

Dear editor,

Thank you for accepting our manuscript.

We updated the code and data availability statement to clarify how the different code versions relate. The full model code presented in the paper is based on the release 0.3.1 (GitHub) with added GPU support which is currently not part of the development releases. Furthermore, minor bug fixes were back ported to properly run the new case, thus version 0.3.1b. The standalone dynamical core with the different GPU implementations is also part of the Zenodo release. To highlight the corresponding versions in the Gitlab repository, we added tags to the relevant commits.

The final comments of the reviewer have been integrated into the final version of the manuscript:

*Reviewer: Line 12: Line starting with additionally. I would either add a short conclusion on the study of the higher order numerical schemes as it is done with the numerical precision. Otherwise, I would leave this out.*

We left out the first part on higher-order discretizations.

*Reviewer: Line 15 cyrospherre = cryosphere*

We fixed the typo.

*Reviewer: Line 19: This refers to the atmospheric models? Maybe mention that.*

We clarified in the text that this refers to all Earth system components.

*Reviewer: Line 77 – 84 This looks like something from a summary, discussion or abstract. Consider to move it*

We decided to leave a summary of the results in the introduction to provide the reader with a teaser of the conclusions he can expect.

*Reviewer: Line 100: This starts as a general “often” and becomes specific with namely. I would rephrase to say that “here the mEVP solver is used” instead of namely (or something like that). There are other flavors of the solution than the mEVP.*

We adapted this as suggested by the reviewer.

*Reviewer: Line 475: Without having read the two references, then the lower computational efficiency will lead to reduction in e.g. number of iteration, resolution etc. Then it is not sure that the total solution is better despite that the higher order solver seen isolated improves the solution. This is also discussed in the conclusion (line 584 – 585).*

We added a comment to clarify the point.

*Reviewer: Figure 10+11? Is it correctly understood that section 3.2 close the use of oopenMP/openACC for GPU but not CPU's?*

Yes, as discussed in Sec. 3.2 in our manuscript, OpenMP/OpenACC were not usable for us on the GPU.

*Line 512 (continuation of point before): This is mentioned below. It seems to be the GPU version of Kokkos that is faster not the CPU version. I would soften this and state that the gpu*

We clarified that the GPU version of Kokkos is meant.

Best regards,

Robert Jendersie, on behalf of the authors