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The relation between rock fall frequency and erosion rate

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The rock fall frequency in a valley wall is related to the erosion rate. A quantitative relation is presented between the erosion rate of a homogeneous valley wall and the rock fall frequencies for different volume ranges (Hantz et al., 2003a). The analysis of several rock fall inventories has shown that these frequencies are distributed according to a power law, with an exponent close to 0.5, which appears to be independent of the geological context (Dussauge-Peisser et al., 2002). It ensues that, when no rock fall inventory exists, the rock fall frequencies can be derived from the erosion rate of the valley wall. The knowledge of these frequencies may help to assess the failure probability of potentially unstable rock masses that have been detected in the wall (Hantz et al., 2003b).

A relation between the volume and the scar area of 25 rock falls occurred in calcareous cliffs, in the French Subalpine Ranges, has been found. It implies that the scar area distribution also obeys to a power law and the "renewal rate" of the cliff (the proportion of the cliff surface that is renewed each century due to rock falls) can be estimated knowing the rock fall frequencies. Inversely, the rock fall frequencies (and the erosion rate) could be determined from the age distribution on the cliff. The model will be tested by dating cliff surfaces in the French Subalpine Ranges.

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