

Evaluating Oligocene calcareous nannoplankton diversity and community dynamics

Claire M. Routledge

Christian-Albrechts-University of Kiel, Institute of Geosciences, Kiel, Germany; claire.routledge@ifg.uni-kiel.de

Paul Bown

Department of Earth Sciences, University College London, London, UK; p.bown@ucl.ac.uk

Jeremy Young

Department of Earth Sciences, University College London, London, UK; jeremy.young@ucl.ac.uk

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The Oligocene (33.9–23.03 Ma) remains a relatively understudied interval, yet it is bookmarked by two large glaciations signifying the development of a continental-sized ice sheet on Antarctica (Eocene/Oligocene boundary at 33.9 Ma) and the expansion of the ice sheet (Oligocene/Miocene boundary at 23.03 Ma). The lack of high-resolution, long-term records has hampered efforts to document the structure of biotic change through the Oligocene, a time of significant ocean and climate reorganization as the Earth system switched from the warm climates of the Paleogene to the cooler world of the Oligocene and initiation of glacial–interglacial cycles.

Here we present long-term, high-resolution community records of nannoplankton assemblages from the early Oligocene to Early Miocene (31.89–21.77 Ma) obtained from Integrated Ocean Drilling Program (IODP) Sites U1406 and U1411 in the northwest Atlantic Ocean. We document the evolutionary history and community dynamics of calcareous nannoplankton throughout this time to investigate the drivers behind the decline in diversity following the Eocene peak and to analyze population restructuring associated with the emergence of key extant coccolithophore groups that constitute the foundation of modern phytoplankton communities. Generating these long-term records is crucial for understanding the background-level dynamics, and they are essential for accurately gauging the scale and impact of transient climatic events (i.e., Eocene/Oligocene and Oligocene/Miocene boundaries).