Ocean Sci. Discuss., 7, C190–C192, 2010
www.ocean-sci-discuss.net/7/C190/2010/

Ocean Science Discussions

Interactive comment on "Wind forcing effects on coastal circulation and eddy formation around a cape" *by* P. De Gaetano et al.

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Received and published: 29 April 2010

The major criticism to the paper concerns the coupling of the meteorological model with the ocean one. Reviewer 1 states that the value for the constant drag coefficient chosen for the simulations is always smaller than values produced by the variable drag coefficient algorithm. We agree with the Reviewer 1 that this choice is incorrect and we plan to perform a new set of simulations with higher values of the constant drag coefficient. Instead, Reviewer 2 claims that our choice for the variable drag coefficient formula is not updated with respect to some papers recently published on international journals. In particular, he mentions Kochanski et al. (2006). We found a paper published in Deep-Sea Research II [*Kochanski, A., Koracin, D., Dorman, C.E., 2006: Comparison of wind-stress algorithms and their influence on wind-stress curl using*

buoy measurements over the shelf off Bodega Bay, California, Deep-Sea Research II, 53 (2006), 2865-2886], where three different algorithms for the drag coefficient calculation are compared. The first algorithm is developed by Large and Pond (1981) and consists of a bulk algorithm very similar to the one we have used in our study, proposed by Csanady (1982) one year later. The other two algorithms take into account not only the wind speed, but also the shape of the wind profile under different stability conditions. The aim of our study is to assess the role of the wind stress and its resolution on the coastal circulation in the Promontorio di Portofino area over a three-year period. Therefore, for sake of simplicity, we avoided to use a very complex algorithm for the drag coefficient, such as one taking into account a large number of variables and parameters.

The other major comment, presented by Reviewer 1, concerns the meteorological models used to evaluate the wind speed forcing on the ocean model. The meteorological model BOLAM, in its two versions with 21 or 7 km as horizontal resolution, is the meteorological model that has been used operationally since a decade by the Meteo-Hydrological Functional Centre for Civil Protection of the Liguria Region (CFMI-PC) to provide an official regional weather forecast. We agree in general with Reviewer 1 that a higher resolution wind model would be desirable in the future, nevertheless we cannot agree on stating that the BOLAM7 wind fields can be more realistic than the BOLAM21 wind fields only "in a purely coincidental manner".

Moreover, we disagree with Reviewer 2 on the following statements i) "There is no single figure in the manuscript to show eddy formation in lee of the cape" ii) "Wind field analysis is extremely poor". Indeed, i) the recirculation in the lee of the cape is clearly shown in the plot of the progressive vectors at points 1 and 2 in Fig. 6, 7 and 8 and of the average current vectors in Fig. 12 and 13; ii) far as the wind analysis is concerned, we present a detailed comparison based on wind roses, progressives vectors and cluster analysis between BOLAM21 and BOLAM7 fields.

Concerning the latter technique, as far as we know, this is the first application of cluster

analysis ever performed on marine current velocity data and we regret that has not been discussed by the two reviewers.

Finally, we deeply apologize for grammar errors and we thank the reviewers for their constructive comments.

Interactive comment on Ocean Sci. Discuss., 7, 207, 2010.