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Ocean Science
Discussions

Interactive comment on "Metrics of hurricane-ocean interaction: vertically-integrated or vertically-averaged ocean temperature?" *by* J. F. Price

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Hello Ocean Science and Referees:

Referee 1:

I can understand the exasperation with the seemingly open-ended discussion of ocean metrics with which the paper closes. However, I think that the only way to tell just which ocean metric will work best in practice is to try several and see what comes out on top. The original OHC should certainly be among the candidates. It is surely a big task to set up the necessary hurricane and ocean data sets (and beyond the scope of the present paper). But once the mechanism is set up, it shouldn't be a huge effort to try

generalized versions of both OHC and Td. I expect that searching for the best among several candidate metrics will be a better–posed problem than trying to test just one candidate in isolation.

Not sure that I understand fully what is meant by the comment that one number can not suffice to characterize hurricane-ocean interaction. I can certainly appreciate that the horizontal scale over which the metric (SST) varies is a very important issue, and will be relevant in the testing noted above.

In the end, I expect that a metric of the kind espoused here will be most useful as an adjunct to comprehensive coupled models and less so as a stand-alone method (as now happens with OHC). An ocean metric should be able to show, in effect, what will happen (or happened) with the ocean, aside from the variable effects of the hurricane. This may sound like an awfully modest goal, but will likely be very useful when trying to understand the results from coupled air-sea models in which everything is changing and unconstrained.

Referee 2:

Forecasting should be done with Td rather than T100. The latter helps make the notion of a depth-averaged temperature clear, but as the Referee points out, d = 100 m will not be appropriate for every case, especially developing tropical storms for which d might be much less than 100 m. The revised text tries to emphasize this point.

The revised paper also includes supplementary material available online (now my web page but eventually an Ocean Science permanent archive) that documents an extensive series of comparisons of Td against a 3-d numerical ocean model. It seems that Td works well, and in one key respect, better than it has any right to. Namely, the dependence of Td upon translation speed is quite good (for the criterion assumed) even at very low translation speeds despite that Td omits vertical advection. The reason is a compensating error in the greatly simplified momentum balance. The dependence of d upon wind stress amplitude is also quite significant and germane to the comparison

of Td and T100. Indeed, Td and T100 will be roughly equal only for the case of big, mature hurricanes, as the Referee implies. Thus, use Td if any doubt.

Thanks to both Referees for their comments. Regards, Jim Price.

Interactive comment on Ocean Sci. Discuss., 6, 909, 2009.