Oral presentation *Pre-doc level*

Impact assessment of offshore dredging activities and wind farms on sediment dynamics using a coupled ocean-wave-sediment transport model

Ivanov Evgeny[1], Capet Arthur[1], Barth Alexander[2], Delhez Eric[3], Soetaert Karline[4] and Grégoire Marilaure [1]

[1] University of Liège: Modelling for Aquatic SysTems (ULg-MAST), Quartier Agora Allée du 6 Août, 19 - Bât. B5a, 4000 Liège 1 Sart-Tilman, Belgium
E-mail: evgeny.ivanov@uliege.be
[2] Université de Liège, GeoHydrodynamics and Environmental Research group (ULG-GHER), Allée du 6 Août 17, Sart Tilman, B5, 4000 Liège, Belgium
[3] Université de Liège, Modélisation et Méthodes Mathématiques, B37 - Institut de Mathématiques Quartier POLYTECH, 1 Allée de la Découverte 12, 4000 Liège, Belgium
[4] Koninklijk Nederlands Instituut voor Onderzoek der Zee: Estuarine and Delta Systems (NIOZ-EDS), Korringaweg 7, Postbus 140, 4400 AC Yerseke, The Netherlands

Intensification of offshore human activities, i.e. aggregate extraction and wind farms operation, in the Belgian Coastal Zone (BCZ) leaves an imprint on biodiversity and biogeochemical cycles via changes in sediment dynamics. This impact requires a quantitative assessment in order to develop indicators for management policies. The FaCE-IT project (Functional biodiversity in a Changing sedimentary Environment: Implications for biogeochemistry and food webs in a managerial setting) funded by the Belgian Science Policy Office (BelSPo) was created to assess the local impact of an individual wind farm and upscale it over the BCZ using numerical modelling.
The coupled Ocean-Wave-Sediment transport (COAWST) modelling system (Warner, 2010) was implemented for the BCZ on the fine resolution grid (i.e. 1 km2), which is connected with the coarse resolution grid (5 km2) set for the English Channel and the Southern Bight of the North Sea in two-way nesting. The sediment model was initialized with several classes for both cohesive and non-cohesive sediments provided by the Flanders Marine Institute (VLIZ). The full validation using VLIZ in-situ data and satellite products from Copernicus Marine Environment Monitoring Service was conducted with a specific target to solve various processes important for sediment dynamics, such as freshwater plume dynamics and patterns of residual currents, as well as a system response to different meteorological events.

Scenarios have been designed to represent aggregate extraction and the turbid wake issued from wind farm flow perturbation and epifaunal activity in terms of sediment source, sinks and redistribution. Preliminary results showing the influence of those local perturbations on seafloor integrity and suspended particulate matter are presented at the regional scale of the BCZ.

Reference

- Warner, John C., et al. "Development of a coupled ocean–atmosphere–wave–sediment transport (COAWST) modeling system." Ocean modelling 35.3 (2010): 230-244.

Keywords: Ocean modelling; Belgian coastal zone; Offshore wind farms; Sediment transport