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# Towards the prediction of pre-anthropocene sediment yields for small catchments in Europe

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Human impact on erosion and sediment fluxes at various scales and environments has received considerable attention as it is relevant for various scientific and environmental issues. At the hillslope scale, this impact is relatively well understood, while recent models have also allowed evaluating the human impact on sediment fluxes at a global scale (Syvitski et al. 2005; Syvitski & Milliman 2007). However, for the intermediate catchment scale (i.e. 0.01 $km^2$ - 10 000 $km^2$), the current understanding of the human impact on sediment yield is limited. A great difficulty in assessing this human impact is the lack of 'base-line' values, i.e. the catchment sediment yield (SY) that could be expected if humans had no influence on the sediment flux, as only very few catchments currently exist that are not significantly affected by human impacts.

This research aims to bridge this gap by developping a model that predicts SY that could be expected if humans had no influence on catchment SY. Based on an extensive literature review, a dataset was constructed with measured SY data from (almost) undisturbed catchments in Europe. By combining data from various other studies, using various techniques (e.g. observations from gauging stations, reservoir surveys and sediment budget reconstructions based on corings) data from over hundred catchments across Europe were collected. The majority of these undisturbed catchments are located in sparsely populated regions, i.e. areas of high altitude or latitude. However, also for lowlands and temperate regions, some data could be collected.

As a first exploration of this dataset, a comparison was made between the measured sediment fluxes and the fluxes obtained when the ART-model (Syvitski et al. 2005) is applied to these catchments. The modeled SY values show a very poor agreement with the measured SY values and generally overestimate SY with two to three orders of magnitude. However, the deviation between the modeled and measured sediment flux tends to decrease if catchment area increases. These results clearly indicate that the ART-model, which was developed to estimate sediment fluxes without human influence at a global scale, is not applicable at smaller catchment scales. Further analyses of the dataset indicate that the factors included in the ART-model (i.e. Catchment Area, Relief and Temperature) explain very little of the observed variation in area-specific sediment yields. Relief, for example, is positively correlated with sediment fluxes at a global scale, while for many of the observations, SY tends to decrease with increasing relief. This illustrates that other factors, such as lithology and runoff discharge have a relatively larger influence on the observed sediment fluxes.