

The Cryosphere Discuss., referee comment RC3
<https://doi.org/10.5194/tc-2021-125-RC3>, 2021
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Comment on tc-2021-125

Anonymous Referee #3

Referee comment on "Local-scale variability of seasonal mean and extreme values of in situ snow depth and snowfall measurements" by Moritz Buchmann et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-125-RC3>, 2021

Buchmann et al. are presenting an in-depth analysis of a large set of closely located station pairs with parallel snow measurement in Switzerland. Most of the sites have several decades of parallel measurements which gives valuable insight in possible differences, caused by the impact of the station environment in contrast to the climate/region the stations may represent.

The achieved results of the presented statistical analysis give an estimated magnitude of the added uncertainties which can be expected due to (the often unknown) variety in the less-than-ideal siting of the station. This information is valuable for any analysis of long-term snow measurement, especially in case of single located stations, as metadata describing the location for such kind of measurements are often lacking the necessary accuracy or may even be missing entirely.

The paper is written in an understandable language and the analysis method is described adequately. I do recommend the publication of the study, but do have some concerns and suggestions that should be addressed before publication in TC:

- The authors introduce a lot of abbreviations for their measured and calculated parameters, station names, time periods (seasons) and analysis methods. While some of those are well-known and their use well-established and justified, are others solely defined in this paper. The sheer amount is severely hampering the reading process, as the reader is required to either memorize the abbreviations or searching the meaning of the abbreviations somewhere in the text. This comment is of technical nature and should be easy to address. Please refer to the attached file with specific comments for possible solutions.
- The description of the results sometimes lacks clarity and accuracy. Obvious exceptions are just very briefly and sometimes not at all mentioned, neither are possible reasons for those exceptions discussed. Please find some concrete examples in the attached file

with specific comments.

- The authors were not able to conclude on the exact causes for the observed differences due to the lack of metadata for their sites. That fact is well described and creating awareness of this kind of problem that may likely exist for other long-term snow measurements is one of the main messages of the paper. I do think, however, that it would be appropriate to recommend a list of necessary metadata to record for ongoing snow measurements and if possible, also give advice on which sites to avoid entirely.
- Further, as also one of the other reviewers mentions, it is necessary to clearly state that also for the case of parallel measurements of two ideal and neighbored sites, it is likely that significant differences in the described variables may still be observed. I can imagine that some of the still existing neighbored sites (such that metadata could be achieved and described for the more recent measurements) in this study could be used to illustrate, discuss, and possibly quantify these differences and how they compare to the differences found for the long-term analysis presented in this study.

Please find more minor and specific comments and suggestions in the attached file.

Please also note the supplement to this comment:

<https://tc.copernicus.org/preprints/tc-2021-125/tc-2021-125-RC3-supplement.pdf>