

Biostratigraphy of Middle Miocene Sediments from the Tuzla Basin (North-eastern Bosnia) Based on Foraminifera and Calcareous Nannoplankton

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The Tuzla Basin (NE Bosnia), situated on the southern periphery of the Central Paratethys, was a gulf during Miocene. The thickness of Miocene sediments is about 2300 m. PETROVIĆ (1979/80) and VRABAC et al. (1990) reported about the stratigraphical position of Miocene sediments from the Tuzla Basin based on foraminifera. Foraminifera and calcareous nannoplankton from Miocene sediments were newly investigated from outcrops in the Tuzla area, and from the borehole Tetima (B-77) located 12 km NE from Tuzla. The borehole is placed in the Dokanj syncline in the south-western edge of Majejica horst anticlinorium. This investigative-exploitation borehole (B-77) was drilled during 2005, and recovered salt formation at depth about 407 m.

Foraminifera

Lower Sarmatian sandy marls and sandstones from the uppermost part of the investigated section (about 25 m) contain very rare foraminifera (*Elphidium* sp.) and molluscs: *Mohrensternia* sp. and *Hydrobia* sp. According to the specific association of fossils these Lower Sarmatian sediments can be correlated with *Rissoa* Beds. This stratigraphic unit corresponds to the local *Anomalinoidea dividens* foraminiferal zone. Upper Badenian sediments belong to the local *Bolivina dilatata maxima* zone (sample from 32 m). Foraminiferal assemblages of this zone contain *Globigerina bulloides*, *Pappina parkeri*, *Bulimina elongata elongata*, *Uvigerina semiornata* etc. Middle Badenian sandy marls and sandstones contain a fauna characteristic for *Pappina parkeri* local zone. The investigated sediment is from 85 m depth. Lower Badenian sediments are palaeontologically defined in an interval from 125–400 m. According to foraminiferal assemblages this interval can be subdivided into two local zones: *Ammonia viennensis–Nonion commune*, and *Globigerinoides trilobus–Orbulina suturalis*. In the local *G. trilobus–O. suturalis* zone, which is recognized from 125 to 340 m, occur: *Uvigerina macrocarinata*, *U. pygmaoides*, *Lenticulina inornata*, *Globigerina bulloides*, *Globoquadrina altispira*, etc. The *A. viennensis–N. commune* assemblage points to shallower deposition depth.

Calcareous nannoplankton

In total, 77 samples for nannoplankton were quantitatively analysed in the interval from 23 to 400m from borehole B-77. Analysed sediments from 23 to 125m do not contain *Sphenolithus heteromorphus*, and therefore they can be included in nannoplankton zone NN6. Nannoplankton association contains high percentage of *Reticulofenestra pseudumbilica* (5–7µm) form. Following forms are present in this interval: *Calcidiscus leptoporus*, *Calciosolenia murray*, *Coccolithus pelagicus*, *Coronosphaera mediterranea*, *Helicosphaera carteri*, *H. minuta*, *H. walbersdorfensis*, *H. wallichi*, *Holodiscolithus macroporus*, *Pontosphaera multipora*, *Reticulofenestra gelida*, *R. minuta*, *R. haqii*, *Rhabdosphaera sicca*, *Sphenolithus abies*, *S. moriformis*, *Syracosphaera pulchra* and *Umbilicosphaera jafari*. According to the LO of zonal marker *Sphenolithus heteromorphus*, the NN5/NN6 boundary is placed between 230 and 235m. All investigated samples from 235m downward to the salt formation (to 395m) contain this form and can be attributed to biozone NN5 (*Sphenolithus heteromorphus* Zone; MARTINI 1971). The most frequent forms in this zone are small reticulofenestrids: *Reticulofenestra minuta* and *R. haqii* (>80% of total nannoplankton association). Also occur: *Coccolithus miopelagicus*, *C. pelagicus*, *Cyclicargolithus floridanus*, *Geminilithella rotula*, *Helicosphaera carteri*, *H. walbersdorfensis*, *Pontosphaera multipora*, *Reticulofenestra pseudumbilica*, *Sphenolithus moriformis*, *Syracosphaera pulchra* and *Umbilicosphaera jafari*.

Based on the changes in percentage of *H. heteromorphus*, nannoplankton Zone NN5 can be subdivided into two subzones: 1) from 235 to 395m with *S. heteromorphus* up to ca. 20% and 2) from 395 to 400m with significant lower content of this form (up to ca. 5%). It is important to mention that these two intervals correspond to local foraminiferal zones: the zone with high percentage of *S. heteromorphus* can be correlated with the *G. trilobus*–*O. suturalis* local zone, while the zone with lower percentage of *S. heteromorphus* corresponds to *A. viennensis*–*N. commune* zone.

Sediments of the local *A. viennensis*–*N. commune* zone, above salt formation were stratigraphically positioned into the Karpatian before. New results of calcareous nannoplankton analyses of sediments from the borehole B-77 allow now a correct attribution of this local zone into nannoplankton Zone NN5, and belong therefore to the Lower Badenien.

References

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