

Interactive comment on “Dealing with discontinuous meteorological forcing in operational ocean modelling” by Bjarne Büchmann

Anonymous Referee #1

Received and published: 16 April 2019

General comments

This paper concerns the use of operationally provided meteorological forcing for ocean models and the resulting discontinuities that arise between subsequent issued forecasts. This is an interesting topic and the paper is well written with clear explanations.

However, I feel that it needs more work to expand the results and put them in more context as we cannot currently tell whether the proposed ramping solution actually leads to any improvements in the ocean model forecasts.

C1

Specific comments

The paper gives a convincing explanation of the hypothetical basis for introducing spurious waves into the ocean model from the discontinuous forcing, but does not give a feel for how much this is actually a problem in real forecasting. Has it caused noticeable issues with the operational surge model setup that is discussed?

The only comparison shown of results with and without the ramped forcing is at a single location (Wick) from the outer model NA3. The reasoning is that this is close to the boundary location of the nested NS1C model, but it would also be useful to see what differences are seen throughout the rest of the model domain to provide more information on the impact of the ramping method – is Wick representative of the rest of the region? Additionally it would be useful to see how the model results compare with observations at this location as we cannot currently tell if the ramping has led to an improvement. This would also put the differences between the “noramp” and “ramp6” cases in more context as I suspect the difference is small compared with other sources of model error.

Section 2.4 states that as the NA3 model is used to provide boundary conditions for the nested models any spurious waves created by the discontinuity in the NA3 model’s forcing may therefore also enter the inner models through the boundaries. However there are no results shown or discussion of what (if any) differences are actually seen in the inner models when they are forced with boundary data from the two different experiments. Again it is therefore very difficult to judge the impact of the proposed ramping method.

It is acknowledged in the same section (in the footnote) that the inner models will have the same issue as their surface forcing dataset (DMI-HARMONIE-NEA) also contains the discontinuities - is there a reason the ramping experiment was only done for the outer model, where the potential impact is limited only to the effect on the boundary data that is used for the inner models? It would seem more relevant to try ramping the

C2

forcing data of the inner models and see the impact that it has there as presumably they are the main focus of the operational system.

With these extra comparisons we would have a much clearer idea of what effect the ramping solution has on the ocean models. It may turn out to be the case that there is actually little impact, but that would still be a useful result since so many institutions run operational models forced by datasets containing these discontinuities.

Technical corrections

- The title! discontinuos -> discontinuous
- Page 7, line 5: apparantly -> apparently
- Page 10, line 14: have -> has
- Figures 6 & 7: It might be useful to include the location of the "neat!" box here as well?
- Figure 10: As a general point please avoid using red and green colours to distinguish lines, as this is not accessible to people with colourblindness. It would be better with a different pair of colours and/or different symbols on each line.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-35>, 2019.