Spatial variability of the snowpack and solid precipitation along a north-south divide in the north-western Swiss Alps

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Snow is highly variable over space. This study aims to gain further knowledge on the spatial variability of snow along a divide. The divide serves as a natural border for two climate regions in Switzerland. In the north-western Swiss Alps, the variability study was carried out using SNOWPACK – a one-dimensional physical snow model. Three snow stations were analyzed for three winters focusing on snow height (HS), snow water equivalent (SWE), snow stratigraphy and solid precipitation. One snow station is located in the climate region located to the north of the divide; the two others are located in the climate region to the south of the divide. A precipitation analysis was carried out using measured precipitation values from meteorological stations located in the two different climate regions.

Similarities and differences between the snow stations regarding HS and SWE changed from winter to winter. Meteorological patterns of short time scales (one winter) seem to have a higher influence than topography. The modelled snow stratigraphy is highly influenced by the model set-up. Further research has to be done, to assess the sensitivity of SNOWPACK on different input parameters in a comparative study.

The precipitation analysis led to surprising results. Modelled precipitation at the snow station is not necessarily more similar to measured precipitation in the same climate region. General weather situation is more important than the divide during the three investigated winters. The results show, that similarities and differences of snow along the divide in the north-western Swiss Alps are not always an obvious deduction from the geographically closest station and variability does not only occur in a spatial but also in a temporal context.

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