

Diversity and abundance patterns of marine primary producers across the Paleocene – Eocene boundary

Christian Joachim¹, Jörg Mutterlose¹, Peter Schulte²

¹ Ruhr-Universität Bochum, Universitätsstr.150, D-44801 Bochum, Germany

² GeoZentrum Nordbayern, University Erlangen, D-91056 Erlangen, Germany

The composition of calcareous nannofossils across the Paleocene – Eocene Thermal Maximum (PETM) has been investigated at an equatorial site (Demerara Rise; ODP Site 1258C). The onset of the PETM is defined by a distinctive negative carbon isotope anomaly, carbonate dissolution and specific nannofossil events; the top of the PETM is gradual and therefore less accurately defined. The PETM interval is 1.47 m thick, including a 57 cm thick basal clay layer. Calcareous nannofossils were studied in high-resolution intervals of 5 cm and 2 cm by using smear and settling slides.

In the pre-PETM interval the species richness ranges from 20 to 32. The lowermost 22 cm of the PETM interval yield assemblages of low abundance and low diversity, in the upper 1.25 m of the PETM species richness increases to 19 species and remains high thereafter. Absolute abundances have a maximum of 2.3×10^9 specimens/g sediment in the pre-PETM interval. At the base of the PETM abundances drop to values slightly above zero, they stay below 2.5×10^6 specimens/g sediment during the event, before they increase slowly. Abundances are below 1.0×10^9 specimens/g sediment for the rest of the succession. Calcareous nannofossils show marked changes in the assemblage composition: Increased abundances of *Campylosphaera* sp. and *Chiasmolithus* sp. precede the onset of the PETM and may indicate eutrophic conditions. The nannofossil record during the PETM onset is obscured by carbonate dissolution, causing low total abundances in the lowermost 35cm of the PETM. Smaller taxa, like *Coronocyclus bramlettei* and *Coccolithus minimus* seem to have favoured the conditions prevailing during the early phase of the PETM, an interval perhaps affected by surface-water acidification. In the later stage of the PETM the large sized species *Coccolithus bownii* appears with high percentages and remains highly abundant throughout the interval. Discoasterids indicating warm surface-waters become more frequent and diversify concomitant to the PETM onset. *Discoaster araneus* is characterized by a reduction of its rays from a maximum of 9 in the lowermost part of the PETM to a minimum of 5 – 6 rays in the later stage. Deformed discoasterids are common throughout the entire PETM interval, paralleled by *C. bownii* and *Rhomboaster cuspis*. *R. cuspis* and *Rhomboaster bramlettei* are the only coccoliths, showing a distinctive variability of size, without changing their shape during the event.