

Name of research institute or organization:

**University of Zürich, Department of Geography,  
Glaciology and Geomorphodynamics Group**

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Title of project:

Measurement and modelling of rock-surface temperatures in steep alpine rock faces

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Project leader and team:

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Project description:

Knowledge on the spatial distribution of rock surface temperatures and a reliable method for their parameterisation is required for 2D and 3D ground temperature models as well as the retrieval of climate signals from deep permafrost boreholes. The virtual absence of winter snow cover on steep rock faces combined with the direct coupling of surface and subsurface energy balance (without complex thermal offset in a mixed-media active layer) is a unique chance for the calibration and verification of surface energy-balance models. Practical relevance is added to this topic by the influence of warm or degrading permafrost on the stability of rock walls in cold-mountains suggested by recent research.

A strategy for the measurement of rock surface temperatures in the Swiss Alps has been designed and in summer and autumn 2001, more than 20 specially redesigned UTL-1 data loggers were placed at locations between 2000 and 4500 m a.s.l. Sites were selected in order to cover a wide range of temperatures and exposures and mostly com-



prised near-vertical faces. Temperatures are recorded several times per day with a capacity to store more than a year's worth of data. Four main considerations in campaign planning are: 1) sampling strategy and site selection based on an existing regional ground temperature model 2) logistics involved in safely and efficiently accessing sites 3) criteria for the local placement of dataloggers and 4) logger design.

Test sites included the surroundings of Jungfrauoch, the Schilthorn area, Corvatsch, Gornergrat/Stockhorn, Kleinmatterhorn and Colle Gnifetti on Monte Rosa. In the context of safe and efficient access of our measurement sites, the research station Jungfrauoch was of key importance.

The results of this project are not only expected to provide knowledge on the distribution of permafrost in rock faces but also to further the understanding of the processes involved and to promote model development.

Key words

Permafrost, rock faces, mean annual ground surface temperature, energy balance

Collaborating partners/networks:

Scientific publications and public outreach 2001:

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