

Review of revised manuscript:  
Monitoring of snow surface near-infrared bidirectional reflectance factors with added light  
absorbing impurities  
A. Schneider, M. Flanner, R. De Roo, and A. Adolph

General comments:

I think the authors present a streamlined and much-improved revised version of their manuscript. They also addressed in great detail the comments I had about the initial manuscript, which I appreciate. I only have a few minor comments regarding the revised manuscript (see specific comments below).

While the main focus of the manuscript has shifted (and the manuscript benefits from this), I would still encourage the authors to tackle a more detailed assessment of the snow SSA measurement uncertainties for their NERD in the future (as they seem to allude to in the final sentence of their conclusions). Unfortunately, such uncertainty analyses are still not always provided when a(ny) novel measurement technique is introduced, yet they can be highly valuable for the application of a(ny) novel measurement technique, especially when trying to interpret initially puzzling measurement results from both a qualitative and a quantitative perspective or for an inter-comparison of different measurement techniques or when comparing in situ measurements and remote sensing retrievals. For snow SSA measurements with the NERD, one crucial component that should be included in more detail in a possible future study is how the natural variability of snow at and near the surface and especially within the NERD measurement volume may affect derived snow SSA values.

Specific comments:

page 1 line 23: I do not fully understand the different expressions for sphere effective radius  $r_{\text{eff}}$  and  $R_e$ ; is one definition based on the ice surface area and the other one on the projected area? Maybe the authors could either briefly clarify the difference or only introduce one of the two effective radii here.

p.2 l.7, 9 and 12: I would suggest to remove the word 'accurate', because the usage of the qualifier 'accurate' should also include information on how accurate the measurement method is (i.e., accurate ... with an uncertainty of XYZ % or with an accuracy of better than xyz m<sup>2</sup>/kg, for example). If such information about the measurement uncertainty cannot be obtained or summarized easily, I would just leave out this qualifier.

p.4 l.2ff: To illustrate this point, the authors could provide the first figure that they included in their author response in a Supplement to the article or in a second Appendix section, or they could possibly cite a previous study that shows this shallow penetration depth of long-NIR-wavelength radiation in snow.

p.5 l.1: Is '1 nm' correct? This should probably be 1  $\mu\text{m}$  (or 1000 nm).

p.6 l.24: What is 'just a pinch' of BC? According to the caption of Figure 7, this seems to be < 1 g. I would suggest to add this value here as well: ..., just a pinch (< 1 g) of BC and 30 g of sand were deposited ...

p.10 l.8: Again, without further specifying 'accurate', e.g., a specific accuracy that the NERD aims

to achieve, I would remove 'accurate' and rewrite the sentence, e.g.: ... are needed to fully characterize snow SSA measurements by the NERD (technique). Further investigation ...

p.10 l.9: Similarly as above for 'accurate', I would suggest to remove the qualifier 'precise'. Alluding to 'quantitative uncertainties' already implies that the accuracy and precision of snow SSA retrievals will be the subject of the follow-on study.

By the way, I believe that such a study will be very valuable for the future application of the NERD and the interpretation of the measurement results.

Caption of Figure 3: Remove comma before droxtals.

Caption of Figure 6 + 7, and possibly in corresponding text of the article: I would suggest to replace 'standard errors' with 'standard deviations'.

Caption of Figure 7: Are the units of  $\text{gm}^{-1}$  correct, as in  $< 1 \text{ g m}^{-1}$  and  $30 \text{ g m}^{-1}$ ? Maybe I do not fully understand, but units of  $\text{g m}^{-2}$  would make more sense to me.