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Mass movements in a high mountain environment, Kitzsteinhorn (3203 m), Hohe Tauern, Austria: Controlling factors and geotechnical surveys.

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In the context of climate change the stability of rock walls in high mountain areas is an important risk factor for the local population, tourism and infrastructure. Many rock falls in the hot summers of 2003 and 2005 indicate a possible increase of gravitative mass movements due to changing climate conditions. The understanding of these short and mid-term reactions of rock walls due to climate changes like temperature, precipitation and insolation has an essential relevance to assess and mitigate risks.
The main objective of the project MOREXPERT is to develop an innovative expert system based on a combined monitoring of surface and underground conditions. At the Kitzsteinhorn peak (Hohe Tauern, Salzburg - Austria) relevant factors in steep rock (rock temperatures and properties, permafrost distribution, rock movement, fissure water, air temperature, radiation, precipitation, etc.) will be detected, critical thresholds identified and their sensitivity to climate change analyzed.
The Kitzsteinhorn is situated in the central Alps and is part of the Hohen Tauern. It consists of rocks of the Glocknerdecke, especially of greenstones and limestone-micashists. The existing tourism infrastructure is directly affected by changes in the rock stability. Depending on the risk potential the working area was divided into four main areas with different scales. An engineering geological mapping has been carried out for large parts of the peak and rock walls to describe in detail the geological and rock mechanical characteristics. Based on several mapping campaigns (incl. gallery inspections) we obtained valuable data on joint orientations, joint characteristics, block size and shape, exposition and gradients. Different mechanisms of failure like toppling, settlement and block sliding were detected. Due to the joint settings, which represent ideal pathways for circulating water, and the ongoing retreat of the Schmiedingerkees glacier it is expected that rock stability decreases in the future. By the intense retreat of the glacier the rock faces have lost their natural bearings creating oversteepened cirque walls. The configuration of the joint sets and the resulting failure mechanisms in these oversteepened walls can lead to an increasing number of mass movements in this area.