Middle Eocene to Late Oligocene climate variability: A new integrated calcareous nannofossil and magnetostratigraphic record from the equatorial Indian Ocean

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A new record of calcareous nannofossil biostratigraphy and magnetostratigraphy from the Middle Eocene to the Late Oligocene allows the establishment of a precise biochronology and information about climatic variability in the equatorial Indian Ocean. The dataset compares Site 709 with results obtained from Site 711 (Fioroni et al., 2015).

This palaeoecological investigation, based on grouping taxa with similar responses to environmental conditions using statistical analysis, first shows a response of the nannofossil assemblages to the Middle Eocene climatic optimum with a short-lived increase in the abundance of warm-water taxa. This is followed by a long cooling trend that leads to the greenhouse-icehouse change across the Eocene–Oligocene transition (EOT). Most notably, we documented a complete reorganisation in the nannofossil assemblages, shown by abundance variations in ecologically-significant species that preceded the onset of the EOT. This prominent change in the phytoplankton community is interpreted as a response to increasing nutrients in the surface waters. The strengthened nutrient supply could be the result of a lowering sea level, which in turn could be linked to ice-sheet expansion in East Antarctica and equatorial upwelling of the Subantarctic Mode Water.

The response of the phytoplankton community to the Late Oligocene warming event was also recognised. A comparison with recent data (Dunkley Jones et al., 2008; Fioroni et al., 2015; Jones et al., 2019) makes possible the reconstruction of a basin-scale palaeoceanography of the low-latitude Indian Ocean.

References

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