Dear anonymous reviewer. Thank you for the detailed and helpful review.

In the following we will answer the specific comments (the numbers correspond to the lines in our manuscript). The intended arguments are your comments and our response follows:

> *L43 ff: Regarding SWE, it should be mentioned more clearly that the conversion from snow depth to SWE is not trivial and needs additional density assumptions / simulations. In the first paragraph of the current version (p. 2, l. 43ff), the reader might get the impression that you can just use the acquired snow depth maps to derive SWE.*

We will clarify that the calculation of the SWE is not trivial and needs additional density assumptions.

> *In l. 50, you state that snow depth maps are used for validating models. I fully agree. However, using models such as Alpine3D in combination with precipitation scaling methods (Vögeli et al., 2016) cannot be classified as validation. Here, snow depth maps serve as an input to derive simulated snow cover patterns and are used for precipitation scaling. In addition, you should mention that snow depth maps can also be used for snowpack model assimilations as various studies already presented (e.g., Alonso-González et al., 2022).*

You are right that it sounds like Vögeli et al. (2016) used snow depth maps as validation instead as precipitation scaling. We will rephrase this section to clarify and differentiate the various applications.

> *Snow depth information on slopes is an interesting information for ski resorts. Spandre et al. (2017) as well as Ebner et al. (2021; for even more resorts, also in Switzerland) used GNSS techniques mounted snow groomers. In ski resorts, snow depth is derived with the latter method on an almost daily basis; one snow map per season is of course not sufficient for a ski resort and as your maps are acquired around peak SWE, this would rather be at the end of the skiing season and of less importance for the ski resort. However, I would recommend to mention your snow depth maps more in the context of a possible validation/comparison for GNSS derived snow depths on slopes.*

Thanks for the correct hints. However, our snow depth maps have the advantage that they can also serve as reference outside the slopes, for example in ungroomed ski routes. We will modify this section while focusing on our snow depth maps as validation for GNSS derived snow depths as well as reference outside the groomed slopes.

> *The costs of airplane-based photogrammetry is as you mention a bit more economic as ALS, however, I agree with reviewer 1, that both techniques are expensive and not applicable for most regions and (scientific) applications so far. As there is not an order of magnitude of a difference in the price (30.000 – 60.000 CHF vs. 50.000 – 80.000 CHF), I recommend not pronouncing too much that your method is more economic.*

You are right that airplane-based photogrammetry is still very expensive, but taking into account that we planned several flights, the lower costs were crucial for the decision of the platform used. But due to the mentioned concerns by both reviewers we will modify this sentence that airplane-based photogrammetry is only slightly more economic.

There is a bit of confusion regarding the amount of reference points in the manuscript for the year 2020. In Table 1, 38 reference points are listed, in the text (e.g., Sections 3.2.3 and 4.1) you mention 40 reference points, and in Figure A1 less than 38 or 40 points are shown. Please clarify and be consistent. In addition: Are some reference points used in 2018, 2020 and 2021 the same?

Thank you for the hint. We measured 37 reference points simultaneously to the Ultracam flight in 2020. One of these points was not suitable because of problems with the GNSS. 2 further points were hard to identify on the images and accordingly also excluded from the workflow. Four of these reference points were used as ground control points. The other 30 points were used as check points. As described in chapter 3.2.3 (Manual reference points), we also measured 10 points in retrospect. 4 of these 10 points were used as ground control points in 2017. In 2018, 3 of these 10 points were applied as ground control points. The other 7 points served as check points. In 2019, 2 points were used as ground control points, 6 points as check points. In 2020, none of these 10 points were included in the workflow. In 2021, 8 points served as check points. However, the selected

We will clarify the number of reference points in a consistent way.

L. 263: What is meant with outlying areas?

We excluded the peripheral areas close to the edge of each processed snow depth map because in these areas the number of overlapped images was limited and accordingly also the reliability of the snow depth values decreased. We will remove this detail in the revised version.

L. 271: I guess there is a typo regarding the NDSI threshold. I assume it should be 0.4 (instead of 0).

No, 0.0 is the threshold used in our snow depth maps. We tried different values and this threshold led to the best results. In the snow depth map 2022, which is not part of this publication, we modified this threshold to –0.02 because accumulated sahara sand on the snow surface led to different reflectance characteristics.

Section 4.2.2: I see the point that you increased the upper limit for the 2019 snow depth map generation to 15 m. However, please also point out that this could also lead to a potential offset compared to the other years (e.g., it could lead to a higher potential of including more high value errors (up to 15 m) than in the other years (up to 10 m)).

We checked the location of snow depth values between 10 and 15 m and they mainly occur in avalanche deposits, which is the reason why we adapted the threshold. Additionally, they also falsely occur in isolated pixels in extremely steep faces. However, we do not think that the adjustment resulted into a significant offset. Therefore, we will add that the modification of the upper threshold does not lead to a significant offset of the statistics.

Section 4.2.6: Here you present the masking overview for the snow depth map 2020. How is the masking overview for the larger and smaller study areas of the years 2017 and 2018?

The masking overview (area and relative part) of all years is presented in the appendix B (Table A2). Would you prefer a presentation and description of the overview in the text? Due to the length of the paper, we prefer to limit this overview to 2020. Also, except the outlier mask we do not see an added value of a detailed description for each year.

Table 6: Besides showing the average and standard deviation, it would make sense to include the median as well as upper and lower quantile values (e.g., Q5 and Q95) for each year.

We will calculate the median, the Q10 and the Q90 because Q5 and Q95 do not have an added value from our point of view.

> *Figure 12: The 2017 normalized snow depth map shows much darker red areas (right side of image), which are not represented in the colour bar. Are these holes in the map and the underlying upper left image shimmers through with dark? In this case, please let the holes just white.*

Exactly, there are holes in the snow depth maps and additionally the dark Hillshade shimmers through. We will fill the holes with a white layer.

> *In addition to Figure 12, it would be very interesting to show difference maps for four years taking one year as reference (e.g., 2021-2017, 2021-2018, 2021-2019, 2021-2020), then potential offsets / differences would become more visible.*

The length of the paper and the number of figures is already at the limit. But we will add a figure calculating the actual difference of the snow depth maps 2019 and 2020, because 2019 was very snowy and 2020 was slightly below average.

> *Section 6.2.4: As stated above, Vögeli et al. (2016) does not use snow depth maps for validation. I would recommend renaming the title of the Section 6.2.4, e.g., to: 'Validation and Snowpack modelling approaches.*

We will rephrase this section that our data can be used to improve input parameters and as validation for numerous projects in snow-hydrological modelling. We will rename the section corresponding to your suggestion.

> *L.692ff: As mentioned before, it has to be pointed out more clearly that the conversion from snow depth to SWE is not trivial / straightforward.*

We will clarify that the conversion from snow depth to SWE is not trivial in the revised version.