

I would like to thank to the authors for revising and improving the manuscript. The revised manuscript has become much more persuasive to show the benefit of the suggested grid refinement method.

Most of my concerns have been resolved. I think that the revised manuscript is worth publishing after minor revisions (e.g grammatical correction, revising figures for readability etc).

* L510: "we note that the baroclinic instability of the real atmosphere is much smaller than in the initial state of the JW test..."

-> "instability is smaller " appears to be grammatically strange.

For an example, "we note that the disturbance growth due to the baroclinic instability in the real atmosphere is much weaker than in the initial state of the JW test..."

could be an alternative. (However, I am not an English native speaker, so, I leave it to the authors and editor's decision.)

*L563: "On the other hand, this test has shown the ability of the child-to-parent feedback mechanism to have a small but noticeable positive impact on the quality of the nest interface conditions."

-> I interpret that "positive impact on the quality" is corresponding to representing leeward propagation in the R2B11 parent domain more consistently with the R2B12 reference run, than that in the R2B11 without nesting. If my understanding is correct, the author could write down that more explicitly around L560.

*In Figures 13 and, 15, which are newly added to the revised manuscript, boxes showing the nested domain or boundaries of the interpolation zone could be plotted for readability, as in Figures 4, 6, and 7.

For the author's responses below, although my suggestions have not completely been reflected to the revised manuscript, I understand that the author's thought and agree with the responses. I understand that one of the main scopes of this manuscript is describing the two-way nesting including multi domains / multi levels as a grid refinement method for ICON.

(my comment) L388: The multi-nesting using the recursive approach sounds interesting, however, the rest of this paper does not present any results from the multi-nesting experiments. Section 2.4 should be shortened and moved to Section 4 as future work, or

should be moved to Appendix.

(author's response) In Section 2.4, we pointed out more clearly that multi-domain same-level and multi-level nesting is not an envisaged feature for the future, but that this feature is already implemented and used by the ICON community. What is, however, missing so far is a comprehensive technical description of this feature, which is one focus of this paper. An example of multi-domain same-level nesting is already given as part of the baroclinic wave tests in Sect. 3.1 (see Fig. 4e,f). Regarding multi-domain multi-level nesting we added a recent reference, where mountain-wave induced PSCs are simulated using a global ICON(-ART) configuration with three successively nested domains (Weimer et al.,2021).

(my comment) L610: I suggest that the authors write down possible future works or plans of this study in the end of Section 4. Propagating the impacts of the two-way nesting downstream is the interesting and gives important implication. This finding implies the possibility of another nested domain upstream from the EU region for improving medium-range forecast over the EU region. This point could be a future prospect of this study in addition to multi-ways nesting described in 2.4.

(author's response) We feel that discussing upcoming upgrades of our operational system would be beyond the scope of this paper, the primary purpose of which is to document the nesting implementation in ICON. Actually, we are preparing a horizontal resolution upgrade from 40/20 km to 26/13 km in the ensemble part of our system, and a vertical resolution upgrade from 90 to 120 levels in the deterministic as well as the ensemble part. We also considered extending the nested domain over the Atlantic towards the American coast, but the cost-benefit ratio of this change turned out to be not as good as for the general resolution increase. This is consistent with the widespread experience that the benefit of higher model resolution comes to a large extent from better resolving the orography, implying that the impact is more pronounced over land than over oceans.