



Dating sedimentation in the Belgian loess region

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In many catchments in temperate regions, soil erosion and sediment deposition has varied largely during the Holocene as a result of variations in climate and land use. In order to identify the relative importance of these driving forces, an accurate dating control of the sedimentary archives is necessary, which is not straightforward. The objective of this study is to identify the driving forces for Holocene sediment dynamics in the Dijle catchment (central Belgium), based on dating results. Individual colluvial and alluvial sedimentation units were dated using AMS radiocarbon and optical dating. For each individual site a sediment deposition curve was constructed. These curves represent the evolution of sediment mass accumulation through time, corrected for the presence of organic material and bulk density. Apart from this, a database was constructed with all available radiocarbon ages of the catchment. Analysis of this database allows to identify catchment wide patterns in the sedimentation history. First, it was analyzed using cumulative probability functions (CPFs) of calibrated ages, grouped by the geomorphological activity phase they represent (active/stable floodplain). In addition, sediment mass accumulation rates were calculated. These rates were normalized in order to allow a comparison between sites with different total accumulated volumes. OSL dating results for the floodplain show some stratigraphic inconsistencies, caused by incomplete bleaching of the sediments upon deposition. The results indicate that for most sites an increase in sediment deposition starts between 4000 BCE and 500 BCE for colluvial sites and around 2000 BCE for alluvial sites and. Before this first increase, floodplain deposition was low with mainly peat growth, while there remain no traces of colluvial sedimentation. Between ca 4000 BCE and 1000 CE, the relatively larger part of the sediments were deposited as colluviums compared to the previous or subsequent period. The major part of the Holocene deposits, both colluvial and alluvial, has been deposited in the last 1000 a. Sedimentation curves vary between individual sites, and even sites located close to each other may vary largely. The CPFs of the radiocarbon ages contains peaks in active colluvial deposition ages from 4000 BCE on, while most peaks are situated in the last 3000 a. Peaks in the CPFs of active floodplain deposition are mainly situated in the last 1000a, while ages of stable floodplains and peat growth are spread over the Holocene. The analysis of mass accumulation rates indicates that colluvial sedimentation increased from ca 1000 BCE on, while alluvial sedimentation has on average increased in the last 2000 a. Using these three methods, the results indicate that the sedimentation history shows an important correlation with the catchments land use history, while there is no field evidences for an influence of climatic variations. There is, however, some variation between the individual sites, indicating that single site studies are not valid to reconstruct the sedimentation history of a catchment.