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Intercomparison and validation of operational coastal-scale models, the experience of the project MOMAR.

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The need for regional governments to implement operational systems for the sustainable management of coastal waters, in order to meet the requirements imposed by legislation (e.g. EU directives such as WFD, MSFD, BD and relevant national legislation) often lead to the implementation of coastal measurement networks and to the construction of computational models that surround and describe parts of regional seas without falling in the classic definition of regional/coastal models. Although these operational models may be structured to cover parts of different oceanographic basins, they can have considerable advantages and highlight relevant issues, such as the role of narrow channels, straits and islands in coastal circulation, as both in physical and biogeochemical processes such as in the exchanges of water masses among basins.

Two models of this type were made in the context of cross-border European project MOMAR: an operational model of the Tuscan Archipelago sea and one around the Corsica coastal waters, which are both located between the Tyrrhenian and the Algerian-Ligurian-Provençal basins. Although these two models were based on different computer codes (MARS3D and ROMS), they have several elements in common, such as a 400 m resolution, boundary conditions from the same "father" model, and an important area of overlap, the Corsica channel, which has a key role in the exchange of water masses between the two oceanographic basins.

In this work we present the results of the comparison of these two ocean forecasting systems in response to different weather and oceanographic forcing. In particular, we discuss aspects related to the validation of the two systems, and a systematic comparison between the forecast/hindcast based on such hydrodynamic models, as regards to both operational models available at larger scale, both to in-situ measurements made by fixed or mobile platforms. In this context we will also present the results of two oceanographic cruises in the marine area between Tuscany and Corsica, named MELBA (May 2011) and Milonga (October 2011).

In both campaigns, in addition to standard oceanographic measurements (profiles, samples), currentemeter data were collected along tracks using vessel mounted ADCPs, which have allowed us to identify some of the most interesting hydrodynamic features of the area. During MELBA, such current measurements were also carried out through the use of an Autonomous Underwater Vehicle (AUV), while during MILONGA a large survey of the area and a mapping of currents and water masses were carried out by a large number of Lagrangian instruments (drifters and floats).

First results allow a hydrodynamic characterization of the Corsica channel, highlighting the three-dimensional structure of the currents along the channel, and characterizing the current reversals (from North to South and vice versa) in dependence to different oceanographic and weather conditions. Collected data provides a basis for a first validation of such operational models, and allow the evaluation of their relative reliability under different conditions.