

Author's point-by-point response to referees

We would like to thank the two referees for their positive feedbacks. This third version of our manuscript follows most of the modifications proposed by the referees 3 and 4. You will find below a point-by-point response to the referees. The modifications are written in purple in the author's track-changes file.

Referee 3 (report 1).

You propose to shorten substantially the section "5.4 Dissemination of the acquired knowledge to the mountain community and implementation of management measures of the route", to avoid distraction of the mainly academic audience of NHESS. However, we decided to keep this section 5.4 and not reduce it for two main reasons:

- (1) the dissemination of our results "within the mountain community to promote the implementation of efficient adaptive behaviors and to avoid an increase in the number of accidents due to rockfalls" (L. 68) is one of the objectives of this study.
- (2) The journal NHESS addresses its publications to "a wide and diverse community of research scientists, practitioners, and decision makers concerned with detection of natural hazards, monitoring and modelling, vulnerability and risk assessment, and the design and implementation of mitigation and adaptation strategies, including economical, societal, and educational aspects". So, we feel that the dissemination part we developed completely fits within the objectives of education that NHESS wants to fulfill.

Line 56. Between the 29 June and 04 September 2019, there were 17,768 ($\pm 7.2\%$) passages on the route. The risk of death for one passage is therefore $2 \cdot 10^{-4}$. In comparison, in Switzerland, experts tend to agree that an annual risk of death due to natural hazards of less than 10^{-5} is acceptable (PLANAT, 2015). However, the main limitation of this comparison is that the exposure to a hazard on an annual scale is compared with an exposure on a very short period of time of a few seconds/minutes.

Line 177. We made the text modification.

Line 196. We changed for "contours".

Figure 3. In the Goûter couloir, it is very rare for a rockfall to be a single falling block. In most cases, a rockfall event involves dozens of blocks falling at the same time. You have good illustration of it in the following videos:

<https://www.youtube.com/watch?v=JDbsq2EFjfU>,

<https://www.youtube.com/watch?v=LHwYupeWE>,

<https://www.youtube.com/watch?v=JUPjRGbeAYU>

In the figure 3.B, the different impacts from 1 to 8 indicated in the seismic signal are the result of multiple rocks falling. Therefore, the location of each impact can't be really compared together. In order to indicate this more clearly, we have changed the title of the figure as follows: "Seismic waveforms of multiple successive rockfalls that occurred on 02 August 2019,

recorded by the 5 sensors (noted S1 to S5 and located with triangles on the maps of subplots B)".

Line 218. You are right, it is a 2-year period. We changed it in the text.

Line 234. We made the text modification.

Line 234. We did 3 sessions every year. We deleted "at least".

Line 237. We changed for "Trois Monts Blanc"

Referee 4 (report 2).

Section 6. The objective of this section was to highlight that the future effects of climate change on high mountain environments are likely to lead to a change in the rockfall regime in the couloir du Goûter. We agree with you that this section is too far from the main goal of the article, and indeed does not bring new fundamental elements to the article. So, we decided to delete it.

Overall title. You are right that the primary objective of the study is one step before the direct promotion of mountaineer's adaptation. However, the objective of the study is not only to "« better characterizing the rockfall hazard and its origins in the Goûter area". It is also to disseminate the results to the mountain community with the aim of encouraging the implementation of adaptive measures (introduction, line 67). The study was therefore designed from the beginning to acquire data relevant to mountaineers and to disseminate the results in order to encourage their adaptation. The way in which we responded to this objective of disseminating the results is presented in section 5.4. and shows that they were effectively mobilized for the implementation of adaptive measures.

Considering these elements, we have changed the term "promote" to "encourage" in the overall title, which we feel is more in line with the objectives of our study.

Line 487. We made the text modification.

Line 489. Following your suggestion, we changed for "However, the effectiveness of these management measures, particularly in reducing the number of accidents, has not been examined in this study".