The Miocene – Pliocene boundary in the eastern North Atlantic: dinoflagellate cyst biostratigraphy

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Keywords: biostratigraphy, Miocene, Pliocene, North Atlantic, dinoflagellate cysts

Abstract

The lacking of an accurate biostratigraphic framework for the transition between the Miocene and the Pliocene in the North Atlantic has hampered geological studies in this area. In this study we present the first biozonation scheme for the eastern North Atlantic, spanning an interval between 9.0 and 2.5 Ma (late Miocene – Pliocene), based on dinoflagellate cysts and acritarchs. The material used to establish our biozonation was acquired from ODP Site 982, which is situated in the Hatton–Rockall Basin. This site contains a continuous sedimentary sequence spanning the required time interval, and thus a complete record of marine palynomorph evolution. Different sections of Site 982 have furthermore been calibrated to the astronomically tuned timescale by multiple studies. For this study we constructed a composite age model for Site 982, mainly based on oxygen isotope stratigraphy, spanning the desired time interval. Analysis of 40 samples revealed a rich assemblage of 58 dinoflagellate cyst and 21 acritarch species. We identified 25 bio-events and calibrated these to the astronomically tuned timescale (Gradstein & Ogg, 2012) through the age model for Site 982. To determine the reliability and biostratigraphic potential, we compared the bio-events recorded in this study to events from the Nordic Seas, the western North Atlantic and the nearby Rockall Trough. This allowed us to establish a biozonation scheme for the Miocene–Pliocene transition in the eastern North Atlantic, consisting of 10 HRB (Hatton–Rockall Basin) biozones and 2 subzones. Two HRB biozones span the latest Tortonian to Messinian; the remaining 8 span the Pliocene. Excellent agreement of the Pliocene bio)-events of this study with the Rockall Trough allows correlation for the eastern North Atlantic. To a lesser extent can the HRB biozonation furthermore be applied for the western North Atlantic Ocean and the Nordic Seas.