

The Cryosphere Discuss., referee comment RC1  
<https://doi.org/10.5194/tc-2021-70-RC1>, 2021  
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## Comment on tc-2021-70

Anonymous Referee #1

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Referee comment on "Brief communication: Evaluation of multiple density-dependent empirical snow conductivity relationships in East Antarctica" by Minghu Ding et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-70-RC1>, 2021

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This study presents a reliable evaluation on multiple empirical, density-dependent snow conductivity model/schemes, with three automatic weather station records. Although the subsurface heat flux is relatively low compared with the other components of air-snow/ice interaction, but it is essential for controlling the upper thermal boundary condition of ice sheets. As I know, there is urgent needs on the studies with in situ measurements in Antarctica. The sites the authors chosen can represents typical climatical regions of Antarctica, and they also presented a clear vision for further study, thus the result is effective and have a wide appeal. Several issues should be addressed prior to publication.

Line 15: "appears" should be "appeared".

Line 27: Oldroyd et al., 20135?

Line 27: histories or history?

Line 37-39: "For example, the land model CLM and snow model SNTHERM use the empirical relationship developed by Jordan (1991), and is also adopted in other land surface energy balance and model studies, e.g., Wang et al. (2017)." This words should be rewritten.

Line 46-49: The paragraph can be simplified and merged with the previous part.

Line 60: delete "figure 1".

Line 66: what is the lowest air temperature at Dome A? is it colder than Vostok?

Line 66: you may mean "specific humidity" rather "humidity"?

Line 67: "There were no radiation measurements at the site".

Line 75: I noticed that Figure S4-S6 showed before Figure S1 and suggested modification.

Line 103: "relationships".

Line 144-145: it is unexpected that Ca2 performed much worse than Ca1, what is the reason in your opinion?

Line 148-149: "The 3 AWS sites in different locations in East Antarctica that we have used for our validation cover a large range of elevation and distance from coast" can be "the 3 AWS sites in the paper cover a large range of elevation and distance from coast."

Line 150-152: "We also urge for similar evaluations to be conducted at more geographic locations (e.g., west Antarctica Ice Sheet) where snow temperature and density observations are available." Should be deleted.

Line 168-216, Ensure the references format are consistent, such as line 194, 210, the publication years are different.

Line 216, check the name of author, "Yen Y C" instead

Figure 2: the results of figure 2 is duplicated with Table 2, thus I suggest to move one of them into supplementary material.

Table 2: It is better to adjust the order of sites as "Dome A, Eagle and LGB69", or "LGB69, Eagle and Dome A", which is similar with the figure 1. And this order is same with the introduction in "Results and discussions".

The grammar and writing in general is good enough for my understanding, but I am not a native English speaker, so I leave this issue to ED.

Please also note the supplement to this comment:

<https://tc.copernicus.org/preprints/tc-2021-70/tc-2021-70-RC1-supplement.pdf>