Correlation of Late Miocene–Pliocene lacustrine to fluvial lithostratigraphic units of the Danube–Kisalföld Basin (Slovakia, Hungary)

ORSOLYA SZTANÓ[1], MICHAL KOVÁČ[2], IMRE MAGYAR[3,4], MICHAL ŠUJAN[2], LÁSZLÓ FODOR[5], ANDRÁS UHRIN[6], LILLA TŐKÉS[1], SAMUEL RYBÁR[2] and GÁBOR CSILLAG[7]

1 – Department of Geology, Eötvös Loránd University, Pázmány P. s. 1/c., Budapest, Hungary

2 – Department of Geology and Paleontology, Faculty of Natural Sciences, Comenius University in Bratislava, Mlynská dolina, Ilkovičova 6, 842 15, Bratislava, Slovakia

3 – MOL Hungarian Oil and Gas Plc., Október 23. u. 15, Budapest, Hungary

4 – MTA-MTM-ELTE Research Group for Paleontology, Budapest, Hungary

5 – MTA-ELTE Geological, Geophysical and Space Science Research Group, Pázmány P. s. 1/c., Budapest, Hungary

6 – Eriksfiord AS, Stavanger, Norway

7 – Geological and Geophysical Institute of Hungary, Stefánia út 14, Budapest, Hungary

The northwestern subbasin of the Pannonian Basin System is crossed in the middle by the Danube river which marks the international boundary between Slovakia to the north and Hungary to the south. The basin is called “Danube basin” in Slovakia and “Kisalföld” in Hungary. The lithostratigraphic subdivision of the more than 4 km thick Upper Miocene to Pliocene sedimentary succession of the basin, deposited in Lake Pannon and in the adjacent fluvial environments, has been developed independently in the two countries. A careful study of the sedimentary formations across the entire basin, however, led us to claim that these formations are identical or similar between the two basin parts to such an extent that their correlation is indeed a matter of nomenclature only.

Nemčiňany Formation corresponds to Kálla Fm, representing locally derived course-grained deltas and gravelly shores along the basin margin (11-9.5 Ma) developed during the early transgressive phase of Lake Pannon. The deep or open lacustrine sediments are collectively designated Ivanka Formation without considering genetics in Slovakia, whereas they are subdivided into four formations in Hungary depending on their position and depositional processes. Endrőd Formation, calcareous to clay marls are found in center and flanks of deep lacustrine depressions (11.6-10 Ma) up to a thickness of several hundred meters, while Szák Claymarl marks floodings of the basement highs (ca. 10.2 and 8.9 Ma) and is only a few tens of meters thick. This latter comprises a thin transgressive lag overlain by open-lacustrine fossiliferous marls formed in water depth less than 100 m. Szolnok Sandstone represents deep basin turbidite systems (10.5-9.5 Ma) occasionally up to a thickness of 1000 m. Algyő Formation comprises the fine-grained slope deposits and related thin turbidites prograding through the basin between 10-9 Ma ago. Beladice Formation represents nearshore lacustrine and deltaic deposits, fully corresponding in its definition to Újfalu Formation (10.5-8.5 Ma). The fluvial deposits, assigned into Volkovce Formation in Slovakia are designated Zagyva Formation in Hungary (10-6 Ma).

The synoptic description and characterization of the formations offer a basin-wide insight into the development of this sedimentary basin during the Late Miocene.

The turbidite systems, the slope, the overlying deltaic and fluvial systems are all genetically related and are coeval at any time slice after the regression of Lake Pannon initiated about 10 Ma ago. All these formations are younging to the S, SE as the progradation of the shelf-slope went on. The Danube-Kisalföld Basin got filled up to lake level by 9 Ma, since then fluvial deposition dominated in areas of subsidence, transmitting huge amount of sediment to the SW and SE parts of the Pannonian Basin.

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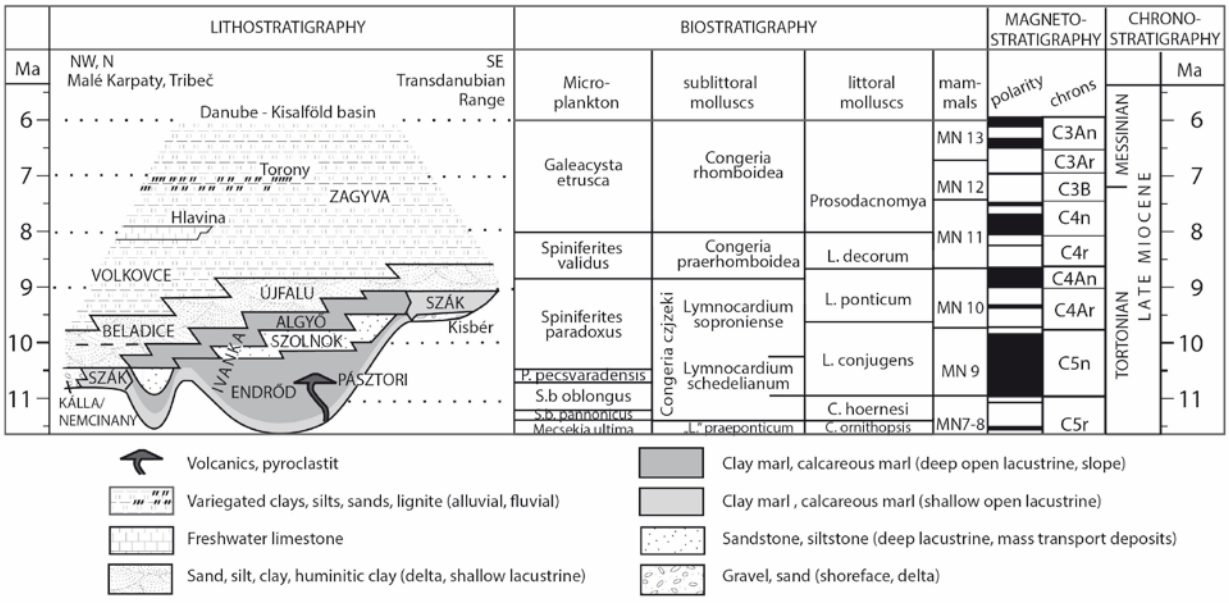

Figure 1: Litho-, bio-magneto and chronostratigraphy of the Late Miocene sedimentary fill of the Danube-Kisalföld Basin