INCORPORATION OF CONTINENTAL AND URBAN RUN-OFF INTO A COASTAL CIRCULATION MODEL: APPLICATION TO THE CATALAN COAST.

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Introduction

Coastal seas are ecologically and economically, among the most productive areas of the world ocean and have been the subject of many international agreements and conventions looking to preserve and exploit them in a sustainable manner. Additionally, more than 120 million people live in and "impact" on Europe's coastal regions and their quality of life is affected by the environmental status of its regional seas.

Most studies on freshwater influence into the coastal sea have focused on estuarine environments (*e.g., Liu et al.,* 2009; *MacCready et al.,* 2009; *Warner et al.,* 2005; *Hetland. R.D.,* 2004) but continental/urban runoff has been rarely considered in coastal circulation. This paper will discuss the implementation of the best possible land boundary fluxes for coastal circulation modeling including river and urban runoff. Adequate incorporation of the land boundary fluxes plays a crucial role for assessment and prediction of circulation in coastal waters. As a demonstration part of the Catalan coast has been chosen. The combination of local topography with torrential rain fall can produce considerable local run-off on a short time with a large impact on the receiving coastal waters.

Methodology and aim

For the coastal circulation model, version 3.0 of the Regional Ocean Modeling System (ROMS, Haidvogel et al., 2000) has been implemented for small portion of the Catalan coast. ROMS uses sigma coordinates and solves the 3-D Reynolds-Averaged Navier-Stokes equations. The code design is modular, so that different choices for advection and mixing, for example, may be applied by simply modifying preprocessor flags. Nested increasing-resolution domains have been used in order to reproduce with enough resolution the coastal circulation (see Figure 1). The boundary conditions are obtained from the MyOcean project (*http://www.myocean.eu.org./*).

River and urban run-off are estimated based on rainfall (predictions) form the contributing catchments areas. Conceptual models based on a reservoir-type schematization of the river and sewer network have been set up to allow the fast prediction of the different point source boundary conditions (*Keupers et al.,* 2011).

Particular attention will be paid to the 3D structure of the land boundary flux. Different vertical profiles for velocity, salinity and temperature for fluxes at the land boundary will be used in order to investigate their effect on e.g. the salinity field in the coastal region.

Model output for selected events will be compared to data from dedicated campaigns during the Field_AC project (*http://lim050.upc.es/field_ac/index.html*) and to data from operational buoys in the Catalan coastal area.

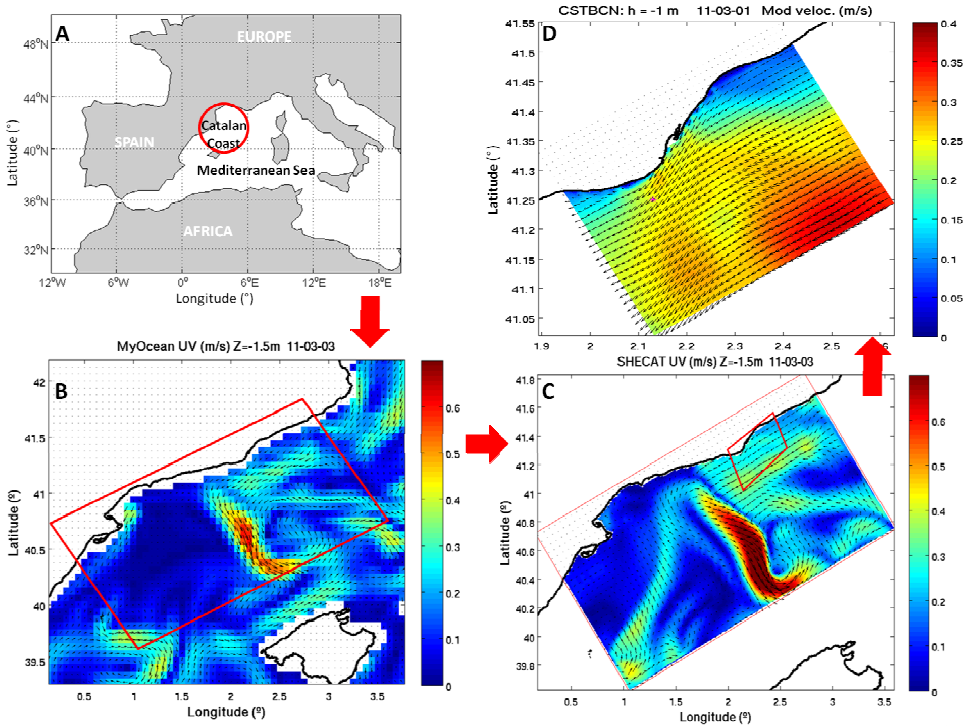

Figure 1. Study area (panel A), Boundary conditions (UV m\s) by MyOcean project (panel B), surface velocity in the SHECAT grid (panel C) and surface velocity in the computational domain of this study (D).

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