



Fingerprint analysis of suspended sediment transport in a mesoscale catchment in northern Mongolia

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Little is known about the sources of suspended sediment (SS) in the investigated 15.000km² Kharaa catchment in Mongolia. Recent studies however show that SS have considerable impacts on the river ecosystem. This study focuses therefore on the qualitative identification of sediment sources and the quantification of the suspended sediment transport in the catchment. Geochemical sediment source fingerprinting in combination with isotope fingerprinting is used to identify and localize the most important sediment source areas in the catchment and assess their contribution to the suspended sediment load. More than 600 grab samples from 22 river junctions of the outlet of each sub basin into the main tributary were taken in 2009 and 2010. Their fine sediment fractions (<10µm) have been analysed for major elements (e.g. Si, Al, Mg, Fe, Na, K, P) and trace elements (e.g. Ba, Pb, Sr, Zn) using ICP-MS. The contribution of each sub basin to the SS in the main tributary has then been calculated with the help of mixing model analysis. Additionally isotope fingerprinting was used to assess the importance and share of surface, stream bank and gully erosion on total sediment load of the catchment. Biannual samples of 12 topsoil eroding surface reference sites, 4 stream banks and 4 suspended sediment samples were analysed for the atmospheric fallout radionuclides Cs-137, Pb-210 and Be-7 using gamma ray spectrometry. A monitoring scheme has been developed, providing continuous high resolution data on discharge, turbidity and temperature at selected sites for future SS transport modelling. Additionally long term SS concentration data were available since 1986. The sediment budget of the catchment was calculated with help of the regional catchment scale sediment budget model (SedNet) based on DEM, land use- and soil maps and climate data and information on hill slope, gully- and riverbank erosion. The SedNet results were compared with a range of different rating curve approaches based on daily archive data on suspended sediment and discharge from the catchment outlet and high resolution discharge and turbidity measurements from 2009/2010. Results suggest that only a small part of the catchment contributes considerably to the total sediment load and that gully and bank erosion might be the dominating sources in the catchment, due to the low levels of ⁷Be in the SS. Also there seems to be a difference in erosion behaviour between spring and fall, with a higher contribution from surface erosion during summer rainfall. Future work will concentrate on the effective modelling of the sediment transport in the catchment with help of the HBV-based semi distributed, conceptual hydrological and nutrient transport model HYPE.