

09106922

# 30th International Geological Congress

DEDALUS - Acervo - IGC



30900001630

# ABSTRACTS

## VOLUME 2



**BEIJING, CHINA**

8-14 August 1996

THE ORIGIN INTERPRETATION OF THE INTERNAL GROWTH STRUCTURES OF MANGANESE NODULES IN THE PACIFIC OCEAN

Xiqiu HAN, Jianlin CHEN, Huati SHEN (The Second Institute of Oceanography, SOA, Hangzhou, China)

The study of polished sections of manganese nodules with an ore microscope reveals several types of internal micro-structure such as stromatolitic, oolitic, mottled, massive structure. They are concentric finely laminated growth structures consisting of ferromanganese oxide which can be classified into primary and secondary. With TEM, it was observed that the primary structure were constructed by numerous micro-organism body in an order of  $10^{-3}$  m.

The micro-structures may be used as indicators of growth environment when they formed. Through studies of the characteristics of the micro-structures as well as nodules' growth environment, it is suggested that manganese nodules were constructed by micro-organisms, while the intensity of the bottom current and the supply of the mineral matter decided the features of the internal growth structures, and the interstitial water modified them when the nodules were buried or half-buried by sediments.

THE RESEARCH ON MANGANESE NODULES (CRUSTS) IN THE SOUTH CHINA SEA

Jiafang LI, Jianxing QIAN (The Second Institute of Oceanography, SOA, Hangzhou, China)

On the basis of the data obtained from the China and German Joint study of the Earth Science in the South China Sea, the manganese nodules (crusts) in the North of the South China Sea mainly distribute on the low continental slope and the continental slope foot; east - northern area of Xishan Archipelago; north, east and south sea. area of Zhongsha Archipelago where the water depth is deeper than 800m. The manganese nodules (crusts) mainly consist of vernadite and todorokite. There is no birnessite. The Mn/Fe ratio of the manganese nodules (crusts) of the South China Sea is smaller as compared with the Pacific Ocean, and the cobalt content of the samples is higher above the water depth of <2000m. The enrichment of lighter REE and the high Ce anomaly are in agreement with those of the Pacific Ocean. It suggests that the REE are derived from volcanism and halmyrolysis. The study on the origin of the nodules (crusts) indicates that the main controlling factors on the formation area both of physic and chemical mechanism. The physical mechanism is attributed to the functions of Antarctic Bottom Water, low sedimentation rate and rock or other nucleus. The chemical mechanism is the chemical precipitation in association with volcanism.

THE DEPOSITION OF THE BAMBUI GROUP WITHIN THE CONTEXT OF THE REGIONAL GEOTECTONIC EVOLUTION

Umberto G. CORDANI - IG/USP (BRAZIL); Antonio THOMAZ FILHO - DG/UERJ (BRAZIL); Koji KAWASHITA - IG/USP (BRAZIL)

The fragmentation of the Rodinia Supercontinent, around 1000 Ma, produced rifted fragments of continental masses, some of which became sites of important sedimentation processes under the influence of large scale continental glaciations.

Among these deposits, over the western part of the São Francisco-Congo continental mass, the Macaúbas Group, the Ibiá Group, as well as the Bebedouro and Jequitai Formations, may be mentioned.

The sedimentation of the Bambuí Group is related to the successive large scale geotectonic processes involved in the agglutination of Gondwana, during the Late Proterozoic to early Paleozoic Pan-African-Brasiliano orogenic cycle. The principal evidences are as follows:

- sedimentary, structural and metamorphic unconformities between the Bambuí Group and the Macaúbas and Bebedouro sequences.
- sedimentation of the Bambuí Group directly over the basement exposures of the São Francisco Craton;
- drastic shift from glacial to the platform carbonatic sedimentary environment of the Bambuí Group;
- polymictic metaconglomeratic layers, including deformed basement detrital fragments, interbedded with thick pelites and limestones of the Bambuí Group, indicating a source area with rugged topography.

The above evidences converge to the interpretation of the Bambuí Group as formed in a foreland basin over the São Francisco Craton, and associated to the successive activities of thrust fronts originated in the adjacent mobile belt. This resulted in a cyclic sedimentation, followed by the final molásic-type sedimentation of the Três Marias Formation.

Since the compressive pulses of the Brasiliano Orogenic Cycle, as determined in the adjacent Araçuaí mobile belt, are comprised in the 650-500 Ma age interval, the present authors indicate that the maximum sedimentation age of the Bambuí Group shall not be very distant from to 650 Ma.

The Neoproterozoic palaeogeography of Australia

M. R. WALTER and J. J. VEEVERS (School of Earth Sciences, Macquarie University, NSW 2109, Australia)

The Australian continent is a large segment of the Earth's crust and on it Neoproterozoic rocks are particularly abundant, making it a good place to elucidate the history of this eon. Within a framework of lithostratigraphy, sequence analysis and tectonic analysis, isotope chemostratigraphy and acritarch biostratigraphy allow analysis the Neoproterozoic stratigraphy of the Centralian Superbasin in terms of four supersequences. Finer subdivision is possible in the Ediacarian ("Terminal Proterozoic").

We have selected eight time intervals for which to portray the palaeogeography of the Australian continent during the Neoproterozoic. Several intervals are temporally well resolved, and truly represent "moments" in geological history, while others are no more than a crude first attempt to portray the palaeogeography of the continent, because the studies required to allow precise correlations between basins are at an early stage. W. V. Preiss has attempted a much more detailed analysis of the palaeogeography of the Adelaide Basin ("Geosyncline") and we have adopted his interpretations for that region.

*Time Slice 1A* (~800Ma) a sand sheet wedges out against several internal basement highs and against the granitic basement in the southern Georgina Basin. At the locations of such wedge-outs carbonates are interbedded with the sands. It is a mixed fluvial and shallow marine succession. *Time Slice 1B* (~800Ma, the upper part of Supersequence 1) is characterised by interbedded stromatolitic carbonates and evaporites including halite and anhydrite. These were deposited in peritidal to very shallow marine settings. There is local mafic volcanism.

*Time Slice 2A* (~700Ma) is characterised by the Sturtian glaciation, the deposits of which are limited in extent. *Time Slice 2B* (~700Ma) is assumed to encompass a major eustatic rise in sea level following de-glaciation, resulting in widespread deposition of a thick succession of silt and mud. A shallow epicritic sea is envisaged. The succession shallows up and in places there are peritidal carbonates and sands.

*Time Slice 3A* (~600Ma) is defined by the second (Marinoan) glaciation. Again it is assumed that all the glacial sediments are approximately coeval. Diamictites are not known from the Georgina Basin, nor certainly from the Officer Basin, and elsewhere are patchy in their distribution. Arkoses, conglomerates and arkosic sands are more widespread, and are interpreted as glacial outwash deposits. A major eustatic rise in sea level (*Time Slice 3B*, ~600Ma) followed de-glaciation, resulting in the deposition of a thick succession of silt and shale. A shallow epicritic sea is envisaged. The Musgrave Block soon became emergent and shed coarse sediment to the north and south. The supersequence shallows up to peritidal carbonates including extensive ooid and intraclast shoals; evaporites occur in the southern Georgina Basin (*Time Slice 3C*, ~580Ma).

*Time Slice 4* (~580-550Ma) began with a flooding event during which turbiditic sands were deposited locally, and coarse sediment was again shed from the Musgrave Block. Most of the southern part of the superbasin and the central Amadeus Basin may have been emergent. Fluvial and shallow marine deltaic complexes developed extensively in the north. There was extensive basaltic flood volcanism in the western Officer Basin and in northern Australia (though the ages of these units are poorly known). What seems to have been a eustatic fall in sea level occurred near the time of the Proterozoic-Cambrian boundary, exposing most of the superbasin to subaerial conditions. Fluvial and shallow marine deltaic conditions were re-established in the Early Cambrian.

Laurentia, which adjoined Australia on the east, shared with Australia a) a mafic volcanic event at 800-780Ma, b) an early glacial event, poorly dated at 700Ma, c) a late glacial event, at about 600Ma and d) continental breakup in the earliest Cambrian (544Ma). All except the 800Ma event can be related to supercontinent tectonics.