

## BOOK REVIEWS

*The Quaternary of China*. Edited by Zhang Zonghu, Shao Shixiong, Tong Ghobang and Cao Jiadong. Institute of Hydrogeology and Engineering Geology, Zhengding, China. Beijing 1991 China Ocean Press, 575 pages. *Explanatory Notes of the Quaternary Geologic Map of the People's Republic of China and Adjacent Sea Area*. Edited by Zhang Zonghu, Shao Shixiong, Zhou Mulin and Fan Yi. Beijing 1990 China Cartographic Publishing House (9 maps and 78-page manual).

These book(s) and maps were produced in association with the 1991 INQUA XIII Congress in China. The primary work, *The Quaternary of China*, includes 16 chapters by various authors. The companion work, *Explanatory Notes of the Quaternary Geologic Map of the People's Republic of China and Adjacent Sea Area*, consists of nine 1:2,500,000 high-quality color maps (104 x 76 cm) of the Quaternary Geology of China, along with an explanatory 78-page volume.

*The Quaternary of China* bears many similarities to *Late Quaternary Environments of the Soviet Union*, edited by A. A. Velichko (1984). Zhang *et al.*'s work is more comprehensive and larger, and has the wonderful maps, but the format is the same. Following a general introduction by the Chief Editor (Zhang), there are chapters covering a wide range of topics, from tectonism to vertebrate paleontology. The design of the figures and correlation charts is even the same. Like the Soviet volume, *The Quaternary of China* provides a glimpse of prolific research in a region of great interest for Quaternary studies. Velichko's volume has photographs, Zhang *et al.*'s does not, and neither has an index.

As with Velichko's volume, *The Quaternary of China* provides a valuable counterpoint for Western Quaternary studies. Many conclusions seem familiar, but others are novel or exotic. The Quaternary time scale presented is entirely familiar. Major subdivisions are based on magnetostratigraphy and the marine oxygen isotope stages, and the Holocene subdivisions clearly are descended from the European Blytt-Syrrander sequence. Also familiar are the environmental reconstructions for the Last Glacial Maximum. In Tibet, lake basins dried *ca.* 18.9 ka BP, and trees were replaced by cold- and drought-resistant herbs. The periglacial limit was 800 m lower, and the snow line descended 350–1100 m, with many regional variations. In eastern coastal areas, sea level was 130–150 m lower.

Climatic events during the deglaciation are unclear. Whereas there are indications of climatic fluctuations between 18 and 10 ka BP, and some evidence for the Younger Dryas event (p. 232), I found no mention of whether lake levels were higher during deglaciation (like the northern Great Basin), or in the early Holocene (like southern Sahara). In fact, I found little information on the history of the Asian monsoon, beyond a general statement regarding its Neogene intensification due to uplift of the Tibetan plateau.

In contrast to recent claims of intensified monsoonal precipitation during the early Holocene (An *et al.* 1991), the climatic chronology presented in this book indicates greater aridity in the early Holocene (pp. 150–154). The middle Holocene, 5.5–2.5 ka BP, was warm and wet in most regions, and the late Holocene cold and dry. The mountainous regions of western China contain extensive deposits left by Holocene glacial advances dated 5500, 3900, 2800, 1700, 1100 and 400–70 yr BP. Many records of (relative) Holocene sea level from eastern China indicate water depths *ca.* 4 m greater than today during the middle Holocene (8–4 ka BP).

Several aspects of the book and maps warrant special mention. Chapter 6, titled "Quaternary Geology in Offshore Areas of China", is the most detailed and informative of the book. The errors

are minimal, and there are more figures, radiometric dates, and detailed diagrams of ostracods and pollen than in any other chapter. I also appreciated Chapter 15 by Zang Zonghu, Zhang Zhiyi and Wang Yunsheng on “Loess in China”. It includes a detailed history of loess research, regional descriptions of loess stratigraphy, summaries of fossils preserved in loess, discussions of soil-forming processes and implications of loess stratigraphy for the environmental chronology.

I recommend highly the chapters on fossil hominids in China, “The Other Cradle of Humanity”. Chapter 6 in *Explanatory Notes ...* lists the Ziaochangliang Culture, dated 2.5 Ma by paleomagnetism, as the oldest evidence (tools only) for humans in China. Chapter 10 in *The Quaternary of China* mentions, more conservatively, the earliest skeletal remains of *Homo erectus yuanmouensis*, dated 1.7 Ma by paleomagnetism. These are followed by many discussions of other human fossils throughout the Quaternary.

Chapter 13, by Han Tonglin, includes a discussion of a unique aspect of Chinese Quaternary studies: the early Pleistocene “Great Ice Sheet”. This extensive ice cap formed before the uplift of the Tibetan Plateau had blocked monsoon moisture from the Indian Ocean. Its deposits include several continental-scale glacial features, such as bedrock drumlins and till-covered plains. The ice is estimated to have been 1000–2000 m thick, covering an area of 2–3 million km<sup>2</sup>.

Other topics include neotectonics, volcanism, stratigraphy, paleogeography, palynology and laterites. There are two regional syntheses: one for the Qinghai-Tibet Plateau, another for the Eastern China Plain. I was surprised by the absence of some topics, such as Quaternary faunal extinctions, and the minimal coverage given to the history of monsoon climate and pluvial lakes, but overall, the coverage is thorough.

Although *The Quaternary of China* compares favorably with Velichko’s Soviet volume, it would have benefitted from English-language editing. Wright and Barnosky (Velichko 1984) provided a conceptual interface for Western readers and revised the English. The errors in *The Quaternary of China* range from distracting to obscuring. Some sections must be read very carefully, and figure captions are particularly error-prone. For example, the axes of Figure 3.12 are labeled “Age (Ma BP)”, but the units are actually 10,000 yr. Most errors appear to result from the typesetters’ unfamiliarity with the English alphabet, but these mistakes should have been caught in proof. *Explanatory Notes ...* (Fan Yi, English Editor) is comparatively error-free.

The volumes are valuable sources of information on the Pleistocene of China, but they fall short as a resource for further study. The “big picture” is there, but without the specifics. Most references cited in the text are not included in the “Main References” at the end of the book. Even the radiocarbon dates are given without laboratory numbers. Despite these shortcomings, I strongly recommend these books and maps to any Quaternary scientist interested in Asia, in particular, or global change, in general. They provide a broad introduction over a wide array of topics for this fascinating region, and they have heightened my interest in more detailed studies.

## REFERENCES

- An, Z. Kukla, G. J., Porter, S. C. and Xiao, J. 1991 Magnetic susceptibility evidence of monsoon variation on the Loess Plateau of central China during the last 130,000 years. *Quaternary Research* 36: 29–38.
- Velichko, A. A. 1984 *Late Quaternary Environments of the Soviet Union*. Wright, H. E., Jr. and Barnosky, C. W., (eds., English edition). Minneapolis, University of Minnesota Press: 327 p.

Owen K. Davis  
Department of Geosciences  
The University of Arizona  
Tucson, Arizona 85721 USA