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River sinuosity changes as indicators of the possible neotectonic activity – a case study on the Danube River between Paks (Hungary) and Beograd (Serbia)

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The meandering, pre-regulation river planforms of the Danube River, between Paks (Hungary) and Beograd (Serbia) was digitized from the map sheets of the Second Military Survey of the Habsburg Empire (Timár et al., 2006). These maps were surveyed before or simultaneously with the river control works, so it is possible to follow the natural riverbeds, the natural changing of the meandering structure.
The sinuosity values were calculated with different window sizes, and displayed in a spectrum-like diagram (sinuosity spectra; after van Balen et al., 2008). The channel sinuosity of this river is analyzed in order to draw conclusions on the neotectonic activity of the western part of the Great Hungarian Plain. Several points of sinuosity change were identified. To prove that these are of neotectonic origin, a neotectonic map and seismic sections crossing the study area, were also analyzed. Significant sinuosity changes (low to high or high to low), spatially correlated to linear features identified in seismic survey sections or in tectonic maps (Horváth et al., 2006), indicate their neotectonic activity (Ouchi, 1985; Timár, 2003; Zámolyi et al., 2010).
Upstream of the Hungarian-Serbian border, the Duna (Danube) has anabranching planform, the Baracskai-Duna is the main anabranch. There is a fault on the neotectonic map, crossing both rivers, and cause the decreasing of the sinuosity. The vertical activity of the structural line, which is more or less parallel to the international border, is verified by the sinuosity change. The direction of the change (from high to low sinuosity values) correlates with the normal fault character, shown on the map.
Another significant sinuosity change occurs downstream of the Drava River confluence. The explanation of this change can be of two kinds. First, there is a known tectonic feature along the Drava River, with dextral faulting. The sinuosity increase could indicate a small active vertical component of this structural line. However, another possible explanation is based on the significant sediment load of the tributary, that is naturally decreases the river sinuosity.

Horváth, F., Bada, G., Windhoffer, G., Csontos, L., Dombrádi, E., Dövényi, P., Fodor, L., Grenerczy, Gy., Síkhegyi, F., Szafián, P., Székely, B., Timár, G., Tóth, L., Tóth, T. (2006): A Pannon-medence jelenkori geodinamikájának atlasza: Euro-konform térképsorozat és magyarázó. Magyar Geofizika 47(4), 133-137.
Ouchi, S. (1985): Response of alluvial rivers to slow active tectonic movement. Geol. Soc. Am. Bull. 96, 504-515.
Timár, G. (2003): Controls on channel sinuosity changes: a case study of the Tisza River, the Great Hungarian Plain. Quaternary Sci. Rev. 22, 2199-2207.
Timár, G., Molnár, G., Székely, B., Biszak, S., Varga, J., Jankó, A. (2006): Digitized maps of the Habsburg Empire – The map sheets of the second military survey and their georeferenced version. Arcanum, Budapest, 59 p.
van Balen, R. T., Kasse, C., Moor, J. (2008): Impact of groundwater flow on meandering; example from the Geul river, the Netherlands. Earth Surf. Process. and Landf. 33(13), 2010-2028.
Zámolyi, A., Székely, B., Draganits, E., Timár, G. (2010): Neotectonic control on river sinuosity at the western margin of the Little Hungarian Plain. Geomorph., in press, DOI: 10.1016/j.geomorph.2009.06.028