Evidence of tropical Pacific forcing in the western Indian Ocean coccolithophore productivity record

Deborah N. Tangunan
University of Bremen, MARUM - Center for Marine Environmental Sciences, 28334 Bremen Germany; tangunan@uni-bremen.de

Karl-Heinz Baumann
University of Bremen, Department of Geosciences, 28334 Bremen, Germany; baumann@uni-bremen.de

Jürgen Pätzold
University of Bremen, MARUM - Center for Marine Environmental Sciences, 28334 Bremen, Germany; jpaetzold@marum.de

Rudiger Henrich
University of Bremen, Department of Geosciences, 28334 Bremen, Germany; henrich@uni-bremen.de

Michal Kucera
University of Bremen, MARUM - Center for Marine Environmental Sciences, 28334 Bremen Germany; mkucera@marum.de

Ricardo De Pol-Holz
Universidad de Magallanes, GAIA-Antártica, Center for Climate and Resilience Research (CR), 6210427 Punta Arenas, Chile; ricardo.depol@umag.cl

Jeroen Groeneveld
University of Bremen, Department of Geosciences, 28334 Bremen Germany; jgroenev@uni-bremen.de

We present a new coccolithophore productivity reconstruction that covers the last two glacial-interglacial cycles in sediment core GeoB12613-1, which was retrieved from the western tropical Indian Ocean, an area that mainly derives its warm and oligotrophic surface waters from the eastern Indian Ocean. Our results were compared to the record from an upwelling region off the southern tip of Sumatra (SO139-74KL; Andruleit et al., 2008), which allowed us to determine the productivity and water-column dynamics between the eastern and the western Indian Ocean regions. Florisphaera profunda index and estimated primary productivity (EPP) records from GeoB12613-1 and SO139-74KL show the same long-term trend in paleoproductivity over the studied time period (i.e., strengthening of stratification and reduced productivity towards the Holocene). We observed a similar orbital cyclicity at the precession and also at the obliquity band. Moreover, the strong similarity in the EPP trend at a different period of time and the opposing pattern in the water-column stratification proxy F. profunda index suggest the possible existence of an Indian Ocean dipole (IOD) that is analogous to the present day and thus operated on a longer time scale. This is in contrast to the current view of the IOD, which is based only on the Holocene timescales.

References