



ROCKFALL ACTIVITY OF CLIFF INFERRED FROM DEPOSIT AND CONE METHOD

M. Jaboyedoff (1,2), F. Baillifard (1,3), J.-D. Rouiller (1)

(1) CREALP (Research Center on Alpine Environment), (2) Quanterra, Lausanne, (3) Institute of Geology and Paleontology, University of Lausanne

Assuming that fresh scree slopes are significant indicators of recent rockfall activity, they can be used as activity indicators for a given rockfall source area.

Using simple geometric rules and a DTM (digital elevation model), the propagation zone can be estimated by considering that each potential rockfall source cell (corresponding to the entire cliff) can generate a scree slope within a cone with a slope ranging from 27° to 37° . Thus, the count of pixels representing rockfall deposits that are contained in this cone represents a relative scale of recent rockfall activity.

According to Evans and Hungr (1993), the source cell can be chosen at the bottom of the cliff, with lower angles. Choosing the entire cliff or the bottom of the cliff as source area depends on the morphology of the slope situated below the cliff.

The cone can also be laterally limited in order to avoid the counting of illogical rock slope trajectories ($\pm 20^\circ$).

In Switzerland, the vectorized 1:25,000 topographic map (vector25) can provide scree slope and cliff area data sets. Results obtained using this method show good agreement with field observations, although it is evident that the highest topographic reliefs are favored by this method, as verified in the Alps.

Compared to the method of Menéndez Duarte and Marquínez (2002), which uses GIS-calculated watersheds as propagation areas, the present method does not take small changes of topography into account.

References

Evans, S.G. and Hungr, O. The assessment of rockfall hazard at the base of talus slopes. *Canadian Geotechnical Journal*, 30/4, 620-636, 1993.

Menéndez Duarte, R. and Marquínez, J. The influence of environmental and lithologic

factors on rockfall at a regional scale: an evaluation using GIS. *Geomorphology*, 43, 117-136, 2002.