



A numerical model for the whole Wadden Sea: results on the hydrodynamics

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A high-resolution baroclinic three-dimensional numerical model for the entire Wadden Sea of the German Bight in the southern North Sea is first validated against field data for surface elevation, current velocity, temperature and salinity at selected stations and then used to calculate fluxes of volume, heat and salt inside the Wadden Sea and the exchange between the Wadden Sea and the adjacent North Sea through the major tidal inlets.

The General Estuarine Transport Model (GETM) is simulating the reference years 2009-2011. The numerical grid has a resolution of 200x200m and 30 adaptive vertical layers. It is the final stage of a multi-nested setup, starting from the North Atlantic. The atmospheric forcing is taken from the operational forecast of the German Weather Service. Additionally, the freshwater discharge of 23 local rivers and creeks are included.

For validation, we use observations from a ship of opportunity measuring sea surface properties, tidal gauge stations, high frequency of salinity and volume transport estimates for the Mardiep and Spiekeroog inlet.

Finally, the estuarine overturning circulation in three tidal gulleys is quantified. Regional differences between the gullies are assessed and drivers of the estuarine circulation are identified. Moreover, we will give a consistent estimate of the tidal prisms for all tidal inlets in the entire Wadden Sea.