

Interactive comment on “Assessing the effect of lithological setting, block characteristic and slope topography on the runout length of rockfalls in the Alps and on the La Réunion island” by Kerstin Wegner et al.

Anonymous Referee #3

Received and published: 27 October 2020

The paper presents detailed analysis of rockfall deposits mapped using point cloud datasets captured at four sites with differing lithology. The analysis explores how the properties of rock shape and volume along with terrain roughness and morphology influence runout distance. The findings are discussed and contrasted with previous works on the topic. Differences are identified in the runout character according to lithological setting. A number of analysis methods fail to link the measured metrics with the potential rockfall runout process controlling them and perhaps could be enhanced by applying alternative metrics of rock shape and volume. Inconsistencies in terms

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applied to descriptions of rock shape lead to some confusions in understanding the findings regarding the influence of rock volume and shape on rockfall runout.

The following observations and questions arise: 1) The differences in lithology between the study sites make this study of interest for rockfall. However, the fragmentation of rock during rockfall and the lithological control on preconditioning down slope fragmentation is poorly treated in this work. It would be interesting to consider the rock-mass properties of each of the rock walls. How do the site specific failure mechanisms, discontinuities and rock strength influence the distribution of rock fragments across the talus cone? Investigating this theme would be possible with the detail of data presented in this work, and have the potential to enhance the observations made in sections 4.1 and 4.2. 2) The use of rock axis ratios as a shape classification is an obvious choice given the volume of available data. Moreover, the geometric axis ratio has a bearing on the inertial axes of the rocks and its ability to maintain momentum during run out. The rock volume and shape are therefore coupled in their influence on runout behaviour. The analysis could benefit from coupling rock volume and shape. General comments to the text. 1. Introduction L34 to L38 The text introduces preconditioning and preparatory factors as well as triggering events. A clear distinction between preconditioning and triggering rockfalls for the examples of each that are given would be useful. L39 “Due . . . importance”, of what? L61 -63 please clarify the use of proximal in this sentence, proximal to the source or deposits?

2. Study sites L97 & 98 Please clarify the use of “untreated” with regards the rock mass description. Table 1 could benefit from details of the rock mass properties and strength.

3. Materials and Methods L122 consider replacing “Both . . .” with “Each scanner works . . .”. L124 clarity on the importance of coloured point clouds to the methodology would be useful. Section 3.2 the method applied to obtain rock volume using the three principal geometric axes a b & c give the volume of a cuboid. To what extent does this method over estimate rock volume in this study? L152 The applied rock

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shape indicator bundles the platy and elongate rock shapes into the same indicator, please discuss this choice in more detail. L154 The axis ratio of 1 in which axes are the same length is referred to as a round shape. How does the applied shape classification account for the roundness of the rock? Could an axis ratio of 1 be described as “equant”? Please consider applying equant throughout the text. How do larger rocks with flat sides but axis ratio of 1 runout in comparison to a rounded rock? Section 3.3 L168 “rock fall” please replace with rockfall.

4. Results and Discussion L190 please consider deleting “dispersion also”. L193 please consider “clearly shown” in replacement of “well visible”. L241 To what extent can this be attributed to fragmentation of rock during runout? L300 repetitive use of adverb “clearly” “obviously”.

5. Conclusions L345 the term sphericity is newly introduced in the conclusions, it is not clear how sphericity was measured in the methods. Is rounded or equant shape meant?

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2020-322>, 2020.

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