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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A preliminary study on the comprehensive threshold for debris-flow early warning" *by* X. Xue and J. Huang

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A rainfall and pore pressure thresholds for debris-flow early warning: The Wenjiagou gully case study

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The authors would like to thank the two reviewers for their thorough work on the manuscript providing us with insightful and constructive comments and suggestions, which helped improve this manuscript. We have tried our best to carefully consider and respond to all the comments raised. The title of this manuscript has been changed to "A rainfall and pore pressure thresholds for debris-flow early warning: The Wenjiagou gully case study".

Response to Anonymous Referee #1 Thank the reviewer for the kindest article summary.

General Assessment: 1. Please, number the lines.

The revision has been added the numbers of lines.

2. English needs to be improved.

The language has been improved thoroughly and the text has been well edited.

3. It is not clear to me what "comprehensive" means when it is referred to a rainfall threshold. Compared to a single rainfall threshold, the pore pressure has been considered in this study. Therefore, the thresholds include these two factors.

4. The approach is too simple to be published in a top-rank journal as NHESS. It is very simple with respect to the current state of the art of both empirical rainfall thresholds and physically based approaches.

The method presented in this manuscript is simple, but it's still difficult to provide in these mountainous areas in Southwest of China particularly for the lack of valid data. However, the catastrophic disasters occurred every year in these regions, so that is so much urgent requirement for a simple and useful warning threshold under a limited information background.

5. The introduction is very focused on China, discouraging the interest of a possible international audience.

More information about the warning thresholds for debris flow presented by international researchers have been added in the revision.

6. FIG 7: the way the line is drawn is very subjective and it is not supported by evidence. A threshold like I = 0.17R + 20 could be valid as well. Or even better, from a purely graphic point of view. The threshold line is defined by a probabilistic and empirical method presented by Zhuang et al. (2014) and Huang et al. (2015b). This

method has been used directly in this work for lack of enough data and urgent demand. Zhuang J-q, Iqbal J, Peng J-b, Liu T-m (2014) Probability prediction model for landslide occurrences in Xi'an, Shaanxi Province, China Journal of Mountain Science 11:345-359. Huang J, Ju NP, Liao YJ, Liu DD (2015b) Determination of rainfall thresholds for shallow landslides by a probabilistic and empirical method Natural Hazards and Earth System Sciences 15:2715-2723 doi:10.5194/nhess-15-2715-2015.

7. In the manuscript there is a threshold linking I and E (rainfall parameters) and a series of threshold values of U. It is not clear to me how these two different aspects (rainfall parameters and U) are linked together in the analysis and in the procedure of forecasting. They appear to stay disjointed. This manuscript has been greatly improved to express itself in a clear way. During this study, rainfall and pore pressure are both considered in the warning threshold. First, the relationship between the two factors are analysed. Then, a threshold combined with both of them are presented.

8. The test is represented by a SINGLE event that DID NOT trigger debris flows. This is not a good test: it does not support anything. Moreover, the threshold was exceeded (fig. 8).

During this work, one single event was introduced in this manuscript for a better explanation about the approach. Surely, it can be seen that the rainfall threshold was exceeded, but the pore pressure was not exceeded during the rainfall event. Therefore, there is no debris-flow occurred during this rain event. Finally, this case study shows that the presented threshold is a useful tool for debris-flow prevention and mitigation in mountainous area at a preliminary stage. And the warning threshold can be improved and modified as long as more data are available during subsequent studies in the future.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2016-149/nhess-2016-149-AC1-supplement.pdf

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