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Human impact and colluvial sediment storages in Central Europe since the Neolithic

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The adoption of agricultural techniques during the early Neolithic persistently affected sediment fluxes in geomorphic hillslope and adjacent river systems. Since then soil erosion and colluviation has become important geomorphic processes in hillslope-channel-systems. Soil erosion in turn affected human societies by soil degradation causing dramatic shifts of settlement centres.

Erosion induced soil degradation initiated by land use activities is considered as a major link between the interaction of humans and their environment. To test this hypothesis a large-scale synoptic analysis of local case studies is currently under progress within the Collaborative Research Centre "Our Way to Europe", which deals with human environmental interaction and human mobility in the late Quaternary. In this study it is intended to achieve the following four aims: i) a reconstruction of the spatial trajectory of the beginning colluvial process, ii) the identification of crucial controlling factors of colluviation, iii) the quantification of colluvial sediment storage in Central Europe, iv) a spatio-temporal analysis of the colluviation process.

The methodological approach includes the compilation of a colluvial database for Central Europe containing information on sediment depth, volumes, sedimentation rates and sediment ages. The database will be completed by own data collections in a small catchment and by calculating a sediment budget for the Pleisbach catchment (Pleiser Hügelland, near Bonn, Germany). Based on this colluvial data an isoline map of the spatial variable starting times of colluviation is generated. The isolines will be compared to archaeological maps of European neolithisation in order to identify stagnancies in expansion of Neolithic techniques in colluvial sediment archives. Furthermore a semi-quantitative erosion index will be developed that integrates qualitative information on controlling factors of colluviation, i. e. vegetation, land use, settlement history and climate delivered by other researchers of the CRC. The index will be evaluated by local sedimentation rates quantified in local case studies. DEMs, digital geological maps and soil maps are used to identify the importance of other parameters to develop a model of colluvial sediment storage on a regional scale.

Currently the colluvial data base is being compiled. Over 100 study sites with information on the onset of colluviation could be identified so far. Furthermore 48 catchments with known colluvial volumes have been analysed concerning the impact of loess on the colluviation magnitude. According to this analysis loess covered catchments show only slightly higher volumes than catchments dominated by other substrates. This is true for different orders of magnitude from 0,001 - 1000 km^2 despite longer land use duration in loess regions and higher erosion susceptibility of loess originated soils.