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Three-dimensional modelling of the hydrodynamics of the Southern Bight of the North Sea: first results

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In the frame of the Belgian research project FaCE-It (Functional biodiversity in a Changing sedimentary Environment: Implications for biogeochemistry and food webs in a managerial setting), the impact of dredging activities and offshore wind farm installation on the spatial distribution of sediment grain size, biodiversity and biogeochemistry will be estimated in the Southern Bight of the North Sea (SBNS) with a focus on the Belgian Coastal Zone (BCZ).

To reach this goal, the three-dimensional hydrodynamical model ROMS-COAWST is implemented in the SBNS in order to simulate the complex hydrodynamics and sediment transport. Two levels of nesting are used to reach a resolution of 250 m in the BCZ. The model is forced at the air-sea interface by the 6-hourly ECMWF ERA-interim atmospheric dataset and at the open boundaries by the coarse resolution model results available from CMEMS (Copernicus Marine Environment Monitoring Service), and also considers tides and 4 main rivers (Scheldt, Rhine with Maas, Thames and Seine).

Two types of simulations have been performed: a 10-years climatological simulation and a simulation over 2003-2013 to investigate the interannual dynamics. The model skills are evaluated by comparing its outputs to historical data (e.g. salinity, temperature and currents) from remote sensing and in-situ.

The sediment transport module will then be implemented and its outputs compared to historical and newly collected (in the frame of FaCE-iT) observations on grain size distribution as well as with satellite Suspended Particulate Matter (SPM) images. This will allow assessing the impact of substrate modification due to offshore human activities at local and regional scales.