

Pleistocene glacial-interglacial dynamics along the Australian margin: ODP Leg 194, Site 1198.

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Micropaleontology of calcareous nannoplankton and planktonic foraminifera is here coupled with geochemistry of phosphorus carbonates and isotopes to obtain a multi-proxy paleoceanographic scenario. The study area is the northeastern Australian margin where Ocean Drilling Program Leg 194 drilled at Site 1198 a sedimentary section particularly suitable for high-resolution studies.

The bulk carbonate record and the isotope stratigraphy indicate that the upper 15 meters of the sequence span the glacial-interglacial cycles from Marine Isotope Stage 12 (\approx 460 kyr) to MIS1. Additional biostratigraphic information are provided by the first occurrence of *Emiliana huxleyi* at 6.6 mbsf (base of Zones NN21 of Martini, 1971) and by the *E. huxleyi* acme Zone from 3.6 mbsf up to the top of the section. In tropical regions, the base of this interval is equated to about 85 kyr (e.g., Thierstein et al., 1977).

Increasing amount of aragonite and Mg-rich calcite at about 460 ka may correlate with the onset of a carbonate platform along the Australian margin near the Marion Plateau, possibly the Great Barrier Reef (Meyer et al., 2006). The trend of the aragonite seems to be in disagreement with the general climate in MIS 5. In fact, it is less abundant at the base of the stage when climate is supposed to be warmer and increases just before the glacial stage where the climate is supposed to become cooler. This tendency may be related to sea level lowering at the top of MIS5, which may have triggered aragonite export from the platform into the deeper part of the basin.

Glacial interval MIS6 is the best characterized glacial stage in the section. The trends of detrital phosphorus and quartz, which are a good indicator of detrital input, recall the trends of iron and suggest an increased input of terrigenous material into the ocean during this glacial stage.

MIS6 records high abundances of *Globigerinoides ruber* (up to 25%), as also previously observed in glacial stages by e.g., Reiss and Hottinger (1984), lower abundances of this species are observed in MIS5. This planktonic foraminifera can tolerate variations of salinity in the range of 22 to 49 ‰.

Detrital phosphorus depends either on eolian or fluvial input, during periods of intense precipitation. Fluvial input would also imply variations in sea-water salinity, thus representing a causal link between faunal assemblages and climate. Detrital input from the continent could have also boosted productivity in surface waters as indicated by relative abundances of

Globigerina bulloides (foraminifera), and created nutrient-poorer and optimal conditions for *F. profunda* (calcareous nannoplankton) in the lower photic zone.

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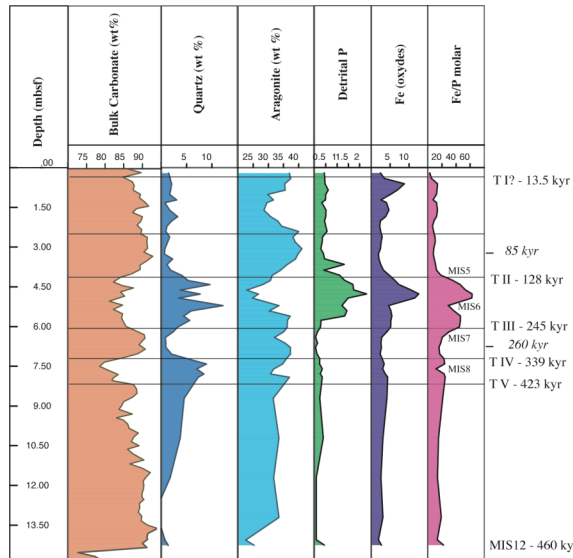


Figure 1: carbonate mineralogy (wt%), quartz (wt%), detrital phosphorus (P) and iron (Fe) (μ moles/gr of sed.).

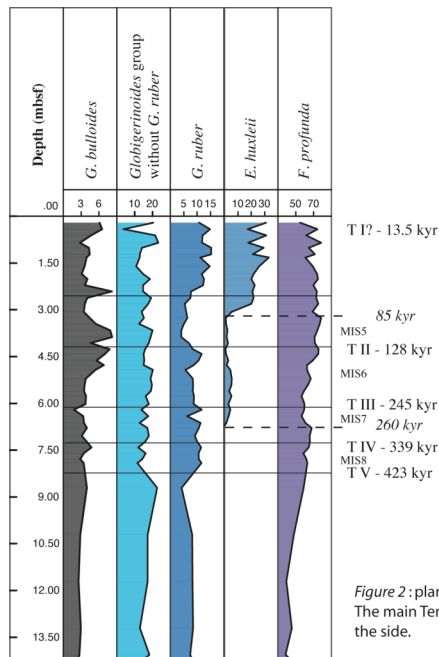


Figure 2: planktonic foraminifers and nannofossils (%). The main Terminations (from V to I) are indicated on the side.

REFERENCES

- Meyer, N., Kindler, P., Spezzaferri, S., Tamburini, F., Vennemann, T. (2006): Evidence for the initiation of the Great Barrier Reef in Pleistocene sediments from Marion Plateau, NE Australia, Swiss Sed 2006, 22-23.
- Martini, E. (1971): Standard Tertiary and Quaternary Calcareous Nannoplankton Zonation. In: Proceedings of the II Planktonic Conference, Ed. Tecnoscienza, Roma, 739-785.
- Reiss, Z., and Hottinger, L. (1984): The Gulf of Aquaba. Ecological Micropaleontology. Springer-Verlag, 354 pp.

Thrierstein, H. R., Geitzenauer, K.R., Molfino, B., and Shakleton, N.J., 1977. Global synchronicity of late Quarternary coccolith datum levels: Validation by oxygen isotopes. *Geology*, 5: 400-404.