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International Geographical Union - Karst Commission
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Collected and edited by
Andrej Kranjc



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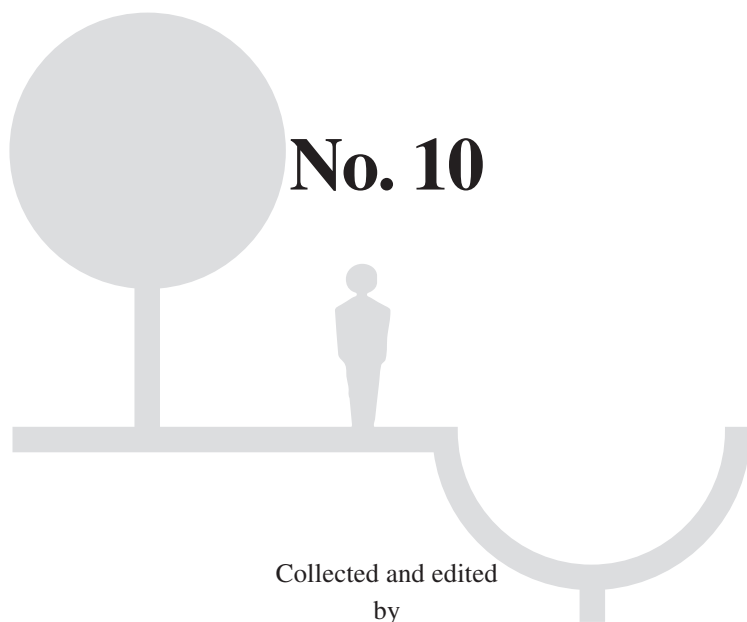
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ANDREJ KRANJC

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May, 2002

FOREWORD

I am very pleased to be able to write the foreword to this, the tenth annual bibliography of global karst research published by members of the IGU Karst Commission. Particular thanks are due to Andrej Kranjc and his colleagues at the Karst Institute Postojna for collecting and editing the material published in 2001 and to the board of Acta Carsologia for allowing the Bibliography to be published as a supplement.

In the foreword to the ninth edition I traced the history of the Bibliography and explained that our aim is to provide abstracts, in English, of publications 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 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. To continue production for ten years is a good record but over the past 1-3 years there seems to have been a reduced demand for the Bibliography. In part this may be a consequence of the increased availability of electronic sources and in 1999 we discussed the possibility of moving to purely electronic publication. At that stage there was a demand from members for hard copy but we would like to seek your views again as we want to ensure that the Bibliography continues to be of use to members. Please could those who would like to continue to receive a paper copy of the Bibliography register with me, even if you receive your copy via a country representative. Please also let me know whether you would prefer to receive the Bibliography electronically. We will then make a decision on what format to publish in 2003. Whether it is published on paper or electronically, the Bibliography can only be of use if it contains a wide range of relevant material. Hence, 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.

May, 2002

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YEAR 2000

- 10-1 Fairchild, I. J. ; Borsato, A. ; Tooth, A. F. ; Frisia, S. ; Hawkesworth, C. J. ; Huang, Y. ; McDermott, F. ; Spiro, B.: Controls on trace element (Sr-Mg) compositions of carbonate cave waters: implications for speleothem climatic records. *Chemical Geology* 166, 255-269, 2000.**

At two caves (Clamouse, S France and Ernesto, NE Italy), cave drip and pool waters were collected and sampled at intervals over a 2-3 year period. Mg/Ca and Sr/Ca concentration ratios, corrected for marine aerosols, are compared with those of bedrocks and, in some cases, aqueous leachates of soils and weathered bedrocks. Cave waters do not lie along mixing lines between calcite and dolomite of bedrock carbonate, but typically show enhanced and covarying Mg/Ca and Sr/Ca.

Four factors are considered as controlling processes. 1) the much faster dissolution rate of calcite than dolomite allows for the possibility of increase of Mg/Ca if water-rock contact times are increased during drier conditions. A theoretical model is shown to be comparable to experimental leachates. 2) prior calcite precipitation along a flow path is a powerful mechanism for generating enhanced and covarying Mg/Ca and Sr/Ca ratios. This mechanism requires the solution to lose CO₂ into pores or caverns. 3) Incongruent dolomite dissolution has only limited potential and is best regarded as two separate processes of dolomite dissolution and calcite precipitation. 4) selective leaching of Mg and Sr with respect to Ca is shown to be important in leachates from Ernesto where it appears to be a phenomenon of calcite dissolution. In general selective leaching can occur whenever Ca is sequestered into precipitates due to freezing or drying of soils, or if there is derivation of excess Sr and Mg from non-carbonate species.

The Ernesto cave has abundant water supply which in the main chamber is derived from a reservoir with year-round constant PCO₂ of around 10^{-2.4} and no evidence of calcite precipitation in the karst above the cave. Two distinct, but overlying trends of enhanced and covarying Mg/Ca and Sr/Ca away from the locus of bedrock compositions are due to calcite precipitation within the cave and, at a variable drip site, due to enhanced selective leaching at slow drip rates. Mg-enhancement in the first chamber is due to a more dolomitic bedrock and longer residence times.

The Clamouse site has a less abundant water supply and presents geochemical evidence of prior calcite precipitation, both in the cave and in overlying porous dolomite/dedolomitized limestone bedrock. Initial PCO₂ values as high as 10⁻¹ are inferred. Experimental incubations of Clamouse soils which generated enhanced PCO₂ and precipitated CaCO₃ had compositions similar to the karst waters. Calcite precipitation is inferred to be enhanced in drier conditions.

Hydrological controls on cave water chemistry imply that the trace element chemistry of speleothems may be interpretable in palaeohydrological terms. Drier conditions tends to promote not only longer mean residence times (enhancing dolomite dissolution and hence Mg/Ca), but also enhances degassing and calcite precipitation leading to increased Mg/Ca and Sr/Ca.

- 10-2 Frisia, S. ; Borsato, A. ; Fairchild, I. J. ; McDermott, F.: Calcite fabrics, growth mechanisms and environments of formation in speleothems (Italian Alps and SW Ireland). *Journal of Sedimentary Research*, 70, 1183-1196, 2000.**

The synergy of different physico-chemical factors influence the development of five speleothem fabrics from Alpine and Irish caves. Columnar and fibrous fabrics grow when speleothems are continuously wet, and from fluids at low supersaturation ($SI_{cc} < 0.35$), through the screw dislocation mechanism, and seem to precipitate in isotopic equilibrium with the parent fluid. Microcrystalline fabrics form under the influence of growth inhibitors and variable discharge. Despite the high density of defects, microcrystalline fabrics likely forms in isotopic equilibrium. Dendritic fabrics develop in disequilibrium conditions, related to prolonged outgassing during dry periods which probably result in ^{13}C enrichment. Cave calcareous tufa likely forms at $T^{\circ}C > 8^{\circ}C$. The petrographic analysis of speleothem fabrics, therefore, yields useful paleoenvironmental information and is a necessary prerequisite to interpret the physico-chemical properties of speleothem calcite.

- 10-3 Frumkin, A.: Dissolution of salt, in Klimchouk, A. B., Ford, D. C., Palmer, A., and Dreybrodt, W., eds., *Speleogenesis: Evolution of Karst Aquifers*, Huntsville, National Speleological Society, 169-170, 2000.**

Halite, the main mineral of salt, dissolves physically, dissociating to Na^+ and Cl^- . Special features such as density stratification may arise from the high solubility, 360 g l^{-1} while the rapid kinetics promotes intense karstification in short time scales. Salt water enhances limestone dissolution by the ionic strength effect. Other soluble salts reduce halite solubility through the common ion effect.

- 10-4 Frumkin, A.: Speleogenesis in salt — the Mount Sedom area, Israel, in Klimchouk, A. B., Ford, D. C., A., P., and Dreybrodt, W., eds., *Speleogenesis: Evolution of Karst Aquifers*: Huntsville, National Speleological Society, 443-451, 2000.**

Mount Sedom salt diapir, with some 20 km of salt caves, is the most studied salt caves site. Its vadose caves are formed by captured ephemeral streams. Cave profiles are adjusted to base level, allowing reconstruction of the evolutionary history of the region. Some 57% of Mount Sedom surface area is drained by the underground karst system. Waters in cave conduits do not reach saturation during flood flow, unless the water is ponded for at least several hours. Common cave features are vertical shafts, close to the cave inlet, and sub-horizontal passages, leading to outlets at base level. Where no fissure connects the inlet with the margins of the mountain, an inlet cave is formed, capable of absorbing the flood discharge in a terminal pond. Water and solutes escape from the pond by slow seepage through narrow fissures to a regional aquifer.

- 10-5 Frumkin, A. ; Ford, D. C. ; Schwarcz, H. P.: Paleoclimate and vegetation of the last glacial cycles in Jerusalem from a speleothem record: *Global Biogeochemical Cycles*, v. 104, no. 3, 863-870, 2000.**

A speleothem isotopic record taken from Jerusalem is used to reconstruct regional climate over the last 170,000 yr. Glacial periods in Jerusalem were generally cooler and wetter than the present climate. Stage 5e in the desert margin of Jerusalem was extremely unsta-

ble, dry and warm, and instability persisted throughout the transition to glacial conditions. Climate after stage 5e became gradually cooler and wetter over a 20,000 yr interval and did not recover to interglacial conditions in stage 5c and 5a. $\delta^{13}\text{C}$ varied by up to 12‰, from glacial (stage 6, 4-2) values of -10 to -12‰ that reflect dense C_3 vegetation above the studied cave, up to 0‰ in early stage 5 when there was probably complete loss of vegetation. The climatic instability during interglacial periods is much larger than during glacial periods, and glacial/interglacial transitions do not behave the same in each climatic cycle in this region.

- 10-6 Genty, D. ; Baker, A. ; Vokal, B.: Intra- and Inter- Annual Growth Rate of Modern Stalagmites, Chemical Geology, Vol. 176, 193-214, 2000.**

K.W.: flowstone growth.

- 10-7 Hamilton-Smith, E.: Managing for Environmental and Social Sustainability at Jenolan Caves, New South Wales, Australia. In: Bárány-Kevei, I. & Gunn, J. (eds.), Essays in the Ecology and Conservation of Karst, Acta Geographica Szegedensis, 36, 144-152, 2000.**

Jenolan Caves have been open to the public since the 1850s, and at one time were Australia's premier tourism destination. In about 1993, the administration decided that the continuing increase in visitor numbers represented a significant threat to the environmental quality of the site. Accordingly, a meeting of karst and tourism professionals was set up to advise on action, and as a result, a continuing program of both environmental and social monitoring was established under the oversight of a supervising committee. This paper will describe the innovative managerial arrangements, which are in place and the processes being utilised. Results to date will be outlined.

- 10-8 Kaiser, T. M. ; C., Seiffert: Die Travertine am Songwe-River - ein tropisches Karstgebiet in Zentraltansania. Die Höhle 51, 93-103, 2000.**

K.W.: karst morphology, Tansania.

- 10-9 Verheyden, S. ; Keppens, E. ; Fairchild, I. J. ; McDermott, F. ; Weis, D.: Mg, Sr and Sr isotope geochemistry of a Belgian Holocene speleothem: implications for paleoclimate reconstructions. Chemical Geology, 169, 131-144, 2000.**

In this study, variations in Mg/Ca, Sr/Ca and $^{87}\text{Sr}/^{86}\text{Sr}$ ratios in a Holocene Belgian speleothem (cave secondary carbonate deposit) are interpreted in terms of changes in water residence time and changes in weathering processes, possibly induced by changes in West European climate. A stalagmite from the Pere-Noel cave (Belgium) was dated with the TIMS U/Th method and was deposited between ± 13 and ± 2 ka BP. The 1000Mg/Ca ratio varies between 4.9 and 26, and displays short-term changes but no significant long-term trend. The 1000 Sr/Ca ratio varies between 0.09 and 0.31 and displays both short-term changes and a long-term decreasing trend from 12.9 to 3.5 ka. In parallel, the Sr isotopic composition of the speleothem decreases from 0.7090 at 12.9 ka to 0.7088 at 3.5 ka. The Sr isotope ratio is higher than expected from the overlying limestones ($^{87}\text{Sr}/^{86}\text{Sr} = 0.7081$) which implies an external source of radiogenic Sr, most

probably from a silicate phase. Short-term and long-term changes in Mg/Ca, Sr/Ca as well as long-term changes of $^{87}\text{Sr}/^{86}\text{Sr}$ ratios can be explained by changes in the dissolution and precipitation processes of the host limestone. These processes are controlled by changes in water residence times linked to changes in the water excess (precipitation minus evapotranspiration).

YEAR 2001

- 10-10 Aguilar, Jean-Pierre ; Crochet, Jean-Yves ; Michaux, Jacques ; Mihevc, Andrej ; Paunović, Maja: The small vertebrate fauna (Rodents, Insectivores, and Reptiles) of Šandalja 1A (Istria, Croatia). *Acta carsologica*, 30/1, 115-124, Ljubljana, 2001.**

Is described under the name of Šandalja 1A, a Lower to Middle Pleistocene fauna of small vertebrates including rodents, insectivores and reptiles. Extracted from a bone breccia found in 1999 in the Šandalja quarry near Pula, its accurate localization with respect to the previously known bone breccia of Šandalja 1 is not known. Nevertheless this dating - a Biharian age - is congruent with the younger age now advocated for the fauna of large mammals of Šandalja 1 and its associated chopper.

- 10-11 Alexandrowicz, Witold Pawel: Molluscan assemblages from deposits filling small karst forms in the Tatra Mountains (Southern Poland). *Acta carsologica*, 30/1, 125-142, Ljubljana, 2001.**

Numerous shells of molluscs were found in loamy sediments rich in limestone and dolomite scree filling small karst forms and forming debris fans. They have been analysed from several logs in the Tatra Mountains. Woodland and open-country snails are the main components of fauna. Relations between two mentioned ecological groups of molluscs indicate climatic changes and moving the timberline. Three phases of warming separated by two stages of the colder climate were recognised. They can be related to following ages: XIII and first half of XIV centuries AD (warm phase), second half of XIV - XVII centuries AD (cold phase), XVIII and the first half of XIX centuries (warm phase), second half of the XIX century (cold phase) and finally to XX century (warm phase).

- 10-12 Angsüsser, Stephan: Meaning and representation of boundaries in karst type maps. *Acta carsologica*, 30/2, 195-202, Ljubljana, 2001.**

The paper deals with boundaries in general and specifically with boundaries in large scale karst type maps. On the basis of a differentiation into dependent and independent variables a methodological attempt is presented, allowing to integrate information about the boundary type and the boundary accuracy. This additional information should help karst researchers answering genetic questions.

- 10-13 Aničić, Bogoljub ; Dozet, Stevo ; Ramovš, Anton: Development of the Scythian series in the Orlica anticline area (Sava folds). Acta carsologica, 30/1, 85-96, Ljubljana, 2001.**

This paper deals with the development of the Scythian series in the Orlica anticline area. The Scythian beds of the Orlica anticline area lie discordantly upon various Carboniferous and Permian rocks. They are composed of five lithostratigraphic members: The older two members belong to the Lower Scythian, Seis beds respectively, and the younger three to the Upper Scythian, Campilian beds in the wider sense respectively. In the sandy beds of the Seis succession the pelecypods *Eumorphotis venetiana* and *Anodontophora* occur. On the other hand, in the Campilian beds the gastropods *Natiria costata* and *Natica*, as well as the pelecypod *Myophoria costata* and the foraminifera *Meandrospira pusilla* occur.

- 10-14 Audra, Philippe ; Camus, H. ; Rochette, P.: L'aven de la Combe Rajeau : un jalon dans l'évolution du karst des plateaux jurassiques et de la moyenne vallée de l'Ardèche. Bulletin de la Société géologique de France, 172, 1, 121-129. Paris, 2001.**

K.W.: karst morphology, speleology, France.

- 10-15 Audra, Philippe ; Lauritzen, S. E ; Rochette, P.: L'hyperkarst des montagnes Nakanai. Modèle d'évolution d'un réseau juvénile (gouffre Muruk) basé sur des datations U/Th et paléomagnétiques des sédiments, 93-99 in Audra, Ph; De Coninck, P.; Sounier J.-P. (Ed): Nakanai 1978-1998. 20 ans d'exploration, 224 p. Hémisphère sud, Antibes, 2001.**

K.W.: karst morphology, speleology, Sarawak.

- 10-16 Audra, Philippe: Feichtner cave (Kitzsteinhorn, Salzburg, Austria), A deep cave system developing into calcareous schists in a glacial environment. Acta carsologica, 30/2, 165-174, Ljubljana, 2001.**

The Kitzsteinhorn (3208 m) in the Central Alps of Salzburg, Austria, is a partly glaciated karst area with two deep caves recently surveyed. Both the "Zeferethöhle" (-560 m) as well as the "Feichtner-Schachthöhle" (-1024 m) are developing in micaceous calcareous schists. Observations on the genesis, hydrology, sedimentology and the cave climate are discussed.

- 10-17 Audra, Philippe: French Alps karsts: study methods and recent advances. UKPIK, Rapports de recherches, 10 (Workshop "Cave genesis in the Alpine belt", Habkern 2000), 7-28. Institut de géographie, Fribourg, 2001.**

K.W.: karst morphology, France.

- 10-18 Audra, Philippe: Geowissenschaftliche Beobachtungen in der Feichtner -Schachthöhle (Kitzsteinhorn, Salzburg). Die Höhle, 52, 1, 1-7. Wien, 2001.**

K.W.: speleology, Austria.

- 10-19 Audra, Philippe: L'organisation verticale des réseaux karstiques non confinés. Contrôle de la structure et du niveau de base. XI^e Congrès national suisse de spéléologie, Genève, 125-127. Société suisse de spéléologie, La Chaux-de-Fonds, 2001.**
K.W.: speleology.
- 10-20 Audra, Philippe: L'organisation verticale des réseaux karstiques non confinés. Contrôle de la structure et du niveau de base. 11^e Rencontre d'octobre, L'Isle-en-Rigault, 13-15, Paris, 2001.**
K.W.: speleology.
- 10-21 Audra, Philippe: Mesures de débit et traçages. Manuel à l'usage des spéléologues, 44 p. Université de Nice, 2001.**
K.W.: karst hydrology.
- 10-22 Audra, Philippe: Origine des grands vides souterrains du réseau de Muruk et rôle des séismes (montagnes Nakanai), 101-107 in Audra, Ph.; De Coninck, P.; Sounier, J.-P. (Ed): Nakanai 1978-1998. 20 ans d'exploration, 224 p. Hémisphère sud, Antibes, 2001.**
K.W.: tectonics.
- 10-23 Audra, Philippe: Précipitations, ruissellement et infiltrations dans le karst des montagnes Nakanai, 65-76 in Audra, Ph.; De Coninck, P.; Sounier, J.-P. (Ed): Nakanai 1978-1998. 20 ans d'exploration, 224 p. Hémisphère sud, Antibes, 2001.**
K.W.: percolation water.
- 10-24 Audra, Philippe: Traçages dans le système Muruk-Bérénice, montagnes Nakanai (avec F. Hobléa), 87-92 in Audra, Ph.; De Coninck, P.; Sounier, J.-P. (Ed): Nakanai 1978-1998. 20 ans d'exploration, 224 p. Hémisphère sud, Antibes, 2001.**
K.W.: water tracing.
- 10-25 Audra, Philippe: Un nouveau "-1000" dans un karst englacé : le gouffre Feichtner (Kitzsteinhorn, Salzburg, Autriche). Genèse de la plus profonde cavité karstique du monde en roche non calcaire. XI^e Congrès national suisse de spéléologie, Genève, 19-24. Société suisse de spéléologie, La Chaux-de-Fonds, 2001.**
K.W.: speleology.
- 10-26 Audra, Philippe: Valeur et répartition de la dissolution spécifique dans les karsts des montagnes Nakanai, 77-86 in Audra, Ph., De Coninck P., Sounier J.-P. (Ed): Nakanai 1978-1998. 20 ans d'exploration, 224 p. Hémisphère sud, Antibes, 2001.**
K.W.: solution rate.
- 10-27 Ayub, Soraya ; Cucchi, Franco ; Forti, Paolo ; Zini, Luca: Pollution Integrate Vulnerability Map for the aquifer of the Perolas - Santana, Grilo and Zezo karst systems**

(Sao Paulo, Brazil). 100x140 cm Map, 1:10.000 scale. Editoriale San Giusto editor, Trieste, Pubbl. n°2415 del GNDICI, LR4., 2001.

In the last 15 years the U.O. 4.7 and 4.9 of the National Group for the defence against the hydrogeological catastrophes evaluated the pollution vulnerability of several karst aquifers in the temperate zone by using the SINTACS point count system (Cività & De Maio 1997, 2000). The present paper is the first attempt to apply the same method to an important karst spring in a tropical area. The Pérolas-Santana, Grilo and Zezo karst systems are located in the Iporanga region, São Paulo state, Brazil. Their catchment areas extend more than 24,2 km² and are mainly located inside the High Ribeira State Turistical Park (PETAR) wich is characterised by an Atlantic forest with a subtropical humid climate (Gutjahr 1993) without arid periods and an average rainfall of 1500-1850 mm/yr. The karst aquifers consist of limestones and dolostones surrounded and interbedded with metamorphic siltstones and sandstones. The karst systems are well developed, with a flood flow rate of about 0.0359 m/s (April 1997) thus corresponding to medium to high velocity systems (Smart & Hodge 1979).

In order to obtain the vulnerability map for the aquifer feeding the karst spring it has been necessary to prepare several digital thematic maps (geological, geomorphological, hydrogeological, speleological, ecc) which represent the base layers for the SINTACS evaluation of a specific GIS for the intrinsic and integrated vulnerability of the whole studied area. In the present paper the used criteria for defining the values of the different parameters to be used in the SINTACS model are shortly discussed. In fact it was necessary to adapt them to the hydrogeological specificity of the tropical karst environment. The final map, obtained by overlapping the potential pollution sources to the intrinsic vulnerability map should be a powerful tool for a safe use of the environment in the management and development of the natural park which hosts most of the aquifer feeding the studied karst aquifer.

10-28 Baker, A. ; Genty, D. ; Fairchild, I. J.: Hydrological characterisation of stalagmite drip waters at Grotte de Villars, Dordogne, by the analysis of inorganic species and luminescent organic matter. Hydrology and Earth System Sciences, 4, 439-450, 2001.

Five stalagmite drip-waters in the Grotte de Villars, Dordogne, have been monitored from early 1997 to early 1998, for variations in discharge, major inorganic species and dissolved luminescent organic matter. When compared to surface precipitation, each drip-water has a subtly different response, both in terms of discharge variability and lag time between surface precipitation and drip rate response. Calculated water excess is shown to be important in determining drip-water discharge; during periods of soil moisture deficit, drip-waters either show no response to surface precipitation, or in the case of one sample station, respond only to high intensity and/or quantity precipitation events.

All drip-waters have evidence of a large storage component to their flow. Four sample stations have a similar hydrochemical and luminescence response, although the precise timing and magnitude of the responses may vary between drip sources that are <5 m apart. Drip-water luminescence intensity increases in winter and spring, and increases in discharge lag by 2-3 months, suggesting that the water in the rising limb and peak of the winter discharge comes from the stored groundwater component rather than a soil source.

Drip-water strontium anti-correlates with luminescence and exhibits a strong ($\pm 100\%$) seasonal variation, with high-strontium waters derived from stored groundwater and is inferred to be sourced ultimately from localized Sr-rich primary components in the limestone. Drip-water conductivity reflects Ca-HCO_3 variations and falls during late summer to autumn, which is inferred to result from increased calcite precipitation above the cave related to enhanced degassing related to progressive drying of the aquifer. Drip-water magnesium (following removal of the marine aerosol component) is just above detection limits and does not show strong seasonal variations. Variations in solution PCO_2 occur, with a particularly strong increase in early 1997. The various chemical trends are observed at a number of different sites despite a pronounced variation between them in terms of total Ca-HCO_3 mineralization and PCO_2 .

One sampling station of the five investigated had a different response to surface precipitation; drip discharge was more variable, with evidence of non-linear responses, and luminescence intensity exhibited a dilution response to drip rate. For this site, flow switching occurred at times of high rainfall, with a rapid discharge response less than 24 hours after rainfall. Luminescence intensity, inorganic chemistry, and discharge characteristics at the site are compared with results published from other cave systems, and demonstrates significant inter-site variability depending on the geology, depth of sample sites and extent of karstification. This suggests that the interpretation of stalagmite luminescence, and Sr, Ca and Mg variations must be considered at a site by site basis.

10-29 Baker, Gerry ; Petrič, Metka ; Parkin, Geoff ; Kogovšek, Janja: Surface and Groundwater Interaction of the Bela Stream and Vipava Springs in Southwestern Slovenia. *Acta carsologica*, 30/2, 217-238, Ljubljana, 2001.

Previous studies suggest a hydrogeologic link between the Vipava springs and the neighbouring Bela surface stream. The Vipava springs drain the Nanos karst plateau. The Bela stream drains the very low permeable flysch to the north west of the Nanos plateau before flowing onto limestone where it gradually sinks along its course. A tracer, uranine, was injected into the Bela upstream of the village Vrhpolje and hydraulic connection with all the Vipava springs was proved. A dispersion model was used to characterise the tracer breakthrough curve of one of the springs where the highest concentrations were found. The hydrology of the Bela was analysed by measuring the discharge of the stream at 8 different sections and analysing the difference in flow between each section. The conclusion drawn from the analysis was that the Bela stream has a different hydrological response related to whether the majority of recharge comes from the karstic or flysch area of the catchment. A flow separation analysis based on hydrochemical measurements indicated that the hydrological response of the Vipava springs also depends on the recharge source area. Proved connection leads to environmental concern for the water quality of the Vipava springs, which are the main water supply of the area, because untreated wastewater is discharged into the Bela stream.

10-30 Bakšić, Darko: [Exploration of Slovačka jama in 1999]. *Speleolog*, 46/47 (1998-1999), 13-16, Zagreb, 2001.

K.W.: regional speleology, cave description, exploration history, Croatia.

- 10-31 B ́ar ́any-Kevei, Ilona ; Goldie, H. ; Hoyk, E. ; Zseni, A.: Heavy metal content of some Hungarian and English karst soils. Acta Climatologica et Chorologica. Tom. XXXIV-XXV, 81-92, 2001.**

The heavy metal content of karst soils is a significant aspect of karst water because 25% of drinking water comes from the karstwater of the world. The pollution (especially the heavy metal pollution) of the soils is dangerous for karst areas. If the metals pass from the soil into the karst water it will be unhealthy for the population. Much heavy metal is inherited from dry and wet deposition. Acid dry and wet depositions bring pollution materials and give rise to acidification of soils. Soils, which have appropriate characteristics can bind the heavy metals to the different soil particles. This power to prevent the heavy metals reaching soil solution mainly depends on the pH, the organic matter and clay content of the soils, namely on the buffering capacity of the soil. The soils with high buffering capacity can accumulate the dangerous metals in the soils and do not permit them to go to soil solution and thus to reach the limestone bedrock and finally the karst water. Generally, the mobility of heavy metals increases with decreasing pH and decreasing organic matter content of soils. Our paper presents the heavy metal content of karst soils in some English and Hungarian karst territories. The analysis of soils attempts to detect the connection between the organic matter content, pH and the heavy metal content of these soils. In the karst-literature we have as yet few data concerning heavy metal contamination of karst soils. Our data indicate the pollution level of karst soils. These data are a basic point for further investigations.

- 10-32 B ́ar ́any-Kevei, Ilona ; Zboray, Z.: Karszt ́ajak v ́altoz ́asainak vizsgálata t ́erinformatikai m ́odszerekkel. (Research of karstland change by the geoinformatic methods). Karsztfejl ́od ́es VI: Szombathely, 45-59, 2001.**

Previous researches of karst processes have already demonstrated the quickly effects of human impact on karsts. The knowledge of this effects are important because we can to project the sustainable development of karsts if we know the previous and recent processes of this territories. After the brief summary of previous using types of karsts we present some geoinformatic methods for detailed analysing of dolines, cones, expositions of slopes and we show the relief modelling on karstic areas.

- 10-33 Baro ́n, Ivo: Morphogenesis of the Garlika Shaft in conditions of the contact karst. Acta carsologica, 30/2, 175-180, Ljubljana, 2001.**

The Garlika Shaft is located in at about 2 km long W-E depression in southern part of the Silica Plateau (the Slovak Karst Biosphere Reservation, Slovak Republic). The origin of the Garlika shaft is different than most of the other shafts of the Slovak Karst plateaus. Formerly a sinkhole of an ephemeral stream has developed to the shaft due to several factors. A thin water film corrosion and a wall water stream corrosion extended the former fissure. Then, after the stream decrease, thin water film corrosion and a tectonic breccia crumbling has modelled the deeper parts of the shaft. The entrance part of the shaft has been influenced with frost weathering, corrosion of the condensed water and corrosive action of lichens, moss and rotting organic detritus.

- 10-34 Barrett, Peter J.: Searching for Water on Christmas Island. *Helictite* 37(2), 37-39, Melbourne, 2001.**
A hundred years of searching for underground water supplies for the settlement and mine operations on Christmas Island (Indian Ocean) has involved dug wells, drilling, cave exploration and geophysics. Water has been extracted from wells, drill holes, springs and caves. The main production at present is from a set of cave streams on the plateau.
- 10-35 Bednar, David ; Aley, Thomas: Groundwater dye tracing: an effective tool to use during the highway development process to avoid or minimize impacts to karst groundwater resources. *Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 201-207, Lisse etc., 2001.***
K.W.: regional karstology, underground water tracing, highway construction, karst hydrology, aquifer.
- 10-36 Bella, Pavel: [Geomorphological situation around Domica cave]. *Aragonit*, 6, 5-11, Liptovský Mikuláš, 2001.**
K.W.: regional speleology, speleogenesis, regional karstology, karst morphology, Slovakia.
- 10-37 Bella, Pavel; Holubek, Peter: [Meanders in Domica cave]. *Aragonit*, 6, 11-15, Liptovský Mikuláš, 2001.**
K.W.: regional speleology, speleogenesis, Slovakia.
- 10-38 Benson, Richard C. ; Kaufman, Ronald D.: Characterization of a highway sinkhole within the gypsum karst of Michigan. *Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 103-112, Lisse etc., 2001.***
K.W.: sinkhole, gypsum, highway construction, geophysics, morphology, USA.
- 10-39 Blanc, Jean-Joseph: Histoire géologique et enregistrement karstique. Exemple du massif Siou Blanc et de ses abords (Var). *Karstologia*, 37, 11-22, s.l., 2001.**
K.W.: regional karstology, geology and tectonics, exokarst, speleogenesis, regional speleology, karst morphology.
- 10-40 Bono, P. ; Dreybrodt, W. ; Ercole, S. ; et al.: Inorganic calcite precipitation in Tartare karstic spring (Lazio, central Italy); field measurements and theoretical prediction on depositional rates. *Environmental Geology*, 41 (3-4), 305-313 Dec. 2001.**
K.W.: karst hydrology, sediment.
- 10-41 Borsato, Andrea ; Forti, Paolo: Le pubblicazioni di speleologia fisica in Italia 1992-1998. *Atti XVIII Congresso Nazionale di speleologia, Chiusa di Pesio, 29-31 Ottobre 1998, 125-128, 2001.***

A list of the Italian publications on physical speleology is supplied for the period 1992-1998 together with a short discussion on them.

- 10-42 Bourgeois, Denys: Les périmètres de protection des captages d'eau potable. Protègent-ils aussi les spéléologues?. Spelunca, 82, 2, 27-30, Paris, 2001.**
K.W.: nature conservation, water protection.
- 10-43 Božić, Vlado: Dušan Novak (27.7.1931 -21.9.1998). Speleolog, 46/47 (1998-1999), 94, Zagreb, 2001.**
K.W.: Novak Dušan, In memoriam.
- 10-44 Božić, Vlado: Peter Habič (29.9.1934 -24.12.1999). Speleolog, 46/47 (1998-1999), 96, Zagreb, 2001.**
K.W.: Habič Peter, In memoriam.
- 10-45 Božičević, Srećko: [Dr. France Habe - an expert in Croatian karst] (11.1.1909 - 12.10.1999). Speleolog, 46/47 (1998-1999), 95-96, Zagreb, 2001.**
K.W.: Habe France, In memoriam.
- 10-46 Brouyère, S. ; Jeannin, P. Y. ; Dassargues, A. ; Goldscheider, N. ; Popescu, I. C. ; Sauter, M. ; Vadillo, I. ; Zwahlen, F.: Evaluation and validation of vulnerability concepts using a physically based approach. 7th Conference on Limestone Hydrology and Fissured Media, Besançon 20-22 Sep. 2001, Sci. Tech. Envir., Mém. H . S. n° 13, 67-72, Besançon, 2001.**
Starting from the observation that lacks and drawbacks of existing vulnerability methods are strongly related to the fuzzy and ambiguous definitions on which these concepts rely, a more physical point of view of the concept of vulnerability is proposed. An applied definition is derived from what actually underlines the concept of groundwater pollution. For intrinsic vulnerability, three factors describing a pollution by a conservative contaminant are defined: contaminant transfer time, contamination duration and level of concentration reached by the contaminant. These factors are schematically put into a three-dimensional diagram, called the vulnerability cube, which can be used to assess or validate the vulnerability of any point within a given catchment.
- 10-47 Burri, E. ; Castiglioni, B. ; Sauro, U. (Eds): Karst and Agriculture in the World. International Journal of Speleology, 28/2, 198 p., 2001.**
Aim of the theme issue is to give an overview of some of the most typical karst landscapes and environments of the World with special emphasis to the aspects linked with the exploitation of their natural resources for agriculture. It includes thirteen contribution about different countries or areas (6 of European countries, 3 of Asiatic countries, 1 of Morocco in Africa, 2 of American countries and 1 of Australia).
The large variety of aspects of inter-relations between the human communities and the karst geo-ecosystems is evidenced by the different cultural landscapes and characters of the human impact on the basic resources, as the soil and vegetation covers.

- 10-48 Burri, E. ; Castiglioni, B. ; Sauro, U.: Agriculture, landscape and human impact in some karst areas of Italy. International Journal of Speleology, 28/2, 33-54, 2001.**

In Italy there is a large variety of karst morphounits characterised by different geological and geomorphological evolution and land reclamation and human impact histories. The mosaic of human landscapes is complex and various in relation with the the morphostructural setting, the climatic conditions, the types of soil, the different types of land use, the pattern of agricultural plots, the utilisation of peculiar resources as the different types of soluble rocks, the structure of the settlements, the variety and “stratigraphy” of the signs impressed by man.

Most of the landscapes present a oasized agriculture according with the thickness of the soil covers, which depends by the morphodynamic processes and the landforms characters. In recent times while a few karst areas have been integrated in the new economy, most karst morphounits have been gradually deserted and are now interested by the expansion of the wood. Examples of resources exploitation, human impact, landscape building in some areas of northern central and southern Italy are outlined and discussed.

- 10-49 Cella, G. D. ; Forti, Paolo ; Mocchiutti, Andrea ; Muscio, Giuseppe: Caratteristiche chimico-fisiche delle acque dei sistemi carsici delle Prealpi Carniche. Mem. Ist.It. Speleol. S.2, n.12, 145-151, 2001.**

The chemical and bacteriological characteristics of groundwaters of the karst systems in the Carnic Pre-Alps are here described. Particular attention is given to the Risorgiva di Eolo and the Magico Alverman underground systems.

- 10-50 Chenoweth, M. S. ; Day, M. J. ; Koenig, S. ; Kueny, J. A. ; Schwartz, M.: Conservation issues in the Cockpit Country, Jamaica. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 141/S6. Published on CD 2001c.**

K.W.: conservation, Jamaica.

- 10-51 Chenoweth, M. S. ; Day, M. J.: Developing a GIS for the Jamaican Cockpit Country. In: Geotechnical and Environmental Applications of Karst Geology and Hydrology, ed. B.F. Beck and J.G. Herring, Balkema Publishers, 67-72, 2001.**

K.W.: karstology, GIS, Jamaica.

- 10-52 Cigna, Arrigo A.; Cucchi, Franco ; Forti, Paolo: Engineering problems in developing and managing show caves. Journal of Nepal Geological Society, Vol. 22 (2000), 85-94, Katmandu, Nepal, 2001.**

Show caves play an important role in the socio-economic development of a country. A fast increase of such caves can be attributed to the increasing demand from tourists eager to observe natural features and phenomena. On the other hand, the karst environment is quite vulnerable to changes, and hence the transformation of a natural cave into a show cave must be designed, implemented, and managed with due attention to the problem of environmental protection. For this reason, the contribution of the engineering geology is instrumental. Engineering geology is particularly useful for the following activities.

- Environmental Impact Assessment including choice of the materials to minimise the environmental impact and to optimise the safeguard of tourists and employees;
- Identification and implementation of countermeasures for unstable zones in the cave;
- Design and construction of tourist pathways and other structures;
- Identification of the best light sources and their operation;
- Cave cleaning and maintenance (devices to supply water and to take out sewage, measures to minimise dust, and the problem of maintenance of old show caves); and
- Management of the surface area (planning and managing human activities in the outside area corresponding to the whole intake site for the karst system, as most of them may greatly affect the show cave environment, but, on the other hand, some of them such as parking, ticket office, and toilets are absolutely unavoidable).

In the paper, the main engineering problems related to establishing and managing a show cave are presented together with practical examples from some of the main show caves in Italy and abroad.

10-53 Cigna, Arrigo A.: Evaluation of the tourist impact in the Kartchner Caverns (Arizona, USA). Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 014/S6. Published on CD 2001.

In November 1999, Kartchner Caverns in Arizona, USA was opened to the public. Arizona State Parks took 11 years and spent \$30 million preparing the cave for viewing while protecting it from the impacts that the tourists would have on the resource. Because the cave is a wet cave (99% humidity) just below the arid Arizona desert, extreme precautions were necessary to ensure that the cave would not dry out when opened to the public. This paper will explore the sciences used in the planning of the development, the techniques used to protect the cave during development and to mitigate anticipated tourist impacts, and the management constraints imposed in the operation. It will also highlight the eco-tourism niche that was developed due to the extreme care given to this resource.

10-54 Cigna, Arrigo A.: Results of the preliminary monitoring network of Cango Caves (Oudtshoorn, South Africa). Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 015/S6. Published on CD 2001.

Cango Cave is the most important show cave in Africa with some hundreds of thousand visitors per year, and is presently monitored to ascertain its visitors' capacity. A simple monitoring network has been installed in September 2000 to be operated for one year. It consists of 15 rugged data loggers distributed along the cave. Air and water temperature, carbon dioxide concentration, and relative humidity are measured and the values are transferred periodically by a shuttle into a computer outside the cave. The first results are here reported. Later, a totally automatic monitoring network will be installed after the results of the first simple network are achieved. In addition to the parameters measured by the first simple network, also air current and water level will be included in the automatic one.

10-55 Cigna, Arrigo A.: Salvaguardia e turismo. Atti Bora 2000, Fed. Spel. Triestina, 2001, 151-153, 2001.

K.W.: Show caves, cave protection, karst protection.

- 10-56 Colchester, D. M. ; Pogson, R. E. ; Osborne, R. A. L.: Niter and sylvite from Jenolan Caves, New South Wales, Australia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 133/S1. Published on CD 2001.**

Niter deposits occur in two large natural bridges, the Grand Archway and the Devil's Coach House at Jenolan Caves, New South Wales. The likely source is urine from colonies of brush-tailed rock wallabies (*Petrogale penicillata*) that lived in the bridges until the late 1960s. Niter associated with sylvite is found in the "Dust Cave", an extremely dry section of the Grand Archway. The Grand Archway has an east-west orientation and strong dry cold winds flow through it in the winter, bringing temperatures below zero. Evaporation at low temperature is proposed to account for the deposition of sylvite, but not halite, in the Archway.

- 10-57 Cooley, Tony: Geological and geotechnical context of cover collapse and subsidence in mid-continent US clay-mantled karst. Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 19-24, Lisse etc., 2001.**

K.W.: epikarst, geotechnics, sinkhole, genesis, morphology, USA.

- 10-58 Crawford, Nicholas C.: Field Trip Guide, Part 1: Environmental problems associated with urban development upon karst, Bowling Green, Kentucky. Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 397-424, Lisse etc., 2001.**

K.W.: field guide, regional karstology, human impact, USA.

- 10-59 Cucchi, Franco ; Casagrande, Giacomo ; Manca, Paolo ; Zini, Luca: Il Timavo ipogeo tra l'Abisso di Trebiciano e la Grotta Meravigliosa di Lazzaro Jerko (Carso Classico triestino, Italia). The underground Timavo river between Trebiciano Abyss and Lazzaro Yerko Cave (Classical Karst, Italy). Le Grotte d'Italia, s. V, 2 (2001), 39-48, Iesi, 2001.**

The Trebiciano Abyss and the Lazzaro Jerko Cave (3.25 km distant) are the only two caves that reach an important branch of the underground Timavo in the Trieste Classical Karst. In this work the results of temperature, conductivity and water level monitoring between January and May 2000 are discussed. Instruments are located at 11.7 m a.s.l. in the Lindner Hall of Trebiciano Cave and at 3.5 m a.s.l. in the Medeot Hall of Lazzaro Jerko Cave. Three significant flood events are recorded during this monitoring.

In these two caves floods start in the same time, temperature and conductivity fluctuations are practically contemporaneous and have a similar trend. The hydraulic system is immediately keeping with the rainfalls, the underground flow is rapid (between the caves water velocity is over 800 m/h), the renew is remarkable. Stronger flows mobilize deep waters because of hydraulic pressure, so the water level changes in a very short time. All that

shows that caves are collected with the same hydraulic circuit, as two piezometric towers along the under pressure deep water conduits.

10-60 Cucchi, Franco ; Piano, Chiara: Studies for the realization of the Hydrogeological Map of Friuli-Venezia Giulia. Ipogea, n. 3 (2000), 57-71, Trieste, Pubbl. n°2030 del GNDICI, LR4. 2001.

The definition of the hydrogeologic characteristics of the formational units in the region is an introduction to start the realization of hydrogeologic maps relative to the vulnerability of mountain aquifers. These maps must be homogeneous, comparable and compatible with G.I.S. In this work all the formations and/or lithostratigraphic units forming the underground of the mountain and hilly parts of Friuli-Venezia Giulia are analysed and briefly described considering lithology, primary or secondary permeability and possible karst. Moreover, the regional structural characters are described in order to identify preliminary hydrogeologic complexes, karstic and spring areas.

10-61 Čar, Jože: Structural Bases for Shaping of Dolines. Acta carsologica, 30/2, 239-256, Ljubljana, 2001.

By a precise registration of geological structural elements (the location of beds and to what degree the rock is fractured) and by observation of some morphological properties one may define for each individual doline, either directly or by combining the data known in nearby dolines and their vicinity, the geological bases which give the foundations for its present location, shape and size. On such a basis we prepared a descriptive-genetic classification of dolines and I defined 8 basic types of dolines (labelled from A to H, Fig. 1). In nature pure types are rare; usually combinations occur. The findings relate to dolines in different carbonate rocks and carbonate clastites. Hence it follows that the genesis of dolines cannot be simplified into one general model but all the models are »valid« (corrosion, collapse, climatic) combining among them and intertwined by interdependence of circumstances.

10-62 Čar, Jože ; Šebela, Stanka: Karst characteristics of thrust contact limestone-dolomite near Predjama. Acta carsologica, 30/2, 141-156, Ljubljana, 2001.

With detailed lithological and tectonic-structural mapping at the scale 1:5000 we studied the area near Bukovje NE from Predjama. In the studied area and further towards the NE we can follow a strong thrust contact between Upper Cretaceous limestones of Snežnik thrust sheet over which Upper Triassic Norian-Rhaetian dolomite of Hrušica thrust sheet is overthrust. The thrust is cut by systems of dextral faults with expressed vertical component. Beneath the studied area underground passages of Predjama cave can be found; they are developed in limestones as in dolomites. Dolines in Upper Cretaceous limestone are uniformly arranged and are in structural-genetic view broken (D), near-fault (E) or fault (F). Along the thrust edge we have contact dolines (G) in dolomite. The rest of the dolines on dolomite are connected to differently broken rocks in fault zones and are called reproduced fault-broken dolines / HF(D)_{do} /. For described karst features along thrust contact we suggest the name *contact karst on dolomite along thrust*.

- 10-63** Čalić-Ljubojević, Jelena: **Karst features of narrow limestone belts - case study of the ridge Dževrinska Greda, Eastern Serbia. Acta carsologica, 30/2, 81-87, Ljubljana, 2001.**

The paper presents several most interesting features of the ridge Dževrinska Greda (Carpatho-Balkanides, Eastern Serbia). Being 20 km long and, on average, 100-300 m wide, this narrow limestone belt is a typical polygon for contact karst and fluviokarst research. Beside examples of features such as through cave, through gorge, dry and blind valleys, there is also a discussion on types of contact (tectonic and sedimentary), impact of fluvial factors, directions of groundwater flow, etc.

- 10-64** Daly, D. ; Drew, D. ; Deakin, J. ; Ball, D. ; Parkes, M. ; Wright, J.: **The Karst of Ireland, Karst Working Group, Dublin, 37 p., 2001.**

A non-technical introduction to karst in the island of Ireland. A general introduction to karst is followed by brief description of the main karst regions of Ireland. Engineering and environmental aspects of karst in Ireland are examined and the importance of conserving karsts is discussed.

- 10-65** Day, M. J.: **Sandstone caves in southwestern Wisconsin. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 107/S1. Published on CD 2001c.**

K.W.: speleology, USA.

- 10-66** De Waele, J. ; Forti, Paolo ; Perna, G.: **Hyperkarstic phenomena in the Iglesias mining district (SW-Sardinia). In "Water-Rock Interaction 2001", R. Cidu (Ed.), A.A.Balkema Publishers, Lisse, 619-622, 2001.**

The up to present knowledge of the hyperkarstic phenomena in the Iglesias is shortly outlined together with new ideas about the importance of the "mine caves" (caves without any natural connection with the surface, which have been intersected by mine galleries) for understanding speleogenesis and ore deposits in areas with MVTOD.

- 10-67** Dozet, Stevo: **Tertiary and Quaternary tectonic movements in the Kočevje area - Wallachian tectonic epoch, pliocene/pleistocene, southern Slovenia. Acta carsologica, 30/1, 97-114, Ljubljana, 2001.**

In this preliminary article a review of tectonic events in the Tertiary and Quaternary period in the Kočevje area and its surroundings with special emphasis on the tectonic activity on the Tertiary/Quaternary border has been presented. On the basis of results of regional and detailed geological mappings in the Kočevje area giving interesting data on stratigraphic development, facial composition and structure of that part of Slovenia, we came to the significant discover that some folds in the Kočevje area originated on the border between the Tertiary and Quaternary as a consequence of the last strokes of the Alpine orogeny being ascribed to the Wallachian tectonic epoch. In the Kočevje area, the neotectonic activity is in the narrower sense limited on the Quaternary period.

- 10-68 Drew, D. P.: Classic Landforms of the Burren Karst. 51 p., The Geographical Association, Sheffield, 2001.**
The karst of the Burren in County Clare and the adjacent limestone lowlands of County Galway, western Ireland are described. Examples of distinctive karst landforms in the region such as enclosed depressions, littoral zone karren, limestone pavements and collapse dolines are presented together with descriptions of caves characteristic of the areas.
- 10-69 Drew, D. P.: Karst in Oxford Companion to the Earth / P. L. Hancock and B. J. Skinner (Editors), Oxford university press, Oxford, 576-579, 2001.**
A brief overview of what is meant by karst and the major karstic landforms.
- 10-70 Dreybrodt, W. ; Romanov, D.: Karstification below dam sites: a model of increasing leakage from reservoirs. Geotechnical and Environmental Applications of Karst Geology and Hydrology, Barry F. Beck & J. Gayle Herring (Editors), Balkema publishers, Lisse/Abingdon/Exton(PA)/Tokyo, 131-137, 2001.**
K.W.: karst aquifer, karstification, dams, limestone solution.
- 10-71 Droms, Yvonne: Following the Wind: 280 Meters Underground in the Sierra Madre Oriental. NSS News, 59, 8, 226-230, Huntsville, 2001.**
K.W.: regional speleology, cave description, exploration history.
- 10-72 Drysdale, R. ; Pierotti, L. ; Piccini, L. ; Baldacci, F.: Suspended sediments in karst spring waters near Massa (Tuscany), Italy. Environmental Geology, 40, 8, 1037-1050, 2001.**
K.W.: regional karstology, karst hydrology, turbidity, sediments, quarry, water quality, flood.
- 10-73 Fairchild, I. J. ; Baker, A. ; Borsato, A. ; Frisia, S. ; Hinton, R. W. ; McDermott, F. ; Tooth, A. F.: High-resolution, multiple-trace-element variation in speleothems. Journal of the Geological Society, London, 158, 831-841, 2001.**
This study aims to establish evidence for the widespread existence of preserved high-resolution trace element variations in speleothems that may have climatic significance. Ion microprobe analysis of speleothems reveals that annual to sub-annual variations in element chemistry exist at five, shallow western European cave sites (Crag Cave, County Kerry and Ballynamintra, County Waterford, Ireland; Uamh an Tartair, Sutherland, Scotland; Grotte Pere-Noël, Belgium; Grotta di Ernesto, NE Italy) with widely varying climatic, geomorphic and geological settings. The variations are not restricted to species (Mg, Sr and Ba) known to substitute directly for Ca in the calcite lattice, but include H, F, Na and P. Phosphorus (as phosphate) displays the greatest variability and may have the most significance as a proxy for the seasonal temperature cycle because of its role as a nutrient element. The technique allows estimation of growth rate of speleothems at any interval of interest, which is one of several possible uses in palaeoclimatology.

10-74 Faulkner, Trevor: Reconstruction of deposition events at Neptune's Cave, Norway. Cave and Karst Science 27 (3), 131, Dec. 2000. (Abstract). [Published May 2001].

Whereas marine deposits from karst caves in the Velfjord area of central Norway have been reported before, none have been previously dated. The recent discovery of an extensive series of deposits in Neptune's Cave, near Velfjord, has provided the first opportunity for such deposits from an *inland, marine influenced, karst*, cave to be dated. Six types of fossil have been collected and identified from the cave: mammal bones, marine molluscs, barnacles, foraminifera, ostracods and pollen. Some of these were lying within a sediment that is rich in organic matter. Four different samples (animal bone, marine molluscs, organic sediment and barnacles) have been dated using radio carbon techniques. From the datings, and an understanding of the Late Weichselian de-glaciation and Holocene uplift of the area, a possible sequence of events is constructed that explains the situation and condition of the various deposits. With the removal of the ice burden during the latter part of the Younger Dryas stadial, Fennoscandia started to rebound at a very fast rate initially, so that the cave soon emerged from below sea-level. The radio carbon dates obtained lie within the ranges anticipated from an assumption about the appropriate sea-level curve for Velfjord.

10-75 Faulkner, Trevor: Cave Development in Central Scandinavia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 155/S1. Published on CD 2001.

Metacarbonate outcrops occur in most nappes of the central Scandinavian Caledonides, but their numbers, lengths, areas and foliation dip-angles decline to the east. Caves of all complexities occur in the higher metalimestone-bearing nappes, from valley shoulder positions down to valley floors, and in (commonly homoclinal) *Vertical, Angled, and Non Stripe* karst types that guide internal morphologies. Total cave dimensions show no systematic trend when normalised against the *length* of outcrops, and are not related to catchment areas. Vertical distributions of outcrops and cave entrances are essentially random. Cave depth is always much smaller than the outcrop vertical range: caves in *stripe karst* have formed entirely within an upper 50m-thick zone of fractured rock. Similar cave inception, development and removal processes may have operated across the whole area from the time of the Caledonian Orogeny, and under the direct, and indirect, influences of the many glaciations since the late Miocene.

10-76 Forti, Paolo ; Cucchi, Franco ; Ayub, Soraya: Le "marmitte di corrosione" della Grotta Perolas (San Paolo, Brasile). The "corrosion cups" of the Perolas Cave (Sao Paulo state, Brazil). Le Grotte d'Italia, s. V, 2 (2001), 15-24, Iesi, 2001.

During a trip inside the Perolas-Santana karst system it was possible to make a geomorphological study of some peculiar forms, the genesis of which previously was attributed to erosion processes induced by the floods of the river flowing inside this cavity. It has been demonstrated that the environmental conditions inside the cave avoid the possibility of such a mechanism and strongly support their evolution through chemical corrosion. Therefore these forms must be referred to as "corrosion" and not "erosion" cups. Similar forms were in advance cited only in a cave of Slovenia even if no detail on

their genesis was given. In the present paper, after a short description of the Perolas cave, the genetic mechanisms for these new cave forms is presented.

- 10-77 Forti, Paolo ; Chiesi, Mauro: Idrogeologia, idrodinamica e meteorologia ipogea dei gessi di Albinea, con particolare riguardo al sistema carsico della Tana della Mussina di Borzano (ER-RE 2) (Albinea, Reggio Emilia). GNDCI pubbl.2084. Mem. Ist. It. Spel. S.II vol. 11, 115-139, 2001.**

The Albinea gypsum karst was studied in detail from the hydrogeological point of view. This karst is characterized by simple caves developed along the maximum extension of the gypsum outcrop. Dye tracing experiments put in evidence short transit time, while the absence of base flow testifies a scarce storage capacity. Condensation has proved to be an important recharge mechanism. Finally the anomalous high N content in the Tana della Mussina di Borzano was caused by an immoderate use of fertilizers close to the majors sinkholes of the system.

- 10-78 Forti, Paolo ; Mecchia, M.: Val de Varri: la storia infinita di un progetto di grotta turistica. Speleologia 43, 24-29, 2001.**

The climate of the Val de Varri Cave is shortly described in order to define the possible impact of tourism over such a cave. The cave started to be transformed into a show cave before monitoring its climate and therefore it was rather hard to reconstruct the original climatic behaviour of the cavity.

- 10-79 Forti, Paolo: Biogenic Speleothems: an overview. Abstract of Papers, 15th Int. Symp of Biospeleology, Intervales, Brasile, 3-6, 2001.**

The idea that speleothems may be somehow influenced by living organisms is rather old, but specific studies have only started in the last few decades and presently there are only a couple of systematic paper on this topic. The role of micro-organisms is perhaps the best investigated even if it is not fully understood, while studies over upper organisms and speleothems in a cavern environment are scarce and details are not always given on the involved genetic mechanisms.

The aim of the present paper is to give an updated overview on these topics in order to enhance the interest of the scientific community. In fact the complex biochemical reactions involved in the development of the different cave deposits, though still not well understood, clearly have an interest and an importance far exceeding the simple speleogenetic interest.

- 10-80 Frumkin, A.: The Cave of the Letters sediments — Indication of an early phase of the Dead Sea depression?. Journal of Geology, v. 109, no. 1, 79-90, 2001.**

The highest aquatic sediments along the shoulders of the Dead Sea depression have been found in the Cave of the Letters, Nahal Hever, Israel. The cave has acted as a sediment trap, preserving autogenic dolomite and detritic deposits. The dolomitic sediment may correlate with late Miocene dolomites within the rift valley. The morphostratigraphic setting of the sediment implies deposition within an early topographic low which existed in the Dead Sea region since ~10 to 7 Ma ago.

- 10-81 Frumkin, A. ; Raz, E.: Collapse and subsidence associated with salt karstification along the Dead sea: Carbonates and evaporites, v. 16, no. 2, 117-130, 2001.**

Two types of sinkholes are observed along the Dead Sea shore, Israel. The first is associated with vadose dissolution in Mount Sedom salt diapir. The second is associated with dissolution under the watertable along the retreating Dead Sea shore. The Dead Sea level is falling dramatically, mainly because of human activity. Simultaneously, the lake shores suffer tremendous impact since the late 1980s: The ground is collapsing and subsiding in hundreds of points along the lake, with people, roads and property being swallowed in the more catastrophic events. The collapse is believed to result from dissolution of salt by aggressive groundwater, following the retreat of Dead Sea level and the groundwater halocline. Geological evidence suggests that a previous major lake level fall occurred *naturally* ~2000 BCE. This may provide a new explanation for a curious historical-geological phrase in the book of Genesis, suggested to record formation of collapse sinkholes which occurred in response to the historic falling lake level, associated with climatic desiccation.

- 10-82 Futrell, Mike: Reconnaissance in Nakhon Ratchasima Province, Thailand. NSS News, 59, 5, 141-143, Huntsville, 2001.**

K.W.: regional speleology, Thailand.

- 10-83 Gabrovšek, F. ; Dreybrodt, W.: A model of the early evolution of karst aquifers in limestone in the dimensions of length and depth, J. Hydrol. 240 (3-4), 206-224, Jan. 10, 2001.**

K.W.: karst aquifer, limestone solution, speleogenesis.

- 10-84 Gams, Ivan: Notion and forms of contact karst. Acta carsologica, 30/2, 33-46, Ljubljana, 2001.**

These forms are through valley, blind valley, karst plain, cave with allogenic river, overflow polje, cave on the impermeable rock, subglacial karst and interstratal karst. Emphasized is the role of climate and alluvium for closed basins by comparing Wombeyan cave area in Australia with polje Velo polje in Julian Alps (Slovenia). In the temperate humid alpine climate is intensive mechanical weathering on the steep and bare slopes above Velo polje (1680 m) and steep dry valley rising up to 2200 m. After heavy downpour the periodical brook Velski potok is sinking on the 400 m wide bottom and depositing new sheet of rubble, sand and organic particles. This process lasted since last glacier retreat 9 - 10,000 years ago. Despite age of many hundred million years and confluence of two rivers from surroundings built of igneous rocks on southern corner of 3,6 km² large isolated Wombeyan marble there prevail gorges, caves and narrow valleys without large alluviated bottoms, and the surface is not levelled. The main reasons for the difference are in this view the semi-arid climate and the absence of alluvium causing larger and longer moist contact of alluvium with limestone basis.

- 10-85 Ganter, John: Lava over gypsum: Cave exploration at Frettem Ranch, New Mexico. NSS News, 59, 2, 32-39, Huntsville, 2001.**

K.W.: regional speleology, lava, gypsum, cave description.

- 10-86 Genty, D. ; Baker, A. ; Massault, M. ; Procror, Ch. ; Gilmour, M. ; Pons-Branchu, E. ; Hamelin, B.:** “Dead carbon in stalagmites : limestone paleodissolution versus ageing of Soil Organic Matter - Implications for ^{13}C variations in stalagmites”, *Geochimica et Cosmochimica Acta*, 65, 3443-3457, 2001.
K.W.: geochemistry, sediment.
- 10-87 Genty, D. ; Diot, M. F. ; O’yl, W.:** Sources of pollen in stalactite drip water in two SW-France caves. *Cave and Karst Science*, vol. 28, n° 2, 2001.
K.W.: sediment.
- 10-88 Gillespie, Thomas D.:** Karst feature control on the mobility of petroleum residues in groundwater: a hydrocarbon reservoir analogue. *Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001*, 8, 293-296, Lisse etc., 2001.
K.W.: regional karstology, aquifer, pollution, karst hydrology.
- 10-89 Goldscheider, Nico ; Hötzl, Heinz ; Fries, Willhelm ; Jordan, Peter:** Validation of a vulnerability map (EPIK) with tracer tests. *7th Conference on Limestone Hydrology and Fissured Media, Besançon 20-22 Sep. 2001*, *Sci. Tech. Envir., Mém. H. S. n° 13*, 167-170, Besançon, 2001.
Vulnerability maps are tools for land-use planning and protection zoning. However, different methods produce different results that are usually not validated and can consequently be contested. In the catchment of a karst spring in the Swiss Jura Mountains, a vulnerability map (EPIK) was validated with tracer tests. Seven tracers were injected on the land surface and in a swallow hole in order to simulate the impact of hazards. The concentration and the recovery rate were found to be suitable for the validation while the transit time is less significant. The advantages and limitations of this validation technique are discussed.
- 10-90 Goldscheider, Nico ; Hötzl, Heinz ; Käss, Werner ; Kottke, Kerstin ; Ufrecht, Wolfgang:** Kombinierte Markierungsversuche im Stuttgarter Talkessel zur Klärung der hydrogeologischen Verhältnisse und zur Abschätzung des Gefährdungspotenzials im Mineralwasseraquifer Oberer Muschelkalk, Stadtgebiet Stuttgart. *Schriftenreihe des Amtes für Umweltschutz*, 1/2001, 5-80, Stuttgart, 2001.
The aim, arrangement, results and consequences of two large combined tracer tests in the area of the mineral and medicinal springs of Stuttgart (SW Germany) are discussed in great detail in this volume. The springs represent the second largest mineral water resource in Europe after Budapest. They discharge from a complex regional karst system in Triassic carbonate rocks. Since 1984, a contamination with chlorinated solvents in very low concentrations has been observed. In order to investigate the hydraulic properties of the aquifer and the mechanisms of contaminant transport, two combined tracer tests were carried out in 1998 and 1999. Besides fluorescent tracers (naphthionate, eosine, pyranine) also particle tracers (clubmoss spores, microspheres) were used. Naphthionate turned out

to be the best tracer in this experiment; eosine and pyranine failed totally. The maximum flow velocities range between 53 and 230 m/d. The breakthrough curves demonstrate a highly heterogeneous aquifer. The results obtained with naphthionate prove that the mineral springs receive their water from SW direction. A boundary flow line subdivides the resource in a northern zone of low mineralised and a southern zone of highly mineralised water.

10-91 Goldscheider, Nico ; Hötzl, Heinz ; Käss, Werner ; Kottke, Kerstin ; Ufrecht, Wolfgang: Tracing mineral water in the artesian karst aquifer of Stuttgart (SW Germany). Proc. XXXI IAH congress Munich 2001, 83-88, Munich, 2001.

The artesian mineral and medicinal springs in the city of Stuttgart discharge from a complex regional karst system in Triassic carbonate rocks. Since 1984, contamination with chlorinated solvents in very low concentrations has been observed in some springs. Two combined tracer tests were carried out in the catchment of the springs in order to investigate the hydraulic properties of the karst aquifer and the mechanisms of contaminant transport. The fluorescent dyes naphthionate, eosine and pyranine as well as microspheres and clubmoss spores were used as tracers. The best results were obtained with naphthionate while pyranine was completely decayed in the groundwater. The results of the tracer tests are essential both for risk assessment and for developing protection strategies. A short overview of the results is presented in this paper.

10-92 Goldscheider, Nico ; Hötzl, Heinz ; Käss, Werner: Comparative Tracer Test in the Alpine Karst System Hochifen-Gottesacker, German-Austrian Alps. Beiträge zur Hydrogeologie 52, 145-158, Graz, 2001.

Within the framework of an ATH research programme on tracer studies in the unsaturated zone and groundwater, a comparative tracer test was performed in the alpine karst system Hochifen-Gottesacker. Ten different substances, belonging to three classes of tracers were used: fluorescent dyes (naphthionate, pyranine, uranine, sulforhodamine), salts/ions (strontium, lithium, bromide) and particles (green and red microspheres, bioparticles). The tracers were injected simultaneously in a swallow hole, samples were taken at two springs. Breakthrough curves were obtained for only six tracers, while pyranine and the particles disappeared completely, probably because of decay and filtration respectively. Amongst the fluorescent dyes, naphthionate turned out to be the most conservative tracer in this experiment; lithium is favourable because of its low limit of detection compared to other salts.

10-93 Goldscheider, Nico ; Hötzl, Heinz ; Kottke, Kerstin: Microbiological decay of Naphthionate in water samples as a source of misinterpretation of tracer tests - Proc. XXXI IAH congress Munich 2001, 77-81, Munich, 2001.

The UV fluorescent dye Naphthionate is often used for groundwater tracing due to its favourable properties. As it is invisible in the water, it was selected as a tracer for an experiment in the karstic catchment of the mineral springs of Stuttgart (Germany) where any risk of colouring had to be avoided. Irregular breakthrough curves indicated the decay of Naphthionate. It was possible to demonstrate that the decay does not occur in the aquifer.

fer but in the sampling bottles. Laboratory experiments proved that the decay is due to microbiological activity and favoured by room temperature while the light has no significant influence.

- 10-94 Goldscheider, Nico ; Hötzl, Heinz ; Neukum, Christoph ; Werz, Heike: Tracer tests and vulnerability mapping (PI method) in the alpine karst system Winterstaude as the scientific basis of a drinking water protection strategy for the community of Bezau (Austria). 7th Conference on Limestone Hydrology and Fissured Media, Besançon 20-22 Sep. 2001, Sci. Tech. Envir., Mém. H . S. n° 13, 171-174, Besançon, 2001.**

The community of Bezau in the Western Austrian Alps receives its drinking water from springs at the base of the folded alpine karst system Winterstaude. However, there are problems both with the quality and with the quantity of the water. In order to develop a strategy for sustainable drinking water supply and protection, a hydrogeological research project was set up. A tracer test with seven injection points proved that the troughs of the plunging synclines form the main flow paths and allowed the catchments of the springs to be delineated. A vulnerability map using the PI method helped to find a compromise between land-use and drinking water protection.

- 10-95 Gradziński, Michał ; Szulc, Joachim ; Motyka, Jacek ; Stworzewicz, Ewa ; Tyc, Andrzej: Travertine mound and cave in a village of Laski, Silesian-Cracow Upland. Annales Societatis Geologorum Poloniae, vol. 71, 115-123, Kraków, 2001.**

The paper deals with Holocene travertine mound occurring near Olkusz, southern Poland. The mound developed within a spring zone maintained by ascending groundwater, which drained the Muschelkalk carbonates. The travertines formed by intense calcification of the moss vegetation colonizing the spring area. The obtained radiocarbon age indicate that the mound developed in early and middle Holocene. Outwashing of the underlying sandy deposits resulted in a breaking of the travertine mound and involved development of a small cave within the mound.

- 10-96 Grimes, Ken G.: Karst Features of Christmas Island (Indian Ocean). Helictite 37(2), 41-58, Melbourne, 2001.**

Christmas Island (in the Indian Ocean) is an uplifted, composite, reef-carbonate island with a volcanic core. The coast is mostly cliffed and rises steeply via a series of terraces to a central phosphate-blanketed plateau. In spite of the high rainfall, there is little surface water as drainage is underground and karstic - it is initially stored in an epikarst aquifer, then follows the limestone/volcanic contact out to the island edge to emerge at major conduit springs. These springs are mostly at or below sea level, but some perched springs occur where the volcanic rocks appear at the surface. Caves occur at the present coast, as uplifted coastal caves, on the plateau, and there are a few pseudokarst caves. Cave development involves mixing zones between fresh and sea water in the coastal zone, and between vadose and phreatic waters perched on the volcanic rocks beneath the plateau. Cave locations and form are controlled by the rock structure (especially jointing) the location of the volcanic contact, and the combination of uplift with present and past sea levels - which controls the location of the mixing zone.

- 10-97 Hamilton-Smith, E. ; Ackroyd, P.: An Idyllic Setting: The Buchan Caves Reserve. Gipsland Heritage Journal, 25, 16-23, 2001.**
Reviews the history of landscaping in an Australian tourist cave reserve. It focuses upon the respective contributions of an early manager, a landscape architect, a minister of government and a professional horticulturalist.
- 10-98 Hamilton-Smith, E. ; Ramsay, Alison: Social and Environmental Evaluation at Jenolan Caves, New South Wales. Evaluation Journal of Australia, n.s., 1, 60-65, 2001.**
Recent years have seen an increasing concern with the idea of sustainability in environmental management, and this has been expressed in, amongst others, the nature-based tourism arena, while park managers have long had a concern about the environmental and social impacts of recreation. These two concerns come together at Jenolan Caves, New South Wales and a comprehensive program of ongoing evaluation has been established. While this was initially based on a model which originated in the United States, it has since developed a number of distinctive characteristics of its own.
- 10-99 Hamilton-Smith, E.: Managing for Environmental and Social Sustainability at Jenolan Caves, New South Wales, Australia. ACKMA Journal, 42, 22-27. (Reprinted from Bárány-Kevei & Gunn 2000), 2001.**
K.W.: speleology, managing.
- 10-100 Hartwig, Andreas: Zur Definitionsgeschichte von "Erdfall" und "Doline" - Anmerkungen zu Kempe & Rosendahl (2000). Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher e.v., 47, 2, 40-44, München, 2001.**
K.W.: terminology, Erdfall, doline, discussion.
- 10-101 Horvatinčić, Nada ; Božić, Vlado: [Ice cave in Velebit - a challenge to scientists] . Speleolog, 46/47 (1998-1999), 47-52, Zagreb, 2001.**
K.W.: regional speleology, ice cave, ice sampling, dating, U/Th, speleothem, Croatia.
- 10-102 Huang, Y. ; Fairchild, I. J. ; Borsato, A. ; Frisia, S. ; Cassidy, N. J. ; McDermott, F. ; Hawkesworth, C. J.: Seasonal variations in Sr, Mg and P in modern speleothems (Grotta di Ernesto, Italy). Chemical Geology, 175, 429-448, 2001.**
Sub-annual variations in trace element chemistry and luminescence have recently been demonstrated from speleothems and offer the potential of high resolution palaeoclimatic proxies. However, no studies have yet examined microscopic trace element variations in relation to modern cave conditions. In this study, the spatial variations in trace element (Sr, Mg and P) concentrations in speleothems (a stalagmite and a soda straw stalactite) from the alpine Ernesto cave (temperature 6.6 ± 0.1 °C) in a forested catchment in NE Italy have been studied using Secondary Ion Mass Spectrometry (SIMS) and compared with environmental parameters and waters in the modern cave. An annual lamination exists in the stalagmite and soda straw stalactite in the form of clear calcite with narrow visible layers, which are UV-fluorescent and interpreted to contain soil-derived humic/

fulvic acids washed into the cave during autumn rains. Microanalyses were undertaken of seven annual laminae, probably deposited during the 1960's, in the stalagmite, and seven laminae in the 1990's for the stalactite.

The analysis results show that Sr consistently has a trough and P a peak centred on the inclusion-rich layer. Mg shows mainly a negative covariation with Sr in laminae formed in the 1990's, but a positive covariation in the stalagmite formed in 1960's. The spatial scale of the main geochemical variations is the same as that of annual laminae of inclusion-poor and inclusion-rich couplets. Mass balance arguments are used to show that the P is inorganic in form and presumably occurs as individual phosphate ions within the calcite.

Most dripwaters show limited chemical variations, but a summer peak in trace elements in 1995 and decrease in Mg/Ca in the following winter are notable. More pronounced covariations in Mg/Ca and Sr/Ca are shown by a site with highly variable drip rates where ratios increase at slow drip rates. The strongest seasonal variations are found in pool waters where ratios increase reflecting significant Ca removal from the water into calcite during the winter in response to seasonal PCO_2 variations in cave air. Thus, the cave waters' compositions tend to reflect climate conditions, such that Mg/Ca and Sr/Ca are tentatively interpreted to be higher when climate conditions are dry.

Combining results from the speleothems and cave water along with the behaviour of each trace species, Mg/Ca variations in the speleothems are considered to reflect their variation in the cave waters, whereas, Sr incorporation is also dependent on precipitation rate, in this case, mainly controlled by temporal variations in PCO_2 in the cave (and conceivably also by inhibitors such as phosphate). P adsorption (a fraction of which is subsequently incorporated within calcite) depends on aqueous phosphate concentration and water flux, both of which should increase during the autumn. Therefore, multiple trace elements profiles in speleothems reflect multiple aspects of environment seasonality and conditions, and hence a calibration against weather records is desirable to establish their palaeoclimatological meaning. The strong annual variation of trace elements, and particularly P, can provide chronological markers for high resolution studies of other climate proxies, such as stable isotopes.

10-103 Huang, Y. ; Fairchild, I. J.: Partitioning of Sr^{2+} and Mg^{2+} into calcite under karst-analogue experimental conditions. *Geochimica et Cosmochimica Acta*, 65, 47-62, 2001.

There is a paucity of experimental data on calcite precipitation from waters at low ionic strength and low ratios of Mg/Ca and Sr/Ca, using controlled and constant precipitation rates. Such data are particularly needed for studies of speleothem geochemistry in relation to palaeoclimates.

We carried out a series of experiments using a karst-analogue set-up in a chamber of constant temperature and 100% humidity. A steady flow of NaHCO_3 and CaCl_2 solutions at PCO_2 around $10^{-3.2}$ were mixed just before passage through a tube (analogous to a soda-straw stalactite) and allowed to drip onto a surface, analogous to a stalagmite. Growth rates were comparable with linear extension rates of natural speleothems.

Analytical spots gave reproducible analyses in later analytical cycles after ablation of

surface calcite with Na and Mg contamination. Different crystals from the same experiment tended to show positive covariation of Na and Mg with negative covariation with Sr. This may be due to the presence of growth hillocks with vicinal faces with differential partitioning behaviour.

The result for the partition coefficient for Mg (D_{Mg}) at 25 °C is 0.031 ± 0.004 , which is quantitatively in good agreement with the trends of previous workers. At 15°C, the result is 0.019 ± 0.003 . The temperature dependency is higher than experimental data on seawater-analogue solutions, but lower than a previous estimate based on a comparison of speleothem chemistry with single water analyses.

Data for D_{Sr} are mainly in the range of 0.057 to 0.078, with a possible weak dependency on growth rate, consistent with previous experimental work. Absolute values are higher than studies in Mg-free saline solutions, which is attributed mainly to salinity effects. Values of D_{Sr} are nevertheless somewhat lower than in natural caves, which may relate to crystal growth factors.

Mg partition coefficient values should allow robust determination of solution Mg/Ca compositions in enclosed caves, which are at constant temperature on the decadal timescale. The inferred sensitivity of D_{Sr} to growth rate factors implies that Sr values should be interpreted more cautiously. Muted changes could relate entirely to growth rate variations, whereas changes of large magnitude imply a control by solution composition. The absence of local (tens of micron scale) antipathetic variations in Sr and Mg in studied natural speleothems, implies that intracrystalline zoning phenomena, if present, are on a finer scale in those natural materials compared with experimental products.

10-104 Humphreys, W. F.; Eberhard, Stefan: Subterranean Fauna of Christmas Island, Indian Ocean. *Helictite*, 37(2), 59-74, Melbourne, 2001.

The subterranean environment of Christmas Island (Indian Ocean) is diverse and includes freshwater, marine, anchialine, and terrestrial habitats. The cave fauna comprises swiftlets, and a diverse assemblage of invertebrates, both terrestrial and aquatic, which includes a number of rare and endemic species of high conservation significance. At least twelve species are probably restricted to subterranean habitats and are endemic to Christmas Island. Previously poorly known, the cave fauna of Christmas Island is a significant component of the island's biodiversity, and a significant cave fauna province in an international context. The cave fauna and habitats are sensitive to disturbance from a number of threatening processes, including pollution, deforestation, mining, feral species and human visitors.

10-105 Jalžić, Branko: [A contribution to history of Biokovo cave exploration] . *Speleolog*, 46/47 (1998-1999), 53-57, Zagreb, 2001.

K.W.: regional speleology, cave history, biospeleology, Croatia.

10-106 Jelinić, Igor: [Ice cave in Lomska duliba]. *Speleolog*, 46/47 (1998-1999), 17-22, Zagreb, 2001.

K.W.: regional speleology, ice cave, cave description, exploration history, Croatia.

- 10-107 Jernigan, Jonathan W.; Swift, Randall J.: A mathematical model of air temperature in Mammoth Cave, Kentucky. Journal of Cave and Karst Studies, 63, 1, 3-8, Huntsville, 2001.**
K.W.: regional speleology, speleoclimatology, mathematical model, air temperature.
- 10-108 Jeschke, A. A. ; Vosbeck, K. ; Dreybrodt, W.: Surface controlled dissolution rates of gypsum in aqueous solutions exhibit nonlinear dissolution kinetics. Geochim. Cosmochim. AC. 65 (1), 27-34, Jan. 2001.**
K.W.: gypsum solution, law of kinetics, karst aquifer in gypsum.
- 10-109 Karmann, Ivo ; Sanchez, Uis Enrique ; Fairchild, Thomas Rich: Caverna Dos Ecos (Central Brazil): Genesis and Geomorphologic Context of a Cave Developed in Schist, Quartzite, and Marble. Journal of Cave and Karst Studies, 63, 1, 41-47, Huntsville, 2001.**
K.W.: regional speleology, cave description, speleogenesis, metamorphic rock.
- 10-110 Kaufmann, O. ; Pauwels, M. ; Quinif, Y.: 18 trous à 2.200 m : explorations sur le karst de la Bannalp (Oberrickenbach, Nidwald, Suisse). Stalactite, 51, 23-38, 2001.**
K.W.: speleology, Switzerland.
- 10-111 Kebe, Vekoslav: [Seasonal Lake at Cerknica, a Wonder of Karst Nature] . 40 p., Dolenje Jezero, 2001.**
K.W.: regional karstology, hydrology, ornitology, ethnology.
- 10-112 Kepa, Tanja: Karst conservation in Slovenia. Acta carsologica, 30/1, 143-164, Ljubljana, 2001.**
Karst areas cover 44 % of Slovenian territory. As well as for the area it covers, karst is important for its natural and economic value, specially due to its storage capacity of water. To date, karst areas are increasingly threatened by intensive agriculture practices and industrial activities as well as settlement and infrastructure developments. Due to its overall value on the one hand, and risks and threats to the karst systems on the other, an effective protection of the surface and subterranean areas and karst water is required. To date, 40 % of karst water sources and 13 % of caves are protected by law, and 13 % of all karst is included in the system of protected areas in Slovenia. This situation will improve when the five proposed regional parks in the karst areas are established. 60 % of the Slovenian karst areas will be then legally protected. Although the current legislation in nature conservation has no protection measures specifically for karst systems, it still provides some instruments for their conservation. For a comprehensive conservation of karst systems, both water and cave laws have to be passed in parliament as soon as possible.
- 10-113 Klimchouk, Alexandre ; Kasjan, Youri: A la recherche du moins 2000. Le gouffre Krubera (Voronya). Spelunca, 82, 2, 15-24, Paris, 2001.**
K.W.: regional speleology, cave description, exploration history, depth record -1710 m.

- 10-114 Knez, Martin ; Slabe, Tadej: Shape and rock relief of pillars in Naigu Stone Forest (SW China). Acta carsologica, 30/1, 13-24, Ljubljana, 2001.**

Stone forests have evolved from underground karren. The shape of rock pillars and their rock relief are controlled by different rock beds where they developed at various levels and by underground factors and rainwater.

- 10-115 Knez, Martin ; Slabe, Tadej: The lithology, shapes and rock relief of the pillars in the Pu Chao Chun stone forest (Lunan stone forests, SW China). Acta carsologica, 30/2, 129-139, Ljubljana, 2001.**

The Lunan stone forests developed from subterranean limestone karren. The shape of the rock pillars and their rock relief result from a combination of the characteristics of varyingly thick rock strata, on which they developed at various heights, and the effects of underground factors and precipitation.

- 10-116 Knez, Martin ; Slabe, Tadej: Unroofing of a cave system - an example from Classical Karst. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 105/S1. Published on CD 2001.**

Old caves are being exposed due to lowering and dissecting of a karst surface. The surface either uncovers or intersects them. In the first case the unroofed caves display the form of an oblong indentation and in the second a doline-like feature. Repeatedly intersected passage is shown as a series of described features. The most expressive are these features when the transport of sediments out of the caves is faster than the lowering of the nearby carbonate surface. A bigger cave system near Kozina indicates a diversity of exposing types. A smaller and already vacant passage was known before the earth works for motorway construction started. Other passages were filled up by fine-grained and gravel flysch deposits. Some of them have a thin roof other were roofless already. At the surface parts of a cave system are seen as a system of different indentations and doline-like features.

- 10-117 Knolle, Friedhart: Nazi-"Höhlenerlasse", militärische Höhlenkataster und alierte höhlenkundliche Geheimdienstberichterstattung. Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher e.v., 47, 2, 48-50, München, 2001.**

K.W.: nazi cave register, regional speleology.

- 10-118 Kogovšek, Janja: Monitoring the Malenščica water pulse by several parameters in November 1997. Acta carsologica, 30/1, 39-53, Ljubljana, 2001.**

The results of single event observations of the Malenščica near Planina after the first intensive and abundant autumn rain in November 1997 are given. In the time when the discharge from minimal annual value increased to maximal annual discharge of 10 m³/s the water level, temperature and specific electric conductivity were measured in pumping reservoir at the spring by datalogger. At the same time the water was sampled to define carbonate, calcium, magnesium, nitrate, chloride, sulphate and o-phosphate levels as well as measurements of Uranin which remained at its injection in June 1997 of water tracing at Poček. The results show that the old water from the more permeable part of the Javorniki

recharge area reach the Malenščica first followed later by water from the less permeable part and by infiltrated rain. This inflow is complemented by secondary inflow which in the initial part means an important pollution transport when the riverbeds are rinsed. Later the accumulated water from Cerknjiško jezero represents an important, rather permanent inflow to the Malenščica which is indicated by the Malenščica temperature up to the end of November.

10-119 Kogovšek, Janja: Observations of the Reka flood pulse in May 1999. Acta carsologica, 30/1, 55-68, Ljubljana, 2001.

The results of temperature, pH and specific electric conductivity measurements done on a 10 minute basis are given, supplemented by the analyses of carbonate, calcium, magnesium, nitrate, sulphate, chloride, o-phosphate, COD and BOD₅ levels in water samples of the Reka flood pulse from May 20 to 25, 1999. The middle part of the pulse showed the strongest pollution transport by the Reka underground; in spite of great dilution it is clearly seen in the nitrate and sulphate concentration curves and slightly less in o-phosphate and chloride curves.

10-120 Kranjc, Andrej: About the Name Kras in Slovenia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 193/S4. Published on CD 2001.

The international term karst derived from the name of the karst plateau in the background of Trieste bay (Adriatic sea), on the Slovene-Italian border, called Kras in Slovene, Carso in Italian language and Karst in German. In the antiquity it was called Carsus, Carusadus, Mons Carusad, etc., which came from the pre-Indo-European or Indo-European root *kar/gar, kara/gara*, meaning rock, stone. Italian form Carso is nearer to the origin, while Slovene name Kras changed little more according to the laws of evolution of the Slovene (the group of Slavic languages) language. In the literature there are known numerous examples of names derived from the pre-Indo-European base *kar(r)a/gar(r)a* all over Europe. The same base covers different forms **kal-, *gal-, *kar-, *gar-, also *al-, *ar-*.

Furthermore the word of the regional name Kras in the Slovene language has also a common meaning, that is a rocky, stony, no good or useful (for cultivation or pasture) part of land. In nowadays Slovenia as well as on the whole territory which was settled by the Slavic tribes between the 6th and 8th centuries, it is possible to find names derived from kras. When we are talking about the term "karst" we are usually considering only the direct link **kar(a)/gar(a) > Carusadus > Kras (Karst, Carso)*. But in fact this is only one of the regions, which got the name from stone, regarding its stony character. There are other regions too, having the names from the same root. And beside the regional names there are numerous names, as toponyms, names of geographical and morphological features, of settlements (from towns to hamlets and isolated farms), and of waters. In the paper these names are treated more in detail and explained.

- 10-121 Kranjc, Andrej ; Liu, Hong: Lunan »Shilin« (Stone Forest), human impact and protection of (eventual) World Heritage Site (Yunnan, China). Acta carsologica, 30/1, 25-38, Ljubljana, 2001.**

The Chinese expression »Shilin« (stone forest) is becoming an international term meaning megakarren, that is a »forest« of intensively corroded limestone pinnacles. The best known is Shilin near the town of Lunan. The first known description of Shilin is from 1382. Shilin is very important tourist site. Modern tourism began to develop in 1980, in 1999 the number of visitors reached over 2 million. In 1981 the whole area (350 sq. km) was protected. Under the auspices of the National Ministry of Construction material is being collected for an application to inscribe Shilin into the list of World's Natural Heritage at UNESCO. Related to human impact the most important threats are: exploitation (destruction) of limestone pinnacles as a source of rock material; the pressure of population towards the protection zone due to their increase (need for new building plots); agriculture (farming and stockbreeding) connected to soil erosion and underground water pollution (use of fertilisers); fast growth of visitor numbers. The Shilin administration introduced different protection measures: ban on rock (limestone pinnacles) exploitation in the protection zone (orientation towards afforestation); construction of new tourist facilities out of the core zone (and demolition of some of them in that zone); establishment of a special protection department within Shilin management (18 person); education of »special voluntary rangers« - recruited among highly respected persons of villages and towns in the region.

- 10-122 Kranjc, Andrej: Mednarodna delavnica "Monitoring v kraških jamah - Monitoring of karst caves", Škocjan, 23. 25. november 2001. Acta carsologica, 30/2, 295-296, Ljubljana, 2001.**

K.W.: report.

- 10-123 Kranjc, Andrej: Vladimir Panoš, Karsologická a speleologická terminologie, 352 str., Knížné centrum, Žilina, 2001. Acta carsologica, 30/2, 297-299, Ljubljana, 2001.**

K.W.: book review.

- 10-124 Kranjc, Maja: Škocjanske jame, an addition to bibliography. Acta carsologica, 30/1, 213-228, Ljubljana, 2001.**

This bibliography is an addition to the bibliography of Škocjanske jame published in 1996. It contains 193 references; they were mostly published after 1996 yet there are some older references.

- 10-125 Kuhta, Mladen ; Jalžić, Branko; Novosel, Anđelko: [The spring of Gojak cave]. Speleolog, 46/47 (1998-1999), 3-12, Zagreb, 2001.**

K.W.: regional speleology, cave diving, report, Croatia.

- 10-126 Kuhta, Mladen: [Speleological objects in the over-thrust structure of the Rječina]. Speleolog, 46/47 (1998-1999), 23-29, Zagreb, 2001.**

K.W.: regional karstology, geology, hydrogeology, mapping, regional speleology, list of caves, Croatia.

- 10-127 Kuhta, Mladen: [Cave diving of the Slunjčica spring]. Speleolog, 46/47 (1998-1999), 30-34, Zagreb, 2001.**
K.W.: regional speleology, karst spring, cave diving, Croatia.
- 10-128 Lalkovič, Marcel: The cave in Postojna in Slovak literature before 1918. Acta carsologica, 30/2, 267-277, Ljubljana, 2001.**
Mentions of Postojnska Jama can be found in the then Slovak periodicals before 1918 already. The greater part of them was published in Slovakia, some of them in Budapest or in Vienna (*Domová pokladnica, Slovenské noviny, Lipa, Sokol, Pešt'budínske vedomosti, Obzor*, etc.). They belong to the second part of the 19th century - the period when Slovak language was codified as a standard language. At that time the most important and maybe the most visited cave of the Monarchy attracted scientific sphere and common public alike. Therefore also Slovak periodicals tried to inform their readers.
- 10-129 Lalkovič, Marcel: [Jan Majko, life of a caver]. 183 p., Liptovský Mikulaš, 2001.**
K.W.: Majko Jan, cave history, regional speleology.
- 10-130 Laumanns, Michael/Compiled by: Tanzania 1994-2000. Report on the International Speleological Projects in the Matumbi Hills (Kilwa District), Tanga and Zanzibar. s.n., 67 p., Berlin, 2001.**
K.W.: regional speleology, expedition, cave description, exploration history.
- 10-131 Lauritzen, Stein-Erik: Marble stripe karst of the Scandinavian Caledonides: An end-member in the contact karst spectrum. Acta carsologica, 30/2, 47-79, Ljubljana, 2001.**
Stripe karst is an extreme case of contact karst, where the allogenic contact perimeter is very large relative to the area of the karst outcrop. This is the dominant karst found in metamorphic marble outcrops of the Scandinavian Caledonides, and is named *the Norwegian karst type*, as it was first described here by the Norwegian geologist Gunnar Horn. Analysis of the geometric properties of a stripe suggests that stripe karst can be defined as a narrow karst outcrop with length to width ratio (γ) greater than 3 and is fully developed when $\gamma = 30$. Stripe karst contacts are either sub-vertical, or inclined with confined or perched contacts.
- 10-132 Lismonde, Baudouin: L'âne de Buridan, le principe de Curie et l'effet cheminée. Courants d'air dans les cavités en forme de U. Karstologia, 37, 23-28, s.l., 2001.**
K.W.: regional speleology, air circulation, temperature variations, speleometeorology.
- 10-133 Losson, B. ; Quinif, Y.: La capture de la Moselle. Nouvelles données chronologiques par datations U/Th sur spéléothèmes. Karstologia, 37, 29-40, 2001.**
K.W.: sediment, datation, France.
- 10-134 Lucas, Phil; Collings, Dave: The Helictite Cave Log. NSS News, 59, 1, 4-13, Huntsville, 2001.**
K.W.: regional speleology, cave description.

- 10-135 Macaluso, T. ; Madonia, G. ; Palmieri, A. ; Sauro, U.: Atlante dei karren nelle evaporiti della Sicilia (Atlas of karren in the evaporitic rocks of Sicily). Quaderni del Museo Geologico “G.G. Gemellaro”, Dipartimento di Geologia e Geodesia, Università di Palermo, 5, 143 p., 2001.**

Messinian age gypsum and related evaporites outcrops in western Sicily over an area larger than 1000 km². Here, gypsum outcrops widely, also as a consequence of soil erosion induced by human impact. On the rocky surfaces a wide range of forms different for both the size and the type and very interesting from the aesthetic and the morpho-dynamic point of view are impressed. There are large, medium, small, and micro-sized forms distinguishable as different morpho-types. The Atlas illustrates the most typical morpho-types, especially the small forms originated by solution process (Karren). Also the main geomorphological environments are described. A large number of color photographs (more than one hundred) help in the illustration of the landforms and of the landscapes. The captions of the photographs are both in Italian and in English.

- 10-136 Mader, Brigitta: Karst and Caves in the works of the Austrian Archduke and natural scientist Ludwig Salvator. Acta carsologica, 30/1, 165-179, Ljubljana, 2001.**

The Austrian Archduke and scientist, Ludwig Salvator, who is well known in speleology as the promotor of the explorations of the Cuevas del Drach in the island of Mallorca made by E.A. Martel in 1896, was also interested in karst and caves generally, as he demonstrated by always pointing out various speleological phenomena of the islands and geographical regions he visited. Therefore the author decided to pick out and publish for the first time Ludwig Salvator's descriptions, observations and designs in karstology in a geographical sequence and to present his works as a source for the history of karst research and speleology. In the present paper will be treated the Kvarner region, which occupied Ludwig's interests very early.

- 10-137 Maire, Richard: Philippe Renault (1925-2001). Un des fondateurs de la spéléologie moderne. Karstologia, 37, 1-9, s.l., 2001.**

K.W.: Renault Philippe, In memoriam.

- 10-138 Marinos, Paul G.: Tunelling and mining in karstic terrane: an engineering challenge. Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 3-16, Lisse etc., 2001.**

K.W.: karstology, construction on karst, tunnel, mining.

- 10-139 Meek, Paul D.: The History of Christmas Island and the Management of its Karst Features. Helictite, 37(2), 31-36, Melbourne, 2001.**

Christmas Island (Indian Island) is an external Territory of Australia with a history pre-dating that of mainland Australia. It hosts a diverse range of endemic and native terrestrial, subterranean and aquatic flora and fauna with Australian, Indo-Malesian and Pacific affinities. The Island has survived the impacts experienced on other tropical islands as a

result of human settlement and is a highly valued ecological asset to Australia. The karst environment has been under-valued as an ecological entity until recently when extensive speleological surveys were conducted. These surveys were a part of broader attempts to prepare a management plan to conserve the values of the karst environment.

- 10-140 Meiman, Joe ; Groves, Chris: Field Trip Guide, Part 2: The Mammoth Cave Karst aquifer. Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 425-436, Lisse etc., 2001.**

K.W.: regional karstology, regional speleology, field guide, karst hydrology, USA.

- 10-141 Mihevc, Andrej: [The Speleogenesis of the Divača Karst]. Zbirka ZRC, 27, 180 p., Ljubljana, 2001.**

A number of caves and the surface were selected and studied from the development of the first channels to the time when karst denudation removes the rock around caves and destroys them. The oldest caves are incorporated into the present surface as specific relief forms - unroofed caves. The largest one is 1800 m long. About 18 km long and up to 275 m deep cave system of the Reka river in Škocjanske jame and in Kačna jama was studied. Flowstone dating showed the periods of growth in warmer Pleistocene periods. Dating of younger stalagmites showed the end of the massive sedimentation of the sinking rivers and beginning of the Holocene flowstone deposition before about 16Ka.

- 10-142 Mihevc, Andrej ; Sket, Boris ; Pruner, Petr ; Bosak, Pavel: Fossil remains of a cave tube worm (Polychaeta: Serpulidae) in an ancient cave in Slovenia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 009/S3. Published on CD 2001.**

Calcareous tubes, matching those of the modern cave tube worm *Marifugia cavatica* Absolon & Hrabe in shape and dimensions, were found attached to the wall of a fossilized cave on the Kras plateau, W Slovenia. Due to the supposed absence of any marine influences in that cave, the fact that *Marifugia* is the only freshwater serpulid known at all, and the mentioned similarity, we supposed that the fossil tubes belonged to the same species or its ancestor. Paleomagnetic dating of the sediment fill shows minimal possible age of 1,7 Ma which corresponds to geomorphological observations

- 10-143 Mihevc, Andrej: Use of the Caves as Mass Graveyards in Slovenia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 162/S4. Published on CD 2001.**

This paper provides a brief account of cave use as a mass graveyard in the time from 1941-1945. People were killed at the entrances and then thrown into shafts. Afterwards these entrances were blasted and intentionally filled up thus hiding the evidence for tens of years. In the Cave Register of the Speleological Association of Slovenia 86 caves with human remains are reported. The exact number of people killed cannot be established, an identification of only few individuals was possible. Most of the people were of Slovene origin.

- 10-144 Millo, Pierre ; Robin, Yves ; Schira, Francis: Un prolongement aval dans l'aven Fourchu (Gourdon, Alpes-Maritimes): le réseau Djé. Spelunca, 83, 3, 39-49, Paris, 2001.**

K.W.: regional speleology, cave description, exploration history.

- 10-145 Mocchiutti, Andrea: Contact caves in flysch formations - Friuli Region - northeast Italy. Acta carsologica, 30/2, 157-164, Ljubljana, 2001.**

Most of the discovered caves inside Bernadia mountains and Natisone Valley (northeast Italy) are positioned inside flysch formations at the limestone-marl contact. The longest contact cave in this area reach up to 7 kilometers, but several caves are more then one. The karstic flowpattern begins at the limestone marl contact, but rooms usually develop rapidly throughout a process called "erosion - dissolution" inside marl and sandstone beds, the limestone strata constitutes the compact and massive ceiling of the cave. Several examples are reported, with pictures and geological cross sections.

- 10-146 Móga, János: Contact karst phenomena on the edge of the Galyaság (Gömör-Torna karst). Acta carsologica, 30/2, 115-128, Ljubljana, 2001.**

The lowest part of the karst region, the Galyaság, incorporating low middle mountains and hilly territories is situated on the Southern border of the Gömör-Torna Karst. The Galyaság is the mosaic of diverse structural and superficial regions. Running from West to East it can be divided into 4, more or less morphologically diverse territories. Its Western part, resembling to the Aggteleki-plateau is built from limestone with strong inclination towards karstification. On the edge of the karst plateau, around the Pitics-mount, non-karstified rocks also appear, which become predominant towards the East. The Teresztenye-plateau (Galya-wood) is a karstic island in the ring of Lower Triassic slate and Pannon sediments. On the Eastern border of the Galyaság, on the territory neighbouring the Bódva-river no karstic rocks can be found. On the characteristic allogenic karst of the Galyaság, in the formation of the surface and sub-surface forms, besides the corrosion of the infiltrating waters, the corrosion-erosion effects of the outflowing and the disappearing waters in swallow holes coming from the neighbouring non-karstic regions can be well observed. In the paper the observations accomplished on the border area of the Galyaság, during the research of the phenomena of the contact karst, are presented.

- 10-147 Mottershead, Derek ; Lucas, Gerald: Field testing of Glew and Ford's model of solution flute evolution. Earth Surface Processes and Landforms, 26, 8, 839-846, s.l., 2001.**

K.W.: flute, rock relief, microforms, dissolution, dating, Glew, Ford, model.

- 10-148 Mulec, Janez ; Rupnik, Maja ; Zupan Hajna, Nadja: Comparison of the culturable bacterial flora from three microenvironments from Pečina v Borštu cave (South-west Slovenia). Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 073/S3. Published on CD 2001.**

Pečina v Borštu cave is situated in the karst area of Matarsko podolje in the south-west part of Slovenia. The cave was formed in Upper Cretaceous limestone which is in some parts of the cave extremely weathered. We have analysed samples from three different

microenvironments in this cave: silver flashing droplets, water from a small pond and weathered limestone bedrock of the cave wall. In the water sample approximately 10^4 colony forming units (CFU) per millilitre were detected, whereas the weathered limestone contained approximately 10^6 CFU per millilitre. Fluorescent pseudomonads were found in all three environments. In the silver droplets a single species of a fluorescent pseudomonad was isolated. The bacterial flora in other two environments was more diverse; Gram negative nonfermentative bacteria and actinomycetes were isolated from both samples. The water contained also violet pigmented bacteria and Gram positive cocci.

- 10-149 Mylroie, John E. ; Jenson, John W. ; Taborosi, Danko ; Jocson, John M. U. ; Vann, David T. ; Wexel, Curt: Karst features of Guam in terms of a general model of carbonate island karst. *Journal of Cave and Karst Studies*, 63, 1, 9-22, Huntsville, 2001.**

K.W.: regional karstology, CIKM, coastal karst, carbonate island, karst morphology, tropical karst, dissolution.

- 10-150 Nicholson, Dawn T.: Pore properties as indicators of breakdown mechanism in experimentally weathered limestone. *Earth Surface Processes and Landforms*, 26, 8, 819-838, s.l., 2001.**

K.W.: porosity, limestone, dissolution, breakdown, morphology.

- 10-151 Orndorff, Randall C. ; Weary, David J. ; Šebela, Stanka: Geologic framework of the Ozarks of South-Central Missouri - contributions to a conceptual model of karst. In: Kuniansky, Eve L. (Ed.). *U.S. Geological Survey Karst Interest Group proceedings, St. Petersburg, Florida February 13-16, 2001, (U.S. Geological Survey WRIR report, 01-4011)*. Atlanta: U.S. Department of the Interior: U.S. Geological Survey, 18-24, 2001.**

A geologic framework is required to understand the environmental impact of proposed mining of lead and zinc on large springs in the karst area of south-central Missouri. Information about lithologies, faults, joints, and karst features (sinkholes, caves, and springs) contributes to the development of a conceptual model of karst hydrogeology. Conduits and caves along bedding planes and joints provide avenues for ground-water recharge, movement, and discharge. The trend of joints was studied to determine if they controlled the orientation of cave passages and conduits. The data show that cave passages are curvilinear and do not correlate well with measured joint trends. Instead, stratigraphy, bedding-plane dip, and local base level affect conduit and cave development. The majority of caves in south-central Missouri have developed within stromatolitic dolomite horizons beneath sandstone beds. It is thought that the sandstone beds act as confining units allowing artesian conditions and mixing to occur beneath them, thus enhancing dissolution. Joints and the high primary porosity of the stromatolitic dolomite beds form openings in the bedrock that initiate solution. Where a solution-widened joint intersects a bedding plane, lateral movement of ground water is controlled by the bedding plane.

- 10-152 Orombelli, G. ; Sauro, U.: Aspetti geomorfologici delle frane della dorsale di monte Zugna. In: Dinosauri in Italia (a cura di Leonardi G. & Mietto P.), Accademia Editoriale, Pisa, 339-360, 2001.**

The large rock-avalanche type landslide of Lavini di Marco has interested the bedding plane slope of the homoclinal ridge of M. Zugna, a part of the west facing left slope of Adige Valley south of Rovereto.

The ridge is made up mostly by Jurassic limestones. The total length of the landslide is 5,6 km, the surface interested by it about 3,8 km², and the volume about 41 millions of cubic meters. On the base of the morphostructural and geomorphological features it is possible to outline the dynamic of the landslide. Some radiocarbon based ages of buried soils are discussed and the degree of development of karren on the detachment surface is described. Even if it is not possible to give an exact age to the landslide, the main sliding episode is probably no older than two thousand years. In this region the degree of development of solution features on the detachment surfaces and on large landslide blocks help to determine a "relative geomorphological stratigraphy" of the main landslides occurred during Holocene.

- 10-153 Osborne, Armstrong: A brief introduction to the karst geology of Wombeyan caves. Australiasian Cave & Karst Management Association Journal, 42, 5-7, s.l., 2001.**

K.W.: regional speleology, geology, speleothem.

- 10-154 Osborne, R. A. L.: Karst Geology of Wellington Caves: a review. Helictite 37(1), 3-12, Melbourne, 2001.**

After 170 years of scientific investigation and speculation, significant problems in the karst geology of Wellington Caves remain unsolved. Work in progress is addressing issues relating to: the role of the geological structure in cave development; the mechanism of cave formation; the palaeontology, stratigraphy and sedimentology of the cave sediments; the origin of the phosphate deposits and the relationship between the caves and the surrounding landscape. Little progress has been made in understanding the hydrology of the karst or the meteorology of the caves. These latter problems will require long-term monitoring and data collection, which has yet to commence.

- 10-155 Osborne, R. A. L.: Monitoring - Bistveno in nebistveno, Significance and Monitoring. Kras. November 2001, 49, 45-46. (International Workshop, Monitoring in Karst Caves, Škocjanske jame, November 2001. Published in Slovene & English) 2001b.**

An inventory survey followed by a significance assessment process, are essential precursors to any cave monitoring program. Monitoring must not be seen as an end in itself, but as part of an integrated, significance-based management process.

It is essential to know what is significant, the conditions necessary to maintain its significance and that the condition and integrity of significant elements is being maintained. For instance, if the significance of a mud deposit is not known, monitoring the condition of speleothems will not stop the mud deposit from being destroyed by high-pressure water cleaning. Similarly, there is little point in monitoring temperature if dust is the main threat to the significant elements.

The only way to know that monitoring of environmental conditions is effective is to monitor the ongoing condition and integrity of the significant elements themselves. Without this, lots of interesting data could be collected while the most important features of the cave are lost.

Monitoring should therefore address:

1. The conditions necessary for the maintenance of significance
2. The ongoing condition and integrity of significant elements

The key components of a significance-based approach to monitoring are given in the table below:

A SIGNIFICANCE-BASED APPROACH TO MONITORING

	QUESTIONS	ACTIONS
1	What things (elements) are significant?	A Inventory Survey B Significance Assessment C Condition and Integrity Assessment
2	What conditions are required to maintain significance?	A Risk/Threat Assessment B Management Plan C Management Action
3	How can we tell: - 3.1 If appropriate conditions are being maintained? 3.2 If significance is being maintained?	A Pre Monitoring Research B Monitoring Design C Commence Monitoring D Archive Data E Analyse Data
4	What should be done?	A Information to Management B Management Decision D Management Action

10-156 Osborne, R. A. L.: New Science of Eastern Australian Caves: Implications for Management and Interpretation. Fourteenth Australasian Conference on Cave and Karst Management, Wombeyan Caves, New South Wales, 29 April - 6 May 2001, Conference Handbook, 15, 2001a.

Over the last 20 years it has become increasingly clear that traditional scientific understandings fail to account for many of the key characteristics of caves developed in the Palaeozoic limestones of eastern Australia. These include many of our best-known show caves such as Jenolan and Wombeyan.

A new scientific view of these caves is currently developing which recognises, and attempts to account for:

- Evidence for many phases of cave development occurring over hundreds of millions of years.
- Exposure of palaeokarst deposits in caves (unusual on an international scale).

- Cave development in steeply dipping limestone.
- Poor relationship between surface and underground geomorphology.
- Poor relationship between surface and underground drainage.
- Unusual patterns of cave development, including downward-narrowing caves.
- Development of blind “passages” (Halls) and cupolas.
- Unusual mineral assemblages.

The new science suggests that:

- Rising ground water, rather than sinking surface water, played a significant role in cave development.
- Sinking streams have largely modified the caves, rather than formed them.
- Sediment blockage and paragenesis have played an important role in the development of both surface and underground landscapes.
- Many of the features of the caves result from processes that were active hundreds of millions of years ago.

Management and interpretation of these caves appears to rest on two assumptions:

1. Surface catchment management is the key to conservation.
2. We currently know what the significant features of the caves are, and are conserving and interpreting them.

The new science challenges both of these views. If key features of the cave are the products of non-meteoric processes in the distant past, then managing the catchment (while an important conservation tool in its own right) will not conserve them.

If the internationally significant features of the caves are not recent speleothems, but fragile mud deposits (possibly hundreds of millions of year old) and strange, fragile, mineral deposits, then our lack of knowledge of them (and the water cleaner) poses greatest threat to their survival.

The new science suggests that inventory studies (and significance-based management and interpretation, following the Australian Natural Heritage Charter) are urgently required for best-known caves in eastern Australia, particularly if we have World Heritage listing in mind.

10-157 Osborne, R. A. L. ; Cooper, I. B.: Sulfide-bearing palaeokarst deposits at Lune River Quarry, Ida Bay, Tasmania. Australian Journal of Earth Sciences. 48, 401-416, 2001.

The Lune River Quarry at Ida Bay, Tasmania exposes numerous palaeokarst features developed in the Ordovician Gordon Limestone. These palaeokarst features contain carbonate and siliciclastic deposits probably representing Late Devonian to early Late Carboniferous and Late Carboniferous karstification and sedimentation. Five facies of palaeokarst deposits are recognised, namely megabreccia, graded-bedded carbonate, laminated sandstone/siltstone, diamictite/quartz lithic sandstone and coarse crystalline calcite. Pyrite, dolomite and sphalerite were emplaced in the palaeokarst deposits after the Carboniferous. These deposits are probably associated with a phase of hydrothermal cave development in Exit Cave, which adjoins the quarry. Pyrite weathering accounts for the abundance of gypsum speleothems and cave breakdown in Exit Cave.

- 10-158 Osborne, R. A. L.: Australian caves without roofs. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 134/S1. Published on CD 2001.**

While “caves without roofs” have only recently been recognised in parts of Europe, they have been recognised in Australia since the 1870s. Some of Australia’s most significant Cainozoic vertebrate fossil deposits at Wellington and Wombeyan in New South Wales and at Riversleigh in Queensland occur in, or are closely related to, unroofed caves. Ongoing palaeontological work in the World Heritage Fossil Site at Riversleigh, karst documentation in northern New South Wales, karst mapping using differential GPS at Wellington and recent reconnaissance fieldwork has shown that these features are more common than was previously thought. Caves without roofs offer an opportunity for new insights into the development of Australia’s ancient landscapes.

- 10-159 Osborne, R. A. L.: Halls and narrows: Network caves in dipping limestone, examples from eastern Australia. Cave and Karst Science. 28 (1), 3-14, 2001b.**

Structurally guided network caves formed in limestones dipping at greater than approximately thirty degrees differ in plan and section from maze caves developed in horizontal to gently dipping limestone. These caves are characterised by the development of large elongate cavities oriented along strike called *halls* and smaller, short cavities oriented perpendicular to strike called *narrows*. Halls typically terminate blindly along strike. A range of hall and narrows development is recognised, resulting from increases in dip and differing disposition of joints. Entrances to hall and narrows caves appear to have little genetic relationship to the caves. Hall and narrows caves are common in the steeply dipping Palaeozoic limestones of eastern Australia. While the origin of these caves has yet to be completely explained, many of their features suggest that hydrothermal or artesian water had a role in their development.

- 10-160 Osborne, R. A. L.: Non-meteoric speleogenesis: evidence from eastern Australia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 131/S1. Published on CD 2001a.**

Many caves in Palaeozoic limestones of eastern Australia have morphological, hydrological and mineralogical features indicating a non-meteoric, hydrothermal or artesian origin. Some caves decrease in volume with depth. Structurally-guided cavities frequently terminate in blind ends. Cupolas, spongework, pockets and blades are common. Many caves intersect palaeokarst. Caves are often poorly related to the surrounding hydrology. Some caves and whole karsts lack streamsinks, springs or both. Cave streams post-date the main phase of excavation. Palaeokarst and less-soluble bedrock is altered, with pyrite and dolomite emplaced. These weather to form aragonite, huntite and gypsum. Etched walls, spar coatings and boxwork are common. Some caves contain remnants of iron-rich carbonate fills.

- 10-161 Osborne, R. A. L.: Petrography of lithified cave sediments. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 132/S1. Published on CD 2001b.**

Lithified cave sediments occur in palaeokarst deposits, relict caves and “caves without roofs”. Lithification and diagenesis can transform the whole range of cave deposits into indurated rocks. These often contain fossils and are frequently misidentified as flowstone. In vadose conditions meniscus cement forms in coarse clastics. Water seeping through entrance facies emplaces spar and flushes out fines, forming pelletal and caliche-like textures. Speleothem recrystallises, losing depositional texture. In phreatic conditions acicular cements form which change by neomorphism to blocky spar. Carbonate sands and muds, deposited in caves flooded by the sea, resemble marine limestones. Lithified lime muds from caves resemble marine mudstones.

- 10-162 Palmer, Arthur N.: Dynamics of Cave development by Allogenic water. Acta carsologica, 30/2, 13-32, Ljubljana, 2001.**

Streams that drain from non-karstic surfaces tend to have great discharge fluctuations and low concentrations of dissolved solids. Where these streams encounter karstic rocks they can form caves with hydraulic and chemical dynamics quite different from those fed by autogenic recharge (e.g. through dolines). Caves in carbonate rocks that are fed by allogenic streams have a relatively short inception period, after which the mean-annual rate of dissolutional wall retreat is typically about 0.01 cm/yr. Most of the annual growth takes place during a few major floods that occupy only a small fraction of the year. Local growth rates can be enhanced by abrasion from sediment. During floods, highly aggressive water is delivered rapidly to points deep within the karst aquifer. As flood discharge increases, cave streams become ponded by constrictions caused by detrital sediment, insoluble beds, or collapse material. Because the discharge during a flood rises by several orders of magnitude, the head loss across constrictions can increase enormously, causing water to fill parts of the cave under considerable pressure. This highly aggressive water is injected into all available openings in the surrounding bedrock, enlarging them at a rapid and nearly uniform rate. Depending on the structural nature of the bedrock, a dense array of blind fissures, pockets, anastomoses, or spongework is formed. Many such caves develop traversable mazes that serve either as bypass routes around constrictions, or as “karst annexes”, which store and later release floodwaters. Many features that are sometimes attributed to slow phreatic flow or mixing corrosion are actually generated by ponded floodwaters. In caves that experience severe flooding, adjacent fissures or bypass routes with initial widths at least 0.01 cm can grow to traversable size within 10,000 years.

- 10-163 Pellegrin, Jean-Christophe ; Salomon, Jean-Noel: Hydrocompaction, dissolution, suffosion et soutirage. Contribution à la formation des dépressions fermées. Karstologia, 37, 54-56, s.l., 2001.**

K.W.: karst morphology, dissolution, doline, morphogenesis, processes.

10-164 Perica, Dražen ; Buzjak, Nenad: Contact karst of Southern Velebit (Croatia). Acta carsologica, 30/2, 103-113, Ljubljana, 2001.

Due to the predominance of soluble and broken carbonate beds on Velebit Mt., karst is main relief type there. But there also contact karst or fluviokarst occurs. It is developed in the parts where the alternation of permeable carbonate and less permeable or impermeable Carboniferous, Permian and Triassic beds occurs. Most significant contact karst forms in the area of Southern Velebit are Oštarijsko polje, Crno vrilo creek blind valley and Bunovac valley.

10-165 Perroux, Anne-Sophie: Etude du fonctionnement d'une cavité englacée durant un cycle climatique. Site de la glacière d'Autrans (Vercors). Premiers résultats. Karstologia, 37, 41-46, s.l., 2001.

K.W.: ice cave, dynamics, climatic changes, temperature, air circulation, morphometry.

10-166 Petrič, Metka: 30th IAH Congress groundwater: Past achievements and future challenges. Acta carsologica, 30/1, 231-232, Ljubljana, 2001.

K.W.: report.

10-167 Petrič, Metka: The role of accurate recharge estimation in the hydrodynamic analysis of karst aquifers. Acta carsologica, 30/1, 69-84, Ljubljana, 2001.

For the karst aquifer in the background of the Vipava springs in south-western Slovenia the first the model of the recharge estimation was set on the base of the method of soil moisture balance. Additional to precipitation, the influences of the interception on vegetation cover, snow and snowmelt, evapotranspiration, water storage in soil, rapid recharge and secondary infiltration were also considered in this model. It was calibrated by comparison with the discharges of the Vipava springs and then the daily values of recharge were estimated. To test the role of such accurate estimation of the recharge in further hydrodynamic analysis of karst aquifers, the black-box method was used. As the input signal in the supposed linear system the measured precipitation was first adopted, and then the estimated recharge values. It was demonstrated by comparison of results that the introduction of the recharge function significantly improves the model. In this way the important influence of the processes in the air, vegetation and soil on the amount and the time distribution of the recharge, and through this also on the hydrodynamic functioning of karst aquifers, was proved.

10-168 Peško, Matuš: [Physico-chemical properties of the percolation water in Važecka jaskyna]. Aragonit, 6, 19-21, Liptovský Mikuláš, 2001.

K.W.: regional speleology, percolation water, water chemistry, Slovakia.

10-169 Pipan, Tanja ; Brancelj, Anton: Ratio of copepods (Crustacea: Copepoda) in fauna of percolation water in six karst caves in Slovenia. Acta carsologica, 30/2, 257-265, Ljubljana, 2001.

Hypogean fauna from percolation water and from puddles, filled with percolation water from six cave systems in Slovenia, was studied in the period 2000/2001. Special attention

was given to the ratio of copepods (Crustacea: Copepoda) to the other taxa in the samples. Four categories of small water-bodies were distinguished: direct water jets from the ceiling, permanent small depressions on stalagmites filled with water, puddles on clay and puddles on calcareous sinter. Faunal data are supplemented with other information, including geographical position of the caves, physical and chemical parameters of water quality, cave roof thickness, geological structure of the limestone strata, hydrology and vegetation above the caves.

- 10-170 Pipan, Tanja ; Brancelj, Anton: Preliminary researches concerning ecology and dynamics of the subterranean realm - especially of percolation waters and puddles filled with percolation water. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 152/S3. Published on CD 2001.**

Biodiversity and abundance of hypogean fauna from percolation waters in six cave systems was studied. Four categories of small water-bodies were distinguished: water filtered directly from dripping, small holes on stalagmites, pools in clay and pools on flowstone. A special emphasis is given to the copepod fauna because of the extreme diversity of fauna associated with high level of endemism.

- 10-171 Plagnes, Valérie ; Bakalowicz, Michel: The protection of karst water resources: the example of the Larzac karst plateau (south of France). Environmental Geology, 40, 3, 349-358, 2001.**

K.W.: regional karstology, nature protection, hydrogeology, water supply, human impact, water tracing.

- 10-172 Price, Liz: Caves and karst of Peninsular Malaysia. A register. Kuala Lumpur, 2001.**

This register lists all the known limestone hills and caves in Peninsular Malaysia. There are more than 500 limestone outcrops, and this is the first book to cover all the sites in the Peninsula. The register is divided into geographical states. Each entry is allocated a reference number, listing the state, hill number and cave number.

There is a description of the karst geology, and tables of highest hills and longest caves. Other pages provide an introduction to Malaysian history and 19th century visitors to caves, as well as archaeology and history of cave exploration. There is a map, glossary, 16 cave surveys and many photos, and a bibliography of cited references.

- 10-173 Quinif, Yves ; Vandycke, S.: Les phénomènes karstiques de la région de Han-sur-Lesse - Rochefort (Belgique). Bull.Inf.Bass.Paris, 38, 1, 6-19, 2001.**

K.W.: karstology, Belgium.

- 10-174 Quinif, Yves: Hommage à Philippe Renault. Karstologia, 37, 9-10, s.l., 2001.**

K.W.: Renault Philippe, bibliografija, In memoriam.

- 10-175 Ross, Jan-Henning ; Rieg, Alfred ; Leibundgut, Chris: Tracer Study on the Tectonic Control of the Drainage System in the Contact Karst Zone of Lake Voralp (Swiss Alps). Acta carsologica, 30/2, 203-213, Ljubljana, 2001.**

Lake Voralp is a small karst lake, dammed up by a Pleistocene rockslide and without any surface drainage. A dye tracer test under flood conditions shows a widespread drainage system to remote springs and direct afflux to the porous aquifer of the Rhine Valley. These karstwater passages are leading through nonkarstified flysch and a marly layer. Both layers are lithologically rather impermeable and karstwater passages through these layers indicates water leading fault zones. Properties of the drainage patterns strongly depend on the hydrological situation.

- 10-176 Rózkowski, Jacek: Nitrates as permanent and regional pollutants of fissure-karstic waters in agricultural areas (taking the Cracow Jurassic area in Poland as an example). Hydrogeochemia '01. Zbornik z konferencie. 16 maj 2001, Bratislava, 70-76, 2001.**

The investigations concern the karstic area of the Cracow Upland, southern Poland, where performed within the Upper Jurassic carbonate aquifer. This area is under strong human impact of agricultural as well as industrial-urban of Cracow agglomeration and Upper Silesia activity. Regional and progressing pollution with nitrates influence groundwater quality. Results of comparison between nitrate concentrations in 60-ties and at present are presented. Data show shifting of the hydrogeochemical background of the nitrate content in groundwater from 0,2 to 6,0 mg N-NO₃ dm⁻³. During thawing period and in autumn concentration rise up to 22 mg N-NO₃ dm⁻³.

- 10-177 Sahagun, Carlos Lazcano: Naica's Subterranean Marvels. NSS News, 59, 6, 166-169, Huntsville, 2001.**

K.W.: regional speleology, cave history, mine, gold, silver, crystal, selenite, gypsum, speleothems.

- 10-178 Samani, Nozar: Response of karst aquifers to rainfall and evaporation, Maharlu Basin, Iran. Journal of Cave and Karst Studies, 63, 1, 33-40, Huntsville, 2001.**

K.W.: regional karstology, hydrogeology, aquifer, evaporation, water supply, karst spring, Iran.

- 10-179 Sauro, Ugo: Aspects of contact karst in the Venetian Fore-Alps. Acta carsologica, 30/2, 89-102, Ljubljana, 2001.**

In the Venetian Fore-Alps there is a wide range of situations of contact karst. To illustrate some of the more typical situations it is necessary to define the concept of contact karst, which may be considered both in a strict and in a wide sense. In a strict sense we consider, as contact karst, the karst phenomena and forms influenced by the contact between a karstifiable rock and a non-karstifiable rock. In a wide sense also the karst phenomena and forms influenced by the contact between two karstifiable rocks different in some characters, as chemical composition, porosity and fracture density, etc., are cases of contact karst. The types of contact may be stratigraphic, tectonic, and sedimentary. In the contribution, some typical examples are presented.

10-180 Sauro, Ugo ; Zampieri, D.: Evidences of surface faulting and surface rupture in the Fore-Alps of Veneto and Trentino (NE Italy). *Geomorphology*, 40, 2001, 169-184, 2001.

The Fore-Alps of the Veneto and Trentino regions belong to the central Southern Alps (NE Italy), in which there is little evidence of very fresh surface ruptures or surface faulting. This does not seem to match historical data about earthquakes, some of which have been very intense. The strong influence of the inherited structures makes it difficult to detect a direct link between morphotectonic features and present-day stress fields.

In the present study, four areas (Orsara, Scandole, Naole and Soran) with surface faulting and surface rupture features were examined and models of morphotectonic evolution are discussed. In the Lessini Mountains, the Orsara graben and Scandole ridge show examples of surface faulting and surface rupture, respectively, reactivating Paleogene normal faults and fractures. Within the Orsara graben, rocky bluffs displace the previous morphological features. The bluffs are some decimetres to some metres high and are practically devoid of evidence of either physical or chemical weathering; on the slopes above them are steep areas which may be interpreted as the remnants of previous strongly weathered bluffs. The Scandole ridge has many trenches, some with rocky walls, which may be the result of several episodes of morphotectonic rupture.

In the Giudicarie Belt, the Naole and Mt. Soran surface faulting landforms are details within large frontal culmination walls of Neogene thrusts. The Naole ridge corresponds to the south-eastern sector of Monte Baldo. Here, inside a fault angle valley a sinuous scarp originating from surface faulting marks the base of the fault scarp slope. Ridge splitting is the expression of the backward migration of separation niches due to slope tectonics, also evidenced on the slope by several terrace-like features and by a lower belt of very thick slope breccias. On Mt. Soran, in the Gruppo di Brenta massif, the surface faulting scarp faces uphill, giving rise to a trench-like feature. Downvalley of the scarp, there is the niche of a large landslide dated to 3 ky B.P.

All these landforms are consistent with slope tectonic movements caused by intense earthquakes. Whereas the morphostructures in the Lessini Mountains are the result of responses by sensitive structures, the Naole and Mt. Soran features express the evolution of frontal culmination walls of thrusts, with clear evidence of present-day tectonic activity.

On the basis of the weathering of the scarps and associated features, the relative seismotectonic episodes probably occurred between the Bronze and Middle Ages.

10-181 Schaezler, Donald J. ; Baer, Therese M. ; Berry, Richard N.: Design and construction of water remediation systems used to manage karst water contamination. *Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001*, 8, 319-324, Lisse etc., 2001.

K.W.: water treatment plant, pollution, fuel, karst hydrology, aquifer.

- 10-182 Shaw, Trevor R. ; Adam, Nadja: Alberto Fortis and the Istrian karst, Croatia, in 1770 and 1771. Acta carsologica, 30/1, 181-212, Ljubljana, 2001.**

An unpublished letter written by Alberto Fortis in 1771 describes his visit to the Mramorica cave near Brtonigla (Istria) in 1770, and a journey over the karst from Pula to Rovinj in 1771. He argues that caves are formed by collapse initiated by underground streams washing away soil from bedding planes, with subsequent collapse of higher levels until an opening appears at the surface. Dolines result from rain and frost action causing the entrance walls to collapse into the cave.

- 10-183 Shaw, Trevor R.: Bishop Hervey at Trieste and in Slovenia, 1771. Acta carsologica, 30/2, 279-291, Ljubljana, 2001.**

Two letters written in 1771 by Frederick Augustus Hervey are printed in full. They report that he saw caves at Postojna, Planina, Škocjan and Pazin about May 1771, before he joined Fortis in Istria and continued with him to Dalmatia and their better-known cave explorations there. From other sources it is shown that Hervey also visited the caves at Vilenica, Socerb and Brtonigla in the same journey. He mentions also two identified caves close to the Timavo springs.

- 10-184 Shopov, Y.; Stoykova, D.; Tsankov, L.; Sanabria, M.; Georgieva, D.; Ford, Derek ; Lundberg, J. ; Georgiev, L. ; Forti, Paolo: Intensity of solar luminosity cycles and their influence over past climate and geomagnetic field. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 216/S1. Published on CD 2001.**

Calcite speleothems luminescence depends exponentially upon soil temperatures that are determined primarily by solar visible and infrared radiation. So microzonality of luminescence in speleothems is used as an indirect Solar Insolation proxy index. The solar insolation proxy record contains not only orbital variations but also solar luminosity self variations, producing many cycles of different duration. Latest result suggest that these millennial solar luminosity cycles can produce climatic variations.

- 10-185 Shopov, Y.; Stoykova, D.; Tsankov, L.; Sanabria, M.; Georgieva, D.; Ford, Derek ; Lundberg, J. ; Georgiev, L. ; Forti, Paolo: Influence of solar luminosity variation on glaciations and time shifting of Termination II. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 217/S1. Published on CD 2001.**

Calcite speleothems luminescence depends exponentially upon soil temperatures that are determined primarily by solar visible and infrared radiation. So microzonality of luminescence in speleothems is used as an indirect Solar Insolation proxy index. From experimental measurement carried out on a speleothem of Jewel Cave, Solar luminosity seems to be as powerful as orbital variations and can produce climatic variations with intensity comparable to that of the orbital variations.

- 10-186 Steiner, Helmut: Tsiribihina Gorge, Madagaskar, 1999. Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher e.v., 47, 2, 34-38, München, 2001.**

K.W.: regional karstology, regional speleology, expedition, Madagascar.

- 10-187 Šebela, Stanka: Summit 2000, GSA Annual Meeting (Reno, Nevada, USA November 9-18, 2000). Acta carsologica, 30/1, 236-237, Ljubljana, 2001.**
K.W.: report.
- 10-188 Šebela, Stanka: Tectonique active et géologie, RIVIERA 2000 Villefranche-sur-Mer (France), 18-22 October 2000. Acta carsologica, 30/1, 233-235, Ljubljana, 2001.**
K.W.: report.
- 10-189 Šebela, Stanka: U.S. Geological Survey Karst Interest Group, Proceedings, St. Petersburg, Florida, February 13-16, 2001 (Water-Resources Investigation Report 01-4011, Eve L. Kuniandy, editor, 211 pp., Atlanta, Georgia). Acta carsologica, 30/1, 238-239, Ljubljana, 2001.**
K.W.: report.
- 10-190 Šebela, Stanka: Collapse dolines and passages of Postojnska jama cave system. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 148/S1. Published on CD 2001.**
The surface above the longest Slovene karst cave Postojnska Jama Cave System (20 km) is characterized by numerous dolines and collapse dolines. We have 17 collapse dolines in the area of 2,55 km². They vary in depth, shape and size. Some have steep slopes where collapse blocks look fresh others are relics of former collapse dolines with gentle slopes. The deepest collapse doline is basically the entrance shaft to Pivka Jama Cave (77 m), the biggest collapse doline is Vodni dol (600x240x60 m). Most of collapse dolines is situated near the crest of Postojna anticline, on its northern flank. Development and especially deepening of collapse dolines like Velika and Mala Jeršanova doline, Vodni dol and Kozja Jama has a genetic connection with the lowering of Postojnska Jama Cave System active water passage into SW and NW passages due to the regional tectonic uplifting.
- 10-191 Šebela, Stanka ; Slabe, Tadej ; Kogovšek, Janja ; Liu, Hong ; Pruner, Petr: Baiyun Cave in Naigu Shilin, Yunnan karst, China. Acta Geologica Sinica (English Edition), Journal of the Geological Society of China, Vol.75, No. 3, 279-287, 2001.**
Baiyun cave is a 380 m long karst cave in Naigu Shilin, situated 70 km SE from Kunming, Yunnan. The prevailing orientations of the cave passages are N110-120°E and N0-10°W. Prevailing fissures orientation in the cave are N30-40°W and N20-30°W. The cave is developed in the thick-bedded Lower Permian Qixia group. The cave has an active water flow and is today at the near water-table stage. There are many different infills of cave sediments. The cave shows different stages of paragenesis. With paleomagnetic analyses of cave sediments we determined their age to be younger than 780 kyr B.P. (Brunhes chron). The upper part of the sampled profile belongs to reverse Blake event (112.3-117.9 kyr B.P.). The formation of the Baiyun cave is directly connected with the development of Naigu Shilin. The formation of karst underground and surface features depends on regional tectonic deformation, on Cenozoic extension of the studied area.

10-192 Trofimova, E. V.: The azonal role of the karst in Irkutsk amphitheatre. The doctrine about the zone of the nature in the rupture of the millennium. Nizhny Novgorod, 180-191, 2001.

According to the geographical zonality, the region of the explorations - Irkutsk amphitheatre, 52-580 N and 97-1090 E, is situated in the zone of the taiga. The "island steppes" are observed here: Angarskaya, Leno-Angarskaya and Olkhonsky steppe region. In the course of the superposition of the maps "Landscapes of the south of Eastern Siberia" and "Karst of Irkutsk amphitheatre" the significant coincidence of the areas of the propagation of the karstifiable rocks with the "island steppes" was founded. Angarskaya and Leno-Angarskaya steppes were formed in the regions of the development of the carbonate, sulphate and salt karst dated by Cambrian. Olkhonsky steppe region (Archaean) is placed in the areas of the carbonate karst, which is evolving the most actively along the tectonic fissures and the tectonic fractures.

By the method of the "sliding window" the new maps transformed were prepared. For the each step of the window the relations, in the percentages, between the steppe and the taiga landscapes were took into consideration in the analyse of the landscapes, and between the karstifiable rocks and the indissoluble ones in the analyse of the karst were rechecked. The coefficient of the correlation of the characteristics of the phenomena considered of the new maps was comprised $0.91+0.07$. Consequently, karst is determining the development of the "island steppes" in the Irkutsk amphitheatre.

10-193 Urankar, Rafko/Ed.: [Do not enter the cave brainless]. 131 p., Ljubljana, 2001.

K.W.: regional speleology, speleogenesis, caving techniques, topography, manual.

10-194 Urbani, Bernardo: Ein wenig bekannter Brief Alexander von Humboldts über Petroglyphen aus einer Höhle in La Urbana (Bolivar, Venezuela). Mitteilungen des Verbandes der deutschen Höhlen- und Karstforscher, 47, 1, 8-11, München, 2001.

K.W.: letter, Humboldt Alexander, cave history, Father Ramon Bueno, Langles.

10-195 Urich, Peter B. ; Day, Michael J. ; Lynagh, Fiona: Policy and Practice in Karst Landscape Protection: Bohol, the Philippines. The Geographical Journal, 167(4), 305-323, 2001.

The karst landscape in the interior of the Philippines' Bohol Province represents one of the World's premier kegelkarst, or cone karst environments.

Government efforts to protect some of this karst, exemplified by the establishment of the Rajah Sikatuna National Park and the Chocolate Hills Natural Monument, have proven to be significant catalysts of social conflict. In Bohol there is a long history of traditional land tenure, which has recently been supplanted by a westernised model. Protected area establishment is a response to deforestation, agricultural exploitation and uncontrolled quarrying. However, the imposition of protective legislation to prevent further degradation has disenfranchised and marginalised many local farmers and residents. The conflict between the obligation of the State to insure environmental protection and the perceived property rights of landowners and farmers has provoked an escalation in civil unrest and armed conflict.

10-196 Urushibara-Yoshino, Kazuko: The karstification of uplifted limestone areas in Japan. Transactions, Japanese Geomorphological Union, 22(3), 391-401, 2001.

Almost all limestone areas in Japan have been uplifted. The karst areas are not broad enough to form typical holokarst systems, and the typical fluviokarst is widespread. The fluviokarst in Taishyakukyo, where we have the date of dating, was described first as an example of uplifted areas. The 5 cave levels, related to river terraces covered by the key tephra, show continuously uplifted conditions. Secondly, Kikai Island in Nansei Islands covered by Pleistocene and Holocene coral reefs, which have been clearly dated in accordance with time sequence, was described and analyzed. It shows high uplift rate of ca. 1.8 m/ka. On this island, the palaeo-cave levels and the karst springs have developed well.

The development of dolines and the presence of palaeo-cave levels on the high uplift areas of each coral reef terrace suggest high speed of karstification. The soil formation processes on the terraces were also examined with iron crystallinity. The iron crystallinity of B₂ horizon on the uplifted terraces shows an increase by age. Thirdly, Minamidaio Island will be considered. Here a slowly uplifted atoll is found with karstification as dolines, doline lakes, limestone walls and caves having been formed. It will be suggested that the caves, which were formed are connected with low sea level during the Last Ice Age, they are partly under the sea level at present. The dolines, which were formed during the age of lower sea level, are doline lakes at Present.

10-197 Urushibara-Yoshino, Kazuko: The effect of El-nino on the rice production in karst areas in Java and Bali Islands. Global environmental Research, 6(2), 195-205, 2001.

During El-nino event in 1997-1998, serious drought occurred in Java and Bali Island. The questionnaire of rice production had done in karst areas of Gunung Sewu, Java Island and Bali Island.

The results obtained are as follows: On the slopes of conical hill in the limestone areas of Gunung Sewu, completely no harvest was occurred in 1997 and 1998. The farmers, who cultivated slightly better conditions, could harvest rice more than 1.6 t/ha. They stayed in own village during drought. But, farmers who could harvest less than 1.6 t/ha, had to get temporal job in Jakarta or Yogyakarta. In Kepele village, death rate increased one year after the severe drought of the El-nino year.

In Bali Island, drought occurred in 1997 and 1998 as same to Java Island. However, irrigation water, supplied from the surrounding mountain areas, was available in most fields in this island. This resulted is not so much decrease of harvest. The mountain areas higher than about 1400m a.s.l., have been kept as natural forest by the reasons of religion in this island.

10-198 Walsh, Peter ; Morawiecka, Zacharz Iwona: A dissolution pipe palaeokarst of mid-Pleistocene age preserved in Miocene limestones near Staszów, Poland. Palaeogeography, Palaeoclimatology, Palaeoecology, 174, 327-350, 2001.

Many hundreds of solution pipes are exposed in quarries near Staszów, SE Poland. The pipes are contained in late Badenian (middle Miocene) carbonates of the Chmielnik

Formation and are filled with sediment derived from a weathered Sanian (Elsterian) till cover. Geological and geomorphological description of the phenomena is a part of the paper. The Staszów piping represents a covered, intraformational palaeokarst system. It is postulated that it developed as a product of fast-acting deglaciation and, possibly also, of irregular permafrost decay below the Elsterian till, early in the Holsteinian warm period.

- 10-199 Weary, David J. ; Orndorff, Randall C.: Physical controls on karst features in the Ozark Plateaus of Missouri, U.S.A., As determined by Multivariate analyses in a Geographic Information System (GIS). Acta carsologica, 30/2, 181-194, Ljubljana, 2001.**

Physical controls on the genesis and aerial distribution of karst features can be identified through analyses of detailed geological mapping and karst data such as cave spring and doline locations. Our study tests the effects of geologic structures and stratigraphic position on the distribution of caves, springs, and dolines in a 625 km² area in the Ozark Plateaus Province of south-central Missouri. The bedrock in the region is relatively flat-lying Cambrian and Ordovician dolomite, sandstone, and chert. Joint attitude measurements at 1121 locations were interpolated to produce grids representing local structural grain. Structure contours derived from detailed field mapping were used to interpolate a grid representing the attitude of bedding surfaces across the study area. Aspect and slope grids were generated from the structure surface and correlated with known locations of karst features. The density of karst features per lithostratigraphic map unit was calculated and found to be a misleading statistic because it reflects only the map surface expression of karst and not its true distribution in the stratigraphy, which is 3-dimensional. These methodologies may be useful in other areas of relatively flat lying carbonate rocks to delineate zones of enhanced karst development.

- 10-200 Wiśniewski, Wojciech W.: Show caves in Poland. Polish Caving 1997-2001, 6, Kraków, 2001.**

K.W.: regional speleology, cave tourism, Poland.

- 10-201 Wiśniewski, Wojciech W.: [About pretendet the oldest printed mentioningrealtied to a cave from Polish Tatra Mountains from the year 1672]. Materiały 35. Sympozjum Speleologicznego. Sekcja Speleologiczna Polskiego Towarzystwa Przyrodników im. Kopernika, Bartkowa, 26-28.10.2001, 52-53, Kraków, 2001.**

K.W.: speleohistory.

- 10-202 Wiśniewski, Wojciech W.: [Annotated Bibliography of Jaskinie peridical from years 1992-2001 and edition Polish caving 1997-2001" with complete index of caves and persons mentioned inside of this periodical]. Jaskinie, 4 suplement, I-XL, Kraków, 2001.**

K.W.: bibliography.

- 10-203 Wiśniewski, Wojciech W.: [Iconography of Beskidy's caves in 19th c. and first half of 20th c.]. *Materialy 35. Sympozjum Speleologicznego. Sekcja Speleologiczna Polskiego Towarzystwa Przyrodników im. Kopernika, Bartkowa, 26-28.10.2001, 47-49, Kraków, 2001.*
K.W.: speleohistory, Poland.
- 10-204 Wiśniewski, Wojciech W.: [Jamnik (1970-1979) - information bulletine of KKTJ]. *Jamnik. 35 lat Krakowskiego Klubu Taternictwa Jaskiniowego. 59-80, Kraków, 2001.*
K.W.: bibliography.
- 10-205 Wiśniewski, Wojciech W.: [Profesor Stanisław Dżułyński has died] : [1924-2001]. *Jaskinie, 2(23), 9, Kraków, 2001.*
K.W.: In memoriam.
- 10-206 Wiśniewski, Wojciech W.: [The cave Voronja (Krubera cave) in the massive Arabika is the deepest cave of the world. A new world record of a cave depth - 1710 m]. *Spravodaj Slovenskej Speleologickej Spoločnosti, 32/3, 37-43, Prešov, 2001.*
K.W.: regional speleology, report, cave expedition, cave, depth record.
- 10-207 Wiśniewski, Wojciech W.: [The cave Voronja (Krubera cave) in the massive Arabika is the deepest cave of the world. A new world record of a cave depth - 1710 m]. *Taternik, 76/2, 294, 48-52, Warszawa, 2001.*
K.W.: regional speleology, report, cave expedition, cave, depth record.
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- 10-211 Worthington, Stephen R. H. ; Ford, Derek C.: Test methods for developing a conceptual model for a PCB-contaminated carbonate aquifer. *Geotechnical and Environmental Applications of karst Geology and Hydrology. Proceedings of the Eight Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karsts, Louisville/Kentucky/1-4 April 2001, 8, 333-338, Lisse etc., 2001.*
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10-212 Zupan Hajna, Nadja: Weathering of cave walls in Martinska Jama, SW Slovenia. Proceedings of the 13th International Congress of Speleology, Brasilia D.F., Brazil, July 15-22, 2001. 092/S1. Published on CD 2001.

Martinska Jama is a cave situated in karst area of Matarsko Podolje in the south-west part of Slovenia. The cave was formed in transition between Lower and Upper Cretaceous carbonate beds. In some parts of the cave limestone walls are extremely weathered specially in side passage Boeganov Rov. Limestone beds are weathered from few millimetres to some centimetres in depth, depend on freshness of breakdowns and presence of fissures. The weathered zone of carbonate rock is almost identical to parent rock in its mineral and chemical composition yet it is much more porous. It is very unusual that the weathered remain is not insoluble rest but purified calcite. Weathered zone of limestone bedrock has "spongy" like texture. The main reason of limestone weathering in this part of the cave is probably corrosive moisture which has it origin in percolation water from the surface above the cave.

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