

EGU2020-20014

<https://doi.org/10.5194/egusphere-egu2020-20014>

EGU General Assembly 2020

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The Holocene landscape sensitivity of the central Bavarian Jura foothills towards climatic and human influences

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There is an ongoing debate about the main drivers of the Holocene landscape dynamics in Central Europe, i.e. when and where these were dominantly controlled by climatic (e.g. rapid climate changes) or anthropogenic factors. Investigations of colluvial and fluvial deposits are ideal to contribute to this discussion, given that the formation of colluvial deposits in Central Europe is often controlled by human activity, whereas the formation of alluvial deposits might be more influenced by climatic fluctuations.

In the forefront of a road construction intercalated colluvial and fluvial sediments with thicknesses up to 4 m were outcropped and studied during archaeological excavations led by the Bavarian State Office for Monument Conservation near Dettenheim in central Bavaria (southern Germany) in 2015. This investigated site is located next to the Fossa Carolina (Karlsgraben), a canal that was built at the end of the 8th century AD to bridge the watershed between Rhine and Danube but that was never finished. We investigated the sediments using sedimentological, archaeological and geochronological (OSL) methods. After a period with fluvial activity during the Early Holocene, the landscape was mostly stable between ca. 10 and 2.5 ka, allowing the formation of soils. Although human activities next to the investigated sites originate from the Hallstatt period, the first interruption of the stable period only occurred during the La Tène Period when fluvial and colluvial deposits were formed. Subsequently, intensive colluviation occurred during the Migration Period/Early Middle Ages, followed by intensive colluvial and fluvial deposition that started since the High Middle Ages and continues until today. Our investigations indicate that human disturbance obviously led to an intensive landscape degradation during the La Tène Period, and the landscape was subsequently much more sensitive towards human and climatic fluctuations than before.