Submitted Abstract

ID IMC22-FSAbstr- 772

First Author First Name Last Name	 Alexander Radlherr
Submitting Author First Name Last Name	 Michael Winkler
Correspondence	michael.winkler@zamg.ac.at
Co-Authors **>> E-Mails will be not listed**	Winkler, Michael
Organisations	ZAMG, Austria
Country	Austria
Region	Western Europe
Title	Comparing Manual Measurements Of Snow Water Equivalent.
Keywords	Snow Water Equivalent, Swe, Manual Measurement, Comparison Experiment
Type	List Of Focus Session
Focus Session ID	36

Abstract

The snowpack is a key component in several fields like climatology, hydrology, or natural hazards research and mitigation, not least in mountainous regions. One of the most considerable snowpack features is the snow water equivalent (SWE), representing the mass of water stored in the snowpack and – in another perspective – the weight straining objects the snow is settling on (snow load). In comparison to other snow properties, like e.g. snow depth, SWE is rather complex to measure and consecutive observations do not have a long tradition in many regions.

Despite various recent developments in measuring SWE by means of remote sensing or other noninvasive methods, e.g. with pressure sensors, scales, GNSS sensors, cosmic-ray neutron probes etc., the standard measuring technique still is using snow tubes or gauging cylinders, often in combination with digging pits. The cylinder or tube designs very a lot: from meters long metal coring tubes of typical inner diameters of ca. 4-7 cm (without the need of pits) or PVC cylinders with typical lengths of 0.5 to 1.5 m and diameters ranging from about 5-20 cm to small aluminum tubes holding a maximum of 0.5 liter of snow. Comparison and calibration experiments traditionally use (one of) these “standard methods” as reference. However, studies addressing their accuracy, precision and repeatability are rare.

This contribution provides first results of several field tests at different sites in the Austrian Alps covering a great variety of snow conditions (e.g. dry and wet), snow depths and SWEs, respectively. Different types of SWE measurement tubes are compared to each other but they are also confronted with “absolute” observations. For the latter 3 x 4 m rectangular areas have been cleared of snow and the respective snow masses have been weighed stepwise using ~50 liter buckets. Known issues like increasing accuracy with increasing diameters are confirmed, however, many statistical measures like variance and bias vary quite a lot depending on the equipment used. Furthermore, a synopsis of the suitability of the various methods depending on the problem or the objective of the observation is provided.