



Deep-sea ecosystem response to the Middle Eocene Climate Optimum (MECO) in the North Atlantic Ocean

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We investigated the benthic foraminiferal diversity and species composition from North Atlantic IODP Site U1408 in order to document changes in deep-water circulation and organic matter fluxes across the Middle Eocene Climate Optimum (MECO). Site U1408 was drilled at a present water depth of 3022 m southeast of the coast of Newfoundland. The benthic foraminiferal faunas are characterized by generally high species diversity suggesting favorable environmental conditions throughout the studied interval. Among a total of 193 benthic foraminiferal taxa the most dominant genera include *Nuttallides*, *Oridorsalis*, *Cibicidoides*, *Pullenia*, *Anomalinoidea*, *Globocassidulina* and *Gyroidinoides*. Increased abundances of elongate-cylindrical infaunal species suggest approximately 460 ka duration of the MECO (from around 40.19 to 39.73 Ma) and the presence of slightly less ventilated bottom waters and elevated food availability during this time interval. The duration of the MECO also coincides with the presence of the planktonic foraminifer *Orbulinoides beckmanni*, which therefore is used as an Eocene biostratigraphy marker defining the end of the warm interval with its Last Appearance Datum. Changes in the benthic foraminiferal fauna probably reflect the onset of deep-water formation in the northern North Atlantic Ocean as response to the long-term climatic cooling trend of the middle Eocene. The intensification of deep-water currents and increased influence of cold and well-ventilated deep-water masses is reflected by increased importance of the *Nuttallides truempyi*-fauna. Superimposed on this long-term faunal trend are changes in the distribution of *Globocassidulina subglobosa* at a period of approximately 200 ka suggesting an eccentricity forcing of deep-water formation and associated food quality at the sea floor.