

Geosci. Model Dev. Discuss., referee comment RC1  
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## Comment on gmd-2021-51

Anonymous Referee #1

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Referee comment on "Australian tidal currents – assessment of a barotropic model (COMPAS v1.3.0 rev6631) with an unstructured grid" by David A. Griffin et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-51-RC1>, 2021

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This paper discusses the validation of a new tide model for the waters surrounding Australia. The model is based on a new implementation of shallow water dynamics on an unstructured grid using the EMS modeling system which they have open-sourced. The authors provide a new compilation of tidal current observations in their domain, which should be quite useful for others. They provide nuanced and intelligent discussion of their process of model development (emphasizing details such as the hand-adjustment of topography and implementation of open boundary conditions) which should also help others. They systematically discuss the model-data intercomparison, emphasizing locations where tidal currents are relatively large in comparison with sub-tidal currents, which is appropriate considering the aimed-at operational uses for the model. Overall, the authors have produced a well-organized and thoughtful comparison, with the appropriate level of detail provided, and I think this paper requires only very minor adjustments before publication.

Detailed notes, itemized by line number:

L14: Should this read "Rood Mean Square Error (RMSE)"? Otherwise, why captials?

L15: Two periods.

Up to L70: This discussion of the grid development will be useful for others. Very good.

L91: Indeed this is unusual, but it is an indication that you have achieved a necessary level of accuracy. Interesting.

L100: When I first read this, I did not understand that the tidal synthesis was only used at the preliminary stage of model tuning. Later, at line 155, this is explained. I think this should be explained right away when the tidal synathesis is mentioned.

L106: Capitalize "TPXO".

L140: This is a clear explanation of the current meters and ADCP dataset.

L175: Are D and C in the same units, or is C a measure of area? If you believe the model errors are related to this quantity, perhaps it would be better to plot the error statistics as a function of J. It does not seem that this J is used later, so maybe it can be omitted.

L182: Please write out the expression for the relative error that includes the sub\_o velocity.

Table 1: Please format the text so that the lower parts of letters are visible. Note, for example, how the "p", "y", and "g" are truncated from several of the place names.

Up to L230: This is a good overview of the errors. Appropriate detail.

To L305: A good explanation of why the discussion focusses on only certain stations.

L374: It would be useful to label Van Diemen Gulf; although, I guess it is the large body of water enclosing Christine Reef?

Fig 11: I cannot read the place names here. Can you please label Broad Sound?

L387: I think I know the location of this gauge, but I don't understand what we are supposed to observe from Fig 3.

L465: Good to see this basic comparison with TPXO here. You might wish to look at Zaron and Elipot JGR 2021, who compare currents from an earlier version of this model with drifter-derived currents. Alternately, you might find drifter-derived currents are another useful validation dataset.

L472: I don't have the expertise to comment on whether the model currents are operationally useful. Instead of saying they are "arguably" useful, it would be better if you can describe alternate viewpoints in a more detail. Are there definitions or criteria which would be useful for arguing this question? What criteria should be used to decide if a model is "good enough" to be useful for current predictions vs tidal energy site evaluation?