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Optimization of boundary conditions of a North Western Mediterranean coastal zone using HF radar measurements

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Correction of open boundary conditions (OBC) is attempted to improve surface velocity fields by assimilating HF radar velocities in a North Western Mediterranean (NWM) coastal model nested in a large scale operational model (Mercator Ocean system PSY2) providing IC (Initial Conditions) and OBC.

A method based on HF radar velocities assimilation using an Ensemble Kalman Filter (EnKF) to derive the optimal wind forcing had already been validated. The objective of this work is to implement this method to the OBC correction. An ensemble simulation of the NWM sea model is carried out under different OBC to estimate model error covariance and covariance between surface currents and OBC. We evaluate the ability to correct the baroclinic oceanic forcings and to improve the surface current using a distant HF radar system.

First, the method is assessed using twin experiments and a NWM sea model based on a Regional Ocean Model System (ROMS) configuration at 1/12°.
Next, the method is applied to a high resolution (1/64°) NEMO-based model using a HF radar system operating in the Cote d'Azur.

The method evaluation is done in both the eulerian and the lagrangian framework, based on a comprehensive data set (surface radial currents, surface drifter trajectories) obtained during the TOSCA (MedProgram) campaign. TOSCA project intends to optimize the response to marine accidents (oil spill, search and rescue) in Mediterranean sea, and the radar data assimilation may represent a great advantage to describe with more accuracy surface currents.

Keywords : HF radar, data assimilation, ensemble simulation, surface meso-scale process, North Western Mediterranean sea, coastal modelling.