

Dear Dr. Vuyovich,

Thank you for the handling of this manuscript and facilitation of the review process. It has been a positive experience with the two reviewers to strengthen the study and its findings.

We have made revisions based on the recent comments of referee #1 and a further copy edit of the manuscript. We note referee #2 recommended the accept as is without further comment.

Below is a point-by-point response to the review of referee #1 including a list of all relevant changes made in the manuscript. Please see below our responses to [in blue](#).

Sincerely,

Dave Casson

On behalf of the co-authors

Anonymous referee #1 Suggestions for revision or reasons for rejection

Summary and Recommendation

Casson et al. have sufficiently resolved all comments and suggestions I made in the first round of review, and I find that the manuscript has been improved. I particularly appreciate the additional analysis with spatial snow remote sensing data (MODIS snow cover metrics and ASO SWE), which helps to resolve concerns about different spatial scales (model vs. evaluation data). I only have minor comments to offer (below) and otherwise recommend the article for publication in the journal.

We thank the reviewer for a second detailed review of the manuscript and the positive assessment of the study overall. Our addressing the comments is below.

Thanks for the second detailed review and helpful comments. They have strengthened the study, and specifically the spatial snow data analysis.

SPECIFIC COMMENTS

- L. 59: Missing space here, should be “resolve energy”.
 - [Corrected, thank you for catching.](#)
- L. 214 and L. 217: I suggest replacing “observations” with “estimates” at both of these lines since SWE is not observed directly. This would be more consistent with the convention in L. 216.
 - [Agreed and corrected.](#)
- L. 665: Should be “builds”.
 - [Corrected](#)
- L. 680-684: Here or elsewhere, you should acknowledge that the snow remote sensing data are not without error either. For example MOD10A1 snow cover has been shown to have some negative bias (Stillinger et al., 2023), which could explain why SCF is lower for MODIS vs. the SUMMA simulations in two of the three study basins (Fig. 14). What I

think is reassuring is that the year-to-year variations seem generally similar between MODIS and SUMMA.

- Very good point and nuance. This has been updated in the manuscript at Ln 50 and Ln 630 with the reference added.

• L. 695: Missing space here, should be “for land-surface”. I suggest the authors double check for other similar cases since this is the second case of a missing space.

- Updated, and the paper has been copy-edited to check for similar cases.

• L. 778-796: Add sentences for the MODIS snow cover and ASO data in the data availability section.

- Updated with the text as follows.

Snow in-situ observations are available in the the NorSWE dataset \citep{mortimer_2025_dataset}. Daily snow-cover observations were obtained from the MODIS/Terra Snow Cover Daily L3 Global 500 m product (MOD10A1, Collection 6.1; \citep{HallMODIS2021}) using Google Earth Engine. ASO SWE data was accessed from the NASA National Snow and Ice Data Center (NSDIC) Distributed Active Archive Center \citep{painter2018}.

FIGURES AND TABLES

• Fig 12: I see a gap in ASO coverage during 2017. To my knowledge, there were several more ASO acquisitions during the 2017 snow season (these data have appeared in other publications and public presentations), but I see now that these data do not seem to be listed at the NSIDC/NASA Earthdata site. You could consider requesting these missing data from 2017 directly from the ASO group or from NSIDC User Services.

- Thanks for identifying this. Given the scope of the current analysis of ASO data being limited, and basing analysis on publicly available data, we'll choose to proceed at this time with the data currently available on NSIDC.

• Fig. C1: In the title of panel (c), the text “regionalization” is cut-off.

- Thanks, updated

REFERENCES

Stillinger, T., Rittger, K., Raleigh, M. S., Michell, A., Davis, R. E., and Bair, E. H.: Landsat, MODIS, and VIIRS snow cover mapping algorithm performance as validated by airborne lidar datasets, *The Cryosphere*, 17, 567–590, <https://doi.org/10.5194/tc-17-567-2023>, 2023.