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Hydrology and Earth System Sciences
Discussions
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Interactive comment on "Obtaining sub-daily new snow density from automated measurements in high mountain regions" *by* Kay Helfricht et al.

Anonymous Referee #1

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The authors explored new snow density (NSD) calculated from the data of automatic measurement of snow height and water equivalent with 1 hour interval at four high mountain observation sites. Because the data included uncertainty resulting from measurement errors, the authors tried to exclude them using several threshold values. Then they compared their NSD with estimated NSD using 7 existing empirical parameterizations with meteorological data in previous studies. Based on these analyses, they demonstrated that most of previous empirical parameterizations overestimate NSD. In this paper, they could not propose alternative parameterization of NSD because of insufficient statistical significant. Therefore their conclusion seems to be unsatisfied, but this study represents a massive effort for quality control of NSD based on measurement data and it deserves to be published HESS, as these data will most likely continue to

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be a unique resource well into the future. However, the present paper needs for several improvements before publication. Especially, several parts should be simplified because of overlapping descriptions. Below I give suggestions for improvement of the arguments in the manuscript.

<Comments>

The names of observation site are different between texts, Figures, and Table 1. Please unify their names.

P6 L5-8: Did you estimate the effect of the estimation error of air pressure on the value of Tw?

P7 L14: -13 < T >= -2.5ãĆIJC in Eq.(6) should be wrong.

P7 L16-17: the ranges of root in Eq. (8) are ambiguous. Please clarify them.

P8 L4. "high HNW values are accompanied by rather high HN". Which figure shows this result? This needs to be addressed as well.

P8 L5-L7. Fig. 7 shows only wet bulb temperature while the authors discuss the air temperature in this part. Moreover, Tw of Kuehtai seems to be higher than Weissfluhjoch in Fig.7. Please check it

P9 L19-20: Mean Tw at Weissfluhjoch is not lowest in Fig. 7. It seems that the mean Tw at Wattener Lizum is lower than Weissfluhjoch. Please check it.

P9 L24-L25. I can not agree the sentence that "A relationship between NSD and Tw is obvious for Kuhtai stain between the different periods, with higher NSD for higher Tw." Which figure shows this result? This needs to be addressed as well.

P10 L12-31: The description in this part should be moved to "Data and Methods" because they explain how to control the quality of calculated NSD. Therefore, they should be before "Results".

P13 L1-L2: I can not agree the sentence that “The relative low densities presented in this study are . . ..”. Are there any evidence or references ? This needs to be addressed as well

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