Ocean Sci. Discuss., 7, C154–C156, 2010
www.ocean-sci-discuss.net/7/C154/2010/

Ocean Science Discussions

Interactive comment on "Sensitivity study of wind forcing in a numerical model of mesoscale eddies in the lee of Hawaii islands" *by* M. Kersalé et al.

Anonymous Referee #4

Received and published: 14 April 2010

General Comments:
This study presents a comparison between two numerical simulations of the Hawaiian region obtained using different wind forcings: $\frac{1}{2}^\circ$ resolution COADS wind stress in one case, and $\frac{1}{4}^\circ$ resolution QuikSCAT wind stress in the other. The results show that the formation of wind-generated eddies in the lee side of the islands is highly dependent on the resolution of the wind forcing: the higher the resolution the more realistic the eddy structures, as well as the eddy field reproduced in the simulation.
Despite few grammar errors, the paper is well structured and the figures are of good quality. Unfortunately the conclusions are too similar to the ones already presented in Calil et al. (2008), and therefore, in my opinion, this manuscript should not be accepted for publication in its present form.

What was not discussed in Calil et al. (2008) is the influence that the lateral shear and bottom stress induced by the Hawaiian Islands have on eddy formation. Refocusing the manuscript on this aspect might greatly improve its scientific significance. My suggestion is to include in the study a series of experiments similar to the ones from Dong et al. (2007) in the Southern California Bight, in order to examine the relative importance of wind stress, lateral shear and bottom stress on eddy formation in the lee of islands.
Analyzing the solutions from the different simulations using one of the many automated eddy detection methods already proposed (i.e. Chelton et al., 2007; Doglioli et al., 2007; Chaigneau et al., 2008; Nencioli et al., 2010) might also improve the quality of the study, as it would make it possible to compare temporally and spatially averaged eddy statistics, rather than single mesoscale events.

Specific Comments:
Page 479, Line 7: the cited references are all from studies from the Canary Islands. The sentence should be rephrased to clarify this.

Page 482: What are the values of the nudging time scales used at the open boundaries? Also, why using 3 day averaged fields (instead of instantaneous fields) to analyze mesoscale eddies?

Page 483, Line 26: 20° N, 156° W is very close to the Island of Hawaii. A point further offshore, closer to the middle of the Alenhuihaha Channel, would be more representative for the comparison. Also, it would be nice to have the point indicated on the maps in figure 2.

Page 488, Lines 1-2: It is stated that the circulation from both simulations resembles the one described by Lumpkin (1998); however, averaged circulation is never showed in the manuscript. A figure (possibly a 2 panel vector map) should be added.

Page 496, Fig.5: Why are the masks from C- and Q-run different (also in Fig.6 and 7)? Shouldn't wind stress be the only difference between the two experiments?

OSD
7, C154–C156, 2010

Page 499, Fig.8: What is the location of these transects? Other two panels with velocity vectors and the transect locations should be added to the figure.

References:

Dong C.M., McWilliams J.C., 2007; A numerical study of island wakes in the Southern California Bight, CONTINENTAL SHELF RESEARCH, Vol 27, Num 9, pp. 1233-1248

Chaigneau, A., A. Gizolme, and C. Grados, 2008: Mesoscale eddies off Peru in altimeter records: Identification algorithms and eddy spatio-temporal patterns. Prog. Oceanogr., 79 (2–4), 106–119.

Chelton, D.B., M.G. Schlax, R.M. Samelson, and R.A. de Szoeke, 2007: Global observations of large oceanic eddies. Geophys. Res. Lett., 34, L15606, doi:10.1029/2007GL030812.

Doglioli, A. M., B. Blanke, S. Speich, and G. Lapeyre, 2007: Tracking coherent structures in a regional ocean model with wavelet analysis: Application to Cape Basin eddies. J. Geophys. Res., 112, C05043, doi:10.1029/2006JC003952.

Nencioli, F., C. Dong, T. D. Dickey, L. Washburn, and J. C. McWilliams, 2010: A vector geometry based eddy detection algorithm and its application to a high-resolution numerical model product and high-frequency radar surface velocities in the southern california bight. J. Atmos. Oceanic Technol., 27 (3), 564579, doi:10.1175/2009JTECHO725.1

Interactive comment on Ocean Sci. Discuss., 7, 477, 2010.