

Review on: How well can satellite altimetry and firn models resolve Antarctic firn thickness variations?

by Kappelsberger et al 2023

Thanks for implementing the comments, I think the manuscript reads much better now. I would like to see the following done/answered before publication.

Minor comments:

I believe that the abstract would be more robust if you could quantify some of your main findings.

The firn model from Veldhuijsen uses RACMO/ERA5 and the firn model from Medley uses MERRA-2, why different firn models and different reanalysis datasets? does that introduce extra uncertainty?

Consider merging sect. 3.5.3 with another section, as it is very short to stand alone

Consider merging sect. 4.4 with another section, as it is very short to stand alone

R-squared vs R^2 you use both in the manuscript like in sect 4.2.4 lines 308 and 319. Also you use R-squared in the caption of Fig 9. and R^2 in the caption of Table 3. Choose one for consistency

You write rmsm std, and psd with small letters but RCM, EOF, PCA, and SMB in capital letters, is there any reason for the difference?

Please go through all the figures again and make sure that they have units, if they are unitless that should be indicated, I have given some examples below.

Specific comments:

L269. Replace Fig 5 with Figure 5, as it is the beginning of the sentence. As per the submission guidelines.

L 323. Same as above

L 395. Same as above

L527, Is RACMO2.4 not a polar version? referred to as RACMO2.4p1

L540-545. Might be useful with a reference here, maybe this one, <https://www.nature.com/articles/s43017-023-00507-9>

Figures:

Figure 4 has no units on the y-axis nor does the colorbar

Figure 7d. what is the unit, if unitless it should be stated or indicated with (-)

Figure 10b. what is the unit, if unitless it should be stated or indicated with (-)

Figure 11d. what is the unit, if unitless it should be stated or indicated with (-)

Figure 12d. what is the unit, if unitless it should be stated or indicated with (-)

Figure 14. what is the unit, if unitless it should be stated or indicated with (-)

Figures S6 to S9 have no units on the y-axis

Figure S24. what is the unit, if unitless it should be stated or indicated with (-)

Figure S26. what is the unit, if unitless it should be stated or indicated with (-)

Figure S30. what is the unit, if unitless it should be stated or indicated with (-), also can the scaling factor be less than zero, since the colourbar has a minimum extension?

References:

The Firn Symposium team. Firn on ice sheets. *Nat Rev Earth Environ* 5, 79–99 (2024).
<https://doi.org/10.1038/s43017-023-00507-9>