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Building a new late Pleistocene stratigraphy of fluvial terraces in the Budejovice Basin (Czech Republic) using 3D-modelling and OSL-dating

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Mapping and dating of Pleistocene river terraces of the Vltava (Moldau) river in the Budějovice Basin focuses on the establishment of a chronology of terrace formation for a major European river having its source in a non-glaciated region. Crossing the Budějovice Basin from the south to the north the rivers Vltava and its tributary Malse accumulated terrace bodies of different horizontal and vertical extent during the whole Pleistocene and probably further back in the past. According to the scheme used in most European regions, influenced by the Pleistocene glacial cycles, these terrace staircases were previously assigned to the 4 or 5 main Alpine glacial periods by most scientists. Due to the fact that the catchments of the rivers were not glaciated during the Pleistocene, this correlation is not straightforward as terraces are not connected to moraine bodies like in the Alps. Additional stratigraphical errors may arise from the previous approach to correlate fluvial terraces along the streams solely using the elevation of the terraces above the receiving waters. Such correlations do not account for possible Pleistocene tectonics and vertical movements on faults crossed by the rivers. Since there is no data concerning the numerical age of the Quaternary sediment cover in the research area so far, OSL-dating is the key method in building a late Pleistocene stratigraphy of the basin sediment fill.

The research area of the Budějovice Basin in Southern Bohemia was selected for both, the wide-spread occurrence of Pleistocene sediments and the wealth of available data. It is a fault-bounded sedimentary basin overlying Variscan crystalline basement of the Bohemian Massif. The sedimentary basin fill mostly consists of Cretaceous (Klikov Fm.) and Miocene sediments (Zliv and Mydlovary Fm.) covered with Quaternary fluvial and colluvial deposits. Currently available data is derived from more than 60 outcrops, hand drillings and 21 shallow boreholes. Stratigraphic correlations rely on 19 OSL ages. Additionally, archive data from more than 980 drilling reports from the Czech Geological Survey (Geofond) in combination with a high-resolution DEM was used to create a 3D-model of the terrace bodies in the basin.

The DEM and well data defining the horizon Base Quaternary allow verifying the bases of two widespread Quaternary terraces in the eastern edge of the basin, which cover an area of approximately 13 km^2. Results from field mapping in the vicinity of Hluboká nad Vltavou show 5 terrace levels in the crystalline basement north of the basin and at least 4 levels within the Budějovice Basin. For the lower terraces, it was possible to create a consistent stratigraphy with ages ranging from about 80 ka to the Holocene, whereas the uppermost terrace levels are out of the dating range of the method.

Further mapping and dating, as well as sedimentological analyses are planned to create an inventory of terrace bodies in this area and to correlate their formation with tectonic and climatic evolution in this region.