No dramatic changes observed in subtropical radiolarian plankton assemblages during the Middle Eocene Climatic Optimum (MECO); evidence from the North Atlantic ODP Site 1051

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Résumé

The Middle Eocene Climatic Optimum (MECO; ca. 40 Ma) was a prominent global warming event, characterized by a gradual rise of 4–6 ∘C in seawater temperature throughout the water column. Although the biotic response during the MECO has been documented for several microfossil groups, this is practically unknown for polycystine radiolarians. To address this issue, quantitative analyses were undertaken in well-preserved assemblages recovered from ODP Site 1051 (western North Atlantic). At this site, the warming interval is characterized by increased radiolarian abundance, indicative of higher productivity in surface waters. This observation is consistent with the diatom record. As suggested by the stable isotope record of planktonic foraminifera, changes in surface water fertility of the Blake Plateau are probably the result of increased mixing in the water column induced by coastal upwelling. The peak of radiolarian diversity coincides with the isotope shift and no extinction was found across the studied interval, suggesting that subtropical radiolarians are relatively resilient to transient warming events. Likewise, variations in faunal composition show that ocean warming induced only a weak ecological response in radiolarians. One of the most striking faunal changes associated with the MECO is the poleward migration of warm tropical radiolarian species, increasing the taxic richness by _˜30% during the MECO. Similarly, several typical middle Eocene tropical species are more abundant in the warmest interval. In addition to these poleward migrations, we identified three clusters composed of warm-water or cool-water species, as well as two abundant artostrobiid species which may represent nutrient opportunists.

Mots-Clés: Middle Eocene, Global warming, Middle Eocene Climatic Optimum, Blake Nose, Siliceous microfossils, Marine productivity

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