

I have now reviewed the paper by Rückamp et al. for a second time. In the first and second round of reviews major revisions were suggested by the reviewer(s). I have gone through the author's rebuttal letters and the revised manuscript and can say that the manuscript appears greatly improved to the previous round. All of the major scientific points raised by the reviewers have been appropriately addressed. I have only a couple of minor scientific points that I would like the authors to address (see list below). In addition, I would like to urge the authors to go through the manuscript with a fine brush to iron out any language lapses. I am listing below all I could find, but it is quite likely that I missed a few.

### Scientific comments

1. On page 5 in the paragraph lines 16-22, you are saying that SEMIC provides annual mean surface temperatures. Are you using these temperatures as a Dirichlet boundary condition at the surface for the temperature equation or are you using the near-surface temperatures from the GCMs? If the former, how do you account for intra-annual temperature variabilities? If the latter, do you correct the temperature for the height difference between the GCM and ISSM? Please clarify!
2. I am also still missing what kind of boundary condition you apply at the base of the floating parts for the temperature equation. I suspect that no matter what you specify there, it wouldn't affect your results much, but for completion it would be nice if you could add this piece of information to the second paragraph on page 10 (I think I would set a Dirichlet condition to the local pressure melting point temperature).
3. Could you add somewhere in the inversion section, if you use any sort of regularisation (e.g. Tikhonov?) in your basal friction coefficient inversion? If so, how do you estimate the optimal parameters for the regularisation (usually done with an L-curve analysis but this might be a bit expensive for your advanced initialisation method)? If you do not use regularization, how do you ensure that you get a smooth velocity field?

### Specific comments

I am noting all typos and grammar issues I found but the authors need to go through the manuscript with a fine brush and give it a good workover in terms of language style in general. Also I am not sure what the ESD policy is on whether North American or British spelling should be used, but in this manuscript it is mostly a strange mixture e.g. coloured (BE), but initialized (AE).

Throughout the manuscript it is **sea level**, but **sea-level rise**.

P1L5 approach between = approach of

P1L7 Just to check, are citations allowed in the abstract? I don't find it necessary here as you cite Krapp et al. 2017 later in the text.

P1L13 Here and throughout spatial-integrated=spatially-integrated

P1L12-14 please replace “never falls below zero” with something along the lines of “SMB remains positive”. Also “a recovery of SMB towards values of slightly below present day” is a bit too general for my taste. You have to know that the SMB is positive for Greenland to understand this. This is OK for the main paper where you give numbers, but if the SMB for the whole ice sheet was negative, this sentence would sound strange. Why instead not write that SMB “decreases in the latter half of the simulation period reaching values similar to present day”?

P2L1 This sentence makes no sense. Are you trying to say that Greenland’s contribution to global sea-level rise has been 20%? Please rephrase.

P2L2 delete “to global sea-level rise”

P2L4 Nerem et al. 2018 show only that SLR is accelerating, but not why. Please use a different reference.

P2L6 keep a global = keep the global

P2L19 by that time = by 2100

P2L19 by 2000 and ... should that not read 2100?

P2L26 delete “abated”

P3L6 add at the end: “, which is employed/used in this study.”

P3L6-7 delete “by means”

P3L16 make sure you introduce the acronyms at first use. You don’t seem to introduce them in the abstract. Please make sure this conforms with the ESD guidelines.

P3L30 delete “very”

P4L1 based on reconstruction. What reconstruction?

P4L10 parentheses around SMB missing

P4L16 from available energy = from the available energy

P4L31-P5L1 MIROC5 also exceeds this threshold according to Figure 1

P5L3 it stabilizes= temperatures stabilize

P5L9 delete second “the”

P6L8 parameter=parameters

P6L13 delete “However”

P6L18 still lacks details and quality compared = still lack details compared

P6L21 differs up to = differs by up to

P6L21 full stop after 200 Gt a<sup>-1</sup>

P7L20-21 Delete sentence starting with “This one way coupling ...”. You have said this before.

P7L28 delete focusing on negative emissions

P7L30-31 Delete sentence starting with “As mentioned before ...”. You have said this before.

P8L13 delete “over the year from SMB”

P8L22 below the magnitude of present day = present day magnitude

P8L27 among the models is rather similar = is rather similar among the models

P8L29 agrees well to = agrees well with

P8L31 delete sentence. Try to avoid hollow statements like this.

P8L32 change sentence structure to read: "For the available RACMO2.3 time series and the SEMIC-GCMs we have computed the interannual SMB variability.

P9L7 year missing from citation

P11L13 please write out approximately here and throughout

P11L18 remove parentheses around Rignot and Mouginot citation

P11L20-24 Out of curiosity, can you restart ISSM simulations from different 3D unstructured grids? Is there a routine that interpolates these fields between the meshes?

P13L16 I am not a native speaker, but I don't think I would capitalise compass directions unless I talk about a specific region e.g. Western Rockies. But I leave this up to the editor.

P14L11 less=lower

P14L23 experienced = experiences

P14L24 change to something like "mass loss from a decline/less positive surface mass balance"

P16L12 change to "response is different across all models"

P16L16 delete "abated"

P17L12 whether=neither

P18L12 change to "Despite all three GCMs being based on ...."

P18L13 instead of considerably large, please give a number and avoid such vague language.

## Figures

Figure 4 Is there a solid black line in the upper panel? Might be worth it to bring the black line to the front in both panels.

Figure 5 alls = all.

The thick solid lines show 30-year moving means. (all lines are solid in this figure!)

Figures 7 & 8 Why are the fields from IPSL so patchy? Is this a resolution issue?

Figure 9 In caption: how can this be observed velocities if HadGEM2-ES was used? Can we also have different colourbar labels? They look odd.

Figure 12 Caption change to: The solid black line indicates ...

Best wishes,

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