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The value of parallel snow measurement time series

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It is well known that the measurement of snow can heavily depend on location, even over small distances. A data set of parallel manual snow measurements, gathered by two separate institutes in Switzerland provides a unique opportunity to analyse the local-scale variability of typical snow climate indicators. The daily independent measurements date back several decades and are always taken in the same villages, usually separated by less than 1 km and less than 30 metres in elevation.
A sensitivity analysis is carried out to find which snow climate indicator, such as mean snow depth, snow fall sum, maximum snow depth or number of days with snow fall shows the smallest differences is due to local influences. In contrast to many other meteorological variables the manual snow measurement instruments have luckily not changed over time. However, the data series almost certainly encountered one or several changes in the exact measurement location or observer, which may not have been documented in the metadata. Such changes may have caused breaks, which are better detectable in some, and less in other snow climate indicators. The unique data set allows investigating which indicators are least sensitive to such changes and if such changes can be separated from climatological breaks by comparing the different snow climate indicators of the parallel measurement series. These experiences should help to detect and interpret similar breaks in snow data series from locations without parallel measurements and without documented changes in the metadata and thus contribute to the generation of more homogenous snow climatological time series.