



## **A method for the evaluation of the failure probability of potential rock falls**

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We present an operational method to estimate the quantitative failure probability for potential rock falls as a function of time. This method applies the historical, geomechanical and probabilistic approach proposed by Hantz et al. (2003), which combines the relative failure probabilities of detected potential rock falls and the historical rock fall frequency for a given area and a given volume range. A Susceptibility Index of Failure (SIF) is determined for each potential rock fall, by evaluating the occurrence and the importance of a number of causal factors. The relative failure probabilities are supposed to be proportional to the SIF. Most of the causal factors have been defined from the analysis of 25 rock falls occurred in the limestone cliffs in the Grenoble area (Frayssines et al., 2006). They are: Persistence of the potential failure surface; morphology of the cliff surface; shape of the rock mass; smaller rock fall activity; water inflow; freeze and thaw. The expected rock fall number for a given period of time is derived from the rock fall frequency. Usually, the potential rock fall number is greater than the expected one. Their absolute failure probabilities must be "shared" between the potential rock falls, according to their relative failure probabilities. The method has then been applied in the Grenoble area, where 33 potential rock falls of more than  $10^5 \text{ m}^3$  have been detected in limestone cliffs stretching over 150 km.

### **References**

- Frayssines, M., Hantz, D. (2006) Failure mechanisms and triggering factors in calcareous cliffs of the Subalpine Ranges (French Alps). *Engineering Geology* 86, 256-270.
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