Geophysical Research Abstracts
Vol. 14, EGU2012-6207, 2012
EGU General Assembly 2012

The Neogene of the Iceland Sea – Paleoenvironmental reconstructions using marine palynomorphs

M. Schreck, J. Matthiessen, and R. Stein
Alfred Wegener Institute, Geosciences, Bremerhaven, Germany (michael.schreck@awi.de)

ODP Hole 907A was drilled in the Iceland Sea as the mid-point of a paleoenvironmental transect across the Norwegian-Greenland Sea in order to investigate the response of the Arctic gateway region to the long-term global cooling that occurred after the Miocene Climate Optimum. However, owing to a generally low carbonate deposition/preservation and scarcity of calcareous microfossils in Neogene sediments of the Nordic Seas, the application of these traditionally used microfossils and deduced δ18O and Mg/Ca temperature proxies is strongly hampered. Hence, most previous studies have focussed on reconstructing the paleoceanographic and paleoclimatic history since the onset of large-scale Northern Hemisphere glaciations. On that account, the Miocene and parts of the Pliocene have been largely ignored and the Neogene paleoenvironmental history of the Nordic Seas still remains enigmatic.

To bypass the absence of biogenic carbonates, organic-walled microfossils (e.g. dinoflagellate cysts, prasinophyte algae and acritarchs) are required for detailed paleoenvironmental reconstructions on pre-Quaternary timescales since they are continuously present and show relatively high abundance and diversity in the high northern latitudes hemipelagic sediments. ODP Hole 907A in the Iceland Sea, located close to the growing ice sheets, experienced the effects of sea-ice cover, migrating wind fronts and ocean currents, thus being a sensitive area with respect to global climate. In this context, Neogene climate deterioration and associated reorganisation of global ocean circulation must have led to alterations in the palynomorph association and may have affected turnover in species composition.

Here we present a comparatively high-resolution palynomorph record from the almost continuous Middle Miocene to Late Pliocene sediment sequence of ODP Hole 907A in the Iceland Sea. Its pristine paleomagnetic record provides the unique opportunity for detailed investigations on how palynomorph assemblages alter in response to the major Cenozoic climate transition. The analysed sequence is characterized by a general long-term trend from a diverse middle Miocene palynomorph assemblage towards the impoverished (glacial) assemblages of the late Pliocene, clearly reflecting the prevailing Neogene cooling. However, superimposed on this trend several short-term changes in diversity, abundance and assemblage composition, particularly pronounced in the late Miocene and Pliocene, have punctuated the long-term decline. We identified different assemblages and distinctive suites of acmes, proving considerable changes in the physical characteristics of surface water masses that presumably reflect both, globally recognized trends and more local events. Ecostratigraphic interpretations based on these changes allowed us to identify several paleoceanographic and paleoclimatic signals, which provide new insights into the paleoenvironmental evolution of the Nordic Seas during middle and late Neogene times.