



Rockfalls on steep rock walls in the Mont Blanc massif: a statistical approach for the 2007 and 2008 events

L. Ravanel (1), F. Allignol (1), P. Deline (1), and M. Ravello (2)

(1) EDYTEM Lab, Université de Savoie, CNRS, Le Bourget-du-Lac, France (ludovic.ravanel@univ-savoie.fr), (2) Fondazione Montagna Sicura, Courmayeur, Italy

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 in several rockfall scars. Due to a lack of systematic observations, magnitude and frequency of high mountain rock failures remain poorly known. As a part of the French-Italian PERMAdataROC project (2005-2008) and the EU-funded transalpine PermaNET project (2008-2011), we developed a present-day rockfall database. It contains information collected during systematic surveys carried out by local people (mountain guides, hut keepers, researchers). Although difficult to implement, this approach seems an efficient way to systematically record slope instability events of all sizes related to climate variations.

The database compiles the characteristics (topography, volume, scar geometry, deposit) of the 44 and the 20 rockfalls observed in 2007 and 2008, respectively, in the Mont-Blanc massif (Swiss and Saint-Gervais sides excepted). For each event, scar elevation, slope angle and aspect of the affected slopes are issues from ArcGIS, using a 50 m digital elevation model (DEM) – enhanced to 10 m for affected areas – for the French side of the massif, and a 10 m DEM for the Italian side.

Among the 64 documented rockfalls, 53 occurred at an altitude above 3000 m a.s.l (but none above 3900 m), on slopes with an angle mainly in the range 50-60°. Massive ice has been directly observed in 12 scars.

The four largest rockfalls occurred on the steepest, Italian side at: Dent de Jetoula (at 2810 m a.s.l.; 15,000 m³) on August 2007, one of the lowest in altitude; Tour des Grandes Jorasses (at 3830 m; 10,000 m³) on September 2007; Aiguilles de Thoules (at 3450 m; 8,000 m³) on July 2008; and Tré-la-Tête (at 3470 m; 50,000 m³) on September 2008.

Detailed results are presented, statistically analysed and normalized.