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Local Wind Influence on Freshwater Plume Behavior: Application to the Catalan Shelf.

Maria Liste (1), Manel Grifoll (2), Jaak Monbaliu (1), Ingrid Keupers (1), and Homayoon Komijani (1)

(1) Hydraulics Laboratory, K.U. Leuven, Kasteelpark Arenberg 40, B-3001 Heverlee, Belgium, (2) LIM/UPC, Jordi Girona, 1-3, 08028, Barcelona, Spain.

Introduction

Freshwater fluxes are not always considered, and often their 3D character is neglected. The "distributed" continental run-off is seldom taken into consideration. The main aim of the EU-FP7 Field_Ac project (*www.field_ac.eu*), was to improve operational service for coastal areas and to generate added value for shelf and regional scale predictions including land discharge as a boundary condition. In this paper the dispersal of a fresh water plume in a small part of the Catalan Coast (NW Mediterranean Sea) caused by a flash flood event in March 2011 is presented in response to the local wind forcing. Observations and modeling results are shown for a short period but 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, *Shchepetkin and McWilliams*, 2005] has been chosen. ROMS solves the 3-D Reynolds-Averaged Navier-Stokes equations in sigma coordinates. 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 models have been implemented in order to reproduce with sufficient spatial resolution the coastal circulation and the river plume evolution in a small portion of the Catalan coastal area. The boundary conditions for the largest domain model are obtained from the *MyOcean products*.

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

Model output data are compared to in situ data from dedicated campaigns during the *Field_AC Project* and to data from operational buoys in the Catalan coastal area.

Results

Wind forcing leads to freshwater spreading. As expected, wind speed and direction and the magnitude of the fresh water discharge affect substantially the plume behavior. This case study illustrates clearly the need to consider both the wind forcing and the fresh water discharge as part of a single system.

References

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MyOcean products (*http://www.myocean.eu/*).

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