

Oligocene paleoceanographic events of Afales Basin, Ithaki island, Greece: Evidence from Deep-Sea Benthic Foraminifera

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Abstract

An expanded succession of upper Priabonian (upper Eocene) to Chattian (upper Oligocene) hemipelagic marls interbedded with turbiditic sandstone layers is present in the Afales section (Ithaki island, western Greece). A quantitative and paleoecological study using deep-sea benthic foraminifera as a tool to identify climate and oceanographic oscillations across the Oligocene, is presented. Benthic foraminifera have substantial scope in paleoceanographic studies and are recognized as one of the most important paleoecological and paleoenvironmental indicators because their abundance, wide distribution in all marine environments and their high sensibility to the past variability in deep water properties.

Benthic foraminiferal assemblages and planktonic:benthic (P:B) ratios can provide proxies for fluctuating sea level and indicate an upper to possibly upper-middle bathyal depth of deposition for most of the studied section, with paleobathymetric analysis made difficult because of the common presence of shallow water taxa, some reworked by turbidites and others epiphytic taxa, which may have been transported by turbidites or by floating plant material. The mixed neritic-bathyal faunas were present in the clastic unit, indicating redeposition in the deep basin by mass-wasting processes.

The consistent high presence of *Cibicidoides mundulus-praemundulus*, *Oridorsalis* spp. and *Gyroidinoides* spp. indicate well oxygenated bottom waters and oligotrophic conditions during the Oligocene. However, the upper part of the record is characterized by high relative abundances of *Nuttallides umbonifera* (Cushman) and *Stilostomella* spp. The nature and timing of this benthic foraminiferal change based on species distribution, abundance and diversity patterns indicate environmental changes.

Since *N. umbonifera* is a deep-water species, its presence was thought by some to correlate with deep ocean calcium carbonate undersaturation and could be useful for paleoenvironmental reconstructions (Bremer & Lohmann, 1982; Corliss et al., 1986).

Although *N. umbonifera* has been considered a species that favours a carbonate bottom environment in general (Bremer & Lohmann, 1982), we find that this is not necessarily so. However, the variability of proportion of *Nuttallides umbonifera* might reflect cyclic changes in temperature, oxygenation, input of organic matter, water depth and/or tectonic activity.

References

- Bremer, M. L. & Lohmann, G. P., 1982. Evidence for primary control of the distribution of certain Atlantic Ocean benthonic foraminifera by degree of carbonate saturation. *Deep-Sea Research*, 29, 987–998.
- Corliss, B.H., Martinson, D.G. & Keffer, T., 1986. Late Quaternary deep-ocean circulation. *Geological Society of America Bulletin*, 97, 1106–1121.