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## Temporal variability of annual suspended sediment yield estimates and their uncertainties

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Suspended sediment contributes to the vast majority of the annual sediment load transported by rivers to the global oceans. At the same time, this large fraction is transported just in a fraction of time. Towards achieving sustainable sediment management and healthy fluvial systems, identifying the impact of the temporal variability on annual load estimates becomes indispensable in order to reduce uncertainties.

We aim to estimate the temporal variability of suspended sediment transport and the uncertainty of annual suspended sediment loads. Our approach is based on high-resolution time series (15 min sampling interval) of discharge and suspended sediment concentration (SSC) at four monitoring stations with different degrees of discharge variability. The quantification of the variability of discharge and sediment yield is achieved through the exceedance time. The uncertainty of the annual sediment load is estimated using a bootstrap approach. We assess the impact of the sampling interval and link the optimal sampling interval to different SSC-variability. Further, the impact of rating parameters on the uncertainty of annual loads is investigated.

Our results indicate an increase in SSC-variability with decreasing discharge, leading to a negative relationship with the contributing catchment area. The 80 % exceedance times for the annual sediment load range from less than 10 % for the river Ammer (catchment area 608 km<sup>2</sup>) between 10 – 20 % for the rivers Ilz (765 km<sup>2</sup>) and Moselle (27 088 km<sup>2</sup>) to more than 40 % for the river Rhine (109 806 km<sup>2</sup>). Simultaneously, the variability increases with a decrease in sampling frequency. Our preliminary results indicate a negative exponential relationship between exceedance time and uncertainties in annual load estimates. This relationship can be used to estimate the uncertainty of annual loads estimated based on low frequency sediment sampling at the continental to global scale.