Dear the reviewers:

First of all, we would like to take this opportunity to thank the reviewer for your constructive comments and relevant questions. By adding the answers/revisions to these questions to the revised version of the manuscript, we feel that the quality of the manuscript has been improved. A revised manuscript has been submitted, and all of corrections/modifications are only included in the revised manuscript for the sake of non-repeat. Extra answers to your concerns and questions are presented as follows.

Reviewer 1:

Comments

Review of Zhang et al.

I'm satisfied with the response provided by the authors and I think that the manuscript has clearly been improved. There is now a good discussion of the strengths and limitations of this new dataset, which I think will be greatly appreciated by future users. The metadata have also been corrected. I made a few minor comments below (the line numbers refer to the line numbers of the track-changed manuscript):

L12: Please state concisely what 'The sophisticated corrections' consist of here. This is too vague for an abstract.

Answer: Thanks for pointing out this issue. The corrections are intermission bias corrections. We shouldn't use sophisticated here. We have made relevant revision in the revised manuscript.

L124-127: You need to justify your choice of retracker here. You spend some time in the introduction (L56-61) to mention three different techniques to mitigate the effects of radar penetration so I think it would be nice to reflect on that and state what method you chose and why.

Answer: Thank you for the suggestion. We have justified in the revised manuscript.

L162: Do you have enough data within a 2 km grid cell to constrain the least-square fit during the ERS-1/2 missions?

Answer: Sorry to mislead you. In this study, the least-squares fitting was performed on a 2 km polar-stereographic grid, but not within a 2 km grid cell. For each grid node, all observations within 2.5 km of the centre of the grid node are used for the iterative least-squares estimation. This can ensure that the most grid node have enough data to constrain the least-squares fitting during each mission, including the ERS-1 and ERS-2 missions. We have made relevant revision in the revised manuscript.

L163: What ice sheet mask/delineations are you using? Please specify here whether you're using Rignot's, Zwally's definition or something else.

Answer: Thank you for the suggestion. In this study, we used the Zwally's ice sheet mask. We have specified it in the revised manuscript.

L178: I would add ‘at least 100 elevation anomalies in the 216 months of the 2003-2020 period are retained’ for clarity

Answer: Thank you for the suggestion. We have added it in the revised manuscript.

L191: ‘and then add them back to the EOF reconstruction results’ instead of ‘return them’

Answer: Thank you for the suggestion. We have made relevant revision in the revised manuscript.

L199: ‘can be calculated’

Answer: Thanks for pointing out this issue, and we have made relevant revision in the revised manuscript.

L267: ‘~~The i~~Ice velocity’

Answer: Thanks for pointing out this issue, and we have made relevant revision in the revised manuscript.

L277-279: I suggest moving this sentence at the end of section 2.4 as it belongs more to the methodology than the results section.

Answer: Thank you for the suggestion. We have moved it at the end of section 2.4 in the revised manuscript.

L398: ‘even when applying’

Answer: Thanks for pointing out this issue, and we have made relevant revision in the revised manuscript.

L399: I would be more specific ‘a small residual signal caused by the 2012 melt event and manifesting as a surface elevation increase signal is found in the merged time-series’. Can you quantify this elevation step in your time-series to give the user an indication of how small the signal is? You could calculate the elevation difference before/after summer 2012 for the ice sheet as a metric.

Answer: Thank you for the suggestion. We have estimated that the mean elevation difference before/after summer 2012 for the regions above 2000 m in altitude is about 0.16 m between the months before (January–June, 2012) and after (August–December, 2012) the extreme melt event, which is consistent with Slater et al. (2019) of 0.21 $\pm$ 0.09 m. And we have made relevant revision in the revised manuscript.

References cited in authors’ response:

Slater, T., Shepherd, A., Mcmillan, M., Armitage, T. W. K., Otosaka, I., and Arthern, R. J.: Compensating Changes in the Penetration Depth of Pulse-Limited Radar Altimetry Over the Greenland Ice Sheet, IEEE Transactions on Geoscience and Remote Sensing, 57, 9633-9642, doi:10.1109/TGRS.2019.2928232, 2019.