

The meaning of Suspended Sediment Transport in the Elbe for the coastal area (Germany)

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Introduction: The Elbe River is the third largest river in Central Europe, starting in the Czech Republic and running through the cities of Dresden and Hamburg before emptying into the North Sea. Due to extensive historical contamination and redistribution of contaminated sediments throughout the basin, the Elbe River transports significant loads of contaminants downstream, particularly during flood events. These contaminated sediments are ultimately deposited in the coastal environment. The contribution of the Elbe River to North Sea contamination will be evaluated by comparing monitoring data from near-coast monitoring stations to upstream data as well as by modeling contaminant transport within the Elbe basin.

Methods: Currently, no contaminant transport model for the mouth of the Elbe River exists. Tidal currents and an oscillating turbidity cloud in the tidal zone complicate modeling efforts. Given this complexity, the estuary from Geesthacht to the mouth of the North Sea will be initially evaluated as a black box using input and output data at monitoring stations upstream of Hamburg and at the mouth of the Elbe River. To better understand sediment fate and transport in the Elbe River as well as the input to the estuary, a hydraulic and suspended sediment model for the Upper and Middle Elbe River was developed. The results from this modeling effort provide insight into sediment dynamics, areas of historically contaminated sediment, and sources of secondary contamination, as well as aid in identifying potential source management measures.

Results: An overview of monitoring data from the ARGE-Elbe for the estuarine zone will be provided, with an emphasis on the implications for the North Sea and the DiPol project. Initial results from the transport model will be shown, as the model provides insight into sediment input to the estuary. The influence of the 6900 groyne fields along the Elbe River, which act as both sinks and sources for sediment, as well as the importance of floodplains for sediment loads in the Elbe, will be discussed in relation to their significance for the impact on coastal water quality. Broad-scale suitability of the model to European river basins will be discussed.