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Assimilating Ibiza Channel HF radar currents in a high resolution model

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High frequency radars (HFR) are key observing platforms of coastal Research Infrastructures. They provide high temporal and spatial resolution surface current measurements over wide coastal areas, bringing new insights into coastal processes and helping to assess and improve the performance of ocean models. In particular, the regular and high resolution sampling of HFR measurements make them potentially very valuable inputs for data assimilation in operational systems.
Since 2012, SOCIB, the Balearic Islands Coastal Observing and Forecasting System, operates two coastal HFR sites to monitor the surface currents in the Ibiza Channel (Western Mediterranean Sea). This channel area is a well-established biodiversity hotspot characterized by important meridional flow exchanges with significant impacts on ecosystems. These exchanges result from the complex interaction of different water masses from the surface to deep layers under strong topographic constraints, including mesoscale activity. This makes the Ibiza channel a challenging area from the point of view of numerical modeling.
In the framework of JERICO-NEXT EU project, several experiments have been carried out to evaluate the improvement in model forecasts when assimilating HFR measurements in addition to multiplatform observations from satellite and ARGO floats, with the objective of being able to be implemented in the operational system. A multimodel Ensemble Optimal Interpolation scheme has been coupled to the SOCIB Western Mediterranean Operational Model (WMOP) to assimilate observations recursively, including HFR surface velocities. WMOP is a 2-km resolution configuration of the ROMS model using CMEMS numerical products as initial and boundary conditions and high-resolution surface forcing from AEMET.
The sensitivity to different configurations and initialization methods has been evaluated. A control simulation assimilating multiplatform observations without including HFR velocities allow to characterize the influence of HFR measurements on the forecast performance. Results have been assessed comparing against independent HFR fields and surface drifter buoys, showing a better local performance in representing surface currents, resulting in a decrease in RMSD against observations without degrading other variables.