Geophysical Research Abstracts
Vol. 21, EGU2019-12695, 2019
EGU General Assembly 2019

A HR extension of CMEMS towards the coast using structured and unstructured approaches: the CURAE project

Pablo Cerralbo (1), Marc Mestres (1), Johannes Pein (2), Johannes Schulz-Stellenfleth (2), Manuel Espino (1), Joana Staneva (2), Lars Boye Hansen (3), and Agustín Sánchez-Arcilla (1)

(1) Universitat Politècnica de Catalunya, DECA, Maritime Engineering Laboratory, Barcelona, Spain (pablo.cerralbo@upc.edu), (2) Helmholtz-Zentrum Geesthacht (HZG), Geesthacht (Germany), (3) DHI-Geographic REsources Analysis and Science (DHI-GRAS), Hørsolm (Denmark)

The modelling of the two-way interactions between harbor / coastal infrastructure and natural processes in coastal areas requires a detailed knowledge of hydro-morphodynamic processes and patterns that is seldom obtained from current operational forecasts. Their limited capacity to reproduce small-scale coastal hydrodynamics due to low model resolution and the omission of the interplay between the active coastal fringe and the shelf sea (i.e. land-to-sea fluxes of water, sediment and nutrients) hampers the use of these products for coastal applications.

The CURAE project addresses these limitations by preparing a new set of downscaling and coupling tools to enhance the coastal dimension of present CMEMS products. The procedure is tested in two hydrodynamically contrasting coastal sites (micro and macro tidal range, low and high wave energy, ...) but which present river and irrigation discharges, dredging and their interactions. Two numerical approaches (structured vs. unstructured grids) are used for downscaling so that the derived conclusions and tools should be generic enough and of direct value for the extension of CMEMS towards the coast. Furthermore, the assessment of the different relative weights of processes and couplings in coastal areas with respect to deep waters will provide criteria and recommendations for such evolution of operational CMEMS services.

In this contribution we present the current state of development of CURAE simulations and their application to both study sites: the Fangar bay in the Ebro Delta (Spanish Mediterranean coast), and the Wadden Sea (North Sea German coast). The former is an important but environmentally fragile shellfish cultivation area, whereas the second presents sediment-laden river discharges and significant dredging/disposal operations required for port activities. The results obtained are encouraging, and back the need for a high-resolution coastal extension of CMEMS, while supporting the validity of the developed approach.