Changes in benthic foraminiferal assemblages at the Eocene-Oligocene transition in the Transylvanian Basin (Romania)

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Abstract

The Eocene-Oligocene boundary that marks a pivotal transition in the Cenozoic climate is intensively studied and best known at the global scale as a cooling event, coincident with the appearance of the first significant permanent ice sheet in Antarctica. This had a major impact on the global ocean and consequently on the marine biota, although its effects on regional palaeoceanography are not uniformly well understood and remained especially poorly constrained in the Transylvanian Basin (Romania). This study aims to identify the regional signals that may be related to a trend of global temperature drop and major palaeoceanographic changes linked to the development of polar ice sheets. We investigated a 35-meter-thick section of the Upper Eocene Brebi Formation from the Transylvanian Paleogene Basin to reconstruct the changes in shallow-marine palaeoenvironments across the Eocene-Oligocene transition. The proxies used are based on the fossil benthic foraminiferal assemblages, because the modern benthic foraminifera taxa are good indicators of various environmental parameters, e.g., temperature, pH, dissolved oxygen, and nutrients of the seawater. A total of 61 samples were collected and processed, and at least 300 benthic foraminifera specimens were picked from every sample. More than 60 species have been identified in the studied material. Diversity indices were calculated, and multivariate data analysis (principal component analysis and cluster analysis) was performed on the benthic foraminiferal dataset. In addition, a morphogroup approach and calculation of BFOI (Benthic Foraminiferal Oxygen Index) also yielded promising results. Our data show that the most common and most abundant benthic foraminifers in the samples belong to the orders *Rotaliida* and *Miliolida*. There are distinctive changes in species abundance distribution patterns along the section, indicating highly dynamic changes in the paleoenvironmental parameters. Our interpretations will highlight both the similarities to global trends and the regional differences inferred from the foraminiferal record in the Transylvanian Paleogene Basin.

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Keywords: palaeoclimate, palaeoenvironment, foraminifera, cooling event, Paleogene