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Tectonically induced drainage system in the Western Pannonian Basin

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The Western Hungarian region to the east of the Styrian basin displays a remarkable arrangement and geometry of geomorphologic features already visible from the topologic map. This area, bordered to the West by the Penninic windows of Rechnitz – Kőszeg and Eisenberg, shows a trend of generally positive recent vertical crustal motions (Joó, 1992) coupled with very low relief. A major NE – SW trending structural feature of the area is the Rába-line that separates the northwestern and southwestern part of the pre-Neogene basement (Dunkl & Demény, 1997) acting as a low-angle normal fault (Tari & Horváth, 1992).

In the area of the Pinka and the Gyöngyös plateau the fluvial system is oriented along a NNW-SSE trending straight zone and an approximately E-W trending, slightly arcuate bow. Also, the Pinka-plateau and related areas resemble the form of rigid panels that are tilted towards SE with unstable steep slopes. This instability triggers a variety of geomorphologic processes (e.g. landslides, detachment-limited valleys) that decrease the overall slope angle. This fact is an important societal and economic factor since it controls the land use and the use of resources of the affected area.

In this study we focus on the connection between tectonics, geomorphology and fluvial dynamics with the help of a time series analysis approach. The basis for our investigations is the comparison of the state of river channel evolution at two separate points in time. Input-data are the historic maps from the First Military Survey of the Habsburg Empire created in the years 1782-85, and the topographic map sheets of the Republic of Hungary that were completed in 1999. As a result, deflection zones of water courses were mapped. Additionally points of abrupt change in the sinuosity of the river courses overlain on a high resolution digital elevation model served as a basis for lineament mapping and analysis. These data and the geomorphologic features observed in the field were gathered in a comprehensive GIS that allows the integrated analysis of these factors.

This approach reveals that the steepness of slopes is linked to either river incision or tectonic uplift. After a first field impression local incision seems to be the major contributing factor. However, most probably, the evolution of the channel geometry on a large scale is triggered by several stages of incision and tectonic activity. According to our investigations the drainage pattern formed due to regional uplift, which is a plausible process in this part of the Penninic window including the Kőszeg- and the Sopron mountains.

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