Geophysical Research Abstracts
Vol. 12, EGU2010-12428, 2010
EGU General Assembly 2010

Scaling of sediment yield: the effect of sediment storage across spatial scales.

Thomas Hoffmann (1), Manuela Schlummer (1), Gert Verstraeten (2), and Bastiaan Notebaert (2)

(1) University of Bonn, Department of Geography, Bonn, Germany (thomas.hoffmann@uni-bonn.de, +49 228 739099), (2) Department of Earth and Environmental Sciences, Physical and Regional Geography Research Group, K.U.Leuven, Belgium

Erosion, transport and deposition of sediments in geomorphic systems strongly depend, on the one hand, on the external forcing (eg, climate and human impacts) and, on the other, on the internal configuration of the system. Sediment yields are thus not exclusively linked to climate or human induced changes in erosion rates but are to a large extent also modified or buffered by sediment storage on the hillslope and in floodplains, which may operate at different timescales. While there are a large number of studies which have considered the scaling of sediment yields across spatial scales, our knowledge of sediment storage across spatial scales is insufficient to fully explore the relative importance of internal and external controls on catchment sediment dynamics at a range of spatial and temporal scales.

In this study, we present for the first time results regarding the scaling of sediment storage and sediment yield on the hillslope and in floodplains. Based on a review of numerous local case studies from Central Europe and GIS-based upscaling approaches, we estimated Holocene sediment storage on hillslopes and floodplains across spatial scales (up to 185.00km^2). The results of the scaling relation of sediment storage and catchment size suggest an increasing storage potential of large catchments. This includes not only the increase of floodplain storage due to their increasing significance at larger spatial scales, but also the increasing colluvial storage at the hillslope scale.

Based on the comparison of our results (regarding the scaling of sediment storage) with the scaling of contemporary sediment yields, we will develop a conceptual/mathematical sediment budget model that considers the scaling of sediment sources and sink in large geomorphic systems, which are dominated by human induced soil erosion.