



Snowmelt and onset dates processed from 123 automatic meteorological stations at high elevation in the Swiss Alps

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In alpine terrains, climate change is expected to cause major modifications on the environment, in particular through changes in the snow conditions. The effects of the temperature increase on the snowpack and snowmelt timing are critical for alpine ecosystems, as well as for winter tourism or hydrological regimes. Despite the expected relevance of the snowmelt time in spring, snowmelt patterns are still largely missing in scientific literature, due to lack of in-situ measurements at high elevation.

Here, we analyzed snow height and temperature data from 123 permanent automatic meteorological stations located in remote areas from 1600 to 3000 m asl in the Swiss Alps over the period 1993-2015. We developed an algorithm based on manual data processing to accurately determine the onset and snowmelt dates. We then described the spatial and temporal patterns of the onset and snowmelt dates over the study period and in connection with some longer series originating from traditional manual observations since the 1950's.

Our results show high inter-annual variabilities of the onset and snowmelt dates, even at the highest elevations, in connection with increasing temperatures. The method developed here provides accurate snowmelt dates that could be further investigated, particularly in connection with alpine plant growth and phenology.