



## Time-series studies of drainage pattern and morphological features along the Leitha river (Eastern Austria)

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Geomorphologic mapping and drainage network analysis was conducted in the Southern Vienna Basin on the Leitha and Fischa rivers. The study area belongs to an active pull-apart basin between the Eastern Alps and the Carpathians that started to subside in Karpatian times ( $\sim 17$  Ma), but with still active faults, proven by fault scarps and earth quakes. The investigated rivers are important tributaries to the Danube river and run through a region that has been subject to settlement since Neolithic times. Thus, interaction between land use, settlement pattern and river dynamics can be studied. Several datasets are integrated to perform a comprehensive overview of geomorphological, as well as river dynamic changes in the landscape. During an earlier stage of this investigation a map of paleochannel distribution including the location and shape of the paleochannels was extracted from color-infrared and RGB digital orthophotos. Based on this map the location, character and shape of palaeomeanders is studied on different georeferenced historic maps (Timár et al., 2006; Biszak et al., 2007) in order to derive a time-series study. The paleochannels extracted from the digital orthophotos show a good coincidence with the depicted rivers on the historic maps. This partly allows quite well constrained age estimates of the paleochannel sections. The investigated maps are the Walter maps, the First, Second and Third Military Survey of the Habsburg/Austro-Hungarian Empire. Mapping of the Walter maps was conducted 1754-56 (Ulbrich, 1952), the First, Second and Third Military Surveys were mapped in this area in the time-span of 1782-1785, 1819-1869, and 1872-1873, respectively (Kretschmer et al., 2004). This sequence of georeferenced historical maps allows to study only a very short time-span (1755 – 1873) compared to the geological time scale. However, the characteristics of river dynamics special for the study area can be derived and, considering certain assumptions, extrapolated to a wider time range. Within the observable time period the Leitha river preserved its meandering characteristics. Small shifts of the mean channel towards E or W can be detected.

A disadvantage of the maps previous to the Third Military Survey is the lack of contour lines. On these maps, variation in terrain elevation was mapped „a la vue” and rather depicted as changes in slope of the terrain by applying hatchures showing a density increase with higher slope. This method provided a very plastic overview of changes in the terrain, but the reading of absolute or relative elevations is not possible. According to this, geomorphologic observations from these maps are constricted to the comparison of the horizontal position of elevated areas and the change of their outline. This study shows that historical maps provide an essential tool to investigate younger river dynamics and sensitively show the impact of anthropological modifications as well as active tectonics.

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