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Interactive comment on "Brief communication "Estimating rockfall frequency in a mountain limestone cliff using terrestrial laser scanner"" by A. Guerin et al.

Anonymous Referee #2

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The brief communication presents an interesting case study of an alpine rockfall dataset. However I'm not certain of the usefulness of the 'rockfall activity parameter' for the following reasons:

(1) The two datasets used in the discussion to compare the parameter values were collected using different techniques and consequently cover different rockfall volume ranges and are of different resolution and accuracy. Therefore comparing the value or significance of the rockfall activity parameter of the two sites is difficult. Comparing two datasets collected using the same technique would help clarify the usefulness of the parameter.

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(2) I'm not sure what the rockfall activity parameter and the ratio of its difference between two sites tells us about the geological, geomorphological and environmental controls of rockfall activity? And I think this is what the authors are saying is the purpose of the parameter value. Perhaps its calculation for a large number of sites may be able to tell us something about these controls.

I have included some recommended technical and grammatical changes for specific lines in the text below.

Technical changes

Page 124

Line 7: (See comment below for lines 11-16 on page 128: The magnitude-frequency exponent 'a' does not represent only rockfalls larger than 1 m3.) Also in the discussion (line 28 page 129) you use a different description to define the rockfall activity parameter - using it to look at rockfalls >100 m3, not >1 m3 as specified here.

Line 19: What do you mean by 'erosion factors'?

Page 124 line 26 – page 125 line 5: It would be useful to have a figure showing the cliff geology and morphology, including the elevations of the cliff layers so they can be compared to the position of the scanner.

Page 127

Line 17: What do you mean by a "watertight mesh"?

Line 22: States that volumes >0.1 m3 provide a better fit, yet in Figure 2 0.2 m3 is used as a cut-off. Would be better to be consistent in how the data is discussed and presented, as is done for Figure 3.

Line 23 - 27: "According to the accuracy expected" – Do you mean according to the accuracy calculated accounting for the errors caused by a – e that are discussed in the previous section? What is the deviation threshold is between the two scans accounting

for errors caused by a – e?

Page 128

Lines 11 – 16: The exponent 'a' is actually an indicator of the overall volume of rockfalls during a monitoring period, rather than the number of rockfalls solely > 1m3. Also research by Barlow et al. (2012) suggests that both a and b exponents can be also potentially determined by the spatial and temporal extents of the study, as well as geology and geomorphology, and there is evidence that variations in environmental forcing also influence the magnitude-frequency distribution exponents, see Barlow et al. (2012).

Page 129

Line 13 – 14: Include the equation of the rockfall activity parameter.

Grammatical changes

Page 124

Line 2: "Using a terrestrial. . .."

Line 3: "..over a period of. . .."

Line 15: "In recent years, terrestrial laser scanning. . .."

Line 20: "..allows accurate calculation of the frequencies. . .."

Page 125

Line 22: ". . .Application has been. . .."

Line 23: ". . ..than the rock of the cliff."

Line 27: "..from the scanner to the cliff.."

Page 126

Line 1: "The LiDAR point clouds were georeferenced by registering them with….."

Line 8: Should 'east' be 'right' as we don't know where east is on the x axis?

Line 10: "2.7 million triangles and 1.3 million vertex…"

Line 12: "…scanner to the cliff"

Line 19: "..due only to rockfalls that occurred…"

Line 23 "… the latter cause…"

Page 127

Line 10: "..in the previous paragraph."

Line 14: "..out of which 2 are false…"

Line 15: "…and 5 are uncertain…"

Line 26: "..out of which 229 are probable…"

Page 128

Line 19: "…maximum likelihood method…"

Page 129

Line 13: "..by the cliff surface area and…"

Line 19: "..from the 120 km…"

Line 22: "..falls per year per hm2…"

Line 28: "..per century per hm2.."

Page 130

Line 9: "Terrestrial laser scanning…"

Line 15: "…per year per hm2…"

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