

The Cryosphere Discuss., referee comment RC2
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Review of "Spatiotemporal distribution of seasonal snow water equivalent in High-Mountain Asia from an 18-year Landsat-MODIS era snow reanalysis dataset"

Edward Bair (Referee)

Referee comment on "Spatiotemporal distribution of seasonal snow water equivalent in High Mountain Asia from an 18-year Landsat–MODIS era snow reanalysis dataset" by Yufei Liu et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-139-RC2>, 2021

In "Spatiotemporal distribution of seasonal snow water equivalent in High-Mountain Asia from an 18-year Landsat-MODIS era snow reanalysis dataset" a new daily snow reanalysis dataset is introduced covering all of High-Mountain Asia at ~ 0.5 km resolution. Overall, I commend the authors for this notable contribution. Creation of this 3.4 TB dataset is an achievement worthy of publication that will improve our understanding of the so called Third Pole and form a basis for comparison for future large-scale estimates of water stored in this region. That said, I have a few major critiques and some minor ones detailed in the attached annotated PDF.

Major:

- 1) I understand the need for a non-seasonal snow mask (based on the remotely-sensed snow cover constraint) but only examining the unmasked areas limits the utility of the analysis and makes the results difficult to compare with other studies. The authors should consider using the modeled melt instead of peak SWE, which should be valid over all the pixels, for the analysis presented in the results.
- 2) The authors acknowledge that missing snow cover observations due to clouds will cause higher uncertainty, but do not acknowledge the errors of omission and commission in cloud snow discrimination. These errors will lead to snow that disappears too early or that melts out too late. I'd like to see some discussion of how these errors propagate and are addressed.
- 3) Analysis of a spatial timeseries of the datasets show videos of the SWE as being

unbelievably smooth and therefore not representing ephemeral snow accurately.

4) Some of the snow albedos are way too low (e.g., 0.01).

5) As the other reviewer notes, in its current form this is a data paper but the submission is listed as a "Research article." Perhaps a journal such as Earth System Science Data would be more appropriate for publication.

Minor:

See attached annotated manuscript

NB 6/22/21

Please also note the supplement to this comment:

<https://tc.copernicus.org/preprints/tc-2021-139/tc-2021-139-RC2-supplement.pdf>