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Interactive comment on “Mean circulation in the coastal ocean off northeastern North America from a regional-scale ocean model” by K. Chen and R. He

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Received and published: 29 December 2014

I was very happy to read about this work. As an oceanographer at the Northeast Fisheries Science Center, I am glad that there are now multiple modelers generating multi-year hindcasts on the entire NE shelf. While the work described in this paper is fairly basic (primarily a look at climatologic means and validation), it is their first step in addressing the more important aspects of inter-annual variability. Now that they have described the basic workings of the nested models, the authors will need to take it a step further in order to make the hindcast useful. It is obvious they will need to reduce the grid sizes in the next round of runs and perhaps they will use an alternative parent

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model of their own (other than HYCOM).

Since most of the action on the NE shelf occurs at the shelfedge and the bulk of the transport occurs in a relative narrow jet near steep topography, the authors I'm sure are aware that the 6-10 km grid cells are probably not adequate to resolve the fronts in these areas. This paper speaks broadly about the shelf system but, in the future, it would be nice if the modelers could focus in on some of the canyons and be able to quantify their contribution to the overall import/export of shelf waters. This will require, I imagine, some higher resolution model grids.

The biologist at our lab are interested in describing and attributing the year-to-year changes in larval recruitment and survival to the variability in transport. Can the number of young cod and haddock on Georges Bank, for example, in any one year be explained by the degree of retention or loss from the bank due to pure physical processes? We certainly do not have enough observations anywhere on the shelf to be able to quantify these processes. We do need observations however for both assimilation and validation purposes. We need these models and it is best to have multiple models.

In some places, there was detailed validations but much more will be needed in the future. For example, the time series comparison of temperature and salinity were plotted in Figures 5 and 6 for a single location that is certainly not representative of the entire shelf. The authors note that "the model generally tracks the subsurface temperature series" but, from what I can see from Figure 5, there is a 2 to 3 degC discrepancy during the stratified season. It is not clear to me what, if any, hydrographic data was assimilated in the child model. I imagine some (or much more) will need to be included in the next set of hindcast runs. It is clear that the parent HYCOM assimilates some T/S.

I was happy to read that there is an archive of state variables but it would be nice, in the future, if the authors could point to these archives (assuming these fields are

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accessible). In the spirit of open access for all, it would benefit the authors if other investigators could query the data, do some validations of their own, and they could share their results.

I had only a few minor technical corrections/comments:

1) It was mentioned in the abstract that data from "glider transects in the MAB" were compared to the model but I didn't notice where.

2) p. 2758 line 5: Would the phrase "understand and quantify" be "understanding and quantifying"? I'm not sure.

3) p 2759 line 4: "Gulf stream" should be capitalized?

4) Figure 7. Is there no arrow for the model at Martha's Vineyard Coastal Observatory or is it hidden under the observed vector?

5) p. 2767 line 8: It says of the Gulf Stream that "mesoscale eddy fields strongly perturb its mean velocity state". Does that mean that there is not enough years in the climatology? Is this not true for the shelfshope front jet as well?

6)Figure 9. It is mentioned somewhere in the text that there is a shoreward transport in the deep at the shelfedge but, based on the figure, that is really only occurring at the Long Island transect.

7) Figure 10. I really like this figure. It should be replicated by anyone attempting to model the NE Shelf in the future.

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