

Foreword

Paleomonsoon variations and terrestrial environmental change during the late Quaternary

Paleomonsoons are an important sub-system of past global climates and one of the major controlling factors of environmental change in the tropical and subtropical zones of Asia, Africa and Australia. Fluctuations in monsoon circulation have been associated with significant and sometimes abrupt changes in rainfall, temperature and aerosol dynamics. Records of past monsoon variations probably still provide the most reliable basis for predicting future climatic trends in the tropics.

About 20 years ago, R. Fairbridge, J. Kutzbach and M. Sarnthein introduced the phenomenon of “the changing pulse of the monsoon”. However, few field data were then available. The results of the International Geological Correlation Programme 252 (1987–1992) “Past and Future Evolution of Deserts” confirmed and publicized the spectacular changes in the range of the African, Indian and Asian monsoons during the interglacial isotopic stages 5 and 1. The area which, in the Old World present-day arid belt, oscillated between desert and semi-humid, often swampy and methanogenous environments, was estimated to be at least 14,000,000 km². The regions in question are confronted with the problem of overpopulation, hence increasing the importance of studying monsoonal patterns within the Global Change mechanisms.

Over the last 5 years, the Paleomonsoons Project of the International Union for Quaternary Research (INQUA) and the Past Global Changes Programme (PAGES), in coordination with several other international programmes such as the Pole-Equator-Pole Transects (PEP I–III), the International Decade of East African Lakes (IDEAL) and the Paleoclimate Modelling Intercomparison Project (PMIP), com-

pleted a great deal of work based upon the study of geological records.

Recent marine and terrestrial paleoresearch suggests synchronous variations in Holocene monsoon circulation affecting the lower latitudes of the Northern Hemisphere from the Western Atlantic to central Asia and beyond. These data have been discussed at several “Paleomonsoon” workshops in a region-by-region approach at workshops in Kenya, China, Germany, Venezuela and Egypt, which focused geographically on the paleomonsoon systems of Africa, Asia, the Americas and their adjacent oceans (Kröpelin and Odada, 1994; Gasse et al., 1997; PAGES Workshop Reports 94-2 and 97-2).

However, while marine research of the past few decades has provided continuous and high-resolution data for the late Quaternary climatic history of the oceans, it is often not clear to what extent these records have been reflected in the terrestrial paleoenvironments of the continents. For both the understanding of human response to climatic change, and paleoanalogues and prognostic efforts, however, knowledge of the continental conditions, specifically during the Holocene, is crucial.

Evidence regarding the correlation between global warming and the enhancement of monsoonal precipitation amounts and latitudinal range permitted the hypothesis that — contrary to many previous conjectures — the current global warming trend would extend the semi-arid environments at the margins of the tropical deserts, to the prejudice of the current arid lands (Petit-Maire, 1990).

This volume includes 18 articles based on papers presented by internationally renown quaternarists at the Berlin (1995) and Siwa (1997) “Paleomonsoons”

meetings. We warmly thank the authors who trusted us with their manuscripts and original results, and assisted in peer review. The first guest editor apologizes to some of the early authors for the delay in publication because of his extended annual field seasons in Africa.

A great deal remains to be done in order to decipher the couple mechanisms involved in “the changing pulse of the monsoons”; we trust the project members will continue their important research. It is important to know which climate fluctuations inferred from ocean drilling and Greenland and Antarctica ice cores are reflected in the continental records of Africa, Asia and tropical America, and which not (“Man is no fish or penguin”). Moreover, since dating methods are being increasingly refined, observation and possible periodicities of short or mid-term non-orbital external (not exclusively solar) and internal forcings, which have been somewhat neglected during the “Milankovich explosion” of paleoclimatology, should be increased. We encour-

age our colleagues in the field to push ahead into these little explored territories.

All the best to “Paleomonsooners”!

References

- Gasse, F., Kröpelin, S., Oldfield, F. (Eds.), 1997. PEP III: The Pole-Equator-Pole transect through Europe and Africa. With reports from the workshops Coordinating paleoenvironmental research along the PEP III transect (Bierville, France Sept. 12–15, 1996) and Continental signals of Paleomonsoon dynamics in Africa: interhemispheric perspectives (Siwa, Egypt, Jan. 11–22, 1997). PAGES Workshop Report Series 97-2.
- Kröpelin, S., Odada, E. (Eds.), 1994. Paleomonsoons in Africa and Surrounding Oceans: The Last 200 000 Years — Recommendations for Research. PAGES Workshop Report Series 94-2.
- Petit-Maire, N., 1990. Will greenhouse green the Sahara? Episodes 13, 103–107.

Stefan Kröpelin
Nicole Petit-Maire