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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Influence of uncertain identification of triggering rainfall on the assessment of landslide early warning thresholds" *by* David J. Peres et al.

Anonymous Referee #2

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GENERAL COMMENTS In this manuscript the authors investigate the effects of uncertain knowledge of the timing of landslide occurrence on the definition of intensity-duration rainfall thresholds. The study is based on synthetic rainfall data and virtual landslide events. Thresholds are defined using the True Skill Statistic as optimization criterion. The work is carried out for one ideal slope in the Peloritani Mountains in Sicily (IT). Overall the paper is well written, with a clear structure and objective. I believe it could benefit from some more elaborations on some of the aspects presented, mentioned here below. I recommend minor revisions before publication on the journal.

SPECIFIC COMMENTS

1 – On the line of what already mentioned by Anonymous Referee #1, the study is purely focused on one ideal slope and synthetic data. The authors could discuss how this might make the results transferable to a real situation, when regions are considered and heterogeneities come in to play. This with respect especially to the difference in the scale and the use of virtual landslides.

2 – The authors should report the total number of landslides as well as of non-triggering events considered. While this probably changes with the different parameters for the definition of the events, it would be useful to give an idea of the "robustness" of the results, that is whether the change of just few events among different scenarios would affect or not the threshold. Although the TSS considers both triggering and non-triggering events, the less the triggering events the more their relative importance on the definition of the threshold.

3 – The authors could elaborate more on how the threshold was defined, as the results are difficult to explain without this information. An example is the change going from the case shown in Figure 5a to 5b. The "two rainfall events shifted to a duration of 1 h" (line 18-19 page 6 in the text) cannot be responsible for the lowering of the threshold intercept or slope as they are not correctly captured by the threshold but are "missed". So either some other triggering events changed causing the decrease of the threshold or the threshold shouldn't have changed. All this is true unless the authors gave somehow weight also to the distance from the threshold. If being just below the threshold or well below the threshold makes a difference in the TSS, then yes those points could be responsible for the change and you should ignore this comment, but it would be helpful if the method would be explained.

4 – It seems that in general the points in the ID plane always move down (or left) in all the different scenarios. One would expect that sometime the landslides occur during intense rainfall storms and therefore including some extra hours actually could increase the intensity and duration.

5 – The authors could explain better how the different scenarios are then used and corresponding triggering events selected. In fact the scenarios are explained very well, but it is unclear how the events are then constructed. Is ei randomly selected for each virtual landslide within the range defined for each scenario? Are then the results shown only one possible realization? Or is the wrong timing always fixed to Ta (that is always midnight, either 0, 24 or 48)? In other words, is the triggering event always the one happening at midnight or the last one that happened just before then? That wouldn't be a very realistic case because one would either try to find out at least whether it was morning or afternoon, or choose the most intense event within the day (which would then result in an overestimation of the threshold, but probably would still better than taking midnight rain) or choose the typical timing of landslides. Also for an available database, not for all entries timing or at least part of the day would be unknown (for the example you report in line40page1 to line2page2, only 27.7% of the cases would fall in this case, of only day know)

6 – The case of the Italian rainfall dataset is presented in which precipitation for the day D is collected for the 24h preceding 9am of day D. Wouldn't one use this dataset by shifting it by one day? So that precipitation of day D is between 9am of day D and 9 am of day D+1? Surely there will still be some error as it still wouldn't match with the day definition, but this would probably be more meaningful.

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