

5) Development of an uncertainty framework for suspended sediment fluxes in rivers

Start: Summer or winter semester of 2021

Supervision: Collaborative supervision by the International Centre for Water Resources and Global Change and the “Fluvial morphology, sediment dynamics and management” department of the Federal Institute of Hydrology.

Introduction:

Fine mineral and organic matter is transported in suspension from their sources to the ocean by rivers. These suspended solids carry bound contaminants and nutrients and, therefore, affect river morphodynamics as well as the water quality and ecosystem functioning. Concentrations of suspended solids and sediment-bound pollutants are monitored in many river systems worldwide. However, these monitoring programs differ considerably in terms of monitoring techniques, measuring intervals and sampling locations within the river. This leads to uncertainties in load estimations around the globe. This thesis investigates uncertainties that are driven by sampling intervals and derives how these uncertainties differ on a global scale.

The thesis should deal with the following research questions:

- How do different sampling strategies influence the uncertainty of global suspended sediment flux calculations?
- How does the river discharge-suspended sediment relationship of different rivers influence the uncertainty of global suspended sediment flux calculations, for given sampling intervals.

The following tasks need to be addressed in the thesis:

1. Compiling and homogenizing German and international suspended sediment datasets with high resolution sampling intervals
2. Exploit the datasets to investigate the relationship between river discharge and suspended sediment
3. Investigate the influence of different monitoring intervals on yearly flux calculations for rivers with different river discharge-suspended sediment relationships.
4. Develop an uncertainty calculation framework to provide yearly fluxes with uncertainty bounds for different rivers on earth.

Required skills/background:

- Study background in Geosciences (Hydrology, Geomorphology, Geography)
- Affinity with scripting languages is an advantage (R, Python, MATLAB)
- Interest in working with large datasets
- Sufficient English-skills

Contact:

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