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Discussions

Interactive comment on "Statistical modelling of the snow depth distribution on the catchment scale" *by* T. Grünewald et al.

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1) Resolution of the analysis (400 m): we now mention the cell size in the abstract (p 3239 L 12: "(cell size 400 m)" and in the introduction (p 3243 L28 "We assembled high-resolution snow depth data from different mountain regions and averaged them to a 400 m grid for our analysis."

2) "still" was replaced by "only" in the abstract (p3239 L19)

3) p3244 L20: Calculation of DEMs: The DEMs were calculated by simply averaging the data provided by the flight operators (processed data) to a regular grid of 1m. Data gaps are infrequent and were treated as NoData values. We changed the text to: "From the point clouds obtained by ALS, we calculated digital surface models by averaging

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the points to a regular grid of 1m cell size. Snow depth maps were then produced by subtracting a digital surface"

4) p3244 extreme snow depth: Extreme values of snow depth were present at both sides of the distribution and are caused by (rare) measurement errors, which have not been filtered in the post processing of the flight operators. Extreme outliers at the left side of the distribution (negative values) are physically wrong (negative snow depths) and were therefore removed (set to 0). The right tail (high HS) of the distributions is running down smoothly (see right panels in Fig 1-3). We could not identify a clear break for the cut off. The exact position of the cut off is nevertheless not crucial as these extreme values are very rare. Changing the cut off from e.g. 10 to 12 m would hardly make any difference. In the end about the same number of positive and negative extreme values have been detected and removed.

5) HRU: see reply to comment 1 of Referee 2

6) grid size: see reply to comment 2 of Referee 2

7) p3257 We added some additional discussion on the model representativeness: "Generally the table indicates relatively small interquantile ranges for most models and parameters. For example for WAN (first line) the difference between the upper and lower quantile and the median of αi is only 6 to 10% of the median. Similar ranges are characteristic for most parameters in the other data sets. Only $\alpha 1$ and $\alpha 3$ for SKO and $\alpha 3$ for ARO show larger deviation of the quantiles and the median. For R^2, interquantile ranges between 0.01 and 0.12 (Table 3) were calculated. Nevertheless, it is still necessary to note that for a few data sets outliers with much larger or much smaller R^2 values were observed. It is therefore an important finding from these ensemble calculations that the scatter between the single runs is only moderate. Taken as a whole, Table 3 shows that most of the models represent the total average well. Moreover, we can conclude that the absolute position of the subareas only has a minor effect on the models. The spatial averaging procedure appears to result in relatively stable statistical

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relations, at least at the scale of the 400 m grid."

8) Table 1: the "mean accuracy in the vertical direction" is the measurement error of the ALS in z-direction. It was not calculated in this study, the values are taken from reference in the right column of the table. The caption was changed to "...the mean accuracy in vertical direction as quoted in the Reference column"

9) Figures: We have changed Fig 1-3