



## **Changes in Snow Cover in the Alps 1975–2002: Evidence from historical observations and projections made using a land-surface model**

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Better representation of snow processes in regional climate models is a key important requirement in the development of strategies for successful management of water resources and natural hazards in the future. There are two objectives of the proposed research. The first is to investigate spatial and temporal patterns in observed precipitation, air temperature and snow cover. We consider the influence of different atmospheric circulation patterns on extreme snowfall and snow cover statistics in different climatological regions of Austria.

Our second objective is to compare a new implementation of a grid-based hydrological model embedded in a model of land-surface climatology (the Joint UK Land Exchange Scheme; JULES) with observations of snow cover available in Austria over the past 30 years. The JULES model was driven with observed precipitation and air temperature. Additional meteorological driving variables for the land surface model (air humidity, wind speed, net radiation) were obtained from regional climate simulations driven by the ERA-40 reanalysis. The results of simulations were evaluated against daily snow depth observations at 754 climate stations. We found the overall accuracy with which the model simulated snow cover was 89% for the entire year and 75% during the winter months. The comparison of spatial and temporal snow cover patterns indicates that the model accurately reproduces the seasonal accumulation and melt in lowland and mountain regions. The implications of these findings will be discussed in the context of climate change simulations using the modeling framework we have developed.