

## ***Interactive comment on “Brief communication “Application of mobile laser scanning in snow cover profiling”” by S. Kaasalainen et al.***

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This paper presents a novel rapid method to study snow surface roughness from a mobile unit. The authors obtain topographic maps with a mm vertical resolution over a path width of several tens of meter. These profiles can potentially be used for the validation of remote sensing retrieval algorithms, and also for the monitoring of changes in the surface morphology of the snow cover.

The method is interesting and appears reliable. There is sufficient innovation to warrant publication in “The Cryosphere”. I just wish to propose minor changes to slightly improve the paper.

1- Since the authors indicate (p. 2514, line 25) that the data obtained can be used for

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radar remote sensing and snow reflectance (presumably optical) modeling, it would be nice to mention what characteristics of the surface roughness are actually required for both aspects (e.g. size of features), and subsequently conclude as to how the data obtained addresses those requirements.

2- The instrument has a vertical resolution of about 1 mm. This is very nice. But since the instrument records 16 profiles per m (p. 2516, line 28), only one profile can be obtained every 6 cm. The horizontal resolution is therefore not on the same scale as the vertical resolution. Is that sufficient to detect structures likely to impact snow optical reflectance ?

Style and grammar.

The use of prepositions is often not adequate. Abstract line 2: replace “on” by “to”, line 4, replace “consists of” with “consists in”, line 7, replace “in” by “to”.

Use hyphens between grouped words, e.g. vehicle-based, satellite-based.

p. 2516, line 26: the increase in thickness

p. 2517, line 8: in representing the vertical mm-scale changes.

p. 2517, line 21: data can be acquired at distances up to 20-30 m.

Figure 2. How about an X and a Y scale ?

Figure 3. If I understand right, this profile is parallel to the trajectory ? the legend is misleading, at least to me. Please make the figure more legible and possibly increase the vertical scale.

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