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Climate and Biota across the Eocene-Oligocene transition at Site 1090: recent advances on calcareous nannofossils as paleoclimatic and dissolution proxy

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The Eocene-Oligocene transition represents the biggest biotic turnover in the Cenozoic, involving both terrestrial and marine realms. In this study we present the results obtained by a quantitative analysis of late Eocene-early Oligocene (35.5- 33.1 Ma) calcareous nannofossil assemblages from ODP Site 1090 Hole B (Leg 177). This Hole is located on the southern flank of the Agulhas Ridge on the Subantarctic sector of the Atlantic Ocean (42°54′S), and lies along the boundary between the North Atlantic Deep Water and the Circumpolar Deep Water. Thanks to its position above the Carbonate Compensation Depth (3702 m), the nannofossil assemblage preservation is from poor to good in most of the section, even thought some intervals are barren. A well-preserved magnetostratigraphic signal along all of the section and nannofossil biostratigraphy provided the time framework essential for interpreting the assemblage variations.
Within a high resolution biostratigraphic framework and through the comparison with bulk oxygen and carbon isotope datasets we attempt to reconstruct sea surface water temperature and trophic conditions, aimed to a late Eocene - early Oligocene paleoceanographic reconstruction for the South Atlantic. A marked change in the nannofossil assemblages is associated with the Oi-1 event: a nonlinear increase of cool-water taxa gives evidence as the evolution of this climatic event is more complex than previously estimated by calcareous nannofossils in the Southern Ocean (Villa et al., 2008). In fact cool-water taxa variation trend likely reflects the two distinct shifts (Step 1 and Step) recognised by Coxall et al. (2005) within the oxygen isotope shift .Step 1 falls in the uppermost part of magnetochron C13r, while the end of step 2 correlates with the base of Chron C13n (Channell et al., 2005). Furthermore, changes in nannofossil abundance and preservation suggest CCD depth fluctuations, showing a deepening near the Eocene/Oligocene boundary, as previously suggested (Coxall et al., 2005). Site 1090 is located at 3702 m water depth, currently lays above the CCD (Gersonde et al., 1999), but it was probably close or below it during the Eocene until its deepening at the Oi-1 event; this might explain the presence of numerous barren samples along the section and a major dissolution event occurring just before Step 1.

References

Channell, J.E.T., Galeotti, S., Martin, E.E., Billups, K., Scher, H., Stoner, J.S., 2002. Eocene to Miocene magnetostratigraphy, biostratigraphy, and chemostratigraphy at ODP Site 1090 (sub-Antarctic South Atlantic). Geological Society of America Bulletin, 115, 607-623.
Coxall H.,, Wilson P.A., Palike H., Lear C.H., Backman J.(2005). Rapid stepwise onset of Antarctic glaciation and deeper calcite compensation in the Pacific Ocean. Nature, 433 6 January 2005.
Gersonde, R., Hodell, D.A., Blum, P., et al., 1999b. Proc. ODP Init. Rep. 177 [Online]. Available from World Wide Web: http://www-odp.tamu.edu/publications/177_IR/177toc.htm.
Villa G., Fioroni C., Pea L., Bohaty S.M., Persico D., 2008. Middle Eocene – Late Oligocene climate variability: Calcareous Nannofossil response at Kerguelen Plateau, Site 748. Mar. Micropaleont., 69, 173-192.