



Estimating trajectories of floating objects using the new ICATMAR high-frequency radar network

Since early 2023, a new high-frequency radar (HFR) network has been implemented along the Catalan Coast (Northwestern Mediterranean Sea) by the Catalan Institute of Research for the Governance of the Sea (ICATMAR). The ICATMAR is a cooperative body between the Institute of Marine Sciences (ICM-CSIC) and the Catalan Government aiming to provide scientific advice for the maritime governance and blue economy development in this region. The HFR network consists of 7 CODAR antennas, 5 of which are already operating and the rest will be commissioned before the end of 2024. This array of antennas provides surface radial velocities and waves measurements between the coastline and about 80 km offshore covering, once completed, around 300 km of the coastline. Radial velocity measurements obtained by the antennas are combined using the (unweighted) least-squares fitting method to derive the total velocity fields of sea surface currents. Sea surface velocities provided by the ICATMAR HFR network have a spatial resolution of about 9 km, are computed every hour and are accessible through ICATMAR's website. Here, we show preliminary results on sea surface currents data validation and a first testing exercise on using this operational product to estimate drift trajectories of floating objects. For data validation, an 18-months long time series of HFR-derived total velocity currents from the northern sector of the Catalan Coast has been compared with Eulerian velocity measurement from buoy sensors and ocean modelling systems spanning the same time interval. In this same region, some Search And Rescue simulation exercises have been conducted by local authorities since the ICATMAR HFR network is operating. This has allowed us to start the validation of real drifting trajectories with predictions based on HFR currents and ocean modelling systems. The results of this study serve to highlight the relevance of HFR systems in providing operational products for marine safety, search and rescue operations, plastics and other kind of pollutants' drift. Future improvements are expected through data assimilation of HFR velocity fields into the ICATMAR forecasting system. A web-based public service to visualize both predicted and observed short-term trajectories, combined with the observed HFR velocity fields, will be available through the ICATMAR's website.

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