

reviewer's favourite paper is by Pissart, Van Vliet-Lanoë, Ek & Juvigné (No. 13) and concerns aspects of sediments in the Grotte de Remouchamps (Belgium). The crux of this most lucid and concise article is the recognition in fine sediments of micromorphological features indicative of former segregation ice. This observation is carefully placed within a framework of chronology, cave meteorology and sedimentary history. It is concluded that, since superficial permafrost degrades from the surface downwards, the persistence of frozen sediment and ice masses in lower parts of the Remouchamps system as a thaw set in would explain the observed reactivation of higher passages. Finally, the authors make a plea for the publication of direct observations of segregation ice in modern caves.

It cannot be claimed that the proceedings of the Han symposium constitute a 'seminal' work (although one or two of the individual papers might qualify). Nevertheless, this reviewer has a feeling that the book will make its own special place in the history of karst sedimentology because it has been written at one of those moments when international communication is improving, when new techniques are being applied and when researchers are asking a much wider variety of questions of their study material and are experimenting with different conceptual frameworks to organize their observations. One could think of many adjectives to characterize all or part of the book, but just plain 'enjoyable' will probably do.

Proceedings of the IAH 21st Congress, 1988, Karst hydrogeology and karst environment protection. Geological Publishing House, Beijing, China, 1261 pp. ISBN 7-116-00351-7/P. 302. Price U. S. \$. 20.
(reviewed by S. L. Hobbs)

The 21st IAH (International Association of Hydrogeologists) conference concerning karst hydrogeology and karst environment protection was held in Guilin City, China. It was attended by 380 delegates from 34 countries, a combination that ensured a diverse range of karst research from many different environments was presented. The two-part conference proceedings contain 156 papers and 107 abstracts, all except one of which are written in English. Over 100 papers/abstracts are by Chinese authors, which illustrates the range of work that is currently being carried out in China on karst hydrogeology.

The papers in the proceedings are divided into the following fourteen sub-groups (numbers in brackets refer to the number of papers/abstracts): Part 1: keynote papers (11); strategy of comprehensive planning and development of karst areas (24); general karstology (27); regional distribution pattern and systematic analysis of karst groundwater (58); Part 2: parameters and modelling of karst groundwater (37); geophysical and remote sensing techniques (11); isotopic approach (9); karst geochemistry, groundwater tracing and thermal mineral water in karst areas (32); water pollution problems (16); mine dewatering in karst areas (9); leakage from reservoirs in karst areas (10); surface collapse problems (12); karst hydrogeological maps (5); hydrogeological problems in non-karst areas (2). Because of the number and range of papers no detailed critique of individual work is given. However a generalized summary is presented below.

Part 1 of the proceedings contains most of the more descriptive papers. These range from overviews of karst hydrogeology in India (K. S. Murty), Thailand (S. Wongsawat—abstract) and China (Zhuang Shuoue *et al.*) to detailed catchment area studies in countries as far apart as Canada (F. A. Michel *et al.*) and South Africa (M. Marker). Some of the papers concentrate

on conflicts between water resource exploitation and environment protection (Qui Chagsi), whilst others consider conflicts between groundwater exploitation and industries such as quarrying for example (G. Michel). Other interesting papers include a discussion of the use and difficulties associated with creating underground storage reservoirs in karst areas in Yugoslavia (P. Milanović), legal problems of water abstraction and associated environmental problems in the U.S.A. (P. E. LaMoreaux), and the effect of catchment altitude on the hydrodynamic, physical and chemical behaviour of springs in Switzerland (Y. Lavanchy *et al.*). The large number of Chinese authors has resulted in hydrological and geomorphological descriptions of many previously undocumented karst areas in China. There is also a paper which lists uranium-series ages of speleothems in caves from eastern China (Zhao Shusen *et al.*).

Part 2 contains papers that are both more quantitative, and more wide ranging in their applications to karst aquifers. The section concerning modelling for instance not only contains research relating to mathematical modelling of spring response (Lin Min *et al.*), but also work which examines the similarity between flow through fissured and porous aquifers (S. Troisi *et al.*). Few of the modelling papers relate to environment protection, but applications of remote sensing to this task are discussed (J. Svoma), along with its use for locating water bodies (Liu Guangyao *et al.*). The tracing section includes more site specific work using dye tracers in Austria for example (R. Benischke *et al.*), and use of B, F, and Sr tracers in Israel (A. Arod). This section also contains research into geothermal resources (Zhang Zhenguo) and thermal mineral waters including their medicinal uses (Tan Kai'ou *et al.*). General pollution problems are examined (Z. P. Stevanović), along with models of contaminant transport (Yang Tianxing *et al.*), and protection strategy proposed for aquifers in the U.S.A. (M. S. Field). Other environmental problems discussed in part 2 include mine dewatering, leakage from karst reservoirs and surface collapse problems, all of which are dominated by examples from China. These include both description of problems encountered (Zou Chengjie) as well as their control and prevention (Tian Kaiming).

The paper that the proceedings are printed on is cheap, but the production is acceptable; however the small number of photographs included have not reproduced well. At only US\$20 for over 1,250 written pages, one cannot be too critical of the poor quality paper. Some of the diagrams are also poor, but this is a reflection on individual authors, as papers were submitted in a camera ready form to the publishers.

In summary this conference proceedings is recommended to all, but especially for libraries, and those interested in karst research in China.

SBORDONI, V. (ed.): Speciation and adaptation to cave life: gradual vs. rectangular evolution. *International Journal of Speleology* vol. 16(1-2), 1987, 68 pp.

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(reviewed by P. R. J. Chapman)

Valerio Sbordoni's introduction raised hopes that this collection of papers would take a new look at one of cave biology's longest running controversies, namely: 'are caves a cosy "twilight home" for elderly and infirm "living fossils" which can no longer survive the rough and tumble of the real world outside, or are they a kind of "Wild West Frontier" under constant pressure