# NANNOPLANKTON CONSTRAINTS ON THE MIOCENE AGE OF OUTER DINARIDE FLYSCH SEDIMENTATION

Tamás Mikes[1,*], Mária Báldi-Beke[2], Miklós Kázmér[3], István Dunkl[1], and Hilmar von Eynatten[1]

[1] Department of Sedimentology and Environmental Geology, Geoscience Center Göttingen, Germany
[2] Rákóczi utca 42, H-2096 Üröm, Hungary
[3] Department of Palaeontology, Eötvös University Budapest, Hungary
* Corresponding author; tamas.mikes@geo.uni-goettingen.de

Tertiary siliciclastic flysch deposits are associated with the Outer Dinaride nappe front. They overlie Eocene platform carbonate to bathyal marl successions that in turn cover Cretaceous platform carbonates of Apulia and the Dinaride nappes. Planktonic foraminifer biostratigraphy indicates an Eocene age of flysch sedimentation, while a part of the southeastern occurrences have recently been dated as of Neogene: biostratigraphic data by de Capoa et al. (1995) indicate that in Central Dalmatia and to the SE, the flysch formation lasted up to the Early Tortonian. Remnants of Upper Cretaceous to Lower Palaeogene flysch are found in the inner part of the Dinarides (Bosnian and Durmitor Flysch, smaller patches of Cretaceous deep-marine clastic strata near Zagreb and Bosanski Novi).

We present new calcareous nannoplankton data from several localities in the entire Adriatic flysch zone. Areas of the regional sampling include the Trieste-Koper and Pazin Basins in Istrian Peninsula, Pag Island, Šopot section near Benkovac, Split area, and Montenegro. The youngest nannofossil assemblages correspond to the NN4-6 Zones, placing most of the flysch into the Lower-to-Mid-Miocene, most probably Langhian. In addition, much reworked species are commonly found from the Upper Cretaceous, and from the Middle and Upper Eocene – many of them have non-overlapping stratigraphic ranges. The obtained Miocene ages of deposition are rather uniform throughout the flysch zone.

Our new biostratigraphic results allow us to conclude that:

1. The reworked Upper Cretaceous and Lower Palaeogene nannoflora suggests that the Cretaceous platform carbonate nappes of the Outer Dinarides were extensively covered by marine sediments behind the present-day thrust front already since the Late Cretaceous.
2. The present-day position of the flysch basin is a result of migration of the orogenic deformation front in the Tertiary. During permanent convergence, the Cretaceous depozone has continuously migrated towards the Apulian foreland. The mass of clastic sediments (originated partly outside the Dinarides, as shown by a significant amount of detrital garnets derived from higher-grade metabasic source rocks that mismatch present-day Dinaride lithologies) has been cannibalized by submarine erosion and repetitively re-deposited in the migrating basin.
3. Basin migration progressed as a series of SE-NW elongated wedge-top basins.
4. By the Mid-Miocene, erosion of older flysch from top of the advancing Cretaceous carbonate thrust wedge was completed, and the flysch depozone switched to the Apulian foredeep. This is supported by coarse "molasse" sediments that prograde onto the Miocene flysch: they are dominated by carbonate clasts, and their pebble spectra retain the inverted stratigraphy of the Cretaceous carbonate platform covered by thin foraminiferal limestones and flysch.
5. On Apulia, and locally on the outermost nappes, there should be a widespread regional unconformity between the Eocene and the Lower-to-Mid-Miocene which has hitherto received only little attention.

de Capoa, P., Radoičić, R. & D'Argenio, B., 1995. – Mem. Sci. Geol. 47:157–172.

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