Nat. Hazards Earth Syst. Sci. Discuss.,
doi:10.5194/nhess-2015-318-RC2, 2016

Natural Hazards and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "The influence of expertise on rockfall failure probability assessment – an original experimentation" *by* A. Delonca et al.

Anonymous Referee #2

Received and published: 16 May 2016

General comments 1) A good site characterization seems essential in order to allow readers to carry out your own appraisal of the hazard and evaluate the interest of the study. Nevertheless, a very basic description of the site and sectors is provided. Especially important are data on joint orientation, prevailing failure mechanism and past rockfall occurrence. Is traction failure of overhanging blocks the main mechanism in the site? This is a key issue, because SMR method is routinely used to assess rockfall susceptibility of failure mechanisms involving shear on joints (including flexural toppling) tough it seems not applicable to failures caused by traction.

2) Several descriptors are used for the temporal likelihood of rockfall failures (occurrence probability, temporal probability, susceptibility to failure and failure probability,

Printer-friendly version

Discussion paper

Tables 1 to 7). This is quite confusing: a) Susceptibility is assessed in the manuscript using both spatial conditioning factors and those related to (potential) temporal occurrence. This does not follow internationally accepted standards (e.g. as the defined by JTC-1 in Fell et al., 2008), in which susceptibility corresponds to the volume and spatial distribution (i.e. size and spatial probability) of potential landslides. Although it is expected that landsliding will occur more frequently in the most susceptible areas, in the susceptibility analysis, time frame is explicitly not taken into account (Fell et al., 2008). b) In page 9, occurrence probability and temporal probability for applying LPC method are defined as addressing the questions if a rockfall will occur (will the rockfall occur?) and when will the rockfall occur (as the annual frequency of occurrence), respectively . The difference is not clear to me. They provide the same type of information, because a null temporal frequency means a null occurrence probability (the rock fall will not occur). The words used for describing the "temporal probability" (imminent, very short term) does not suggest annual probability but time expected to failure, which is a different random variable. Could you clarify this issue? Time to failure is more difficult to be estimated than annual probability even when monitoring data are available. c) Use of failure probability for a hazard matrix (Tables 5 and 7) can be misleading. A high failure probability means a high temporal probability of occurrence, which typically lowers when landslide size increases. Hazard level increases with both temporal probability and landslide size.

3) Information or qualitative criteria used for estimating occurrence/temporal probability of Tables 1 and 2 should be specified in order to make the results obtained by different people comparable. Similarly, geomorphic indicators used in the SMR-based method should be also described in the manuscript. Quoting El-Shayeb (1999) work seems not sufficient. What type of morphological traces where found in the test site? How weathering degrees were defined? Even for a qualitative method, more detailed descriptors should be provided.

4) Morphological traces are used by the Authors in the SMR-based method to assess

Printer-friendly version

Discussion paper

temporal activity of rockfalls. However, geomorphic indicators as the spatial density of scars and presence of cracks, or other types of morphological traces merely provide data on spatial probability and, therefore, on rockfall susceptibility (e.g. Table 4 of Fell et al., 2008). Such types of geomorphic indicators do not give information on rockfall activity or temporal frequency.

5) Weathering degree can be used to obtain relative ages of rockfalls. To be applied for estimating temporal frequency, a previous calibration by using data on temporal occurrence of events is required. Temporal data on rockfalls in the study site, or from other sites with similar setting, are also necessary for an heuristic hazard assessment to build personal judgement (tentative or fuzzy calibration). It should be clarified in the manuscript if, and how, data on recent rockfall events or on recent exposure of rock faces in the site or in close rock walls have been used for a qualitative estimation of hazard.

6) Susceptibility by SMR and assumed activity is used in the SMR-based method to define occurrence probability (Table 6). On one hand, this is simply formally not correct. As it has mentioned above, susceptibility (SMR) values do not give any information on probability of temporal occurrence. Nor, on the other hand, data on spatial density of morphological traces or weathering degree, unless they are calibrated with absolute ages.

7) Finally, the two methods used involve relative techniques for assessment of susceptibility and qualitative temporal probability, each one having your own scales for rockfall volume and temporal probability. Though results obtained are re-scaled using a common hazard rating, they can hardly be compared if a common reference regarded as "truth" is not used. Indeed, comparison seems more reliable if is done separately for the susceptibility results and temporal probability results obtained by each technique. Comparison of susceptibility results could be carried out by using the spatial distribution of rockfall scars (this method has been applied to validate relative susceptibility methods based on rock slope characterisation; e.g. SMR in Corominas and Mavrouli,

2009). Methods for qualitative assessment of temporal probability should necessarily be validated and compared by means of real data on temporal frequency.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2015-318, 2016.

Printer-friendly version

Discussion paper