Project: 1244

Project title: APOC - Anthropogenic impacts on particulate organic carbon cycling in the North Sea

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Report period: 2023-01-01 to 2023-12-31

The allocated resources have been used successfully to reach the project goals set for the allocation period. We expect to use the remaining CPU node hours by the end of the allocation period.

Three model setups were used to meet the project goals for this year:

- 1. A coupled hydro-/sediment-dynamics-macrobenthos model (SCHISM-SED-TOCMAIM) for the North Sea. This model was run for one year with six simulations, including four different human use scenarios (Figure 1). These scenarios will be run for 10 years each in order to gauge the inter-annual variability.
- 2. A coupled hydrodynamics-ecosystem model (SCHISM-ECOSMO) for the North Sea. This model has been run from 2000-2005 with and without the effects of bottom trawling resuspension (Figure 2). This setup will be used further for simulating climate change impacts.
- 3. A coupled hydro-/morphodynamics model (SCHISM-SED) for the German Bight. This setup is able to reproduce the hydrodynamics of the German Bight reliably (Figure 3), including the stratification due to the Elbe river plume, and will be used to investigate the sediment trapping mechanisms controlling the development of the Helgoland Mud Area.



Figure 1. Changes in sedimentary carbon in response to different scenarios of fishing pressure redistribution in the North Sea. Fishing closure areas are outlined in green. Positive and negative values indicate an increase and decrease in sedimentary carbon compared to the reference scenario with actual fishing pressure, respectively.



Figure 2. Difference in seasonally averaged surface primary production between the simulations with and without bottom trawling resuspension in 2000-2005.



Figure 3. High-resolution grid for the German Bight with location of the Helgoland Mud Area outlined in red (top) and comparison of simulated and measured water levels at three tide gauge stations (bottom).