

ABSTRACT

The reach angle method is an empirical way to estimate the areas that might be reached by rockfalls depending on mobilised volume. In one hand, it has the great advantage that it is very simple and cheap. Consequently, nevertheless, it is not reliable as it might be expected because the results show great dispersion.

Some recent publications show the necessity to improve this method by using more homogeneous rockfall groups. The heterogeneities that might be found in the report are due to the presence of obstacles in slopes and their geometries. This work shows that correlation coefficients improve when rockfalls are classified into different groups. The cases belonging to each group are very similar to each other and it makes the procedure to become much more useful. In order to carry out this investigation, it has been necessary to study lots of different rockfalls. Some of them had already been studied but some others had not been analysed yet. In this work, a new procedure is proposed, ranging from camp work and sampling to data analysis and interpretation.

Apart from proving the effect of dispersion decrease, the aim of this work is to analyse the effect of different types of obstacles on blocs movement and which obstacles are more or less efficient.

A new aspect that has been studied is the distribution of the rocks on the slope. Consequently it is possible to analyse the reach angle for specific percentages of mobilised blocs and not only for the whole of them as it has been happening so far. Therefore this study can be of great importance for engineering and territorial planning because it is important to know whether the reach angle is reached for most of the volume or only by little proportion of it.

Macro-roughness is a parameter that has been introduced to explain part of variation of rockfall reach. It depends on the difference between the distance from the source to the furthest bloc and the distance that detached blocs have covered along the slope.

New ways of rockfall classification have been studied from a global point of view of the whole of the obstacles found by rockfalls, not only considering the most important obstacles and forgetting about the rest of them as it has been happening until now. The aim of this work doesn't look for homogeneity in the different cases in a group but it looks for rockfalls that have similar difficulties to move, independently of the kind of obstacles. Each obstacle will mean a specific decrease of movement, which is proportional to the amount of obstacles along the slope and its capability to dissipate energy.

For this analysis, by using a computer program, it can be deduced again the capability of reach reducing of each obstacle in the slope.