Geophysical Research Abstracts
Vol. 19, EGU2017-16385-1, 2017
EGU General Assembly 2017

The Eocene/Oligocene boundary in the western North Atlantic (IODP Site U1411): Paleoclimatic and paleoceanographic change reflected by dinoflagellate cyst assemblages

Lisa M. Egger (1), Steven M. Bohaty (2), Oliver Friedrich (1), Richard D. Norris (3), Paul A. Wilson (2), and Jörg Pross (1)

(1) Institute of Earth Sciences, Heidelberg University, Im Neuenheimer Feld 234, 69120 Heidelberg, Germany, (2) National Oceanography Centre, University of Southampton, 20 European Way, Southampton SO14 3ZH, UK, (3) Scripps Institution of Oceanography, University of California, San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0244, USA

The Eocene/Oligocene transition is characterized by two distinct, stepwise δ18O shifts, the so-called EOT-1 and Oi-1isotope events. The multi-step character of these isotope events indicates that the onset of large-scale Antarctic glaciation was part of a complex paleoclimatic and paleoceanographic turnover that also comprised changes in northern hemisphere paleoclimate and paleoceanography, including surface-water circulation in the North Atlantic Ocean. However, the processes connected to both cooling and sea-level fluctuations are yet poorly understood for the North Atlantic realm, which is at least partly due to a lack of continuous marine sediment successions.

Dinoflagellate cyst (dinocyst) assemblage data from the new, continuous Newfoundland Drift succession recovered during IODP Expedition 342 provide new insights into the development of North Atlantic surface-water dynamics. Our high-resolution dataset of latest Eocene to earliest Oligocene (33-35 Ma) dinocyst assemblages off Newfoundland reveals two distinct pulses of reduced surface-water temperatures, which can be correlated to the EOT-1 and Oi-1 isotope events. They reflect a temporary southward expansion of the proto-Labrador Current, which may have resulted from a strong cooling of the Arctic region at that time. The second cooling pulse also shows a strong percentage increase in near-coastal dinocysts, which can be attributed to the influence of substantial sea-level fluctuations. The cooling and sea-level-fall signals do not appear simultaneously in the dinocyst record for the Oi-1 isotope event; notably, the sea-level fall leads the cooling signal by approximately 100 kyrs, which provides insight into the sequence of paleoceanographic events in North Atlantic surface waters during the Eocene/Oligocene transition.