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

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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 a major revision to address all the comments raised by the reviewer. All changes have been marked with RED color 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.

Q1: 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.

A1: The title of this paper has been revised to "Hazard Assessment Comparison of



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Discussion paper

Tazhiping Landslide Before and After Treatment Using Finite Volume Method". Please see p.1, line 2.

Q2: 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.

A2: This paper adopted the RAMMS to simulate the mass movement process. In RAMMS, we can automatically generate the friction coefficient for our calculation domain based on topographic data analysis, forest information and global parameters and so on. Therefore, we can use a changed frictional resistance. This problem has considered in the discussion section. Please see p.22-23, line 378∼406.

Q3: 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.

A3: We have reconstructed and added Figure4. Please see p.10, line 218.

Q4: 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.

A4: We have reconstructed and added Figure8. Before engineering treatment, Figure.4 and Figure.5 have showed 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). Please see p.15, line 300∼302 and 306∼308.

Q5: 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?

A5: We have cited standard code and literature( Fell R et al., 2008; Qiao , 2009; DZ/T 0286-2015). Please see p.18, line 354∼355.

Other specific comments are given below.

Q6: 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. p.11, line 266: figure is subtitled with.

A6: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 references and quotations section.

Q7: Fig.1 needs proper citation. A7: It has been revised (Christen et al., 2010a).

Q8: 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.

A8: The Figure.6 and Figure.7 is shown that the last moment of the flow. Different moment have different deposit flow height, velocity and pressure. However, the coloredbar shows the maximum values of mowing process or an instantaneous for a given time step. It has been revised. Please see p.17, line 324-325.

Q9: 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.

A9: This sentences has been reformulated, because of wrong word order. Please see p.14, line 288 and p.17, line 328.

Q10: L289. What technique is used for searching the sliding plane.

A10: The method coupled with field borehole surveying and numerical calculation method described in Q4 were used to search the sliding plane.

Q11: L305, Fig.4 should be Fig.7.

A11: It has been revised. Please see p.17, line 324. Please see p18, line 358 and 359.

Q12: Tab.3. How is the “Building damage probability” evaluated?.

A12: By the thickness of the landslide mass to evaluate the ability of a building to withstand a landslide disaster. We have cited relevant literatures (Hungr et al., 1984; Petrazzuoli et al., 2004; GB, 50010–2010; Hu et al., 2012; Zeng et al., 2015). Please see p18, line 358 and 359.

The text of the manuscript has been revised.

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