Geophysical Research Abstracts, Vol. 8, 08976, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08976

Paleochannel evolution of the Leitha river (eastern Austria) – A bird's eye view

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The Leitha river is an important tributary to the Danube in eastern Austria. It is formed by the Schwarza river, originating in the Northern Calcareous Alps, and the Pitten river, coming from the Lower Austroalpine unit of the Wechsel area. In contrast to the general trend of the rivers in the southern Vienna Basin towards the NNE directly towards with the Danube, the Leitha river makes an abrupt turn towards the East at Götzendorf. At Rohrau the next turn follows towards the SE and the Leitha runs through the gate of Carnuntum onto the little Hungarian Plain. The confluence with the Moson-Danube lies farther to the East at Mosonmagyaróvár.

The geometry of paleochannels of the Leitha river was investigated in the river section between the confluence of Pitten and Schwarza (forming the Leitha) near Lanzenkirchen and Bruck/Leitha by paleochannel digitization using infrared and black and white aerial photography. This study is part of an archaeological project investigating patterns of prehistoric settlements in this region. The section of the Leitha river between Lanzenkirchen and Bruck/Leitha is especially suitable for the study of dynamic fluvial processes and the comparison between former natural river behavior and present regulated riverbed, because of the transition from relatively high to low river slopes in this section. Additionally, this area has been densely populated in prehistoric and historic times. Thus interaction between land use, settlement pattern and the dynamic system of the Leitha river can be studied. The constantly changing river channels and linked flood hazards in the floodplains has always been an important determining factor for the selection of settlement areas. Archaeological sites, for

instance, are mainly located on the rim of the Würm age terraces, at the margin of the subrecent floodplain. For such considerations the present conditions of the rivers, which have been regulated for decades, are definitely not a good analogue since they behave in different ways to natural rivers. A good example was the flooding of 2002 in eastern Austria when many of the regulated rivers returned to their natural embankments.

Based on the digitized paleochannels and a digital elevation model of the investigation area characteristic morphometric parameters of the Leitha river, like stream slope and paleochannel shape were calculated. Generally, the stream slope of the investigated river section decreases towards the NNE from 0.23˚ to 0.07˚. However, several knickpoints with a difference in slope of 2˚ - 13˚ in the river profile indicate active tectonic movements. Simultaneously to the overall continuous change in slope a transition from braided river type channels to single meandering channels can be observed. Our data have been complemented by several lithostratigraphic sections in the alluvial deposits of the Paleo-Leitha done by Hannes Kellermann (Department of Geodynamics and Sedimentology, University of Vienna) during archaeological excavations north of Frohsdorf. The course of the Leitha in the investigated area is located within the Vienna basin, a major pull-apart structure with tectonic activity from Miocene to present. Fault-slip analysis, seismicity and tilted terraces of the Danube and fault scarps indicate Quaternary activity for at least some of the faults (Decker et al. 2005). Normal faults and linked vertical rotations along the western and northwestern margins of the Vienna Basin tilted middle Pleistocene river terraces of the Danube and created several basins with thick Quaternary sediments (Decker et al. 2005). Indications for Quaternary tectonic activity finds expressions to the North of the Danube, but also extend further to the South into the Southern Vienna Basin and are well preserved in the paleochannel geometry and river profiles of the Leitha river. Abandoned meanderbelts, as an example, reveal possible, tectonic tilting towards the Southeast in the Southern Vienna Basin and a paleochannel migration towards the same direction. Thus, it should be emphasized that the paleochannel interpretations not only provide important information on reconstruction of paleolandscape, but also serve as a good base for further constraints on tectonic movements in the Southern Vienna Basin.

Literature:

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