

Interactive comment on “Evaluation of the CloudSat surface snowfall product over Antarctica using ground-based precipitation radars” by Niels Souverijns et al.

Anonymous Referee #1

Received and published: 17 July 2018

This study evaluates the surface snowfall measured derived by CloudSat by comparing it with the product from ERA and Micro Rain Radar signals over Antarctica. The study brings valuable information to the scientific community to better understand changes in snow cover over Antarctica. It uses a combination of ground instruments, satellite and reanalysis data. It was found that CloudSat does not measure well snowfall because of the lower time resolution of passes of the regional whereas ERA covers the entire continent with 3 hourly outputs. The snowfall measured by the MRR is similar to ERA because it can capture single events as opposed to CloudSat. This study contributes to better understand the evolution of snow cover in Antarctica. Finally, the English and the clarity of some figures should also be improved.

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These are the specific comments/questions:

1. P.3, line 27-31: It would be useful to explain in an Appendix the choice of the Z-S relationship chosen and how it was compared to other available data used to measure snowfall at each site (other than CloudSat). Also, could you clarify in the manuscript how the 3 sets of data were compared? If I understood correctly they don't provide the snowfall information at the same altitude. For example, it is indicated in the manuscript that the lowest level where the snowfall is estimated by CloudSat is at 1200 m and the MRRs is at 300 m above ground level. I assumed that ERA snowfall is probably produced at the surface. How these differences affect the results of your study?
2. P.4, Figure 1: Could you add the name of the stations on the map with the acronym used in the text and other figures?
3. P.5, line 25, Please double check the guidelines for references. The reference should be (conforme Palerme et al., 2014) instead of (conforme Palerme et al. (2014)).
4. P.6, line 5, How is a snowfall event defined? Were they defined per day or per time period when snow accumulated at the ground (or at the lowest MRR level)?
5. P.7, line 16-26, there are 3 times “in order to get” in the same paragraph. It should be reworded.
6. P.8, Figure 3, It is surprising to see that the MRR misses many events detected by ERA. It should be further discussed in the manuscript. Also, a legend should be added to the figure.
7. P.9, figure 4, Is it possible to do the same figure from ERA and maybe CloudSat? It would be interesting to see how well they compare among each other if possible.
8. P.9, line 9, Should it be Fig 4 instead of Fig 7?
9. P.10, Figure 5: Add the title of the y-axis on the left column.
10. P.11, Figure 6: Add the title of the y-axis. Also, define omission and commission in

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the figure caption.

11. P.12, line 8: Delete “)” at the end of the sentence.

12. P.12, line 21, should it be “rates” instead of “numbers”?

13. P.13, line 22 and p.14, Figure 7: The dots on the figure represent each sample of data. Can you indicate how many samples for each dataset used?

14. p.15, Table 1: It could also be a barplot.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-111>, 2018.