



Multi-platform validation of a high-resolution model in the Western Mediterranean Sea: insight into spatial-temporal variability

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This study focuses on the validation of the high resolution Western Mediterranean Operational model (WMOP) developed at SOCIB, the Balearic Islands Coastal Observing and Forecasting System. The Mediterranean Sea is often seen as a small scale ocean laboratory where energetic eddies, fronts and circulation features have important ecological consequences.

The Medcliv project is a program between “La Caixa” Foundation and SOCIB which aims at characterizing and forecasting the “oceanic weather” in the Western Mediterranean Sea, specifically investigating the interactions between the general circulation and mesoscale processes. We use a WMOP 2009-2015 free run hindcast simulation and available observational datasets (altimetry, moorings and gliders) to both assess the numerical simulation and investigate the ocean variability. WMOP has a 2-km spatial resolution and uses CMEMS Mediterranean products as initial and boundary conditions, with surface forcing from the high-resolution Spanish Meteorological Agency model HIRLAM.

Different aspects of the spatial and temporal variability in the model are validated from local to regional and basin scales: (1) the principal axis of variability of the surface circulation using altimetry and moorings along the Iberian coast, (2) the inter-annual changes of the surface flows incorporating also glider data, (3) the propagation of mesoscale eddies formed in the Algerian sub-basin using altimetry, and (4) the statistical properties of eddies (number, rotation, size) applying an eddy tracker detection method in the Western Mediterranean Sea.

With these key points evaluated in the model, EOF analysis of sea surface height maps are used to investigate spatial patterns of variability associated with eddies, gyres and the basin-scale circulation and so gain insight into the interconnections between sub-basins, as well as the interactions between physical processes at different scales.