

The article "**Assessing the relationship between weather conditions and rockfall using terrestrial laser scanner to improve risk management**" presents the results obtained during one year of rockfall observation using LiDAR. Three zones along Route 132 in Haute-Gaspésie (Canada) were studied. The peculiarity of the analysis presented is that instead of performing scans with a periodic frequency, these have been made related on weather conditions, trying to adjust as much as possible the triggers with the possible environmental effects that cause them.

The article is long and well written, although this reviewer considers that linguistic strategies have been used that make it difficult to read the text quickly and comprehensively. Examples of this are

- a) the overuse of a lot of coding which makes it difficult to understand [245-260, 311-317], or
- b) the use of the terms rockfall and rockwall together in same sentences [e.g. 55]. In this case, the reviewer suggests using other terms such as rockface, rock-slope, cliff for future works, which, as well as helping to improve the positioning of the paper (Google scholar), will be more consistent to the bibliographic references [37-38, Abellán et al. 2014 -> rock slopes].

Also, in terms of writing, the reviewer suggests reviewing the use of the separation of thousands. As an example: [367 vs 111,213] (Occurs in more cases). In addition, it also suggests homogenisation of the units (mm/yr) or (mm/a) [340 vs Figure 7]. Same as the term for this result. Please always use Erosion rate (Figure 7) or Retrate rate (348) to refer to these values.

Finally, this reviewer asks for the following typing error to be resolved: Figure 9(a) and the text [285, 291] refer to a data collection on 23 February, while Figure 3 refers to 24 February.

In addition, the author suggests that the following minor errors be modified:

Line 37: Try to remove one challenging

Line 43: Combining -> maybe it's better use "comparing".

Line 46: I understand the idea...but maybe is a strong sentence and not up to date.

Line 63: This sentence needs a reference.

Line 103: Very impressive numbers! Valore to show it adding the relationship events/years/km (16 rockfalls/year/km)

Line 112: Consider 350° as a pure north

Line 125: Reference required

Line 134: Figure 2(b)

Line 137: Please, add the M3C2 quote (Lague et al 2013)

Line 239: Use 5 and 20, or five and twenty

Line 283: Add space between Figure 4 and Figure 9

Regarding the **scientific aspect** this reviewer would like to notify the authors that an in-depth revision of the article should be considered based on the following major points:

- a) In the methodology it is not described or referenced which workflow has been used to go from the M3C2 comparison to the "rockfalls". There are different strategies such as applying clustering algorithms (DBSCAN...), filter values etc. In no case can the reader know which threshold value has been used to show the red/green points in Figure 6, A1 or A2. This value that allows separating Positive Change and Negative Change from noise is crucial to identify the accuracy of the method.
- b) Furthermore, although the magnitude (volume) is a key element in all the scientific discourse of the article, at no point is it described how it is calculated. There are different published methodologies, but none is referenced.
- c) This reviewer has not found anywhere (method, discussion...) if all the red clusters observed in Figure 6 have been considered as rockfalls or not. There are few errors associated with the vegetation identified in Figure 6, A1 and A2. Have all clusters been considered or only some of them? What criteria have been used for this selection?
- g) The classification of periods is a bit complicated. Although the reviewer appreciates the effort of the authors (and appreciates Figure 4). I would make more effort to explain how the periods have been classified. For example, the LiDAR capture from 19 March to 21 March is considered WIN. FT, but it is the second period with the highest rainfall intensity according to Figure 9.
- d) The reviewer considers it an error that figure 10 is presented in the results in the way it is done. This result is neither introduced in the introduction nor explained in the methodology. It appears suddenly in the results and neither the colouring nor the classification can be discussed because there are no references. If the authors consider it to be a relevant result, the reader should be led to it, finding it natural and consistent with the reading to obtain this result.
- e) The conclusions should be revised. "Line 457: This study proposed the novel technique of quantifying rockfall volume using LiDAR during...". This study does not propose any novel technique for quantifying volume. In fact, it does not explain how it is done.  
"Line 462: "which is among the highest in the world". This is neither referenced nor presented in the main text and needs to be referenced.
- f) I find missing in the main discussion the analysis of why a per phenomenon analysis is better than a periodic one (Late motive of the article that requires further development in the discussion). In general discussion can be improved.

Minor changes:

Line 64: Be careful with the terms hazard and risk. Rockfall hazard can only be mitigated by changing the physics of the rockfall. The work that you have implemented helps to mitigate the Risk.

(risk = hazard x exposure x vulnerability)

Line 97: Natural Hazard -> Well used!

Line 221: Please, change “pre-rupture movement” -> “pre-failure deformation”

Line 432: You are introducing into the discussion a singular result that has not been presented before.

**Regarding the results, this reviewer wishes to notify that:**

a) At no point are the results presented separated by study areas. This separation is key to identifying if patterns are reproduced equally in all areas. Presenting everything together implies that no comparative bias can be applied. The article would gain a lot of force if the results are presented for each study area and the result of the comparison of the 3 areas leads to the same conclusions.

b) At no point are the raw results presented. Number of rockfalls identified and their magnitude for each study area and for each LiDAR comparison. Although the reviewer agrees with the "cooking" of the results, he considers that the article should start from the raw results and from there carry out/apply the corresponding analysis.

**Figures** (minor changes at authors' choice):

Figure 2: Please, change "Cloud autocorrelation" in c,d and e. Change to names more appropriate to the process (c,d -> merge?, e-> 3D Comparison). And explain the methodology better. M3C2 comparison, how to isolate the clusters etc.

Figure 5: The fourth group with the most rockfall in the histogram is not enlarged (and is the group where the rockfalls associated with the highest risk occur). List or show how the rockfalls in this group evolve (this is the only graph where we can see the rockfalls you have identified).

Figure 6: The colour scale does not help to identify the comparison. For experience, different colour scales (one for positive change and one for negative change) will allow the reader to better appreciate how the deformation evolves.

Figure 9a: Is it possible to have double freeze-thaw for the same period? Specify because for captures between 19/03 and 27/04 there are double readings of values. Filter or specify it, please.

Figure 9b/c: Although I understand the intention and I think it can be well solved, adjust the heights of the bars 9.3, 6.3, 13.8, 8.5.

Figure 11: Consider the real need or not to add an image at the end of the whole discussion, when this rockfall has not been presented individually throughout the text.