

General comments:

The authors have made a good effort to improve their manuscript and responded to all my points in my initial review. Particularly I appreciate the inclusion of an extensive discussion that clearly helps the reader to put the findings in the right context. I still have a number of remaining issues, which should be addressed before this manuscript goes in print.

Main points:

1. Mass balance for both GrIS and AIS (follow-up of my initial point 5)

I am not fully satisfied how the authors present their findings (in figures and text) on mass balance changes for both the GrIS and AIS. Although the authors have added some valuable information to the respective figures (Fig. 4 & 8) I still have the feeling that these figures should be created in a way that the reader can see very quickly which terms are the dominant ones for the mass balance changes of the two ice sheets. In particular, in Fig. 8 I have difficulties to figure out what are the dominant processes contributing to the mass balance of the grounded ice sheet and I think this should be revised accordingly.

Specifically I request:

1.1 Please state for both ice sheets what exactly goes into your calculation of the mass balance, so the reader can understand the whole budget. I think this goes best with showing all terms of the budget as a formula. For Antarctica, make clear how the mass balance of the grounded ice sheet connects to the mass balance of the ice shelf.

1.2 As usually done for a budget, all terms of the mass balance should be expressed in the same quantity (in Fig. 4 & 8) – currently you are mixing m/yr (water equivalent) and m³/yr which is confusing.

1.3 In Fig. 4 you show calving flux as a “positive” quantity although I have the understanding that increased calving leads to a decrease in the mass balance. Please clarify this e.g., expressing the budget as a formula (as suggested above).

2. Section 5.3 (Antarctic ice sheet) still could be improved

I still feel that the writing of this section could be improved as it is quite hard to read. For example you list a lot processes that you find not to be of crucial importance for the LIG decrease of the AIS before you actually describe the main processes that are driving your mass balance changes. Connected to point 1 I would prefer to have a more systematic description of the mass balance changes.

3. Sea level rise as main driver of WAIS retreat

Connected to a comment by Reviewer #4 which you have not really addressed in the revised manuscript: how should one understand that the majority of the LIG sea level high stand (coming from the WAIS) is triggered by a prescribed sea level increase? Is this kind of a positive feedback mechanism that any sea level rise (from whatever process) leads to an additional sea level rise from the WAIS? Please clarify in the manuscript.

Also in I think you could improve your message (for example in the abstract and conclusions) explaining how the sea level rise does lead to a WAIS retreat as currently you just say that the ice shelf viscosity is reduced but not how this explicitly relates to a melting of the ice sheet.

4. Extend the possible improvements

I generally like the section 6.6 about possible improvements. I think it should be extended by a discussion of the steps that are needed to come up with a fully-coupled simulation with more “predictive” skill than your current approach (e.g., using an “internally” sea level also for the ice sheet models etc.). Also neither in section 6.5 nor 6.6 you give some insights whether there are remaining issues to be improved in terms of ice sheet processes (i.e. the representation of ice sheet dynamics in models)

Minor points:

1. Consistently use “present-day” or “present day”
2. Same as above but for “fully-coupled” and “fully coupled”
3. Line 246: This sentence is somehow confusing: the low scaling factor does not lead to the smallest minimum ice sheet.
4. Table 1: description of the simulations “Forced high” and “Forced low” is confusing. I assume that e.g., “Forced high” is forced with climate output from “High” and equivalently “Forced low” uses output from “Low”.
5. In Fig. 4 and the description of it in section 5.2 you describe that Greenland accumulation (Fig. 4b) increases with warmer temperatures (Fig. 4a). But why does the accumulation remain at a high level towards the end of the LIG (120-115ka) when temperatures decrease again?
6. Similar issue as in the point above but for Antarctic accumulation and temperatures (Fig. 8a,b)
7. Fig. 6: Please give a reference for the source of the ice core temperature curves (incl. the uncertainty estimates)
8. Introduce “SO” as abbreviation for “Southern Ocean” at the first instance in the text.
9. Consistently use the “NH” and “SH” abbreviations
10. Since your experimental description is quite lengthy (for good reasons) it would be good to remind the reader of the goals of the study at the beginning of the results (section 5). Make again clear that the focus lies on the comparison of different experiments to show the importance of the fully-coupled approach rather than expecting the “reference” simulation to compare perfectly with observed/reconstructed data.
11. Lines 394-396: Please rephrase this sentence.
12. Line 547: Rasmus et al., 2016 should read Pedersen et al., 2016