

Biostratigraphy and paleoenvironment of middle Miocene deposits from the southern Pannonian Basin (Bosnia and Herzegovina) based on calcareous nannofossils

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Quantitative and semi-quantitative analyses were performed on calcareous nannofossils from 370 samples that were collected from middle Miocene sediments at the Ugljevik section (Bosnia and Herzegovina). During the middle Miocene, the studied section was located in the southern part of the Pannonian Basin (Central Paratethys domain).

The calcareous nannofossil assemblages were dominated in general by *Reticulofenestra minuta*, followed in lower amounts by *Coccolithus pelagicus*, *Reticulofenestra pseudoumbilicus*, and *R. haqii*. Continuously present within the section, but less abundant, were *Umbilicosphaera jafari*, *Helicosphaera carteri*, *H. walbersdorfensis*, *Coronosphaera mediterranea*, *Holodiscolithus macroporus*, *Reticulofenestra gelida*, *Sphenolithus moriformis*, and *R. antarctica*. The following species and taxonomical groups were rare and sporadic: *Acanthoica cohenii*, *Braarudosphaera bigelowii*, *Calcidiscus* spp. (*Calcidiscus leptoporus*, *C. macintyreii*, *C. premacintyreii*, *C. tropicus*, and *C. pataecus*), *Discoaster* spp. (*Discoaster adamanteus*, *D. deflandrei*, *D. exilis*, *D. musicus*, and *D. variabilis*), *Hayella challengeri*, *Pontosphaera multipora*, *P. discopora*, *R. producta*, *Rhabdosphaera sicca*, *Sphenolithus heteromorphus*, *S. cf. abies*, and *Umbilicosphaera rotula*. These species indicate placement in Zones NN5 (*Sphenolithus heteromorphus*) and NN6 (*Discoaster exilis*) for the sedimentary succession.

The paleoecological preferences for the most abundant taxa, coupled with obvious shifts in their abundance and in assemblage composition through the studied interval, were considered for paleoenvironmental interpretation. High amounts of *R. minuta* (up to 90%) were documented in the lower half of the section, indicating a eutrophic environment with a terrigenous nutrient-rich input. In the second half of the section, the assemblages were mainly dominated by *C. pelagicus*, *R. pseudoumbilicus*, *R. haqii*, and helicoliths, suggesting fluctuations between shallower and more marine environments and changes in nutrient-type availability, sea surface temperatures, and upwelling intensity. Short intervals with elevated numbers of *U. jafari* were recorded in the middle part of the section, indicating a probable nearshore, hypersaline marine environment.

Didemnid ascidian spicules represented a secondary component of the microfossil assemblages from the Ugljevik section, and the parataxonomical classification of Varol & Houghton (1996) was used for tentative taxa identification.

References

- Varol, O. and Houghton, S.D., 1996. A review and classification of fossil Didemnid Ascidian spicules. *Journal of Micropalaeontology*, **15**: 135–149.