Natural Hazards
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Discussions

Interactive comment on "Rainfall thresholds for shallow landslides occurrence in Calabria, southern Italy" *by* C. Vennari et al.

C. Vennari et al.

gariano@irpi.cnr.it

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We would like to thank the referee for the careful review and the valuable comments, which were constructive and useful to correct our mistakes and to improve the quality of the manuscript. Our replies to the specific comments are listed below. In the attached file you can also find the responses, a revised version of the manuscript and the figures.

1. Use of units. A number of Equations for Intensity-Duration (ID) and Event-Duration (ED) thresholds are reported and discussed in the "Background" Section. These equations require the specification of the units which are used in the writing (typically, these are mm, hours and mm/hours). The identification of the units is reported at P5149 L5, but this arrives too late in the ms for a correct understanding of the equations reported

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in the "Background" Section.

P5144 L10-12: The suggestion of the reviewer is accepted, by modifying the sentence as follows: "Inspection of the literature reveals that most of the thresholds are determined considering the duration (D, in h) of the rainfall events, the event cumulated rainfall (E, in mm) or the mean rainfall intensity (I, in mm/h) of the events that have resulted in landslides."

2. Please report how the surface measures provide a metric for the geographic accuracy. Moreover, please provide the relative frequency of landslides in each spatial and temporal accuracy class. This provides a measure for the accuracy of the gathered landslide data. P5147 L10-17: The suggestion of the reviewer is accepted, by modifying the sentence as follows: "Individual landslides were mapped as points, and were given a level of geographic accuracy, P1, P10, or P100, depending on the detail of the information source. In particular, we considered a circular buffer to define a high (P1 < 1 km2), a medium (1 ≤ P10 < 10 km2), or a low (10 ≤ P100 < 100 km2) accuracy, according to Peruccacci et al. (2012).".

The relative frequency of the landslide spatial accuracy is already reported in Table 1. We report now in the text also the relative frequency of the landslide temporal accuracy: "In the catalogue, the number of rainfall events with high, intermediate and low temporal accuracy is 65 (34.9%), 76 (40.9%), and 45 (24.2%), respectively".

3. Please provide a comment on the distribution of the landslide-triggering precipitation depths, in terms of recurrence intervals.

The recurrence intervals of the precipitation depths that triggered landslides are extremely variable and spans for example from 13 days for a rainfall event nearby the 5% threshold to, at least, 5 years for the most severe rainfall events.

4. Please better specify what the authors mean for 'trend'.

With "trend" we refer to the shape of the distribution of (D,E) pairs. We modified the

sentence at P5152 L22-23 as follows: "The shape (e.g., slope and dispersion) of the distribution of (D,E) pairs for each lithological domain has to be confirmed by collecting a larger number of events.".

5. "We conclude that the established ED thresholds (..) are slightly lower than expected". The meaning of this sentence (which is also reported in the Conclusions) is not completely clear to this reviewer. It seems that the sampling problem associated to the use of the 186 events (statistical granularity) imposes limits to the specification of the ED thresholds. Hence, the text reported to describe the problem should make clear that this is essentially a sampling problem. The asymmetry of the empirical distribution may also play a role, since it exacerbates the sampling problem.

We changed the text as follows: "These percentages are lower than it would be expected (i.e., 1% and 5%, respectively). The result is directly related to the statistical technique used to determine the thresholds, and to the lack of symmetry in the distribution of the empirical (D,E) points around their mean tendency line (Brunetti et al., 2010)."

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/1/C2069/2013/nhessd-1-C2069-2013-supplement.zip

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 5141, 2013.