

Significant geological forcing on element geochemistry of flood loams within the Weiße Elster catchment and potentials for sediment source fingerprinting

Helen Ballasus, Hans von Suchodoletz, Ulrike Werban, Jan Miera, Lukas Werther, Peter Ettl, Ulrich Veit & Christoph Zielhofer

The Holocene alluvial deposits of Central European river systems preserve information on hydro-climatic dynamics and are considered cultural indicators. Hydro-sedimentary processes such as soil erosion, sediment transport, deposition and re-deposition influence the evolution of such Holocene sedimentary archives, especially in susceptible loess-covered landscapes. Within the Weiße Elster river basin we expect that humans have been influencing these hydro-sedimentary dynamics since the Early Neolithic (land use induced erosion). However, it is difficult to separate the individual impacts of natural, climate-related versus anthropogenic forces on depositional environments, and the complexity of the geomorphological responses is part of an ongoing debate in geomorphological and geoarchaeological research.

A geochemical characterization of the hydro-sedimentary active basin sediments and the deducible connectivity to overbank deposits of the Weiße Elster floodplain can contribute to a better understanding of the interplay of these processes. For this purpose, we analysed (i) (sub-) recent alluvial sediments of the Weiße Elster tributaries in a standardised mesoscale approach (in an 8*8 km grid template covering the entire Weiße Elster catchment), and (ii) Weiße Elster floodplain sediments recovered near the villages of Salsitz, Trebnitz and Meilitz by a drilling device. We applied SPECTRO X-ray fluorescence analysis (XRF) to obtain their elemental composition. We demonstrate that the investigated alluvial catchment sediments are significantly distinguishable based on their geological background by employing discriminating element ratios. Further, the chemostratigraphical record of the vertical floodplain sequences combined with the geochemical characterization of potential sediment sources offers the possibility to trace sediment provenances. The results of our statistical fingerprinting approach provide indications for the accumulation of two flood loam types in the investigated sequences with different supply areas.

Kontakt:

Helen Ballasus: Universität Leipzig, Institut für Geographie, E-Mail: helen.ballasus@uni-leipzig.de