



Rates of high altitude rock wall erosion: four years of laserscanning in the Mont Blanc massif

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Many rockfalls detach from steep high-Alpine rock walls, and were especially frequent during the hot summer of 2003 in the Alps. It is hypothesized that an observed increase of high mountain rock wall instability is related to permafrost changes. Nevertheless, because of a lack of systematic observations, magnitude and frequency of high mountain rock-slope instabilities remain poorly known up to now.

As a part of the French-Italian PERMAdataROC project (2005-2008) and the EU-funded transalpine PermaNET project (2008-2011), we use the Terrestrial Laserscanning method for remote monitoring of geomorphological activity from the ground, focusing on seven steep high-Alpine rock walls (elevation: 3000-4500 m a.s.l.) affected by permafrost in the Mont-Blanc massif.

Here we present the methodology to get high-resolution digital elevation models (DEM) of rock walls surveyed annually by laserscanning and to make diachronic comparisons of those DEM. This work has been carried out using a ground-based LiDAR Optech ILRIS-3D, working up to 800 m in the best conditions of surface reflectivity. We present the key results of this first quantification of high altitude rock wall instability, based on the first four years of measurement at Les Drus, Aiguille du Midi, Grand Flambeau, Aiguille d'Entrèves, Tour Ronde, Aiguille Blanche de Peuterey and Piliers de Freiney - Grand Pilier d'Angle. The main instabilities affected the West Face of Les Drus (546 m³ of rock detached between October 2005 and October 2006), the Tour Ronde East Face (536 m³ between 2005 and 2006, and 266 m³ between 2007 and 2008) and the close Freshfield ridge (448 m³ between 2006 and 2007).

The high resolution of the DEM also allows performing remote geomechanical characterization of the rock faces. First results about survey of fractures will be also present.