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Ocean Science Discussions

Interactive comment on "A nested Atlantic-Mediterranean Sea general circulation model for operational forecasting" *by* P. Oddo et al.

Anonymous Referee #1

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Review of "A nested Atlantic-Mediterranean Sea general circulation model for operational forecasting"

General Comments:

"A nested Atlantic-Mediterranean Sea general circulation model for operational forecasting" by Oddo, et al., presents the results of comparing a Mediterranean twin-experiment. One member utilized open boundaries in the outer Atlantic model while the second utilized climatological nudging with closed boundaries for the outer Atlantic model. Hence, the two "twins" were identical models run with different open boundary forcing. The surface forcing was consistent between the two.

The results of the experiment were interesting for two reasons: 1) the salinity from the "open" Atlantic simulation was increased across Gibraltar and 2) the sea surface state variability was dramatically increased by the same Atlantic simulation. The authors do a sufficient job of detailing the results and I recommend its publication with minor revisions as described below.

The comparisons performed between the sea surface height solutions and observations were well thought out, and a significant part of the paper.

Specific Comments:

1. There are a couple of instances in which generalities are stated as definitive without data or reference to back them up. For instance, pg 1100:29, "...we argue that this is due to the coarse...resolution..." This is no argument at all but a supposition. Provide an explanation or data as to why you make such an "argument."

2. It would seem that with constant temperatures and increased salinity ($\sim$0.2) that there would be a density issue. Could you comment on this? For instance, why in figure 4, with such a significant increase in salinity that propagates into the Atlantic, we do not see a deepening of this salinity difference where the denser water sinks into the fresher Atlantic? A simple statement or description of the density as a whole would suffice.

3. Similarly, a confusion is created by your statements regarding the volume conservation on pg. 1104:25. You state that the water surface fluxes are different by the volume conservation; however, in the previous section went to great length (including Fig. 3) that the surface fluxes were identical between the two solutions and that the results were due to the advection across Gibraltar.

4. There are significant variations in the transport across Gibraltar between the two twins; however, advection is eliminated as a possible mechanism for any temperature variations. Why is this? The only mechanism that is stated that could account for it is

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air/sea flux, which leads us back to point 3. Please explain these seeming disconnects.

5. PCC. When performing pattern correlation on anomalies, it is most often referred to as ACC, and when using anomalies, you must remove the same climatological mean from both fields; otherwise, you can easily make any two fields appear well correlated. Ideally, one would use a Levitus or other "observed" mean removed from both to do the comparison.

Technical Comments:

1. A number of sentences contain an introductory clause without the trailing comma, (e.g., "In the past ten years operational oceanography...") should have a comma after years.

2. Typo "cantered" should be "centered" at pg 1098:2.

3. Define "MUSCL"

4. Many of the figures or captions need work. Fig.2, the deviations in salinity: though they look significant in the figure, the differences are 0.02% of the total. I'm not sure that the axes are chosen in such a way to properly convey the information. Fig. 4c, the color scale is cut-off below the level of many of the data (many of the values are > 0.2). The caption for Fig. 7 should be rewritten as it is confusing. Fig. 9 requires changes: the caption and figure legends do not match and there is a large discontinuity in the red line (not sure if it is obs or MFS_V2.2) at 150m. Fig. 10, remove last sentence of caption, it is repeated. Fig. 11, redo the color scale for the lower panels: it is black from 0.1 to 0.15–use color.

5. Pg. 1106:29, the sentence that begins, "To understand the difference–similarities..." reads very awkwardly.

Interactive comment on Ocean Sci. Discuss., 6, 1093, 2009.