Submitted Abstract

ID IMC22-FSAbstr- 337

First Author First Name Last Name	 Harald Schellander
Submitting Author First Name Last Name	 Harald Schellander
Correspondence	harald.schellander@zamg.ac.at
Co-Authors >> E-Mails will be not listed	Winkler, Michael
Organisations	ZAMG - Zentralanstalt für Meteorologie und Geodynamik, Austria
Country	Austria
Region	Western Europe
Title	Historical Trends Of Alpine Snow Water Equivalents.
Keywords	Trend, Swe, Modeling, Alpine, Change
Type	List Of Focus Session
Focus Session ID	10

Abstract

The snowpack in mountainous regions plays a key role in the water cycle, by storing water during the winter season, and releasing its content as runoff in the spring and summer months. The mass of a snowpack can be measured in terms of snow water equivalent (SWE), which describes the equivalent amount of water stored in the snowpack. It is directly connected to snow depth (HS) by the bulk snow density.

Due to its obvious importance, SWE trends and their relationship to climate change have already been the goal of a number of studies mostly on a global and hemispherical scale and, e.g., the Fifth IPCC assessment report states a high confidence for a general and continuing decline of SWE over the past decades. For the European Alps, however, only few studies have been conducted. They show a similar decrease, but at higher elevations and at smaller scales the spatial distribution and temporal evolution of SWE is still not well understood and highly uncertain. This is due to generally sparse and short SWE measurements in the Alps and considerable difficulties for satellite- and model-based techniques due to the complex topography.

Recent modelling efforts led to the ΔSNOW model, a semi-empirical approach to derive daily SWE exclusively from consecutive HS series, of which there are many in the Alps of excellent quality and length, and which have recently been published and are freely available. In the first part of this contribution, improvements of the ΔSNOW model are presented. For example, the model's restriction to temporally fixed density parameters is eliminated. This will extend the usability for the conversion of snow depths to SWE to long-lasting snowpacks of high Alpine areas and lowlands. The improved ΔSNOW model is then used to estimate SWE at more than 1500 stations with continuous, daily HS records in and around the Alps from flatlands to very high Alpine regions with 130 stations above 2000 m. We also show first results of a trend analysis of seasonal mean and peak SWE of this very large number of stations in the Alps. The high station density and large elevation range covered opens the opportunity for gaining new insights in the spatial and elevational distribution of SWE changes in the Alps at an unprecedented local scale.