Geophysical Research Abstracts, Vol. 9, 08708, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08708

Geoelectrical measurements for permafrost monitoring at the Hoher Sonnblick, Salzburg, Austria

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Global warming induced permafrost degradation in Alpine regions causes negative effects on environment and engineering problems. Sub-terrain processes in such permafrost degrading environments are still not completely understood. One of the main objectives of the project ALPCHANGE, carried out at the University of Graz and Graz University of Technology, funded by the Austrian Science Fund, is to quantify landscape dynamics in alpine regions caused by climate change in the past and at present (*cf.* www.alpchange.at and Lieb *et al*. 2007). Within the framework of the project ALPCHANGE, first geoelectric measurements been carried out at the summit area of the Hoher Sonnblick (Hohe Tauern, Salzburg, Austria) by the Geological Survey of Austria in summer 2006. Generally, geophysical investigations - in particular the geoelectric method - have been applied for many years for permafrost characterisation (e.g. Hauck 2001, Kneisel 2006). The geoelectric method is intended to determine the distribution of the specific electrical resistivity within the subsurface. Resistivity methods can be used to map changes in the subsurface due to variations in water saturation and pore fluid conductivity. To evaluate the framework conditions for a continuous monitoring of permafrost regions with the geoelectric method, first test resistivity measurements have been performed at the summit area of the Hoher Sonnblick at an altitude of 3106 m a.s.l.. Several constraints for future permanent monitoring could be derived during this test phase. A test monitoring profile was installed nearby the meteorological observatory. An operational monitoring test phase, using a GEOMON4D measuring console, a proprietary development by the Geological Survey of Austria, has recently been launched. The advantage of this geoelectric system is that it allows full control of the measurement data to optimize data quality. That means all sam-

ples of the single measurements are saved, containing full information of the inherent noise and therefore allowing follow-up noise filtering in a post-processing step. A Fast-Fourier-Transformation module allows determining the frequency content of the noise. Consequently sampling intervals can be adapted to multiples of the detected noise frequencies. Data quality and optimization is necessary for the interpretation of resistivity changes, which should allow observing seasonal freezing and thawing processes leading to a better understanding of related processes.

References:

Hauck C. 2001. Geophysical methods for detecting permafrost in high mountains, Versuchsanstalt für Wasserbau und Glaziologie, ETH, Mitteilungen 171.

Kneisel Ch. 2006. Mapping and monitoring mountain permafrost using electrical resistivity tomography, Geophysical Research Abstracts, Vol.8; 04181.

Lieb GK, Kellerer-Pirklbauer A, Avian M. 2007. ALPCHANGE - An innovative project on Climate Change and Impacts in southern Austrian Alpine Regions. Geophysical Research Abstracts, Vol. 9 (this volume).