

Interactive comment on “Technical notes: Rainfall threshold calculation for debris flow early warning in areas with scarcity of data” by Hua-li Pan et al.

Anonymous Referee #1

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General Comments The paper explores a very interesting topic: the occurrence of debris-flows after earthquakes producing huge amounts of loose deposits remained in the channels and on the slopes. To this aim, a simple physical model is proposed; it is calibrated and “validated” on few cases available on the area. The cited literature is adequate and the approach could be reliable. However, data characterizing mechanical, rheological and hydraulic behavior of the soil are not properly displayed. Moreover, the reliability of the physical approach for such cases is not properly substantiated. In particular, the choice of accounting for antecedent precipitations avoiding to adopt usual I-D approaches should be justified. In this perspective, the paper should be substantially improved according my view. Under such constraints, it could be reconsidered only after performing major revisions Furthermore, specific comments and requests for

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clarifications/modifications are reported below:

Abstract

L28: please amend “scarcity” for “scaricty”

1 Introduction

L32-80: probably, reorganizing the first part of abstract could help readability; my proposal is first introducing debris flow and rainfall thresholds, after debris flow post earthquake and associated thresholds with the focus on debris flows post 2008 earthquake

L72: please amend “triggeringdebris” in “triggering debris”; please check the entire Manuscripts where several typos are recognized

L82: please stress the deep uncertainties affecting “frequency calculated method”

2 Materials and methods

L106-108: please check font size

L109-110: what do you mean for “The characteristics of rainfall in the watershed were analyzed firstly by the field survey” (in this sense, also further details for figure 1 should be provided)

L124-126: grain-size distribution regulates hydraulic properties and then duration and intensity of rainfalls triggering the event; please introduce such elements about it

L129: please cite as “Rianna et al., 2014”

L130-138: the assumed link between debris flow initiation and rainfall pattern should be deepened; as reported in previous item, hydraulic properties of soils involved regulate what type of rainfalls can generate or not phenomena. As general rule, the higher the conductivity, the larger the influence of short heavy rainfall events able to totally entering the soil; on the other side, for soils characterized by low hydraulic conductivity, cumulative values on longer time spans are relevant for mass movements. L146:

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please move the Figure 3 below under the related text.

L148-156: please stress the constraints associated to such assumptions

L161: avoid the term “density” for soil particles; “unit weight of soil” could be preferable

L162: please check font size

L172: avoid the term “density” for soil particles; “unit weight of soil” could be preferable

L172-174: please specify if such parameters can be assumed constant or featured for such soils; in this case, please move in “Case Study” section

L176-177: please provide further details or brief definitions for d16,d50,d84

L180: please specify what you intend for “stored-full runoff”

L190: please confirm that I_m is roughly represented by porosity for soil depth

L196: why is 1h assumed as reference duration?

L202: what do you intend for “computational step”?

L204: how do you define such parameters?

3 Case study

L218-219: please check the number of inhabitants

L254: you could consider the table a simple list of events occurred; frequency is not calculated

L263: please define “abnormal”; in this perspective, the rainfall threshold could be used to define rainfalls of interest

L265: please correct “monitroring”

L283: please correct as “Figure 9”

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L282: you could report also reference percentiles of PDF (e.g. 25 and 75) in order to evaluate if 2011 and 2012 trends are included in range

L297-300: for debris flow, a graph similar to Figure 9 for monthly average maximum daily precipitation could be very useful; in this regard, to maintain consistency, you should use 1971-2000 time span

L301-310: information about hydraulic conductivity of involved soils is crucial to understand what could be the duration of interest; also for rainfall patterns reported in Figure 10, reporting hourly rainfall values could be interesting

Figure 11: please provide further details about annual average data; of course, you calculate only on wet fraction; what is the threshold for discriminating rainfall event? E.g. 1mm/d

L320-321: please you confirm that the data reported in line in figure 11 are related to average values and not to average of maximum yearly data?

L333-338: an evaluation of hydraulic behavior is crucial; as you report short term durations are crucial. Are you sure that antecedent precipitations could play a relevant role for triggering events?

L343-351: the sentences could be moved in “Introduction” part

4 Results

L358: please check the number of equation

L359: please report on y-axis that the graph reports “Percent passing by weight”

L365: please specify in which ways the value about velocity is retrieved

L367: please specify on what soil depth you evaluate I_m

L377-387: the formula is not clear; please provide further details; indeed, it is not clear why you sum rainfalls (R_t) with effective rainfalls. Moreover, K parameter should be

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not related to atmospheric conditions but to geomorphological conditions regulating the “detection” time of water in the soil depth of interest (e.g. hydraulic conditions, bottom conditions, slope angle). Moreover, it could take into account the effect of evapotranspiration losses reducing the amount of soil water content . For very coarse soil, K could be very low. An interesting work about such parameter is carried out by Baum & Godt (2010) (DOI10.1007/s10346-009-0177-0) and cited works.

L396-397: the issue related to antecedent conditions is widely debated in literature; in this perspective several elements concur and then further details about involved soil are required

Table 4: it provides several information already available in Table 1; please merge the two ones

Figure 14: please provide information about why the reliability of I-D rainfall thresholds accounting for only “triggering” event has not been assessed.

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