

Dear Editor and Reviewers,

We would like to thank you and the reviewers once again for your constructive feedback on our manuscript. We have addressed **all** remaining requests from Reviewer #1 (see point-by-point below), and also explain below why we are unable to address Reviewer #2's suggestion. We hope this version of the manuscript is now sufficient for publication.

Reviewer 1:

The revised manuscript has been largely improved by the authors and I only have technical comments on this new version:

L20: 'Our study' instead of 'or'

Thanks for catching this.

L78: Please be more specific than 'ice change', i.e. 'ice and firn thickness change'

We now say "Measured height changes reflect the (solid) ice thickness change and the changes in air content within the firn layer"

L82: 'those processes deemed most relevant to glacier studies', can you enumerate those relevant processes here?

We now say: "GEMB is run as a module of NASA's open-source Ice-sheet and Sea-level System Model (ISSM). It is a column model (no horizontal communication) of intermediate complexity, simulating thermal diffusion, shortwave subsurface penetration, meltwater retention, percolation and refreeze, effective snow grain size, dendricity, sphericity, and compaction."

It seems that the revised figures have not been included in the revised manuscript? Please check that the figures presented are up to date.

We have updated the figures.

Figure 5, right panel: The ice shelves are not labelled?

We have added labels for each ice shelf: Pine Island, Thwaites remnant, Thwaites calved, Crosson, and Dotson

Figure 6: The black line is still on the inset map?

We have removed the black line.

Figure 9: This figure has not been changed, though the authors had agreed to change the size of the green vectors and add the date of the grounding line?

We have increased the size of the vectors, changed their color to white for clarity, and added the following text to the caption of the figure: “grounding lines compiled from InSAR measurements taken from 1994 to 2009 (Rignot et al., 2011).

Reviewer 2:

Dear Fernando Paolo and co-authors,

I think the revised manuscript is a nice re-worked version of the original manuscript which absolutely IMHO increased the readability. Moreover, I would like to thank the authors for their effort to make the code much more accessible. I personally think this is great for open science!

Since the authors did not do a comment-by-comment response to the reviews, I have however checked some of my original comments and repeated one important (rephrased) comment below. I do suggest that addressing this comment is potentially important, but I leave it at the editor's decision to decide if it is absolutely needed or not

Comment: the authors currently attribute the change in thinning rates to two main causes: i) changes in ice flow and ii) changes melt rates (as the remainder of flow+SMB). However, the relative contribution of each factor for each ice shelf remains unclear (e.g., it is shown for only four ice shelves in Table 2). I really do think it will help the reader to much better see the broader perspective of the drivers if the relative contributions of flow vs melt would be shown for all ice shelves. I would therefore strongly recommend to add the relative contributions for the ice flow and melt and the change in thinning rates for all ice shelves. This could be done for example as extra columns in Table 3 and as additional time series in the revised Figure 14.

We agree that knowing the changes in ice flow of all ice shelves would be valuable additional information to know. Unfortunately, we do not have time-dependent

velocity data outside of the ice shelves presented in Table 3 (Pine Island, Thwaites, Crosson, and Dotson). In fact, we are not aware of existing velocity records for most ice shelves outside of the Amundsen Sea sector for the time period of our study. So we could not calculate the change in ice divergence for most ice shelves. We also note that Gardner et al. 2018 showed no significant changes in ice velocity for most East Antarctic ice shelves in more recent years, meaning that changes in ice divergence are likely a minor contribution to the overall thinning/thickening rate of those ice shelves.

Sincerely,

Fernando Paolo
and co-authors