

The Cryosphere Discuss., referee comment RC1
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Comment on tc-2022-96

Yves Bühler (Referee)

Referee comment on "Assessing the seasonal evolution of snow depth spatial variability and scaling in complex mountain terrain" by Zachary S. Miller et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-96-RC1>, 2022

The paper entitled «assessing the seasonal evolution of snow depth spatial variability and scaling in complex mountain terrain» investigates the important question what spatial resolution is needed to capture the spatial variability of snow depth. It is well written, however in my opinion further information and discussion are needed to make it a helpful contribution for the scientific community. I recommend to discuss and extend on the following main points:

- The applied nearest neighbor resampling technique is in my opinion the wrong approach to resample the different snow depth maps. If nearest neighbor is taken, the value of the coarser resolution grid is the value that is located closest to the center of the new cell. If you go to coarser resolutions (0.5 – 20 m) this makes no sense as this value can be very random. I would propose an aggregation or a cubic convolution resampling.
- There are no figures illustrating the snow depth maps or the applied detrending. It would be important for the readers to see such figures here to better understand what is done.
- The motivation, why semivariograms are used, is not really clear. Are there other possible methods? If yes, a comparison of the results from other methods would be very interesting.
- The discussion is very much based on hard-to-understand metrics (Sill, Range etc.). I am missing a part where the discussion is on a level where the average reader can follow. What do these values mean discussed on examples, best illustrated with figures showing the snow depth distribution.
- The investigated site is very small and we do not know how representative this is. It is not clear if the findings that are presented are valid for further regions. We would have drone-based snow depth maps from sites in the region of Davos, Switzerland (also several dates in one winter) we could provide to check if the results are consistent in different regions.

I think with the proposed extensions, this paper can get a very valuable contribution for

the snow depth mapping community.