The Cryosphere Discussions

The Cryosphere Discuss., referee comment RC1
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Comment on tc-2021-53

Anonymous Referee #1

Referee comment on "Experimental and model-based investigation of the links between snow bidirectional reflectance and snow microstructure" by Marie Dumont et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-53-RC1, 2021

This study presents a new observational dataset and the corresponding model simulation to examine snow microphysics and its impacts on snow radiative properties. Such work is desirable and especially crucial for remote sensing retrievals and data assimilation over the snow-covered regions and is also critical for global climate modelings constrained by reanalysis data. The experiment is properly designed and the discussion is well presented. The reviewer only has some minor questions regarding the sample treatment.

Section 2.1:

- "S3 is taken from the same temperature gradient experiment as S2 except that it was turned upside-down so that the grain orientation is changed by 180." Why did you flip sample S3?

Section 2.1.1

- "a 7 cm thick snow layer was collected on a 60x60 cm2 styrodur plate after a snowfall close to the lab and stored for 3 weeks in isothermal conditions at -20 C (Fig. 1A)."

Why did the authors store the snow for 3 weeks before measurements? Would snow morphology alter during the storage time?

- "A vertical temperature gradient of 19.4 Cm−1 was applied inside the box with a mean temperature of -4 C". Could the authors provide more information on why pick this temperature gradient and -4 degree C? Was this tested in a previous experiment? If so, please provide some references here.