. (1972) - The Runcu Gorge, geomorphological remarks: Geology, Geophysics, Geography, the Geography Series, XIX:1, p. 81-92 [in Romanian].

Exo- and endokarstic forms and the successive captures of the Runcu River favored by the tectonics of the calcareous rocks.

1715 Sencu, V. (1971) - The "Ochuil Bea" Lake (the Anina Mountains): Geology, Geophysics, Geography, the Geography Series, Vol. XVIII, p. 231-237 [in Romanian].

A karstic lake consisting of a sinkhole and supplied by an underground karstic spring.

1716 Sencu, V. (1970) - Karstic phenomena in tectonic breccia, Romanian Review: Geology, Geophysics, Geography, the Geography Series, XIV:2, p. 277-280.

A cave in crystalline limestone and a tectonic breccia made of crystalline limestone are studied.

1717 Sencu, V. (1970) - Valleys of sinkholes in the karst of the Banat Mountains: Geology, Geophysics, Geography, the Geography Series, XVII:2, p. 177-185 [in Romanian].

The valleys of sinkholes are formed through the alignment of sinkholes under the impact of the general topography of the relief, through contact between calcareous rocks of various origins, contact between calcareous and non-calcareous rocks, and tectonic lines. The transverse profile acquires various shapes and the longitudinal profile is undulated.

1718 Sencu, V. (1968) - The map of the karst and the clastic karst in Romania, Romanian review: Geology, Geophysics, Geography, the Geography Series, XII:1-2, p. 35-41 [in French].

It gives a color 1:1,000,000 map including karstic and clastic-karstic formations (crystal limestone and dolomite, mesozoic limestone and dolomite, neozoic limestone, gypsum, salt, tuff and volcanic agglomerations, sandstone and calcareous conglomerates, loessial depositions with calcium carbonate).

1719 Sencu, V. (1968) - "Muntele de sare" in Slanic Prahova: Bucharest; Ocrot. Nat., 12:2, p. 167-179, 13 fig., 4 ref. [in Romanian with French res.].

There is given a detailed analysis of the "Muntele de sare", a natural reserve and part of the salt massif from Slanic-Prahova and the exokarst on the insoluble rocks which cover the salt karst.

1720 Sencu, V. (1967) - "Cazanele Dunarii", geomorphological remarks: Geology, Geophysics, Geography, the Geography Series, XIV:2, p.161-171 [in Romanian].

Exo- and endokarstic forms, karstic captures and their evolution are studied.

1721 Sencu, V. (1967) - Contributions to the study of water supply in the town of Anina from the neighbouring eastern karstic area: Cluj; Stud.

Univ. Babes-Bolyai, Geology-Geography Series, Fascicle 2, p. 207-213 [in Romanian].

Karstic waters and karstic captures in correlation with exo- and endokarstic forms are studied for water supply.

1722 Sencu, V. (1967) - The morphology and formation of Marby Slanic-Prahova: Romanian Review Geology, Geophysics, Geogragphy, the Geography Series, XI:1, p. 49-65 [in German].

The karstic forms situated on the salt mountain and on the insoluble rocks that cover the karstified salt are studied. Karstic collapse sinkholes and karstic subsidence valleys are found on the insoluble rocks with salt in the bedrock.

1723 Sencu, V. (1966) - Geomorphological remarks on the karst on the Cirsei Hill (Banat): Geology, Geophysics, Geography, the Geography Series, XIII:1, p. 99-106 [in Romanian].

Exo- and endokarstic forms, their genesis and evolution.

1724 Sencu, V. (1965) - The karst on halite in Romania, Romanian review: Geology, Geophysics, Geography, the Geography Series, IX:1, p. 45-58 [in French].

The distribution of salt deposits in Romania and their shape, the morphology and genesis of the karst on salt, a classification of karstic formations in natural karstic forms (lapies, karstic holes, karstic solution and crumbled sinkholes, caves) and anthropic karstic forms (karstic cavities, crumbled salt pits, karstic shafts, karstic galleries, and underground solution basins).

1725 Sencu, V. (1964) - Research in the karstic phenomena in the southern part of the locality of Anina (Banat): Geology, Geophysics, Geography, the Geography Series, Vol. XI, p. 149-162 [in Romanian].

Caves and karstic captures, their genesis and evolution.

1726 Sencu, V. (1963) - Research in karstic phenomena round the locality of Anina (Banat): Problème de Géografie, Vol. X, p. 155-180 [in Romanian].

Caves and karstic captures, their genesis and evolution.

1727 Sendlein, L.V.A.; and Palmquist, R.C. (1977) - Strategic placement of waste disposal sites in karst regions in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 323-336.

1728 Seneraro, Rino. (1969) - Osservazioni su alcune morfologie ipogee nei calcari presso sagrado d'isonzo ed il lero mapporto con l'incarsiniento freatico: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 510/1-510/5.

1729 Serban, M. (1984) - On the meandres in the Vintului Cave (the Padurea Craiului Mountains): Bucharest; Theoretical and Applied Karstology,

Vol. I, p. 107-116, 4 fig., the "Emil Racovita" Speological Institute [in French].

The meanders of the fossil karst-formation level corresponding to the first floor of the cave are described. The study of the transverse sections highlights an alternation between the elliptical and rectangular form of the pressure major distributor which may be observed in the gallery roof.

1730 Serban, M. (1970) - Compared morphology of the ice stalagmites in the cave at Scarisoara: Bucarest; Trav. Inst. Spéol. "Emil Racovita", Vol. 9, p. 35-60, 13 fig. [in French].

Ice stalagmites are considered to be periglacial formations of cave glaciation which developed at the limit between the cold and warm meroclimate inside the cave. Their morphology differs from one place to the other depending on local microclimate. The Scarisoara Cave is distinguished by the ice monocrystals in the spherical heads of the stalagmites.

1731 Serban, M. (1961) - The "Rotonda" - a new form of underground water flow: Kie Hohle, 12 (2/3):115, Wien [in German]. Abstract of a work to be read during the Third International Congress of Speleology, Vienna, Austria.

Underground meanders are shown to be produced by the same fluid mechanics laws that cause the meanders of epigenous streams. The fixed meanders in the Vintului Cave at Suncuius are highly developed. They conserve all the phases in their historical evolution and represent more complex features of relief for which the term "rotonda" is suggested.

1732 Serban, M.; Blaga, L.; Chifu, A.; and Ciobotaru, T. (1967) - Contributions to the stratigraphy of ice deposits in the Scarisoara ice body: Bucarest; "Emil Racovita", Vol. 6, p. 107-140, 12 fig. [in Romanian].

The authors present a study of the stratigraphy of the cave ice depositions in the Scarisoara Cave in the form of stalagmites and horizontal strata which generated an ice block 18 m thick in the past 3,000 years. With a view to preparing a paleoclimatic study of the whole ice body, the isotopic composition (H2, 018) of 23 layers with significant differences was analyzed and certain periodicity was observed.

1733 Serban, M.; Coman, D.; and Givulescu, R. (1948) - Recent discoveries and observations concerning the natural ice body called "Ghetarul de la Scarisoara": Bulletin de la Société des Sciences de Cluj, Vol. 10, p. 174-210, 13 fig. IV diagrams [in French].

The authors outline explorations of the Ghetarul de la Scarisoara Cave conducted in 1947 under the aegis of the Speleological Institute in Cluj. The ice body in the cave is stratified and includes packs of ice layers alternating with strata of impurities which indicate climatic cycles.

1734 Serban, M.; Coman, D.; and Viehmann, I. (1957) - Speleological research in the Apuseni Mountains (Romania): Ceskoslovensky Kras, 10(1), p. 11-25, 8 fig. [in French].

The karstic regions in Romania are briefly presented and the cave complex is described, including the caves "Ghetarul de la Scarisoara" and "Pojarul Politei" and the cave at Sesuri. A description is given of the great sinkholes of Cetatile Ponorului and of the Neagra Cave in the Barsa Hole.

1735 Serban, M.; and Domsa, M. (1985) - On the micro-relief of corrosion in the Vintului Cave (the Padurea Craiului Mountains, Romania) and the morphogenesis of the plane roof in the forced conduits: Bucharest; Theoretical and Applied Karstology, Vol. 2, 9 fig., the "Emil Racovita" Speleological Institute [in French].

The scallops and flutes in the cave were measured to assess flow velocities in fossil conduits. A discharge equation and the width of the conduit were established for six transverse sections. Applying the assessed velocities to the morphological study of phreatic conduits, the conclusion was drawn that the eccentricity of the ellipse-shaped transverse section increases with the rise in the kinetic energy of the stream until extremely flat sections, which create the plane roofs of a dynamic nature, are generated.

1736 Serban, M.; and Heltmann, H. (1961) - Notes on the flora in several caves in the Western Carpathians of Romania: Wien; Die Höhle, 12 (2/3), p. 87 [in German]. An abstract of a paper to be read during the Third International Congress of Speleology, Vienna, Austria.

The microclimatic conditions specific to cave mouths are often expressed by floral particularities. The authors discuss the flora particular to specific caves in Romania.

1737 Serban, M.; and Viehmann, I. (1963) - The similarity between underground and surface streams, novelties in karstology and speleology: Moscow; The Academy of Sciences of the USSR, Vol. 3, p. 80-81 [in Russian].

The contribution of the hydrodynamic factor to the morphogenesis of underground water drainages based on the development of meanders and erosion levels and on the existence of profiles of equilibrium in caves, which attests to a similarity between underground and surface water flows.

1738 Serban, M.; and Viehmann, I. (1961) - Explorations of the caves and the karst in the Western Carpathians and the Rodna Mountains (Romania) from 1947 to 1960: Wien; Die Höhle, 12(2/3), p. 65-66 [in German]. Abstract of a paper to be read at the Third International Congress of Speleology, Vienna, Austria.

Reference is made to the ice cave at Scarisoara and two neighboring caves - Pojarul Politei, with exceptional stalagmitic formations, and the cave at Sesur, which is 180 m deep; the caves at Padis at Coiba-Mare on the upper Garda Valley; the Vintului Cave at Suncuius

with fixed meanders; and the Izvorul Tausoarelor Cave which sets a new depth record for Romania (-341 m).

1739 Serban, M.; and Viehmann, I. (1961) - The hology of underground and surface streams: Wien; Die Höhle, 12(2/3), p. 115 [in German]. The abstract of a paper to be read at the Third International Congress of Speleology, Vienna, Austria.

On the basis of studies of several caves in Romania the conclusion is reached that there is a certain parallelism between underground and surface waterflows. The existence of a profile of equilibrium is accepted for underground rivers too. If the morphology of the upper course is dominated by tectonics, the influence of the hydrological factor shows in the lower course of underground drainages.

1740 Serban, M.; Viehmann, I.; Bals, S.; and Bordea, S. (1961) - The Neagra Cave in the karstic region of Padis (Romania) and its importance: Wien; Die Höhle, 12(2/3), p. 66 [in German]. Abstract of a paper to be read at the Third International Congress of Speleology, Vienna, Austria.

The Neagra Cave at Padis, which has a total length of 1,200 m and was explored in 1952 and 1956, contains a stream with three active and one fossil tributaries which feature meanders, erosion levels, and a plane-horizontal roof, all formed under the hydraulic action of the stream.

1741 Serban, M.; Viehmann, I.; and Coman, D. (1961) - Caves in Romania: Bucharest; the Meridiane Publishing House, 33 p., 143 photographs [in Romanian, with abstracts in French, German, Russian, and Magyar).

The photographs, grouped by themes (landscapes from karstic regions; surface karstic formations; underground streams; underground karstic formations; cave exploration; stalagmitic formations; cave ice; aspects of speleological research; and various caves in Romania), are accompanied by a text paying tribute to Emil Racovita (1968-1947), the initiator of biospeleology (1904) and the founder of the Speleological Institute of Romania (1920).

1742 Serban, M.; Viehmann, I.; and others. (1974) - The Ialomita Cave, results of the speleological expedition of December 1953: Bucharest; the University Centre of Bucharest, Bulletin of the "Emil Racovita" Circle of Speleology, Vol. 3, p. 50-51, 1 map [in Romanian].

The Ialomita Cave was formed during a diaclase with an inclined position which was highlighted by four successive water losses, all situated on the left-hand side of the primary underground drainage. In the terminal side of the cave, the active stream reaches the crystalline shales in the autochthonous of the Bucegi Massif.

1743 Settergren, Carl D. (1977) - Early conflicts over effluent irrigation in Missouri's Ozarks <u>in</u> Dilamarter, R.R. and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, KY; Western Kentucky University, p. 405-410.

A discussion on whether or not it is feasible to discharge wastewater for effluent irrigation in the karst Ozarks.

1744 Sevastopoula, G.D. (1982) - Irish limestones, Port Laoise seminar: Irish Group, IAH, 30-31 March.

Summarized the Irish limestone, with emphasis on stratigraphy, lithology, and structure. Some information on karstification.

1745 Shafer, G.H. (1966) - Ground-water resources of Guadalupe County, Texas: Texas Water Development Board Report 19, 93 p.

A discussion of occurrence and availability of ground water, location, and extent of water-bearing formations and possible problems resulting from oil field brine disposal. Includes well records and chemical analyses. The Edwards and associated limestones are present only in the subsurface.

1746 Shayani, S.; and Rottman, M.R.C. (1973) - Hydrogeological study of Sobradinho reservoir in Proceedings of a symposium on sink-holes and subsidence, Hannover: Germany, F.R., Essen; Deutsche Gesellschaft für Erd-und Grundbau, 7 p.

1747 Shelburne, Orville B. (1959) - A stratigraphic study of the Kiamichi Formation in central Texas in Symposium on Edwards Limestone in Central Texas: University of Texas Publication No. 5905, p. 105-120.

Twenty stratigraphic sections of the Lower Cretaceous Kiamichi Formation were measured and described from surface exposures in the southern Fort Worth Prairie in Hill, Bosque, Coryell, McLennan, and Bell Counties, Texas.

1748 Shourong, Shu. (1982) - The coincident spectral plot method for selecting the remote sensing bands of carbonate rocks: Carsologica Sinica, 1:2, p. 158-166.

1749 Shouyue, Z. (1984) - Karst and subsidence in China in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 97-104.

Subsidence has occurred in nearly every province of China. This paper discusses the various mechanisms of karstic subsidence and their distribution, the damage which they cause, and their treatment.

1750 Shrivastava, G. (1976) - Most Jamaican water comes from limestone aquifers: Johnson Drillers Journal, 48:3, p. 12-13, May-June, 1976, 1 fig. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 9:22.

Limestone aquifers are the major source of water in Jamaica and their importance is increasing continuously with the demand for water for domestic, agricultural, and industrial purposes. The land surface of the island is nearly entirely underlain by

limestone and is permeated by karst topography. Ground-water levels are ephemeral in the limestone aquifers.

1751 Siegenthaler, U.; Oeschger, G.; and Tongiorgi, E. (1970) - Tritium and oxygen-18 in natural water samples from Switzerland: Isotope Hydrology 1970, IAEA, Vienna, p. 373-385.

1752 Sieh, T.W. (1974) - Edwards (Balcones Fault Zone) aquifer test-well drilling investigation: Texas Water Development Board, File Report 118.

Summarizes the results of a detailed core-drilling program in the Edwards (Balcones Fault Zone) aquifer in the San Antonio area, and correlates physical description and laboratory testing of cores with numerous geophysical logs and tests.

1753 Sĭlar, J. (1968) - On the origin of the mineral springs in Yunnan (China): Czechoslovakia; XXIII International Geological Congress, 17, p. 45-51.

1754 Sĭlar, J. (1965) - Development of tower karst of China and North Vietnam: U.S.; The National Speleological Society Bulletin, 27:2, p. 35-46.

This paper deals with the origin of the tower or cone karst [Turmkarst, Kegelkarst] in southern China and North Vietnam. Proof is given of its origin in early Tertiary times under tropical climatic conditions. At present the tower karst occurs not only in the tropics but also outside that climatic zone. The early Tertiary tower karst of southeastern Asia is analogous to that in Asia and Europe where tower karst is preserved below Tertiary deposits or where it has been modified by the Pleistocene periglacial climate.

1755 Silvestru, E. (1984) - The relationship between tectonics and karstification in the cave from Izvorul Tausoarelor (Rodna Mountains): Theoretical and Applied Karstology, 1, p. 35-42, 9 fig.

The author presents the importance of tectonics in the karstification of the limestone area from Tausoare (Rodna Mountains), using the tectonogram of the limestones and several morphological details. A correlation is attempted between the types of cracks and the role played by each one in the development of the underground drainage.

1756 Silvestru, E.; and Viehman, I. (1982) - A study of compared microtectonics in the karst of the Rodna Mountains (Romania): Bucharest; Proceedings of the "Emile Racovitza" Speleological Institute, XXI, p. 63-67, 6 fig. [in French].

The authors outline the processing of the data of micro-tectonic measurements conducted in three caves in the Rodna Mountains. The tectonic origin and the synchronism of the phenomena that entailed the emergence of the fissures that created the karst in local limestone are established.

1757 Simion, G.; Ponta, G.; and Caspar E. (1985) - The dynamics of underground waters from Baile Herculane, Cerna Valley (Romania): Annales de la Societe Geologique de Belgique, T. 108, p. 245-249.

Thermomineral water resources of the Cerna Valley come from three different hydrogeological origins: (1) cold waters coming from hydrogeological structures located in the upstream part of the Cerna system; (2) hot waters, coming from the depth and thermalizing cold waters; (3) mineralized waters coming from a structure probably located outside the Cerna basin, which mineralize warm waters.

1758 Simmons, M.D. (1983) - Remedial treatment exploration, Wolf Creek dam, KY: Journal of the Geotechnical Engineering Division, Proceedings of the American Society of Civil Engineers, 108:GT7, p. 966-981, July 1982, 3 tab., 8 fig., 11 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 16:2, p. 57-58.

Remedial treatments to solve underseepage and piping problems related to the karstic foundation of Wolf Creek dam in Kentucky are described. Various exploratory techniques were used to assess the source of problems caused by development of a sinkhole at the downstream toe of the earth embankment.

1759 Simpson, E.S.; and Duckstein, L. (1976) - Finite state mixing cell-models in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 489-507.

In this paper a quasi-physical, finite-state model is developed that is suitable for the modeling of karst water resources in a systems framework. The paper emphasizes model properties.

1760 Sinclair, W.C. (1983) - Sinkhole development resulting from ground-water withdrawal in the Tampa area, Florida in Herschman, A., editor, Abstracts of Papers of the 149th National Meeting of the American Association for the Advancement of Science: U.S.; AAAS Publication 83:2, p. 31.

1761 Sinclair, W.C., investigator (1983) - Sinkholes in west-central Florida: U.S.; U.S. Geological Survey Professional Paper 1375, 240 p.

1762 Sinclair, W.C. (1982) - Sinkhole development resulting from ground-water withdrawal in the Tampa area, Florida: U.S.; U.S. Geological Survey, Water Resources Investigations 81-50, 1982, 19 p., 6 fig., 1 tab., 11 ref.

Alignment of established sinkholes along joint patterns in the bedrock suggests that a well along these lineations might have direct hydraulic connection with a zone of incipient sinkholes. Therefore, pumping of large-capacity wells along such lineations would increase the probability of sinkhole development.

1763 Sinclair, W.C., investigator (1980) - Sinkhole development as a result of hydrologic changes in the Tampa area: U.S.; U.S. Geological Survey Professional Paper 117, p. 128-129.

1764 Sinclair, W.C.; Stewart, J.W.; Knutilla, R.L.; Gilboy, A.E.; and Miller, R.L. (1985) - Types, features, and occurrence of sinkholes in the karst of west-central Florida: U.S.; U.S. Geological Survey, Water-Resources Investigations Report 85-4126.

1765 Skrivanek, F.; and Rubin, J. (1973) - Caves in Czechoslovakia: Prague; Czechoslovak Academy of Sciences, Prague, 113 p.

A multi-topical description of caves and related features in Czechoslovakia.

1766 Slack, L.J. (1977) - Hydro-environmental effects of sprayed sewage effluent, Tallahassee, Florida, U.S. in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, I.A. H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 309-322.

1767 Slagmolen, André. (1971) - Le sauvetage en grotte in Proceedings of the 4th International Congress of Speleology: Ljubljana; Vol. 6, Section 4, p. 53-59.

A discussion on safety and the organization necessary to have a safety-rescue operation available for cavers in trouble.

1768 Slavoaca, D.; Oraseanu, I.; Gaspar, E.; and Bulgar, Al. (1986) - Hydrogeological contributions for the existence of the Getic Nappe in the Motru Sec-Baia de Arama region: Theoretical and Applied Karstology, 2, (in press).

Tracer investigations proved the continuity of the Danubian Unit under the crystalline schists of the Motru Sec-Baia de Arama zone and hence the existence of the Getic Nappe was established in this area by use of a hydrogeological method.

1769 Sloane, B., editor (1977) - Cavers, caves, and caving: U.S.; Rutgers University Press.

1770 Smart, C.C.; and Ford, D.C. (1983) - Castleguard karst, main ranges, Canadian Rocky Mountains: Journal of Hydrology, 61:1-3, p. 193-197,

Subglacial water is drained through the karst to constricted springs in the Castleguard Valley. Spring discharge measurements and fluorescent dye injections were made.

1771 Smart, C.C.; and Ford, D.C. (1980) - Hydrogeology of the Castleguard karst, Main Ranges, Rocky Mountains of Canada: U.S., Boulder; Geological Society of America Abstracts with Programs, 12:7, p. 523.

Castleguard karst is the foremost example of modern subglacial karst drainage. 16 km of relict cave conduits have been mapped. A well integrated glacier and karst conduit aquifer is indicated.

1772 Smart, P.L. (1976) - The use of optical brighteners for water tracing: Transactions of British Cave Research Association, 3:2, p. 62-76.

Optical brighteners are colorless blue fluorescent dyes. Quantitative use of optical brighteners is not a practical proposition due to high losses which are caused by absorption, chemical and photochemical decay. Optical brighteners with cotton, in particular calico, are a viable and sensitive technique. Toxicity data indicate no harmful effects on man or aquatic organisms from the optical brighteners.

1773 Smith, A.R. (1980) - Solution scarp and related fissure system, Yeso Hills, Culberson County, Texas and Eddy County, New Mexico: U.S., Huntsville; NSS Bulletin, 41:4, p. 117.

1774 Smith, D.D. (1984) - Iowa's driftless area in Hanson, R.W., editor, Iowa's driftless area, 45th session of the Iowa Academy of Science, Decorah, Iowa, U.S., 1983: U.S.; The Proceedings of the Iowa Academy of Science, 91:1, p. 1-2.

1775 Smith, D.I. and Atkinson, T.C. (1977) - Underground flow in cavernous limestones, with special reference to the Malham area: Field Studies, Vol. 4, p. 597-616.

1776 Smith, D.I. and Newson, M.D. (1974) - The dynamics of solutional and mechanical erosion in limestone catchments on the Mendip Hills, Somerset [reprinted from Fluvial Processes in Instrumental Watersheds, Institute of British Geographers, Spec. Pub. 6, pp. 155-167 (1974)] in Sweeting, M.M., editor (1981), Karst Geomorphology, Benchmark Papers in Geology, Vo. 59: U.S.; Hutchinson Ross Publishing, p. 361-373.

1777 Smith, D.L.; and Short, D.G. (1983) - Detection of subsurface solution cavities with pole-dipole electrical resistivity measurements: U.S.; Geological Society of America, Abstracts with Programs, 14:1-2, p. 83.

Measurements of electrical resistivity using pole-dipole electrode arrangement demonstrated a strong correlation between resistivity anomalies and known subsurface cavities in north-central Florida. Postulated cavities up to 80 feet below land surface were verified by a shallow drilling program.

1778 Smith, E.J. (1978) - Spring discharge in relation to rapid fissure flow: Ground Water, 17:4, p. 346-350, July-August 1979, 6 fig., 10 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 12:18, p. 5.

A study of the hydrogeology of a Lincolnshire Limestone spring-fed catchment enabled three zones of discharge to be defined, based on their relative elevation along the valley floor.

1779 Smosna, Richard; and Warshaver, Steven M. (1978) - The evolution of a carbonate shelf, Silurian McKenzie Formation, West Virginia: A cluster analytic approach: Journal of Sedimentary Petrology, 48:1, p. 127-142.

A quantified petrographic analysis of a McKenzie core defined a suite of environments from shelf-edge to lagoonal to pertidal. Q-mode cluster analysis showed up nine different depositional

environments, and R-mode clusters showed up five genetic associations.

1780 Smyre, J. (1984) - Survey and cartography of the Cagle Chasm Complex, Marion County, Tennessee: U.S.; Speleonews, 28:5, p. 96-101, includes map, scale 1:475.

1781 Sneed, J.M. (1977) - The occurrence and mining of saltpeter in American caves: U.S., Atlanta; Georgia Journal of Science, 35:2, p. 77.

1782 Sociedade Excursionista e Espeleologica. (1969) - La grutad de los brejos, localizacion y vias de acceso: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vo3. 1, p. 548/1-548/6.

1783 Sokolov, A.A. (editor). (1969) - Methodical recommendations for studying the regime of surface and ground waters in karst: Leningrad; Hydro Meteorologicheskoe Izdatelsvo, 150 p.

1784 Song, L.; Zhang, Y.; Fang, J.; and Gu, Z. (1983) - Karst development and the distribution of karst drainage systems in Dejiang Province, China in Beck, W., and LaMoreaux, P.E., guest editors, V.T. Stringfield Symposium - Processes in Karst Hydrology: Netherlands; Journal of Hydrology, Vol. 61, p. 3-17.

Karstification of two contrasting areas is shown to be controlled by structure, lithology, geomorphic history, and tectonics.

1785 Soritau, D.; Nicoara, D.; Silvestru, E.; Demeter, I.; Popa, C.; and Viehman, I. (1984) - The pothole at Stanul Foncii: Buletinul Cercului Studentesc de Speologie "Emil Racovita" din Centrul Universitar Cluj Napoca, supliment al revistei "Napoca Universitara", Cluj Napoca, 1, p. 79-88, 1 fig. [in Romanian].

The authors describe the morphology of the deepest pothole in Romania (-339 m). Several morphological considerations and observations on underground climate are made. Maps of the cave are supplied.

1786 Soto, A.E.; and Morales, W. (1984) - Collapse sinkholes in the blanket sands of the Puerto Rico karst belt in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 143-146.

Collapse sinkholes in the northern Puerto Rico karst occur within the outcrop belt of surficial deposits known as blanket sands. Photographs taken in 1936 and 1982 (1:10,000) show most present sinkhole problems could have been avoided. Zones evidencing subsidence activity today are essentially the same as those recognizable in the 1936 photography. A model for Puerto Rico collapse sinkholes is illustrated.

1787 Soulios, G. (1985) - Effective infiltration into Greek karst: Journal of Hydrology, 75:1-4, p. 343-356.

Representative karstic aquifer systems were chosen for the calculation of the coefficient of effective infiltration into karst in Greece. The coefficient of effective percolation and the specific efficiency of the Greek karst were calculated.

1788 Southworth, C.S. (1984) - Structural and hydrogeologic applications of remote sensing data, eastern Yucatan Peninsula, Mexico in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 59-64.

LANDSAT and SEASAT satellite images and aerial photographs of eastern Yucatan Peninsula, Mexico, were analyzed to delineate geologic controls of ground water. Three significant interpretation results are given.

1789 Sowers, G.F. (1984) - Correction and protection in limestone terrane in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 373-378.

Structural features that are hazards to building foundations are given. Design measures to overcome them include avoiding areas of concentrated hazards, correcting the hazards by filling them or collapsing them, bridging over small hazards, reinforcing the rock, bypassing shallow hazards with deeper foundations, and minimizing activation of the hazard-forming processes.

1790 Sowers, G.F. (1973) - Remote sensing of water resources: U.S.; Civil Engineering, 43:2, p. 35-59.

1791 Speece, J.H. (1983) - Dyers Cave: U.S.; The Journal of Spelean History, 7:1-2, p. 21.

1792 Spencer, T.; Woodroffe, C.D.; and Stoddart, D.R. (1984) - Calcareous crusts and contemporary weathering of raised reef limestones, Grand Cayman Island, West Indies (abstract) in Ginsburg, R.N., chairperson, Advances in Reef Science, Joint Meeting of the Atlantic Reef Committee and the International Society for Reef Studies, Miami, Florida, U.S., 1984: U.S.; University of Miami, Rosenstiel Sch. Mar. and Atmos. Sci., p. 117.

1793 Spigner, B.C. (1974) - Hydrogeology of Mississippian carbonates near Birmingham, Alabama: Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 73-79.

There are three karst aquifers in the Eastwood Mall area of Birmingham in Mississippian bedrock. Karstification is controlled by fractures and jointing. There are problems of overdevelopment of shallow aquifers, improper well spacing, paving of the recharge area decreasing the well yields and causing subsidence around the discharging wells.

1794 Spigner, B.C.; and Graves, Stanley L. (1977) - Groundwater development problems associated with folded carbonate rock aquifers in the Irondale area, Alabama in Dilamarter, R.R. and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, KY; Western Kentucky University, p. 241-248.

A discussion of the problems related to the development of wells in limestones, with particular reference to the Irondale area, Alabama. Well yield, well drilling and development problems, subsidence, and contamination are discussed.

1795 Sprouse, P. (1980) - Purification A (cave investigation, Mexico): U.S., Huntsville; NSS Bulletin, 41:4, p. 125.

1796 Sprouse, P. (1976) - Deep caves of the United States: U.S., Great Falls; Alp Karst Newsletter, 2, p. 14.

1797 Stajic, Slobodan. (1971) - Die höhlen in Serbien und thr schutz in Proceedings of the 4th International Congress of Speleology: Ljubljana; 1965, Vol. 6, Section 4, p. 123-127.

1798 State Co-ordinating Technical Committee. (1966) - Sinkholes and subsidence on the safety of the municipal area of Carletonville-Oberholzer: A report from South Africa.

1799 Stearns, R.G. (1977) - Porosity and hydrology of jointed Middle Ordovician limestones in the J. Percy Priest Dam area of central Tennessee in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 431-432.

1800 Steeples, D.W.; Knapp, W.R.; and McElwee, C.D. (1983) - Seismic reflection surveys of a catastrophically collapsed sinkhole, Ellis County, Kansas in 1983 annual meeting abstracts, Society of Exploration Geophysicists, 53rd annual international meeting, Las Vegas, Nevada, U.S., 1983: U.S.; Geophysics, 49:5, p. 629.

1801 Steeples, D.W.; Knapp, W.R.; and Miller, R.D. (1984) - Examination of sinkholes by seismic reflection in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 217-223.

Salt dissolution sinkholes have developed at more than a dozen localities in Kansas during the past 25 years. High resolution seismic reflection surveys across more than a half dozen of these sinkholes were performed. It is possible to discern considerable geological detail at depths of 10 to 500 meters within the sinkholes by seismic reflection methods.

1802 Stehli, F.G.; and Hower, J. (1961) - Mineralogy and early diagenesis of carbonate sediments: Journal of Sedimentary Petrology, Vol. 31, p. 358-371.

1803 Stelcl, O. (1976) - Geomorphological characteristics of the karst regions in the Czech Socialist Republic: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology; p. 373-380.

Karst in the Czech Socialist Republic occurs in small but numerous districts with each region possessing its typical features which are the result of many factors. The different regions ae described briefly.

1804 Stenner, R.D. (1972) - The measurement of the aggressiveness of water to calcium carbonate, parts II and III: Cave Research Group of Great Britain Transactions, 13:4, p. 283-296, November 1971, 1 fig., 5 tab., 14 ref., 4 append. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 5:13, p. 22.

The changes of concentrations of trace constituents of natural waters on saturation with calcium were investigated by a number of analytical techniques, including x-ray fluorescence spectrometry following concentration in ion exchange papers.

1805 Stepinac, A. (1976) - Examples of determination of void volume in karst formations in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 355-386.

1806 Stewart, J.W. (1977) - Hydrologic effects of pumping a deep limestone sink near Tampa, Florida, U.S. in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 195-212.

1807 Stewart, M.; and Wood, J. (1984) - Geophysical characteristics of fracture traces in the carbonate Floridan aquifer in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A.A. Balkema, p. 225-230.

Several geophysical methods were used to investigate the geophysical and geologic character of fracture traces at two sites in west-central Florida. These included horizontal electrical profiles, vertical electrical soundings, tri-potential profiles, and microgravity and triple-track gravity profiles.

1808 Stitt, R. (1974) - Environmental impact in the Guadalupe escarpment, New Mexico and Texas: U.S.; NSS Conv (Decorah, Iowa), p. 14.

1809 Stitt, R. (1974) - Some legal aspects of underground wilderness and the Wilderness Act of 1964: U.S.; NSS Conv (Decorah, Iowa), p. 14.

1810 Stockman, K.W.; Ginsburg, R.N.; and Shinn, E.A. (1967) - The production of lime mud by algae in south Florida: Journal of Sedimentary Petrology, Vol. 37, p. 633-648.

1811 Stoddart, D.R.; Spencer, T.; and Scoffin, T.P. (1984) - Reef growth, karst erosion and sea level history on Mangaia, Cook Islands (abstract) in Ginsburg, R.N., chairperson, Advances in Reef Science, Joint Meeting of the Atlantic Reef Committee and the International Society for Reef

Studies, Miami, Florida, U.S., 1984: U.S.; University of Miami, Rosenstiel Sch. Mar. and Atmos. Sci., p. 117.

1812 Stojic, P. (1976) - Influence of reservoirs on earthquakes, case study of the reservoir Bileca in a karst area in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 607-622.

It is assumed that increased seismic activities in the storage reservoir area were caused by the reservoir water load and the water effects on bedrock. However, it may be concluded from the observations recorded until the present, that after several cycles of reservoir loading and unloading, a period of stagnation and equilibrium in earthquake activity has been reached.

1813 Stojic, P.; Milicevic, M.; and Milanovic, P. (1976) - Use of Piezometers boreholes for karst investigations in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 607-626.

1814 Stone, B. (1979) - Exploring high karst areas of the land of big drops Mexico: Wells; Descent, 41, p. 26-29.

1815 St. Pierre, D.; and St. Pierre, S. (1984) - A bibliography of Puerto Rican caves, karst and limestone geology and the longest caves list in Friends of the Karst Meeting, Puerto Rico, 1984, Friends of the Karst, Puerto Rico Meet in Abstracts: U.S.; Geo 2, 11:3.

1816 St. Pierre, D. (1981) - Puerto Rico - caves, karst and limestone geology - bibliography, part 5: U.K., London; Speleo, 16:1, p. 42-46.

1817 St. Pierre, D. (1979) - Puerto Rico - caves, karst and limestone geology - bibliography, part 4: U.K., London; Speleo, 15:1, p. 23-26.

1818 St. Pierre, D. (1976) - A preliminary bibliography of Puerto Rico caves, karst and limestone geology, 3: U.K., London; Speleo, 14:1, p. 12-14.

1819 St. Pierre, D.; and St. Pierre, S. (1981) - A preliminary list of Puerto Rico's largest caves: U.K., Bridgewater; Caves and Caving, 12, p. 6-8.

1820 Strahler, A.H. (1964) - Quantitative geomorphology of drainage basins and channel networks in Handbook of Applied Hydrology: New York; McGraw-Hill, p. 4.39-4.76.

1821 Strayle, Gunter. (1969) - Untersuchungen zum karstwasserhaushalt der schwabischen alb: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY16/1-HY16/10.

Using dyes, the drainage system of the karst areas in the Schwabische Alb was determined and a water budget for the area was estimated, showing the ground-water reservoir that is available for development.

1822 Streltsova, T.D. (1977) - Storage properties of fractured formations in Dilamarter, R.R. and Csallany, S.C, editors, Hydrologic Problems in

Karst Regions: U.S., Bowling Green, KY; Western Kentucky University, p. 188-192.

Response mechamism of a fractured aquifer to a pressure change due to pumping is considered. General differential equation for the flow to a well is derived.

1823 Stricklin, F.L., Jr.; Smith, C.I.; and Lozo, F.E. (1971) - Stratigraphy of Lower Cretaceous Trinity deposits of central Texas: Texas University Bulletin, Economic Geology, Report of Investigations 71, 63 p.

The author describes the stratigraphy of the Lower Cretaceous Trinity Division in central Texas, of which the Glen Rose Limestone is a part. The Glen Rose is often an associated limestone in reports dealing with the Edwards and associated limestones.

1824 Stringfield, V.T.; LaMoreaux, P.E.; and LeGrand, H.E. (1974) - Karst and paleohydrology of carbonate rock terranes in semi-arid and arid regions with a comparison to humid karst of Alabama: U.S.; Alabama Geological Survey Bulletin 105, 106 p.

This report describes three carbonate-rock terranes in arid or semi-arid regions (Kaibab Plateau in Arizona, Nullarbor Plain on the south coast of Australia, and the Western Desert of Egypt) and compares them with terranes in more humid regions of the United States (areas in Alabama) and with that in the northern part of the Yucatan Peninsula, Mexico. The geologic and hydrologic history of each arid carbonate region is reconstructed.

1825 Stringfield, V.T.; and LeGrand, H.E. (1975) - Karst hydrology of northern Yucatan Peninsula, Mexico (abstract) in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:16, p. 7.

Karst features in Yucatan were divided into two groups: (1) surficial features that do not extend more than a few meters below the surface, and (2) deep features as sinkholes, solution shafts, and solution cavities. There are no surface streams because water on the surface moves freely into the underlying limestone.

1826 Stringfield, V.T.; and LeGrand, H.E. (1974) - Development and hydrologic effects of sinkholes and other karst features in limestone aquifers (abstract) in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S., West Virginia Geological and Economic Survey, 1974, p. 111.

Factors affecting the solution of limestone which are responsible for the development of karstic features and permeability are given with examples.

1827 Stringfield, V.T.; and LeGrand, H.E. (1966) - Hydrology of limestone terranes in the coastal plain of the southeastern United States: U.S.; Geological Society of America, Special Paper, Vol. 93, 45 p.

1828 Stringfield, V.T.; LeGrand, H.E.; and LaMoreaux, P.E. (1977) - Hydrology of limestone terranes (development of karst and its effects on the

permeability and circulation of water in carbonate rocks, with special reference to the Southeastern States): U.S.; Alabama Geological Survey, Bulletin 94G, 68 p.

Large recharge rates and large permeability are karst characteristics that may lead to many environmental problems, in particular subsidence and sinkholes.

1829 Stringfield, V.T.; and Rapp, J.R. (1981) - Karst in coastal areas and the effects on circulation of water in carbonate rocks in Halasi-Kun, G.J., editor, Hydrogeology and other Selected Papers: Pollution and Water Resources, Columbia University Seminar Series 14, Vol. 1: U.K.; Pergamon Press, p. 53-64.

1830 Stringfield, V.T. and Rapp, J.R. (1976) - Land subsidence resulting from withdrawal of ground water in carbonate rocks in Proceedings of the Anaheim symposium on land subsidence, December 1976: IAH, Pub. 121, p. 447.

Land subsidence in carbonate terranes is discussed and specific references are given as to the various ways in which subsidence may be triggered. This paper discusses the differences between those subsidence events that are man-induced and those that occur naturally.

1831 Stringfield, V.T.; and Rapp, J.R. (1977) - Progress of knowledge of hydrology of carbonate rock terranes - a review in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 1-9.

A review of the ideas, research, and writings up to the present with recommendations for future studies in karst areas.

1832 Stringfield, V.T.; Rapp, J.R.; and Anders, R.B. (1979) - Effects of karst and geologic structure on the circulation of water and permeability in carbonate aquifers: U.S.; Journal of Hydrology, 43:1-4, p. 313-332.

Three types of karst aquifers are described based on yield. The aquifers with the largest yields include five of the most productive in the U.S.A.

1833 Strong, L. (1976) - Caves - a resource to be preserved: New York; Rocks Minerals, 51:2, p. 77-79.

1834 Stumm, Werner; and Morgan, J.J. (1981) - Aquatic chemistry, 2nd edition: New York; John Wiley and Sons, 780 p.

1835 Stupishin, A.V. (1971) - Plain karst and the basic laws of its development: USSR; Ministry of Higher and Secondary Special Education of the USSR, Kazan, p. 12.

The author distinguishes three main types of plain karst: (1) karst landscapes of river valleys; (2) karst landscapes of old

denudation planation surfaces; and (3) karst landscapes of anthropogen superimposed accumulative plains.

1836 Stupishin, A.V.; and Lapteva, N.N. (1976) - Regional singularities of surface and subsurface karst in middle Volga region: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology: p. 367-371.

A description of the middle Volga region where karstic features occur of differing ages of development.

1837 Suciu, N. (1983) - Thermic waves propagation through limestones: Buletin Speologic Informativ, 7, p. 21-45, 7 fig. [in Romanian with English abstract].

One of the most important controls of karst is climate. Temperature is probably its main characteristic and that is why the study of thermic waves propagation through a karstic medium is of prime importance.

1838 Summers, C.L. (1985) - Hydrological investigation in karst terrain utilizing geophysical and geochemical methods: Geological Society of America, Abstracts with Programs, 17:3, p. 193.

1839 Sunartadirdja, M.A.; and Lehenann, H. (1960) - Der Tropische karst von Maros und Nord-Bone in SW-Selebes (Sulawesis): Germany, F.R.; Zeitschrift für Geomorphologie, Supplementband 2, Internationale Bertrage zur Karstmorphologie, Gottingen, p. 49-65.

1840 Supko, Peter R. (1977) - Subsurface dolomites, San Salvador, Bahamas: U.S.; Journal of Sedimentary Petrology, 47:5, p. 1063-1077.

A discussion on the nature of fluids responsible for dolomitizing the San Salvador carbonates. No unequivocal answer was found.

1841 Sweet, G. (1984) - Karst land forms in the northern interlake area of Manitoba, Canada in Friends of the Karst Meeting, Puerto Rico, 1984, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

1842 Sweet, L.; and Connor, B. (1980) - The Farmers Loop sinkhole: U.S.; The Northern Engineer, 12:4, p. 6-10.

1843 Sweeting, M.M. (1981) - The karst of Kweilin, southern China [reprinted from Geogr. Journal 144: 199-204 (1978)] in Sweeting, M.M., editor (1981), Karst Geomorphology, Benchmark Papers in Geology, V. 59: U.S.; Hutchinson Ross Publishing, p. 410-416.

1844 Sweeting, M.M., editor. (1981) - Karst geomorphology: U.S., Pennsylvania; Hutchinson Ross, distributed by Academic Press, New York, 427 p.

1845 Sweeting, M.M. (1973) - Some comments on the lithological basis of karst landform variations: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology; p. 319-329.

A discussion of some aspects of limestones which affect the development of both surface and underground landforms. Discussion based on observations and sampling from many parts of the world.

1846 Sweeting, M.M.; and Gerstenhauer, A. (1960) - Zur frage der obsoluten geschwindigkeit der kalkkorrosion in verschiedenen klimateu: Germany, F.R., Gottingen, Zeitschrift für geomorphologie, Supplementband 2, Internationale Beitrage zur karstmorphologie, p. 66-73.

Type of climate alone is insufficient to allow for a full understanding of the solution of limestones. Calcium carbonate and magnesium carbonate should be discussed separately with special attention given to the estimation of "free carbon dioxide."

1847 Sweeting, M.M.; and Pfeffer, K.H., editors (1976) - Karst processes: Berlin; Gebr. Borntraeger, 210 p.

1848 Sweeting, M.M.; and Sweeting, G.S. (1969) - Some aspects of the carboniferous limestone in relation to its landforms with particular reference to N.W. Yorkshire and County Clare: from Extrait des Recherches Mediterraneennes, Etudes et Travaux de Mediterranie, No. 7, p. 201-209.

The textures of nearly 200 limestones were described with the limestones in the two areas showing a high percentage of sparry calcite. Preliminary work shows that detailed examination of limestones is as important as studies of weathering processes in any discussion of limestone landforms.

1849 Szabo, M.W. (1982) - Paleo-collapse features in northwest Alabama: U.S.; Geological Society of America, Abstracts with Programs, 14:5, p. 293.

Five large areas of paleo-collapse are present in Colbert County in northwest Alabama. Mississippian strata have been lowered by 12 to 15 meters in these areas. Subsidence probably was caused by contemporaneous collapse of overlying beds into cavities formed by the dissolution of limestone.

1850 Szczerban, E.; Urbani, F.; and Colbee, P. (1977) - Cuevas y simas en cuarcitas y metalimolitas del Grupo Roraima, Meseta de Guaiquinima, Estado Bolivar [Caves and shafts in quartzites and metalimolites of the Roraima Group, Guaiquinima Plateau, Bolivar]: Venezuela; Soc Venezuela Espeleol, Bol 8:16, p. 127-154 [in Spanish].

1851 Szebenyi, L. (1977) - Ground water budget of the mountainous regions of Hungary: Magy All Foldtani Intez Evi Jel, 1971, p. 221-228, 1973.

The dynamic ground-water reserves of Hungary's basins were calculated in profiles plotted on the basin margins.

1852 Szilagy, A.; Komives, I.; Varga, A.; and Kerekes, K. (1979) - The Vintului Cave: Bucarest; Trav. Inst. Spéol. "Emil Racovita", Vol. 18, p. 259-266, 1 map [in Romanian].

A brief historical survey of explorations over more than ten years in the largest cave in Romania and a general description of this remarkable karstic feature including 21,470 m of galleries, accompanied by a polychrome map.

1853 Szlaboczky. (1978) - Preparation of maps of regional hydrogeological units in Hydrogeology of Great Sedimentary Basins: Hungary; Conference in Budapest, 1976, p. 632-642.

A regional hydrogeological map of northeastern Hungary was made to serve as a handy, informative guide for use mainly by state executives of regional and industrial planning. The water-bearing sequences most significant for water recovery purposes have been distinguished on the map, including the paleo-Mesozoic basement of limesotne and dolomite.

1854 Talley, J.H. (1981) - Sinkholes, Hockessin area, Delaware: U.S.; Delaware Geological Survey Open File Report 14, 16 p.

1855 Talour, B. (1976) - Hydrogéologie karstique du massif de Grand Som (Chartreuse, Isère): France; Géol. Appl. Grenoble; Thèse Doct. 3 ème cycle, 166p.

Etude des caractéristiques du karst du Massif du Grand Som. Fonctionnement hydraulique des karsts de Chartreuse.

1856 Tangney, J.A. (1970) - Chemical engineering aspects of cement manufacture: Trans. Inst. Engineers of Ireland, Vol. 96, p. 184-192.

Touches on the solubility of calcite, dolomite, and other minerals.

1857 Tanji, K.K.; and Doneen, L.D. (1966) - Predictions on the solubility of gypsum in aqueous salt solutions: Water Resources Research, Vol. 2, p. 543-548.

1858 Taviani, M. (1984) - Submarine "sinkholes"; a review in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 117-122.

The exploration of the submarine realm has led to the discovery that structures closely resembling subaerial dissolution karstic features are relatively frequent at great depth. The formation of sinkholes due to subsurface solution of salt does not necessarily require a subaerial environment.

1859 Tell, L. (1976) - About karst in general and Swedish karst in particular: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 381-407.

A discussion with specific examples from Sweden on true karst in carbonate rocks and para-karst and pseudo-karst in non-carbonate rocks.

1860 Tell, Leander. (1976) - Fifty typical Swedish caves: Archives of Swedish Speleology, No. 14, Centreocommerce AB, 603 52 Norrkoping.

A descriptive account of 50 caves in Sweden.

1861 Tell, Leander. (1969) - Höhlen auf der Iusel Malta: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 58/1-58/4.

The geology of the island of Malta and a short survey of some typical caves.

1862 Tell, Leander. (1969) - Höhlenphanomene in Granit und andereu kristallinishcen urgesteinen: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 59/1-59/6.

Karstic features are usually associated with carbonate rocks, but in Sweden the glaciers have sculpted out features in granites and crystalline rocks that resemble karst features.

1863 Tell, Leander. (1969) - Spéléologie et grottes dans la laponie suedoise: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 51/1-51/3.

The author emphasizes the fact that there is a well developed karst in northern Sweden.

1864 Tennyson, Larry C.; and Settergren, Carl D. (1977) - Subsurface water behavior and sewage effluent irrigation in the Missouri Ozarks in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 411-418.

Recommendations for detailed preliminary investigation of the land site and for the rate of application of irrigated sewage effluent on soils or karst regions are necessary if the potential for contamination of ground-water supplies is to be minimized.

1865 Testar, Gregoire. (1969) - Caractères morphologiques distinctifs des phénomènes: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M7/1-M7/6.

The Bas Vivarais (between the Massif Central and the Rhone Valley) shows two characteristic karst areas: the karst of the Jurassic and the karst of the Under Cretaceous. The morphological differences between the two areas are discussed.

1866 Texas Water Development Board. (1978) - An environmental study of several streams which appear to recharge the Edwards aquifer: U.S.; Texas Water Development Board, File Report 130.

This study on four streams in the San Antonio River Basin containing low flow, geologic, and chemical quality information points out certain considerations when assessing the land-carrying capabilities for urban development.

1867 Texas Water Development Board. (1978) - Hydrology and geology of Cibolo Creek Basin: U.S.; Texas Water Development Board, File Report 132.

This report points out the sensitivity of the Edwards aquifer to surface features and urban development and how the movement, quality, and quantity of water which is recharged can be vitally affected.

1868 Thatcher, L.L. (1967) - Water tracing in the hydrologic cycle in Isotope Techniques in the Hydrology Cycle: U.S.; American Geophysical Union, Washington, p. 97-108.

1869 Thatcher, L.L.; and Payne, B.R. (1965) - The distribution of tritium in precipitation over continents and its significance to groundwater dating: U.S.; Proceedings of the 6th International Conference on Radiocarbon and Tritium Dating, Pullman, Washington, p. 604-629.

1870 Therond, R. (1973) - Recherche sur l'étanchéité des lacs de barrage en pays karstique in Collection du Centre du Recherches et d'Essais de Chatou: France; Eyrolles éd. Paris, Vol. 16, 444 p.

Synthèse de l'ensemble des données recueillies à l'occasion de la conduite de travaux de barrages en terrains karstiques et relatifs aux risques de fuite, d'après l'exemple de 17 grands barrages dont les conditions hydrogéologiques sont examinées en detail.

1871 Thilo, L.; and Muennich, K.O. (1970) - Reliability of carbon-14 dating of groundwater: effect of carbonate exchange in Isotope Hydrology 1970: Vienna; IAEA, Proc. Ser., p. 259-270.

1872 Thomas, C.P.; and Beckford, S. (1982) - Tracing well water pollution in a limestone aquifer: U.S.; Journal of American Water Works Association, 74:4, p. 182-187.

1873 Thomas, F. (1984) - The Topolnita-Epuran cave system (the Mehedinti Plateau, Romania): Wien; Naturwissenschaftliche Forschungen uber Siebenburgen, Vol. 2, p. 311-335, 13 fig., Bholai Verlag Koln Vien [in German].

The Mehedinti Plateau in the Southern Carpathians, north of the Danube Pass, includes numerous remarkable karstic features, among which is the Topolnita-Epuran cave system. The author describes the karstic hydrography of the region and the monumental speleothems within the system of caves.

1874 Thomas, F.W. (1984) - The new cave of Risnov - the Valea Fundata Cave (Romania) Wien; Naturwissenschaftliche Forschungen uber Siebenburgen, Vol. 2, p. 295-310, 7 fig., Bohlau Verlag Koln Wien [in German].

The first reference to the karstic water resurgence in the Postavaru Massif nearby Brasov was made by F. Podek (1911, 1912, 1925) who recalled an eruption (1903) of the "periodic spring" at Risnov. A similar eruption, occurring in August 1949, is shown to have opened the mouth of the cave at Valea Fundata, near Brasov.

1875 Thompson, G.M.; Lumsden, D.N.; Walker, R.L.; and Carter, J.L. (1975) - Uranium series dating of stalagmites from Blanchard Springs Caverns, USA (Arkansas, Quaternary): U.K., Oxford; Geochimica et Cosmochimica Acta, 39:9, p. 1211-1218.

1876 Thompson, Peter; Schwarcz, H.P.; and Ford, D.C. (1981) - Continental Pliestocene climatic variations from speleothem age and isotopic data [reprintd from Science 184: 893-894 (1974)] in Sweeting, M.M., editor (1981) Karst Geomorphology, Benchmark Papers in Geology, V. 59: U.S.; Hutchinson Ross Publishing, p. 273-275.

Spelothems (cave-deposited travertines) from some limestone caves in West Virginia, the southern Canadian Rockies, and the Northwest Territories have been dated by the 230Th/234U method.

1877 Thornbury, W.D. (1965) - Regional geomorphology of the United States: New York, London; John Wiley and Sons, 609 p.

1878 Thorp, M.J.W.; and Brook, G.A. (1984) - Application of double Fourier series analysis to ground subsidence susceptibility mapping in covered karst terrain in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 197-200.

Grid point elevations were interpolated from 1:24,000 scale topographic maps of a 9 x 12 km area in suburban Orlando, central Florida, to produce 3,780 data points with X, Y, and Z coordinates. The data were analyzed by the double Fourier series technique. Results indicate that double Fourier series analysis may be useful in isolating significant fracture zones in bedrock beneath overburden in covered karst regions.

1879 Thrailkill, J. (1985) - The inner Blue Grass karst region in Dougherty, P.H., editor, Caves and Karst of Kentucky: U.S.; Kentucky Geological Survey Special Publication 12, p. 28-62.

1880 Thrailkill, J. (1984) - Hydrogeology and environmental geology of the inner Bluegrass karst region, Kentucky: U.S.; Geological Society of America, 31 p.

1881 Thrailkill, J. (1977) - Relative solubilities of limestone and dolomite in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 491-500.

1882 Thrailkill, J. (1976) - Carbonate equilibria in karst waters in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources, Vol. 2: U.S.; Water Resources Publications, p. 745-766.

Other than showing that karst water may remain unsaturated with respect to calcite after long travel distances underground because of the introduction of carbon dioxide, these investigations have so far raised more questions than they have answered.

1883 Thrailkill, J.; Byrd, P.E.; Sullivan, S.B., Spangler, L.E.; and Taylor, C.J. (1983) - Studies in dye-tracing techniques and karst hydrogeology: Kentucky Water Resources Research Institute, Research Report No. 140, July 1983, 97 p., 36 fig., 13 tab., 43 ref. in Selected Water Resoruces Abstracts: U.S.; U.S. Geological Survey, 16:11, p. 23-24.

Information on fluorescent dyes used for water tracing and the results of six studies are reported. Optical brightener, direct yellow, fluorscein, rhodamine (WT), and other dyes are described and the producers employed in their use in the field and in equilibration experiments are described.

1884 Thrailkill, J.; and Gouzie, D.R. (1984) - Discharge and travel time determinations in the Royal Spring ground-water basin, Kentucky: U.S,; University of Kentucky, Water Resources Research Institute, Report 149, 43 p.

1885 Thrailkill., J.; Hopper, W.M., Jr.; McCann, M.R.; and Troester, J.W. (1983) - Problems associated with urbanization in the inner Bluegrass karst region in Dougherty, P.H., editor, Environmental Karst, Karst Symposium, Louisville, Kentucky, U.S., April 1980: U.S.; Geospeleo Publications, p. 51-52.

1886 Thrailkill, J.; Spangler, L.E.; Hopper, W.M., Jr.; McCann, M.R.; Troester, J.W.; and Gouzie, D.R. (1982) - Groundwater in the inner Bluegrass karst region, Kentucky: U.S.; University of Kentucky Water Resources Research Institute and Office of Water Research and Technology, 108 p.

1887 Tierney, J. (1985) - Caves of northeastern Kentucky; with special emphasis on Carter Caves State Park in Dougherty, P.H., editor, Caves and Karst of Kentucky: U.S.; Kentucky Geological Survey Special Publication 12, p. 78-85.

1888 Tillmans, J. (1932) - Die chemische untersuchung von wasser und abwasser: Verlag. W. Knapp, Halle, 252 p.

1889 Titcomb, E.F., Jr.; and Keeton, J.M. (1984) - Sinkhole activity in the vicinity of the Sunny Point, N.C., Military Ocean Terminal in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 349-352.

On 1 December 1976, two springs and a sinkhole appeared along the Army-owned railway 3 miles north of the Sunny Point Military Ocean Terminal. Exploratory borings revealed an underground cavity of large extent beneath the railway. The geology, causes, exploratory programs, remedial actions, and present status of this problem are addressed.

1890 Tixeront, J.; Berkaloff, E.; Caine, A.; and Mandeuch, E. (1959) - Water balance of the Tunesian Limestone Massifs - Development for Tunis and Bizerta: B.I.R.H. records, T. 689.

1891 Tixeront, J.; Berkaloff, E.; Caine, A.; and Mandeuch, E. (1951) - Bilan d'eau des massifs calcaires en Tunisie Gaz des captages de Tunis et de Bizerte: A.I.H.S. Assemblée Générale de Bruxelles, Extrait du tome IV.

1892 Todd, T.W. (1966) - Petrogenetic classification of carbonate rocks: Journal of Sedimentary Petrology, Vol. 36, p. 317-340.

1893 Tolson, J.S.; and Doyle, F.L., editors. (1977) - Proceedings of the 12th international congress, karst hydrogeology, Huntsville, Alabama, U.S.: U.S.; University of Alabama in Huntsville Press, IAH Memoirs, XII, 578 p. [English or French with abstract in the other language].

1894 Tomlinson-Reid, S. (1979) - Karst features in Yucatan and the subsurface of Texas (geology of Cancun, Quintana Roo, Mexico field guide): U.S., Midland; Field Trip Guidebook West Texas Geological Society, 72, p. 124-127.

1895 Torbarov, K. (1976) - Estimation of Permeability and effective porosity in karst on the basis of recession curve analysis in Yevjevich, V., editor, Karst Hydrology and Water Resources: U.S.; Water Resources Publications, p. 121-136.

1896 Torres, A. (1984) - Hydrologic study of the Rio Camuy cave system, Puerto Rico in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

1897 Torres-Gonzalez, A. (1980) - Hydrology of the Rio Camuy Cave system, Puerto Rico: U.S.; Geological Society of America, Abstracts with Programs, 12:7, p. 536.

The Rio Camuy flows underground for 15 kilometers through underground caves. Studies have proven the existence of two hypothetical underground passages and others that were previously unknown.

1898 Toth, J. (1963) - A theoretical analysis of groundwater flow in small drainage basins: Journal of Geophysical Research, 68:16, p. 4795-4812.

1899 Toth, J. (1962) - A theory of groundwater motion in small drainage basins in central Alberta, Canada: Journal of Geophysical Research, 67:11, p. 4325-4387.

1900 Toulemont, M. (1984) - Le Karst gypseux du Lutétien supérieur de la région parisienne, Caractéristiques et impact sur le milieu urbain: France; Rev. Géol. Dyn. Géogr. Phys., 25:3, p. 213-228.

1901 Townsend, H.M. (1982) - Drilling techniques, Port Laoise Seminar: Irish Group, IAH, 30-31 March.

Describes methods of drilling in hard rocks, as limestone and dolomite. Air drilling additives should be added in problem and large-diameter holes. Lost circulation in limestones with cavernous and vugular opening.

1902 Transvaal and Orange Free State Chamber of Mines. (1966) - The facts about sinkholes: Johannesburg; Transvaal and Orange Free State Chamber of Mines, Mining Survey No. 59.

1903 Tranteen, Peter. (1969) - Höhlenperlen aus bulgarien-genesis und systematik: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 535/1-535/5.

1904 Tratman, E.K., editor. (1969) The caves of north-west Clare, Ireland: Univ. Briston Spelaeological Soc.; David & Charles, Newton Abbot, 256 p.

Within the 50 square miles overlying the caves, the latter have a length totaling some 35 miles. Section 5 deals with limestone solution and cave formation. Section 6 deals with the Quaternary sediments partially infilling some of the caves.

1905 Trimmel, Hubert. (1971) - Bericht der kommission für terminologie und kanventielle zeichen der internationaler spelaologischen union: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 6, p. D4/1.

1906 Trimmel, Hubert. (1971) - Schewhöhlen in osterreich-bedeutung und entwicklung: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 129-134.

1907 Trimmel, Hubert. (1969) - Gedanken zur abfolge von entwicklungs, phasen in höhlen der alpinen karstgebiete: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 526/1-526/3.

1908 Tripet, J.P. (1976) - Study of the permeability and the porosity of limestone karst formations (Alta Verapaz, Guatemala): France, Besançon; Ann Sci Univ Besançon Ser 3 Geol, 25, p. 411-421 [in French].

1909 Tripet, J.P. (1971) - Etude hydrogéologique du basin de la source de l'Arsece: Thèse, Université de Neuchâtel, France.

1910 Troester, J.W.; White, E.L.; and White, W.B. (1984) - A comparison of sinkhole depth frequency distributions in temperate and tropic karst regions in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 65-73.

Sinkholes from several temperate karst regions (Appalachian areas; the central Kentucky karst; Perry County, Missouri; and northern Florida) and tropical karst regions (northern karst belt of Puerto Rico and the Cervicos karst region of the Dominican Republic) were characterized by their depth and density. The frequency of occurrence of sinkholes decreases exponentially with depth.

1911 Troester, J.W.; and White, W.B. (1984) - Geochemical investigation of three tropical karst drainage basins in Puerto Rico in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

1912 Trombe, F. (1952) - Traite de spéléologie: Paris; 376 p.

1913 Trudgill, S.T. (1976) - Limestone erosion under soil: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 409-422.

1914 Trudgill, S.T. (1972) - Quantification of limestone erosion in intertidal, subaerial and subsoil environments, with special reference to Aldabra Atoll, Indian Ocean: Cave Research Group of Great Britain Transactions, 14:2, p. 176-179, March 1972, 18 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 5:17, p. 13.

Eròsion rates of limestone were studied on an atoll in the Indian Ocean by using micro-erosion meters, measurements of carbonate saturation, direct weight loss of pre-weighted tablets, and growth rates of boring mollusks.

1915 Trudgill, Stephen T. (1985) - Limestone Geomorphology: London and New York; Longman, 231 p.

1916 Trufas, C. (1970) - Dracului Lake and Cave: Terra, Vol. 5, p. 43-45 [in Romanian].

The lake was formed in the hollow of a "Vaucluse" type spring, which at present ceased its activity, its flow being diverted toward a new emergence point. It constitutes an underwater entrance toward a probable network of passages and underground streams.

1917 Trufas, C. (1970) - Observations concerning the karstic phenomena from Pestera-Pui: Sargetia, Vol. 8, Deva, p. 57-60 [in Romanian].

An almost 2 km^2 karst area was formed by a brook piercing a Jurassic limestone stripe, from beneath mio-pliocene deposits.

1918 Trufas, V. (1966) - Observations of karstic morphology in Piatra Lesului area: Lucrarile Institutului de Speologie "Emil Racovita", Vol. 5, p. 261-273, 9 fig. [in Romanian with English abstract].

The genesis of a gorge is discussed, as well as the water losses and rises and a set of caves developed in the walls of the gorge.

1919 Trufas, V. (1960) - The Lake Invirtita from Nucsoara: Natura, Vol. 5, p. 78-81, 4 fig. [in Romanian].

The lake bowl is a depression of suffusion and subsidence in gypsum with interstratified sandstones. Mention is made of the morphometry, the temperature, and the hydrologic regime.

1920 Trufas, V.; and Trufas, C. (1960) - Gaunoasa Cave from Valea: Bobii-Comunicari de Geologie-Geografia, 1, p. 73-77 [in Romanian].

Gaunoasa Cave is a cave generated by a cohydrographic capture. It crosses a Jurassic limestone stripe uncovered from beneath tortonian deposits.

1921 Tsui, Po Chow (1984) - Deformation ground subsidence, and slope movements along the Salt River escarpment in Wood Buffalo National Park [microform]: Canada, Ottawa; National Library of Canada, 3 microfiches [Master's thesis, University of Alberta, 1982].

1922 Tulipano, L.; Tadolini, T.; and Fidelibus (1982) - Pollution of groundwater in a carbonate and karstic aquifer due to urban effluent and agricultural activities in International Symposium of International Association of Hydrogeologists, Prague, Czechoslovakia, 1982, Impact of Agricultural Activities on Groundwater: Czechoslovakia [in English].

1923 Tulucan, T. (1979) - Martel Cave: Buletin Speologic, Vol. 1, 7 fig. [in Romanian].

The relationship between a temporarily flooded cave and the rainfall, as well as the drainage system, is considered. It appears that only a short segment (some 100 m) of the 4 km long passage effectively drains water, while the rest of it is subjected to seasonal water level fluctuations.

1924 Tunny, H. (1985) - Management and disposal of farm wastes: Read at meeting, June 1984, for An Foras Taluntais; published by Irish Nat. Comm., IHP, p. 139-158.

1925 Turcanu, N.; and Lascu, C. (1980) - Underground flow through the gneiss of the Iovan foundation barrage (the Cerna Valley) through the method of labeling with dye tracers: Proceedings of the "Emil Racovita" Speleological Institute, XIX, p. 243-246 [in French].

The way to pinpoint the velocity and direction of flow through open fissures in the gneiss in the foundation of a barrage tectonized area is outlined.

1926 Turk, L.J. (1976) - Predicting the environmental impact of urban development in a karst area in Yevjevich, Vujica, editor, Karst Hydrology and Water Resources Publications: Dubrovnik; Proceedings U.S.-Yugoslavian Symposium, 1975, Vol. 2, p. 680-702.

Urban development in karst terranes poses a serious threat to water quality because the pollutants generated in urban areas commonly have easy access to subsurface water. In some areas it is possible to study a similar nearby substitute hydrologic basin that has been urbanized, to predict accurately the environmental impact of a particular development. An example is presented of a substitute-basin study to predict the environmental effects of a proposed development (San Antonio Ranch New Town) in the San Antonio area, Texas.

1927 Turk, L.J. (1973) - Land-use planning for San Antonio Ranch New Town: A new community in a carbonate terrain sensitive to water quality degradation (abstract): U.S.; Geological Society of America, Abstracts with Programs, Vol. 7, p. 884.

Urban development can lead to problems of water quality; therefore, in planning development it is necessary to consider water quality before all other factors.

1928 Turner, William M. (1977) - Use of thermonics in foundation studies in karstic terranes in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 459-462.

Thermonics, the analysis of ground-water flow systems related to temperature, plus fracture trace analysis, is a very efficient method of locating fractures and solution features in karstic terranes.

1929 Uil, Hilko (1978) - Application du carottage thermique et de hydrochimie à l'étude des circulations d'eau souterraine en milieu karstique (région karstique nord-montpelliéraine): France; Thèse Ing. Doct. Sci. de l'Eau, Montpellier.

1930 Ukayli, Mustafa Ahmed. (1978) - Hydrogeology and digital modeling of the buried-valley aquifer and the Silurian-Devonian carbonate aquifer in the Scioto River basin, Ohio: U.S.; Ohio State University Ph.D. dissertation, 287 p.

1931 UNESCO-FAO. (1975) - Glossary of multilingual equivalents of karst terms: Paris; UNESCO.

1932 UNESCO-FAO. (1973) - Karst hydrology in eight circum-mediterranean countries (first preliminary edition): Paris; UNESCO-FAO SC/WS/446, 23 p.

1933 UNESCO, IASH, IAH, Institute of Geological Sciences. (1970) - International legend for hydrogeological maps: Paris; UNESCO, 101 p.

1934 Upchurch, S.B.; and Lawrence, F.W. (1984) - Impact of ground-water chemistry on sinkhole development along a retreating scarp in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 23-28.

The Cody Escarpment of north Florida is a classic, retreating, karst escarpment. It is the middle of three ground-water chemical domains, which contain: (1) confined, "stagnant", calcite-saturated water under the upland, (2) aggressive, organic-rich water from recharge along the scarp, and (3) unconfined, slightly aggressive water characterized by lateral flow below the scarp.

1935 Urbani, Franco. (1973) - Carsos de Venezuela, Parte 3: Zona piemontina de la parte central de la cordillera de la costa: la Sociedad Venezolana de Espeleologia, Boletin No. 2, Vol. IV, p. 153-173.

1936 Urbani, Franco. (1972) - Notas sobre la cueva walter dupony (Mi.2), Capaya, Estado Miranda: la Sociedad Venezolana de Espeleologia, Boletin No. 3, Vol. III, p. 169-178.

1937 Urbani, Franco. (1967) - La sima de agua dulce (Chichirwiche, Edo. Falcon): la Sociedad Venezolana de Espeleologia, Boletin No. 1, Vol. I, 1967, p. 5-10.

1938 Urbani, Franco. (1967) - Las espeleotlmas: la Sociedad Venezolana de Espeleologia, Boletin No. 1, Vol. I, 1967, p. 23-24.

1939 U.S. Army Corps of Engineers and Edwards Underground Water District. (1964) - Edwards underground reservoir: U.S.; U.S. Army Corps of Engineers, Ft. Worth, Texas, Vol. 3.

The authors give the results of an investigation of the problems associated with the water resources of the Edwards underground aquifer and the portions of the three river basins which contribute to its recharge.

1940 U.S. Army, Office, Chief of Engineers and U.S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory. (1977) - Symposium on Detection of Subsurface Cavities: U.S.; U.S. Army, 168 p.

1941 U.S. Commission. (1962) - The report of the U.S. Study Commission-Texas; 2 parts: U.S.; United States Study Commission, 1962.

A discussion with recommendations on the water resources of Texas.

1942 U.S. Department of Agriculture. (1970) - Groundwater recharge hydrology: U.S.; ARS 41-161, Agricultural Research Service, 62 p.

1943 U.S. Department of Interior. (1975) - Land subsidence: parts of U.S. are sinking: U.S., Washington; U.S. Department of Interior News Release, 10:12, 3 p.

1944 U.S. Environmental Protection Agency. (1974) - Methods for chemical analysis of water and wastes: U.S., Washington; EPA 625-16-74-003, Office of Technology Transfer, 298 p.

1945 U.S. Geological Survey. (1977) - Maps of areas showing occurrences of sinkholes in Alabama counties, forty counties mapped by U.S. Geological Survey, 1977: U.S.; U.S. Geological Survey.

1946 U.S. Geological Survey. (1974) - Mammoth Cave National Park, Kentucky, 1966: U.S.; U.S. Geological Survey, Map.

1947 Uzunovic, Omer. (1969) - Hydrologische probleme in Unac-Tal und ergebnisse der spelaologischen und hydrographischen untersuchunger: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY18/1-HY18/9.

A discussion of the problems involved in the Unvac Valley with regard to the development of a large water supply.

1948 Vadeanu, T. (1982) - Possibilities of using metric wave communication between the outside and the underground in karstic areas: Bucharest; Buletinul CSER, Vol. 7, p. 113-126, 3 tab., 2 sketch, 2 maps, 2 photographs.

Experiments with interesting results which show the possibility of communicating through electromagnetic waves.

1949 Vadeanu, T. (1981) - Cociului Cave (Padurea Craiului Mountains): Carst, Vol. 1, p. 11-13, 1 map [in Romanian].

A description of a reception cave 391.5 m long and with a 86.5 m gradient.

1950 Valenas, L. (1985) - The morphology of the cave from Izvorul Gabor (Padurea Craiului Mountains): Crisia, Vol. 15, [in French with Romanian abstract].

The paper discusses the morphologic and hydrogeologic problems that developed in the lithological-structural frame of the cave from Izvorul Gabor (2,707 m long). The part played by the cave as a first order drain for the underground capture of an epigean water course in the benefit of another subaerial stream is outlined. A post-medium Pleistocene age is proposed for the cavity.

1951 Valenas, L. (1984) - The complex study of the karst from the area Izvorul Ursului-Piriul Sec (Bihor Mountains): Crisia, Vol. 14, p. 559-580 [in Romanian with French abstract].

A study making use of multidisciplinary data (lithology, structure, karst water geochemistry, endokarst morphology).

1952 Valenas, L. (1983) - Preliminary considerations concerning the problems arisen by the active tectonics in the cave from Piriul Hodobane (Bihor Mountains): Nymphaea, Vol. 10, p. 183-194, 10 fig. [in French with Romanian abstract].

The paper debates the problems related to active tectonics in the endokarst. Seven morphologic forms of active tectonics observed in the cave from Piriul Hodobane (22,042 m development) are described. The observed forms are considered to belong to active tectonics, subsequent to the organization of the underground network, which prevail on that of "active mechanics".

1953 Valenas, L. (1981) - New investigations of physical speleology in Padurea Craiului Mountains: Nymphaea, 8-9, p. 265-316 [in Romanian with French abstract].

The author describes 34 new cavities. A similarity is drawn with Bihor Mountains in respect to the 1:1 proportion of the active versus fossil passages in a cave longer than 1 km. The cavities where access was possible only by means of mining galleries are also investigated, their origin being considered phreatic.

1954 Valenas, L. (1979) - A complex study of the area Craiasa Valley-Virtoape Valley, with special regard to Ursilor Cave (Bihor Mountains): Nymphaea, Vol. 7, p. 139-176, 15 fig., 3 plates, 1 tab. [in Romanian with French abstract].

A study of Ursilor Cave (1,500 m development) and its surrounding area. Lithologic, structural, hydrologic, geomorphologic, relief evolution trend, and economic geography data are presented.

1955 Valenas, L. (1979) - Morphology of the Cave Spiacych Rycerzy Nizna (Western Tatra, Poland): Nymphaea, Vol. 7, p. 243-250, 3 fig. [in Romanian with French abstract].

The paper includes data concerning the morphology and the morphometry of a 240-m long cave from Western Tatra. The cave is considered an old resurgence, fossilized as a consequence of the block uplift of Western Tatra in the upper Pleistocene. It is also estimated that the age of the endokarst of the Polish Tatra is post-medium Pleistocene.

1956 Valenas, L. (1978) - Morphology of the pothole from Cuciulata (Bihor Mountains): Nymphaea, Vol. 6, p. 363-368, 2 fig., 1 plate [in Romanian with French abstract].

The morphology and the hydrology of the pothole from Cuciulata (-186 m depth, 925 m length) are discussed. It is a descending cavity, developed along a lithologic contact between karstifiable and nonkarstifiable rock. Erosion in the endokarstic environment is considered.

1957 Valenas, L. (1978) - The morphology of the system Coiba Mica-Coiba Mare-Izbucul Tauz (Bihor Mountains), Nymphaea, Vol. 6, p. 329-362, 13 fig., 1 plate, 1 tab. [in Romanian with French abstract].

The paper studies the karst from Casa de Piatra-Tauz area (Bihor Mountains), which includes the hydrogeologic system Coiba Mica-Coiba Mare-Izbucul Tauz (2.9 km extension). Lithologic, structural, hydrogeologic, and morphologic data are furnished.

1958 Valenas, L. (1977) - Morphology of the karst from Groapa de la Barsa (Bihor Mountains): Travaux de l'Institut de Spéologie "Emile Racovitza", Vol. 16, p. 243-257, 9 fig. [in French].

This article focuses on the closed depression Groapa de la Barsa (2.42 km^2 surface), which at the date of the paper included 16 cavities, with a cumulated length of 14,880 m of passages. The surface and the underground karst are described in an organic view.

1959 Valenas, L. (1977) - Problems of karstic morphology in Groapa de la Barsa (Bihor Mountains): Nymphaea, Vol. 5, p. 157-199, 28 fig., 1 plate, 2 tab. [in Romanian with French abstract].

A closed karst depression of 2.42 km^2 is drained by 17 epigean water courses, resulting in a drainage density of 5.34 km/km^2. The underground capture of these courses takes place in a more than 15-km long cave network, developed mostly along various systems of fractures, under epiphreatic conditions. The structural position of the limestones favors the occurrence of a perched aquifer, collecting the waters of the karstic system.

1960 Valenas, L. (1976) - A general view on the Bihor Mountains karst: Nymphaea, Vol. 4, p. 21-58, 19 fig. [in Romanian with French abstract].

Theoretical concepts concerning erosion, corrosion, phreatic and vadose genesis, rates of karstification, and karst network organization are illustrated by eloquent field examples from the well developed karst of Bihor Mountains.

1961 Valenas, L.; Bleahu, M.; Brijan, P.; and Halasi, G. (1977) - The speleological inventory of Bihor Mountains: Nymphaea, Vol. 5, p. 209-335, 7 tab., 1 plate [in Romanian with French abstract].

A statistical study of the number of cave entrances, the cave lengths, and active versus fossil passages is performed for the karst area of Bihor Mountains. It appears that the descending caves, situated on the high plateaus, average three times the length of the ascending caves on valley borders. It also appears that the outflow caves have mostly a localized, poorly organized drainage, since they are more numerous, yet average much shorter lengths than the active caves from the plateaus.

1962 Valenas, L.; and Drimba, Gh. (1978) - Physical speleology investigations in Padurea Craiului Mountains: Nymphaea, Vol. 6, p. 279-328, 24 fig., 3 plates, 1 tab. [in Romanian wih French abstract].

The article is a synthesis on the endokarst of Padurea Craiului Mountains (1,400 km^2). The authors use a multidisciplinary approach to interpret the results obtained from the investigation of 21 representative cavities (of 12,483 m cumulated length). It is concluded that the relatively recent age of the endokarst from Padurea Craiului is post-medium Pleistocene.

1963 Valenas, L.; Halasi, G.; and Czako, L. (1983) - The morphology and the hydrology of the underwater passages from Girda Valley Basin (Bihor Mountains): Nymphaea, Vol. 10, p. 195-205, 7 fig., 2 plates [in French with Romanian abstract].

Morphologic and hydrogeologic data concerning the sumps from Girda Valley are presented. The lithologic-structural frame in which the sumps are developed is discussed. A general drainage model of the karst systems to which the sumps belong is given.

1964 Valenas, L; and Iurkiewicz, A. (1985) - The morphology of the cave from Hoanca Apei (Bihor Mountains): Crisia, Vol. 15 [in Romanian with French abstract].

The paper discusses the morphology, the morphometry, and the hydrogeology of the cave from Hoanca Apei (1,839 m long).

1965 Valenas, L.; and Zygmunt, J. (1980) - Contributions to the knowledge of the karst of the Dedegol Dag Massif (Western Taurus, Turkey): Buletin Informativ, Vol. 4, p. 7-23, 3 fig., 1 tab. [in Romanian with French abstract].

The morphology and the water geochemistry of the karst of Dedegol Dag is discussed. The karst circulation model, based on the interpretation of the geochemical data, indicates a fast vadose alpine type drainage. The paper was elaborated as a result of the Polish expedition from 1978.

1966 Van der Ancker, H. (1978) - A reconnaissance survey of the groundwater around Mallow, Co. Cork, Ireland: Netherlands; Free Univ. Amsterdam, unpublished M.Sc. thesis.

Structure in the Dinantian, Namurian, and Westphalian limestones and sandstones are very complex. Karstification permits deep ground-water circulation with resurgent warm springs.

1967 van Everdingen, R.O. (1982) - Morphology, hydrology and hydrochemistry of karst in permafrost terrain near Great Bear Lake, Northwest Territories: National Hydrology Research Institute, Paper No. 11, Inland Water Directorate Scientific Series No. 114, 1981, 53 p., 32 fig., 8 tab., 53 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 15:4, p. 9.

Collapse features in the area are interpreted as being the result of subsurface solution of evaporites. They appear to be concentrated on and around a number of small "domes" on the Keele Arch.

1968 van Everdingen, R.O. (1977) - Observations of karst morphology and hydrology, Norman Wells (96E), Mahony Lake (96F) and Lac des Bois (96K) map areas, N.W.T., 1975/1976: Canada; Canada Inland Waters Dir, Rep. Ser. 55, p. 71-74.

1969 van Everdingen, R.O. (1976) - Use of LANDSAT imagery in studies of spring icings and seasonally flooded karst in permafrost areas in Remote sensing of soil moisture and groundwater; workshop proceedings, Toronto, Canada, 1976: Canada; Can Aeronaut Space Inst, p. 231a-235.

1970 Van Putten, F.A.M. (1978) - A hydrogeological investigation of the catchment areas of the Sow River, the Blackwater River and the Castlebridge River, Co. Wexford: Netherlands; Free Univ. Amsterdam, unpublished M.Sc. thesis.

Limited basins of rather complex nature, analyzed for their groundwater content.

1971 Van Ree, D.F.; and Rot, G. (1981) - The lower carboniferous limestone aquifer near Buttevant, Co. Cork: Netherlands; Free University Amsterdam, Inst. Earth Sci., Dept. Geographic Hydro. and Hydrogeol., thesis.

The Dinantian limestones, mainly to the east of Buttevant town, are mainly karstified aquifers with ground-water discharge for 1981 as 29 percent of precipitation and as 33.3 percent for 1982. Transmissivity was calculated as 5.8 liters per second. Swallow holes and resurgences are common.

1972 Varnadoe, W.W., Jr.; and Lundquist, C.A. (1984) - The fault and caves in Newsome Sink, Alabama in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

1973 Varnadoe, W.W., Jr.; and Lundquist, C.A. (1983) - Geological observations concerning caves of the Newsome Sinks area in Rea, G.T., editor, Proceedings of the National Sepeleological Society Annual Meeting, Elkins, Wyoming, U.S., 1983: U.S.; NSS Bulletin, 45:2.

1974 Veizor, Jan. (1977) - Diagenesis of pre-Quaternary carbonates as indicated by tracer studies: Journal Sedimentary Petrology, 47:2, p. 565-581.

Tracer studies have limitations, but they offer one of the best ways of obtaining quantitative criteria in facies interpretation of old carbonate rocks.

1975 Vianello, Marino. (1971) - La grotta gigante presso Trieste: Centro turistico e scientifico d'importanza mondiale: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 135-147.

1976 Viehmann, I. (1984) - A microscopic analysis of the stalagmitic formations in the caves Soreq, Atatort, and Har Sedon (Israel): Carst, Vol. 3, p. 57-60 (in Romanian).

The author processes the results of the microscopic analyses conducted on thin sections for 11 samples of stalagmitic formations (corallite, stalactite, stalagmitic crusts, helictite and mondmilch depositions). Most of the formations developed from calcite.

1977 Viehmann, I. (1984) - The stalagmitic formations in the Ghetarul de la Scarisoara Cave: Pestera, Vol. 1, p. 31-38 [in Romanian].

The author describes the distribution of stalagmitic formations in the chambers of the cave, their composition and classification, and then analyzes more particular crystallizations and concretions in detail.

1978 Viehmann, I. (1976) - Essay on the classification of underground cave forms: Olomouc; Proceedings of the 6th International Congress of Speleology, Academia Praha, III, p. 289-293 [in French].

The author classifies the relief of the endokarst in several excavation formations (cave forms and constitutional forms) and filling forms (fluviatile, ice, clay, biomorphic, and detritic forms and speleothems).

1979 Viehmann, I. (1976) - Ten years of periodic research in an ice cave (Scarisoara Cave, Romania): Olomouc; Proceedings of the 6th International Congress of Speleology, Academia Praha, IV, p. 323-327 [in French].

Ghetarul de la Scarisoara Cave was studied eleven months each year over a 10-year period. Observations were made and climate and

glaciology recordings performed. Partial and preliminary results are outlined.

1980 Viehmann, I. (1969) - Methods of experimental research in the study of ice caves: Germany, F.R., Stuttgart; 5 Internationaler Kongress für Speleologie, Verband der Deutchen Höhlen und Karstforscher, Munchen, 2, p. 29/1-29/3 [in German].

The author describes several methods of registering climate in ice caves, two devices for recording roof drips, as well as the typology of cave pearls and the morphodynamics of ice formations.

1981 Viehmann, I. (1967) - Pojarul Politei Cave: Ocrotirea Naturii, 11(1), p. 61-74, 11 figs. [in Romanian].

The abundance of stalagmitic formations and crystallizations in Pojarul Politei Cave is underscored. A map of this cave is supplied.

1982 Viehmann, I. (1966) - Fluorescein tracing experiments in the investigation of the hydrography of the karst (II): Hidrotehnica, 11:1, p. 92-96, 2 fig., 3 tab. [in Romanian].

An interpretation of several tracing experiments conducted in the Apuseni Mountains. Attention is paid to the phenomenon of fluorescein retardation with respect to the water it colors.

1983 Viehmann, I. (1966) - Fluorescein tracing experiments in the investigation of the hydrography of the karst (I): Hidrotehnica, 11:1, p. 37-42, 2 tab. [in Romanian].

The means of underground water tracing are surveyed. The fluorescein tracing technique is described in detail. The results of the tracing experiments performed in the karst of Romania are given.

1984 Viehmann, I. (1964) - Notes on the genesis of lapies: Dari de Seama ale Comitetului Geologic, Vol. 49, p. 271-288, 8 diagrams [in Romanian].

The paper gives an analysis of the causes behind the genesis of lapies, of their evolution and morphology, followed by their classification. Several examples taken from the karst of Romania are studied.

1985 Viehmann, I. (1962) - Cave pearls in Ghetarul de la Scarisoara: Dari de Seama ale Sedintelor Comitetului Geologic, 41 [in Romanian].

The author presents the morphogenesis of spherical, polyhedral and flat pearls, of micro-pearls, and of pearls with nest. Explanations are supplied concerning the presence of a large amount of flour and micro-pearls in the cave, relying on the water-freezing phenomenon.

1986 Viehmann, I. (1962) - Observations on the morphogenesis of giant's cauldrons: Dari de Seama ale Comitetului Geologic, Vol. 46, p. 505-521, 8 fig. [in Romanian].

A discussion is given of research work into the morphogenesis of giant's cauldrons. Several experiments with dyes and floats which permitted eddy currents to be identified are described. A number of typical examples taken from Romania's karst are listed.

1987 Viehmann, I. (1960) - A description of stalagmitic formations in the Ialomita Cave: Comunicari de Geologie-Geografie ale Societati Stiinte Naturale si Geografie a R.P.R., p. 61-66, 4 fig. [in Romanian].

Several particular stalagmitic formations in the Ialomita Cave in the Bucegi Mountains are studied and the causes of certain anomalies in their development commented upon. The effects of the changes in the floor or in the supports of stalagmites are described.

1988 Viehmann, I. (1959) - Contributions to the investigation of the genesis of giant's cauldrons: Warsaw; Speleologia, Biuletyn Speleoklubu Warszawskiego, Nakladem Speleoklubu Warszawskiego, 1:3, p. 145-177 [in French].

A brief historical survey is made of research into the morphogenesis of giant's cauldrons. A series of explanations and hypotheses are supplied concerning the morphogenesis of this type of karstic relief. Several examples from the Apuseni Mountains are given.

1989 Viehmann, I. (1959) - Contributions to the investigation of stalagmitic formations in caves: Dari de Seama ale Sedintelor Comitetului Geologic, Vol. 42, p. 579-610, 17 fig. [in Romanian].

Twelve types of stalagmitic formations, frequently found in caves, are listed. The physical, chemical, and crystallographic causes that might explain their genesis are studied. Examples taken from various caves are analyzed.

1990 Viehmann, I. (1958) - The stalagmitic formations in the caves of the Scarisoara karstic complex (Romania): Bruxelles; Mémoires du Colloquium International de Spéléologie de la Fédération Spéléologique de Belgique, p. 73-80 [in French].

The stalagmitic formations in the Ghetarul de la Scarisoara and Pojarul Politei Caves and the pothole at Sesuri are described. The concretions are located in the passages of the respective caves. Emphasis is placed on rare formations such as the "flower" of micro-pearls, cave pearls of various types, eccentric calcite crystals, which are called "cristalictite", and depositions of mondmilch. A description is given of the "permanent drip" phenomenon, an essential factor in the genesis of eccentric crystals.

1991 Viehmann, I.; and Craciun, V. (1969) - Ice migration in the Ghetarul de la Scarisoara Cave: Lucrarile Institutului de Spéologie "Emil Racovita", Vol. 8, p. 51-54, 2 fig. [in Romanian].

The authors investigated the seasonal migration of ice in the deep chambers of the cave. The results of their observations are highlighted.

1992 Viehmann, I; Cristea, M.; Serban, M.; and Ghitea, S. (1980) - The morphology of the Cetatile Ponorului karstic complex (Apuseni Mountains, Romania): Travaux de l'Institut de Spéologie "Emil Racovitza", Vol. 19, p. 261-274, 7 fig. [in French].

The authors describe the morphogenesis of the two gigantic sinkholes and the catchment vertical shaft at Cetatile Ponorului. The underground hydrography is described in correlation with the surface one. Maps of the features described are supplied.

1993 Viehmann, I.; Demeter, I.; Lungu, V.; and Sarkady, P. (1981) - Preliminary notes on the white clay in the Iza Cave (the Rodna Mountains, Romania): Travaux de l'Institut de Spéologie "Emile Racovitza", 20, p. 213-215 [in French].

The authors pinpoint the analyses conducted on the white clay discovered in the cave at Iza - diffractometric analysis, x-ray spectrometry, electronic microscopy, and spectrogram analysis in the visible spectrum, as well as ultraviolet-ray analysis (under voltaic arc). It is a special clay which is neither kaolin nor montmorillonite.

1994 Viehmann, I.; and Mac, I. (1966) - Observations on the karst on the gypsum of the Sebes Mountains and the Turda Gorge: Lucrarile Institutului de Spéologie "Emil Racovita", Vol. 5, p. 67-74, 2 fig. [in Romanian].

The authors make a study of the forms of exokarst in the gypsum of the Sebes Massif and the Turda Gorge, insisting on lapies formations.

1995 Viehmann, I.; Plesa, C.; and Rusu, T. (1964) - The cave at Vadu-Crisului: Lucrarile Institutului de Spéologie "Emil Racovita", Vol. 3, p. 49-81, 13 fig. [in Romanian].

After a brief historical survey of the research conducted, a number of physico-geographic considerations are advanced about the karst in the Vad area where linear, sinkhole-like depressions are to be found. The two caves included in the karstic system generated by the waters in the Pestireu Valley (Batrinului swallet and Vadu-Crisului outflow) are described at length.

1996 Viehmann, I.; and Racovita, Gh. (1968) - A particular case of ice stalagmites in the cave at Scarisoara: Natura, Seria Geografie-Geologie, Vol. 2, p. 26-30, 4 fig. [in Romanian].

The influence which the periodic variations in air temperature exert on the morphology of ice stalagmites is emphasized. A particular type of formation - thermoindicating stalagmites - is described, which most faithfully reproduces in morphology the succession of the respective variations.

1997 Viehmann, I.; Racovita, Gh.; and Riscutia, C. (1970) - Traces indicating the presence of the man and of the cave bear in Ciur-Izbuc Cave in Padurea Craiului Mountains: Bucuresti; Livre du Centenaire "Emil G. Racovita", Editura Academiei R.S.R., p. 521-527 [in French].

A presentation of the footprints of paleolithic man and of traces of activity of the cave bear preserved in Ciur-Izbuc Cave (Padurea Craiului Mountains). A discussion of the indicators that attest to the old age of the respective prints and traces.

1998 Viehmann, I.; Racovita, Gh.; and Serban, M. (1969) - Ghetarul de la Scarisoara: Bucuresti; Editura Meridiane, 79 p., 42 photographs [in Romanian with French and German versions].

A rough presentation of the major elements characteristic of this glacial cave, the most important in Romania and one of the most remarkable in the world with respect to genesis and conservation of the underground deposits of perennial ice.

1999 Viehmann, I.; Racovita, Gh.; and Serban, M. (1965) - Observations on the microclimate at Ghetarul de la Scarisoara: Lucrarile Institutului de Spéologie "Emil Racovita", Vol. 4, p. 105-115, 5 fig. [in Romanian].

Considerations on the effects the aerodynamic exchanges between the cave and the exterior exert on the physical factors of the underground atmosphere and the extent of the area occupied by the ice deposits in this glacial cavity. An experimental demonstration of the phenomena of ice sublimation and volatilization.

2000 Viehmann, I.; Rusu, T.; and Serban, M. (1964) - The Tausoare-Zalion karstic complex (Rodna Mountains): Lucrarile Institutului de Spéologie "Emil Racovita", Vol. 3, p. 21-48, 4 fig. [in Romanian].

The cave at Jgheabul lui Zalion, situated on Izvorul Orbului in the Telcisor Basin and having a resurgence in Izvorul Rece, belongs to the Izvorul Tausoarelor karstic system. Underground hydrography, studied in relation to surface hydrography, shows that the cave passes beneath Gersa Valley, from one hydrographic basin into another.

2001 Viehmann, I.; and Serban, M. (1963) - Preliminary note on the cave at Izvorul Tausoarelor (Rodna Mountains): Lucrarile Institutului de Spéologie "Emil Racovita", 1-2, p. 179-207, 12 fig. [in Romanian].

The authors describe a cave on the Izvorul Tausoarelor Valley in the Gersa Basin, Bistrita-Nasaud County, at an altitude of 950 m and discovered in 1955. The resurgence at Izvorul Rece on the Telcisor Valley is 5,700 m away from the terminus. The cave contains gypsum crystallizations and particular spherical formations, 8 to 20 cm in diameter, of a lithologic nature, which are called "giant's cauldron balls".

2002 Viehmann, I.; and Serban, M. (1961) - On the genesis of plane-horizontal cave roofs: Die Höhle 12(2/3), p. 72-73 [in German].

The plane and horizontal planes are shown to appear only in the small-slope sections of underground streams, an observation which suggests their genesis results from lateral erosion of the water flow. In the case of the plane-horizontal roof of the Neagra Cave (Apuseni Mountains), it could be demonstrated that this feature of relief has genetic links with neither tectonics nor the stratification of the limestone massif, the layer fronts proper intersecting the surface of the plane-horizontal roof.

2003 Viehmann, I.; Silvestru, E.; and Fabian, C. (1979) - Iza Cave (Rodna Mountains): Travaux de l'Institut de Spéologie "Emile Racovitza", Vol. 18, p. 201-207, 3 fig. [in French].

The work describes the cave at Iza. It is a typical cave of geologic contact. Kaolinitic-type white clay was discovered in the cave and was subjected to a number of chemical analyses which are briefly described.

2004 Viehmann, Josif. (1969) - Methoden fur experimentelle forschung im studuim der eishöhlen: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 2, p. 529/1-529/3.

2005 Viktorov, S.V. (1973) - Phytoindication of certain hydrological and geodynamic conditions of takyrs in the Ust Urt Desert: Ekologiya, 2:5, p. 25-30, 1971 [in Russian] in Selected Water Resource Abstracts: U.S.; U.S. Geological Survey 6:12, p. 35.

Water movement along the surface of takyrs and karst suffosion processes in the area were studied using vegetative communities and phytogenic relief as indicators.

2006 Vila, Gabriel. (1971) - Cavernes de France ouvertes aux touristes: Yugoslavia, Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 5, Section 4, p. 149-160.

A description of caves that are open to the public.

2007 Villinger, Eckhard. (1969) - Beziehunger zwischen quellen und trockentabern im seichten und liefen karst der schwabischen alb: Germany, F.R. Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 5, p. HY19/1-HY19/13.

A discussion of the types of karst found and the position of springs.

2008 Vincenc, S. (1973) - Phénomènes karstiques de las parlie occidentale de la montagne Velka Factra: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 551-555.

A structural introduction of the Velka Factra Mountain with the three karst regions indicated. The origin of karst development with particular reference to the sediments which developed is discussed.

2009 Vineyard, J.D. (1980) - Integrated karst mapping for environmental control activities, Paleozoic carbonate terrane, Missouri, USA: U.S.; Geological Society of America, Abstracts with Programs, 12:7, p. 542.

Karst mapping, water tracing, seepage runs, cave mapping, and spring mapping are conducted to aid in developing strategies for protection of ground-water resources.

2010 Vineyard, J.D. (1976) - The concept of a governmental catalyst in the planning and management of water resources in karst regions in Yevjevich, Vujica, editor, Karst Hydrology and Water Resoruces, Vol. 2: U.S.; Water Resources Publications, p. 829-846.

The multidisciplinary nature of these problems requires concerted effort by disparate regulatory agencies whose areas of authority often overlap. In the State of Missouri the Department of Natural Resources' Geological Survey promotes catalysis between regulatory agencies and the private sector to provide the data and theory upon which land use and management decisions are based.

2011 Vineyard, J.D.; and Feder, G.L. (1974) - Springs of Missouri: U.S.; Missouri Geological Survey Water Resources, Water Resources Report No. 29, 266 p.

2012 Vineyard, J.D.; Feder, G.L.; Pflieger, W.L.; and Lipscomb, R.G. (1975) - Springs of Missouri (with sections on fauna and flora): Missouri Geological Survey and Water Resources, Water Resources Report No. 29, 1974, 267 p., 94 fig., 26 tab., 2 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey 8:5, p. 11.

Information about springflow and 585 springs in Missouri is presented. The physical and cultural changes in the spring environs are illustrated and described.

2013 Vineyard, J.D.; and Williams, J.H. (1973) - Geology and water pollution in the Devil's Icebox and Rock Bridge Memorial State Park, Boone County, Missouri in Report of the Devil's Icebox - Rockbridge Park Conservation Task Force: U.S.; Missouri Speleology, 13:3, p. 68-75.

2014 Vintilescu, I.; Constantinescu, T.; and Diaconu, G. (1970) - Caves, karstic phenomena and the hydrological situation in the Susita Verde Valley (the Vilcan Mountains): Bucarest; Trav. Inst. Spéol. "Emile Racovitza", IX, p. 9-33 [in French].

Twenty caves located on the slopes of Susita Valley, the Vilcan Mountains, are described.

2015 Vishnevskiy, P.F., editor. (1973) - Investigation and calculation of components in the hydrologic regime of rivers: Moscow; Ukarinskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskey Institut Trudy, No. 107, 1971, 167 p. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:7, p. 8.

This collection of 13 papers provides information on flood discharge, spring runoff, and minimum flow on rivers in the Ukraine

and Moldavia. Investigations are made of the effect of karst topography on floods on left-bank tributaries of the Dniester River.

2016 Vladimirov, L.A. (1970) - Vodnyy balans Bol'shogo Kavkaza v predelakh issleduyemoy territorii (water balance of the greater Caucasus) in Izuchenige i ispol'zovaniye vodnykh resursov SSSR 1966-1967 gg, p. 57-58, Akad. Nauk, SSSR, Inst. Vod. Probl., Moscow.

2017 Vogel, J.C. (1970) - Carbon-14 dating of groundwaters in Isotope Hydrology 1970: Vienna; IAEA, p. 225-239.

2018 Vogel, J.C. (1967) - Investigation on groundwater flow with radiocarbon in Isotopes in Hydrology: Vienna; IAEA, p. 355-369.

2019 Vouve, J. (1975) - Etude en hydrogéologie et paléohydrogéologie karstique: France; Thèse Sci. Bordeaux, 419 p.

Examen des principes fondamentaux relatifs aux transferts énergétiques dans les couches très superficielles de la croûte terrestre. Comportement thermique du sol et sous-sol au-dessus d'un réseau karstique peu profond. Identification de la notion de degré hydrogéothermique se rapportant aux circulations concentrées en milieu fissuré. Problème de la définition des limites de détection des colorants. Localisation de réseaux karstiques souterrains par de moyens géophysiques. Etude des phénomènes hydrogéologiques actuels et passés spécifiques du bassin aquitain, de l'apport de l'hydrogéologie karstique à une meilleure connaissance de l'évolution géologique de bassin sédimentaire en liaison avec le Golfe de Gascogne.

2020 Vozgrin, B.L. (1982) - The application of computer modelling to prediction of karst activity: Moscow; Abstracts of Reports at III Karst Speleology Conference, 52 p.

2021 Vuylsteek, G. (1983) - Contribution à l'étude hydrogéologique, chimique et isotopique de massif karstique de Nifflon (Chablais, Haute Savoie): France; Géodyn. Paris, Thèse Doct. 3ème cycle, 200 p.

Etude d'un massif karstique de faible extension (6 km2) situé en zone montagneuse (altitude moyenne de 1600 m) ou les variations climatiques sont très marquées. La couverture nivale est présente pendant presque six mois de l'année et ses variations de stock vont jouer un rôle majeur dans les débits et la chimie des sources.

2022 Vytras, K.; and Vytrasova, J. (1973) - Spectrophotometric determination of iron in limestones and cave fillings: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 331-336.

A sensitive spectrophotometric method has been worked out for determination of low contents of iron in limestones and cave fillings.

2023 Wade, N.H.; and Courage, L.R. (1984) - Self-healing sinkholes in an earth dam foundation in Beck, B.F., editor, Sinkholes; Their Geology,

Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 261-266.

This paper describes and attempts to explain the phenomena of "self-healing" sinkholes which were discovered at the upstream toe of a 21-m high earthfill dam founded on 60 m of glacio-fluvio deposits. Subsequent loading of intermixed glacial, alluvial, and talus deposits by the rising reservoir and concurrent artesian pressure dissipation resulted in migration of fines in the mixed grained formation sufficient to "self-heal" most of the sinkholes shortly after they developed.

2024 Wadewitz, S.; Pfeiffer, S.; and Sternisko, H. (1976) - Erdfallform und volumenberechnung als grundlage zur erfassung der zusammenhange zwischen erdfall und gelände: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 423-433.

2025 Wadge, G.; Fincham, A.G.; and Draper, G. (1979) - The caves of Jacksons Bay and the Cenozoic geology of southern Jamaica: U.K., Bridgewater; Transactions, Br Cave Res Assoc, 6:2, p. 70-84.

2026 Wadsworth, J.R.; Brook, G.A.; and Carver, R.E. (1983) - Surface expression of heavily mantled interstratal karst bordering Okefenokee Swamp, Georgia in Technical papers of the 49th annual meeting of the American Society of Photogrammetry, Washington, D.C., 1983: U.S.; American Society of Photogrammetry, p. 463-480.

2027 Wagener, F.V.M.; and Day, P.W. (1984) - Construction on dolomite in South Africa in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 403-412.

Structures are successfully founded on dolomitic terrane in South Africa. Various methods of construction are presented. A classification of a dolomite site in terms of overburden thickness is followed by a discussion of the relevant construction methods.

2028 Waite, W.P. (1973) - Differential scattering cross-section in Dellwig, L.F., MacDonald, H.C., and Waite, W.P., authors, Radar Remote Sensing for Geoscientists: Short Course Notes: U.S.; Kansas University Center for Research, Inc., 543 p.

2029 Walker, L.E. (1974) - The occurrence, availability, and chemical quality of ground water in the Edwards Plateau region, Texas: U.S.; Texas Water Development Board, File Report 142.

The author gives information about the geologic units and their water-bearing properties; the occurrence, use, availability, and quality of ground water; and fluctuations of water levels. Includes records of wells and springs, driller's and electrical logs, and chemical analyses of water.

2030 Waltham, A.C. (1977) - Review of Thompson, P. (editor), Cave exploration in Canada (Canadian Caver, Edmonton, 1976, 183 p.): U.K., Bridgewater; Bulletin Br Cave Res Association, 16, p. 26.

2031 Waltham, A.C. (1974) - Caves: U.S., New York; Crown Publishers, Inc., 240 p.

A descriptive account that is excellently illustrated of caves throughout the world.

2032 Waltham, A.C.; and Smart, P.L. (1975) - Caves of Jamaica: U.K., Bridgewater; Bulletin Br Cave Res Association, 10, p. 25-31.

2033 Walton, W.C. (1979) - Progress in analytical groundwater modeling in Back, W., and Stephenson, D.A., guest editors, Contemporary Hydrogeology - The George Burke Maxey Memorial Volume: Journal of Hydrology, 43, p. 149-159.

2034 Walton, W.C. (1970) - Groundwater resource evaluation: New York; McGraw-Hill Book Co., 664 p.

2035 Warren, W.M. (1976) - Sinkhole occurrence in western Shelby County, Alabama: U.S.; Geological Survey of Alabama Circular 101.

2036 Warren, W.M. (1974) - Retention basin failures in carbonate terranes: Geological Survey of Alabama, Water Resources Bulletin, 10:1, p. 22-31, February 1974, 4 fig., 12 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 7:10, p. 59.

Infiltrating water from retention basins may cause subsurface erosion and eventual failure by collapse of the structure. The resulting ground-water contamination would be great as the pollutants spread throughout the solution-cavity system.

2037 Warren, W.M.; and LaMoreaux, P.E. (1975) - The use of remote sensing for subsidence studies in Alabama: Society of Mining Engineering, American Institute of Mining Engineering, Preprint No. 75-AG-21, 18 p.

Conventional and modern remote-sensing techniques are being used in Alabama to locate and define areas of sinkhole activity and to determine which areas are most prone to its occurrence.

2038 Warwick, G.T. (1976) - The metamorphosis of karren in the north of England: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 435-443.

Examines some of the evidence of sub-aerial modification of karren, especially of those generally assumed to have been formed beneath a cover of soil and/or glacial deposits.

2039 Warwick, Gordon T. (1961) - Cave deposits and paleoclimatology: Rassegna Speleologica Italiana e Societa Speleologica Italiana, Memoria V, Tomo 1, p. 30.

Climatic interpretations of cave sediments must take account of many factors, but unless the climatic information can be allocated to its correct place in the geologic past it will be of little use.

2040 Warwick, Gordon T. (1960) - The effect of knick-point recession on the water-table and associated features in limestone regions, with special reference to England and Wales: Germany, F.R.; Zeitschrift für geomorphologie, Supplementband 2, Internationale Beitrage zur Karstmorphologie, p. 92-99.

Summarizes the main characteristics of the limestone regions of England and Wales, where evidence points to the existence of definite bodies of ground water, with water tables subject to seasonal and shorter-term fluctuations. Rejuvenation by knick-point recession along the rivers in these areas lowers the water table laterally and also upstream of the rejuvenation head.

2041 Warwick, Gordon T. (1958) - The characteristics and development of limestone regions in the British Isles with special reference to England and Wales: Bari-Lecce-Salerno, Deuxième Congress International de Spéléologie, 1958, Tome 1, Section 1, p. 79-105.

The history of the development of limestone regions since the Tertiary uplift is discussed.

2042 Washburn, D. (1984) - The caves of Yucatan: the relationship between a culture and its environment: U.S.; NSS News, 42:4, p. 150-155.

2043 Water Resources Board. (1972) - Artificial recharge of the London Basin: U.S., Reading, Pennsylvania; Water Resources Board, Publication No. 14.

2044 Water Resources Research Center. (1974) - Geomorphology, hydrology and soils in karst, southern Indiana, field conference, April 1974: U.S., Bloomington; Water Resources Research Center, Indiana University.

2045 Watson, R.A. (1976) - Pseudo-karst of the Klutan Glacier, Yukon Territories, Canada: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 445-450.

Pseudo-karst features of the Klutan Glacier are the result primarily of the downwasting and removal of ice by melting. The similarity of morphological forms of downwasting glaciers and downwasting limestone karst is the result of converging effects of the two different processes of melting and solution.

2046 Watson, Richard A. (1966) - Underground solution canyons in the central Kentucky karst, U.S.A.: International Journal of Speleology, Vol. 11, p. 369-376.

A descriptive account of solution canyons and their mode of formation with solution of water seeping down joint planes forming the canyons.

2047 Watt, W.A. (1957) - A Tertiary deposit in County Tipperary: Sci. Proc. Royal Dublin Soc., Vol. 27, p. 309-311.

The formation of swallow holes and similar karstic depressions in ancient outcrops of limestone have enabled small remnants of Tertiary formations to be preserved from erosion by the Quaternary ice. One such deposit from County Tipperary is described here.

2048 Watt, W.A. (1984) - The Holocene vegetation of the Burren, western Ireland in Haworth, E.Y.; and Lund, J.W.G., editors, Lake Sediments and Environmental History: U.S.; University of Minnesota Press, p. 359-376.

2049 Way, Douglas S. (1972) - Terrain analysis; community development series: U.S., Pennsylvania; Dowden, Hutchinson and Ross, Inc. Stroudsburg, 392 p.

An account of the factors that must be considered when limestone terrains are developed.

2050 Weber, E.M.; and Hassan, A.A. (1972) - Role of models in groundwater management: Water Resources Bulletin, 8:1, p. 198-206.

2051 Wedderburn, Leslie A. (1977) - Groundwater pollution of a limestone aquifer by caustic waste in Dilamarter, R.S., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 388-404.

The disposal of "red mud" wastes, a by-product of alumina extraction in karst depressions, leads to a high risk of ground-water pollution due to the fracture and solution nature of the karst. Most sites are located in the recharge area of the highly used aquifer. Much research should be put into choosing a disposal site, with a strict monitoring program enforced to minimize pollution.

2052 Wedow, H., Jr.; and Marie, J.R. (1964) - Statistical analysis of solution-collapse structures (abstract): U.S.; Geological Society of America, Special Paper 76, 262 p.

2053 Weeks, A.W. (1945) - Balcones, Luling, and Mexia fault zones in Texas: U.S.; American Association of Petroleum Geologists Bulletin, Vol. 29, p. 1733-1737.

The Balcones, Luling, and Mexia fault zones are outlined and are discussed with reference to their age and to the geologic history of the coastal plain deposits.

2054 Wefer, F.L. (1982) - Surveying the Butler Cave-Sinking Creek system in White, W.B., editor, Burnsville Cove symposium: U.S.; NSS Bulletin, 44:3, p. 64-66.

2055 Wefer, F.L.; and Nicholson, I.K. (1982) - Exploration and mapping of the Sinking Creek system in White, W.B., editor, Burnsville Cove Symposium: U.S.; NSS Bulletin, 44:3, p. 48-63.

2056 Wegrzyn, M.; Soto, A.E.; and Perez, J.A. (1984) - Sinkhole development in north-central Puerto Rico in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First

Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 137-142.

Development of sinkholes in the blanket sands is directly related to the drainage of rain water through this sand layer to underlying cavernous limestones. Ground-water level fluctuations, even sudden and large, have no bearing on the sinkhole development in the area of study because of the great depth (60+ meters) of the water table.

2057 Weidie, A.E.; and Ward, W.C., editors (1976) - Carbonate rocks and hydrogeology of the Yucatan Peninsula, Mexico; AAPG-SEPM 1976 annual convention, New Orleans, Louisiana, U.S.: U.S.; New Orleans Geological Society.

2058 Weller, Stuart. (1927) - Geology of the Cave-in Rock quadrangle: U.S.; Kentucky Geological Survey, Series 6, Vol. 26, p. 1-128.

2059 Wells, S.G. (1976) - Drainage basin morphology in the sinkhole plain of the central Kentucky karst (abstract): Proceedings of the 4th Conference on Karst Geology and Hydrology, West Virginia Geological and Economic Survey, 1974, p. 91.

A description of subsurface drainage basins, traced with dyes, in the Pennyroyal Plateau of the central Kentucky karst.

2060 Wells, S.G. (1974) - Geomorphology of the sinkhole plain in the central Kentucky karst in Geological Society of America, 23rd annual meeting, southeastern section, U.S., 1974: U.S.; Geological Society of America, Abstracts with Programs, 6:4, p. 410-411.

The method of using the equation of best-fit curves permitted the projection of profiles of sinking streams from adjacent uplands beyond the terminal sinks of the streams to two levels beneath the present sinkhole plain surface.

2061 Wells, S. (1973) - Geomorphology of the sinkhole plain in the Pennyroyal Plateau of the central Kentucky karst: U.S.; University of Cincinnati Master's Thesis, unknown p.

2062 Wenzens, Gerd. (1974) - Morphologische Entwicklung ausgewahlter Regionen Nordmexikos unter besonderer Berücksichtigung des Kalk-krusten-, Pediment- und Poljeproblems: Germany, Dusseldorf; Im Selbstverlag des Geographischen Institutes der Universitat Dusseldorf, 330 p. [in German, summary also in English, French, and Spanish].

2063 Wenzens, Gerd. (1969) - Gipskarstformen in soutraer zechsteingebeit: Germany, F.R., Stuttgart; 5th Internationaler Kongress für Spelaologie, 1969, Vol. 1, p. M2/1-M2/11.

Depressions in the upper Permian region of Soutra which suddenly arise from caving in at the surface due mostly to extraction of salt or gypsum from underground were examined.

2064 Wermund, E.G. (1974) - Environmental units in carbonate terranes as developed from a case study of the southern Edwards Plateau and adjacent interior coastal plain in Approaches to Environmental Geology: U.S.; The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 81, p. 52-79.

Developing environmental geologic and resource capability units in carbonate terranes in the southern Edwards Plateau and Balcones fault zone area.

2065 Wermund, E.G. (editor). (1974) - Approaches to environmental geology: U.S.; The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 81.

2066 Wermund, E.G.; and Cepeda, Joseph C. (1977) - Regional relation of fracture zones to the Edwards limestone aquifer, Texas in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 239-253.

For understanding the infiltration and producing zones of the Edwards limestone aquifer, the surficial fracture zones were delineated. Fractures due to the Balcones fault system with related cave development were noted and fracture systems of an older system were also seen. Aerial photographs and computers were used to evaluate their numbers and orientation.

2067 Wermund, E.G.; Cepeda, J.C.; and Bell, A.E. (1974) - Fracture patterns in the southern Edwards Plateau, Texas: U.S.; Texas Water Development Board, File Report 151.

Explains the technique of mapping regional fracture patterns by machine digitizing, computing, and plotting of aerial photographic interpretations of fracture zones in the Edwards limestone aquifer.

2068 Wermund, E.G.; and others. (1974) - A test of environmental geologic mapping, southern Edwards Plateau, southwest Texas: U.S.; Geological Society of America Bulletin, Vol. 85, p. 423-432.

Because the increasing populations affect a booming residential and recreational development, information on the geological environment of the plateau (the recharge area for the Edwards aquifer) must be made available to planners so that the aquifer can be safeguarded. From this pilot study a reconnaissance environmental mapping technique has been developed. The basis for defining the environmental mapping units is predominantly geomorphic.

2069 Wermund, E.G. and Woodruff, C.M., Jr. (1977) - Land resource units for planning in carbonate terranes in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 339-356.

2070 Werner, E. (1984) - Sinkhole prediction - review of electrical resistivity methods in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on

Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 231-236.

The cost of drilling programs for the detection of sinkhole potential has encouraged the investigation of geophysical methods. The author presents a discussion of the advantages and disadvantages of these methods.

2071 Werner, E. (1981) - Guidebook to the karst of the central Appalachians: U.S.; International Congr Speleol, 51 p.

2072 Werner, E. (1979) - Alpine karst in the Rocky Mountains - introduction to the Symposium: U.S.; NSS Bulletin 41, p. 51-52.

The alpine karst developed in many parts of the Rocky Mountains at high elevations are distinct from low-altitude karsts of the same latitudes. Variations in chemical and physical factors create different solution landforms, and the higher hydraulic gradients (due to greater topographic relief) cause different geohydrologic patterns. The landscapes have a different appearance because of the permanent snowfields and poorly developed soil and vegetative cover.

2073 Werner, E., editor, (1979) - Alpine karst symposium; geomorphology and geohydrology of alpine karst terrains of the Rocky Mountains; annual meeting of the Geological Society of America, Denver, Colorado, U.S., 1976: U.S.; NSS Bulletin, 41:3.

2074 Werner, E. (1974) - Karst of western Wyoming; an alpine karst in Tosi Creek basin, Gros Ventre Mountains: U.S.; Contributions to Geology, 13:1:summer, p. 41-46.

2075 Werner, E.; and Modville, D. (1976) - Karst and cavern development in the Gros Ventre Mountains: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 451-459.

Karst development in the Gros Ventre Mountains is discussed. Two major types of solution occurred: (1) flat or gentle sloping areas of nearly horizontal limestone with well developed surface karst forms, and (2) areas of cavern development in steep youthful valleys, usually where steeply dipping limestone borders a fault.

2076 Werner, Eberhard. (1977) - Chloride ion variations in some springs of the Greenbrier limestone karst of West Virginia in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 357-363.

The use of salt to de-ice highways can cause an increase in salt concentration in ground water that drains into the aquifer. This salt has been found to persist and if salt concentrations were not monitored, it could lead to water quality problems for sensitive users, i.e., fish hatcheries.

2077 Werner, Eberhard. (1974) - History and status of geologic research in the West Virginia karst in Proceedings of the 4th Conference on Karst

Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, 1974, p. 1-9.

An outline of the work which has been done to date on the caves of West Virginia with suggested fields for study in the future.

2078 Werner, Eberhard. (1974) - Preliminary report on karst springs near Edray, northern Pocahontas County, West Virginia in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, 1974, p. 25-28.

Seven springs extending for about 1,500 feet along the southern edge of Wolfpen Ridge near Edray, West Virginia, have been sampled and analyzed. Associated with the springs is a cave system developed at the same stratigraphic horizon which is 60 to 65 feet laterally removed from the springs.

2079 West, T.R.; Kallio, T.; and Warder, D. (1981) - Construction of an apartment/social center complex in karst terrain, Bloomington, Indiana in Winslow, D.R., editor, Proceedings of the Indiana Academy of Science, 1981: U.S.; Proceedings of the Indiana Academy of Science, 91, p. 348.

2080 Weyer, K.U. (1984) - Ground-water flow and karst geology at Pine Point, Northwest Territories, Canada; speculations on the genesis of the Mississippi-Valley-type lead-zinc deposit in Moreland, J.A., and Van Voast, W.A., compilers, 13th Annual Rocky Mountain Ground-Water Conference, Great Falls, Montana, U.S., 1984, Abstracts: U.S.; State of Montana Bureau of Mines and Geology, Special Publication 91, p. 4-5.

2081 White, E.L. (1977) - Surface water hydrology in carbonate basins within the Appalachians in Tolson, J.S. and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 377-390.

2082 White, E.L. (1977) - Sustained flow in small Appalachian watersheds underlain by carbonate rocks: Netherlands, Amsterdam; Journal of Hydrology, 32:1-2.

2083 White, E.L. (1976) - Role of carbonate rocks in modifying flood flow behavior: Water Resources Bulletin, 12:2, p. 351-370, April 1976, 5 fig., 7 tab., 19 ref., 1 append. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 9:18.

Sixty-two carbonate watersheds were grouped. This was followed by multivariate analyses: factor and cluster analyses. Predictions equations for those basins underlain by dolomite rock and for those underlain by carbonate rock with very little surface expression were proposed.

2084 White, E.L.; Aron, G.; and White, W.B. (1984) - The influence of urbanization on sinkhole development in central Pennsylvania in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 275-281.

Suffosional sinkholes, transient phenomena, are the principal land-use hazard in central Pennsylvania. Suffosional sinkholes occur naturally but are exerbated by runoff modifications that accompany urbanization.

2085 White, E.L.; and White, W.B. (1984) - Flood hazards in karst terrains: Lessons from the Hurricane Agnes storm: International Congr. Hydrogeology 1, p. 261-264.

2086 White, E.L.; and White, W.B. (1983) - Karst landforms and drainage basin evolution in the Obey River basin, north-central Tennessee, U.S.A.: Netherlands; Journal of Hydrology, 61:1-3, p. 69-82, 7 fig. 1 tab., 14 ref.

Tributary streams were analyzed by fitting their longitudinal profiles to exponential and logarithmic functions. Linear segments of semilogarithmic plots permitted extrapolating both active streams and under-drained stream channels through the doline karst.

2087 White, E.L.; and White, W.B. (1979) - Quantitative morphology of landforms in carbonate rock basins in the Appalachian Highlands: Geological Society of America Bulletin, Pt., I, V. 90, p. 385-396, April 1979, 12 fig., 6 tab., 30 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 12:15 p. 1-2.

The principal landforms in the Appalachian Highlands are sinking streams, dolines, and caves. Landform measures were devised for the drainage features and for dolines and applied to 62 small basins between Pennsylvania and Alabama.

2088 White, E.L.; and White, W.B. (1974) - Analysis of spring hydrographs as a characterization tool for karst aquifers (abstract) in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, 1974, p. 103-106.

Spring hydrographs are used to investigate whether ground-water movement can be characterized by the analysis of spring discharge behavior as a function of time in response to different intensity, spacing, and duration of precipitation events.

2089 White, M.N. (1980) - Saline intrusion of the karstic limestone aquifer in the lower Rio Cobre Basin, Jamaica: Jamaica, Kingston; Journal of the Geological Society of Jamaica, 19, p. 25-34.

2090 White, W.A. (1970) - Major geomorphic divisions of the Florida Peninsula: U.S.; Florida Geological Survey, Bulletin 51.

2091 White, W.B. (1984) - Infiltration, internal runoff, and differential sculpturing of surface and near-surface karst landforms: U.S.; Geological Society of America, Abstracts with Programs, 16:6, p. 692.

2092 White, W.B. (1984) - Kinetic models for the development of closed depression landforms in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

2093 White, W.B., editor. (1982) - Burnsville Cove symposium: U.S.; NSS Bulletin, 44:3.

2094 White, W.B. (1982) - Mineralogy of the Butler Cave-Sinking Creek system in White, W.B., editor, Burnsville Cove Symposium: U.S.; NSS Bulletin, 44:3, p. 90-97.

2095 White, W.B. (1979) - Karst landforms in the Wasatch and Uinta Mountains, Utah: U.S.; NSS Bulletin, Vol. 41 p. 80-88.

A discussion of the widespread but subdued karst that has developed on the Mississsippian carbonate rocks of the Wasatch Front Range and in the Uinta Mountains of northeastern Utah.

2096 White, W.B. (1977) - Conceptual models for carbonate aquifers: Revisited in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; University of Western Kentucky, p. 176-187.

2097 White, W.B. (1977) - Role of solution kinetics in the development of karst hydrogeology in Tolson, J.S., and Doyle, F.L., editors, Karst Hydrogeology, I.A.H. Memoirs, Vol. XII: U.S.; University of Alabama in Huntsville Press, p. 503-517.

2098 White, W.B. (1976) - Caves of western Pennsylvania: U.S.; Pennsylvania Geological Survey, 4th Series, General Geology Report 67, 97 p.

A general account of the geology and development of caves is given followed by individual descriptions for 79 caves in the Mississippian and Pennsylvanian limestones of the Appalachian Plateau Province of western Pennsylvania to act as a regional guidebook for cave explorers.

2099 White, W.B. (1976) - Geology and biology of Pennsylvania caves: U.S.; Pennsylvania Geological Survey, 4th Series, General Geology Report 66, 103 p.

A detailed account of caves, outlining cave nomenclature, theories of cave development, parameters which affect cave shapes and formation, ore occurrence of sediments, with special reference to the caves of Pennsylvania. Cave fauna of Pennsylvania and Appalachian bone caves are also described.

2100 White, W.B. (1969) - The Appalachian karst: an overview: Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 1, p. M13/1-M13/5.

The contrasts in karst development between the valley and ridge and the plateau in the Appalachian Highlands can be explained in terms of the differences in stratigraphy, structure, and topographic placement of the carbonates.

2101 White, W.B. (1967) - Modification of fluorescein dye groundwater tracing techniques: Steir, Beitr, Z. Hydrogeologie, 18:19, p. 151-158.

2102 White, W.B.; and Hess, J.W. (1982) - Geomorphology of Burnsville Cove and the geology of the Butler Cave-Sinking Creek system in White, W.B., editor, Burnsville Cove Symposium: U.S.; NSS Bulletin, 44:3, p. 67-77.

Burnsville Cove is a synclinal valley in Bath and Highland Counties, Virginia. A doline karst, an elaborate underground drainage system, and the Butler Cave-Sinking Creek system are developed in the Silurian-Devonian Helderberg limestones.

2103 White, W.B.; and White, E.L. (1984) - The Appalachian karst; status of research in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

2104 White, W.B.; and White, E.L. (1974) - Base-level control of underground drainage in the Potomac River basin in Proceedings of the 4th Conference on Karst Geology and Hydrology: U.S.; West Virginia Geological and Economic Survey, p. 41-53.

A subjective semi-quantitative examination of cave levels in the Potomac drainage system to see if they are controlled by base level. Correlation is better for the downstream reaches of the rivers than the headwaters. Statistics used are limited to available data and a more comprehensive study is necessary.

2105 White, W.N. (1937) - Investigations of underground water in the High Plains, Texas: U.S.; U.S. Geological Survey Open-File Report, 5 p.

Explains some of the methods to be used in making the investigation.

2106 Whitehead, B. (1980) - Hydrogeology of sedimentary rocks; Part I - carbonates: Canadian Water Well, 5:4, p. 26-29, November 1979, 4 fig. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 13:7, p. 6.

Shale, carbonates, and sandstone are the sedimentary rocks that are important sources of ground water. Surface weathering of carbonate rock results in solutioning along fractures which permits the development of substantial quantities of water in the upper 10 feet of rock.

2107 Whitley, Leonard Darrell. (1977) - Karst topography and its occurrence in Kentucky in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 41-49.

A general account of the development of karst with special reference to examples found in Kentucky.

2108 Wiersma, J.H.; Stieglitz, R.D.; Cecil, D.L.; and Metzler, G.M. (1984) - Characterization of the shallow groundwater system in an area with thin soils and sinkholes (Door County, Wisconsin) in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 305-310.

Door County, Wisconsin, is a region of karst topography underlain by Silurian dolomite bedrock. Sinkholes intercept much of the surface runoff and act as sites for direct ground-water recharge. The interactions of surface and ground water, and the role of solution features in water interchange were studied in a small drainage basin.

2109 Wigley, T.M.L.; and Brown, M.C. (1969) - Geohydrological implications of cave breathing: Germany, F.R., Stuttgart; 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 2, p. 523/1-523/7.

Observations of cave breathing can be used to determine the hydraulic characteristics in a karst aquifer. Estimation of secondary permeability and to some extent the degree of anisotrophy of the porous medium can be estimated if information on cave geomorphology can be obtained.

2110 Wigley, T.M.L.; Drake, J.J.; Quinlan, J.F.; and Ford, D.C. (1973) - Geomorphology and geochemistry of a gypsum karst near Canal Flats, British Columbia: Canada; Can Journal Earth Science, 10:2, p. 113-129 [in English, summary in French].

2111 Wilford, G.E.; and Wall, J.R.D. (1965) - Karst topography in Sarawak: Journal of Tropical Geography, Vol. 21, December 1965.

The distribution, geology, topography, and drainage of the upper carboniferous to Miocene limestones found in Sarawak are described; their origins and evolutionary stages are discussed, and a brief account of their climate, soil, and vegetation is given.

2112 Williams, A. (1984) - The geology of Wayne's Womb Cave, New Mexico: U.S.: Rocky Mountain Caving, 1:4, p. 29-31.

2113 Williams, J.H.; and Vineyard, J.D. (1978) - Geologic indicators of catastrophic collapse in karst terrain in Missouri: U.S.; National Academy of Sciences, Transportation-Research Record 612, p. 31-37, 1976, 4 fig., 31 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 11:23, p. 7.

Analysis of geologic indicators such as losing streams, relict karst landforms, and residuum type and thickness, as well as speleological data offer cost-effective techniques to define target locales for subsequent detailed exploration for incipient collapses. Drilling is necessary to validate evidence inferred by surface geologic indicators and geophysical methods.

2114 Williams, P.W. (1983) - The role of the subcutaneous zone in karst hydrology (New Mexico, New Zealand): Netherlands; Journal of Hydrology, 61:1-3, p. 45-67, 11 fig., 52 ref..

The subcutaneous zone is of hydrological importance in karst because of its high secondary permeability. The paper examines the hydrologic processes of the subcutaneous zone and their significance to the understanding of karst geomorphology.

2115 Williams, P.W. (1970) - Limestone morphology in Ireland: Belfast; Irish Geographical Studies, Queen's Univ., p. 105-124.

Detailed description of the morphology of the karstified limestones of Ireland. They have undergone eroison, burial, exhumation, and renewed erosion several times, and the resulting landscape is varied and complex.

2116 Williams, P.W. (1969) - Caves and karst areas in east New Guinea: Germany, F.R., Stuttgart, 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 1, p. M31/1.

A description of a karst morphometry study in four areas in Papua New Guinea where the limestones range in age from Permian to Holocene.

2117 Williams, P.W. (1969) - Illustrating morphometric analysis of karst with examples from New Guinea (abstract): Germany, F.R., Stuttgart, 5th Internationaler Kongress fur Spelaologie, 1969, Vol. 1, p. M33/1.

The relevance of morphometric techniques in the study of karst landforms is discussed with two areas in New Guinea being used to test the method.

2118 Williams, P.W. (1966) - Limestone pavements with special references to western Ireland: Inst. British Geographers, Publication No. 40.

Describes the karst limestone pavements of western Ireland. The landscape is due largely to solution on the surface and under ground, plus collapses due to this solution. Ground water is dominant in shaping karst morphology.

2119 Williams, P.W.; and Bowen, R. (1973) - Geohydrogeological study of the Gort lowlands and adjacent areas of western Ireland, using environmental tritium: Water Res. Research, Vol. 9, p. 753-758.

Isotopic analyses show that these ground waters fall into a single hydrochemical group, while tritium content indicates modern recharge and rapid circulation in most areas. Ground-water circulation of covered karst may be slower.

2120 Williams, P.W.; and Jennings, J.N. (1968) - An evaluation of the rate and distribution of limestone solution and deposition in the River Fergus Basin, western Ireland in Contributions to the Study of Karst: Australian Nat. Univ., Res. Sch. Pacific Studies, p. 1-40.

Gross solution in the Fergus Basin is 57 $m^3/yr/km^2$, but because of some redeposition, net solution is 51 $m^3/yr/m^2$. More than 80 percent of total corrosion by infiltrating water occurs in the top 8 meters of limestone.

2121 Willis, G.W. (1954) - Ground-water resources of Tom Green County, Texas: U.S.; Texas Board of Water Engineering, Bulletin 5411.

Gives information about the geology and its relation to the occurrence, quality, and development of ground water. The lower Cretaceous Edwards Formation and associated limestones crop out in this northern Edwards Plateau county. Also gives records of wells, logs, and chemical analyses of ground water.

2122 Wilson, J.R. (1979) - Glaciokarst in the Bear River Range, Utah: U.S.; NSS Bulletin, Vol. 41, p. 89-94.

Caves within the Tony Grove and White Pine basins of northern Utah are small, joint-controlled, and are generally restricted to areas peripheral to the path of glacial advance. The anomalous position of the caves relative to the present topography, solution breccias, and the occurrence of fluvioglacial material in karst features suggests several periods of karstification, each followed by a glaciation.

2123 Wilson, J.R. (1976) - Glaciated dolomite karst in the Bear River Range, Utah: U.S.; University of Utah Ph.D. dissertation, 136 p.

2124 Wilson, James Lee. (1975) - Carbonate facies in geologic history: Heidelberg; Springer-Verlag, 471 p.

2125 Wilson, Leonard U. (1978) - State water policy issues: U.S.; Lexington, Kentucky, Council of State Governments.

2126 Wilson, R.C. (1985) - Vertebrate remains in Kentucky caves in Dougherty, P.H., editor, Caves and Karst of Kentucky: U.S.; Kentucky Geological Survey Special Publication 12, p. 168-175.

2127 Wilson, R.C. (1980) - Preliminary report on vertebrate remains from Cutoff Caves, Trigg County, Kentucky: U.S.; Annual Report, Western Kentucky Speleological Survey 1980, p. 35-37.

2128 Wilson, R.L. (1979) - Karst induced subsidence in the Chattanooga-Rossville area, Hamilton County, Tennessee and Walker County, Georgia: U.S.; Geological Society of America, Abstracts with Programs, 11:4, p. 218.

A study was initiated to delineate existing subsidence in the Chattanooga-Rossville area and to define potential areas of subsidence. As a result of the study it was determined that certain low lying areas covered by unconsolidated material and underlain by soluble limestone were regions of potential sinkhole development.

2129 Wilson, William E.; and Gerhart, James M. (1979) - Simulated changes in potentiometric levels resulting from groundwater development for phosphate mines, west-central Florida in Back, W., and Stephenson, D.A., guest editors, Contemporary Hydrogeology - The George Burke Maxey Memorial Volume: Amsterdam; Elsevier Scientific Publishing Co. (Journal of Hydrology, 43:491-515), p. 491-515.

2130 Windham, S.R.; and Campbell, K.M. (1981) - In Florida, sinkholes follow the pattern: U.S.; Geotimes, 26:8, p. 20-21.

2131 Winograd, I.J.; and Friedman, I. (1973) - Deuterium as a tracer of regional ground-water flow, southern Great Basin, Nevada and California: Geological Society of America Bulletin, 83:12, p. 3691-3708, December 1972, 4 fig., 3 tab., 54 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 6:10, p. 7.

Major springs of the southern Great Basin are located along the margins of, or within, the intermontane valleys and have highly uniform discharge, temperature, and water quality. These springs constitute a major water resource. This study uses deuterium as a tracer to determine the origin of these springs.

2132 Winograd, I.J., and Thordarson, W. (1974) - Hydrogeologic and hydrochemical framework in south-central Great Basin, Nev.-Calif.: U.S.; U.S. Geological Survey Professional Paper 712-C, 130 p.

2133 Wittke, Louis. (1968) - Modellversuch zur durchstronung kluftiger medien: Felsmech und Ing. Geologie, Suppl. IV, p. 52-78.

2134 Wojcik, Z. (1976) - Relicts of Tertiary karst forms in later relief of the landscape: Olmouc, CSSR; Proceedings of the 6th International Congress of Speleology; p. 461-464.

The Tertiary, with a temperate, warm, intermittently subtropical climate, was the most important age for karst development, and time was the most important factor. In the Quaternary, glacial waters penetrated and corroded the limestone rock but the time period was not extensive during which this process acted on the rock and evidence of its occurrence is, therefore, not as extensive.

2135 Wolfe, T.E. (1974) - Sedimentation in karst drainage basins along the Allegheny escarpment in southeastern West Virginia, USA [microform]: Canada, Ottawa; National Library of Canada, 6 sheets microfiches [Ph.D. Thesis, McMaster University, 1973].

2136 Wolfe, T.E. (1973) - Karst sieve deposits: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 557-565.

2137 Wolfe, T.E. (1967) - Jordbreun area of northern Norway - an example of high latitude karst: U.S.; NSS Bulletin, 29:1.

2138 Wood, W.W. (1985) - Origin of caves and other solution openings in the unsaturated (vadose) zone of carbonate rocks; a model for CO2 generation: U.S., Geology, 13:11, p. 822-824.

2139 Woodring, W.P. (1960) - Oligocene and Miocene in the Caribbean region: Puerto Rico: Transactions of the 2nd Caribbean Geological Conference, 1959, p. 27-32.

Discussion of the Miocene and Oligocene formations which contain limestones.

2140 Woodruff, C.M.; and Abbott, P.L. (1979) - Drainage-basin evolution and aquifer development in a karstic limestone terrain, south-central Texas,

USA: U.K., Chichester; Earth Surface Processes & Landforms, 4:4, p. 319-334.

2141 Woodson, F.J. (1981) - Lithologic and structural controls on karst landforms of the Mitchell Plain, Indiana, and Pennyroyal Plateau, Kentucky: U.S.; Indiana State University Master's Thesis, 132 p.

2142 Worthington, S. (1984) - Extending stalagmite dating techniques at Friars Hole cave system, West Virginia in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

2143 Worthington, S. (1981) - Sotano de Trinidad, Xilitla, SLP, Mexico (Caving): U.S.; Caves and Caving, 13, p. 10-11.

2144 Worthington, S.R.H.; and Ford, D.C. (1984) - Pattern and antiquity of sinkholes along an alluviated karstified valley: Friars Hole, West Virginia in Beck, B.F., editor, Sinkholes; Their Geology, Engineering and Environmental Impact; the First Multidisciplinary Conference on Sinkholes, Orlando, Florida, U.S., October 15-17, 1984: Netherlands; A. A. Balkema, p. 93-96.

U/U and U/th dating and paleomagnetic analyses of speleothems have shown that Friars Hole is more than 1.65 million years old. It has been possible to correlate valley abandonment with underground passage development, and hence the antiquity of the sinkholes along the valley has been established.

2145 Wright, G.R. (1985) - An outline of the hydrogeology of the southern water resources region: Read at meeting, June 1984, for Geological Survey; published by Irish Nat. Comm. IHP, p. 123-138.

Describes the hydrogeology of the limestone synclines and of the overlying fluvio-glacial deposits. Influence of permeable and impermeable Quaternary cover on infiltration and circulation of ground water in the buried limestone aquifers.

2146 Wright, G.R. (1984) - A new aquifer map of Ireland, Port Laoise Seminar: Irish Group, IAH, 3-4 April.

The map shows all known Irish aquifers. Two types of carbonate rock aquifers are defined - clean, well-bedded Visean with regions of karstification identified; and limestones known to have high yields to boreholes (+250 m^3/day), or where strong folding had opened up the joint system.

2147 Wright, G.R. (1982) - Groundwater in the South Munster Synclines: Read at meeting, May 1979; published by the Irish Nat. Comm. IHP, p. 93-105 and 205-221.

The synclinal limestone valleys of Ireland are major aquifers. Hyrcynian folding produced complex jointing and faulting patterns. Their karstification was reinforced by low sea levels during the glaciations, so that deep karstification occurred. They are thus "drowned karst".

2148 Wright, G.R. (1976) - Groundwater for industry: Technology Ireland, Vol. VIII, No. 9.

Sets out the value of ground water for industry. Evidence of ample ground-water resources in any area will attract new industry into that area. Outlines the ground-water resources, held mainly in carbonate rocks, either solid or as glacial debris.

2149 Wright, G.R.; Daly, D.; and Daly, E.P. (1983) - Groundwater vulnerability and quality in the Republic of Ireland: Comm. European Comm., Enviroment & Consumer Protection Service, Contract No. U(82) 178-(543) DG.XI.

Aquifer vulnerability to pollution is affected by their unconfined nature, shallow depth, the shallow water table, and the predominance of fissure flow. Ground-water quality is controlled by high rainfall and recharge, by shallowness of aquifers, predominance of fissured aquifers, large recharge and low abstractions, and very limited occurrence of evaporite facies.

2150 Wurzel, P.; and Ward, P.R.B. (1965) - A simplified method of groundwater direction measurement in a single borehole: Netherlands; Journal of Hydrology, Vol. 3, p. 97-105.

2151 Yarborough, Keith A.; and Ahlstrand, Gary M. (1977) - Alpha radiation monitoring of National Park Service administered caves in the United States in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 107-116.

An account of the results of a survey of Alpha radiation in National Park Service caves. Alpha radiation can lead to lung cancer if exposure to it occurs over a prolonged period. The survey aims to: (1) safeguard health at the National Park Service administered caves, and (2) develop data on Alpha radiation levels and on natural airflows in caves.

2152 Yevjevich, V. (editor). (1981) - Karst water research needs: U.S.; Water Resources Publication.

2153 Yevjevich, V. (editor). (1976) - Karst hydrology and water resources [Proceedings of the U.S.-Yugoslavian Symposium, Dubrovnik, June 1975]: U.S.; Water Resources Publication, 2 Vols. 873 p.

2154 Yevjevich, V.; DaCunha, L.V.; Vlachos, E., editors (1983) - Coping with droughts: U.S.; Water Resources Publications.

2155 Yonge, C.J.; and Gray, J. (1984) - Stable isotope analysis of subglacial precipitates from the Rocky Mountains, Canada in Friends of the Karst Meeting, Puerto Rico, Friends of the Karst, Puerto Rico Meeting Abstracts: U.S.; Geo 2, 11:3.

2156 Young, A.M.; and Long, D.G.F. (1977) - Carbonate sedimentation in the Late Precambrian Shelf Sea, Victoria Island, Canadian Arctic Archipelago: Journal of Sedimentary Petrology, 47:3, p. 943-955.

A discussion of the different units which make up the Reynolds Point Formation with particular reference to the environments of deposition.

2157 Young, Keith. (1959) - Edwards fossils as depth indicators in Symposium on Edwards Limestone in Central Texas: U.S.; University of Texas, Publication No. 5905, p. 97-104.

A discussion of a single tabular reef along the Brazos River in Hill and Bosque Counties, Texas, which consists of four zones that can be differentiated by different fossil types.

2158 Youngs, Bridget G. (1973) - The petrology and depositional environments of the Middle Cambrian Wirrealpa and Areena Creek Limestones (South Australia): Journal of Sedimentary Petrology, 48:1, p. 63-74.

Petrographic studies allow for the classification of limestones and also a study of the facies allows for the interpretation of the paleogeography of the area.

2159 Zabludowski, E. (1971) - Artificial groundwater recharge practice in Israel: economic analysis: Proc. Con. Artificial Groundwater Recharge, Reading (September 1970), Water Research Association, SL7, SHD, U.K.

2160 Zagar, Marjan. (1971) - Höhlentourismus: Ljubljana; Proceedings of the 4th International Congress of Speleology, 1965, Vol. 6, Section 4, p. 161-163.

2161 Zambo, L. (1971) - The effects of Terra Rossa type sediments on doline morphogenesis: Hungary; International Geographical Union, European Regional Converence, Symposium on Karst-Morphogenesis, 1971, p. 14.

According to the investigation results, it has become obvious that the soils, humic sediments, and permeable non-karstic rocks covering the surface of the karstic rocks play an important role in the karstic solution processes. Terra Rossa type sediments are very favorable for karstic solution processes.

2162 Zans, V.A. (1951) - On karst hydrology in Jamaica: Brussels; International Geod. Geophys. Union, Association Sci. Hydrology Gen. Assembly, Tome 2, p. 267-279.

2163 Zautashvili, B.Z. (1978) - Geochemical regularities in the distribution and concentration of alkaline elements of the carbonate waters in Georgia, USSR in Hydrogeology of Great Sedimentary Basins: Hungary; Conference of Budapest, 1976, p. 643-650.

According to many researchers, the intensive accumulation of rare alkaline elements in carbonate waters is due to the leaching of rocks under high temperatures and pressures. Endogenetic solutions also probably play a quite definite role in the genesis of rare alkaline elements in carbonate waters.

2164 Zebidi, H. (1963) - Contribution à l'étude du bilan hydrogéologique du Djebel Bargou: Thèse Publication 47-46, B.I.R.H., Tunisie.

2165 Zenger, D.H.; Dunham, J.B.; and Ethington, R.L. (1980) - Concepts and models of dolomitization: Society of Economic Paleo. Min., Special Publication 28, 320 p.

2166 Zengina, S.M. (1973) - Maps of estimation of the factors of karst, the Guinean Mountain karst province: Olomouc, CSSR; Proceedings of the 6th International Congress of Speleology, p. 337-341.

The contents of the maps of the factors of karst (geological, geomorphological, and hydrological factors) are given. Such characteristics of karst are needed for the water economic calculation of the various karst territories.

2167 Ziangirov, R.S., Mironov, N.A.; Khristich, V.A. (1984) - The radon method as an indicator of karst: U.S.; International Geology Review, 26:10, p. 1227-1237 [translated from Inzh. Geol., no. 5, p. 65-76, 1984].

2168 Zlobina, V.L.; Kovalevsky, V.S.; Morkovkina, I.K.; and Romanov, V.V. (1980) - Application of helium and tritium surveys to studying groundwater recharge conditions: Moscow, Water Resources (Vodnye Resursi), N 1, p. 13-17.

2169 Zojer, H. (1978) - Significance of quantitative statements in connection with combined investigations of karst waters in Proceedings of the United Nations Water Conference, Mar Del Plata, Argentina, 1977; Water Development and Management, Vol. 1, pt. 4: U.K. and U.S.; Pergamon Press, p. 1884.

2170 Zojer, H.; and Zoetl, J. (1975) - The significance of isotopic measurements for combined karst water studies: Oesterreichische Wasserwirtschaft, 26:3-4, p. 62-70, March-April 1974, 9 fig., 3 tab., 8 ref. in Selected Water Resources Abstracts: U.S.; U.S. Geological Survey, 8:1, p. 9.

It was possible to quantitatively determine the passage of water from one creek into another and the complex communications among these creeks in the karst area by tracer investigations using uranine, tritium, and Lycopodium spores.

2171 Zötl, J.G. (1982) - Remarks on the IAH meeting 1979 in Ireland: Written following the meeting of 22-27 May 1979; published by the Irish Nat. Comm. IAH, p. 182.

Summarizes the meetings and field excursions, with emphasis on Professor Zotl's second visit to the Burren.

2172 Zötl, J. (1961) - Die hydrographie des nordostalpinen karsts: Steiersche Beitr. Hydrogeol., Vol. 2, p. 54-183.

2173 Zötl, J. (1960) - Zur frage der niveaugebundenheit von karstquellen und höhlen: Germany, F.R., Zeitschrift für Geomorphologie, Supplementband 2, Internationale Beitrage zur Karstmorphologie, p. 100-102.

2174 Zötl, J.G. (1977) - Results of tracing experiments for construction of reservoirs in karstic regions in Dilamarter, R.R., and Csallany, S.C., editors, Hydrologic Problems in Karst Regions: U.S., Bowling Green, Kentucky; Western Kentucky University, p. 450-458.

In order to develop dams or reservoirs in carbonates, it is necessary to have very intensive investigations on the geology and related topics. Tracing experiments allow the nature of conduits to be discovered. With intensive site research, dams and reservoirs can be constructed efficiently.

2175 Zötl, Josef (1974) - Karsthydrogeologie: Wien, New York; Springer-Verlag, 291 p.

MULTIPLE AUTHOR INDEX

For main author entries, consult text. This index references only secondary or multiple authors, editors, translators, etc. Designation of credit for a non-author role is expressed in parentheses following the entry number. When a non-author designation precedes a list of entries, it may be assumed that the same role (editor, chairperson, translator) was exhibited for each publication which follows.

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1186 1517 1518 1661
1743 1864 2009 2010
2011 2012 2013 2113

Christian County
0522

St. Louis County
1581

Montana
0014 0306 0307 0308

Nevada
1135 2131 2132

New Jersey
0309 0621 0622 1553

New Mexico
0085 0127 0444 0445
0637 0638 0701 0797
0798 0831 0978 0984
1001 1199 1528 1597
1658 1773 1808 2112

New York
1619

Albany County
1406

Schoharie County
0104 1323 1324

North Carolina
1009 1889

Ohio
0068 0873 1110 1291
1358 1930

Oklahoma
0926

Pennsylvania
0063 0260 0609 0642
0885 0895 0896 0951
0997 1033 1067 1198
1321 1380 1561 1562
1686 2084 2098 2099

Berks County
1136 1137

Lancaster County
1137

South Dakota
0010 0011 1084 1085

Tennessee
0006 0007 0008 0221
0241 0242 0387 0584
0613 0721 0768 0843
0979 0985 1044 1082
1230 1235 1236 1419
1560 1799 2086 2128

Knox County
0841 0842 1279

Marion County
1780

Montgomery County
0981

Putnam County
0901

Texas
0002 0042 0043 0044
0045 0102 0105 0123
0246 0268 0272 0274
0313 0410 0411 0412
0583 0614 0629 0630
0633 0697 0724 0725
0793 0794 0795 0796
0797 0826 0969 1003
1061 1089 1117 1123
1138 1139 1206 1274
1275 1294 1330 1339
1397 1433 1434 1521
1522 1523 1524 1525
1559 1578 1590 1602
1609 1610 1624 1747
1752 1773 1808 1823
1866 1867 1926 1927
1941 2029 2053 2064
2065 2066 2067 2068
2105 2140 2157

Atacosa County
1005 1062

Bexar County
0066 1062

Ector County
1007

Guadalupe County
1745

Hale County
0413

Hays County
0640

Irion County
1481

Kendall County
1579

Menard County
0103

Schleicher County
1312

Tom Green County
2121

Travis County
0067

Wharton County
0531

Winkler County
0135 0136 0137

Utah
0750 2095 2122 2123

Virginia
0328 0448 0449 0500
0833 0843 0861 0864
0879 0880 0891 0892
0893 1072 1124 1320
1570 1662 2054 2055
2093 2094 2102

Washington
0056 0818

West Virginia
0152 0259 0392 0698
0699 0929 0956 0997
1164 1201 1648 1779
1791 2076 2077 2135
2142 2144

Greenbrier County
0853 0854 0954
0955 0957 1105
1402

Monroe County
0855 1105 1366
1367 1368 1369
1370

Pocahontas County
2078

Wisconsin
0450 0163 1611 2108

Wyoming
0870 0888 0898 1202
1204 1657 2074 2075

Union of Soviet Socialist Republics
0001 0120 0122 0331 0549
0550 0552 0761 0788 0795
0993 0994 1014 1015 1021
1040 1088 1147 1148 1200
1262 1374 1466 1554 1703
1835 1836 2005 2015 2016
2163 2167

Venezuela
0015 0460 0664 0702 0718
0765 1173 1213 1850 1935
1936 1937 1938

West Indies
0206 0639 1113 1360 1792

Yugoslavia
0218 0222 0238 0322 0546
0547 0688 0762 0801 0930
1016 1017 1143 1152 1179
1214 1215 1216 1220 1443
1444 1473 1510 1511 1606
1659 1812

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- Flooding
- Land Use
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ENVIRONMENTAL GEOLOGY

0081	0086	0317	0507	0697
0935	0952	0971	1063	1075
1092	1110	1148	1194	1196
1198	1299	1311	1329	1418
1473	1539	1553	1557	1587
1679	1808	1921	2009	2010
2049	2064	2065	2068	2069
2125				

Construction

0160	0305	0341	0622	0699
0859	0883	0914	1119	1125
1279	1812	1870	2027	2036
2079				

Engineering Methods

0157	0205	0397	0443	0531
0642	0696	0780	0799	0823
0961	1221	1394	1552	1616
1649	1758	1789	1901	1946
2023				

Flooding

0105	0175	0402	0404	0555
0901	0950	1229	2015	2083
2085				

Land Use

0029	0129	0176	0203	0206
0270	0282	0285	0289	0347
0349	0351	0467	0506	0508
0513	0523	0525	0526	0633
0690	0691	0745	0792	0918
0926	1294	1798	1809	1927
2084				

Pollution

0048	0049	0063	0125	0177
0319	0403	0430	0431	0432
0558	0570	0722	0754	0776
0815	0816	0846	0927	0929
1039	1149	1200	1332	1373
1457	1651	1727	1743	1766
1864	1922	1924	2013	2051
2076				

Subsidence (Collapse)

0005	0040	0050	0052	0059
0135	0136	0137	0151	0156
0221	0236	0415	0452	0466
0559	0641	0741	0793	0796
0874	0881	0904	0910	0911
0946	0981	1053	1058	1342
1345	1355	1419	1427	1474
1475	1476	1583	1653	1654
1749	1830	1943	2052	2063
2113	2128			

Urban Karst

0171	0309	0462	0583	0852
1885	1900	1926		

Water Supply

0026	0027	0030	0032	0043
0142	0193	0238	0274	0295
0333	0388	0433	0554	0574
0602	0660	0877	1215	1220
1222	1317	1424	1425	1721
1750	1947	2148	2149	

GEOLOGY

0041	0077	0118	0119	0122
0124	0128	0143	0145	0152
0153	0159	0201	0202	0212
0224	0230	0234	0240	0245
0296	0297	0316	0331	0334
0362	0366	0381	0382	0384
0385	0390	0463	0464	0493
0498	0504	0512	0524	0564
0596	0607	0610	0624	0625
0628	0637	0643	0655	0664
0673	0687	0688	0689	0731
0752	0761	0765	0770	0782
0788	0805	0830	0831	0832
0845	0871	0888	0892	0916
0945	0965	0966	0970	0975
0978	0985	0986	0988	0990
1000	1005	1007	1014	1016
1018	1019	1029	1038	1046
1072	1074	1083	1087	1123
1136	1140	1151	1156	1181
1245	1250	1252	1266	1268
1285	1286	1293	1313	1325
1335	1358	1364	1372	1380
1400	1410	1417	1436	1440
1444	1447	1450	1478	1507
1531	1554	1568	1569	1580
1584	1603	1627	1677	1681
1687	1696	1699	1708	1709
1744	1747	1773	1774	1780
1782	1814	1816	1836	1843
1849	1859	1861	1863	1877
1879	1894	1912	1935	1995
2000	2001	2053	2058	2066
2067	2071	2107	2112	2124
2136	2143	2171		

Caves

0004	0006	0007	0008	0010
0014	0034	0035	0036	0037
0038	0039	0053	0056	0061
0076	0095	0138	0140	0150
0187	0192	0194	0195	0197
0198	0199	0210	0218	0228
0231	0259	0265	0273	0275
0300	0322	0335	0339	0340
0346	0348	0352	0354	0360
0365	0375	0376	0377	0386
0401	0422	0429	0438	0445
0458	0465	0473	0483	0503
0505	0528	0550	0560	0561
0585	0586	0614	0631	0636
0650	0651	0657	0658	0666
0667	0670	0682	0684	0693
0703	0719	0739	0742	0743
0757	0773	0781	0785	0791
0801	0840	0861	0864	0870
0880	0893	0898	0900	0907
0930	0938	0953	0976	1041
1077	1079	1127	1141	1152
1240	1242	1251	1259	1295
1301	1330	1336	1337	1398
1463	1464	1465	1477	1498
1516	1543	1544	1597	1605
1624	1625	1641	1644	1645
1646	1662	1675	1729	1738
1740	1741	1742	1765	1767
1769	1791	1795	1796	1797
1819	1833	1852	1860	1873
1874	1904	1920	1936	1946
1949	1950	1961	1972	1973
1975	1981	1987	1991	2003
2006	2014	2025	2030	2031
2032	2042	2054	2055	2098
2099	2116	2160		

Geomorphology

0107	0112	0114	0115	0116
0117	0149	0185	0186	0191
0249	0251	0298	0304	0310
0312	0313	0345	0353	0355
0356	0361	0372	0374	0378
0387	0396	0398	0453	0454
0456	0460	0468	0470	0471
0474	0477	0484	0501	0509
0537	0540	0541	0568	0571
0592	0593	0597	0616	0635
0646	0647	0653	0654	0656
0661	0665	0694	0705	0721
0732	0736	0737	0748	0759
0760	0766	0783	0789	0797
0798	0804	0819	0824	0828
0843	0902	0923	0933	0941
0948	0959	0969	1043	1100
1104	1122	1131	1171	1176
1180	1189	1192	1193	1195
1207	1208	1230	1232	1238
1247	1265	1267	1270	1272
1360	1366	1374	1404	1435
1438	1491	1501	1502	1504
1505	1506	1541	1572	1611
1617	1638	1648	1658	1688
1705	1714	1715	1716	1723
1728	1734	1754	1755	1803
1820	1835	1841	1844	1848
1850	1865	1915	1917	1918
1952	1953	1954	1955	1956
1957	1958	1959	1963	1964
1967	1968	1992	2007	2060
2061	2062	2075	2087	2090
2102	2110	2115	2118	2141
2173				

Alpine Karst

0211	0213	0549	0551	0573
0619	0644	0649	0652	0677
0772	0779	1032	1239	1907
2072	2073	2074	2137	2172

Arctic Karst

0250	0306	0307	0308	1022
1697				

Coastal Karst

0033	0087	0425	0496	0546
0590	0671	0751	0835	1012
1133	1829			

Dolines

0079	0905	0939	0979	0980
1408	1409			

Genesis

0133	0165	0181	0183	0214
0255	0256	0303	0369	0370
0400	0417	0442	0444	0478
0480	0485	0486	0548	0557
0579	0588	0618	0638	0701
0756	0944	0987	1002	1021
1111	1170	1185	1244	1277
1315	1322	1324	1350	1351
1376	1401	1405	1437	1445
1466	1485	1496	1497	1678
1712	1725	1726	1732	1733
1840	1903	1938	1976	1977
1984	1985	1989	1990	1996
2002	2080	2091	2138	2161
2165				

Glaciers
0386 0645 0648 1323 1399
1540 1595 1730 1862 1979
1980 1998 2045 2122 2123

Landform Evolution
0170 0188 0189 0190 0278
0299 0302 0553 0591 0606
0820 0825 0832 0838 0934
0960 1085 1132 1227 1246
1381 1387 1390 1407 1413
1416 1423 1451 1484 1520
1527 1528 1561 1570 1609
1619 1626 1629 1632 1633
1634 1635 1636 1637 1642
1643 1720 1779 1962 2008
2038 2041 2086 2111 2144
2158

Marine Karst
1683 1858

Pseudo Karst
0082 0818

Salt
0085 0102 0217 0566 0794
0795 1495 1719 1722 1724

Sandstone
0740

Solution Features
0078 0080 0876 0884 0886
0936 0982 1120 1134 1202
1256 1298 1518 1520 1585
1701 1785 1975 1986 1988
2046 2047

Structural Geology
0009 0016 0069 0166 0219
0226 0241 0242 0311 0324
0332 0359 0446 0451 0629
0777 0813 0855 0964 1015
1037 1052 1073 1081 1105
1117 1137 1175 1213 1241
1255 1257 1271 1274 1275
1339 1368 1397 1402 1446
1490 1509 1512 1586 1606
1610 1630 1631 1639 1640
1657 1686 1823 1845 1994
2026 2095 2100 2139

Tropical Karst
0108 0109 0110 0111 0264
0414 0603 0626 0627 0728
0790 0915 1064 1264 1839

Lakes
0989 1453 1916 1919

Mineralogy
0479 0481 0482 0487 0489
0490 0491 0492 0600 0634
0837 0869 0882 0885 0906
0912 0949 0977 1001 1135
1144 1150 1173 1304 1316
1371 1439 1533 1598 1623
1707 1781 1802 1856 1993
2094

Oil
1395

Reefs
1792 1811

Sinkholes
0013 0058 0139 0147 0178
0207 0243 0350 0428 0510
0575 0609 0617 0621 0718
0752 0811 0820 0841 0878
0891 0928 0937 0951 1009
1031 1059 1112 1114 1211
1236 1300 1321 1341 1343
1344 1346 1347 1352 1365
1519 1526 1581 1700 1717
1760 1761 1762 1763 1764
1786 1842 1854 1889 1902
1906 1910 1945 2035 2056
2130

Springs
0070 0144 0179 0272 0277
0314 0321 0368 0679 0683
1078 1249 1394 1488 1500
1660 1753 1778 2011 2012
2078

Waterfalls
0227

HYDROLOGY

0091	0101	0148	0337	0367
0495	0640	0674	0725	0727
0876	0897	0903	0908	0909
0913	0954	0955	0956	0993
0994	1007	1025	1088	1089
1094	1096	1108	1124	1177
1199	1201	1206	1209	1233
1234	1278	1283	1288	1292
1302	1308	1331	1333	1396
1420	1441	1448	1542	1545
1546	1547	1550	1551	1563
1579	1594	1618	1620	1622
1682	1690	1691	1745	1752
1784	1799	1824	1825	1826
1827	1828	1831	1832	1846
1847	1851	1866	1876	1886
1932	1937	1939	1941	1960
1999	2016	2029	2034	2044
2081	2082	2089	2093	2103
2114	2121	2132	2153	2154

Geothermal Sources

0018	0019	0022	0023	0025
0028	0051	0062	0286	0287
0296	0532	0533	1011	

Hydrogeology

0003	0042	0045	0066	0074
0094	0103	0104	0113	0120
0121	0123	0126	0154	0158
0162	0163	0167	0196	0225
0246	0288	0291	0293	0294
0320	0326	0336	0373	0389
0392	0393	0394	0406	0410
0411	0412	0413	0418	0419
0420	0435	0437	0439	0440
0455	0475	0476	0494	0499
0514	0515	0518	0527	0530
0534	0535	0543	0544	0556
0572	0580	0582	0594	0598
0601	0623	0663	0668	0669
0698	0702	0723	0733	0734
0735	0744	0746	0750	0764
0774	0775	0778	0800	0810
0812	0814	0822	0839	0842
0844	0848	0849	0450	0853
0854	0858	0863	0865	0899
0917	0919	0931	0967	0968
0973	0983	0995	0996	1017
1024	1026	1027	1028	1033
1034	1035	1045	1054	1061
1090	1093	1097	1101	1107
1116	1118	1128	1138	1139
1143	1147	1154	1155	1158
1160	1161	1182	1204	1205
1210	1214	1217	1218	1219
1223	1224	1254	1260	1262
1289	1290	1334	1338	1340
1361	1362	1367	1369	1382
1383	1385	1388	1391	1403
1406	1411	1413	1414	1422
1429	1494	1521	1522	1523
1524	1525	1530	1556	1589
1593	1600	1602	1621	1680
1692	1694	1735	1746	1756
1757	1770	1771	1776	1787
1805	1855	1880	1890	1891
1893	1895	1896	1897	1908
1909	1951	1965	1970	1971
2019	2021	2024	2039	2057
2105	2106	2109	2145	2147
2150	2164	2169	2175	

Drainage

0020	0141	0942	0957	0958
1187	1226	1235	1291	1310
1503	1535	1536	1537	1628
1656	1821	2059	2104	2140

Geochemistry

0088	0089	0090	0092	0093
0098	0099	0100	0106	0164
0174	0209	0215	0216	0235
0237	0252	0253	0261	0269
0292	0323	0327	0343	0395
0436	0441	0469	0497	0516
0565	0569	0595	0612	0692
0700	0720	0729	0749	0821
0829	0833	0834	0836	0857
0860	0862	0887	0889	0895
0896	0920	0947	0963	1049
1050	1066	1067	1076	1080
1086	1115	1126	1142	1145
1153	1167	1168	1169	1190
1197	1203	1243	1303	1305
1306	1307	1309	1320	1326
1327	1353	1354	1430	1431
1432	1433	1434	1449	1453
1458	1459	1460	1461	1462
1469	1471	1472	1481	1487
1515	1558	1571	1573	1574
1575	1590	1596	1599	1604
1612	1613	1689	1698	1702
1703	1751	1804	1834	1869
1871	1875	1882	1888	1911
1934	2017	2119	2131	2151
2155	2163			

Ground-Water Movement

0002	0024	0057	0064	0075
0083	0084	0130	0161	0229
0233	0271	0279	0280	0325
0371	0405	0448	0500	0529
0545	0589	0599	0632	0685
0686	0802	0803	0807	0817
0827	0940	1062	1183	1186
1225	1287	1328	1467	1479
1489	1492	1499	1559	1564
1655	1676	1731	1737	1739
1775	1884	1898	1899	1923
1966	2088	2108		

Ground-Water Withdrawal

0012	0017	0044	0065	0257
0407	0447	0584	0932	0972
1010	1042	1172	1793	1794
1806	1822	2040	2129	

Pump Tests

0342	0421	1363

Recharge

0054	0060	0223	0232	0239
0254	0268	0284	0409	0472
0520	0577	0723	0787	1184
1216	1577	1867	1942	2043
2159				

Saturation

0538

Sedimentation

0146	0328	0399	0925	1082
1269	1314	1319	1656	2135
2156				

Solubility

0001	0258	0450	0522	0567
0604	0605	0695	0768	0868
0890	0924	0992	1044	1068
1428	1452	1470	1562	1857
1881	1913	1914	2097	2120

Temperature

0021	0247	0283	0383	0416
0611	0680	0681	1065	1356
1588	1693	1837		

Water Level

0069 0894

Modeling

0046	0047	0055	0131	0168
0169	0172	0184	0208	0330
0338	0408	0502	0521	0539
0587	0613	0715	0716	0717
0763	0767	0784	0922	1003
1006	1048	1129	1130	1162
1163	1284	1357	1393	1454
1456	1468	1514	1548	1560
1565	1582	1607	1608	1759
1878	1936	2020	2033	2050
2092	2096	2133		

Water Quality

0318	0991	1023	1030	1069
1312	1443	1510	1511	1517
1578	1704			

INVESTIGATIVE METHODS

0329	0357	0379	0424	0426
0457	0519	0562	0563	0608
0675	0704	0706	0707	0708
0710	0711	0712	0713	0714
0762	0808	0809	0851	0974
1004	1013	1047	1051	1091
1098	1099	1102	1106	1109
1113	1157	1166	1178	1228
1248	1261	1282	1296	1297
1318	1370	1378	1379	1384
1386	1389	1421	1529	1532
1534	1538	1549	1555	1567
1576	1592	1685	1748	1768
1772	1800	1801	1813	1838
1868	1872	1925	1928	1929
1948	1974	2004	2018	2022
2117	2142	2167	2168	2170
2174				

Fluorescent Tracing

0096	0132	0220	0266	0449
0488	0558	0709	1711	1883
1982	1983	2101		

Geophysical Surveys

0072	0127	0134	0182	0204
0222	0244	0260	0267	0276
0301	0315	0391	0434	0547
0552	0576	0676	0771	0856
0999	1036	1070	1258	1276
1652	1807	2070		

ABBREVIATIONS USED IN THIS TEXT

Amer.	-	American
Asso.	-	Association
Bull.	-	Bulletin
ed.	-	Editor
FAO	-	Food and Agricultural Organization
figs.	-	Figures
F.R.	-	Federal Republic
Geol.	-	Geological
Geophys.	-	Geophysical
GUA	-	Goeteburgs Universitets Arsskrift
IAH	-	International Association of Hydrogeologists
IASH	-	International Association of Scientific Hydrology
IHD	-	International Hydrologic Decade
IHP	-	International Hydrologic Programme
Inter.	-	International
Journ.	-	Journal
Nat.	-	Natural
NSS	-	National Speleological Society
p.	-	Pages
pp.	-	Pages
Sci.	-	Science
Soc.	-	Society
Spele.	-	Speleological
Trans.	-	Translator
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
Univ.	-	University
U.S.	-	United States
Vol.	-	Volume
Z.	-	Zeitschrift

Dr. Philip E. LaMoreaux

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