



Early to late Pliocene calcareous nannoplankton biostratigraphy and abundances from the NW Australian shelf

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The early to late Pliocene is considered a past analog for future warming on Earth with warmer sea surface temperatures and atmospheric CO₂ levels similar to those already reached today (~400ppm). Coccolithophores, marine calcifying haptophyte algae, are known to dominate the plankton community in warm and oligotrophic waters, and may therefore be better adapted to such conditions. IODP Expedition 356 Site U1464 is located on the NW Australian shelf, under the direct influence of the Indonesian Throughflow (ITF), which transports heat from the Pacific Warm Pool into the Indian Ocean. Here, we present the Pliocene nannofossil biostratigraphy of this site (145,15-286,67 m CSF-A; biozones NN12 to NN16) and use assemblage data to unravel past algal responses to temperature and other paleoceanographic variability in this tropical region. Nannofossils were identified using polarized light microscopy in slides that were prepared with an adaptation of the dilution technique (the “drop” technique).

The top occurrence of *Sphenolithus* spp. is the most distinct biostratigraphic event (between 157,7-159,2 m CSF-A). Other biostratigraphic events are more difficult to constrain, such as the top occurrence of *Reticulofenestra pseudoumbilicus* (>7µm) and the base occurrence of *Pseudoemiliana lacunosa*. In addition, *Discoaster* species are rare and commonly overgrown and thus not as reliable as biostratigraphic markers compared to deeper marine settings. Reticulofenestrads (*Reticulofenestra* and *Gephyrocapsa* spp.) are dominant and occur in a variety of sizes and were thus grouped based on this parameter (<3 µm, 3-5 µm, >5 µm). Out of these, the most abundant are the smaller than 5 µm placoliths, which commonly exceed 70% of the total abundance, especially in the time interval after the top occurrence of *Sphenolithus* spp. The same top occurrence marks the onset of a decrease of *Gephyrocapsa* spp., which almost disappears in the top of our section (<2% of the total abundance at 149,6 m CSF-A). Other common species are *Calcidiscus* spp., *Umbilicosphaera* spp., *Syracosphaera* spp. and *Pseudoemiliana lacunosa*. At the fringes of the Indo-Pacific Warm Pool, this site documents distinct shifts in coccolithophore communities that reflect both evolutionary adaptations and ecological responses to changes in the predominant water masses.