Geophysical Research Abstracts, Vol. 9, 08116, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08116

Interactions between early Paleogene calcareous nannoplankton evolution and changes in environmental conditions: evidence from ODP Site 1262

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Over the last several decades debates on the 'tempo and mode' of evolution have centered on the question whether morphological evolution occurs gradually or punctuated, i.e., with long periods of stasis alternating with short periods of rapid morphological change and generation of new species. Another major debate is focused on the question whether long-term evolution is driven by, or at least strongly influenced by changes in their environment, or by interaction with other life. Oceanic microfossils offer a unique opportunity to obtain the large datasets as well as the precision in dating of subsequent samples to study both these questions. We present high-resolution analyses of selected calcareous nannofossils from the deep-sea section recovered at ODP Site 1262 in the South-eastern Atlantic (Leg 208; Zachos et al., 2004). The studied section encompasses nannofossil Zones NP4–NP12 (equivalent to CP3–CP9b) and Chrons C27r–C24n.We document more than 70 biohorizons occurring over an about 10 m.yr. time interval, ($\sim$ 62.5 Ma to $\sim$ 52.5 Ma), and discuss their reliability and reproducibility with respect to previous data, thus providing an improved biostratigraphic framework, which we relate to magnetostratigraphic infor-

mation, and present for two possible options of a new Paleocene stratigraphic framework based on cyclostratigraphy (Westerhold et al, in press). This new framework enabled us to tentatively reconstruct steps in the evolution of early Paleogene calcareous nannoplankton through documentation of transitional morphotypes between genera and/or species and of the philogenetic relations between the genera *Fasciculithus* , *Heliolithus, Discoasteroides* and *Discoaster*, as well as between *Rhomboaster* and *Tribrachiatus*. The exceptional record provided by the continuous, composite sequence recovered at Walvis Ridge allowed us to describe the mode of evolution among calcareous nannoplankton: new genera and/or new species usually originated through branching of lineages via gradual, but relatively rapid, morphological transitions, as documented by the presence of intermediate forms between the end-member ancestral and descendant forms. Significant modifications in the calcareous nannofossil assemblages are often related to significant changes in environmental conditions, but the appearance of structural innovations and radiations within a single genus also occurred during “stable” environmental conditions.

References

Westerhold, T., Röhl, U., Laskar, J., Raffi, I., Bowles, J., Lourens, L.J., Zachos, J.C., in press. On the duration of magnetochrons C24r and C25n, and the timing of early Eocene global warming events: Implication for the ODP Leg 208 Walvis Ridge depth transect. Paleoceanography.

Zachos, J.C., Kroon, D., Blum, P., et al., 2004. Early Cenozoic Extreme Climates: The Walvis Ridge Transect. Initial Rep. Ocean Drill Program 208, http://www-odp.tamu.edu/publications/208_IR/208ir.htm.