

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 #3

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The manuscript proposes development a “quantitative method to identify rainfall threshold for debris flow early warning in data-poor areas based on the initiation mechanism of hydraulic-driven debris flow”. Therefore, cannot be considered a classical debris flow mechanism, where the triggering starts on slopes with high declivity, generally from the generalized shallow landslides (models of the unsaturated soil mechanics). Unlike this, the methodological proposal of the manuscript involves modeling with physical characteristics of the loose solid materials (landslide triggered by earthquake - loose deposits that have served as the source materials for debris flows) using the equations (3) and (4) – Takahashi’s model. This issue is very important and should be highlighted (emphasized) in the manuscript, mainly because the rainfall thresholds obtained in this paper cannot be generalized and used to classical debris flow’s early warning systems

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or, at best, used with reservation. In general, the manuscript needs to be more concise and written better. Additionally, in my understanding and opinion, some inconsistent scientific aspects of key parts of the manuscript significantly compromise their acceptance and publication, in the mode as they are. The main scientific inconsistencies of the manuscript are listed below: 3.4 Data collection and the characteristics of rainfall – in this point, the characteristics of the pattern rainfall need to be better explained scientifically, for example, as from others rainfall indexes (accumulated of 48h, 72h, 96h, etc.). In addition, some pattern rainfall indexes analyzed (lines 282 to 300) correspond to previous periods (1971 to 2000 and 1957 to 2008) to the occurrence of the debris flows events (2008 to 2014). In the case of a have information about the pattern rainfall from the debris flows events occurrence period, it is consider fundamental to analyze in detail the rainfall indexes for this period, that is, from 2008 to 2014 (take as an example the information in Figure10 – page 15). 4.1.1 The critical depth of the Guojuanyan gully – the equation (1) used for calculate the critical depth (line 358, page 17) are wrong. The correct equations are (3) and (4). 4.1.2 The rainfall threshold curve of debris flow – in the lines 368 to 369, “. . .rainfall threshold curve of debris flow in the Guojuanyan gully is shown in Table 3”, was used which equation to calculate the threshold curve? 4.2.2 The rainstorm and debris flow events in the Guojuanyan gully during 2010-2014 Analyzing the data of the Figures 13 (a, b, c, d and e), it is observed that the triggering rainfall of debris flow events are situated well above (136 to 165 mm) of the established rainfall threshold (107 mm). The data of the Figure 14 corroborates with this statement. Additionally, two points of debris flow no occurrence were verified above of the rainfall threshold curve. Therefore, the authors’ assertion (lines 433 to 437) does not match the results presented and will have to be re-analyzed. 6 Conclusions - The statements contained in the paragraph between the lines 481 to 483 need to represent better the results presented in Figures 13 and 14, this is, the rainfall threshold curve proposed should be used with caution, because it contains relevant uncertainties due to the scarcity of data.

The following are some comments aimed at improving and clarifying some points of the

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manuscript: Line 101 - "...method nor frequency...." change to ".....method for frequency ..." Line 125 - "..., corrosion resistance,..." the correct meaning is not "..., shear resistance,..."? Lines 246 to 248 - "The Guojuanyan gully had no debris flows before the earthquake; however, it became a debris flow gully after the earthquake, and debris flows occurred in the following years (Table 1)". This does not seem obvious, because before there was no material deposited! Lines 249/250 - "...density of the debris flow was between 1.8 and 2.1 g/cm3..." the correct meaning is not "...density of the soil was between 1.8 and 2.1 g/cm3,..."? Line 265 - "..., monitoring center,..." change to ".....monitoring center" Line 321 - "...obsevation...." change to ".....observation...." Line 327 - "...maxmum...." change to ".....maximum...." Figure 13 (e) – reform the label "debirs flow" Figure 13 – standardize the figure's legend

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