

## ***Interactive comment on “Performance of offline passive tracer advection in ROMS (v3.6, revision 904)” by Kristen M. Thyng et al.***

**Kristen M. Thyng et al.**

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Thank you for your review! We appreciate your time to do this. Our comments are below. The reviewer responses are included in italics and our responses follow each.

*General Comments: This paper provides an excellent description of a new method for running ROMS, a open-source, commonly used hydrodynamic ocean model, offline. The paper does not, to the best of my understanding, represent a huge advance the field of numerical modeling itself, but it does provide documentation of a new tool available to the scientific community. This is consistent with the goals of the GMD journal. Overall, I consider the paper to be excellent in scientific quality and presentation quality, and moderate on scientific significance. The archiving of all relevant files to reproduce*

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*the results implies it has excellent reproducibility. The paper could be improved by considering non-spatially averaged skill scores. In most coastal systems, the dynamics, as well as the representative length scales and temporal scales, vary in space (and time). The extent to which this affects the skill scores in different areas of the grid would be of much interest to readers and possible users of this software.*

A qualitative feel for the spatial structure of the offline simulation errors has been added through both the next response and though comment 2 below.

*It would also be useful to demonstrate that this method works for more than one model configuration. Different pre-processing choices, grid configurations, open boundary conditions, etc. may all impact the ability for this software to be implemented by other ROMS users.*

We present a new simulation using the same numerical model to try to address this point. The simulation is meant to emulate a “real world case” by being at depth and more localized. Skill scores (averaged over space) and percent errors (shown for a snapshot in time and in both planview and a vertical cross section) are presented for the new experiment.

*Specific Comments Technical Corrections:*

1. *Lines 63-5: This sentence is confusing as written. I suggest deleting “as opposed to” and breaking the sentence into two sentences. Thank you, this now reads: “This timescale is specific to the location of the dye patch, which is off the continental shelf and responding to mesoscale processes. If the dye patch was on the shelf, one would expect a shorter timescale.”*
2. *Can you include a map showing the difference in tracer concentration among different model runs so that users can visually see the magnitude and spatial variability of the error of the offline simulations, compared to the online simulations? Yes, good idea. This is now shown in Figure 2 for a variety of offline*

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simulations.

3. *Figure 4 contains a lot of important information, but was difficult to understand. I suggest considering removing the 'dt' from the figure. If needed, this could be included in a subplot. Also, including nhis as a 2nd y-axis instead of numbers on the plot, would be useful for orienting the reader. Finally, drawing a box around the legend would help readers more readily separate it from the rest of the text in the figure. If the dt's are kept in the figure, please include them in the legend. We did not remove the "dt" labels because we thought it would be more confusing to try to explain which is which simulation in words. However, we followed the spirit of your suggestions by altering much of the text in the figure to be lighter in color, and the marker edges to be lighter, so that the plot is hopefully easier to look at now, with the markers themselves standing out more. Also added a box around the legend. A note about dt was added to the legend.*

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