



Hydro- and Sedimentdynamics in the East-Frisian Wadden Sea

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During the last seven years, the East-Frisian Wadden Sea has been the focus of concentrated research in a special research group located at the University of Oldenburg. The German Research Foundation (DFG) funds the research group “BioGeoChemistry” of the Wadden Sea. The complex hydrodynamics in the Wadden Sea is successfully modelled using the General Estuarine Transport Model (GETM) in high resolution (200 m horizontal with 10 vertical sigma coordinate levels). The model was validated using observations from a permanent pile station, various ship cruises, ADCP measurement and satellite data.

Based on this validated hydrodynamical model a sediment model component was added and tested under various conditions. These conditions include sea-level-rise scenarios, extreme wind, and storm surge events. It has been demonstrated that simple analytical models and vertically averaged 2-D simulations of the circulation and its attached sediment and suspended matter transport cannot reveal the complexity of the response to different forcing. Non-linear responses in the hydro- and sediment dynamics have been detected that need further study. The complex interplay between morpho- and sediment dynamics and forcing due to climate change induced variations in sea-level, wave-induced changes in turbulent kinetic energy in the vertical water column and extreme events, like orkans (or European wind storms, e.g. “Kyrill” in January 2007) and severe storm floods, will be highlighted in this talk.