Geoscientific

Model Development

Discussions

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[GMDD]

Interactive

comment

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

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Thank you for your review. We appreciate the time you spent to do this. Our responses are below. The reviewer comments are included in italics with our responses after each.

This paper mentions a methodology that was applied to a commonly used ocean model ROMS for running it offline in order to save computational time. The results of the study are somewhat intuitive i.e. a frequency of output that corresponds with a time step that can resolve advection time scales, forcing realistically and using double precision would help in the most accurate solution. It is unclear that it would add significant scientific value to the existing literature although it could be a good case study for folks trying

to model similarly. It would then require that the authors discuss another example, perhaps something more application oriented besides the test case mentioned in the paper.

Another experiment has been added to the manuscript that is more application oriented, as suggested.

That would also prove the repeatability of some of the key conclusions. It would be also good to add the equations that are solved via a schematic or a written description when the model is simulated in an offline manner. That would help modelers using other type of models get ideas from the paper to broaden its appeal to a wider audience.

No equations were modified for this offline tracer advection scheme. The changes made to ROMS were all to be able to force additional variables as climatology. The tracer advection is forced exactly as normal in ROMS, but the velocity fields advected the tracer are input as climatology (previously saved from an online run) instead of calculated at the time by ROMS.

Some minor corrections

1. *page 1 Line 15-> change time savings to improved computational efficiency* Done.

2. *page 2 line 22-> "showed good accuracy by hill et al." Is there a specific result that Hill showed that can be summarized here.* This sentence has been added: "For a set output frequency, an offline time step of 8 times the online time step gave a skill score of over 98

3. *Besides the 84 proc to 28 proc change, not sure the rest of the paragraph is needed.* The goal with this is to be open about analysis tools used and also to give appropriate credit.

4. *Figure 4 is hard to interpret. what is the significance of y axis representing stor-*

age . the x axis should be computational time. good job with the appendices
The x-axis is computational time per simulation day. The label and caption have
been modified to say this more explicitly. The y axis is storage required to run on
the online simulation which is then forced in the offline simulation (per simulation
day), and it is one of the tradeoffs required when deciding how to run an offline
simulation, along with computational time. This figure has been modified to try to
be easier to see what is important but altering text lightness, etc.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2020-221, 2020.