Neotectonic Investigations of the Érmellék Region (NE Pannonian Basin, NW Transylvania)

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Neotectonic investigation has been carried out along the Ér-river valley, and between the Ér- and Berettyó-river valleys (Érmellék region). This ENE-WSW striking hilly region is situated on the northeastern part of the Pannonian Basin and NW of the Transylvanian (Apuseni) Mountains. The aim of the study was to find evidences for the hypothesised neotectonic control on river network development of the Körös Basin. The Érmellék region represents a natural link between the uplifting Apuseni Mountains and Körös Basin which is the deepest sub-basin of the subsiding Great Plain. The Érmellék region is famous for its presumed neotectonic activity is shown by two larger historical earthquakes occurred in 1829 (M=4,9; I\text{max}=VII) and 1834. (M=6,3; I\text{max}=IX) (Réthly 1952).

The hilly part of the region is mainly covered by loess and “red clays” (Sümeghy 1944). The latter is a brown forest type paleosoil complex of the loess sequence which is resistant to erosion and dominantly covers the top of the ridges. The age of the loess sequence was not dated till this time, but was preliminary correlated to paleosoil horizons and may represent loess up to Middle Pleistocene (Upper sequence of the Old Loess series of the Paks Loess Formation, Marsi et al. 2004). In the Ér-river valley Late Pleistocene – Holocene alluvial sand and aleurolite can be found at different topographic height which are probably the remnants of terraces of the palaco-Tisza, which flowing along the northeast-southwest striking Érmellék depression (Ér-river valley) during the Late Pleniglacial (Gábris and Nádor in press).

We investigated the outcrops of the above mentioned Quaternary sediments of the region by structural, tectono-morphological and sedimentological methods to quantify the main fault directions in the field, and analysed the morphology and river network to determine the style of neotectonic deformation. We found two phases of deformations, based on microtectonic investigation of the area. The older is reflected by NE-SW trending normal faults, joints and dykes in the loess, filled with reddish, brown aleuritic clay. This is a redeposited material of the brown forest paleosoil complex. The younger/second phase is mainly reflected by rejuvenated shear faults of the first phase and Riedel-faults. These are usually filled by greyish-brown aleuritic clay which are probably originated from chernozem-brown paleosoil of the eroded Upper Pleistocene paleosoil complex or recent zonal soil. Apart from small scale faulting, the most characteristic neotectonic feature is surface undulation. This phenomenon is probably related to folding, based on the en-echelon arrangement of the ridges of elongated undulations.

Combination of microtectonical datas with the morphotectonical observations and river network analysis, we concluded that the Érmellék region was a left lateral ENE-WSW striking fault zone with NE-SW compression and perpendicular extension up to the Middle Pleistocene. The second phase was a reaction of the „first” phase, generated by WNW-ESE compression, and caused right lateral transpressions. This seems to be active till this time. Active deformation is also supported by the presence of historical earthquakes, too. This zone is in the northeastern continuation of those tectonical lines which were analysed from seismic sections of the Körös Basin and caused main tectonic control on river network development in the Late Pleistocene (Nádor et al., in press).

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References


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