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Observed temperature dependence of snowfall and snow pack up to 2500 m asl in the Swiss Alps

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The impact of global warming on the snow pack is highly critical for alpine ecosystems as well as for winter tourism. Here, we analyze snowfall and snow pack observed data for up to 100 years at stations spanning elevations from 200 to 2500 m asl in Switzerland.

Our results show clear impacts of higher temperatures both on snowfall and on snow pack: the length of the snow season is clearly decreasing, both in autumn and in spring, not only at lower but also at higher elevations.

Over the last 50 years, the altitude for which snowfall represents 90% of precipitation days has increased by more than 300 meters in elevation. The transfer in altitude of snowfall affects particularly the beginning but also the end of the ski season.

The observed warmer temperatures already result into a clear decrease in snow pack at all elevations. Thus, the amount of snow available for water storage and runoff during the spring and summer months is declining, because more and more winter precipitation will directly contribute to runoff. Impacts are also expected on the alpine vegetation.