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WMOP: The SOCIB Western Mediterranean Sea OPerational forecasting system

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Development of science based ocean-forecasting systems at global, regional, sub-regional and local scales is needed to increase our understanding of ocean processes and to support knowledge based management of the marine environment. In this context, WMOP (Western Mediterranean sea /Balearic OPerational system) is the forecasting subsystem component of SOCIB, the new Balearic Islands Coastal Observing and Forecasting System.

The WMOP system is operational since the end of 2010. The ROMS model is forced every 3 hours with atmospheric forcing derived from AEMET/Hirlam and daily boundary conditions provided by MFS2 from MyOcean/MOON. Model domain is implemented over an area extending from Gibraltar strait to Corsica/Sardinia (from 6ºW to 9ºE and from 35ºN to 44.5ºN), including Balearic Sea and Gulf of Lion. The grid is 631 x 539 points with a resolution of ∼1.5km, which allows good representation of mesoscale and submesoscale features (first baroclinic Rossby radius ∼10-15 km) of key relevance in this region.
The model has 30 sigma levels, and the vertical s coordinate is stretched for boundary layer resolution, also essential to capture extreme events water masses formation and dynamical effects. Bottom topography is derived from a 2′ resolution database.

Online validation procedures based on inter-comparison of model outputs against observing systems and reference models such as MFS and Mercator are used to assess at what level the numerical models are able to reproduce the features observed from in-situ systems and remote sensing. The intrinsic three-dimensional variability of the coastal ocean and open-ocean exchanges imply the need of muti-plaform observing systems covering a variety of scales. Fixed moorings provide a good temporal resolution but poor spatial coverage, while satellite products provide a good spatial coverage but just on the surface layer. Gliders can provide a reasonable spatial variability in both horizontal and vertical axes. Thus, inter-comparison with products from different types of sources provides a good view of how well the model is performing and reproducing the dynamics of the basin.

Additionally, this present study aims at assessing WMOP simulations quantitatively against complementary observational databases, i.e. to identify well-simulated physical features and to characterize the structure of model biases. The simulations are evaluated against hydrographic observations (temperature/salinity profiles from the ENACT-ENSEMBLES database), buoys, gliders and satellite data. We compare various simulations (WMOP, MFS, Mercator) to quantify the impact of the (sub)mesoscale on the large scale circulation.