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Historical river avulsion at the Danube Bend - insights from archive shallow boreholes and vertical geoelectric sounding data at Pilismarót

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The Danube Bend is a spectacular and interesting section of the River Danube: with a rather large curve it changes its W-to-E heading direction towards the south. A number of explanation have been proposed for its formation and age. In a previous study (Székely et al. 2007) an interesting implication has been published based on the evaluation of a famous historical cartographic work, the Tabula Hungariae (1528), implying considerable river avulsion and abandonment of one of its previous arms in historical times.
This observation/model needs verification by geoscientific data: the missing arcuate part of the Danube Bend and the assumed presence of an island in the area of Pilismarót in historical times (today a low relief region with only one channel) has to be confirmed by other methods/observations.
Prior the launch of the eventually abandonned Gabcikovo-Nagymaros Dam Project as preparatory steps, extensive studies were carried out in the area. A number of vertical electric sounding have been carried out in 1964 and some 700 shallow boreholes have been drilled in 1978-1979 in the area of Pilismarót.
These data have been georeferenced, processed and an evaluated. Some models for the different layers have been assumed – for example gravel, sand, clay – to study their position.
According to the geometric model, the assumption of the former arm of the Danube seems to be feasible. We found evidence for an old riverbed and an island composed of smaller bars beneath the base of layers (gravel, gravelly sand). Assuming the ca. 500 year-long evolution of this feature we also tried to assess the incision/silting-up rate. In other studies the incision rate was estimated as follows. Danube incision: ca. 1 mm/year (Mike, 1969; Joó, 1992); while Ruszkiczay et al., 2005 concluded to
1,6 mm/year. Later, based on Tabula Hungariae, a 2 mm/year $\pm$ 70% rough estimate has been considered (Székely et al. 2007). For the same period of time (ca. 500 years) we calculated 2-6 mm/year incision. It's more than the previous results and that may imply (1) either same very rapid neotectonic processes in the Danube Bend (2) or the thickness of these strata has to be reconsidered.
There are some question about the reason of changes of the river flow, the avulsion and its age. Answering these questions we need more geophysical and other data.