Application of two way nesting model to upscale sediment processes of the Southern Bight of the North Sea: full model validation.

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The BRAIN project FaCE-iT (Functional biodiversity in a Changing sedimentary Environment: Implications for biogeochemistry and food webs in a managerial setting) funded by BELSPO aims at evaluating the influence of offshore wind farms settlements and dredging activities on the distribution of sediment grain size over the Southern Bight of the North Sea (SBNS) and the Belgian Coastal Zone (BCZ), as well as associated impacts on biodiversity and biogeochemistry. In this framework an implementation of the tri-dimensional hydrodynamical and sediment transport model ROMS-COAWST was set-up to conduct scenario experiment relating offshore activities to resulting alteration of the seafloor structure.

This implementation combines high resolution nested grids covering the BCZ, embedded into a coarser grid covering the SBNS and is forced by ECMWF ERA-Interim data at the air-sea interface, CMEMS data at the open boundaries, TPXO data to introduce and force the tidal impact, and considers the discharge of four main rivers.

Currently, the work focuses on assessing the skills of this modelling system to resolve the dynamics of the complex shallow and highly tidal region. The 3-year climatological run for 2006-2009 was performed to test the model ability to simulate the interannual dynamics. The model skills were evaluated by validation against remote-sensing temperature fields, tidal elevations and currents at the Meetnet pylons, and in situ temperature and salinity data provided by the Lifewatch network. We evaluate how grid refinement and different set-up of the nesting strategy enhance essential model skills in relation with sediment transport.

The further step will be to confront the sediment transport dynamics stemming from the nested system to that resolved from the coarser parent alone.

Keywords: ROMS; COAWST; hydrodynamical modeling; sediment transport