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STRING: A new drifter for HF radar validation.

Anna-Maria Rammou (1), Vassilis Zervakis (1), Lucio Bellomo (2), Zoi Kokkini (1), Celine Quentin (2), Carlo Mantovani (3), and Alkiviadis Kalampokis (4)

(1) Department of Marine Sciences, University of the Aegean, Mytilene, Greece (am.rammou@marine.aegean.gr, zervakis@marine.aegean.gr, mar01045@mar.aegean.gr), (2) Mediterranean Institute of Oceanography, Université de Toulon, Toulon, France (bellomo@univ-tln.fr, celine.quentin@mio.osupytheas.fr), (3) Istituto di Scienze Marine, Consiglio Nazionale delle Ricerche, La Spezia, Italy,(carlo.mantovani@cnr.it), (4) Dipartimento di Scienze e Tecnologie, Universita degli Studi di Napoli "Parthenope", Napoli, Italy,(alkiviadis.kalampokis@uniparthenope.it)

High-Frequency radars (HFR) are an effective mean of remotely monitoring sea-surface currents, based on recording the Doppler-shift of radio-waves backscattered on the sea surface. Validation of HFRs' measurements takes place via comparisons either with in-situ Eulerian velocity data (usually obtained by surface current-meters attached on moorings) or to Lagrangian velocity fields (recorded by surface drifters). The most common surface drifter used for this purpose is the CODE-type drifter (Davis, 1985), an industry-standard design to record the vertical average velocity of the upper 1 m layer of the water column. In this work we claim that the observed differences between the HFR-derived velocities and Lagrangian measurements can be attributed not just to the different spatial scales recorded by the above instruments but also due to the fact that while the HFR-derived velocity corresponds to exponentially weighted vertical average of the velocity field from the surface to 1 m depth (Stewart and Joy, 1974) the velocity estimated by the CODE drifters corresponds to boxcar-type weighted vertical average due to the orthogonal shape of the CODE drifters' sails. After analyzing the theoretical behavior of a drifter under the influence of wind and current, we proceed to propose a new design of exponentially-shaped sails for the drogues of CODE-based drifters, so that the HFR-derived velocities and the drifter-based velocities will be directly comparable, regarding the way of vertically averaging the velocity field.The new drifter, codenamed STRING, exhibits identical behavior to the classical CODE design under relatively homogeneous conditions in the upper 1 m layer, however it is expected to follow a significantly different track in conditions of high vertical shear and stratification. Thus, we suggest that the new design is the instrument of choice for validation of HFR installations, as it can be used in all conditions and behaves identically to CODEs when vertical shear is insignificant. Finally, we present results from three experiments using both drifter types in HFR-covered regions of the Eastern Mediterranean. More experiments are planned, incorporating design improvements dictated by the results of the preliminary field tests. This work was held in the framework of the project "Specifically Targeted for Radars INnovative Gauge (STRING)", funded by the Greek-French collaboration programme "Plato".