

Name of research institute or organization:

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**WSL Institute for Snow and Avalanche Research SLF**

Title of project:

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Permafrost monitoring at high Alpine sites

Project leader and team:

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Dr. Marcia Phillips (Project leader, permafrost researcher)

Martin Hiller (Electronics)

Andreas Moser (Electronics)

Christian Simeon (Mechanics)

Project description:

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The evolution of permafrost temperatures in boreholes located at high altitudes in the Swiss Alps is monitored. The aim is to determine how rock walls and ridges react to temperature changes and determine long-term trends. The thermal regime strongly determines the stability of rock walls containing ice in cracks and fissures. In addition, the data obtained is highly relevant for construction projects at high altitudes, where the engineering challenges can be significant. Rock temperatures are essential for the determination of the choice of technical solutions (e.g. type of mortar, timing of drilling) in order to ensure a prolonged service-life of high mountain infrastructures.



The permafrost borehole is located in the Jungfrau Ostgrat (bottom right hand corner of the photograph). Photograph: M. Phillips, SLF (November 2009).

The instrumentation in the Jungfrau Ostgrat borehole was repaired, calibrated and reinstalled in 2009 and is now delivering daily thermal data. The borehole is located at 3590 m in the N facing wall of the Jungfrau Ostgrat. It is 20 m long and equipped

with 9 thermistors and a data logger. The first year of data indicates that rock temperatures vary between -4 and -8°C and that there is no discernible active layer, which is similar to the observations originally made by Wegmann in 1998. The borehole will be subject to evaluation for inclusion in the PERMOS network in the course of 2011. The high elevation of the borehole and the fact that it is located in a rocky ridge make the data highly relevant for both scientists and engineers.

Key words:

Mountain permafrost; thermal regime; active layer; stability of rock walls; construction in permafrost

Internet data bases:

[www.permos.ch](http://www.permos.ch)

Collaborating partners/networks:

PERMOS (Permafrost Monitoring Switzerland)

Scientific publications and public outreach 2010:

**Refereed journal articles and their internet access**

Bommer, C., Phillips, M., Arenson, L. (2010). Practical recommendations for planning, constructing and maintaining infrastructure in mountain permafrost. Short Communication, *Permafrost and Periglacial Processes* 21: 97-104. DOI: 10.1002/ppp.679.

**Edited books**

Bommer C., Phillips M., Keusen H.R., Teyssie P. (2010). Construire sur le pergélisol: Guide pratique. Birmensdorf, Eidg. Forschungsanstalt für Wald, Schnee und Landschaft, SLF. 126 p.

PDF Download in German: <http://www.slf.ch/dienstleistungen/buecher/9819.pdf>

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