

Interactive comment on “Factors influencing spring and summer areal snow ablation and snowcover depletion in alpine terrain: detailed measurements from the Canadian Rockies” by Michael Schirmer and John W. Pomeroy

Anonymous Referee #1

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General comments

The objective of the study is to analyse factors which control areal snow ablation and snow cover depletion in a small study area in the Canadian Rocky Mountains. The analysis is based on very detailed maps of snow depth and snow depth differences obtained by several flights of UAV in one winter season 2014/2015. The results indicate that ablation rates differed in space and were mainly related to the spatial patterns of solar irradiance and albedo. The most important factor controlling snow cover depletion was the initial distribution of SWE, which was five times more variable than

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melt variability. The authors conclude that in near summer solstice conditions the snow cover depletion curves can be calculated only from SWE spatial distribution. Generally, the topic of the manuscript is interesting and within the scope of the journal. The manuscript has a good structure and is clearly written. However, the analysis is based on only a few observations in one winter season, so the significance and generality of results are rather small. This is very well documented by the authors, who conclude that: “. . . clear advice to modellers is still not possible” and “Thus longer time series of spatially detailed SWE observations need to be made . . .”. Moreover the methodology used (UAV snow depth mapping) is not new. These facts raise a question whether the presented results provide a significantly novel contribution satisfying the HESS requirements for a scientific paper. In my opinion, the presented results are in its current form rather premature and more systematic and longer datasets are needed to justify interpretations made and to allow a transferability of results to other regions.

Specific comments

- 1) I found a little bit confusing connecting snow depth change directly to snow water equivalent. How valid/uncertain is the assumption of uniform snow density at 10cm spatial scale?
- 2) P.7, l.27: “. . .increase? of R2”. Please check.
- 3) Fig. 5. Perhaps consider to switch x and Y axes (to plot dHS on Yaxis as a prediction variable). Is a simple linear relationship robust enough?
- 4) References: I understand that the authors wrote many papers about the subject and are expert in the field, but I feel that the references are too biased to their own work. I wonder whether all the cited works of the authors are really relevant for the topic and/or if there are some other relevant studies evaluating snow cover depletion curves and factors controlling them on different scales.

