# Calcareous nannofossil response to the early Oligocene Rhodope volcanic eruptions in some central and eastern Paratethyan basins: A comparison


## Kristalina Stoykova

Bulgarian Academy of Sciences, Geological Institute, BG-1113 Sofia, Bulgaria; stoykova@geology.bas.bg

## Peter Marchev, Raia Raicheva

Bulgarian Academy of Sciences, Geological Institute, BG-1113 Sofia, Bulgaria; pmarchev@geology.bas.bg; raya@geology.bas.bg



https://doi.org/10.58998/jnr3287



The aim of the present study is to evaluate the impact of two large early Oligocene Rhodope volcanic eruptions on the marine calcareous nannoflora across several central and eastern Paratethyan basins, including the Thrace Basin (Limnos Island, Greece). The tuff layers from the Hungarian Paleogene Basin (Central Paratethys), Massignano, Umbria-Marche Basin, Italy (western Mediterranean), eastern Carpathian Basin, Romania (Eastern Paratethys), western Black Sea Basin, Bulgaria (Eastern Paratethys), and Thrace Basin, Turkey and Limnos Island, Greece (Eastern Paratethys) have been dated at 33.3 Ma ± 0.1 Myr and 32.7 Ma ± 0.1 Myr, perfectly matching the ages of two early Oligocene supereruptions from the Borovitsa volcano in eastern Rhodope, Bulgaria. The calcareous nannoplankton response to the eruptions was investigated using published data from these basins and our newly obtained quantitative data from Limnos Island (southernmost Thrace Basin). Our results from Limnos significantly differ from the published data from Central and Eastern Paratethys localities, where volcanic eruptions and gradual cooling prompted a decline in species diversity and quantitative abundance and an increase in cold-water nannofossil taxa (e.g., in the Hungarian Paleogene Basin and the pre-Carpathian Basin in Romania). In Limnos, nannofossil species diversity is high (64 taxa recorded), as well as quantitative abundance in the assemblages. However, after each volcanic eruption, there was a resulting increase in the number of species considered eutrophic, such as *Cyclicargolithus floridanus*, *Reticulofenestra bisecta*, and *Zygrhablithus bijugatus*. This reflects an increase in primary productivity and reduced, but moderate, temperature of the seawater.

In conclusion, the documented response of the calcareous nannoplankton to early Oligocene Rhodope volcanic eruptions shows considerable differences across central and eastern Paratethys basins. In the small and more isolated basins (Hungarian, eastern Carpathian, and western Black Sea), the species diversity and quantitative abundance decrease, whereas the number of cold-water taxa increases. In the deep-water environment of Limnos (Thrace Basin), nannofossil species diversity and quantitative abundance remain high, whereas assemblages are dominated by species preferring a temperate sea water temperature. We speculate that the connection between the Paratethyan isolated basins and the Mediterranean Sea remained open during this time through the southernmost part of the Thrace Basin (Limnos Island).



**Acknowledgements:**

This work has been carried out in the framework of the National Science Program "Environmental Protection and Reduction of Risks of Adverse Events and Natural Disasters" and supported by the Ministry of Education and Science (MES) of Bulgaria (Agreement № Д01-27/06.02.2024).