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Geoscientific
Model Development
Discussions

Interactive comment on "The Met Office Unified Model Global Atmosphere 3.0/3.1 and JULES Global Land 3.0/3.1 configurations" *by* D. N. Walters et al.

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1 General response

We thank the reviewer for their detailed reading of the paper and their positive comments on its usefulness as a technical description of the configurations described. Thanks are also due for the constructive criticism of some aspects of the paper, which we hope we have addressed below; we believe the the resulting paper will be the better for this.

2 Reply to specific comments

Comment: *"I have found that the order in which the developments are presented is slightly odd, starting with 3.0, going to 3.1, then falling back to comparisons with 2.0. This does not flow well and ends up creating unnecessary repetition at times. A more logical organisation could make the manuscript shorter and easier to read, leaving more space for science results."*

Reply: We refer the reviewer to our answer in AC C537 to a similar question from the previous review:

"The motivation for this decision was to highlight that the primary purpose of the paper is to document the current configuration, with the supplementary purpose of describing developments made since the last one. . . "

We believe that whilst presenting developments since the previous "Global Atmosphere" configuration first could make the paper slightly shorter by removing a small amount of duplication, this would be at the expense of the description of the current configuration becoming less complete. The logical conclusion of this change would be for the proposed series of annual papers to turn into a long chain of back-references, rather than each paper standing to serve some purpose alone; this is something we wish to avoid.

One change that will make the ordering clearer, however, is to present the differences between GA3.0 and GA2.0 before describing GA3.1. This would flow better, as essentially it would be: "This is GA3.0; this is how it differs from GA2.0; this is the branch configuration GA3.1". This will also help to emphasise that GA3.1 is not part of the "trunk" of the configuration development path. We will make this revision for the resubmitted document and hope that this will satisfy the reviewers and the editor.

Comment: *"There is, in fact, very little science content in the manuscript, which make it less valuable than it could . . . "*

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Reply: We refer the reviewer to the topical editor's comment EC C599:

"... the authors may reconsider the appropriate balance of description and model results. Personally I think the balance is good, but, of course, more in depth verification/validation may be included if it is beneficial to the paper as a whole."

The problem presented here is summed up by the first reviewer as trying *"to balance the relentless march of model development ... with the need to produce traceable results from the model"*. To illustrate how relentless this march is, at the time of writing this response on a paper describing Global Atmosphere 3.0, we have already "closed the gate" for new science changes to be tested for inclusion in the Global Atmosphere 4.0 configuration, which is due to be frozen in less than three months' time. A full process-based assessment of the performance of the configuration is an important part of the model development cycle, but we believe it to be beyond the scope of this model description to present the results of that assessment. Results of these assessments may be presented elsewhere.

We do agree with the reviewer, however, that it may be desirable for this type of paper to present *"1-2 highlights, analysed in terms of processes"*. Whilst we believe that it is too late to include such highlights in this model description, we will endeavour to include something similar to this in descriptions of future configurations.

Comment: *"the only substantial issue I have with this manuscript, which I think must be addressed, is the seemingly contradictory intention of aiming for a seamless approach, but ending up with the 3.0 / 3.1 dichotomy. It is unclear, throughout the discussion, why certain changes are needed (e.g. lumping up tiles at the land surface, with a questionable methodology) in order to obtain better results in NWP mode. I have found this part of the manuscript quite poor and confusing: yes, results seem better, e.g. in Fig. 9, but is it for the right reasons and, if reasons are valid, does this not deny then the entire idea of having a single model for all applications? If no clear rationale for the co-existence of these two versions (3 and 3.1) can be presented, I think that the entire*

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discussion of 3.1 should be removed and left for a future publication, when reasons become clear."

Reply: In answering this question, we admit that the definition of the branch configuration GA3.1 was made solely as a pragmatic choice to allow a "Global Atmosphere"-based configuration to be implemented operationally in our deterministic NWP suite. The small set of differences between GA3.0/GL3.0 and GA3.1/GL3.1 already existed between the previous climate configuration (GA2.0) and the equivalent operational NWP configuration; we simply persisted with these differences in GA3.1. The point we would stress is that Global Atmosphere 3.0 is the Met Office's first attempt at developing a truly seamless model configuration. Whilst the operational implementation of GA3.1 means that we have not yet fully adopted this, we have moved to a seamless development process. Future developments are made on top of the GA3.0 "trunk" and not GA3.1 "branch", with the aim of removing the need for such "branch" configurations in the near future.

The description of the above was the aim of the first paragraph in section 4. We will redraft the text to better justify the decisions taken and to discuss why the definition of a single "trunk" configuration is still important. We believe that in combination with the revised ordering of sections 4 and 5 discussed above, that this will address the main concerns of the reviewer.

3 Reply to minor points

page 1227: *"[Section 3.6] is hard to follow."*

Reply: We will redraft this section to make it both more accessible and concise.

page 1227: *"There is a typo on line 24 of that same page"*

Reply: Please could either the reviewer or topical editor expand on this comment as

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we are unable to identify the error in question.

section 4: *"The entire first paragraph . . . has really no content: it starts with "we believe" and then provides no useful information about model formulation. I would shorten it and leave space for the subsections."*

Reply: We refer the reviewer to our answer to the last point in the previous section. We believe that an introductory paragraph is required to justify the existence of the *"3.0/3.1 dichotomy"*, but acknowledge that this should be rewritten as discussed above to be clearer.

Interactive comment on Geosci. Model Dev. Discuss., 4, 1213, 2011.

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