

Middle Eocene evolutionary lineages from the North Atlantic Ocean, IODP Site U1410: biostratigraphic and paleoecological constraints

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According to global marine isotopic records, the middle Eocene represents the first phase in a long-term cooling that eventually led to the onset of Antarctic glaciation across the Eocene-Oligocene boundary (Zachos *et al.*, 2001). Here, we aim to document the evolutionary changes that are displayed by two different calcareous nannofossil taxonomic groups (coccolithaceans and sphenoliths) during the Lutetian in order to strengthen the biostratigraphic framework and provide a better understanding of plankton evolution during this crucial stage. We studied calcareous nannofossil assemblages for Zones NP15-NP16 or CNE9-CNE12 (Martini, 1971; Agnini *et al.*, 2014) in deep-sea successions recovered at Site U1410 (IODP Expedition 342; 41°19.6987'N, 49°10.1995'W, Norris *et al.*, 2012) on the southeast Newfoundland Ridge (NW Atlantic). This site contains expanded middle Eocene successions of clay-rich nannofossil oozes that have exceptionally well preserved nannofossils, and is thus suitable for detailed morphologic studies, as well as standard quantitative analyses. Morphometric data were collected in order to characterize the central structure of the middle Eocene *Coccolithus-Cruciplacolithus-Chiasmolithus* plexus. In addition, our results provide insights on a sphenolith evolutionary lineage, which includes *Sphenolithus kempii* - *S. perpendicularis* - *S. furcatolithoides* morph. A - *S. cuniculus* - *S. furcatolithoides* morph. B. Based on

general morphology and extinction pattern, we were able to define the successive steps observed in this lineage, which allowed us to improve biostratigraphic accuracy within the Lutetian Stage. This lineage also highlights interesting relationships between middle Eocene evolutionary trends and changes in paleoenvironmental conditions.

References

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