



Quantitative reconstruction of past soil erosion in the Kirschgraben catchment (Spessart mountains, Central Europe)

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An important problem in Holocene landscape reconstruction is quantifying the relative roles of climatic change and human impact. This project aims to quantify and mass-balance sediment flux in high temporal and spatial resolution, therefore a relatively small gully catchment (Kirschgraben) in the low mountain range Spessart (Germany, Lower Franconia) was chosen as a research area. The catchment is 42 ha in size and total relief is ~200 m. Bedrock is composed of Bunter Sandstone, large areas of which are loess mantled. In the intersection between Kirschgraben fan and the alluvial plain of the Elsa River a moated archaeological site was recently excavated. On the basis of process-based stratigraphy and preliminary chronology, a detailed sequence of landscape changes can be interpreted. Gully incision into Pleistocene sand and gravel sediments during early Holocene resulted in rapid fan development. Non-deposition on the fan surface and minor infilling of the gully system suggests relative catchment stability persisted during prehistoric times, at least until the early iron ages, when human occupation of the fan surface is first recorded. The first evidence of human impact, although minor, is represented by thin colluvial layers on the lower slopes during late Neolithic period. Subsequently, almost the entire catchment has been under agricultural use from the early medieval periods on, and well preserved within field terraces along ancient tenure borders. These features demonstrate widespread and intensive soil loss from the slopes, and eroded material is also preserved in various sediment traps within the catchment. Charcoal production in the catchment probably began at the same time as the widespread soil loss, and lasted until ca. 1900 AD. Anthracological investigations provide the opportunity to reconstruct the vegetation composition on a local scale, and is combined with paleobotanical macro remains and pollen analysis. Initial results indicate a rotating wood - pasture - agriculture cultivation system was used within the catchment on slopes with a north west aspect. The fan area was again occupied in the form of a medieval castle from around 1200 until 1462 AD, coinciding with a rise in the ground water table (due to either dam construction in the trunk stream, a decrease in evapotranspiration, or both) intense gully cut and fill cycles, and high slope instability in the catchment. These erosional processes continue due to the persistence of agricultural and pastoral land use and also intense charcoal production until the present day. Initial quantification of the sediment masses in the catchment suggest that most of the eroded material is stored in the gully infills and lower slopes and are not excavated to the fan or the trunk stream. Further work will improve the spatial mass-balance calculations, and in combination with the chronological data, will enable the quantification of a high resolution Holocene sediment flux for the catchment.