Experimental Setup to Investigate the Liquid Water Content in Snow

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Abstract

Snow can exist in a wide range of temperatures. Its behavior changes especially around its melting point. A better understanding for wet snow is essential for snow pack stability, the effect of water percolation and friction between ski and wet snow surface. Technical details about existing experimental setups and the heating processes of dry and wet snow were sparsely apparent. In order to allow standardized studies with dry and wet snow, an experimental setup to investigate liquid water content was developed.

There exist many studies about wet snow impedance in MHz and GHz region. Energy absorption by presence of liquid water is far more important in the kHz range than assumed in literature. An experimental model for energy absorption of dry and wet snow are proposed. The snow heating process was implemented in a multiphysics simulation. Results of the model were verified by quantifying liquid water content at the end of the experiment.

The onset of water percolation in wet snow has been detected by a reversal point in energy absorption during wet snow heating. The onset of water percolation initiated a inhomogeneity in snow and water distribution. Liquid water treasured up at the bottom of the sample holder and left voids in the upper part of the snow probe. The snow heating device can provide standardized snow samples for future studies to investigate liquid water percolation for different snow densities.

Figures used in the abstract

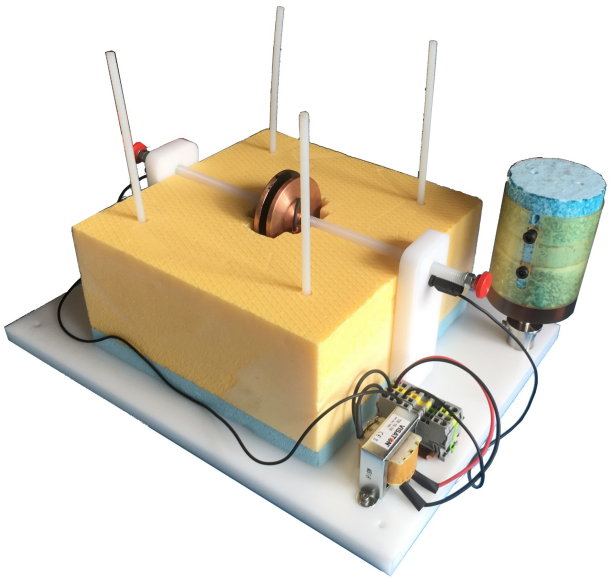

Figure 1: Snow heating device.