



## **Rockwall thermal regime characterization in high mountain areas and related permafrost degradation: preliminary data from the Western Alps**

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Permafrost degradation of ice-filled discontinuities in high mountain areas has been hypothesized to be one of the main causes of rockfalls and rock wall instabilities occurred in the last years in these ambients. In the context of global warming, alpine regions are extremely sensitive to increasing temperatures and permafrost has revealed to be a privileged geoindicator of climate change effects.

The aim of the project *PERMAdataROC* (co-funded by Interreg III *ALCOTRA* Program) is the development of a monitoring strategy of high mountain rock wall instability in relation with permafrost degradation. One of the project's actions, *PERMA\_TEMP*, has been developed in order to measure rock wall thermal regimes and to assess the effect of global warming on their stability.

Aiming to cover wide climatic, geological, geomorphological, topographic and altitudinal gradients, several monitoring sites have been equipped in the western Alps. The measured variables at all sites are: rock temperature at different depths (3, 30 and 60 cm), air temperature and relative humidity close to the rock-atmosphere interface, in the vicinity of rock temperature loggers. Two of these sites have been dedicated to intensive measurements that also include net radiation, wind speed and wind direction by means of an automatic weather station, installed perpendicular to the rock wall.

Seven monitoring areas have been designated: six of them are located in the Mont

Blanc massif (Aiguille du Midi; Les Drus; Tour Ronde; Aiguille de Entrèves; Pilier d'Angle; Aiguille Blanche) and one is on the south-west ridge of Matterhorn. In these seven areas a total of 15 measurement sites are instrumented.

Rock temperature data, in association with the meteo-climatic and radiative parameters, will be used to calibrate and validate models of rock-walls temperature regimes and their regional distribution in high-mountain areas, in order to obtain a better understand of the mechanisms triggering rockfall phenomena.

In the intervention, ongoing measurements and first results from the available data will be illustrated.