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On the influence of a regional drag coefficient parameterization scheme in the forecasting skill of an ocean model in the Aegean and Levantine Seas.

Kostopoulos Vassilis (1), Chrisagi Eurydice (2), Sofianos Sarantis (2), and Helmis Constantinos (1)

(1) Univercity of Athens, Environmental Physics and Meteorology, Athens, Greece (vkostopoulos@phys.uoa.gr), (2) Ocean Physics and Modelling Group, University of Athens, Greece

Recent studies have underlined that the choice of using the drag coefficient regression equation under neutral conditions is regionally dependent. The present study investigates the influence of different drag coefficient parameterizations in the complex circulation patterns of the Aegean and Levantine Seas (Eastern Mediterranean Sea), assessing the forecasting skill of an ocean circulation model. A new bulk formula for calculating the drag coefficient using the wind velocity was obtained from micro-meteorological measurements within the surface Marine Atmospheric Boundary Layer in the Aegean Sea and was incorporated into the ocean circulation forecasting system ALERMO (Aegean-Levantine Eddy Resolving Model), based on the Princeton Ocean Model. The forecasting system is covering the Aegean and Levantine basins, is forced by the SKIRON atmospheric forecasting fields and is nested in the MyOcean forecasting system. The new parameterization is compared with the one based on Hellerman and Rosenstein (1983) that is widely used in ocean models, by performing twin numerical experiments and comparing against satellite observations of the sea surface temperature (SST). Thirty 5-days twin simulation experiments, during 2012-2013 were carried out in a forecasting mode, covering all seasons and different wind field patterns. The new formula's forcing is approximately 30% greater than Hellerman and Rosenstein's, for wind speeds up to 20 m/s, and this is reflected in the kinetic energy and the structure of the surface circulation. The forecasting skill of the ocean model was significantly different locally and seasonally, between the two drag coefficient parameterization schemes, over the Aegean Sea but also in large areas of the Levantine basin. Differences in the forecasting skill were found in open sea and coastal regions, with the later associated with wind patterns that are favorable for coastal upwelling.