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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Hazard Assessment Comparison of Tazhiping Landslide Before and After Treatment" *by* Dong Huang et al.

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Response to Reviewer Comments

Manuscript title: (the original title: Hazard Assessment Comparison of Tazhiping Landslide Before and After Treatment) Manuscript number: 2019-391 Thanks very much for reviewer's comments, which helped us to improve the quality of manuscript. We have made major revisions to address the comments raised by the reviewer. The following responses have been prepared to address reviewer' s comments in a point-by-point fashion. All changes have been marked with RED in the revised manuscript. We would be happy to make further modifications if required. We hope the changes listed have made the manuscript suitable for publication, and we look forward to your response.

General comments

Q1: The manuscript presented a fluid mechanics based method for landslide/debris flow modeling, and was further applied to a real landslide case for hazard zones mapping. The topic is scientifically significant for nature hazard mitigations. The manuscript was logically organized and the results were well described and reasonably discussed. The authors provided sufficient evidence that the proposed method could be used as a promising tool for landslide modeling and hazard mapping. The knowledge obtained from the study would benefit civil engineering society for landslide investigation assessment. This paper can be accepted for publication by considering all the points given below.

A1: Thank you very much for the reviewer's positive comments about our work. We have addressed each comment meticulously and illuminated the requests in the following responses and the text as much as possible.

Q2: The main contribution of this paper seems to be the computational model proposed. It is desired to add related descriptions to the title of this paper.

A2: We appreciate the reviewer's suggestion. The title of this paper has been revised to "Hazard Assessment Comparison of Tazhiping Landslide Before and After Treatment Using the Finite Volume Method". Please see p.1, line 2.

Q3: Previous study on landslide/debris flow issues using the fluid mechanics based method had faced the problem that it predicts higher mobility of the moving body while using the same fluid parameters throughout the whole flowing process. For example, less obvious fluid property is expected when the flow body is approaching stop point. It is stated in this manuscript that a changed frictional resistance is used (L78). However, the details are not clear in the text. Relevant descriptions on this issue should be strengthened.

A3: This paper adopted the RAMMS to simulate the mass movement process. In

RAMMS, the friction coefficient for our calculation domain can be automatically adjusted based on topographic data analysis, forest information and global parameters. Therefore, a changed frictional resistance was applied to the slide mass during the flowing process. We added more details in the discussion section. Please see p.22-23, line 384∼411.

Q4: It is not clear in the text that how the free surface of the landslide/debris flow is treated or reconstructed. An additional figure is need to describe the details.

A4: The landslide body as well as the calculation domain were reconstructed and specified though the topographic data input with the built-in RAMMS Project Wizard. We have added new Figure 4 to show more details. Please see p.10, line 219.

Q5: Fig.4 showed the geological profile of Taziping Landslide and a slide surface is clearly indicated. Is this slide surface comparable with the simulation result? It would be interesting to show their comparison.

A5: The indicated slide surface in Fig.4 shows a potential surface before treatment. Combined with the other field survey data. It was concluded that the sliding mass had an estimated starting volume of about 600,000m3 and a mean thickness of 8m. After fully accounting for the slide-resistant piles and mounds, we introduced the Morgenstern-Price method to calculate the stability coefficient of Taziping landslide after treatment. The method was determined with an iterative approaching by changing the position of the sliding surface until failure of the dumpsite (Figure. 8). It was suggested the treatment significantly improved the slide stability. We added more descriptions on this issue. Please see p.15, line 305∼307 and 311∼312.

Q6: In Tab.3, Various hazard zone levels were cataloged. What is the criterial to assign a specific damage situation to a certain zone level? Is there any standard code to follow?

A6: The hazard zone levels were cataloged according to current standard and litera-

tures. We have cited the relevant standard code and literature (Fell R et al., 2008; DZ/T 0286-2015). Please see p.18, line 359∼360.

Other specific comments are given below.

Q7: The quotations in the manuscript are not in the same format, for example, Line 44, Costa, 1984; VS Line 50, Zhang. Y, 2013. Usually only family name is preferred, please refer to the journal's instructions and make necessary changes throughout the text.

A7: Thank you for pointing out the inaccurate quotation. It has been revised. We have revised all references and quotations in the manuscript according to the NHESSD journal style. The reference list has been updated as well. Please see the references section.

Q8: Fig.1 needs proper citation.

A8: Thank you for the correction. It has been revised (Christen et al., 2010a).

Q9: In Fig.6, Fig.7, what moment of flow does these figures represent? Different moment should have different deposit thickness, flow velocity and pressure. Please confirm.

A9: Figure 6 and Figure 7 show the last moment of the flow. The flow has a different deposit flow height, velocity and pressure at various moments in time. However, the colored bar shows the maximum values of the movement process or an instantaneous for a given time step. It has been revised. Please see p.17, line 329-331.

Q10: L276 "The middle and lower deposits had a thickness of about 5-10m", confusing here, what does "the middle and lower deposits" mean? Similar as "the middle and lower movement speed", please check throughout the text.

A10: The authors apologize for the confusion. The sentences have been reformulated. Please see p.15, line 293 and 294; p.17, line 333.

Q11: L289. What technique is used for searching the sliding plane.

A11: The method coupled with field borehole surveying and the numerical calculation method described in Q5 were used to search the sliding plane.

Q12: L305, Fig.4 should be Fig.7.

A12: Thank you for the correction. It has been revised. Please see p.17, line 328.

Q13: Tab.3. How is the “Building damage probability” evaluated?

A13: Thank you for the comment. Building damage probability is evaluated by the thickness of a landslide mass that the building can withstand. We have cited the relevant literature (Hungr et al., 1984; Petrazzuoli et al., 2004; GB, 50010–2010; Hu et al., 2012; Zeng et al., 2015). Please see p18, line 362 and 364.

The text of the manuscript has been revised.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2016-391/nhess-2016-391-AC8-supplement.pdf

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