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From soils to rivers to lakes – the journey of fine sediments in a South Korean catchment.

Axel Birkholz (1), Katrin Meusburger (2), Marlène Lavrieux (1), Pranav Hirave (1), Ji-Hyung Park (3), and Christine Alewell (1)

(1) Basel University, Umweltgeowissenschaften, Basel, Switzerland (axel.birkholz@unibas.ch), (2) Eidgenössische Forschungsanstalt WSL, Birmensdorf, Switzerland, (3) Ewha Womans University, Environmental Science & Engineering, Seoul, Republic of Korea

Due to the rapid agricultural expansion and intensification during the last decades in the Haean basin, a mountainous catchment in South Korea, large areas of hill slope forests were transformed to paddies and vegetable fields. The intensive agriculture and easily erodible soils are a major reason for increased soil erosion resulting in high suspended sediment loads in the river systems and finally the drinking water- and hydroelectric reservoirs. Among others, the hydroelectric reservoir Lake Soyang is concerned which also provides water supply for large population centres downstream. Landscape managers need to know the land use specific origin of these sediments before they can create landscape amelioration schemes.
We applied a compound-specific stable isotope (CSSI) approach using the isotopic (d13C) signature of plant-wax derived long-chain fatty acids (C24-C30) in source soils, suspended sediments and lake cores to apportion the sources of the suspended sediments in the Lake Soyang catchment. We compared the two mixing model software programmes IsoSource and MixSIAR.
Further we want to present isotopic fatty acid data from a stream bank depth profile of the headwater catchment and sediments from forest soils, caught with sediment traps on land which we compared with the actual source soils.
Aiming for a better understanding of the behaviour of the source soils and suspended sediments, we studied three small subunits of the Haean Basin which is a headwater catchment of Lake Soyang, during three different flood events. Within the three subunits, the source soils were either exclusively forest soils or mixtures between forest- and vegetable soils and forest-, vegetable-, rice-, and maize soils, respectively. It was possible to differentiate maize-, vegetable- and forest/rice soils from each other, but forest and rice soils built a cluster and were not well differentiated from each other. To increase the scale and get an overview of the suspended sediment dynamics in the whole Soyang catchment, we additionally sampled suspended sediments at three more sites downstream during three flood events as well as sediment cores from the Lake Soyang reservoir.
Our results show a clear shift from almost exclusive contribution of vegetable and forest soils to the suspended sediments in the headwater catchment to more and more dominating maize soil contribution downstream towards Lake Soyang, giving strong indication of an increased vulnerability of the agricultural soils where maize is grown. Unexplained remains the d13C values of the suspended sediments at the inlet of Lake Soyang basin which are even more enriched in d13C than the maize soils.