

'CORRELATION OF QUATERNARY CHRONOLOGIES'. Editor W. C. Mahaney, Geo Books, 1984, pp. 517.

Correlation of Quaternary Chronologies is the outcome of a symposium held from May 26-29, 1983 in the York University, Toronto, Canada. Chronologies have been examined from the points of view of the radiocarbon time scale, vertebrate, palaeomagnetic and palaeosol records, and glacial/interglacial sequences.

The volume has been subdivided into four parts: 1) Quaternary chronologies, 2) Palaeomagnetic chronologies, 3) Vertebrate chronologies and 4) Glacial/Interglacial methods.

The section on Quaternary chronologies consists of five papers, which apart from dealing with the multidisciplinary approach, also addresses itself to problems related to the assessment of the hardwater effect in the radiocarbon dating of marl deposits and the application of the TL method in establishing the Geochronological scale of the Late Pleistocene for the East European plain. Further, *Bakker* has presented a chronology of Late Cenozoic African climates and *Terasmae* has elucidated the principles and practice of palynostratigraphic correlations. The most important aspect emerging from this section is the necessity to follow a multidisciplinary approach for achieving a precise subdivision of key horizons in the Quaternary. Reconciliation of the terrestrial record with the marine record is an important task. The oxygen isotope record from the oceans and loess stratigraphy in Europe have demonstrated a frequency of glacial cycles of the order of 100,000 yr. The early 'four glacial' concept is obsolete; yet several modern studies are 'conditioned' by this scheme of events.

The section on Palaeomagnetic Chronologies consists of three contributions which deal with examples drawn from N. America. In a study on the palaeomagnetism and chronology of Early Pleistocene Till in the Central United States, *Easterbrook* and *Boellstorff* use fission track dating of volcanic ashes for interpreting the ages of glacial and palaeomagnetic events. The technique of using palaeomagnetic data and fission track ages of interbedded volcanic ashes has also been used extensively in the Siwalik rocks of the Indian sub-continent. Other Cenozoic sequences from the Indian stratigraphic record need to be studied intensively on these lines. In another study in this section, *Mothershill* has demonstrated the utilisation of palaeoinclination and palaeodeclination logs for chronostratigraphic correlation of the Late Quaternary sedimentary sequence of the Great Lakes area in Canada.

The section on vertebrate chronologies consists of ten papers and includes accounts dealing with Quaternary rodent biochronologies, the palaeoecology of an early Pleistocene cenote, and the evolution of tropical terrestrial communities in the Late Cenozoic. Apart from these studies, data has also been presented on faunal correlations and the correlative potential of palaeofauna of some Canadian Pleistocene deposits.

The next set of five papers (which should have actually been classified in a separate section) deal with the utility of palaeosols in stratigraphic analysis of Quaternary deposits. *Ross*, *Wang* and *Protz* report soil mineralogical evidence as an indicator of Post- and Pre-Wisconsinian weathering in Canada. *Waters* and *Rellter* have used palaeosols and volcanic ash for correlating deposits in southern Alberta. *King* has demonstrated the significance of palaeosols in forming a chronological framework in the Quaternary deposits of the Canadian Rocky Mountains.

The section on Glacial/Interglacial Records is by far the most exhaustive part of this volume. In terms of printed pages, it accounts for approximately one half of the total pages (244 out of 517 pages). Contributions include a discussion of the glacial sequence in Greenland by *Funder*, the sequence of glacier movements in Nova Scotia by *Stea*, the interpretation of 'bog-bottom' radiocarbon dates in glacial chronologies by *Cotter et al*, the problem of dating and correlation of the New Zealand Quaternary by *Burrows*, loess stratigraphy and Quaternary chronology by *Smalley* and *Grabowska-Olozewska*, and Quaternary events in Canadian prairies by *Fenton*. This group of papers also includes data from the Pleistocene of north-east England (*Derbyshire et al*), east-central Lemhe Mountains, Idaho (*Butler et al*), Pleistocene of southwest British Columbia (*Hicock*), Late Cenozoic alluvial fill of the Southern Willamette valley, Oregon (*Roberts*) and the Glacial geology of North Toronto area (*Sado et al*). Included in this section is a study by *Vaikmaa* and *Punning* on the isotope-geochemical investigations on glaciers in the Eurasian Arctic. Correlative connections were elucidated between the oxygen-isotope content of atmospheric precipitation and long-term average monthly temperatures. The correlation increases with the continentality of the climate.

The relative and absolute chronology of varves in the N. American context has been presented by *Schove*. Problems of Quaternary glacial correlation due to regional Ice/local ice interactions have been investigated by *Johnson* and *Kodybka*. In another study, weathering rinds have been used by *Colman* and *Pierce* for the correlation of Quaternary glacial sequences in the western United States.

The geologically short time span of the Pleistocene poses special problems. The lesson to be learnt from this volume is that in providing a chronology for the Quaternary deposits in India, we *must* follow a multidisciplinary approach. It is heartening to note that, in India, physicists, chemists, geomorphologists, archaeologists, palaeoclimatologists plus meteorologists have begun to take interest in what was classically considered to be the geologist's domain – the Quaternary sedimentary record. The Quaternary occurs in abundant measure in India. Its chronological framework is poorly understood. As a first task, the Himalayan Quaternary deposits, the Indo-Gangetic Plains, and the Thar desert need to be provided with independent temporal constraints. In future, attempts should be made to tie up the chronologies across these 'major domains'.

Correlation of Quaternary Chronologies covers a wide spread field both in terms of data and approach. The organisation of the volume into sections seems to be on a rather 'loose' basis. Perhaps, this stems from the need to put together unrelated presentations made at the Symposium. The binding of the book is too fragile. In summary, *Correlation of Quaternary Chronologies* is an extremely useful reference for those interested in the study of Quaternary deposits, and in particular for those who would like to learn about the wide range of techniques available for establishing Quaternary chronologies.

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