Natural Hazards
and Earth System
Sciences
Discussions

Interactive comment on "Study on the combined threshold for gully-type debris flow early warning" by Jian Huang et al.

Jian Huang et al.

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Re: nhess-2018-241 Dear reviewer, With this letter, we are submitting the revised version of the captioned manuscript. All comments from the reviewer have been well addressed. Details are given in the attached response.

The co-authors really appreciate the invaluable comments and do believe that the manuscript has been greatly improved accordingly.

Thank you very much for reviewing.

Best wishes, Jian Huang Manuscript: nhess-2018-241 Title: Study on the combined

threshold for gully-type debris flow early warning Authors: Jian HUANG, T.W.J. van Asch, Changming WANG, Qiao LI

Revision - reviewer' response Summary of the paper: Huang, et al., 2018 implement an early warning system for gully-type debris flows, especially for the northern part of Qingping town, Mianzhu city, Sichuan province, southwest China. The authors attributed the recent occurrence of such mass movements in this region to the fact that the area was hit by an earthquake and heavy rainfalls over a short period of time. That resulted in the gully – type debris flows mentioned before. As a consequence, the authors developed a three-step warning system choosing the critical pore pressure and rainfall factors as their key parameters. Their system/model, which should be pointed out, is quite an accomplishment considering they developed and applied a new model from scratch. Answer: Thanks for the reviewer's comments.

Minor Comments: 1. Reading the paper it was sometimes hard to follow the thread since there were some structural in the paper under review by Huang, et al., 2018 in the methodology chapter. It not only contains methodological aspects but also the data analysis. That being said, the methodology chapter should end at line 144 and the data analysis should be put into a new chapter called e.g. "Results". Answer: Thanks for the reviewer's such a good suggestion. The structure of this manuscript has already been revised in this revision. 2. The discussion chapter (starting at line 270) limits the application of said model to one specific gully, but in the introduction they suggested that they developed a model that was applicable for more than just the one gully. Maybe a change in phrase should be considered, since it is a little misleading for the reader. Even more so as they give an outlook that a broader application must be done in future studies. The same could be said for the abstract which leads the reader to believe that they indeed developed a model that is applicable for mountainous areas in general which in other ways is very well written and summarizes the paper well. Answer: The abstract and discussion of this manuscript has been revised in this revision to make it clearer for understanding and without misleading. Comments on

the Content: 1. Given that it is indeed a new model and that its application is limited to southwest China at the moment, the question arises why the authors have developed it in the first place. Answer: Gully-type debris flows are common in Southwest China, especially after the Wenchuan earthquake. The Wenjia gully was not a debris flow gully before, but it caused great damage and economic losses right now. Therefore, based on the consideration of research funds it has been selected as a typical case study area for the field monitoring and data collecting. Even though there are many limitations and work to deal with in a short time, we still have to begin this study as soon as possible. 2. There are several other models on slope stability as well as warning systems that should have been at least mentioned in the paper. The authors, moreover, do not give a reason why they have decided in favour of their specific model to calculate their parameters since there are several other models to calculate them and therefore Huang et al. should make their motivation clear. There is for example the SINMAP – Model (Deb & El-Kadi, 2009), a GIS -based model for example used in Hawaii in order to predict landslides or the even older TOPMODEL from 1979 (Beven & Kirkby, 1979) to account for the hydrology. Answer: More referred literatures have been added in the introduction of the revised manuscript. The authors finally selected the model from Keefer et al. (1987), which is mainly determined by the field monitoring system, including the rain gauge and pore pressure monitoring sensors. The aim is to find the relationship between the rainfall and pore pressure, as well as the occurrence of debris flow events. 3. On the other hand, the authors (Huang, et al., 2018) made it clear why a warning system for the south west part of China was needed, since the model's first and foremost application should be to save lives in the region. Answer: The earthquake trigged thousands of landslides and cracked mountains, which made these areas prone for debris flow development under rainstorm conditions, and its effect maybe for a long time. Based on these reasons, Wenjia gully has been selected as a case study area, and establish a field monitoring and early warning system to mitigate the losses from debris flow. 4. As for choosing the critical pore pressure, the authors do not justify their preference of this parameter over, for example, the

Factor of Safety or the critical soil depth (MEMPS – Model, (Michel & Kobiyama, 2016)) to estimate the debris flows. Answer: Based on the field monitoring system, critical pore pressure has been selected as a triggering factor for forecasting debris flow occurrence. The other parameters, we think that they might be useful for the geohazards early warning system, and we will study them in the near future. 5. The application and presentation of their findings benefit from the large amount of data which were collected through their measurements but it lacks a specific figure/map overlaid with their model. That would have made it easier for the reader to see where the different warning levels had occurred. Answer: During this application, the tracing alert is in a real-time way. So, we focus on the combined thresholds, to check whether it's useful or not. For readers, it's better that more figures provided for a comprehensive understand where the different warning levels had occurred. But frankly speaking, when we came to the field for an investigation. It's very hard to make sure the accurate position where debris flow start. Therefore, the map of different warning levels we didn't put it into this manuscript. Fortunately, we got more field monitoring data and experiences on debris flow early warning for the next study. Summary: 1. All in all, the paper describes quite a new approach for estimating the danger of debris flows but it does not give a motivation why this specific model has been chosen and not other methods already published. On the other side, the authors of the study clearly stated why a model is needed. This should make a good basis for future studies on gully – type debris flows even though the use of the chosen model is still limited to testing the area described. On a positive note, it can be said that, the paper is also suitable for people that are not familiar with the topic and besides the methodology chapter being not that structured and the discrepancies between abstract/discussion on the one hand and the introduction on the other it is indeed very well written. Answer: Thanks for the reviewer's comments. The Wenjia gully was selected as a case study, and the model used in the area for its simple and useful consideration, as well as determined by the field monitoring system. The nice suggestions about the literatures and structures change are finished in the revised manuscript, and the continued

research in the near future.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-241/nhess-2018-241-AC2-supplement.pdf