

AUTHOR RESPONSES TO REVIEWER 1 COMMENTARY ON TUTTON AND WAY MANUSCRIPT

The abstract promises “a new method termed snow characterization with light and temperature”, but while both parameters are measured, they are then analysed separately and the results from each approach compared. The temperature sensor is used in the light intensity method but only to determine snow-free days for the baseline calibration. The authors do acknowledge that they intend to develop a technique that incorporates both kinds of measurements in future work, but it would be good to clarify this up front.

[T&W response] We agree and acknowledge that the methods outlined in this manuscript prioritize light measurements and have revised the introduction of this method to clarify that this is an evolving method and the temperature consideration requires further attention. See tracked changes to the revised manuscript.

Introduction, line 30: “Unlike its liquid counterpart, snow is . . .” – I presume by this you mean by comparison with rain? If that’s the case, I think it would be better if you revised the sentence and explicitly compared snowfall with rainfall.

[T&W response] We agree with this comment and changed the wording to rainfall.

Introduction, line 35. I would suggest also making reference to the fact that snow does not lie evenly because of the effects of topography and wind (snowdrifts, sastrugi, etc), so extrapolating local or regional levels of snow cover from a single point measurement is very prone to errors. The development of a low-cost technique potentially allows multiple instruments to be deployed within a region of interest to get a more representative measurement of snow cover.

[T&W response] We agree with this comment and included the benefit of dispersed point measurements in the following paragraph.

Struggled to understand whether the interpolation discussed here between loggers on a single stake or was interpolation in time between logger readings. The explanation (it’s between loggers on a stake) doesn’t come until sometime later at the start of section 4.3, so it is worth a clarification here.

[T&W response] We agree with this comment and have clarified that the interpolation is along the x (time) and y (height along stake) throughout.

Results, line 183: “The first, which used changepoint analysis, showed small increases in snow accumulation from late-October to late-January...” – I presume that these “small increases” were relative to the non-interpolated method, but it would be good to have this clearly stated.

[T&W response] We agree that this phrasing is unclear and reworded it to simply describe the increasing snow cover at these stations using the changepoint method.

SUMMARY OF CHANGES:

- [1] Specifying the lack of temperature metrics in the method early and**
- [2] Revisions to phrasing and additional considerations to the significance of this method.**
- [3] Revisions to language to clarify methods.**