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Re: [Paper ID #tc-2022-199] High mid-Holocene accumulation rates over West Antarctica inferred from a pervasive ice-penetrating radar reflector by J. A. Bodart, et al.

Dear Professor Olaf Eisen,

Thank you very much for providing the additional minor comments and for accepting, in principle, our manuscript for submission to *The Cryosphere*. We provide a response to each minor comment in the below document, with your comments provided in italics and our response to them indented in green.

Attached to this response letter are two versions of the manuscript, one with tracked changes ('Bodart_et_al_2023_resubmitted_tracked') and the final updated version with all changes incorporated but not highlighted ('Bodart_et_al_2023_resubmitted'). We have also provided the Supplementary Information documents, one with tracked changes ('Bodart_et_al_2023_supplement_resubmitted_tracked') and the final updated version with all changes incorporated but not highlighted ('Bodart_et_al_2023_supplement_resubmitted').

With very best wishes,

Julien Bodart (on behalf of all co-authors)

Editor comments

Dear Julien & coauthors,

thank you for your revised version of your manuscript and the final response to the reviews. Overall, I find that you considered the issues raised by the reviewers sufficiently adequate so that I can in principle accept your paper for publication in TC. Nevertheless, I would ask you to still make some final changes which I list below. Page and line numbers refer to the pdf with author track changes (ATC1 including SI), which I also attach together with the comments.

Looking forward to the final revision & thank you for submitting to TC.

Thank you very much for the additional comments and for accepting our paper. We particularly appreciate the attention to detail brought to our manuscript by yourself as the Editor.

Minor comments

42: *"When isochronal and dated at ice cores ..." Something is missing here, e.g. "are available"?*

We have reformatted this sentence as follows: "When IRHs are isochronal and dated at ice cores, they can be used to determine palaeo-accumulation rates and patterns on large spatial scales"

55: *"at " -> "reconstructed from"*

Agreed and amended

56: *highlighting: I find this is too strong, as criticized by reviewer 2. I suggest to use "indicating"*

Agreed and amended

116: *"horizontally": I find this misleading, as they are almost never really horizontal, rephrase*

The word "horizontally" has been removed.

122: *power -> return power*

Agreed and amended

155: *shouldn't it be "to improve"?*

Agreed and amended

164: *compare "them" - missing*

Agreed and amended

180: *BBAS ???*

“BBAS” was the name of the survey, as odd as this may sound. We are not sure what it stands for as there is no record of this that we could find. However, BAS refers to this survey consistently as “BBAS”, so we have kept this as is in the paper.

184: *Should be 195 MHz, band 160–230 MHz, see Rodriguez-Morales 2014*

Agreed and amended

201: *Polar Stereographic should be indicated as PS somewhere, as you deleted the previous explanation. Otherwise axis labels are not explained.*

Agreed and amended

217: *190 MHz - see above: 195*

Agreed and amended

228: *model,*

Agreed and amended

235: *epsilon_a Should be the same as in eqn. (2)*

Agreed and amended

241: *Citation of BedMachine v2: the citation you provide is just one part according to the user guide (https://nsidc.org/sites/default/files/nsidc-0756-v002-userguide_1.pdf) which also asks users to do the following: "We also request that you acknowledge the author(s) of this data set by referencing the following peer-reviewed publication: Morlighem, M., E. Rignot, T. Binder, D. D. Blankenship, R. Drews, G. Eagles, O., et al. 2020. Deep glacial troughs and stabilizing ridges unveiled beneath the margins of the Antarctic ice sheet, *Nature Geoscience*. 13. 132-137. <https://doi.org/10.1038/s41561-019-0510-8>" I therefore ask you to add this reference, as this is what open access data and FAIR is living of and requiring to be sustainable.*

Strongly agree. This was added.

243: *provide a density here when introducing ice eq. for the first time for clarity. You do so only later in the manuscript.*

Agreed and amended

254/5: *from ... are based - fix grammar*

Agreed and amended. The sentence now reads “To quantify the suitability of the LLA which is used here to estimate our accumulation rate, [...]”

311: *1-2b-c: what does this refer to? Do you mean Fig 1, 2b, 2c?*

Yes. This was amended. Thank you.

351-355: *Please split sentence, very long.*

Agreed and amended

452: *add explanation of abbreviation for CD - central divide*

Agreed and amended

472: *You might want to add a short explanation on which side of the blue contour the values of D indicate more reliable results for the LLA, e.g. by referring to Fig. S1d.*

Agreed. We added “[...], whereby all values situated inside of this boundary may satisfy the $D \ll 1$ criteria and those outside may require re-evaluating with the use of multi-dimensional models [...]”

Code availability: consider the paper accepted, so you can publish

Thank you. The codes and gridded depth + accumulation are now on Zenodo. The DOI is attached and the reference for the dataset is provided in the reference list.

698: *which timeline to you refer to with “in due course”, i.e. when?*

Upon acceptance/publication; we are in the process of depositing the UTIG IRH on an open-access repository. We will update TC when the DOI is ready so that it can be included in the final version of the paper proofs.

700? *Frémand*

Agreed and amended

704? *consider it accepted and go ahead*

Agreed and amended (see reply to comment above)

Few comments in the supplemental material which are not listed here, see pdf for details (pages attached at the end of the main text).

Thank you. All additional comments in the Supplementary Material document were agreed and amended, as per your suggestions.
