

SLOVENSKA AKADEMIJA ZNANOSTI IN UMETNOSTI
ACADEMIA SCIENTIARUM ET ARTIUM SLOVENICA

ZNANSTVENORAZISKOVALNI CENTER SAZU
INŠTITUT ZA RAZISKOVANJE KRASA - INSTITUTUM CARSOLOGICUM

SUPPLEMENTUM

ACTA CARSOLOGICA

Vol. 30 - No. 1

**Annotated Bibliography
of
Karst Publications**

No. 9



LJUBLJANA 2001



ACTA CARSOLOGICA is included into:

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SLOVENSKA AKADEMIJA ZNANOSTI IN UMETNOSTI
ACADEMIA SCIENTIARUM ET ARTIUM SLOVENICA

RAZRED ZA NARAVOSLOVNE VEDE
CLASSIS IV.: HISTORIA NATURALIS

ZNANSTVENORAZISKOVALNI CENTER SAZU
INŠTITUT ZA RAZISKOVANJE KRASA - INSTITUTUM CARSOLOGICUM

ACTA CARSOLOGICA

Vol. 30 - No. 1
2001
Supplementum

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International Geographical Union - Karst Commission
Association of the Geographical Societies of Slovenia

Collected and edited by
Andrej Kranjc



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2001

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Distribucija in prodaja - Ordering address:
Založba ZRC/ZRC Publishing
Gosposka 13, P.O.Box 306, SI-1001 Ljubljana, Slovenia
fax: +386 (0)1 12 55 253, E-mail: zalozba@zrc-sazu.si

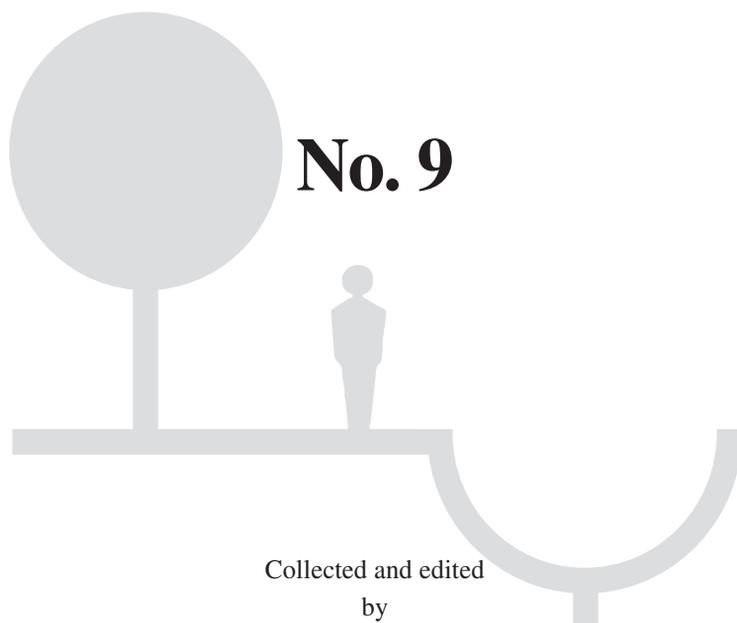
Naslov uredništva - Editor's address:
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<http://www.zrc-sazu.si/izrk/carsolog.htm>
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Tiskano s finančno pomočjo
Ministrstva za šolstvo, znanost in šport RS

Published by the financial assistance of
Ministry of Education, Science and Sport RS

Chairman John Gunn
Karst Commission
International Geographical Union
Association of the Geographical Societies of Slovenia

Annotated Bibliography of Karst Publications



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Collected and edited
by

ANDREJ KRANJC

Karst Research Institute
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Postojna

June, 2001

FOREWORD

It is again my great pleasure to write the foreword to this, the ninth global bibliography of karst research published by members of the IGU Karst Commission. The Bibliography was first produced in 1993 by the IGU Commission on Environmental Changes and Conservation in Karst Areas under the title “Newsletter on Annotated Bibliography”. Four Newsletters were produced under the aegis of the Commission and a further four under the aegis of the subsequent IGU Commission on “Sustainable Development and Management of Karst Terrains”. All eight Newsletters were edited by Kazuko Urushibara-Yoshino who retired as a Full Member of the Commission in August 2000 at the International Geographical Congress in Seoul, Korea. A new Karst Commission of the IGU was approved at Seoul and Full Member Andrej Kranjc agreed to take on the task of editing the Bibliography with the support of colleagues from the Karst Research Institute, Postojna. We also agreed a new name “Annotated Bibliography of Karst Publications”, that would better reflect our aim of providing a compendium of research by Full and Corresponding Members of the IGU Karst Commission. Some of the papers included in this edition will also be listed in the publications of the various international abstracting services but none of these is devoted specifically to karst. Our scope also differs from that of the UIS Speleological Abstracts which aim to cover the whole spectrum of publications relating to caves and karst, including many club journals. Instead we aim to cover topics likely to be of interest and of use to geographers and scientists in related disciplines who are corresponding members of the Commission. The Bibliography is usually published within 6-8 months of year end to ensure that colleagues, and particularly those who have restricted access to international journals, are kept aware of all the information of relevance to their own studies. Subsidies mean that the Bibliography can be distributed free to any member requesting a copy, and back issues of most issues are also available from myself. In closing, I repeat my annual plea to members to keep sending hard copies of their publications to Andrej, together with the abstract as an electronic file. I would hope that the Bibliography will continue to provide a useful service to the world community of karst scientists and look forward to any comments on how we might improve the service offered.

May, 2001

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- 9-1 **Abel, Thekla ; Sauter, Martin ; Hinderer, Matthias: Integrative Ansätze zur Bestimmung von Denudationsraten auf der Schwäbischen Alb.- Laichinger Höhlenfreund, 35, 65-90, Laichingen, 2000.**
K.W.: regional karstology, solution, morphogenesis, hydrochemistry.
- 9-2 **Ackroyd, Peter: Aussies in New Zealand. The discovery and exploration of a new deep cave in the Mount Owen area.- The International Caver, 65-70, Swindon, 2000.**
K.W.: regional speleology, cave description, history of explorations.
- 9-3 **André, Daniel ; Chabaud, Michel: Le plus grand mammouth totémique de la préhistoire?.- Spelunca, 79, 15-28, Paris, 2000.**
K.W.: regional karstology, natural arch, cave painting, mammoth, morphogenesis.
- 9-4 **Arfib, Bruno ; de Marsily, Ghislain ; Ganoulis, Jacques: Pollution by seawater intrusion into a karst system: new research in the case of the Almyros source (Heraklio, Crete, Greece). Acta carsologica, 29/1, 15-31, Ljubljana, 2000.**
Saline intrusion in karstic coastal aquifers is a common phenomenon which affects the quantity and quality of the freshwater resource. This paper examines the case of the Almyros system at Heraklio in Crete (Greece), characterized by a vast recharge area (300 km²) and a single brackish spring. Data from the Almyros spring and the surrounding wells are analyzed and a specific configuration of the karstic system is proposed. The evolution in time and space of the water temperature and chloride content is shown to be conditioned by the complex structure of this system and the heterogeneity of the karstic formations. These two parameters are analyzed and two storage zones are identified which generate different types of saline pollution. The water in the Almyros spring is not directly connected to the surrounding water-table aquifer. An inland reservoir far from the coast stores the cold, freshwater recharged in the mountains and supplies the Almyros spring. The pollution occurs during the transfer of the water toward the spring, through karstic conduits. Moreover, the local coastal aquifer is polluted by a generalized saline intrusion into the fractured matrix of the limestone, increased by withdrawals. Furthermore, the wells are contaminated by preferential saltwater flow through karstic channels reaching the seawater intrusion zone. The case of the Almyros system shows: (a) that a karstic coastal spring is not necessarily indicative of saline intrusion into the system; (b) that in optimal groundwater resource management, the whole hydrogeological system should be taken into account.
- 9-5 **Audétat, Maurice: Hommage au Dr. Villy Aellen (1926-2000).- Stalactite, 50, 68, s.l., 2000.**
- 9-6 **Audra, Philippe: Concrétions prismatiques et atmosphère souterraine. 10^e Rencontre d'octobre, Paris, 5-7, 2000. (<http://perso.wanadoo.fr/ffspeleo/speleo/dir02-40.htm>).**

Mention of an observation of prismatic helictites found in an high-alpine context (Scarabee Chourum, Devoluy, France).

- 9-7 Audra, Philippe: La crue du 24 octobre 1999 au Revest (Alpes Maritimes).- Spelunca, 79, 39-42, Paris, 2000.**

K.W.: regional speleology, flood.

- 9-8 Audra, Philippe: Le karst haut alpin du Kanin (Alpes juliennes, Slovénie-Italie). Etat des connaissances et données récentes sur le fonctionnement actuel et l'évolution plio-quadernaire des structures karstiques. Karstologia, 35, 27-38, 2000.**

Kanin is a high-alpine karst located in the Italo-slovenian Julian Alps. Its surface was elaborated by the quaternary glaciers and includes some inherited discreet tertiary morphological features. Recent dye tracing has shown that the structural setting permits water infiltrated in Italian catchments to contribute to Slovene springs. Hydrodynamic and physico-chemical water analyses show extremely quick transfers of water during snow melt or heavy storms; these create spectacular overflows, such as the Boka spring which emerges as a 100 m high waterfall. The phreatic zone, linked to the impermeable dam of the Soča valley, does not significantly slow these transfers. Nevertheless, it contributes to the occurrence of low water levels during recession periods, giving highly mineralised water after long resident periods. The presence of very deep and developed karst systems is explained by the combination of advantageous factors: thick and jointed limestone, important height gradient, and considerable precipitation. Paleomagnetic dating in one of the largest systems (Črnelško brezno) attributes some glacial sediments to the Lower Pleistocene period. Their configuration seems to show that this karst system is pre-quaternary.

- 9-9 Audra, Philippe: Pliocene and Quaternary Karst development in the French Prealps—Speleogenesis and Significance of cave fills. p. 348-351, in KLIMCHOUK A., FORD D. C., PALMER A. N. ; DREYBRODT W. (Ed.) 2000: Speleogenesis. Evolution of karst aquifers, 528 p., National Speleological Society, Huntsville, 2000.**

Three French cave systems in the Prealps in the Vercors and Devoluy mountain areas are described. It is possible to reconstruct their evolution by analyzing their morphology and by dating the karst fill using paleomagnetism and U/Th. Cave development began at the end of the Miocene during uplift when inclined tubes formed in the epiphreatic zone. Later the tubes were partially blocked by weathered detritus from the surface. Uplift diverted former recharge away from the caves and extensive calcite deposition occurred. The cave systems were reactivated during glaciations, with flooding to considerable depths. The epiphreatic zone was blocked with calcareous varves from meltwater. During interglacial periods, either calcite deposition or dissolution occurred, depending on the altitude and density of the soil cover.

- 9-10 Audra, Philippe: Slovénie. Massif du Razor, Aout 2000.- Expédition spéléologiques des Furets jaunes de Seyssins, 33 pp, s.l., 2000.**

K.W.: speleological expedition, regional speleology, cave description, Slovenia.

- 9-11 Badino, Giovanni: Antartica 2000.- Grotte, 43, 35-37, s.l., 2000.**
K.W.: speleological expedition.
- 9-12 Bakšić, Darko ; Jalžić, Branko ; Šmida, Branislav ; Lacković, Damir: Slovačka jama.- Spelunca, 78, 29-34, Paris, 2000.**
K.W.: regional speleology, expedition, Croatia, Slovačka jama.
- 9-13 Bakšić, Darko ; Jalžić, Branko: Jama Amfora.- Velebiten, 34, 18-21, Zagreb, 2000.**
K.W.: cave description, Croatia.
- 9-14 Bamberger, Anton: Sandkarexpedition 99.- Atlantis, 22, 40-50, Salzburg, 2000.**
K.W.: cave description.
- 9-15 Bárány-Kevei, Ilona: Daten zur karstökologischen Forschung im Aggtelek-Gebirge (NE Ungarn). Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher e.V. München. Nr. 1/2-2000. Jahrg. 46. 1/2. Quart. pp. 8-11, 2000.**
Today, karstecological research is important for the ecological state of environmental sensitive karst terrains. Both land use and environmental pollution have significant effects on the processes of karstecological system. Moreover, the factors and processes of karstecological system are in close connection with each other. At the same time, land use has certain reaction on karstsystem. Thus, the present article shows some aspects and problems of the climate-soil- vegetation system on the Aggtelek-Karst, in Hungary.
- 9-16 Bárány-Kevei, Ilona: Ecological investigation on some Hungarian karsts. Physico-geographycal Research in Hungary. Studies in Geography in Hungary 32, Geogr. Research Institute. HAS, pp. 11-117, Budapest, 2000.**
The sensitivity of karst systems to human activities has become increasingly apparent as a result of research during the 1980's and 1990's. The environmental impacts on karst region must be analysed, since these processes take place very rapidly. Non-karstic materials integrate quickly in the karst water system, modifying or damaging the natural forms that have been developing for millions of years. Karst are for especially sensitive geo-ecological systems and research on different aspects has been encouraged since the 1980's. The paper presents some results of research into karst-ecological systems in some Hungarian karst areas.
- 9-17 Bariviera, Guy: Le gouffre de l'Oule (Saint-Jean-de-Laur), (Lot).- Spelunca, 77, 12-14, Paris, 2000.**
K.W.: cave diving.
- 9-18 Bastiani, Giuliano ; Dirjec, Janez ; Turk, Ivan: [Attempt to establish the purpose of stone artefacts from the Divje Babe I site (Slovenia). Hypotheses on the use of and wear to some Mousterian tools].- Arheološki vestnik, 51, 13-69, Ljubljana, 2000.**
K.W.: speleoarchaeology, Mousterian, artefact.

- 9-19 Bella, Pavel: [Basic morphological and genetic features of the Jasovska Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 42-51, Liptovský Mikuláš, 2000.**
K.W.: speleogenesis, cave morphology, Slovakia.
- 9-20 Bella, Pavel: [Morphology and genesis of the Harmanicka Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 71-81, Liptovský Mikuláš, 2000.**
K.W.: regional speleology, speleogenesis, Slovakia.
- 9-21 Binder, Hans: Karl-Heinz Pfeffer zur Vollendung des 60. Lebensjahres (mit einem Verzeichnis der Publikationen).- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 4-8, München, 2000.**
K.W.: bibliography.
- 9-22 Biondić, Božidar: Karst groundwater protection: the case of the Rijeka region, Croatia. Acta carsologica, 29/1, 33-46, Ljubljana, 2000.**
The problem of protection of water resources in the karst area of Croatia has been particularly acute for the last 30 years. Specific natural conditions under which the dynamics of groundwater is formed and developed were reasons for difficulties in preparation of uniform criteria of protection. Present experience makes it possible to establish a more organized approach to the problem. This applies, in particular, to the surroundings of the town Rijeka, where considerable funds were invested into research on new groundwater abstractions, but also toward their protection. In this paper the general approach to karst water protection in Croatia will be presented. This consists of an explanation of natural conditions, necessary research activities, general criteria and measures for protection, improvement of sanitary conditions in zones of high protection, design of new constructions in protection zones, urban planning and protection, etc. A part of the paper will be directed to the regulation procedure and organizational problems in such an active approach to karst water protection.
- 9-23 Bobro, Milan ; Hančulak, Jozef ; Zelinka, Jan: [Characteristics of microclimate and selected factors of the Driny Cave environment].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 180-183, Liptovský Mikuláš, 2000.**
K.W.: speleoclimate, speleotherapy, Radon.
- 9-24 Bognar, Andrija: [Geomorphology and its development in Croatia].- Zbornik 2. hrvatskoga geografskog kongresa, 43-52, Zagreb, 2000.**
K.W.: geomorphology, science, definition, object, relief, evolution, history, Croatia.
- 9-25 Borger, Harald ; Beck, Rolf K.: Landschaftsentwicklung, Ekologische Grundlagen und anthropogene Veränderungen im westlichen Aggtelek-Karst (NE Ungarn).-**

Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 15-24, München, 2000.

K.W.: sedimentology, morphogenesis, human impact, pedology, vegetation.

9-26 Bosák, Pavel: Notes on the history of some karstological terms - hydrothermal karst, geysermite, vadose zone. Acta carsologica, 29/2, 233-240, Ljubljana, 2000.

The author explains unclear priorities of the terms hydrothermal karst, geysermite, and vadose zone. Hydrothermal karst - karst forms, produced by hot water were described already by J. Nöggerath (1845) and J. Desnoyers (1845). In the Czech literature, the term was introduced by E. Michal 1929-1930, and the term thermomineral karstification in 1941. Both terms were used in the description of Zbrašov Aragonite Caves. Geysermite first time appeared in a guide from 1934 (geyser stalagmites) by J. Chromý. The first published description of those forms are in the contribution of W. Czoernig-Czernhausen (1932 - 1933). He described them as »Quellenstalagmiten« (spring stalagmites). Vadose hydrological zone in karst was characterized by F. Pošepný (1893), who use the term vadose also in connection with formation of cavities.

9-27 Bosák, Pavel: The evolution of karst and caves in the Koněprusy region (Bohemian Karst, Czech Republic), Part III: Collapse structures. Acta carsologica, 29/2, 35-50, Ljubljana, 2000.

Vertical and subvertical pipes are circular to ovate in shape with diameters from 2-4 m up to tens of metres and with proven depth up to 82 m. Some of them terminate by horizontal cave levels at depth. Pipes are filled with complicated sedimentary sequences with clearly developed collapse structures. The fill is composed of pre-Cenomanian, Cenomanian-Turonian and Tertiary deposits. Internal structures of the fill indicate multi-phase collapses. Cretaceous and pre-Cretaceous deposits are often subvertical with chaotic internal texture. In the centre of some of pipes, there are traces of younger collapses, most probably induced by continuing karstification and suffosion at depth. Tertiary deposits overlay the Cretaceous ones unconformably; they show gentler centripetal inclination, but in places they fill the central parts of collapsed fill. The origin of solution pipes is connected with hydrothermal activity most probably during Paleogene to Miocene, when the surface of limestones was still covered by slightly eroded cover of Upper Cretaceous platform sediments. Hydrothermal karst forms developed up to the surface of limestones as the piezometric level was situated within the Cretaceous cover. After the lost of buoyancy support of water, sedimentary cover started to move (collapse) down.

9-28 Bosák, Pavel ; Knez, Martin ; Otrubová, Dana ; Pruner, Petr ; Slabe, Tadej ; Venhodová, Daniela: Palaeomagnetic Research of a Fossil Cave in the Highway Construction at Kozina, SW Slovenia. Acta carsologica, 29/2, 15-33, Ljubljana, 2000.

A fossil channel was filled by sandy sediments of light brown to ochreous color with dynamic structures and textures (lower sequence) unconformably overlain by remains of collapsed roof with brown and ochreous matrix (upper sequence). The sedimentary profile was about 5 m high. In all 38 samples taken from the profile, only one was cemented.

Samples were demagnetised by alternating field (AF) at 10 to 1,000 Oe. The cemented one was demagnetised by gradual thermal process from 80 to 560 °C in the MAVACS apparatus. Detected remanent magnetisation in a natural state varied between 95 and 36,470 pT, values of volume magnetic susceptibility are from 55 to 998 x 10⁻⁶ SI. Rocks showed low or medium magnetisation. Normal and inverse polarization was detected after demagnetisation. The primary component of magnetisation and resulting polarity could not be stated in samples with expressive viscose component (up to 90 %). According to arrangement of individual magnetozones, it can be stated that sediments are older than the top of Olduvai chron (1.77 Ma), as the magnetostratigraphic profile at Kozina terminated by reverse polarised magnetozones and contains two normal polarised zones. The profile can be correlated with the Divača profile, not only from the palaeomagnetic point of view, but also from a lithological point of view. We suppose, as in Divača, that the cave is a result of the Messinian speleogenetic epoch and its fossilization was connected with rapid base level uplift after refilling of the Mediterranean basin by water. If this hypothesis is close to reality, the fossilization process can be dated from about 5.2 Ma up.

- 9-29 Bosted, Peter: China caves 98.- The International Caver, 38-42, Swindon, 2000.**
K.W.: cave expedition.
- 9-30 Bottrell, Simon H. ; Gunn, J. ; Lowe, D. J: Calcite dissolution by sulfuric acid. In: Klimchouk, A., Ford, D., Palmer, A. & Dreybrodt, W. (Eds.) *Speleogenesis: evolution of karst aquifers*. National Speleological Society, 156-7, 2000.**
Dissolution of carbonates, particularly calcite, due to the effects of sulfuric acid is potentially important as a speleogenetic mechanism in a variety of geologic situations, including coastal mixing zones.
- 9-31 Bottrell, Simon H. ; Webber, Neil ; Gunn, John ; Worthington, Stephen R: The geochemistry of sulphur in a mixed allogenic-autogenic karst catchment, Castleton, Derbyshire, UK.- *Earth Surface Processes and Landforms*, 25, 155-165, s.l., 2000.**
Analyses are presented of anion chemistry and sulphur isotopic compositions of sulphate in sinking streams and groundwaters in a mixed allogenic-autogenic karst catchment. Using the sulphur isotopic data, sources of sulphate from agriculture and the effects of sulphate reduction arising from slurry application can be distinguished from natural rock weathering sources. Within the aquifer, sulphate in known autogenic waters has isotopic compositions distinct from allogenic waters, the autogenic waters being dominated by sulphate from rainfall and rock weathering in these low agricultural intensity catchments. On this basis, water rising at low flow from Whirlpool Rising, Speedwell Cavern has been identified as dominantly autogenic. Groundwater flow between the sinks and risings in Speedwell Cavern is believed to be along conduits following mineralised faults (rakes). During transit SO₄²⁻/Cl⁻ in the water increases. Isotopic mass balance shows that this must be due to addition of sulphate from the oxidation of ore minerals by groundwater. Mass balance considerations show that the present rate of sulphide oxidation must be the result of enhancement by lead mining operations on the rakes.

- 9-32 Brancelj, Anton ; Urbanc, Janko: Karst groundwater connections in the valley of the Seven Triglav Lakes. Acta carsologica, 29/1, 47-54, Ljubljana, 2000.**
Results of a tracing test in the high mountain lake of Jezero v Ledvici (Triglav Lakes area) are presented. The tracing experiment proved hydraulic connections between lakes Jezero v Ledvici, Močivec and Dvojno jezero. The article also deals with a comparison of the faunistic and floristic characteristics of the Triglav lakes. The occurrence of biotic species in different lakes is not very similar. No clear explanation for this phenomenon was found up to now, so further investigations of this system are proposed.
- 9-33 Bratus, A. ; Cucchi, Franco: Le classificazioni geomeccaniche nello studio di fattibilità delle gallerie in area carsica (Geomechanical classifications in the feasibility study of tunnels in karst area). Rassegna Tecnica del Friuli-Venezia Giulia, anno LI, 31-34, Jan. - Febr., 2000.**
The results of a thesis in Geological Sciences about railway tunnels feasibility analyses in karst areas are the starting point for some considerations that the authors explain in this article. The geomechanical classifications refer to later are used for the technical characterization of karstified rock masses.
- 9-34 Brilly, Mitja ; Mikoš, Matjaž ; Petkovšek, Gregor ; Šraj, Mojca ; Kogovšek, Janja ; Drobne, Damjana: Eksperimentalno povodje reke Reke.- In: VODOPIVEC, Florjan (ed.). Raziskave s področja geodezije in geofizike - 2000: zbornik predavanj. Ljubljana: Slovensko združenje za geodezijo in geofiziko, 67-76, Ljubljana, 2000.**
K.W.: karst hydrology, hydrochemistry, meteorology, hydrogeology.
- 9-35 Brodar, Mitja: [Kulturfunde aus dem Kontrollschnitt in der Höhle Potočka zijalka].- Arheološki vestnik, 51, 7-11, Ljubljana, 2000.**
K.W.: speleoaerchaeology, Paleolithic.
- 9-36 Brown, Mark ; Doveswell, Pete: Meghalaya - Meghalayan Mega Passage.- Caves & Caving, 87, 22-25, s.l., 2000.**
K.W.: cave expedition.
- 9-37 Bruthans, Jirí ; Šmíd, Jakub ; Filippi, Michal ; Zeman, Ondřej: Thickness of cap rock and other important factors affecting the morphogenesis of salt karst. Acta carsologica, 29/2, 51-64, Ljubljana, 2000.**
Four classes of different thickness of cap rock can be distinguished, each with its special superficial and underground karst forms: 1. salt outcrops, 2. thin cap rock (0,5-2 m), 3. cap rock of moderate thickness (5-30 m), 4. cap rock of great thickness (more than 30 m). The most important factors affected by cap rock thickness are as follows: the density of recharge points, the amounts of concentrated recharge which occur at each recharge point, the rate of lowering the ground surface of salt karst, the dissolution capacity of water and the size and amount of load transported by underground flood-streams into cave systems. The thickness of cap rock above the cave does not influence the cave itself; more important

seems to be the thickness of cap rock in the recharge area of the cave and the type of recharge into the salt environment. Another important factor is the thickness of overburden above the cave, which negatively correlates with intensity of breakdown. Wide passages in some caves are developed as result of intensive deposition of bedload, which expel the stream into the side of the passage and are due to enhanced corrosion in the few decimetres high zone above the bottom of passage.

- 9-38 Bunce, Colin: New discoveries in the Maze Area of Pollnagollum - Pollelva System.- Irish Speleology, 17, 23-28, s.l., 2000.**

K.W.: regional speleology.

- 9-39 Burek, Cynthia V. ; Conway, John S.: The relationship between Carboniferous Limestone insoluble residues and soils on limestone pavements in North Wales. Cave and Karst Science, 27 (2), 53-59, 2000.**

Seven limestone pavements across North Wales were selected for geochemical analysis. The pavements represented a wide variety of locations and cover. At each location a limestone clint and soil from an adjacent gryke were sampled for analysis. Limestone insoluble residue and gryke infilling were analysed for seven elements, Cu, Zn, Pb, Mn, Ni, Sr and Mg, using atomic absorption spectroscopy. The absence of certain elements in the immediate limestone bedrock seems to confirm the claim by some authors that the majority of the insoluble residue in grykes is introduced from outside the area. Glaciation or periglacial aeolian transport/deposition is often cited as the mechanism. Whereas that cannot be ruled out in these areas, an additional source is postulated. Heavy metal smelting began in earnest in North Wales during the late 16th century, and airborne contaminants were released from this process. The levels of heavy metals in the soil samples suggest that this may have been an additional source.

- 9-40 Burek, Cynthia V. ; Conway, John S.: Limestone pavements - managing a fragile heritage. Proc. 2nd UKRIGS conference, Worcester University College, Worcester, 1999, 37-56, 2000.**

The conservation, protection and management of a successful habitat requires that it be understood at all levels. This paper explores the unique habitat of limestone pavements particularly Welsh pavements. It looks at what the pavements are, why they form and the legislation which purports to protect them. RIGS in Wales has undertaken to notify the limestone pavement sites within the principality and looks at the problems which may arise subsequent to their notification. The management of several Welsh sites is examined and the effect of grazing regimes is examined. The problems of safeguarding a dynamic, evolving system is discussed and raising public awareness of these sites becomes a priority.

- 9-41 Buzjak, Nenad: Collapse structures as a connection between the Karst surface and underground (Examples from Croatia). Acta carsologica, 29/2, 65-81, Ljubljana, 2000.**

In the Croatian Karst area there are a lot of collapse dolines. Here we can also find structures that are the result of subsidence (subsidence dolines). In the cases of two selected

caves in different parts of the Croatian Karst area (Dolačina mama cave - Žumberak Mt. and Jama na Sredi cave - Cres island) some geomorphological elements and features of collapse and subsidence processes were analysed (the influence of geological conditions and the cave's stage of development towards collapse/subsidence the morphology of collapse and subsidence dolines and the cave passages beneath them). Observations confirm that collapse is a significant component of cave development and that formation of collapse and subsidence dolines is an important indicator of karst evolution.

- 9-42 Cancian, Graziano ; Princivalle, Francesco: Le "argille e sabbie gialle" della grotta Regina (Carso Goriziano).- Atti del Museo Civico di Storia Naturale, 48, 59-68, Trieste, 2000.**
K.W.: cave sediments, mineralogy, yellow loam.
- 9-43 Castiglioni, Benedetta ; Sauro, Ugo: Large collapse dolines in Puglia (southern Italy): the cases of "Dolina Pozzatina" in the Gargano plateau and of "puli" in the Murge. Acta carsologica, 29/2, 83-93, Ljubljana, 2000.**
The paper deals with the description of the largest doline of Gargano and of other large dolines (puli) of Puglia in southern Italy aiming to suggest an interpretation of their origin and development, in relationship with tectonic events, karst corrosion processes, and transgressive and regressive cycles.
- 9-44 Cevc, Emilijan: [The »human fish«, baron Žiga Zois and the painter Dorfmeister].- Proteus, 62, 359-361, Ljubljana, 2000.**
K.W.: Proteus anguinus, history of speleology.
- 9-45 Chabert, C. ; R. Mansfield ; P. Strinati: Bibliographie spéléologique de l'Irak 1928 - 1999.- U.I.S. documents no. 1, 34 pp., Union Internationale de spéléologie, 2000.**
K.W.: bibliography.
- 9-46 Chabert, Jacques: Les timbres et la spéléologie française. A l'occasion de la sortie du timbre Casteret.- Spelunca, 78, 50, Paris, 2000.**
K.W.: speleophilately.
- 9-47 Choppy, Jacques: Des mots qui font savant.- Spelunca, 78, 40-42, Paris, 2000.**
K.W.: terminology.
- 9-48 Cigna, Arrigo A. (Ed.): Proceedings III Congress of the International Show Caves Association (ISCA) "Show Caves: Where, How, Why", Santadi, 19-25 Oct. 1998, 2000.**
These proceedings include: the minutes of General Assembly of ISCA, the discussions and exchange of the experiences between all the show caves managers regarding marketing and management problems reported at the Round Table, and the papers and reports delivered in the various sessions concerning issues on scientific research, protection and safeguard of underground environments - technical and cultural matters: Badino G. (Italia): A connec-

tion between speleology and show caves. Bolner-Takács K. (Ungheria) : Cave operated for wild cave tourism in Hungary. Bella P. (Slovakia): Show caves in Slovakia - Natural and historical importance, management protection and utilization. Milka D. (Czech Republic): Report on problems of operation of show caves in the Czech Republic. De Waele J. ; Grafitti G. (Italia): Show Caves in Sardinia - Geologic and Biologic aspects. Cherchi F., Carta G.P., Manca F. ; Vargiu L. (Italia): Idrologia dei sistemi carsici del Sulcis-Iglesiente. Cigna A. A. ; Sulas A. (Italia): Air temperature measurements and trends in the "Grotta Is Zuddas". De Waele J., Di Gregorio F., Piras G. (Italia): A monitoring project for Sardinian show caves: the example of Is Zuddas (Santadi, Italy). Forresu R. (Italia): Santadi: archeologia nel territorio. Sanna U. ; Pusceddu C. (Italia): La Grotta di "Su Mannau" e la "Valle di Antas" tra storia, natura e leggenda. Song L. (China): Preliminary study on incoordinate phenomena of origination and weathering of speleothem - Beiyun cave, Hebei Province, China. Song L. (China): Experiment of recovering weathered speleothem - Yaolin cave, Tongly County, Zhejiang, China. Wang L, Wang J. ; Song L. (China): Characteristics of Tourism in Yaolin cave, Zhejiang Province, China. Travous K. (USA): Development of Kartchner Caverns into show caves. Floris A. (Italia): Grotte turistiche della Sardegna e loro potenzialità. Comitato Tecnico Scientifico, Consorzio Frasassi (Italia): Researches and monitoring activities in the "Grotta Grande del Vento - Show Cave in Frasassi (Central Italy). Lippolis P. ; Menichetti M., (Italia): Caratteristiche geologico-ambientali della grotta del Trullo a Putignano (Bari), nota preliminare. Caré A. ; Russo D. (Italia): Turismo escursionistico-speleologico e didattica ambientale presso le grotte di "Pastena-Falvaterra e Collepardo" (Lazio-Italia). Menichetti M. ; Salvatori F., (Italia): Caratterizzazione geologico-ambientale della grotta di Monte Cucco (PG) nell' Appennino Umbro-Marchigiano per la sua fruizione turistica. Oedl F. (Austria) : A consideration on the energy balance in dynamic ice caves.

9-49 Cigna, Arrigo A. ; Sulas A.: Air temperature measurements and trends in the Grotta di Is Zuddas. Proc. III Congr. ISCA "Where, How, Why", Santadi, 19-25 Oct. 1998, 115-119; 2000.

Air temperature has been measured occasionally in some stations in the Grotta di Is Zuddas since 1990 to present. From the whole set of measurements, the series extending over longer time intervals have been considered. A sinusoidal best fit was obtained for the following stations: 0 - Outside, 5 - Medusa Hall, 13 - The Organ (aragonite), 18 - Theater Hall, 19 - Eccentrics Hall. A delay time of the sinusoidal wave was calculated for each station inside the cave to identify the propagation of the outside temperature wave into the cave. A linear best fit of the air temperature data inside the cave confirmed that the temperature increase due to the tourists is negligible in a 6 years interval.

9-50 Cilek, Vaclav: [The lower Pleistocene scree fields of Slovak Karst and their significance for the karst relief formation]. - Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 36-41, Liptovský Mikuláš, 2000.

K.W.: Pleistocene, morphogenesis, sediments.

- 9-51 Clemens, Torsten: Der Einfluß des Klimas auf die Verkarstung.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 30-36, München, 2000.**
K.W.: aquifer, endokarst, climate, dissolution.
- 9-52 Coxon, C. ; Drew, David P.: Interdependence of groundwater and surface water in lowland karst areas of western Ireland: management issues arising from water and contaminant transfers. In: Groundwater in the Celtic Regions: Studies in Hard Rock and Quaternary Hydrogeology. N.S. Robins and B.D.R. Misstear (Editors), London, Geological Society Special Publications No 182, 81-88, 2000.**
K.W.: karst hydrology, pollution, water management.
- 9-53 Cucchi, Franco ; Casagrande, G. ; Manca, P.: Chimismo ed idrodinamica dei sistemi sorgivi del massiccio del M. Canin (Alpi Giulie Occidentali) (Chemical and hydrodynamic features of Canin mt. springs) Atti e Memorie Comm. Grotte "E. Boegan", Vol. XXXVII (1999), 93-123. Pubbl. n° 2164 del GNDCI, LR4, 2000.**
A complete study about the chemical, hydrodynamic and chemical features of the most important karst massif of Friuli-Venezia Giulia is presented. Chemical and hydrodynamic features of the Canin Mt. springs was monitoring and several samples of water was taken too. Different aspects of the system are recognised: the feeding spring areas, the presence of conduit flow systems or diffuse flow ones, the possible communication between different springs, the presence of a deep storage in dolostones and the contribution to the studied system of other different areas (Montasio Mt. in particular).
- 9-54 Cucchi, Franco: Il carsismo epigeo ed ipogeo - Escursione B2. In "Guida alle escursioni della 80ª Riunione Estiva della SGI", Ed. Università di Trieste, 207-234, 2000.**
The excursion occurs on the classical Karst, whether Italian or Slovenian, with particular attention to both the superficial and deep karst morphologies. The itinerary allows you to become familiar with some epigeal and hypogean morphologies, that are the most famous in the classical Karst, a world symbol of the karst phenomenon. The principal aim is to highlight the lithological and structural features, which influence the various forms.
- 9-55 Cucchi, Franco ; Casagrande, G. ; Gemiti, F. ; Manca, P. ; Predonzan, S. ; Vigna, B.: Nuove prove con traccianti sul massiccio carsico del M. Canin: metodologie e risultati (New tracer tests in the Mt. Canin karst plateau: methods and results). Gortania, Vol. 22 (2000), 39-58, pubbl. n° 2203 del GNDCI, LR4, 2000.**
The present work aims at illustrating the results of two new undergrounds water tracing tests in the north-west zone of Mt Canin massif and at explaining the survey and laboratory methods. In this way it is now possible setting the hydrogeology of this area, characterised by a double underground water circulation. The first circulation model evolves in the marginal zone of Mt Canin plateau, whose waters are drained through "Fontanon di Goriuda", a spring higher than the sature zone. The second model evolves in the inner zone of Mt. Canin plateau, characterised by an deep flowpath, partially dispersive, that develops even in below dolostones and appears in a buried spring system located at the bottom of the

Raccolana valley. Moreover this work aims a summary of underground water tracing tests, been carried out in the whole Mt Canin massif (both Italian and Slovenian side), and a re-elaboration of the results in a widest view so to explain the geometry of the whole hydrostructure. In short this study proposes a new model of underground water circulation and settles the hydrogeological properties of "Calcarei del Dachstein" and "Dolomia Principale" formation in this area.

- 9-56 Cucchi, Franco ; Casagrande, G. ; Manca, P.: Le forme glacio-carsiche - Escursione A, 3ª giornata. In "Guida alle escursioni della 80ª Riunione Estiva della SGI", Ed. Università di Trieste, 90-96, 2000.**

New geological information on the Canin Mountain, an important karst area in the Alpi Giulie, obtained in the course of a geomorphological and hydrogeological study. In particular, data retrieval concentrated on underground sites of considerable depth, where geological situations that could only be hypothesized on surface data were identified (they are summarized in 4 geological sections). A statistical analysis of the state of rock fissure (air photography, structural stations and directions of underground cave surveys) was performed in order to identify the limits of hydrostructure and the influence of the fissure system on the karst speleogenesis. The deep morphological surveys of the distribution of forms and their limitations, accompanied by the measurement of the age of cave deposits, have allowed to make some considerations on the geomorphological evolution of this area.

- 9-57 Cucchi, Franco ; Forti, Paolo ; Marinetti, Enrico ; Zini, Luca: Recent developments in knowledge of the hydrogeology of the Classical Karst. Acta carsologica, 29/1, 55-78, Ljubljana, 2000.**

The Classical Karst may well be the best area for polythematic researches. It would be useful to understand karst phenomena and create a hydrogeological model valid for all mature karst. The Karst area is quite well studied and known. The geology, hydrology and its history have been studied since the 16th century. Nowadays the continuous monitoring of hypogean waters, the elaboration of a Digital Elevation Model, the discovery of some new caves and their study has permitted the processing of the vulnerability map. On the basis of the results of all of these researches, we propose activating a co-operation between European researchers to develop hydrodynamic models of the most well known karst in the world: the Classical Karst.

- 9-58 Cucchi, Franco ; Furlani, S. ; Marinetti, E.: Monitoraggio in continuo del livello del lago di Doberdò (In continuum monitoring of the level of the lake of Doberdò). Le Grotte d'Italia, s.V, 1, 21-31. Atti e Memorie Comm. Grotte "E. Boegan", Vol. XXXVII (1999), 143-153. Pubbl. n° 2165 del GNDCI, LR4, 2000.**

In the period between June 1998 and October 1999 in the lake of Doberdò an instrument containing two data loggers was positioned in order to measure in continuum the level and temperature of its waters. The measurements obtained were compared with rainfalls and tidal rises. The results of the survey confirmed that the characteristics and modalities of filling and emptying of the lake are linked to rainfalls and to the regime of the groundwaters

flowing from hypogean galleries in pressure that are fed by the near hydrogeological system of the Timavo and, especially during low waters, by that of the Isonzo-Vipacco. From the comparisons it comes out that also during low waters the oscillations of the level of the lake area not conditioned by the sea regime. A topographic survey led to define exactly the absolute average height of the level of the lake, which is of 3.6 m above the sea level in the period considered. The oscillations of the level are higher than 6 m, the velocity of the rise does not depend upon the level reached, that of emptying is affected by the hydraulic charge; the temperatures of the lake are influenced by the outside temperature especially during low water.

- 9-59 Cucchi, Franco ; Marinetti, E. ; Massari, G. ; Zini, L.: Carta della vulnerabilità intrinseca dell'acquifero carsico triestino ed isontino. (Intrinsic Vulnerability map for Trieste - Isontine karst aquifer). Le Grotte d'Italia, s.V, 1, 21-31, 2000.**

The point count system model SINTACS (release 4) and IDRISI 2 was applied in order to evaluate the intrinsic vulnerability of Trieste and Isontino karst aquifers. The studied area (305 km²) is highly karstified and it is also extremely urbanized. The karst aquifer recharge consists of rainfalls over the catchment basin and by losses of three external tributaries: Reka River (Timavo Superiore), Isonzo River and Vipacco River. The water flow out from a complex springs area and several towns use the water from this karst aquifer for civil water supply. The high vulnerability areas have been individuated in correspondence of lithological units with a high level of karstification and in the spring's area. This study confirmed that lithology has a very important role in the karst aquifers vulnerability.

- 9-60 Čalić-Ljubojević, Jelena: Natural bridges on the Vratna River (Eastern Serbia) as the last remnants of a former cave. Acta carsologica, 29/2, 241-248, Ljubljana, 2000.**

The Vratna River is a right-side tributary of the Danube and its drainage area is situated at the western rim of the Dacian Basin. Along its 22 km long course, the Vratna flows through a 3,5 km long gorge cut in Tithonian limestones. Across the gorge there are three natural bridges, which shelter, in total 94 metres of the river course. There is a strong assumption that two of the natural bridges are the only remaining parts of roof of a former cave. Due to the process of surface denudation and to the disruption of stability, the cave roof almost completely collapsed, with the exception of these two sections. Several short caves and rock shelters exist in the gorge, and the longest cave (305 m) is situated next to the biggest of the three natural bridges.

- 9-61 Čalić-Ljubojević, Jelena ; Ljubojević, Vladimir: Caves below collapse dolines - case study of Tisova Jama (Eastern Serbia). Acta carsologica, 29/2, 95-101, Ljubljana, 2000.**

The cave Tisova Jama (-235 m) is located on Beljanica Mountain (Carpatho-Balkanides, Eastern Serbia). Its entrance pit is situated at the bottom of a great collapse doline (dimensions 180 × 160 m), below which there is a chamber with the greatest surface (11 374 m²) and volume (approx. 170 000 m³) so far known among Serbian caves. Such dimensions can be explained by the presence of a strong underground stream in the unreachable part of the cave. Removal of the material disrupts the stability of the rock below the doline, which leads to breakdown and deepening of the doline.

- 9-62 Dal Molin, Luca ; Lazzarotto, Marco: Segnalazione di moonmilk in alcune grotte degli altopiani ampezzani del Sennes e del Fosses (Prealpi Bellunesi).- Speleologia Veneta, 8, 49-54, s.l., 2000.**
K.W.: mineralogy, moonmilk.
- 9-63 Dalla Vecchia, Fabio ; Tarlao, Alceo ; Tentor, Maurizio ; Tunis, Giorgio ; Venturini, Sandro: First Record of Hauterivian Dinosaur Footprints in Southern Istria (Croatia).- 2. hrvatski geološki kongres, Zbornik radova, 143-149, Zagreb, 2000.**
K.W.: dinosaur traces
- 9-64 Daly, Donal ; Drew, David ; Deakin, Jenny ; Ball, David ; Parkes, Matthew ; Wright, Geoff: The Karst of Ireland. Limestone Landscapes, Caves and Groundwater Drainage Systems.- 35 pp., Dublin, 2000.**
K.W.: regional karstology, morphogenesis, karst distribution, karst hydrology, paleokarst, human impact, Ireland.
- 9-65 Day, M. J.: Tropical karst. In: The Oxford Companion to the Earth, ed. P.L. Hancock and B.J. Skinner, Oxford University Press: 1057-1058, 2000.**
- 9-66 Day, M. J. ; Kueny, J. A.: The history of John Gray, Pleasant Ridge and John Gray Cave, Richland County, Wisconsin. The Wisconsin Speleologist, 24 (1), 2-10, 2000.**
- 9-67 Day, M. J. ; Urich, P. B.: An assessment of protected karst landscapes in Southeast Asia. Cave and Karst Science 27 (2), 61-70, 2000.**
- 9-68 Doctor, Daniel H. ; Lojen, Sonja ; Horvat, Milena: A stable isotope investigation of the Classical Karst aquifer: evaluating karst groundwater components for water quality preservation. Acta carsologica, 29/1, 79-92, Ljubljana, 2000.**
The karst aquifer resurgence zone that is located along the western border of the Classical Karst region of southwestern Slovenia and to the north of Trieste, Italy is comprised of several distinct groundwater components. The purpose of this ongoing study is to examine the varying influence of these groundwater components on the karstic outflow under changing hydrologic conditions, using natural stable isotopes as tracers. In particular, the influence of the Soča river on the groundwater of this region was examined using mercury, a pollutant of elevated concentration in the Soča, as an additional tracer of Soča river water. The results of the isotopic measurements confirm the division of karstic groundwaters into three main categories: (1) springs and the estavelles of an ephemeral karstic lake (Sablici springs, Moschenizze North spring, Doberdò Lake), which are largely influenced by the Soča and Vipava rivers during periods of low flow, (2) the group of the Timavo springs that is subject to main influences of the Reka River and water derived from local precipitation, and (3) the grouping of Sardos spring and Moschenizze South spring, which form an intermediate category between the first two groups, exhibiting characteristics that indicate variable contributions from the other two end-members. Mercury levels in these karstic

groundwaters are generally quite low, however significant variability in mercury levels with varying hydrologic conditions have been observed, indicating also a varying influence of the Soča river.

- 9-69 Dolenc, Tadej ; Lojen, Sonja ; Dolenc, Matej: The Permian-Triassic boundary in the Idrijca Valley (Western Slovenia): isotopic fractionation between carbonate and organic carbon at the P/Tr transition.- Geologija, 42, 165-170, Ljubljana, 2000.**
K.W.: Permian, Triassic, stable isotope, isotopic fractionation.
- 9-70 Douchet, Marc: L'oeil de la Doue, Martel, Lot.- Spelunca, 78, 14-18, Paris, 2000.**
K.W.: cave diving.
- 9-71 Dozet, Stevo: Hočevje oolitic group, Central Slovenia. Acta carsologica, 29/1, 185-199, Ljubljana, 2000.**
A 450 to 500 metre thick and prevalently oolitic complex in the Suha Krajina area, lying conformably upon the Upper Liassic platy and thin-bedded limestones and discordantly under the Upper Malm Korinj breccias, has been denominated and described in this paper. A minor discordance separates the oolitic complex into two parts: the lower black oolitic part of Dogger age and the upper greyish oolitic part of Lower Malm age. The proposed name of the above-mentioned oolitic rocks is the "Hočevje group" consisting of the underlying Laze formation and overlying Šentrumar formation. The micropaleontological study showed that at least the topmost part of Dogger was not deposited.
- 9-72 Drew, David ; Hickey, Caoimhe: Pollawady Cave, Liscahul, Ballaghaderreen, Co. Roscommon.- Irish Speleology, 17, 37-38, s.l., 2000.**
K.W.: regional speleology.
- 9-73 Drew, David P.: Karst. In: Oxford Companion to the Earth. P.L. Hancock and B.J. Skinner (Editors), London, Oxford University Press, 576-579, 2000.**
- 9-74 Drew, David P. ; Jones, G. Ll.: Post-Carboniferous pre-Quaternary karstification in Ireland. Proceedings of the Geological Association, 111, 345-353, 2000.**
- 9-75 Drew, David ; Hickey, Caoimhe: Pollawaddy Cave, Liscahul, Ballaghaderreen, Co, Roscommon. Irish Speleology, 17, 37-38, 2000.**
- 9-76 Dreybrodt Wolfgang ; Gabrovšek, Franci: Dynamics of the Evolution of Single Karst Conduits. In: Speleogenesis, Evolution of Karst Aquifers/Eds.: Klimchouk A.B., Ford D.C., Palmer A.N., Dreybrodt W.- National Speleological Society Inc. Huntsville, 184-193, 2000.**
The evolution of karst conduits by calcite-aggressive water flowing in initially narrow fractures require a non-linear rate law $F_n(c) = K_n(l - c/c_{eq})^n$ for limestone dissolution close to equilibrium with respect to calcite. A mathematical analysis of the evolution of limestone

dissolution rates of water in such early, narrow fractures as a function of the distance from the input reveals an exponential decrease of the dissolution rates for linear dissolution rate laws ($n=1$), such that subsurface karstification is prevented. For non-linear kinetics ($n>2$), however, the decrease of rates proceeds by a hyperbolic relation, such that dissolution rates at the exit of the fracture are still sufficiently high to create a feedback mechanism by which after a long time of gestation a dramatic increase in the widths of the conduits is established. After this breakthrough event, uniform widening along the entire channel determines the further evolution. The time to achieve breakthrough is given by $T = a_0 / 2\mu F(L, 0)$, where $2\mu F(L, 0)$ is the initial widening in cm/year at the exit of the conduit. This however is only true when the inflow solution is at less than 99% of saturation. Otherwise the positive feedback loop is switched off and the conduit widens evenly along its entire length with rates of 10^{-9} cm/year to enlarge extremely narrow fractures with initial widths of several ten microns over distances of kilometers to sizes of about 0.1mm within several ten millions of years. This provides a general explanation for the concept of inception horizons, where usually other mechanisms have been assumed.

- 9-77 Dreybrodt Wolfgang ; Gabrovšek, Franci: Influence of Fracture Roughness on Karstification Times. In: Speleogenesis, Evolution of Karst Aquifers/Eds.: Klimchouk A.B., Ford D.C., Palmer A.N., Dreybrodt W.-National Speleological Society Inc. Huntsville, 220-223, 2000.**

Karst aquifers develop along water-transmitting fractures which are rough by nature. Most numerical models on the evolution of the widths of those fractures by limestone dissolution, however, approximate such rough fractures by two parallel smooth planes. Here we investigate the influence of fracture roughness on the breakthrough time of conduits. All results show that even when the flow through a fracture is reduced by its roughness by a factor of ten in comparison to a corresponding smooth fracture, breakthrough time is increased only by a factor of 4. This gives a first answer to the influence of natural fracture roughness on the evaluation of karst and shows that extreme roughness, unlikely in nature, is necessary to exert significant influence on karstification time.

- 9-78 Dreybrodt, Wolfgang ; Gabrovšek, Franci: Comments on: Mixed transport/reaction control of gypsum dissolution kinetics in aqueous solutions and initiation of gypsum karst by Michael A. Raines and Thomas A. Dewers in Chemical Geology 140, 29-48, 1997.- Chemical Geology, 168, 169-172, s.l., 2000.**

K.W.: discussion, dissolution, gypsum, kinetics, model.

- 9-79 Ellis, Martin: Some caves of the Notranjska karst, Slovenia.- The Journal of the Shepton Mallet Caving Club, Series 10, 179-181, s.l., 2000.**

K.W.: report, Slovenia.

- 9-80 Ende am, Barbara: Wakulla 2 -Building the first fully 3D cave map.- NSS News, 58, 244-260, Huntsville, 2000.**

K.W.: speleology, cave mapping, 3D, cave diving.

- 9-81 Čenčur Curk, Barbara ; Pintar, Marina ; Veselič, Miran: Macro scale experimental study of agricultural pollution in karst. In: Vlahović, Igor ; Biondić, Ranko (Eds.). 2. Hrvatski Geološki Kongres, Cavtat - Dubrovnik, 17-20.05.2000 = Second Croatian Geological Congress, Cavtat - Dubrovnik, 17-20.05.2000. Zbornik radova. Zagreb: Institut za geološka istraživanja: = Institute of Geology, 567-569, 2000.**

More than 40 % of carbonate area in Slovenia and development of human activities, which cause the pollution, lead to more frequent researches of solute transport in fractured and karstified rocks. The purpose of the research was to study nitrate transport in the unsaturated zone of fractured rock. In-situ experiments were done on the experimental field site at Sinji Vrh in Slovenia. An agrometeorological station and suction tubes were installed on the surface. A special construction for collecting water seeping from the ceiling of a research tunnel was developed. Manuring area was located on the basis of a precise cartography of discontinuities on the surface outcrops and within the research tunnel. Simulation of fertilization on meadow at this experimental field site was performed in order to determine agricultural influence with simulation of migration processes and to find out a possibility of agriculture intensifying on karst (production increasing by manuring).

- 9-82 Epstein, Jack B.: Gypsum-karst collapse in the Black Hills, South Dakota-Wyoming, USA. Acta carsologica, 29/2, 103-122, Ljubljana, 2000.**

Intrastratal dissolution of gypsum and anhydrite in four stratigraphic units of Pennsylvanian to Jurassic age in the Black Hills of South Dakota and Wyoming has resulted in many collapse features that have developed primarily in the non-soluble overlying rocks. Subsidence has affected several areas that are undergoing urban development. Subsurface intrastratal dissolution of anhydrite in the Minnelusa Formation has produced a regional collapse breccia, extensive disruption of bedding, many dolines, and breccia pipes and pinnacles, some of which extend upwards more than 300 m into overlying strata. Recent collapse is evidenced by steep-walled dolines more than 20 m deep, collapse in water wells and natural springs resulting in sediment disruption and contamination, and fresh circular scarps surrounding shallow depressions. Many beds of gypsum are contorted because of expansion due to its hydration from anhydrite, and many gypsum veinlets extend downward along random fractures from parent gypsum beds. Several dolines are sites of resurgent springs. As the anhydrite dissolution front in the subsurface Minnelusa moves downdip and radially away from the center of the Black Hills uplift, these resurgent springs will dry up and new ones will form as the geomorphology of the Black Hills evolves. Old dolines and breccia pipes, preserved in cross section on canyon walls, attest to the former position of the dissolution front. Mirror Lake, which is expanding northwestward in a downdip direction, is a local analog of a migrating dissolution front.

- 9-83 Evans, Jim: Imperial College Migovec 1999 (Slovenia).- The International Caver, 75-77, Swindon, 2000.**

K.W.: cave expedition, water tracing.

- 9-84 Faninger, Ernest: Freiherr Sigmund Zois, Zoisit und Karinthin (Zum 250. Jahrestag seiner Geburt).- Geologija, 42, 5-18, Ljubljana, 2000.**
K.W.: mineralogy.
- 9-85 Faucher, Michel: Le gouffre Nébélé.- Spelunca, 77, 23-38, Paris, 2000.**
K.W.: cave description.
- 9-86 Faulkner, Trevor: Caves in metamorphic limestones of the Irish Dalradian Supergroup. Irish Speleology (17), 43-49, Nov., 2000.**
Karst caves in rocks of the Irish Dalradian Supergroup are of interest because their geological setting is rather similar to that of central Norway, and caves have formed in similar marble outcrops in both countries. A comparison between the two settings and the characteristics of their karst caves may provide information that is useful in clarifying the development processes that are applicable to cave formation in metacarbonate rocks. The known cave density in the carbonates of the Irish Dalradian Supergroup seems low when compared with those in the Scottish Dalradian Supergroup and in central Norway. From the clues provided by the topographical maps, the author suspects that there are more, probably mainly short, caves to be found in the Irish Dalradian Supergroup. At present, the cave population is disproportionately biased towards the relatively small area of Connemara, and to the Blair Atholl Subgroup of the Appin Group. Hopefully, over time, cave explorers will plan walks to interesting outcrops in other areas, including north Mayo, Donegal and Antrim, so that better comparisons can be made within Ireland, and across to other Caledonide cave areas.
- 9-87 Faulkner, Trevor: Metamorphic limestones in Shetland. Grampian Speleological Group Bulletin Third Series 5 (3), 40-46, March, 2000.**
Caves and karsts in rocks of the Scottish Dalradian Supergroup are of interest because their geological setting is rather similar to that of central Norway, and caves have formed in similar marble outcrops in both countries. The Dalradian Supergroup rocks continue north into Shetland. Long outcrops of metalimestones have been recorded on the geological maps of the island, but karst caves are unknown. A comparison between the settings of Scotland / Norway on the one hand, and Shetland on the other, may provide information that is useful in clarifying the development processes that are applicable to cave formation in metacarbonate rocks. As the metalimestone outcrops were found by the author to be similar in character to those in central Norway and in the Scottish Mainland Dalradian Supergroup, and these environments are relatively speleogenetic, there seems to be no structural nor lithological reason to account for the lack of karst. Thus, it seems that the absence of caves must arise from a different geomorphological development history that has applied to Shetland when compared to other similar Caledonide terranes.
- 9-88 Faulkner, Trevor: Order and disorder in the karsts and caves of central Scandinavia. Abstracts of the BCRA Cave Science Symposium 2000 held at the University of Huddersfield, UK. Cave and Karst Science 26 (3), p. 131, Dec. 1999. [Published in 2000].**

The Caledonide nappes of central Scandinavia lie in a descending sequence from the Atlantic coast of Norway to the Caledonide thrust front, some 200 km to the east in Sweden. Metacarbonate outcrops occur in most nappes in the study area, but their number, mean length, mean area and angle of dip generally decline as the nappes are descended. Karst caves have formed in all carbonate-bearing nappes down to the lower Kølvi Nappes. A provisional classification of karst as *Vertical stripe karst*, *Angled stripe karst* or *Non-stripe karst* is proposed. Caves of all complexities occur in all karst types, but distinctive suites of internal morphological features can be recognised for each. The number of caves and the total cave dimensions in each zone appear to show no systematic trend when normalised against the total *length* of zonal carbonate outcrop. The vertical distributions of the carbonate outcrops and their cave entrances are essentially random within the constraints of the local topography, and it seems that cave dimensions are not related to contemporary catchment areas. The vertical ranges of cave systems are always much smaller than the vertical ranges of the containing carbonate outcrops. It is tentatively suggested that caves in *vertical stripe karst* have formed entirely within an upper zone of fractured rock that has a maximum thickness of 50 m. It is further suggested that as cave dimensions and their internal morphologies show few systematic trends across the zones, then similar cave inception, cave development and cave removal processes operate, and have operated, across the whole study area.

- 9-89 Faverjon, Marc ; Vielledent, Alain: La Sima A8 de Armena, Huesca, Espagne.- Spelunca, 78, 19-28, Paris, 200.**
K.W.: cave description.

- 9-90 Ferrari, Graziano ; Piccini, Leonardo: The Register of the Italian Caves. Atti II° Symposium ProGeo, Roma 20-22 Maggio 1996, Mem Descr. Carta Geol. Ital., vol. 54, 279-284, 1999 (2000).**

Since the beginning of modern speleology, cavers have collected a great number of documents about caves, concerning the location of the entrance and the geological, hydrological, morphological and biological features of caves. All the documents are currently conserved by caving associations and so they are not of easy consultation. To make them available for the community, official registers of caves have been established. Cave registers represent important, but often unknown, geographic inventories. The collected data can be useful for many environmental researches and in particular for geomorphologic and hydrogeologic researches in karst areas. Indeed many caves have a considerable naturalistic and environmental value and sometime they have the necessary qualities to be defined and protected as a geothope. In Italy, the first national register of caves was established in 1929 by the Italian Institute of Speleology, in the sixties it progressively failed because of the difficulties in keeping it up-to-date. The new project of the Italian Caves Register, carried out by the Italian Speleological Society (S.S.I.), concerns a computerised database where the main data of all the Italian caves are registered, while more detailed information can be obtained from regional inventories. The national register will be easily accessible; read-only software for Windows is now developed and it will soon be available through internet.

- 9-91 Ford, Trevor D.: Vein cavities: an early stage in the evolution of the Castleton Caves, Derbyshire, UK.- Cave and Karst Science, 27, 5-14, s.l., 2000.**
K.W.: speleogenesis, inception.
- 9-92 Forti, Paolo: Minerogenetic Mechanisms and Cave Minerals in the Volcanic Caves of Mt. Etna (Sicily, Italy).- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 37-41, München, 2000.**
K.W.: lava tube, mineralogy.
- 9-93 Forti, Paolo ; Cucchi, Franco ; Piccini, L. ; Picotti, V. ; Fustini, R. ; Marinetti, E. ; Marchesi, G. ; Massari G. ; Oberti, S. ; Pasinetti, V. ; Piano, C. ; Zini, L.: Carta della Vulnerabilità Integrata degli acquiferi carsici della porzione meridionale delle Prealpi Bresciane (Integrated Pollution Vulnerability map for the karst aquifers of the Southern part of the Brescian Pre-Alps). Map 1:10.000, DB Map Ed., Firenze, 2000.**
The Brescia Pre-Alps are characterized by large karst outcrops hosting important water resources, which have been until now neglected, because the civil water supply was derived mainly from the porous aquifer in the Po plain. In the present map the SINTACS method, to evaluate the aquifer vulnerability to pollution, is applied to the study territory, which has been subdivided into a grid of very little size square finite elements (10.000 m²), is shortly described and the achieved results presented. The fast pollution increase experienced by such aquifers obliged the local Authorities to search for new water resources for the drinking water supply of the Brescia Town and its surroundings and therefore a research started 10 years ago to define the potentiality and the protection problems of the karst aquifers feeding the main karst springs.
- 9-94 Francis, Tim: Tsingy de Bemaraha Caves expedition II (Madagascar).- The International Caver, 13, Swindon, 2000.**
K.W.: cave expedition, tsingy.
- 9-95 Funcken, Luc ; Moens, Muriel: Synthèse des explorations au Faustloch depuis 1987.- Stalactite, 50, 2-22, s.l., 2000.**
K.W.: cave description.
- 9-96 Gabrovec, Matej ; Kranjc, Andrej ; Urbanc, Mimi: 29. mednarodni geografski kongres, Seul, Južna Koreja, 14.-18.8.2000. Geografski vestnik, Ljubljana, 72 (2), 93-97, 2000.**
The description of the 29th International geographical Congress at Seoul (2000), including report on the work of commission "Sustainable Development and Management of Karst Terrains".
- 9-97 Gabrovšek, Franci ; Dreybrodt Wolfgang: Role of Mixing Corrosion in calcite-aggressive H₂O-CO₂-CaCO₃ solutions in the early evolution of karst aquifers in limestone.- Water Resources Research, 36, 5, 1179-1188, 2000.**
Two cave-forming mechanisms in limestone are discussed currently. First, when two H₂O-CO₂-CaCO₃ solutions, saturated with respect to calcite but with different chemical

compositions mix, renewed aggressiveness to limestone dissolution occurs. This process called mixing corrosion [Bogli, 1964, 1980], in combination with linear dissolution kinetics, has been suggested as cave forming. Second, it has been shown that solely the action of nonlinear dissolution kinetics can generate extended karst conduits. This paper combines both mechanisms. By digital modeling of the evolution of the aperture widths of a confluence of two fractures into a third one it is shown that the first mechanism does not create large cave conduits. The combination of mixing corrosion and nonlinear kinetics, however, considerably intensifies karstification, compared to that of nonlinear kinetics solely. The times to terminate early evolution of karst are significantly reduced when the CO₂ concentrations of the inflowing solutions differ by no more than 30%. We discuss the underlying mechanisms by inspection of the time dependence of the evolution of aperture widths, flow rates through them, and of the renewed undersaturation of the mixed solution at the confluence of two fractures. Finally, the evolution of a karst aquifer on a two-dimensional percolation network is modeled when mixing corrosion is present, and compared to that on an identical net with identical nonlinear dissolution kinetics, but mixing corrosion excluded. Large differences in the morphology of the net of cave conduits are found and also a reduction of the time of their evolution. From these findings we conclude that climatic changes, which influence the p(CO₂) in the soil, can divert the evolving cave patterns.

9-98 Gabrovšek, Franci ; Menne, Benjamin ; Dreybrodt, Wolfgang: A model of early evolution of karst conduits affected by subterranean CO₂ sources.- Environmental Geology, Springer Verlag, 39 (6), 531-542, s.l., 2000.

In investigating early karstification of one-dimensional conduits by computer models, so far one has assumed that the CO₂ content of the calcite aggressive water stems entirely from the surface. Subterranean sources of CO₂, however, can rejuvenate the solutional power of water already close to equilibrium with respect to calcite, and boast dissolution rates. In a first scenario we have investigated the influence of a punctual source of CO₂ as the most simple case of release of CO₂ into a karstifiable fracture at some position KL from its entrance of the widening joint with length L, ($K < 1$). The results show that only a small increase of the p(CO₂) in the solution to about 0.01 atm is sufficient to reduce the breakthrough times to about 0.3 with respect to the case, where no CO₂ is delivered. Other sources of CO₂ are due to the metabolic activity of microorganisms. The existence of such diverse subterranean microbial life in karst systems demonstrated. Whether situated on the fissure surfaces or free floating in the karst water, one basic product of their metabolism is CO₂. This contributes over the whole flow path to the p(CO₂) of the karst water. Therefore in a second scenario we assumed a constant rate of CO₂-input along parts of the fracture, as could be delivered by the activity of aerobic bacteria dwelling at its walls. Such a scenario also applies to an extended diffuse CO₂ migration from volcanic activity deep underground. In this case drastic reductions of the breakthrough time by about one order of magnitude are observed. These reductions are enhanced when the fracture aperture width of the initial fracture decreases. The physicochemical mechanisms of enhancement of karstification are discussed in detail by considering the evolution of the fracture aperture width and of the dissolution rates in space and time.

9-99 Gabrovšek, Franci: Evolution of early karst aquifers: from simple principles to complex models.- IZRK, Založba ZRC, 150 pp., Ljubljana, 2000.

Basic processes governing the early evolution of karst aquifers are discussed by use of numerical models based on field observations on properties of karst aquifers. Basically three different models are presented and discussed: a single fracture, a two-dimensional fracture network and a model of a vertical cross-section of a limestone plateau. The time-scale of early karst evolution is discussed by a model of a single fracture in limestone under constant head conditions. The flow and dissolution rates are coupled by a feed-back mechanism, which leads to breakthrough, an abrupt increase of widening in a short time span. The breakthrough time is taken as a measure of intensity of subsurface karstification. Assuming an even widening of the fracture by the dissolution rates at its exit, an analytical approximation for the breakthrough time is given which defines all basic parameters governing the karstification. The approximation and the numerical models give the same dependence of breakthrough time on these basic parameters. It is shown that the breakthrough time is inversely proportional to the dissolution rates at the bottleneck, the point, where the dissolution rates are minimal. Few scenarios where the geochemical conditions in the fracture vary are presented. Change of the kinetic order at the lithology boundary or change of the equilibrium concentration due to the CO₂ inputs affect the breakthrough time considerably. The magnitude of these changes and their position in the fracture determine the change of the breakthrough time. A junction of two fractures joining into a third one is presented to discuss the effect of mixing corrosion on early karstification. Different chemical compositions of the solutions at the confluence trigger mixing corrosion and accelerate karstification. Mixing corrosion is most active if the flow rates through both affluent fractures are comparable and solutions at the junction are close to equilibrium. This is particularly valid at the very early stage of conduit development. Mixing corrosion reduces the breakthrough time up to a few times. The models of two-dimensional fracture networks give additional information on the spatial development of karst conduits. Siemers and Dreybrodt showed that the breakthrough times in 2D percolation networks show essentially the same dependence on the basic parameters as in a single fracture. A system of competing conduits connecting inputs and outputs evolves. The evolution is most progressive along the pathways which exhibit the shortest breakthrough times. Similar geochemical scenarios as for the single fracture are discussed also for the 2D networks. The discussion is focused on the pattern development. Mixing corrosion arising from the different pCO₂ at the inputs, induces the growth of isolated conduits in the mixing zones. This conduits cause the redistribution of hydraulic heads and initiate the formation of new preferential pathways. Similar effects are observed in the models where the sources of CO₂ are introduced into the network. A model of a vertical cross-section of a limestone massif is presented to discuss karst evolution in the dimensions of length and depth. The initial aquifer consists of a network with evenly spaced fine fissures (50 mm aperture widths). A constant recharge (450 mm/y) is applied to the to the plateau on the top. The aquifer is unconfined, thus a water-table dividing the vadose and the phreatic zone is present. Most of the flow and highest dissolution rates are located close to the the water-table. Due to the increasing permeability in the water table drops leaving a region of highly permeable vadose zone behind. Once the water-table reaches

the base level, a conduit start propagate from the spring into the aquifer. Additionally a simple pathway or a percolation network of prominent fractures (several 100 mm) can be added. Feed-back mechanism is active along the conduits growing along these fractures, but becomes suppressed due to the dropping water-table. If constant head conditions are also present, the breakthrough occurs either along the highly permeable zone close to the water-table or along the prominent fractures. The results of the various models are discussed also from the view of speleogenetic theories derived from field observation.

9-100 Gams, Ivan: Doline morphogenetic processes from global and local viewpoints. Acta carsologica, 29/2, 123-138, Ljubljana, 2000.

Geomorphogenetical processes of solution dolines are evident from restraints in their global and local distribution: more precipitation than potential evapotranspiration, permeable soil cover, water level and solution front (transition from aggressive to flowstone depositing water) below shallow epikarst, slope inclination below 30°, solid soluble rock. Dolines are an effect of local accelerated solution. In initial phase they are connected with more fractured stone, as the grains have greater specific (surface/volume) surface exposed to soil moisture. Effect of stone fracturing on solution was tested in laboratory. Later growth of basin is based on automatism, as the size of soil/stone interface is increased with deepening of the basin. Funnel-like dolines with growth usually convert in a bowl-like form with greater exceeding. The form is controlled also by water permeability of soil and solifluction. In temperate climate the two million year long Pleistocene offered with more moisture from snow and with intensive fracturing of stone better conditions for doline development than the warmer Neogene and Holocene when man's impact in last centuries essentially reduced primary forest environment and thus processes in the basins. Collapse dolines are not taken into account.

9-101 Gebauer, H. Daniel: Madhya Pradesh ; Orissa. Caves on the Jaypur-Jagdapur Plateau.- The International Caver, 56-64, Swindon, 2000.

K.W.: regional speleology.

9-102 Ginés, Àngel: Patterns of collapse chambers in the endokarsts of Mallorca (Balearic Islands, Spain). Acta carsologica, 29/2, 139-148, Ljubljana, 2000.

A general overview on the patterns of collapse chambers in the karsts of Mallorca is presented. The great significance of single breakdown chambers and strings of large rooms as one of the major constituents of cave patterns is easy to recognize in the cave surveys of many Majorcan caves. Detailed mapping of several collapse features such as breakdown piles, sloped boulder floors, vault profiles, coalescence areas, boulder chokes and dome structures can yield useful information regarding description and better understanding of cave collapse patterns.

9-103 Goldscheider, Nico ; Klute, Markus ; Sturm, Sebastian ; Hötzl, Heinz: The PI method - a GIS-based approach to mapping groundwater vulnerability with special consideration of karst aquifers.- Zeitschrift f. angew. Geologie, 46, 157-166, s.l., 2000.

K.W.: vulnerability, mapping, aquifer, PI method.

- 9-104 Gunn, J. ; Lowe, D. J.: Speleogenesis on tectonically active carbonate islands. In: Klimchouk, A., Ford, D., Palmer, A. & Dreybrodt, W. (Eds.) Speleogenesis: evolution of karst aquifers. National Speleological Society, 238-243, 2000.**

Studies of the geologically young relatively porous limestones on Tongatapu Island in the Tongan Archipelago suggest that the effect of dissolution at the interface between fresh and saline groundwater has been, and continues to be, crucial to the inception and development of underground conduits within young carbonate rock sequences. So far as it is possible to reconstruct the earliest speleogenetic events in the older preserved sequences on nearby 'Eua Island, it seems that the processes that acted upon young reefal and back-reef carbonates during the Eocene were effectively the same as the processes that have acted on subsequent deposits and are still active today. It is commonly assumed that tectonism promotes the erosional removal of any early speleogenetic activity on carbonate islands and coasts. However, there is evidence on 'Eua to suggest that littoral cave systems, and higher level conduits that target upon them, may survive gentle uplift, or even more extreme tectonism. This raises the possibility that some of the caves that can be explored today in both tropical and extra tropical areas owe their origin to development of cavernous porosity in the littoral zone that was penecontemporaneous with rock formation.

- 9-105 Gunn, J.: Karst catchment protection : The Cuilcagh Mountain Park initiative, County Fermanagh, Northern Ireland. In: Barany-Kevei, I & Gunn, J. (Eds.) *Essays in the ecology and conservation of karst*, Special issue of *Acta Geographica Szegedensis*, XXXVI, 121-133, 2000.**

Cuilcagh Mountain, some 20 km south-west of Enniskillen, forms a distinctive ridge profile against the Fermanagh skyline, and is a prominent backdrop to much of the county's lakeland scenery. The summit (667 m) is the highest point in the uplands of south-west County Fermanagh and northwest County Cavan, and the summit ridge forms the border between Northern Ireland and the Irish Republic. The mountain is topped by gritstone, exposed in places as dramatic cliffs sweeping down to the lower sandstone and shale slopes which are covered with a thick layer of peat and form one of the best examples of a blanket bog ecosystem in Northern Ireland. Below the sandstones and shales are limestones and the Marlbank area supports a fine upland karst which includes the only show cave in Northern Ireland at Marble Arch Caves. In 1990, a general concern over damage to the area's environmental resources, coupled with specific concern over an apparent increase in the magnitude and frequency of flooding at Marble Arch Caves, prompted Fermanagh District Council, as show cave owners, to commission a hydrological and environmental investigation. At an early stage of the research it became apparent that the problems were a result of land use changes in the caves allogenic catchment and that the only way in which effective control of land use could be exercised was through land ownership. Following consultations, the Council identified a key portion of the caves catchment and proposed that it be purchased and established as a natural history park. This marked the start of a major initiative designed both to protect the caves catchment and to protect the blanket bog on Cuilcagh Mountain, a priority habitat under the European Union Habitats Directive. The

initiative culminated with the formal opening of the Cuilcagh Mountain Park in June 1999 although work to restore the bog, and to ensure the wider area is managed in a sustainable manner, is ongoing.

9-106 Gunn, John ; Hardwick, P. ; Wood, P. J.: The Invertebrate Community of the Peak-Speedwell Cave System, Derbyshire, England - Pressures and Considerations for Conservation Management. *Aquatic Conservation*, 10, 353-369, 2000.

The freshwater ecology of cave ecosystems has been poorly studied when compared to surface (epigeal) systems. Most subterranean communities are typified by low abundance and low diversity of fauna due to the absence of primary production and other readily available organic carbon sources. The macroinvertebrate community within the inter-connected Peak-Speedwell cave system in the English Peak District was examined over a two-year period. The communities found in the surface streams which supply recharge to the Speedwell Cavern stream, and the communities in the three springs that discharge water from the cave system, were also examined. Changes in the community were strongly associated with seasonal variations and natural hydrological variability. Spatial patterns within the caves reflect differences in water sources (sinking streams or percolation water) and in the ability of the organisms to survive and move through subterranean environments. The majority of taxa recorded within the caves were also found at the surface either in the sinking streams or in the springs. Threats to cave geo-ecosystems, including quarrying, agriculture, waste disposal, groundwater abstraction and tourism/recreation, are examined and discussed in relation to the management and conservation of subterranean environments.

9-107 Gužvica, Goran ; Radanović-Gužvica, Biserka ; Huber, Đuro: [Preliminary Results of Investigation of Vinica Cave].- 2. hrvatski geološki kongres, Zbornik radova, 193-197, Zagreb, 2000.

K.W.: Vinica cave, Holocene, Pleistocene, Palaeolithic, cave sediments.

9-108 Hamilton-Smith, Elery: A workshop (and other things) in Slovenia.- Australiasian Cave; Karst Management Association inc. *Journal*, 41, 37-38, s.l., 2000.

K.W.: report on visit, Slovenia.

9-109 Héduin, Michel ; Renouard, Louis: La zone karstique de Vang Vieng (Laos).- *Spelunca*, 77, 39-44, Paris, 2000.

K.W.: cave expedition.

9-110 Hercman, Helena ; Bella, Pavel ; Glazek, Jerzy ; Gradzinski, Michal ; Nowicki, Tomasz: [Uranium series dating of carbonate speleothems from the Demänovska Cave of Liberty].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 26-35, Liptovský Mikuláš, 2000.

K.W.: dating, speleothem, Uranium.

- 9-111 Hlavač, Jozef:** [Carefulness for the environment and infrastructure of the Dobšinska Ice Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 184-185, Liptovský Mikuláš, 2000.
K.W.: cave tourism, ice cave.
- 9-112 Hochmuth, Zdenko/Ed.:** [50 years of Slovenska speleologicka spoločnosť].- Zbornik referatov z historicko-odborneho seminara, 160 pp., Prešov, 2000.
K.W.: speleohistory, anniversary.
- 9-113 Hochmuth, Zdenko: RNDr. Anton Droppa, CSc. završil osemdesiatku.**- Spravodaj, 31, 58, Prešov, 2000.
K.W.: biography, Anton Droppa.
- 9-114 Hochmuth, Zdenko:** [The Moldavska cave in relationship to the geomorphological development of the Bodva valley].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 52-58, Liptovský Mikuláš, 2000.
K.W.: cave description, cave sediments.
- 9-115 Holubek, Peter:** [New knowledge of the underground hydrological system exploration in the Janska valley (The Nizke Tatry Mts.)].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 120-122, Liptovský Mikuláš, 2000.
K.W.: karst hydrology, Slovakia.
- 9-116 Holzmann, Heinz:** Höhlenkundliche Exkursion in das Bihar-Gebirge 1999.- Höhlenkundliche Mitteilungen, 56, 74-78, Wien, 2000.
K.W.: cave expedition.
- 9-117 Horvatinčić, N. ; Groening, M. ; Mikulić, N. ; Obhodaš, J. ; Valković, V.:** Investigation of groundwater infiltration to seawater in Punat Bay, Croatia, by measurements of conductivity and stable isotopes in water, Acta carsologica, 29/1, 93-105, Ljubljana, 2000.
Locations of freshwater infiltration from the coast to the seawater of the Punat Bay were determined based upon the distribution of conductivity and hydrogen ($^2\text{H}/^1\text{H}$) and oxygen ($^{18}\text{O}/^{16}\text{O}$) stable isotope signatures of the seawater. Seawater samples in Punat Bay were measured and collected in three seasons: summer (25 sites), autumn (12 sites) and winter (20 sites). Freshwater samples from 7 springs and 2 accumulations on Krk Island were also collected. The position of each sampling site was determined by GPS. Conductivity, salinity, temperature and pH were measured *in situ*. Higher freshwater input was defined on the east and north coast of Punat Bay in the summer and winter seasons, and on the north coast in autumn. Stable isotope composition of freshwater from springs on Krk Island indicated fast circulation of groundwater, particularly in the wet winter season.

- 9-118 Hoyk E. ; Keveiné Bárány, Ilona: Tájökológiai szempontú vegetációelemzés a Nyugat-Mecseki Karszton. (Analyse of vegetation in Western-Mecsek Karst with special regard on landscape ecology). Karsztfelődés V. Szombathely, 2000.**
The karst in Western Mecsek is worth protected do to its nearly conserved natural state. In this study the vegetation of this area was investigated. Significantly high ratio of association forming and accompanying species and the presence of protected species in relatively high numbers can be seen that proves the nature-conserving feature of the territory. On the basis on the investigations carried out the maintenance of the present state of territory can be desirable objective and in order to realise this protection of the area is absolutely justified.
- 9-119 Hoyk, Edit ; Keveiné Bárány, Ilona: Landscape ecological analysis of the vegetation on the karstic surfaces of Western Mecsek. (Tájökológiai szempontú vegetációelemzés a nyugat-mecseki karszton) Karsztfelődés V., Szombathely, 47-55, 2000. (in Hungarian)**
The karst in Western Mecsek is worth protected due to its nearly conserved natural state. In this study the vegetation of this area was investigated. Significantly high ratio of association forming and accompanying species and the presence of protected species in relatively high numbers can be seen that proves the nature-conserving feature of the territory. On the basis of the investigations carried out the maintenance of the present state of the territory can be a desirable objective and in order to relise this the protection of the area is absolutely justified.
- 9-120 Činčura, Juraj: [Morphological forms of the pre-Gosau karst in the present day relief of the Western Carpathians].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 99-102, Liptovský Mikuláš, 2000.**
K.W.: karst morphology.
- 9-121 Jakal, Jozef: Environmental Changes of Karst Landcape of Slovakia.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 42-46, München, 2000.**
K.W.: karstology, human impact, Slovakia.
- 9-122 Jakal, Jozef: [Human impact in karst landscape].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 140-145, Liptovský Mikuláš, 2000.**
K.W.: karstology, human impact, Slovakia.
- 9-123 Jantschke, Herbert: Der Tunel de la Atlantida auf Lanzarote (Kanarische Inseln, Spanien).- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 46-49, München, 2000.**
K.W.: lava tube.

- 9-124 Jarlan, Philippe: Expedition Peningat 99.- The International Caver, 48-49, Swindon, 2000.**
K.W.: cave expedition.
- 9-125 Jeutter, Peter W. ; Geyer, Ernest ; Price, Liz: A touch of Malaysia's caves.- The International Caver, 43-47, Swindon, 2000.**
K.W.: list of caves, regional speleology.
- 9-126 Jug, Tjaša ; Vudrag, Marko ; Franko, Mladen: Recent measurements of water quality in Mrzlek spring. Acta carsologica, 29/1, 107-116, Ljubljana, 2000.**
Recent investigations of drinking water quality related to the spring Mrzlek near Solkan, Slovenia are described. Multielemental analyses of 66 elements and anions such as nitrate, nitrite, sulphate, chloride, phosphate, bromide and fluoride in water from the spring Mrzlek and the river Soča, as well as determination of trihalomethanes in chlorinated water, were carried out to reveal eventual impacts of environmental pollution on the quality of drinking water from spring Mrzlek. It was observed that the pollution of the river Soča with heavy metals is recently decreasing, while the concentrations of trihalomethanes in drinking water are relatively low and have not increased during the last five years. At present the quality of drinking water from the spring Mrzlek meets all the standards. Higher concentrations of nitrate in the spring, however, indicate potential pollution from farming on the Banjšice plateau. In general, quite similar concentrations of most elements and anions were observed in the spring Mrzlek and the river Soča. Higher concentrations of Ca, Fe, Zn, nitrate and chloride were observed in the spring, while concentrations of Mn, Mg, Ba, As, and sulphate were significantly higher in the river.
- 9-127 Kaiser, Thomas M.: Die Travertine am Songwe-River - ein tropisches Karstgebiet in Zentraltansania.- Die Höhle, 51, 93-103, Wien, 2000.**
K.W.: hydrothermal tropical karst.
- 9-128 Kartalis, Nikos ; Mais, Karl: The cave of Alistrati - a new show cave in Greece, a new challenge for cave protection.- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 160-167, Liptovský Mikuláš, 2000.**
K.W.: cave tourism, new show cave.
- 9-129 Kashima, Naruhiko ; Urushibara-Yoshino, Kazuko: Solution Rate of Limestone Tablets in Onogahara and Ryuga-do Cave, Shikoku. In: Professor Naruhiko Kashima Commemorative Volume, Ehime no Chigakukenyu, 4(1), 17-26, 2000.**
It was shown that solution rate of limestone tablets in Shikoku Onogahara is maximum among 7 locations in Japan every year during the 5 years from 1993 to 1997. The reason, why solution rate in Onogahara shows the maximum, is the climatic condition that it is very wet in air and in soils even in hot season every year. Annual variation of solution rate in Shikoku Onogahara and Ryuga-do is very wide according to annual water balance. In

Shikoku Onogahara, solution rate of the tablets in air was half of the solution rate in soils. This suggests that solution speed in the bare karst is 1/2 slower than in the covered karst in Shikoku. Lithologically, the solution rate of Quilin limestone tablets was maximum in air and in soils in Shikoku Onogahara every year.

- 9-130 Kempe, Stephan ; Rosendahl, Wilfried: Die Rolle Franz von Rosthorns bei der Einführung des Begriffes "Doline". Ergänzung.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 122-123, München, 2000.**

K.W.: terminology, doline, history.

- 9-131 Kempe, Stephan ; Rosendahl, Wilfried: Von "Erdfall" zu "Doline": Die eher zufällige Einführung eines Fachbegriffes durch A. von Morlot und A. Schmidl in den Jahren 1848 bis 1854.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 49-55, München, 2000.**

K.W.: terminology, doline, history.

- 9-132 Keveiné Bárány, Ilona: Karsztos tájváltozások (Landscape transformation in karst regions). In.: Tájékutatói irányzatok Magyarországon (Directions of landscape researches in Hungary). (Ed.: Schweitzer F.-Tiner T.). MTA Földrajztudományi Kutató Intézet (Geographical Research Institute). HAS, Budapest, pp. 13-24, 2000.**

- 9-133 Keveiné Bárány, Ilona: Természetvédelem - a klíma-talaj-növényzet rendszerének változása és a karsztok. (Natur conservation - change of climate - soil - vegetation system on karst. ÖKO X. évf., 1-2. Szám. pp. 49-58, 2000.**

In this publication the author analysed the changes of climate-soil-vegetation system with special regard on Natur-conservation on Hungarian Karsts. The sustainable silviculture is the main use type on Bükk Karst. Before establishing of National Park was the forest clearing heavy and the reforestation processes are very slowly. Biodiversity of forest reduced, in the soils we can find the acidification tendency. The extreme microclimate on clearing areas delays the reforestation of karst vegetation.

- 9-134 Klappacher, Walter: Wanderungen um den Lamprechtsofen.- Atlantis, 22, 11-17, Salzburg, 2000.**

K.W.: Alpine karst, cave.

- 9-135 Klimchouk, Alexander B. ; Ford, Derek C. ; Palmer, Arthur N. ; Dreybrodt, Wolfgang/ Eds.: Speleogenesis. Evolution of Karst Aquifers.- 527 pp., Huntsville, Alabama, 2000.**

K.W.: speleohistory, speleogenesis, karst typology, modelling, a compendium for karstology.

- 9-136 Klimchouk, Alexander: A new world depth record in the Arabika massif, West Caucasus. Preliminary information.- The International Caver, Swindon, 2000.**

K.W.: depth record, report.

- 9-137 Knez, Martin ; Slabe, Tadej: Jame brez stropa so pomembna oblika na kraškem površju: s krasoslovnega nadzora gradnje avtocest na krasu [in Slovene].- 5. Slovenian Road and Transportation Congress, Proceedings, on CD, Ljubljana, 2000.**
K.W.: cave without roof, karst morphology, road construction.
- 9-138 Knez, Martin: Lithology, Stratigraphy and Selective Corrosion (Example from Shilin Stone Forest, Yunnan Province, China).- 2. hrvatski geološki kongres, Zbornik radova, 261-264, Zagreb, 2000.**
K.W.: karstology, geology, lithology, selective corrosion, stone forest, China, Yunnan.
- 9-139 Knez, Martin ; Slabe, Tadej: Južnokitajski kras: litološke značilnosti in skalni relief lunanskih kamnitih gozdov. Acta carsologica, 29/1, 229-236, Ljubljana, 2000.**
K.W.: lithology, karst morphology, Shilin, Yunnan, China.
- 9-140 Kogovšek, Janja: Underground water velocities in Slovene Karst (tracing experiments). Second Croatian Geological Congress, Cavtat - Dubrovnik, 5, 2000. Proceedings: Institute of Geology, Zagreb, 629-633, 2000.**
We present the velocities of underground water flow in the Slovene Karst as found in tracing experiments. Tracings dated after 1965 were relatively well conducted and the results obtained are comparable with the results of later and even more recent tracings. By injecting into the water flow during high water levels the highest velocities found were up to 5 cm/s. Velocities are generally lower in tracings where water must pass into the vadose zone before reaching karstic springs. Water flow velocities through the vadose zone itself can be even lower, between 0.1 to 0.00015 cm/s. In the event of spillage of larger amounts of fluid during accidents, a velocity exceeding even 2 cm/s may be expected.
- 9-141 Kogovšek, Janja: [Traffic and karst water].- 5th Slovenian Road and Transportation Congress, Bled, 10. 2000. on CD, Ljubljana, 2000.**
At least 43% of Slovenia is karst and half of its inhabitants is water supplied from karst springs. Now comes to the front the quality of drinking water as it was found out that numerous captured springs are already polluted by metals and organic compounds. The source of karst water pollution lies in rapidly-escalating traffic also. The measurements of atmospheric precipitation flowing off the roads indicated increased levels of lead, cadmium and sulphates, the organic pollution is high (COD up to 480 mgO₂/l, BOD₅ up to 84 mgO₂/l), and during the winter road salting chlorides reach even 14 g/l. How much the pollution from the surface influences on the quality of karst water mostly depends on how much the karst is permeable. The outflow of larger amounts of atmospheric waters from roads after intensive rainfall or due to larger substances spill at road accidents is through vadose zone fast through permeable conduits, up to 80 m/h. Through less permeable conduits drainage is very slow causing accumulation of substances and thus long lasting pollution underground. In karst a more permeable conduit is usually accompanied by a network of less permeable conduits. When the pollution due to traffic or accidental spills reaches the underground water flows it is transported with velocity from 20 to over 400 m/h de-

pending on geological and hydrological circumstances. By water tracing tests we found out that pollution from the karst surface may be transported in several directions even 30 km far and thus pollution may reach numerous karst springs even such that are captured for drinking water supply. This is why it is urgent in karst to plan a suitable purification of atmospheric waters flowing off the roads including the control of the treatment effect. This is very important when a direct pollution of less degradable substances occur as we know that self-purification in karst is bad. When a great amount of atmospheric waters flows off the road it is important to know which is the amount requiring higher degree of purification and which lesser. The answer to this question may be given only by a detailed researches of pollution dynamics of rainwater flowing off roads.

9-142 Kogovšek, Janja: Obisk kitajskega krasa v Guangxi provinci (Kitajska). Acta carsologica, 29/2, 315-318, Ljubljana, 2000.

9-143 Kogovšek, Janja: [How to determine the way of percolation and transport of substances by water tracing test in natural conditions]. Ann, Ser. hist. nat., Koper, 10 (1=19), [in Slovene], 2000.

K.W.: karstology, karst water, water tracing, Postojnska jama cave, Slovenia.

9-144 Kogovšek, Janja ; Liu, Hong: Water tracing test in the Tianshengan region, Yunnan - China at high water level. Acta carsologica, 29/2, 249-260, Ljubljana, 2000.

The results of water tracing in the Tianshengan region, Lunan, Yunnan province, China are given. This water tracing presents a continuation of water flow studies in this part of the karst based on Slovene-Chinese scientific co-operation. In September 1997 a water tracing test at high water level was carried out and showed greater velocities double compared to water flow in this area at medium water level in July 1996.

9-145 Kortnik, Jože ; Šušteršič, France: Modelling the stability of a very large cave chamber; case study: Brezno pri Medvedovi konti. Acta carsologica, 29/2, 149-160, Ljubljana, 2000.

The big chamber in Brezno pri Medvedovi konti (Julian Alps, Slovenia), about 150 m wide, over 50 m high and with a volume of about $62 \times 10^4 \text{ m}^3$, is the second largest cave chamber yet discovered in Slovenia. Application of FLAC computer software enabled modelling of the stability of the chamber's arched roof during hypothetical denudational lowering of the overlying surface. Modelling was based on two sets of rock property parameters generally attributed to the local parent rock. In both cases the modelled deformation within the arch was at a minimum at a residual ceiling thickness of 20 to 30 m, whereas collapse occurred when the residual ceiling thickness reduced to about 4 m. These modelling results fit well with field observations of partly collapsed cave chambers.

9-146 Košel, Vladimir: [Speleozoological bibliography of Slovakia in 1971-1999].- Vyskum, využívanie a ochrana jaskyn, 2.vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 123-129, Liptovský Mikuláš, 2000.

K.W. bibliography.

- 9-147 Košir, Adrijan ; Otoničar, Bojan ; Debeljak, Irena ; Buffetaut, Eric: The Late Cretaceous Vertebrate Fauna of Kozina, SW Slovenia.- 2. hrvatski geološki kongres, Zbornik radova, 273-274, Zagreb, 2000.**
K.W.: dinosaurs, crocodiles, Late Cretaceous, Adriatic-Dinaric Carbonate Platform, Slovenia, paleobiogeography.
- 9-148 Kranjc, A.: Gora, ki se dotika Rimske ceste.- Planinski vestnik, 100, 11, 491-493, Ljubljana, 2000.**
Description of the ascent of the Halasan Mt. on Cheju Island (South Korea) during the post-congress excursion of the 29th International geographical Congress.
- 9-149 Kranjc, A.: Karst Research in the Last Decade (1990-1999) in Slovenia.- 2. hrvatski geološki kongres, Cavtat-Dubrovnik 17-20.5.2000, 645-648, Zagreb, 2000.**
The paper is based on 104 works of karst geology and geomorphology published between 1991 - 1999. In these years many general works (encyclopaedia, geography atlas) including mentioned topics were published. There are special monographs also. The contents of the research can be grouped into geological and geomorphological research, study of karst underground and sediments in karst. The most of these studies are focused on Dinaric karst, less on the Alpine and the least on isolated karst. Majority of results were published in form of papers in Slovene journals (77, out of them 48 in *Acta carsologica*), others in monographs, proceedings of scientific meetings and in foreign magazines. About 40% of them are in the Slovene language, others are English with one French exception.
- 9-150 Kranjc, A.: La spéléologie dans les espaces protégés - le cas de Slovénie.- Spelunca Mémoires, Actes des 2èmes Assises Nationales de l'Environnement karstique, Valence, No. 25, 93-94, 2000.**
Brief account of the regulations and restrictions regarding speleological activity in protected areas in Slovenia. Emphasize on special activity of Slovene cavers: "cleaning" of the polluted caves.
- 9-151 Kranjc, Andrej: Karst Water Research in Slovenia. Acta carsologica, 29/1, 117-125, Ljubljana, 2000.**
About 43% of the territory of Slovenia is karst and more than 50% of its inhabitants are supplied with water from karst. Karst in Slovenia is divided into Dinaric, Alpine and transitional karst. Each of these types bears its own hydrological properties. Already in the antique literature underground water connections are mentioned. Water tracing in the Slovene Karst is among the first modern tracing research. Karst water research may be divided into several periods: (1) aimed at determining underground water connections between swallow-holes and springs (the first half of the 20th century), (2) to achieve combined water tracing tests (since 1970), (3) to define karst watersheds, (4) to study water percolation through the epikarst and the vadose zone (since 1980). In particular, the researches of karst water quality must be emphasised, as well as the study of karst hydrology as a phenomenon

- in itself. At the end a logical question appears: what are the future perspectives of karst water studies in Slovenia? Water tracing of not yet fully ascertained connections or repeating the water tracing tests under different hydrological conditions; a detailed determination of watersheds and water flow with the help of tracers directly injected underground; to develop water tracing techniques and methods; to study in the field percolation water behaviour; modelling; to theoretically determine physical laws. Special attention must also be paid to education.
- 9-152 Kranjc, Andrej: Karstologia 35, 1^{er} semestre 2000, Fédération Française de Spéléologie et Association Française de Karstologie. Acta carsologica, 29/2, 326-328, Ljubljana, 2000.**
- 9-153 Kranjc, Andrej; Pulina, M. in W. Andrejczuk: Kras i jaskinie. Wielka encyklopedia geografii świata, t. XVII, 355 str., Kurpisz, Poznań 2000. Acta carsologica, 29/2, 324-325, Ljubljana, 2000.**
- 9-154 Kranjc, Andrej; Trevor R. Shaw, Foreign Travellers in the Slovene Karst 1537-1900. Založba ZRC, 244 str., Ljubljana 2000. Acta carsologica, 29/2, 329-330, Ljubljana, 2000.**
- 9-155 Kraus, Dieter: Höhlenforschung im Steinernen Meer (Berchtesgadener Alpen) - Versuch einer umfassenden Darstellung.- Atlantis, 22, 3-39, Salzburg, 2000.**
K.W.: speleohistory, regional speleology, Austria.
- 9-156 Kryza, J. ; Staško, S.: Groundwater flow rate and contaminant migration in fissure-karst aquifer of Opole Triassic system southwest Poland.- Environmental Geology, 39, 384-389, s.l., 2000.**
K.W.: water pollution, aquifer.
- 9-157 Kusch, Heinrich: Die "Hermes-Höhle" auf dem Zirja-Massiv, ein korinthisch-hellenistischer Kultplatz (Peloponnes, Griechenland).- Die Höhle, 51, 52-63, Wien, 2000.**
K.W.: cave description.
- 9-158 Lalkovič, Marcel: Z historie Dobšinskej ľadovej jaskyne (na okraj 130. vyročia jej objavu) [in Slovak].- Aragonit, 5, 30-32, Žilina, 2000.**
K.W.: speleohistory.
- 9-159 Lalkovič, Marcel: [Administration of the Slovak Caves in 1950-1951].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 200-206, Liptovský Mikuláš, 2000.**
K.W.: Slovakia, cave commission, speleohistory.

- 9-160 Lalkovič, Marcel:** [Contribution to the history of Driny Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecká konferencia 16-19 novembra 1999, Demänovska dolina. Zborník referatov, 189-199, Liptovský Mikuláš, 2000.
K.W.: speleohistory, Slovakia.
- 9-161 Laumanns, Michael:** Mosambik 1999. Europäisches speläologisches Projekt am Rio Buzi.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 150-152, München, 2000.
K.W.: cave expedition.
- 9-162 Laumanns, Michael:** The spirits are always right. European speleological project "Buzi 99".- The International Caver, 10-12, Swindon, 2000.
K.W.: cave expedition.
- 9-163 Lehotska, Blanka ; Lehotsky, Roman:** [Summary of chiropterological data from Driny Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecká konferencia 16-19 novembra 1999, Demänovska dolina. Zborník referatov, 130-134, Liptovský Mikuláš, 2000.
K.W.: biospeleology, bats, Slovakia.
- 9-164 Lehotsky, Roman:** [Neogene abrasion caves of Devinske Karpaty Mts.].- Vyskum, využívanie a ochrana jaskyn, 2. vedecká konferencia 16-19 novembra 1999, Demänovska dolina. Zborník referatov, 103-106, Liptovský Mikuláš, 2000.
K.W.: speleogenesis, Neogene.
- 9-165 Liu, Z. ; Zhao, J.:** Contribution of carbonate rock weathering to the atmospheric CO₂ sink.- Environmental Geology, 39, 1053-1058, s.l., 2000.
K.W.: carbonate rock weathering, soil CO₂, atmospheric CO₂, sink.
- 9-166 Lloyd, Chris:** Lava Tubes of Cuernavaca.- The International Caver, 19-22, Swindon, 2000.
K.W.: lava tube.
- 9-167 Lobo-Ferreira, J.P. ; Leitão, Teresa ; Quigley, Seán P. ; Theves, Thomas:** On flow and transport of miscible tracers in the vadose zone. Acta carsologica, 29/1, 127-139, Ljubljana, 2000.
The paper presents a synthesis of LNEC's contribution to the European Commission (DGXII) Contract n° CI1*-CT94-0014 (DG 12 HSMU), based on the results reported by Lobo-Ferreira et al. (1998). The main contribution of LNEC to the project was the development of flow and transport experiments, for different flow type conditions (i.e. saturated and unsaturated). These included experiments at: (1) different scales (two scales in the laboratory and one in a medium scale - artificial aquifer), (2) different saturation conditions, and (3) different tracers (MgCl₂, CaCl₂, NO₃⁻, Ni, Cd). The goals of the experiments were threefold: (1) analysis and quantification of the physical parameters that con-

trol circulation in this zone (hydraulic conductivity correspondent to the degree of saturation etc.); (2) determination and quantification of the more important processes that control the chemical behaviour of heavy metals and nitrate, and (3) to obtain data for calibrating the numerical models.

- 9-168 Lowe, D.J. ; Bottrell, S.J. ; Gunn, J.: Some case studies of speleogenesis by sulfuric acid In: Klimchouk, A., Ford, D., Palmer, A. & Dreybrodt, W. (Eds.) *Speleogenesis: evolution of karst aquifers*. National Speleological Society, 304-8, 2000.**

Minerals that can weather to produce sulfuric acid directly or indirectly, with or without microbial mediation, occur as trace components in most carbonate sequences, but they are more concentrated at specific horizons. These horizons comprise beds of nontypical lithology, together termed inception horizons, and are commonly associated with breaks between major depositional cycles. Some cycle boundaries are marked by concentrations of sulfide minerals, particularly pyrite, that are readily oxidized to generate sulfuric acid. Cycle boundaries may also be marked by the presence of primary evaporite minerals such as gypsum, and their removal by direct dissolution or by their reduction to hydrogen sulfide may be implicated in early porosity development. Although few caves in carbonate sequences are largely, or entirely, the product of calcite dissolution by sulfuric acid or of evaporite removal, such processes may play an important role in cave inception. This chapter examines several situations where processes other than carbonic acid dissolution have played an important role in secondary porosity generation and have influenced subsequent speleogenesis.

- 9-169 Lowe, J. David: 8th International Karstological School.- Cave and Karst Science, 27, 37-42, s.l., 2000.**

K.W.: report, Slovenia.

- 9-170 Lozej, Borut: [Floods in Škocjanske jame] [in Slovene].- Kras, 40, 18-23, Ljubljana, 2000.**

K.W.: karst hydrology, flood, Slovenia.

- 9-171 Mais, Karel: France Habe.- Atlantis, 22, 28-30, Salzburg, 2000.**

K.W.: In memoriam.

- 9-172 Marušin, Milan: [Geological conditions and the most important caves on the western slope of the Slemä Hill in the Janska Valley (The Nizke Tatry Mts.)]- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 82-83, Liptovský Mikuláš, 2000.**

K.W.: regional karstology.

- 9-173 Marwan, Norbert: Cave blisters in der Oberländerhöhle (M3).- Stalactite, 50, 103-105, s.l., 2000.**

K.W.: gypsum, mineralogy.

- 9-174 McFarlane, Donald A. ; Lundberg, Joyce ; Ford, Derek C.: The Age of the Woolly Rhino from Dream Cave, Derbyshire, UK.- Cave and Karst Science, 27, 25-28, s.l., 2000.**
K.W.: dating, rhino, fossil fauna, Great Britain.
- 9-175 Medzihradsky, Peter: Vrtiglavica - expedicia Klapozub.- Spravodaj, 31, 73-76, Liptovský Mikuláš, 2000.**
K.W.: cave expedition, Slovenia.
- 9-176 Mégnién, Claude: Karst et paléokarst.- Géochronique, 76, 48 pp., s.l., 2000.**
K.W.: a book of abstracts related to paleokarst.
- 9-177 Meneghini, Marco: Le gallerie cannoniere di Monte Fortin.- 20 pp., Trieste, 2000.**
K.W.: artificial cave, military use.
- 9-178 Mietto, Paolo ; Sauro, Ugo: Le Grotte del Veneto: paesaggi carsici e grotte del Veneto. Regione del Veneto - La Grafica Editrice (Vago di Lavagno, Verona), second edition, 480 pp., 2000.**
The volume is a general overview of the karst morphounits, environments and landscapes of the Veneto region. The main karst landscapes and caves are described. The history of exploration and the research progress are outlined.
- 9-179 Mihevc, Andrej: Kras and Škocjanske jame caves.- In : Carulli, Giovanni Battista (ed.). Guida alle escursioni. Trieste: Edizioni Università di Trieste, 229-230, Trieste, 2000.**
K.W.: Classical Karst, speleology.
- 9-180 Mihevc, Andrej: Ljubljana karst river basin. Pivka basin and Postojna cave.- In : Carulli, Giovanni Battista (ed.). Guida alle escursioni. Trieste: Edizioni Università di Trieste, 226-227, Trieste, 2000.**
- 9-181 Mihevc, Andrej: The fossilized tubes from the roofless cave - probably the oldest known remains of the cave worm *Marifugia* (Annelida: Polychaeta). Acta carsologica, 29/2, 261-270, Ljubljana, 2000.**
The paper is a report on the discovery of tubes of a fossilized cave serpulid in a roofless cave in the quarry above Črni Kal village. The site and shape of the fossilized tubes are described. The animals lived attached to the scallops in the wall of the passage. The passage was later filled with clay deposits, followed by a layer of flowstone several metres thick. The roof of the passage has been removed by karst denudation and flowstone now reaches to the surface. Fragments of tubes of animals of various sizes have been preserved, attached to the rock wall; those tubes which grew at a right angle to the wall have broken off but have been preserved in the sediment. In terms of their dimension and shape the tubes remind one of the tubes of the more recent cave serpulid *Marifugia cavatica* Absolon

- and Hrabe. The positions of the preserved tubes and the dating of the nearby sediments by palaeomagnetic method indicate that the remains of the serpulids are from the Pliocene epoch or older.
- 9-182 Mihevc, Andrej: Unroofed cave of Lipove doline.- In : Carulli, Giovanni Battista (ed.). Guida alle escursioni. Trieste: Edizioni Università di Trieste, 233, Trieste, 2000.**
K.W.: caves without roof.
- 9-183 Mikuž, Vasja ; Pavšič, Jernej: Asteracanthus sp. (Chondrichthyes, Hybodontoida) from Upper Triassic beds at Lake Krn in Julian Alps (Slovenia).- Razprave IV. razreda SAZU, 41, 12-23, Ljubljana, 2000.**
K.W.: Oligocene, sea urchin, paleontology.
- 9-184 Milner, Steve ; Kladiiva, Eduard: Vietnam 99 v australskom ponati [in Slovak].- Spravodaj, 31, 79-81, Liptovský Mikuláš, 2000.**
K.W.: cave expedition.
- 9-185 Miotke, Franz-Dieter: Die Verkarstung von Jasmund/Rügen und ihre Bedeutung für die Quartärstratigraphie und die Genese der vermoorten Hohlformen.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 56-84, München, 2000.**
K.W.: Quaternary, karstification, moor, morphogenesis.
- 9-186 Mullan, Graham J.: Geomorphology and exploration of Poulmagree, Co.Clare, Ireland.- Proceedings, 22, 99-110, Bristol, 2000.**
K.W.: speleogenesis, regional speleology, Ireland.
- 9-187 Mullan, Graham,: The History of Exploration in Poulmagree.- Irish Speleology, 17, 29-32, s.l., 2000.**
K.W.: speleogenesis, regional speleology, Ireland.
- 9-188 Mullan, Graham: A comment on “why and how are caves ’organised’: does the past offer a key to the present?” by David J. Lowe (Acta carsologica 28/2). Acta carsologica, 29/1, 225-226, Ljubljana, 2000.**
- 9-189 Murphy, Phillip J. ; Hall, Adrian A. ; Cordingley, John N.: Anomalous scallop distribution in Joint Hole, Chapel-le-Dale, North Yorkshire, UK.- Cave and Karst Science, 27, 29-32, s.l., 2000.**
K.W.: cave diving, scallop, cave morphology.
- 9-190 Nader, Fadi: The story of Houet ed-Dakhoun.- The International Caver, 50-55, Swindon, 2000.**
K.W.: history of cave exploration.

- 9-191 Nicod, Jean: Ras-el-Aïn (Syrie N) et le problème des sources karstiques artésiennes aux marges ou à l'intérieur des domaines arides.- In: L'eau dans le milieu arides et semi-arides; Bull. Association de Géographie Franç., 2, 189-199, s.l. , 2000.**
K.W.: hydrogeology, karst spring, arid zone.
- 9-192 Nigemann, Stefan ; Frank, Norbert ; Mangini, Augusto ; Richter, Detlev K. ; Wurth, Georg: Holozäne Stalagmiten des Sauerlandes (Deutschland) als Klimaarchive.- Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 84-90, München, 2000.**
K.W.: climate, speleothem growth.
- 9-193 Novotny, Ladislav ; Tulis, Jan: [Georadar exploration among the Stratenska Cave, Vojenska Cave and Sintrova Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 95-98, Liptovský Mikuláš, 2000.**
K.W.: regional karstology, georadar.
- 9-194 Novotny, Ladislav ; Tulis, Jan: [Lithological and structural-tectonic conditions in the accessible part of the Dobšinska Ice Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 59-65, Liptovský Mikuláš, 2000.**
K.W.: geology and tectonics, ice cave.
- 9-195 Ogorelec, Bojan ; Dolenc, Tadej ; Pezdič, Jože: [Isotope Composition of O and C in Mesozoic carbonate rocks of Slovenia - effect of facies and diagenesis].- Geologija, 42, 171-205, Ljubljana, 2000.**
K.W.: carbonate rocks, isotope composition, oxygen, carbon, microfacies, diagenesis, Mesozoic, Slovenia.
- 9-196 Okamoto, Toru; Ikeda, Shigeto; Aizawa, Shuhei: Past Human Activities around the Akka Karst, Northeastern Japan. Acta Geographica Szegediensis XXXVI, 84-96, 2000.**
Past human activities around the Akka Karst, northeastern Japan, were investigated (archeologically and pedologically). The first appreciable human occupation in the study area was during the Middle Paleolithic. Some tools such as scrapers were excavated from the entrance of the Hyotan-ana Cave. The vegetation change from forest to grassland induced by human activities, such as forest burning, occurred around the Akka Karst during the early-middle Holocene. There are many archeological sites of the Jomon Period (12-2.4 ka BP) on the fluvial terraces and in caves around the Akka Karst. Thick melanic Andisols (black volcanic ash soils), which was associated with grassland vegetation, mainly occurred along the rivers in the study area. Moreover, a buried humus horizon was found on the karstic plateau, which contained To-Nb tephra (8.6 ka BP) and was covered with To-Cu tephra (5.5 ka BP). This horizon was very dark (10YR2/1) in color and had humus dominated by A type humic acid. Therefore, grassland vegetation occurred not only on the

fluvial terraces but also on part of the karstic plateau in the early-middle Holocene. Intensive deforestation on the karst commenced around the 17th century. An iron smelting industry thrived around the Akka Karst between the 17th to 19th centuries, which required a lot of charcoal. Therefore, the forests on the karst were used as charcoal-fuel woods and repeatedly cleared. The land transformation of iron sand mining and the destruction of forests caused soil erosion on the steep slopes, water pollution, and floods during heavy rains.

9-197 Orndorff, Randall C.; Weary, David J.; Lagueux, Kerry M.: Geographic information systems analysis of geologic controls on the distribution on dolines in the Ozarks of south-central Missouri, USA. Acta carsologica, 29/2, 161-175, Ljubljana, 2000.

The geologic controls on the distribution and development of dolines in the Salem Plateau of the Ozark Plateaus Province, south-central Missouri, USA, was statistically analyzed by using a geographic information system. The controls include lithostratigraphy, geologic structure, slope, and depth to water table. Area and point data for 2,613 dolines in two 30' × 60' quadrangles were compiled on a 30-meter grid. The percent area of dolines was calculated for five lithostratigraphic units, and it was determined that the Jefferson City Dolomite and Roubidoux Formation have the highest density of dolines. A focal sum neighborhood analysis was performed to determine if the distribution of dolines had any clustering or linearity that may suggest structural control. A northwest alignment of doline clusters occurs along a projection of the Bolivar-Mansfield fault zone in south-central Missouri. Most dolines in the study area occur on the plateau areas and on gentle slopes rather than in the highly dissected areas. Intense fracturing near regional fault zones may enhance doline development on the plateau areas. An understanding of the karst system is important for better land-use management practices in the Ozarks, including conservation of natural resources, ground-water management, and environmental protection, especially because the study area includes potential economic lead and zinc mineralization.

9-198 Pahernik, Mladen: Prostorni raspored i gustoća ponikava SZ dijela Velike Kapele - rezultati računalne analize susjedstva [in Croate].- Geoadria, 5, 105-120, Zadar, 2000.

K.W.: distribution of dolines, Croatia.

9-199 Parkes, Matthew A. ; Simms, Michael J. ; Kelly, John G.: Pollnapaste, Lettermacaward, Co.Donegal.- Irish Speleology, 17, 33-36, s.l., 2000.

K.W.: cave in marble, Ireland.

9-200 Pavlovec, Rajko: [Ferdinand Seidl about the Slatna Plate 70 Years Ago].- Geologija, 42, 19-26, Ljubljana, 2000.

K.W.: tectonics, Julian Alps, Slovenia.

9-201 Pavuza, Rudolf: Karl Mais zum 60. Geburtstag.- Die Höhle, 51, 3-11, Wien, 2000.

K.W.: anniversary, Karl Mais.

- 9-202 Petrič, Metka: Characteristics of the recharge-discharge relation of the karst aquifer in the background of the Vipava springs (Slovenia). Acta carsologica, 29/2, 271-292, Ljubljana, 2000.**

In the presented research I tried to find answers to the following questions: what the characteristics of the relation between recharge and discharge of the karst aquifer in the background of the Vipava springs are and which conclusions about the functioning of the karst system can be made based on stated relations between its input and output signal. Several different models of the system recharge-discharge were set. For each the conversion of the input signal to the system response was defined by transfer functions, which express conditions and processes in the karst system in mathematical form. Based on the comparison of the suitability of these different models an important influence of vegetation and processes in atmosphere and soil on the quantity of water that actually enters the karst aquifer and is expressed as recharge function was proved. An increase in the accuracy of the simulation was obtained also by the temporal distribution of recharge in fast and slow component, which is in agreement with the double mechanism of the functioning of the system: fast flow through the karst drainage net and longer retardation in the system with storage of water in less permeable zones.

- 9-203 Petrič, Metka: Recharge-discharge relations of the Vipava karst aquifer, Slovenia. Proceedings of the XXX IAH Congress on Groundwater: Past Achievements and Future Challenges, Sililo et al./Eds., Balkema, Rotterdam, 253-257, 2000.**

Due to highly variable recharge conditions and heterogeneous subsurface flow the hydrodynamic characteristics of karst systems are very complex. One of the research approaches used to define the characteristics of the groundwater flow and storage in karst aquifers is the comparison between the recharge and the discharge of the system. The input function - the recharge can be related to the output function - the discharge by a mathematical relationship called the transfer function that reflects the physical processes taking place within the aquifer. This method was applied also in the study of a karst aquifer in the recharge area of the Vipava spring in south-western Slovenia. Special attention was focused on the estimation of the recharge function and its time distribution. Then the transfer functions were calculated based on the comparison between the daily values of the recharge components and the measured spring discharge. Combining the transfer functions and recharge components the discharges of the Vipava spring were simulated. The comparison with measured values indicated good correspondence.

- 9-204 Peško, Matuš: [Physical and chemical characteristics of percolating atmospheric waters in the Dobšinska Ice Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 107-111, Liptovský Mikuláš, 2000.**

K.W.: ice cave, hydrochemistry, percolation water.

- 9-205 Pflitsch, Andreas ; Piasecki, Jacek ; Niggemann, Stefan: Untersuchungen zum Einfluß von Touristen auf das Höhlenklima in der Dechenhöhle (Iserlohn, Deutschland).-**

Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 46, 96-99, München, 2000.

K.W.: cave tourism, human impact, air circulation, speleoclimate.

9-206 Piccini, Leonardo: Il carsismo di origine idrotermale del Colle di Monsummano (Pistoia - Toscana). Le Grotte d'Italia, serie V, 1, 33-43, 2000.

The Monsummano hill is a small karst area in the northern Tuscany. The interest of this area concerns the occurrence of active hydrothermal karst phenomena. A thermal spring in the NW part of the hill has a mean discharge of 500 l/min. The total amount of water can not be justify with the local infiltration, thus an hallogenic recharge area must be found. This external area is probably located in the Lima valley (Serchio basin), about 20 km NW to Monsummano. Surface karst forms and caves occur on the carbonate outcrops. The largest caves is the famous Grotta Giusti, which is exploited from 1850 for therapeutic use. This cave and other smaller caves were formed by the action of thermal water rising along a normal fault system. Different types of speleothemes, phreatic or vadose in the origin, are present in all the investigated caves. Some of these are due to the gravity sedimentation of floating calcite. The progressive lowering of the hydrothermal water table was caused by the erosion of impermeable rocks around the carbonate structure. This led to the formation of a new generation of speleothemes by cold percolation water.

9-207 Piccini, Leonardo: Il Catasto delle Aree Carsiche d'Italia. Atti II° Symposium ProGeo, Roma 20-22 May 1996, Mem Descr. Carta Geol. Ital., vol. 54, 249-256, 1999 (2000).

During the last years the Italian Speleological Society (S.S.I.) has carried out a project for a national register of karst areas. The importance of this inventory is easily understandable. In Italy, karst areas cover almost 20 % of the whole territory; not including the alluvial plains, the percentage grow up to about 50 %. Karst areas represent an important environment because: (i) karst aquifers contain the most important water resources of mountainous countries and these resources have often a good quality because karst areas have a low anthropic pressure; (ii) karst landscapes are very conservative and we can find the records of the main environmental changes that occurred during the evolution of deep karst; (iii) in karst environments we often find important biotopes with endemic and relict species. "Karst" is currently called a particular kind of landscape where solution landforms are prevailing on other kinds of landforms. Anyway morphological parameters don't seem to be the best criteria for the definition of a karst area. For these reasons modern definitions of karst environment follow more hydrogeological criteria than morphologic ones. The register of karst areas of Italy is based on the following criteria: lythology - karst environments always occur on limestone and gypsum, while the outcroppings of dolomite and impure limestone can be considered as a "karst area" only when hydrogeologic and morphologic features of karst occur; hydrogeology - the occurrence of a highly developed underground drainage which feeds great springs; morphology - the occurrence of typical karst solution landforms such as karren, dolines and cave systems.

9-208 Pipan, Tanja: 8. mednarodna krasoslovna šola "Klasični kras" : udornice, Postojna, 26.-29.6.2000 [in Slovene].- Geografski vestnik, 72, 2, 92, Ljubljana, 2000.

9-209 Pipan, Tanja: Biological assessment of stream water quality - the example of the Reka river (Slovenia). Acta carsologica, 29/1, 201-222, Ljubljana, 2000.

Investigations of macroinvertebrate communities in the Reka, a karst river, were carried out at three sampling sites. We used the so-called "kick sampling" semi-quantitative method, sampling every three months from July 1995 to June 1996. This method proved to be a suitable sampling procedure for identifying macroinvertebrate community structures and for their further analysis. The differences in physical and chemical factors, which indicated seasonal changes, affected the changes in the living communities of macroinvertebrates and were evaluated using diversity, saprobic and biotic indices. The Chandler biotic score changed in proportion to the saprobic value and qualitative classes, and proved to be the best index for assessing water quality in the Reka. Assessments made using the Shannon Wiener diversity index corresponded with those made using a modified saprobic index and the average Chandler biotic score. The river, with an actual biological optimum, does not exert any substantial negative impact on the underground streams of Škocjanske Jame, into which it flows.

9-210 Pipan, Tanja: Function feeding groups of macroinvertebrates in the Reka river (Slovenia). Acta carsologica, 29/2, 293-301, Ljubljana, 2000.

This ecological study deals with the structure of the fauna in a Karst river, classified into different feeding. From the source to the swallow hole the proportion of suspension feeders, filterer-collectors and shredders diminished, but the proportion of deposit feeders and grazers increased. The proportion of predators was roughly the same at all sampling sites. Biological research showed that in the Reka river optimal food exchange with slightly increased trophic activity takes place, but it does not have a negative effect on the community structure of macroinvertebrates.

9-211 Pipan, Tanja: The 8th International Karstological School "Classical Karst" - Collapse Dolines.- Kras, 42, 8-9, Ljubljana, 2000.

From June 26 to 29, 2000 the 8th International Karstological School CLASSICAL KARST was organised in Postojna. The school was focused on collapse dolines as a superficial phenomenon reflecting the development of cavernous karst. More than 100 participants from 17 countries took part and they presented 23 papers, dealing with collapse dolines and other novelties within the sphere of karstology and speleology. Papers and discussions were complemented by field work and excursion.

9-212 Pipan Tanja: ASLO-2000, Aquatic sciences: research across boundaries. Acta carsologica, 29/2, 319-320, Ljubljana, 2000.

9-213 Pirc, Simon: Geochemical Mapping of Karst.- 2. hrvatski geološki kongres, Dodatak, D1-D3, Zagreb, 2000.

K.W.: geochemical mapping, Slovenia.

- 9-214 Pleničar, Mario ; Jurkovšek, Bogdan: Rudists from the Santonian-Campanian bioherm near the spring of the Lijak brook (SW Slovenia).- Razprave IV. razreda SAZU, 41, 51-79, Ljubljana, 2000.**
K.W.: paleontology, rudists, Upper Cretaceous.
- 9-215 Pleničar, Mario ; Jurkovšek, Bogdan: [Rudists from the Cenomanian bioherms of Hrušica and Nanos, Slovenia].- Geologija, 42, 69-116, Ljubljana, 2000.**
K.W.: rudists, Upper Cretaceous, Dinaric carbonate platform, Hrušica nappe, Slovenia.
- 9-216 Pohar, Vida: Franc Osole (1920-2000).- Arheološki vestnik, 51, 257-259, Ljubljana, 2000.**
K.W.: In memoriam, bibliography.
- 9-217 Polič, S. ; Leskovšek, H. ; Horvat, M.: PCB Pollution of the Karstic Environment (Krupa River, Slovenia). Acta carsologica, 29/1, 141-152, Ljubljana, 2000.**
The PCB (Polychlorinated biphenyls) pollution problems in Krupa River are related to sinking surficial streams that mix with the regional groundwater supply, thus endangering the quality of the groundwater reservoirs. The last state of contamination with PCBs and their fate and exposure in the polluted environment were studied in the period 1995 to 1998 within the Remedial Environmental Programme that began in 1984. The concentrations of PCBs in the environmental compartments (air, water, sediment, and soil) of the Krupa were determined. A simple two-compartment (air/water) fugacity mass balance model was applied to these figures, and yielded a reasonable simulation of long-term trends in concentration. The net flux of PCBs from water to air was determined (0.3 ng/m²s). Research into levels of pollution in the Krupa area showed the situation and trends regarding pollution after ten years of remedial measures, and produced a quantitative assessment of the emission of PCBs from the underground catchment area of the source of the river. Comparisons between PCB concentrations in the polluted water measured from 1986 to 1988 and the concentrations measured in 1995 to 1997 show a decreasing trend (i.e. from a mean of 380 ng/l to a mean of 100 ng/l in the Krupa's water). The emission flux of PCBs from water to air for the entire River Krupa (2.6 km long) was estimated at 200 to 500 g/year, i.e. approximately one-tenth of the figure at the time the remedial measure was initiated.
- 9-218 Price, Liz: Madagascar 1998 ; 1999. Kelifely and Tsiribihina River.- The International Caver, 4-9, Swindon, 2000.**
K.W.: expedition, cave fauna.
- 9-219 Price, Liz: Perlis 96 and 98. Explorations in the northernmost state of Peninsula Malaysia.- The International Caver, 32-37, Swindon, 2000.**
K.W.: expedition.
- 9-220 Pruner, Petr ; Bosak, Pavel ; Kadlec, Jaroslav ; Venhodova, Daniela ; Bella, Pavel: [Palaeomagnetic research of sedimentary fill of selected caves in Slovakia].- Vyskum,**

využívania a ochrana jaskyn, 2. vedecká konferencia 16-19 novembra 1999, Demänovská dolina. Zborník referátov, 13-25, Liptovský Mikuláš, 2000.

Research of landscape transformation has become an increasingly important issue of geography. A special attention is to be paid to the environmental impacts on karst terrain, since these processes take place very rapidly. In this paper the author presents some changes induced by the most important processes and features on karsts. Some of these changes happen in the soils developed on karsts: i.e. soil erosion, increasing acidity of soils, heavy metal contamination. As a consequence the composition of vegetation cover also undergoes transformation: there has been an un-going degradation of flora in karst depression, change of forest types and stony grasslands. Intense contamination reaches the ponors, speleothems and springs, and the lakes become eutrophised. Quarry operation has changed the features of karsts whereas deep mining caused the sinking of karst water level.

9-221 Riedl, Helmut: Beiträge zur Kenntnis des miozänen Paläokarstes des ostägäischen Insel Chios (Griechenland).- Die Höhle, 51, 81-93, Wien, 2000.

K.W.: book review, paleokarst, Greece.

9-222 Robledo Ardila, Pedro; Pomar, Luis: Upper Miocene karst collapse structures of the east coast, Mallorca, Spain. Acta carsologica, 29/2, 177-184, Ljubljana, 2000.

In the sea cliffs on the Mallorca Island, Western Mediterranean there are extensive outcrops of Upper Miocene carbonate rocks. On the Eastern coast of Mallorca, the reefal complex is overlain by a Messinian shallow-water carbonate complex. There are abundant Paleokarst collapse structures. The Santanyí Limestone beds are affected by V-incision structures produced by roof collapse of caverns developed in the underlying reefal complex. According to the model, the origin of some of these karst-collapse structures may be related to early diagenetic processes controlled by high-frequency sea-level fluctuations. During lowstands of sea level, fresh-water flow might have create a cave system near the water table by dissolution of aragonite in the reef front facies and coral patches existing in the lagoonal beds. This cave system developed near the subaerial erosion surface. During subsequent rise of sea level inner-shelf beds overlaid the previously karstified reef-core and outer-lagoonal beds. Increase of loading by subsequent accretion of the shallow-water carbonates might have produced V-incision structures by gravitational collapse of cave roofs when these beds were still not completely consolidated.

9-223 Sauro, Ugo: Coastal speleogenesis and collapsing by emptying of karst breccia-pipes on the marine cliffs of the Gargano peninsula (Apulia, Italy). Acta carsologica, 29/2, 185-193, Ljubljana, 2000.

In the coastal cliff of the Gargano peninsula the development of some coastal caves is controlled by the presence of breccia-pipes structures. The breccia-pipes, which may host aquifers, when intersected by the cliff are partially emptied by the waves. In this way dome-like caves may develop, which sometimes open to the surface above. A preliminary model of the geological and geomorphological history leading to the formation of the the breccia-pipes and of this type of cave is outlined.

- 9-224 Sauro, Ugo: Le cavita' carsiche come contenitori di materiali di interesse paleo-ambientale (The karst cavities as containers of materials of paleo-environmental significance). Atti Tavola Rotonda "Un importante sistema carsico dei Monti Lessini: I Covoli di Velo". Museo di Storia Naturale di Verona, 35-44, 2000.**
The karst cavities, both hepigean and hypogean, very often host sediments enclosing a wide time range and containing features significant for the reconstruction of the paleoenvironmental evolution of the area. In the karst environment, different types of karst traps may develop, snaring sediments both of local origin, and coming from outside of the area. In the paper, a review of the main types of karst traps and of their sedimentary contents is outlined. Some of the recent trends and techniques of research are discussed with special reference to the problems of paleo-environmental reconstruction.
- 9-225 Sauro, Ugo: Morphogenetical aspects of collapse dolines and open pits in the karst of the Venetian Fore-Alps. Acta carsologica, 29/2, 195-199, Ljubljana, 2000.**
The author found 6 reasons related to formation of collapse dolines and openings of karst shafts in Venetian Fore-Alps: a) collapse of the roof, decapping of hypogean cavity, speleogenesis and dynamics of the epikarst, swallowing of filling materials inside hypogean voids, swallowing cover of loose materials, opening by seismic shocks. Types of karst structures are the superficial expression of the evolution of drainage structures in the epikarst.
- 9-226 Schwartz, Michael O. ; Ploethner, Dieter: Removal of heavy metals from mine water by carbonate precipitation in the Grootfontein-Omatoko canal, Namibia.- Environmental Geology, 39, 1117-1126, s.l., 2000.**
K.W.: carbonate, water supply, water pollution.
- 9-227 Shaw, Ben ; Penney, Hugh ; Tully, Frank: Oman. Caves of Dhofar.- Caves & Caving, 87, 33-36, s.l., 2000.**
K.W.: cave expedition.
- 9-228 Shaw, T. R.: "Captain Musafir" in Slovenia in 1863 ["Stotnik Musafir" leta 1863 v Sloveniji].- Annales, Anali za istrske in mediteranske študije, 19/2000, Series historia naturalis, 10, 1, 105-114, Koper, 2000.**
K.W.: Slovenia, travellers, Postojnska jama, G.B.Mallesen, 1863.
- 9-229 Shaw, Trevor R.: Views on Cave Formation Before 1900. V: Speleogenesis, Evolution of Karst Aquifers/Klimchouk ; Ford ; Palmer ; Dreybrodt Eds., National Speleological Society, Inc.- 21-29, 2000.**
- 9-230 Shaw, Trevor R.: Foreign Travellers in the Slovene Karst 1537-1900.- 244 pp., Ljubljana, 2000.**
K.W.: a monograph on speleohistory, foreign travellers, Slovene Karst.

- 9-231 Shaw, Trevor R.: Kent's Cavern, England, in the 18th century.- *Cave and Karst Science*, 27, 15-24, s.l., 2000.
K.W.: speleohistory, Great Britain.
- 9-232 Simms, Michael J.: Quartz-rich cave sediments in the Burren, Co.Clare, Ireland.- *Proceedings*, 22, 81-98, Bristol, 2000.
K.W.: cave sediment, quartz, cave without roof, Ireland.
- 9-233 Sims, Major J.M.: Cuetzalan 2000 Recce.- *The International Caver*, 23, Swindon, 2000.
K.W.: short note.
- 9-234 Slabe, Tadej: Inštitut za raziskovanje krasa, Znanstvenoraziskovalni center, Slovenska akademija znanosti in umetnosti.- *Kraški koledar [in Slovene]*, 101-105, Sežana, 2000.
K.W.: report on Karst Research Institute, Slovenia.
- 9-235 Slabe, Tadej: Inštitut za raziskovanje krasa ZRC SAZU v letu 1999 [in Slovene].- *Geografski vestnik*, 72, 145-146, Ljubljana, 2000.
K.W.: report on Karst Research Institute, Slovenia.
- 9-236 Slabe, Tadej: Franci Gabrovšek, Evolution of Early Karst Aquifers: from simple principles to complex models. ZRC Publishing (ZRC SAZU), Ljubljana, 2000. *Acta carsologica*, 29/2, 331-332, Ljubljana, 2000.
- 9-237 Sluka, Martin: [Interpretation of water tracing in the Demänovka watershed from the speleological exploration point of view].- *Vyskum, využívanie a ochrana jaskyn*, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. *Zbornik referatov*, 112-119, Liptovský Mikuláš, 2000.
K.W.: karst hydrology, water tracing, hydrogeology.
- 9-238 Smettan, Hans: Verkarstung im Muschelkalk und Keuper -eine pollenanalytische Studie.- *Laichinger Höhlenfreund*, 35, 3-16, Laichingen, 2000.
K.W.: palynology.
- 9-239 Smith, B.J. ; Warke, P.A. ; Moses, C.A.: Limestone weathering in contemporary arid environments: A case study from southern Tunisia.- *Earth Surface Processes and Landforms*, 25, 1343-1354, s.l., 2000.
K.W.: algae, desert, biokarst, salt weathering, gypsum, rock varnish.
- 9-240 Smrekar, Aleš A.: [Cerkniško polje as an example of settled karst vulnerable area].- *Geographica Slovenica*, 33, 117-156, Ljubljana, 2000.
K.W.: karst, environmental pollution, environment protection, water quality, Slovenia.

- 9-241 Sounier, Jean-Paul: Muruk: l'épilogue.- Spelunca, 77, 15-22, Paris, 2000.**
K.W.: cave expedition.
- 9-242 Stanek, Klaus Peter ; Cobiella-Reguera, Jorge Luis ; Maresch, Walter V. ; Millan Trujillo, Guillermo ; Grafe, Friedemann ; Grevel, Christiane: Geological development of Cuba.- Zeitschrift für Angewandte Geologie, Sonderheft; 31st International Geological Congress, Rio de Janeiro 2000, SH 1, 259-265, Hannover, 2000.**
K.W.: morphogenesis, geology and tectonics, Cuba.
- 9-243 Stummer, Günther: Max Herbert Fink zum 60. Geburtstag.- Die Höhle, 51, 41-52, Wien, 2000.**
K.W.: anniversary, bibliography.
- 9-244 Swart de, Herman W.: About sediments from the Cueva de los Palmeros (Fuentecaliente, La Palma, Canary Islands, Spain).- Newsletter, 25, 4-5, Schimmert, 2000.**
K.W.: lava tube, cave sediments.
- 9-245 Synkiewicz, Adam: Radar profiles (RAMA C2/GPR) of the cave.- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 84-94, Liptovský Mikuláš, 2000.**
K.W.: cave detection.
- 9-246 Šebela, Stanka: A study of geological structures in karst for understanding the underground water drainage and possible paths for pollution in groundwater (European Sciences Foundation, Groundwater Pollution - GPoll exchange grant). Acta carsologica, 29/2, 321-323, Ljubljana, 2000.**
- 9-247 Šebela, Stanka: Določanje starosti jamskih sedimentov s paleomagnetizmom, raziskave v Sloveniji [in Slovene]. In: VODOPIVEC, Florjan (ed.). Raziskave s področja geodezije in geofizike - 2000 : zbornik predavanj. Ljubljana: Slovensko združenje za geodezijo in geofiziko, 145-149, 2000.**
The determination of the time period of formation and development of karst caves is one of the most important studies in karstology. For solution of this problem different methods can be used one of them being paleomagnetic analyses of cave sediments. The Earth magnetic field changes in different time periods. The rocks containing Fe-minerals preserve the magnetic properties from the period of their formation. In this way the age of karst infillings with cave sediments can be determined. In 1987 Gospodarič already sampled the cave sediments from Planinska and Postojnska jama cave system for paleomagnetic analyses, but the samples have never been analyzed. The first paleomagnetic analyses of Slovene cave sediments were accomplished in 1998. Because in Slovenia we don't have the magnetometer, the analyses have been performed at the Institute of Geology of the Academy of Sciences of the Czech Republic, at University of Pittsburgh (USA) and in France.

The oldest cave sediments in SW Slovenia are sediments from denuded caves which are at least 1,67-1,87 Ma old or even 3,8-5,0 Ma old. Data show that fossil and some still active karst caves are much older than it was known before.

9-248 Šebela, Stanka: Folds and karst caves, SW Slovenia. In: Summit 2000 : abstract with programs, (Geological Society of America, Vol. 32, No. 7). Boulder: Geological Society of America, A-252, 2000.

In Slovenia karst represents 43% of the country. The area belongs to Adriatic microplate which pushes in a N-NW direction against Eurasia. SW Slovenia is part of External Dinarides where principal tectonic deformations took place after Eocene. The area was exposed to thrusting, folding and faulting. Detailed tectonic-lithological mapping in the scale 1:5,000 was performed in 3 principal karst caves of SW Slovenia, in Postojnska Jama cave system (20,000 m), in Predjama cave (13,000 m) and in Skocjanske Jame caves (6,000 m). Higher passages of all 3 mainly horizontal caves are actual dry, not water active passages, while lower parts are in water table conditions. Cave passages are developed according to geological structural elements such as joints, faults, folds, bedding planes, interbedded slips. In studied caves tectonised bedding planes play an important role for cave passages formation. Principal regional folds are Dinaric oriented (NW-SE). Due to folding interbedded slips developed what was one of the weaknesses in carbonate massif used by waters to form underground paths-karst caves. Bedding planes especially those deformed by interbedded slips are one of the most important structural elements inside or along which cave passages develop. Cave passages of studied caves are formed on both flanks of anticlines. Anticlines resulted due to compression in folding tectonic events and are primarily not related to younger faulting. Postojnska Jama cave is developed in Upper Cretaceous limestone, Predjama cave in Upper Cretaceous limestone, Jurassic limestone and dolomite and in Triassic dolomite. Skocjanske Jame caves are developed in Upper Cretaceous and Paleocene limestone. In all 3 caves former phreatic channels which shape is in some places still preserved are characteristically formed along interbedded slips or crossings between interbedded slips and faults or joints. Collapse chambers in actual vadose conditions are shaped regarding strike and dip of interbedded slips and more recently active faults.

9-249 Šebela, Stanka: Geology of Postojnska jama cave system. In: Carulli, Giovanni Battista (Ed.). Guida alle escursioni. Trieste: Edizioni Università di Trieste, 227-229, 2000.

Postojnska jama cave system is with 20.000 m the longest known cave in Slovenia. From impermeable flysch of Pivka basin the river Pivka sinks at 511 m to the Postojnska jama cave system and comes out as a spring of Unica river in Planina polje. The passages of Postojnska jama cave system are developed in Upper Cretaceous limestones mostly bedded. Cenomanian and Turonian limestones are more thin bedded and can include chert lenses or layers. Senonian limestones are thick bedded to massive. Cave passages are developed in about 800 m thick lithological column. Postojnska jama cave system is situated between two regionally important faults. These are Idrija fault on the north and Predjama fault on the south. Tectonic structure of the area between those two faults has all characteristics of inner zone between two dextral strike-slip faults. The oldest found cave sediments belong to Matuyama Reversed Epoch (0,73-2,48 Ma).

9-250 Šebela, Stanka: Raziskovalni projekti s področja geodezije in geofizike, zbornik predavanj I. (65 str.) in II. del (88 str.) ob 4. in 5. strokovnem srečanju Slovenskega združenja za geodezijo in geofiziko, 15. december 1999, Ljubljana. Acta carsologica, 29/1, 237-238, Ljubljana, 2000.

9-251 Šebela, Stanka; Čar, Jože: Velika Jeršanova doline - a former collapse doline, Acta carsologica, 29/2, 201-212, Ljubljana, 2000.

The Velika Jeršanova doline (a.s.l.=535 m) is situated on the surface above the Postojnska Jama cave system. Its deepening undoubtedly interrupted the continuation of Pisani rov (a.s.l.=535,5 m) towards N. Through the Velika Jeršanova doline the Postojna anticline crest runs in the direction of NW-SE. The same direction has also the Jeršan fault. Strike and dip of thin bedded Turonian and Cenomanian limestones are disordered on the anticline's crest. The limestones dip 5-25°. The Velika Jeršanova doline today does not have the typical shape of a collapse doline. The main cause for the untypical collapse shape of Velika Jeršanova doline is its formation in the Postojna anticline crest, its shaping in thin bedded clay - rich limestones and intensive erosional lowering of the area. Regarding the actual shape of the slopes and outer edges, the Velika Jeršanova doline is a relic of a former well shaped collapse doline.

9-252 Šebela, Stanka ; Sasowsky, Ira D.: Paleomagnetic dating of sediments in caves opened during highway construction near Kozina, Slovenia. Acta carsologica, 29/2, 303-312, Ljubljana, 2000.

We report on the paleomagnetism of cave sediments from SW Slovenia. Samples were taken from 2 denuded caves that were opened during highway construction in 1999 near Kozina. All samples showed normal magnetic polarity, had good sample strength, and had only 1 paleomagnetic component. Samples SLO033-SLO036 showed good directional clustering slightly West of the present day field, and are younger than 0,73 Ma. Samples SLO037-SLO042 clustered slightly East of the present day field, and either reveal paleosecular variation or belong to an older normal magnetic chron.

9-253 Šebela, Stanka: Geology of Škocjanske jame caves. In : Carulli, Giovanni Battista (ed.). Guida alle escursioni. Trieste: Edizioni Università di Trieste, 231-233, 2000.

Accessible channels of Škocjanske jame caves are developed in Turonian and Senonian, mostly thick bedded limestones with exception of Tiha jama, built in thin layered Cretaceous and Paleocene limestones. Beside bedding-planes especially those tectonised the faults, folds and fissures are important for the formation of cave passages. The cave system (5800 m) is composed by 3500 m long canyon-like water channel (ponor 317 m, siphon 214 m) and by dry galleries.

9-254 Šebela, Stanka: The vulnerability map of karst along highways in Slovenia. Annales, Ser. hist. nat., 10, no. 19, 127-132, 2000.

Within a 3-year project "The vulnerability map of karst along highways in Slovenia", all karst phenomena that can be found on or near highways crossing the karst areas in Slovenia

were introduced. All karst features (dolines, collapse dolines, denuded caves, grooves, grikes, karren, karst caves, karst springs), which had been known before or were discovered during the construction of highways, are documented in the Cave Cadastre of the Karst Research Institute ZRC SAZU and on topographic maps. The summary of the project investigations is represented by 2 vulnerability maps of the karst regarding highways in SW Slovenia (Vrhniko-Kozina, Divača-Fernetiči). On the maps, important karst springs, directions of underground water flow, waste deposit sites and important larger karst caves are presented. In table 1, data for numbers of doline per 1 km² and numbers of karst caves per 1 km are presented in view of different highway sections.

9-255 Šušteršič, France: Are “collapse dolines” formed only by collapse? Acta carsologica, 29/2, 213-230, Ljubljana, 2000.

The paper concerns collapse dolines, which appear to be one of the best-defined surface karst phenomena. Despite this appearance, one may find quite different views in the literature, and some the aspects of their morphogenesis have been overlooked completely. Among these aspects the most obvious is the question of the ongoing development of the closed depression. After the perpendicular walls have disappeared, the slopes are reshaped only by pocket weathering, and denudation penetrates deep below the former level of the pre-existing cave floor. Dolines at this stage of development have been termed phantom collapse dolines. Five of the most common collapse doline types found in Slovenia are considered in terms of general systems theory, leading to a conclusion that cave roof collapse remains the crucial event in a collapse doline's development. However, the collapse event itself may be relatively subdued in terms of the volume of free fallen mass involved.

9-256 Šušteršič, France: The Role of Denuded Caves within the Karst Surface.- Mitteilungen des Verbandes der deutschen Höhlen-und Karstforscher, 46, 105-112, München, 2000.

K.W.: cave without roof, morphogenesis, karstology.

9-257 Tang, Tao ; Day, Michael J.: Field survey and analysis of hillslopes on tower karst in Guilin, Southern China.- Earth Surface Processes and Landforms, 25, 1221-1235, s.l., 2000.

K.W.: slope, dissolution, tower karst, peak forest, peak cluster, caves.

9-258 Tencer, Jan: Tabuľka najdlších a najhlbších jaskyn na Slovensku [in Slovak].- Spravodaj, 31, 17-19, Liptovský Mikuláš, 2000.

K.W.: A list of the longest and deepest caves in Slovakia.

9-259 Thuroczy, Jozef: [Documentation of the Jasovska Cave and further perspectives of the speleological exploration].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 213-216, Liptovský Mikuláš, 2000.

K.W.: speleodocumentation, speleohistory.

- 9-260 Tometz, Ladislav: [Migration of oil contamination in conditions of hydrogeological unit Vel'ka skala (Slovak Karst).- Vyskum, využívanie a ochrana jaskyn, 2. vedecká konferencia 16-19 novembra 1999, Demänovska dolina. Zborník referatov, 146-151, Liptovský Mikuláš, 2000.**
K.W.: vulnerability, nature protection water pollution, oil pollutants.
- 9-261 Trček, Branka ; Veselič, Miran ; Urbanc, Janko: The suitability of carbon isotope composition as natural tracer in karst aquifer investigations. Acta carsologica, 29/1, 153-161, Ljubljana, 2000.**
This isotopic research is ongoing in the catchment area of the karstic spring Hubelj in the area of the Trnovsko-Banjška plateau. Changes in water chemistry and carbon isotope composition are monitored from the aquifer recharge area in precipitation water, through the unsaturated zone to the outflow from the aquifer. Special attention is given to the unsaturated zone. The results confirm that the sampled water is equilibrated with the carbonate rock and that the process of carbonate rock dissolution can be described as an open dissolution system.
- 9-262 Trimmel, Hubert: Weitere Karstgebiete und Höhlen in der Liste des Welterbes der UNESCO.- Die Höhle, 51, 103-104, Wien, 2000.**
K.W.: mixed site, UNESCO.
- 9-263 Tripet, Jean-Pierre ; Doerfliger, Nathalie ; Zwahlen, François ; Delporte, Cyril: Vulnerability mapping in karst areas and its uses in Switzerland. Acta carsologica, 29/1, 163-171, Ljubljana, 2000.**
A new approach for delineating protection zones in karst regions based upon vulnerability mapping of catchment areas is being developed at the Swiss National Hydrological and Geological Survey. Due to the particular hydrogeological characteristics of karst aquifers, specific protection measures are required. Protection zones in karst delineated on the basis of existing guidelines generally do not take into consideration hydrogeological factors, and therefore provide only limited efficiency. The newly proposed "EPIK" method is based on vulnerability mapping of the catchment area of the source, where various objective vulnerability factors are taken into consideration: epikarst (E), protective cover (P), infiltration conditions (I), and karstic network (K). A field application on the case of Saint-Imier pilot area is presented.
- 9-264 Ufrecht, Wolfgang: In memoriam Prof. Dr. France Habe.- Mitteilungen des Verbandes der deutschen Höhlen-und Karstforscher, 46, 136-137, München, 2000.**
K.W.: In memoriam.
- 9-265 Urbanc, Janko ; Brancelj, Anton: [Tracing experiment in the Ledvica Lake in the Triglav Lakes Valley].- Geologija, 42, 207-214, Ljubljana, 2000.**
K.W.: hydrogeology, tracing test, Uranin, Alpine karst, Slovenia.

- 9-266 Urushibara-Yoshino, Kazuko ; Kashima, Naruhiko: Solution Rate of Limestone Tablets in Shikoku Island, (Japan). Mitteilungen des Verbandes der deutschen Hohlen- und Karstforscher e.V. Munchen, 46 (1/2), 112-116, 2000.**

The solution rate of limestone tablets has been measured from 1993 to 1997 at seven locations from north to south in Japan. Shikoku Onogahara and Ryugado in Shikoku Island were chosen as two among seven locations. The solution rates of limestone tablets at Shikoku Onogahara is maximum of seven locations during these five years. It was concluded that the water balance condition of Shikoku Onogahara is the best for the solution in Japan. Climatic conditions in Shikoku Onogahara and Ryugado reflect the year by year fluctuation of solution rate. Wet years, 1993 and 1997, show high solution rates. Especially, the solution rates in soils are about two times higher than in the air during the wet years. These values indicate that the speed of karstification of bare karst is about half as compared with that of covered karst in Shikoku Island. Guilin limestone has about 15% higher solution rate than the average solution rate. The lithological effects also play a role for solution, but not so strong as climatic conditions.

- 9-267 Urushibara-Yoshino, Kazuko ; Kashima, Naruhiko ; Enomoto, Hiroyuki ; Kuramoto, Tadashi ; Kina, Hiroyuki ; Nakahodo, Tadashi ; Higa, Masahiro: Interannual Variation of Limestone Solution Rates in Japan. Acta Geographica, Hungary, 36, 201-211, 2000.**

The solution rates of four tablets made from limestone obtained in Kozina (Slovenia), Guilin (China), Chichibu (Japan), and from the rock at the observation point were measured in seven limestone areas in Japan from 1993 to 1997. Solution rates in the air 1.5 m above the ground show a high correlation with (water surplus (WS) - water deficit (WD)) by Thornthwaite's method. The solution rates of limestone tablets in soils show values 1.5 to 5 times higher than those in the air. The solution rates of limestone tablets in the A₃ and B₂ horizons show high correlation with annual precipitation. High solution rates in soils must be related to high CO₂ values under humid and warm periods. In 1993, when cool and humid summer prevailed in almost all parts of Japan, the trend of solution rates increased in accordance with (WS-WD), having the largest range during the five years. In 1994, when an extremely hot and dry summer prevailed, the solution rates increased in accordance with (WS-WD), having with the lowest range during the five years. Solution rates of limestone tablets in the air at each point increased with increasing (WS-WD) during the five years. However, it is interesting to note that the solution rates of limestone increased sharply by the amount of 1,000-1,600 mm of (WS-WD). Lithologically, Guilin and Slovenia tablets belong to one group, and Chichibu and Akiyoshi tablets belong to the other group. The group of Guilin and Slovenia show high solution rate under the wet condition and low solution rate under the dry condition but the group of Chichibu and Akiyoshi show low solution rate under wet conditions.

- 9-268 Veni, George: In search of Xibalba. An archaeological expedition to the caves of Piedras Negras, Peten, Guatemala.- The International Caver, 14-28, Swindon, 2000.**
K.W.: expedition, speleoarchaeology, Maya.

- 9-269 Veress, Marton: Covered karst evolution in the northern Bakony Mountains, W-Hungary.- A Bakony Termesztudományi Kutatásának Eredményei, 23, 167 pp., Zirc, 2000.**
K.W.: covered karst, morphogenesis, karstification, karst hydrology, Hungary.
- 9-270 Veselič, Miran ; Čenčur Curk, Barbara: EU guidelines and acts for karst groundwater: report for KATER research programme (INTERREG IIC). Ljubljana: IRGO, July, 2000.**
- 9-271 Vesica, P.L. ; Tuccimei, P. ; Turi, B. ; Fornos, J.J. ; Ginés, A. ; Ginés, J.: Late Pleistocene Paleoclimates and sea-level change in the Mediterranean as inferred from stable isotope and U-series studies of overgrowths on speleothems, Mallorca, Spain.- Quaternary Science Reviews, 19, 865-879, s.l., 2000.**
K.W.: sea-level changes, speleothem, cave sediment, isotope, U/Th dating, climate, brackish water, Spain.
- 9-272 Viles, Heather A.: Micro-organisms and Geomorphology.- Mitteilungen des Verbandes der deutschen Höhlen-und Karstforscher, 46, 116-121, München, 2000.**
K.W.: karst morphology, dissolution, microorganism.
- 9-273 Vlahović, Igor ; Biondić, Ranko/Eds.: Excursion Guide-book.- 2. hrvatski geološki kongres, 92 pp., Zagreb, 2000.**
K.W.: Guide-book covering Outer Dinarids, coastal Adriatic karst and some islands in Croatia.
- 9-274 Vuga, Davorin: Stari dedec pri Stajah. Lapis sepulcralis gentis Laepiae [in Slovene].- Kras, 42, 10-11, Ljubljana, 2000.**
K.W.: archaeology.
- 9-275 Waltham, Tony: Karst and caves of Ha Long Bay. A World Heritage Site of International Significance.- The International Caver, 24-31, Swindon, 2000**
K.W.: tower coastal karst, expedition.
- 9-276 Weißensteiner, Volker: Adam Lebenwald und die Drachenknochen aus der Drachenhöhle bei Mixnitz in der Steiermark.- Die Höhle, 51, 63-65, Wien, 2000.**
K.W.: palaeontology, speleohistory.
- 9-277 Wenzel, Walter/Ed.: Höhlen in Kroatien in historischen Schriften des Österreichischen Touristenklubs.- 54 pp., Wien, 2000.**
K.W.: speleohistory, afforestation, travel book, Croatia.
- 9-278 Witthüser, Kai ; Čenčur Curk, Barbara: Groundwater pollution by contaminant transport from soil to fractured rock. Acta carsologica, 29/1, 173-181, Ljubljana, 2000.**

Water flow and contaminant transport from soil to underlying fractured rock is mainly controlled by the hydraulic conditions of the soil-bedrock boundary. In respect to the necessary understanding of contaminant transport at the soil-bedrock boundary the identification of flow paths within both the soil cover and the fractured media is decisive on the one side. On the other hand substance-specific behaviour of the often reactive pollutants compared to water flow has to be known in detail. Field scale tracer tests with different tracers (uranine and salts) and a potential pollutant as a reactive tracer (nitrate) were performed at the IRGO field research facility Sinji Vrh (SI). Injection points are located on the surface, in the soil, at the soil-rock interface and in the fractured rock; water is sampled in an underground tunnel with the help of two subhorizontal boreholes equipped with sampling devices and a special construction for collecting water seeping from the ceiling. The goal of these experiments is to identify the flow paths of solutes to the underground tunnel and to estimate their residence time dependent on the injection point. So far only some conclusions regarding the waterflux into the tunnel could be drawn.

- 9-279 Wolozan, David: Iran.- Spelunca, 77, 7-8, Paris, 2000.**
K.W.: expedition.
- 9-280 Yudao Chen ; Xueyu Zhu ; Xueshun Zhu ; Yaping Jiang ; Qinglin Xie: Transformations and hydraulic captures of petrochemical contaminants in a karst-fractured aquifer.- Environmental Geology, 39, 1304-1308, s.l., 2000.**
K.W.: hydraulic capture, karst-fractured aquifer, petrochemical contaminants, transformation, China.
- 9-281 Zacharov, Michal: [Geological and geomorphological features of the cave Gajdova adit (Jasov Plateau)].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 66-70, Liptovský Mikuláš, 2000.**
K.W.: speleomorphology.
- 9-282 Zelinka, Jan: [Speleoclimatic monitoring in the Driny Cave].- Vyskum, využívanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 168-179, Liptovský Mikuláš, 2000.**
K.W.: monitoring, cave climate.
- 9-283 Zhou, W. ; Beck, B.F. ; Stephenson, J.B.: Reliability of dipole-dipole electrical resistivity tomography for defining depth to bedrock in covered karst terranes.- Environmental Geology, 39, 760-766, s.l., 2000.**
K.W.: karst terranes, electrical resistivity tomography, sinkholes, pinnacles and cutters.
- 9-284 Zseni, Anikó: A talaj szerepe a mészkőjárdák kialakulásában. (The role of soil in the evolution of limestone pavements.) - CD, A táj és az ember - geográfus szemmel. Geográfus Doktoranduszok IV. Országos Konferenciája, Szeged, 2000.,**

Internet: <http://phd.ini.hu> [in Hungarian]

The pH and carbonate content of soil has an important role in the evolution of surfaces of limestone pavements. In general, calcareous soils with high pH (pH of 7 to 9, calcium carbonate content is higher than 10 %) protect the underlying limestone almost completely from erosion, because water becomes saturated with bicarbonate on passing through the soil profile. Under acid soil limestone is extensively weathered. Erosion of limestone is most severe beneath deposits supporting an acid vegetation and with a pH between 4 and 7 and a calcium carbonate content of 0 to 1 %. The analysis of the collected soil samples on limestone pavement surfaces in Northern England support the connection between the developed forms and the pH plus carbonate content of soils.

- 9-285 Zseni, Anikó: Soils on karst areas of the Bükk Mountain, Hungary. Essays in the Ecology and Conservation of Karst, Special Issue of Acta Geographica Szegediensis for the International Geographical Union Comission (edited by Ilona Bárány-Kevei and John Gunn), Szeged, pp. 40-46, 2000.**

The soil has an important role in the karst ecological system because it can buffer the harmful effects. In the last ten years there have been several studies of soils in Hungarian karsts. However, there have been few measurements of soil nutrients in karst areas. During this investigation the pH(H₂O), pH(KCl), carbonate content, plant available phosphorus, calcium, magnesium, potassium and total nitrogen content of soils were measured. Soil moisture, which is important for plants take-up of nutrients, was also part of the investigation. On the basis of the results it is concluded that: the nutrient indices of the beech forest and beech with pine forest are the most advantageous in respect of the plant available calcium, magnesium, potassium and total nitrogen; the difference of the potassium content of soil between the different type of plants is lower than that in the case of the other nutrients; the soils are weakly supplied with magnesium; more than half of the examined soils are well-supplied with phosphorus.

- 9-286 Zseni, Anikó ; Bárány-Kevei, Ilona: Nagy-Britannia mészkőjárdái és a talaj hatása azok fejlődésében. (Limestone pavements of Great-Britain and the role of soil cover in their evolution.) Karsztfelődés V., Szombathely, pp. 181-194, 2000. [in Hungarian]**

This study introduces the present and morphology of the British limestone pavements and the elements which have important role in their evolution. It deals prominently with the role of the soil cover. The pH and carbonate content of soils have a great effect in the evolution of limestone surfaces. We did fieldwork on some limestone pavement areas in Northern England and collected soil samples. The measurements support the connection between the developed forms and the pH plus carbonate content of soils.

- 9-287 Zupan Hajna, Nadja: Some Ideas About the Origin, Diagenesis and Time of Sedimentation of Clastic Sediments from the Karst Surface and Caves around Divača, SW Slovenia. 2. hrvatski geološki kongres, Cavtat - Dubrovnik 17. - 20.5.2000, Zagreb, 489-493, 2000.**

During the motorway construction over the Kras plateau the works uncovered a large number

of dolines and inactive cave passages filled up by fluvial sediments. The comparison of sediments from caves, un-roofed caves and dolines was possible. In almost all samples relatively equal mineral composition prevailed, indicating the main source from Eocene flysch sediments which were weathered in different degree. Yellow sediments have been in contact with percolating water from the surface and they have changed colour during diagenesis in oxidation zone to red. In sediments from caves and specially from now roofless caves we didn't find minerals which are characteristic for material with loess origin, it looks like that caves have already been filled up by sediments when loess deposition in Istria started.

- 9-288 Zvonar, Peter: [Problems of the Driny Cave management].- Vyskum, využivanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 186-188, Liptovský Mikuláš, 2000.**

K.W.: cave tourism, number of visitors, Slovakia.

- 9-289 Zyzanska, Halina ; Zyzanski, Henryk: [The caves near Wojcieszow (Lower Silesia)].- Vyskum, využivanie a ochrana jaskyn, 2. vedecka konferencia 16-19 novembra 1999, Demänovska dolina. Zbornik referatov, 152-159, Liptovský Mikuláš, 2000.**

K.W.: regional speleology.

COMMENT

The change of an editor usually involves the change of the concept too. Prof. Kazuko Urushibara-Yoshino edited eight numbers of Newsletter of Annotated Bibliography under the auspices of three different “Karst Commissions” of the IGU. The booklets were given a lot of sympathy by the members of Commissions and this Annotated Bibliography became a sort of a trademark of our Commission. I regret that Prof. Kazuko cannot continue to do this not always easy but an important task. So I tried to continue her work with the help of some members of the Karst Research Institute at Postojna.

I tried not to change anything, but it was not entirely possible. The first is the title. The inherited title did not seem very good to English native speakers. So we changed it, according to the advice of the chairman, Prof. John Gunn. The covers are double: one is “traditional”, the other is of *Acta carsologica*, because the easiest way to publish Annotated Bibliography was to include it into the *Acta carsologica* series. As usually the volume contains the abstracts sent by the authors. We have also taken some abstracts from the journals that gave us permission of copyright (and did not charge the copyright). Regarding the short time to prepare the volume, we did not have a time to contact editors of different journals and to go through the procedure to obtain the permissions. Therefore this number of Annotated Bibliography is much more the direct contribution of the authors than the number 8. For the next numbers I hope very much that the corresponding members of our Commission will take seriously that the bibliography will contain nearly exclusively the authors’ contributions. And this will save us a lot of time and some money too. Specially the postage fees are high, regarding transcontinental service, they are very high. Our aim is to send a copy of Annotated Bibliography directly (by post) to every author - contributor to the bibliography. How the other corresponding members will get it remains an open question, as well as also a list of the addresses.

We did not want this to happen, but nevertheless I am afraid that in this volume there are more “Eastern” than “Western” contributors. I do not like this classification, but it looks so. Were there more publications published in 2000? Are those authors more ambitious to be included in the bibliography. Maybe the authors from the “West” do not trust that we will publish the volume and that the deadline is serious? Maybe the information of the change of the editor did not reach all the corresponding members? I do not know. There are still two differences comparing to previous numbers. We included just and only the works published in 2000. And we did not separate the works into books, articles, and short contributions due to simplify the procedure and also because the difference was not always clear.

At the end I would like to apologise for the mistakes and for the slips of the pen. I would like to thank all the authors who sent us their contributions. I am asking too the corresponding members of the Karst Commission IGU to send us their conformable contributions for the bibliography for the year 2001 (Annotated Bibliography No. 10) to the beginning of April. In this case I can promise that we will prepare the 10th number of Annotated Bibliography of Karst Publications better than this one and in time.

The Editor

Acta carsologica, 30/1, Supplementum
Annotated Bibliography of Karst Publications
No. 9

Izdala in založila
Slovenska akademija znanosti in umetnosti
in
Znanstvenoraziskovalni center SAZU
v Ljubljani

Grafična priprava
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Tiskarna Lotos Postojna, 2001

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