Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10361, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10361
EGU General Assembly 2008

Quantifying rock falls/avalanches in steep high-alpine rock walls: three years of laserscanning in the Mont Blanc massif

L. Ravanel (1), P. Deline (1), S. Jaillet (1) and A. Rabatel (1)

(1) EDYTEM Lab, Université de Savoie, CNRS, 73376 Le Bourget du Lac, France (ludovic.ravanel@univ-savoie.fr)

It is hypothesized that climatic warming since 1980 increases rock wall instability in high mountains due to permafrost degradation. This is supported by the observation of ice/water in several rock fall scars. Due to a lack of systematic observations, magnitude and frequency of high mountain rock-slope instabilities remain poorly known. The EU Interreg program PERMAdataROC has been set up in 2005 to improve the knowledge and understanding of the relationship between the permafrost degradation and the slope instabilities in steep high-alpine rock faces. One of the aims of this program is to develop, test and validate measurement methods of the rock fall activity (LIDAR, geophones and terrestrial photogrammetry) on several study rock walls (3000-4500 m) affected by permafrost in the Mont-Blanc massif. Here we present the applied methodology to monitor geomorphological activity in steep high-alpine rock wall. It means getting high-resolution digital models (HRDEM) of rock walls measured seasonally (summer/winter) or annually by laserscanning (LIDAR) and genering diachronic comparisons of those models. 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. The field edge is 40° x 40° and the point measure frequency is 2000 points per second. At a distance of 100 m, the laser trace on the object is about 30 mm large (perpendicular shot), and the point accuracy on a flat surface is about 3-5 mm. We also present the key results of the first three 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 most impor-

tant changes have been modeled for the W Face of Les Drus (546 m3 of rock detached between October 2005 and October 2006), the Tour Ronde E-Face (382 m3 between 2005 and 2006) and the close Freshfield ridge ($>$ 500 m3 between 2006 and 2007). In the case of the Drus (2700-3700 m a.s.l.), the main detachment appears to be related to a slope readjustment after the collapse of 2005 (265,000 m3). But this phenomenon could also have been triggered by the development of a new active layer in the scar of 2005, which forms a new surface directly exposed to air temperature. At the Tour Ronde E-Face, the rockfall should be directly related to critical state permafrost. On the Freshfield ridge, the disappearance of the glacial and snow cover and therefore the surface permafrost degradation seems to be a major instability factor. Finally, the main difficulties related to the treatment and analyse (HRDEM creation, masks, changing snow cover) of this type of high density point clouds are discussed.