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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 #1

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

This paper describes the measured physical properties, high-frequency and low-frequency current responses, and the generated wave field across Onslow Bay as Hurricane Isabel passed just offshore. Field data were collected simultaneously at five mooring locations across the continental shelf in Onslow Bay, NC. The topic of the paper is relevant to the scope of Ocean Science, and the field data that are presented are a rarity and would benefit the coastal oceanographic community; therefore, I feel the data should be published. I do, however, have some suggestions and comments about the paper, and some questions pertaining to some of the methods used for simple calculations that were discussed within the text. In addition, I think that the reader

may benefit if the paper were re-organized slightly with the Winds section presented first in the Results so that the reader can understand the physical forcing of the storm across the Bay before reading about the response of the water column. Additionally, the discussion could be expanded upon and the conclusions are somewhat weak.

Specific comments: Results 3.1 Temperature Page 1687- The mentioned, but not provided, PVD analysis would be interesting to see for all moorings. The author states later in the text that the currents in the Bay were slightly different at each of the mooring locations due to the cuspate shape of the Bay.

Pg 1688 - I think it would strengthen the results if the relationship between the measured temperature at each of the moorings and the SST's in the satellite image were discussed. The image helps to explain the results in Fig 2 and why the stations closer to shore are 1.5 - 3 degrees cooler than the moorings on the outer shelf. The corroboration of the satellite and mooring data is mentioned in the last sentence of this section, although it is unclear how the SST's from the satellite confirm that the water column was mixed and not stratified over from Sept 15 - 22.

3.2 Salinity Page 1689- It is unclear what calculations were made to determine the 11cm of water needed to change the salinity by the observed amount at OB27. Lines 10 - 15 are somewhat unclear and I had a hard time following exactly what calculations were made to determine the depth of water needed to change the salinity by the observed amount at OB27. Is this calculation just based on the change in salinity at OB27? What surface area is used to determine the amount of rain needed on the surface?

3.3 Pressure and Sea level The author writes that there was no observed storm surge on the mid- and outer-shelf, and that the records are somewhat aliased having been sampled at 15 and 5 minute intervals. Why couldn't a 36-hour low-pass reveal if the pressure data shows any changes in water level at the two moorings that were equipped with pressure sensors? In addition, all ADCP's come equipped with pressure

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sensors, why wasn't this data utilized at all mooring locations to determine if there was a change in water level across the Bay?

Lines 15-18 describe the 70 cm increase in water elevation at Beaufort, NC as the hurricane was making landfall to the north and east. This would indicate that the wind direction was offshore at Beaufort and would inhibit the storm surge elevation in Beaufort. Is there another water level station north of Cape Lookout and/or north of the landfall location that would indicate a more accurate measure of the hurricane's storm surge as it made landfall?

3.4 Winds Wind data is only measured at FPT throughout the storm event and the author assumes that the winds are consistent in magnitude and direction across the Bay. The modeled winds in Fig 1 at landfall suggest that the winds may have varied from the outer mooring at OB2 to the inner mooring across the shelf. Are there any modeled wind data available that could show that the wind field across the Bay was consistent as the hurricane passed by offshore?

3.5 Low pass current Page 1691 Lines 12-13: The author mentions that the currents may have turned to follow the cuspate shape of the coastline. How would this have effected the vertical variation in the flow? This would indicate that bathymetry is playing a part in steering the currents creating a bottom stress and a bottom boundary layer, within which a rotation in the flow with elevation above the seabed is typical.

Figs 8 and 9 - At what depth are the plotted currents?

Page 1693- The section on the disturbance that propagated across the shelf was confusing and hard to follow. The Figure (10) that is referenced is even more confusing. The subject of low frequency, long wavelength waves is not my area of expertise, so that may be why it is unclear to me.

3.6 High pass current Page 1693, Lines 24 - 26, Figure 11: What depth is the current at OB27?

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Technical comments Figure 2. In the caption the text “Lower or bottom” is confusing. Isn’t the red line the temperature at mid-depth?

On page 1691 Line 18 - Table 2 should be referenced when discussing the time of minimum current speed at all moorings.

Page 1692 Line 20 - Figure 10 is referred to but not referenced in the heading.

Page 1696 Lines 3-4: “Barely rose above the tides” unclear statement.

The author refers to him/herself throughout the manuscript in the plural sense although there is only one author listed.

Date labels on figures throughout need to be changed to show September 2003.

Interactive comment on Ocean Sci. Discuss., 3, 1681, 2006.