High resolution climatology
- towards climate change services

Analysing long-term changes of extreme snow depth and snowfall with a time-dependent GEV model

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The mountain snow cover is an important source of water and a requirement for winter tourism in Alpine countries. However, large amounts of snow can lead to destructive avalanches, floods, traffic interruption or sometimes even collapse of buildings. We use snow depth and snowfall data of 20 stations (between 200 and 1800 m asl) collected during the last 80 winters (1930/31 to 2009/2010) to highlight temporal trends of annual maximum snow depth and extreme snowfall events. The generalized extreme value (GEV) distribution with time as a covariate is used to study the changes in magnitude and frequency of such events. We analyse how current and future return periods are affected by changes. We also investigate the spatial spreading and altitudinal dependence of these trends. Our analysis demonstrates that the temporal trends of extreme snow depth and snowfall events do not show the typical climate change signal as for example the mean snow depth. Less than half of all stations show a decreasing trend with time and not even the highest stations show an increase. This implies that for more than half of the stations the return periods of extreme snow events did not change in the last 80 years despite the observed warming.