

Interactive comment on “Wind-packing of snow in Antarctica” by Christian Gabriel Sommer et al.

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Comments on “Wind-packing of snow in Antarctica”

The paper studies the evolution of the snow surface in a study-site in Antarctica during which a snowfall was followed by a drift event. This led to the formation of a dune and heterogeneous conditions at the surface. The paper ultimately seeks a link between the location of the deposition and snow hardness which has previously been observed in a wind-tunnel experiment. Despite relatively inconclusive results, the paper uses original and new data and, all in all, brings valuable information on the topics of snow redistribution. This topic has received little attention despite its importance for the mass balance of the Antarctic ice sheet.

The paper is interesting but is too short and many details are missing which reduces its potential usefulness for the readers and for future investigations. The title and abstract

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also suggest a wide and comprehensive studies on the topic of wind-packing, but this is in reality only a case study, yet a highly valuable one. Adding the information about the campaign (in the Method section), that may be obvious for the author but are not for the reader, is necessary. This is detailed below in my specific comments.

The data analysis (Result section) is well conducted and flawless. Nevertheless, the conclusion about the relationship between hardness and location and worse between hardness and S_x is not convincing. The correlation is significant (under the assumption of normality) but very weak and seems to depend on a few points (that may be outliers, thus breaking the assumption). The result section overstates this relationship. In contrast, the discussion is fair, which leads me to suggest to rewrite the results section in a more neutral / factual way. Otherwise, it is necessary to further explore the statistical robustness using non-parametric indicator, randomization, etc.

The publication of the data in a public repository is announced in the paper. This is a good point but is not effective yet.

Specific comments:

- The title should be more precise and be closer to the actual content of the paper, such as “Investigation of a drifting snow event in Queen Maud Land, Antarctica”. Antarctica is wide and diverse, the location is important.

- The abstract needs more details about the location, season and should include some more quantitative information and results such as wind speed, typical annual accumulation, the duration of the observation (e.g. what is “subsequent events” ?). The abstract and title should make clear that the study is not universal.

P1 L18: “we” does not include the same authors.

P2L1-5: more detail is needed about the location, its climatic characteristics and the time scale of the experiment.

P2L15: “the cumulative mass flux.”. Starting time is needed.

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P2L19: Does it mean that both sensors are at different height , or the height changed over time during the experiment ?

Add information about temperature during the experiment which is very important for sintering.

P2L20: How many days?

P2L21: Please add information about the height of measurements, intrinsic precision and actual temperature versus operating temperature specified by the manufacturers. What maximum angle is used and surface area is scanned ?

P2L23: "About 450 SMP profiles were acquired" along 3 transects in ... indicate the dates / number of days.

P2L29: What about the perturbation of the snow ? This is why how frequent the transects have been measured is important.

P2L32: "We cannot calculate a time evolution of $S_x b$ ". This is not clear why. The description of the DSM data suggest the authors have all the necessary data.

P3L18: is it possible to show the DSM change map overlaid by SMP measurements (as in fig 3) ?

Fig 1. Panel A: Add transparency on black curve or use a thinner linewidth Panel C: Add transparency on symbols What about adding a graph with snow height variations estimated from DSMs ?

Figure 2B: The horizontal scale and vertical color bar are missing

P4L8-9: Are the date of acquisitions random with respect to the distance to tail ? What is the correlation and p-value ?

Figure 6: It seems that all the negative trend is driven by 6 points, over 68. To some extend, they seems to be outliers, not from the same distribution, which change the

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conclusion. Is it possible to identify the location of these points and explain what make them particular ?

P10: Do you think that the self-organized nature of the Antarctic case can be a cause of the differing results with the experiment ? Maybe add a comment on that.

L12 P10: It seems fair to cite Q. Libois et al. 2014 (doi: 10.1002/2014JD022361) as well.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-36>, 2018.

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