Response to Editor
Monitoring snow depth variations in an avalanche release area using low-cost lidar and optical sensors

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Dear editor,

Thank you for your revision of the manuscript and points of feedback, this helps to further improve the manuscript. We copied your comments into the blue boxes below, so we can answer each part separately. Additionally, the authors have tried to improve the writing and clarity throughout the paper through careful proofreading.

Yours sincerely, Pia Ruttner & co-authors

Response to Editor HP Marshall

> 1) "While the purpose of the study is clear, I think the value of the study could be even more emphasized – there is only one sentence in the introduction that touches on why snow depth variability in the release area matters for avalanches – please elaborate on this a bit further." This could use a few more sentences.

We added a few more sentences in the manuscript: *When snow during a snowfall event or old snow from near surface layers is redistributed by the wind, this modifies the total amount of snow available for avalanche release and changes the composition of the snowpack. The redistribution may lead to the formation of a slab (wind slab), denser than the layer below (EAWS, 2024). Soft and loose old snow beneath the wind slab often turns into a weak layer. Changes of wind speed during the redistribution can cause the formation of weak layers even within a wind slab. Observing and quantifying variations in snow depth, particularly when related to wind-driven distribution, is therefore important to capture one of the major drivers causing avalanches (Schweizer et al., 2003).*

> 2) "projected the 3D models in the vertical direction" This was also a bit confusing to me. Is this standard terminology? Are you actually doing a projection, or just rasterizing the 3D point clouds and then differencing in the vertical direction? If "projection in the vertical direction" is standard, then no change required, but if not, consider rewording as this was brought up during the first review as well.

We are rasterizing the 3D point clouds and then take the difference of the resulting DSMs. Since the terminology of "projecting in the vertical direction" seems to cause confusion we removed it from the manuscript.

> Higher liquid water leads to larger grain sizes and less reflectivity – but does the liquid water itself influence the reflectivity? It would be nice to add one sentence clarifying this.

We clarified this in the text: *Another factor is the presence of liquid water, which can be derived from the TSS being close to or above 0°C. Since the spectral refractive index of water and ice are very close, the main effect of decreased returned intensity is the increase of snow grain sizes, which leads to increased absorption and spectral reflection (Wiscombe and Warren, 1980; Warren, 1982; Prokop, 2008).*

MINOR SUGGESTED EDITS

We implemented all changes regarding language, grammar and punctuation. Below we list only a few comments, that need a short answer.

> L44: change "photo cameras" to "photogrammetry"

In the context of L44 we keep the wording "photo cameras" since we talk about the sensors and not the methodology. However, we changed the expression as suggested in the next paragraph, L50 in the revised manuscript.

For the computation of a 3D model using photogrammetry, each point needs to be captured in at least two images ...

> L238: since you mention snow depth changes here, consider one sentence that mentions subtracting resulting surfaces.

We clarified this in the text, L181 in the revised manuscript:

For the computation of snow depth changes we create a gridded DSM per epoch, using the open source software Cloud- Compare, and calculate the difference between the DSMs. In particular, we perform the following steps: ...

References

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