

2021-02-11

Submission tc-2020-269

Thank you for your submission to be considered for publication in The Cryosphere. The authors did significant amount of work to improve from the initial version of the paper.

I will provide here several comments that may help further polish the manuscript.

- In the revised version the authors suggest to move one appendix into the main paper in order to enhance the originality of the paper as well as complementarity with its companion paper. However, the appendix is mainly a list of equations which would, be in appendix. The authors need to clarify the rationale of what was used from the appendix;
- I believe parts of the introduction must be strengthened. For example, in lines 45-48 there is a statement on the use of satellite snow products being important for climate change study. This is rather general, which product and how are they used given that the following paragraph jumps right into SSA. There is a gap on true motivation and lingering uncertainties this paper tries to address;
- The addition of the SnowEx data on vertical profiles of snow grains lacks explanation at this stage. Grain size are reported in μm , but the SnowEx campaign included vertical SSA measurements. The sizes indicate to me a first half of the snowpack made from rounded grains, with some faceting near the bottom. Sizes displayed do not suggest depth hoar, but column are suggested (solco) in the habit fraction. Further details are needed on the linkages between 3 a and c, and the representativeness of a. Was a computed average of SnowEx profiles, or only one.

Minor comments:

- Improve quality and resolution of figures in general;
- The oscillations in Fig 2 and 3, also noted by one of the reviewers. The answer provided simply refers to the fact that it comes from the original database, but this does not answer the question. Perhaps a sentence to be added on why would avoid confusion.

Regards,

Prof. Dr. Alexandre Langlois

Associate editor, *The Cryosphere*