

Response to the reviewer 1

Review 1

This manuscript reported a new compilation of a variety of surface mass balance observations (stake, ice core/snow pit, GPR, ultrasonic sounders), and made it freely available. The compiled data were checked through vigorous quantitative criteria, and thus the relatively reliable data are left. The authors described the features of this new data set, and compare it with previously published observed SMB datasets. They also made a comparison with ERA5 outputs to test the representativeness of the data set for estimating climatic models.

This compilation is a big and complex task, and the resulting data set represent a huge data synthesis effort, which will facilitate a lot of new studies, especially for Antarctic mass balance studies and validation of climate models, and will be well cited. The data set is also interesting for glaciologist, climatologists, geographer, and so on. In my opinion, this manuscript is well written, and deserves to be published. Before publication, only following minor comments needs to be addressed by the authors.

Response:

We are most grateful for the positive evaluation of our work by the referee.

1. This compilation needs many years of field work by the researchers from different nations, who provide the original data, i.e., the basis of the dataset. Therefore, their scientific contributions are indispensable for this study. However, future work probably simply cite the AntSMB dataset instead of the original studies. So provide the original citation information is important.

Response:

The original citations are included in the three data files of the dataset, which are available at <https://doi.org/10.11888/Glacio.tpd.c.271148>.

2. The authors mentioned a lot of Antarctic locations in the text, and some might not

easily followed by the readers. So a map with the mentioned locations should be included. Alternatively, this figure is provided in the supplementary material.

Response:

Thanks for your advice. We have added the following figure on the Antarctic locations in the supplementary material.

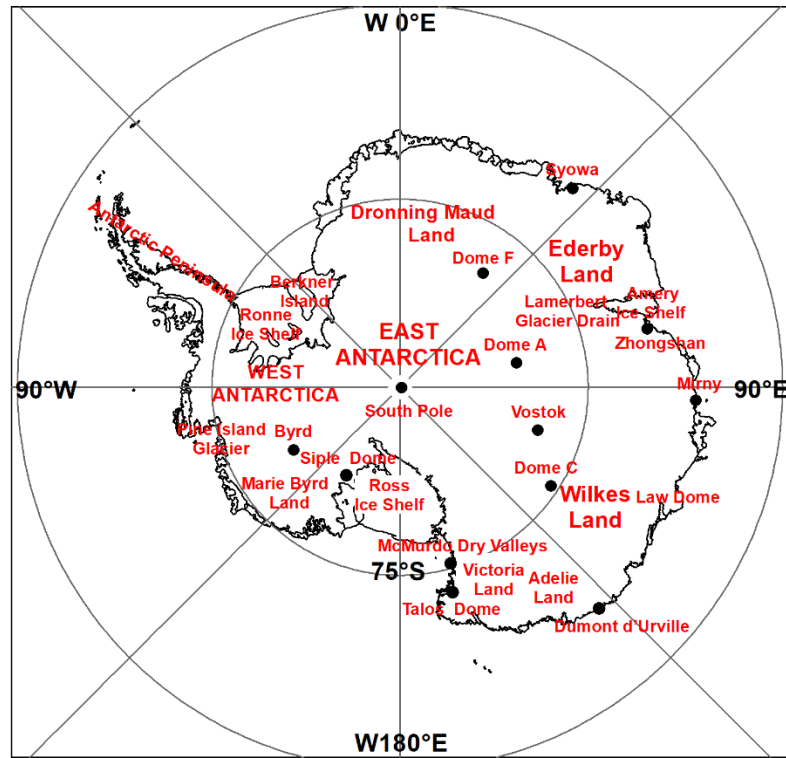


Fig. S1 Map of Antarctica showing the mentioned locations in the text

3. In section 4, I know that the inter-comparison between different types of SMB measurements in the same locations is helpful. But before making the inter-comparison, please clarify how or based on what did you select these locations? And where are they on Antarctica?

Response:

There are at least two types of SMB measurements at the same or near locations. They are mainly distributed near Talos Dome, along a transect from Terra Nova Bay to Dome C, on the western Dronning Maud Land, and at Dome F and Dome A. Corresponding changes have been made in the text, and the Figure captions.

Some other minor issues

Line 29: please update the reference

Done

Line 35: add the reference

Done

Line 44: add “the” between “ improve” and “ ice”

Done

Line 89 : “The remainder” is English formulation?

It has been changed as “the other records”.

Line 146: “100 kg m⁻² yr⁻¹” should be “ 100 kg m⁻² yr⁻¹”, and please use the same “unit” throughout the text. For example, in Figure 7, “kg m⁻² a⁻¹” was used, but use “kg m⁻² yr⁻¹” in the text.

Corrected throughout the text.

Line135-149: There is no any reference in the review on SMB measurements from snow pits/ice cores. Please add the related references.

The references have been added.

Line183: Change “which are composed of ” to “i.e.,”

Done

Line 206: This sentence is confusing, and please rephrase it.

This sentence have been changed as “*We converted the measurements to SMB for the subdataset by multiplying snow height changes by snow density estimated from Wang et al. (2015).*” Hopefully, it is now readable.

Line 310-311: Not necessarily, since it is due to the assimilation (or lack thereof) of satellite data, and these are mostly lacking before 1979, and thus please delete the sentence.

Following your advice, and the sentence has been deleted.

Line 320-375: please use italic “r” and “p”

Done

Line 375: Change “r2” to “r²”

Done