



The initial marine flooding of the southern Pannonian Basin System: the North Croatian Basin transgression correlates with the Middle Miocene

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The Early Miocene stratigraphy of the Central Paratethys and the dating of the initial marine flooding of the Pannonian Basin System is very complex. In northern Croatia the situation is complicated by specific tectonic evolution initiating numerous sub-basins bearing fresh-water deposits with endemic fauna. Additionally the repetitive emersion, erosion and land formation, combined with bad outcrop conditions and fossil preservation, highly complicates dating of available deposits. Hence in largest part of north Croatia, i.e. North Croatian Basin, the oldest Miocene deposits comprising alluvial and lacustrine deposits were previously dated as Otnangian based on the correlation with the main Central Paratethys Lower Miocene restriction event. While alluvial deposits do not contain any fossils, the lacustrine deposits are rich of endemic molluscs, ostracods, charophyta and terrestrial flora. Those fresh-water deposits are conformably covered by marine sediments suggesting continuation of deposition from

the lake to marine environment in wide area. That initial "Schlier" deposits were originally lithostratigraphically correlated with the Karpatian deposits in northern Slovenia. The impoverished foraminifera association, preceding the typical high diversity Badenian assemblages was consequently erroneously held for a Karpatian representative.

Integrated calcareous nannoplankton/planktonic foraminifera biostratigraphy has been recently proved for a powerful tool in solving stratigraphic paradigms around the Karpatian/Badenian boundary. Therefore the re-investigation of two most representative boundary outcrops was initiated for stratigraphic re-evaluation and re-calibration of the Miocene marine flooding of the southern Pannonian Basin System: (1) the locality Čučerje NE of Zagreb on the Mt. Medvednica, and (2) the locality Sokolina W of Poljanska, 45 km NW Slavonski Brod on the Mt. Papuk. All investigated samples from Čučerje contain rich and well-preserved calcareous nanofossils. The presence of *Sphenolithus heteromorphus* Deflandre, 1953 and the absence of *Helicosphaera ampliapertura* Bramlette & Wilcoxon, 1967 in investigated samples allows an attribution into *Sphenolithus heteromorphus* Zone (NN5; Martini, 1971). This Middle Miocene Zone can be correlated with the upper part of the Langhian. Foraminiferal associations with *Amphistegina mammilla* (Fichtel & Moll), *Orbulina suturalis* Bronnimann, *Uvigerina* cf. *macrocarinata* Papp & Turnovsky, and *Uvigerina uniseriata* Jedlitschka, confirms now the Badenian age of these sediments. The initial marine sediments at Sokolina (Poljanska) on the Mt. Papuk contain nannoplankton assemblages characterising the NN5 Nannoplankton Zone. In contrast the underlying lacustrine to brackish limy silts and siltstones comprising very poor nannoplankton assemblages point clearly to sudden but continuous transition from fresh-water lake into a marine environment. These new results change dramatically the paleogeographic and geodynamic concept of the southern Pannonian Basin System shifting the datum of its initial marine flooding event for more than 2 m.y.

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