Authors' reply to editor's comments

We would like to thank the Editor for the detailed comments. We are confident that we have addressed the comments (**bold**) in the revised version. Below we provide a point-by-point response.

Overall, the manuscript is in good shape and has addressed the comments of the reviewers well. Nonetheless, there are several minor improvements to be made. Two relatively general comments are given here:

- Section 2.6 and Appendix A are both a bit strangely introduced in this text, and I think Section 2.6 doesn't belong where it is. Mainly the phrases "Data request for ice sheet model output" and "The requested data" are a bit strange, as this section is intended to describe the data that is available and has been produced in this study right? There has not been a request from someone yet, or the request already happened internally within the group of contributors. Maybe reformulate to "Data availability" and "Data from this study consists of ...". More broadly, I would change current Appendix A to A.1, and move Section 2.6 to Appendix A.2. Reformulate without the phrase "request" anywhere, or make it clear that this relates to the internal requests within your consortium, it is not a current request to the community.
We have integrated information from 2.6 into section 'Data Availability' and reformulated other passages mentioning "data request". We have also revised Appendix A to make it clearer.

- Second, in regards to possible future work with this ensemble using an emulator, in this work I think it is appropriate to avoid referring to a concrete emulator or study, as none was described here. There are a few comments along these lines below.
OK

Along with these general comments, please find additional specific comments for minor revisions below. I look forward to a revised version of the manuscript.

Specific comments

L19-23: These first three sentences are a bit redundant and confusing. Is the study presenting the projections or making use of them? I recommend revising for clarity here.
OK, shortened and reformulated.

L22: The focus is on providing → Here we provide
OK

L25: Consider deleting "some of the"
OK

L53: ice sheet scale → ice-sheet scale
It seems both spellings are possible. We prefer the version without hyphen, consistent with our preferred spelling of "ice sheet model", "ice sheet geometry", …

L56: ice sheet projections → ice-sheet projections [etc, check throughout]
Same as above

L69: it requires statistical tools → statistical tools are needed
OK

L96 (equation): I am a strong proponent of following mathematical notation conventions in equations, which means e.g. 1 letter per variable, subscripts, etc. I would suggest reformulating this equation in this way. For example, I believe $a(x,y,t) = a_\mathrm{ref}(x,y)+a_\mathrm{anom}(x,y,t)+\frac{da}{dz}(x,y,t) \cdot \Delta z(t)$ would a clearer way to write this equation. Greve and Blatter (2009) use "a" for the accumulation-ablation term (ie, SMB), or Cuffey and Patterson (2010) use "b" for balance. I realize you may want to keep consistency with e.g. ISMIP6 and past work, so I would not consider a change mandatory. But I think it would improve readability here and then throughout the text.
As suspected, we would like to keep consistency with ISMIP6 and other recent work and have kept the less formal equation.

L106: kappa → κ
OK

L145: in familiar format → in a familiar format
OK

L245-246: "one statistical downscaling method" ← Earlier it was stated that this would be considered as an RCM (L117-118). Make sure to frame this consistently throughout the paper. Perhaps the statement can be rephrased on L117-118 to simply say it can be considered similar in capability to an RCM in terms of the forcing it provides, if you want to continue to refer to it separately.
We have used the suggested formulation in L117-118 and adapted the text elsewhere. We believe it is clear from that point on that descriptions stating 'RCMs' include the statistical downscaling approach even if it is not a formal definition.

L256: to continue downscaling → of further downscaling of [or] of continuing to downscale
OK

L287: from the beginning a modelling strategy → a modelling strategy from the beginning
OK

L302: choices to cover → choices, intended to cover
OK

FIgure 6: There is an inconsistency between Figs. 5 & 6, namely that in Fig. 5 it is clear that the VUB-GISM simulations gives higher and indeed the maximum SLCs by 2100, but in Fig. 6, NORCE-CISM is systematically higher and represents the maximum. I understand

this is because Fig. 5 shows a particular subset. Would it be possible to add something to Fig. 6, to identify those simulations that were plotted in Fig. 5? Perhaps a vertical grey line behind each symbol that is associated with Fig. 5?
We believe this comment is similar to an issue raised earlier by a reviewer for what is now figure 7. We have addressed it in a similar way by distinguishing symbols for the extreme kappa settings in figure 6. We have also modified the caption for figure 5 to more clearly indicate that it illustrates a subset of experiments.

L334-335: I would suggest listing the (a), (b), ... before the item, so (a) ISMs, (b) RCMs, (c) scenarios and (d) CMIP iterations. This is more usual and eases readability. Or better, remove, the (a), (b), ... entirely, since this really about the figure, right? This ordering information is contained within the caption of the Figure itself.
OK, removed.

L371: climate forcing. → climate forcing,
OK

Figure 9: This figure should be improved significantly. Currently it relies heavily on the long programmatic x-labels to inform the reader of what they are looking at. First I would suggest, keeping one shared y-axis throughout. But rather have the lower 1/3 of the axis spaced evenly from 0-250 mm, then the upper 2/3 of the axis could show values from 250-3000mm. Then I would include some kind of light shading grouping the experiments together, as far as I can see, this is first by scenario, so groups of [ssp585-o2300, ssp126-r2300, ssp245-r2300, rcp85/ssp585-r2300, ssp585-x2300, ssp585-e220], with the latter group set to one side since it is further distinguished from the others. The shaded bands could have text labels directly or a corresponding legend. Then the x-labels could simply be comprised of the climate model and the choice of regional downscaling. This would be one solution to improve this figure.
Thanks for the suggestions. We have updated the figure largely along those lines. Instead of different vertical scaling in the lower and upper range, we have opted for a logarithmic scale throughout.

L398: less ISMs → using a subset of ISMs
OK

L398: due to additional → due to the incorporation of additional
OK

L402: the subsequent → possible future
OK

L415: is dominating → dominates
OK

L419: we have explored here in addition → we have additionally explore here
OK

L430: source of uncertainty → source of uncertainty on this timescale
OK

L432: going to 2300 → going to 2300 or even beyond
OK

L437-439: This sentence needs to be revised. Consider reordering the sentence, something like "Combined, these results indicate that modifications to the ISMIP6 forcing protocols and new methods to account for a changing ice sheet geometry are needed for robust standalone ice sheet simulations well beyond year 2100".
OK

L443: provide the emulator → provide an emulator
OK