



Assessment of the temperature variability at the snow-ground interface – concept and first results

Clemens Hiller (1), Markus Keuschnig (1,2,3), Ingo Hartmeyer (1,2), and Joachim Götz (1)

(1) Department of Geography and Geology, University of Salzburg, Austria, (2) alpS - Centre for Climate Change Adaptation, Innsbruck, Austria, (3) Department of Engineering Geology, Technical University of Munich, Germany

Bottom temperatures of the winter snow cover (BTS) represent the thermal conditions at the snow-ground interface and serve as a proxy for local permafrost occurrence. The BTS method has been used in numerous studies to investigate local permafrost evidence and to validate larger scale permafrost distribution models. However, former studies have shown a relatively strong scattering between single measurements indicating that BTS values are sensitive to further factors.

In order to identify the spatial and temporal variability and mentioned sources of irritation and to better understand their influence we applied repeated BTS measurements on a small scale test site situated below the Maurerkogel (2990 m) nearby the Kitzsteinhorn, Hohe Tauern Range, Austria. The site (c. 2000 m²) shows fairly homogenous surface conditions in terms of roughness and morphometry (bedrock with thin layer of fine-grained talus, slightly inclined to N).

The measurement setup consists of a BTS grid with a minimum spacing of 5 m. Four campaigns with a total of 94 measurements were carried out from March 2012 to April 2013. Universal Temperature Logger (UTL), snow profiles and meteorological data from automatic weather stations are used to interpret the BTS values. The standard deviations of BTS values for each campaign range between 0.4 and 0.9 °C. The mean BTS value within the overall period is -3.1 °C. The near surface temperature logger shows a mean temperature of -3.7 °C in 10 cm depth covering four campaign days.

Both, the correlation between near surface temperatures and BTS values as well as the low standard deviation between the BTS values demonstrate the applicability of the method under appropriate conditions.