

Questions to turbidity measurements in the Elbe River

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Introduction: The River Elbe is the most important German navigation fairway. Tide and river discharge together with temporary weather conditions are responsible for erosion and sedimentation. Water and shipping authorities are enforced to enable navigation of large vessels to the port of Hamburg. Maintenance dredging is the necessary tool to guarantee the depth. To reduce dredging quantities a sediment management and the knowledge of the sediments and sediment transport processes are very important. A partial aspect is the knowledge about suspended matter in the water and its behaviour.

Methods: In the following relations between currents and turbidity occurrences are described and discussed. Corresponding measurements are placed on a pile near Brunsbüttel at the southern bank of the navigation channel (Fig. 1). The sensors located 2.5 m above seabed.

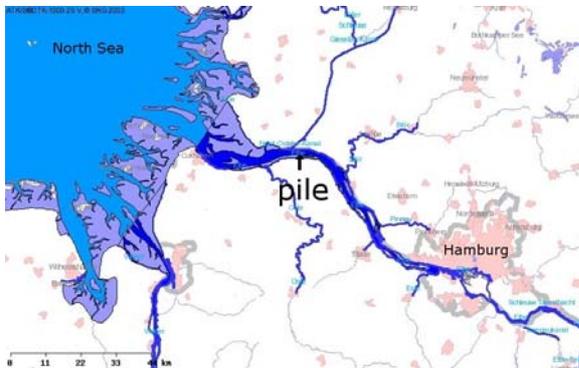


Fig. 1: Map of the tidal River Elbe between Hamburg and the North Sea. The pile mark the measuring station.

Results and Discussion: Generally currents show the M2, the neap/spring cycle as well as the diurnal inequality. Mostly the flood current is stronger than the ebb current. This is to be recognized in the lower part of Fig. 2. Concerning Turbidity these cycles are to be recognized as well. Fig. 2 represents a spring tide cycle on December 25. 2006, the left part is the flood, the right part the following ebb. In the upper

(middle) part optical measured turbidity is represented. In contrast to the higher flood current the turbidity is larger with ebb. In numbers the relation of the integral turbidity of the flood and ebb phase is about 2 to 3.

Also during the previous neap tide in the middle of December 2006 the flood current is stronger than the ebb current, the relations however of the integral turbidity is almost balanced.

The following questions result: How can this observation be explained? Is this observation an individual case or arises this regular? Is it a local phenomenon or is this also observed at other measuring stations?

At present more questions arise than answers.

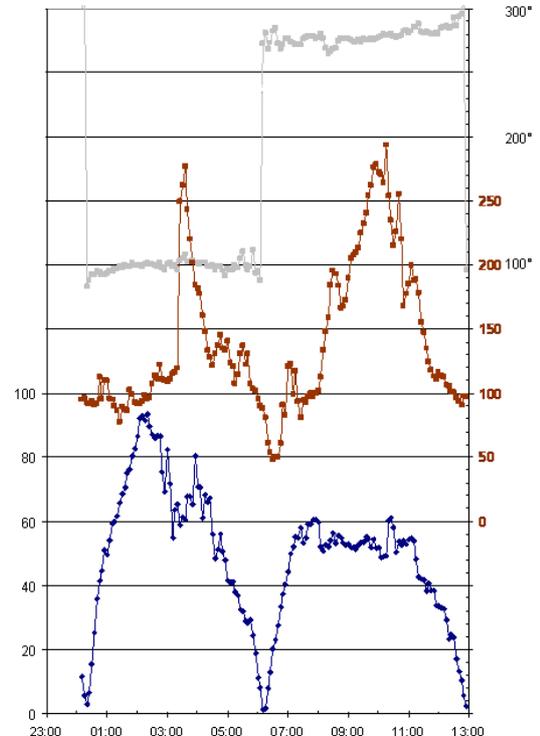


Fig. 2: Current (top/grey: direction [°], below/blue: current [cm s^{-1}]) and turbidity [NTU] (middle/red) at December 25. 2006.