

## ***Interactive comment on “How to use mixed precision in Ocean Models” by Oriol Tintó Prims et al.***

**Matthew Chantry (Referee)**

matthew.chantry@physics.ox.ac.uk

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The authors examined the use of reduced numerical precision to ocean modelling. In particular they examine the NEMO and ROMS ocean models and use a divide-and-conquer algorithm to establish which variables can be calculated with reduced numerical precision. Overall this was excellent and interesting science and a useful tool for investigating precision reduction has been developed. I have made a few points below which I would like the authors address. However, once finalised this paper will be a valuable contribution to GMD.

Overall assessing quality of simulations using RMS (or similar as used here) is a good approach. However it is useful to pair this with some representative map plots (or other

C1

data representation) which can give the readers a sense for the locations and scales of the errors. I would recommend the authors introduce these figures, particularly for the NEMO section.

The authors reference multiple simulations for the NEMO runs. Could they clarify when they use multiple initial conditions and how sensitive the tests are to the initial conditions.

The paper is hindered by its length, there are many points where too many words are used to communicate the necessary information. Cutting space can be a challenging task but the final product will be a paper where readers can easily digest all the information that the authors wish to communicate. Ideally the authors would run through the text and ask themselves whether there is a more concise way of communicating each point or whether the information needs to be communicated. I have highlighted just a few examples in my minor points below.

Minor points.

- \* P7:S2.2 Designing accuracy tests. What is the purpose of this section? This question is more thoroughly discussed in the model-specific sections. I would advise removing this section.
- \* P8:L3-7 Unsure of the purpose of this example. Suggest removing.
- \* P8:L8-14 This paragraph was unclear, could the authors please reformulate.
- \* P9:L15 Do you have a citation for this?
- \* P10 How are the quartiles defined? Over space?
- \* How does the ratio of RMSD and IQR vary as a function of time generally? Are failed simulations more likely to exceed the threshold for early/late times?
- \* P11:L10 "smaller time-step" -> "halved time-step"

C2

\* Example of text reduction. P11 the variable values are duplicated in text and the table below. I would recommend removing from the text and referring to the table.

\* P11 Table: Column headings for thresholds could include their definition. e.g. Tight threshold =  $10^{-3}$

\* Accuracy Score.

\* P12:L15 How are the variables that do not impact the results identified?

\* P13:F1 The colour scheme used is not printer-friendly. The figure caption could be reduced in length if a key/legend was provided for the figure. Why is a bar for the tight constraint not plotted?

\* P13:L1 "After this point . . ." This sentence is too long and I couldn't understand what it was trying to communicate.

\* P16:L8-13 Another example ripe for text reduction. Simply stating that a single variable was responsible for breaking the procedure would suffice. Which variable was responsible?

\* P16 Table. Could the authors reproduce Fig1 but for results with both single and half-precision for ROMS.

\* P21:L1 Typo "wheather" -> "weather"

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