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Ocean Science Discussions



# *Interactive comment on* "Physical response of the coastal ocean to Hurricane Isabel near landfall" *by* F. M. Bingham

**Anonymous Referee #2**

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Physical response of the coastal ocean to Hurricane Isabel near landfall," by F.M. Bingham

This paper discusses measured ocean properties in Onslow Bay, North Carolina, during the approach and landfall of Hurricane Isabel in 2003. The observations discussed in the paper were collected at a series of moorings in water depths ranging from 16-40 m. The data processing is standard and the observations are of interest to the coastal oceanography community and should be published for this reason alone. However, the authors go on to discuss the dynamics of the coastal ocean during the storm and this is where I have most of my questions because some of these statements are not documented in the figures.

They say the entire shelf is moving as a slab but they mean the water on the shelf. However, the only current measurements presented in the paper are the low-pass currents from an unknown depth (Fig. 8), low-pass unknown-depth current speed and direction (Fig. 9), and high-pass speed (Fig. 11) at OB27. I can see that stratification is very weak from Figs. 2 and 4 but this doesn't mean there was no change in flow direction within the water column. These same unknown currents are then plotted in Fig. 10 to show propagation of a disturbance or wave across the study area.

Fig. 10 is a difficult plot to understand from the description in the ms because it is not explained well. The points in this plot are supposed to depict the propagation speed of the disturbance. These vectors are calculated from the time of flow reversal and, I presume, the distance between the moorings. It does appear that this is caused by the wind reversal, which has been observed in other cases (e.g., Keen and Glenn 1999), and suggested by Fig. 8. These data could be presented better to show this relationship and make Fig. 10 easier to understand.

Also, on line 24 of page 1692, Fig. 9 should be Fig. 10. The discussion of this disturbance is rather weak; especially since the bottom pressure data are not shown. Such an isobath-parallel wave was generated by H. Andrew and discussed by Keen and Allen (JGR, 105, 2000); it was attributed to flow divergence on the shelf, which was largely barotropic. However, the response was reproduced in a 2-layer baroclinic model as an interface height. This result was seen in both a complex model and an idealized one. The measurements during Isabel should be examined with this previous result in mind rather than be dismissed as a "mysterious" response. It should also be noted that H. Andrew had a weak inertial response to the left of the storm track in weakly stratified water. This response was more energetic than Isabel because the instruments were not as far from the track.

The conclusion is weak. It seems that the best the authors can come up with is that it is useful to have a well-designed and instrumented array to understand the impact of a hurricane–but not, apparently, to understand the dynamics of coastal flows to a well-



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known forcing field. They need to spend a few more hours examining the response and delve into the literature some more to properly describe their “mysterious” response.

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