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(Modelling for Aquatic Systems)

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Developing a hydrodynamical model of the Southern Bight of the North Sea for impact studies

In the frame of the Brain FaCE-It project (Functional biodiversity in a Changing sedimentary Environment: Implications for biogeochemistry and food webs in a managerial setting), the impact of fining and hardening resulting from dredging and wind farms installation on the sediment grain size distribution has to be assessed at the scale of the Southern Bight of the North Sea (SBNS) with a particular focus on the Belgian Coastal Zone (BCZ). With this aim, the ROMS-COAWST tri-dimensional (3D) hydrodynamic model is implemented to simulate the hydrodynamics in the SBNS. At its open boundaries with the Atlantic Ocean and the North Sea, the model is forced with the results of a coarse resolution model available from Mercator. A high resolution of 250 m is used in the area of the BCZ where the accuracy of model predictions needs to be refined. Model currents, tides, temperature and salinity fields will be described and first validation exercises with satellite and local data will be presented and discussed in regards with the objectives of FaCE-It. In a next step, the model will be coupled with a sediment transport in order to describe the dynamics of suspended particulate materials (SPM) and the distribution of the seafloor sediment grain size. When finalized the hydrodynamic model will be coupled with a diagenetic model and will provide environmental conditions for scaling up local foodweb studies that are performed in the frame of FaCE-iT. The final aim is to assess the impact of substrate modifications due to aggregate extraction and wind farms on the biogeochemistry, benthic functionality and food webs at local (around the wind farm) and regional scales (SBNS).

Keywords: hydrodynamic, high resolution modeling, sediment transport, Belgian coastal Zone, Southern Bight of the North Sea