

Calcareous nannofossil, benthic foraminiferal and geochemical responses to nutrient availability in the SW Pacific Ocean during the Pleistocene

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An integrated micropaleontological (calcareous nannofossils and benthic foraminifera) and geochemical study was carried out from the IMAGES Site MD97 2114 (eastern New Zealand, Pacific Ocean), mostly to reconstruct the oceanographic events that occurred in this area during Pleistocene climate changes. The site studied is located north of the Chatham Rise at a water depth of 1935 meters, recording the last 1.07 Myr, with substantial continuity of sedimentation.

Micropaleontological data have been collected using standard methodologies, then processed by means of the most common and useful statistical methods of mono- and multivariate analyses. The Principal Component Analysis applied to relative abundances of the most abundant calcareous nannofossil and benthic foraminiferal species shows that the distribution patterns of the two groups are mainly driven by nutrient availability controlling primary productivity.

Calcareous nannofossil data document: up to MIS 18, the occurrence of a stratified water-column, predominantly characterised by meso-oligotrophic conditions (*e.g.*, occurrence of *Oolithotus fragilis*); from MIS 14 to MIS 8, enhanced nutrient levels characterised by high abundance of *Gephyrocapsa caribbeanica*; finally, from MIS 8 to the core top, variable trophic conditions. Changes in food supply to the sea floor, related to shallow-water primary productivity, appear to be the main factor controlling benthic foraminifer distribution. The lower portion of the IMAGES core, up to MIS 18, is in fact characterized by benthic foraminifer assemblages indicative of mesotrophic conditions. In the central part of the core, a slow increase in the relative abundances of eutrophic taxa is documented. Then, after a period of re-establishment of mesotrophic conditions (up to MIS 7), a new trend of increasing productivity characterises the upper part of the core.

The biological events are quite well mirrored by the $\delta^{13}\text{C}$ curve: the lowermost portion of the core records a predominantly negative $\delta^{13}\text{C}$ interval, the middle portion (MIS 15-8) is characterised by heavier values of the $\delta^{13}\text{C}$, and finally, after an interval of re-established negative values, several positive peaks are documented up to the MIS 4.