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Discussions

Interactive comment on "Rainfall and weather conditions inducing intense landslide activity in northern Spain (Deba, Guipúzcoa)" *by* Victoria Rivas et al.

Anonymous Referee #1

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The manuscript deals with the analysis of the rainfall conditions that caused a moderate landslide activity in a small area located in the Cantabrian Mountains from 1954 to 2015. The topic would be interesting, but the work is affected by serious methodological errors and by a lack of key information on the dataset used for the analysis. What is indeed surprisingly is the contrast between the short but detailed review of the literature reported in the introduction and the subsequent imprecise approach used to analyze the available data. In the following the main concerns regarding the methodology used in this work are reported.

1. Table 1 - which is supposed to report a summary of the information on available

data - does not include any information on the exact day when the first-triggered land-slides occurred; perhaps, but it is not explained in the text it reports the time interval between two successive flights. This is maybe confirmed by line 77 in the text: "Iden-tified movements have been assigned to 21 time intervals". The lack of information on the landslide occurrence dates severely affects the calculation of the rainfall conditions responsible for the failures, thus introducing a high uncertainty in the rainfall duration D and rainfall mean intensity I.

2. The ID rainfall threshold (Fig. 4) has been defined using 688 dated landslides occurred in six rainfall episodes with multiple landslides. As it is generally meant in literature, a minimum ID rainfall threshold is defined using only the rainfall conditions that first triggered a landslide for each rainfall episode, i.e. the "minimum" rainfall (D, I) able to trigger a failure. This minimum curve is supposed able to identify a potentially dangerous scenario, especially when the threshold is used in a landslide early warning system. This would mean that in fact among 688 landslides only 6 are likely useful to calculate the threshold. As you might guess, this number is insufficient in terms of statistical significance and reliability of the threshold, even in such a small area.

3. Related to the previous point, the uncertainty affecting the reconstruction of the rainfall conditions that have triggered the landslides is not quantified.

4. There's no mention of how the rainfall threshold was defined. Since a decade or more, there is plenty of objective and reproducible methods available in literature to define a reliable threshold (e.g. Bayesian, frequentist).

5. Recently, Marra (https://doi.org/10.1007/s11069-018-3508-4) and Gariano et al. (https://doi.org/10.1007/s11069-019-03830-x) have been demonstrated that for rain-fall thresholds calculated using daily rainfall information, the duration D cannot be ex-pressed in hours, otherwise the obtained power-law curve would become artificially steeper. As a consequence, in the threshold equation D has to be measured in days and hence I in mm/days. A minor suggestion is to use the same color scale for Fig. 2,

in order to allow a better comparison of the maps.

I suggest to revise completely the analysis of available data and to change the goal of the paper, unless more information becomes available on landslides.