Nat. Hazards Earth Syst. Sci. Discuss.,
doi:10.5194/nhess-2016-391-AC4, 2017

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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Received and published: 28 April 2017

Manuscript title: (the original title: Hazard Assessment Comparison of Tazhiping Landslide Before and After Treatment) Manuscript number: 2016-391 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: Some important questions remain still unanswered, namely the sensitivity of the friction parameters and more important the derivation of the best-fit parameters presented in Table 2. This aspect should be at least considered in the discussion and

ideally in the methods section.

A1: It is an important issue on the derivation of the best-fit calculated parameters, and we have considered in the discussion and methodology sections. The present estimation of model parameters can be acquired by laboratory or small-scale experiments in some instance, however the Voellmy rheological model friction coefficient generally lacks a systematic approach to get. Therefore, we tested different coulomb friction coefficient values ranging between and viscous friction coefficient values ranging between . Finally, we selected the coulomb friction coefficient and viscous friction coefficient in accordance with back-analyses of well-documented landslide cases (Cepeda, J., et al. 2010; Du et al., 2015). The text in the method section and discussion section have been revised. Please see p.12, line 267-274 and p.23, line 389-440.

Q2: The title does not promise detailed information about the numeric but rather a specification about the hazard assessment comparison. Therefore or the title or the content of the paper should be changed. The same is true for the abstract.

A2: The title of this paper has been revised to "Hazard Assessment Comparison of Tazhiping Landslide Before and After Treatment Using Finite Volume Method". The corresponding abstract has been revised as well. Please see p.1, line 2 and line 12-13.

Q3: There is some confusion in terminology for figures 6 and 7, that have to be changed. Figures should be improved. Figure 1 seems to be taken from an existing paper without citation.Figure 2 needs more information about the location of the study site in a global perspective and better visualization of the exact location in the Baisha river basin. figures 6 and 7 do not contain more details on the landslide area, location of the objects at risk, etc. This information is only given in figure 8 but visualized rather small. Readability of the outlines of buildings is very hard and not mentioned in the legend.

A3: The confusion in terminology for Figures.6 and 7 have been revised. Please see

p.13,line 278; p.14,line 280; p.16,line 317 and p.17,line 319. We have re-organized and added more information about the location of the studying site and Baisha river basin was shown in Figure 2. Please see p.9,line 212-214. In Figures 6 and 7 we add more details on the landslide area shown in Figures 7a and 9a. Please see p.13,line 277-278. Figure 10 has been extensively visualized and added the outlines of buildings in the legend. Please see p.21-22, line 367-373. Various minor modification and revision were made in all Figures.

Q4: There are some publications in Chinese that are not accessible by all fellow scientist. There is some confusion for the article by Zhang,Z.Y., Wang,S.T., Wang,L.S.,et al., about the year of publication. In the text 1994 is mentioned while in the references there is written 1993. The reference of Toro, 1992 is missing.

A4: We have deleted some parts of unimportant Chineses literature and revised all references according to the NHESSD journal style. We have cited the reference of Toro, 1992. Please see references section.

Other specific comments are given below.

Q5: p.2, line 61: what do the authors exactly mean with "landslide-debris flows?" Please rely on some definitions in the literature.

A5: Landslides move downslope in many different ways (Varnes, 1978).Flow-type landslides can evolve into rapidly travelling flows, which exhibit characteristics of debris flows on unchannelized or only weakly channelized hillslopes. The geomorphic heterogeneity of rapid shallow flow-type landslides such as hillslope debris flows is larger than those observed in channelized debris flows, however, many of these flows can be successfully modelled using the Voellmy-fluid friction relation and initiating the flow as a block release (Christen et al., 2012). It is true that there is some confusion about the term “landslide-debris flows” we used here. We have revised it to “flow-type landslides” and add some definitions in the literature. Please see p2, line 63-64 and discussion section.

Q6: p.2, line 71: what to the autors exactly mean with 3D mapping of the division of hazard zones? Usually, hazards zonation is given on a map, e.g. in 2D.

A6: It has been revised to 2D. Please see p.2, line 74.

Q7: p.3, line 98: this figure is taken from Christen et al., 2010. Please cite source.

A7:It has been added. Please see p.3, line 101.

Q8: p.3, line 107: missing space.

A8: It has been revised. Please see p.4, line 109.

Q9: p.7, line 178: this reference is missing in the reference section.

A9: It has been cited. Please see reference p.26, line 530-531. " Toro, E.F.: Riemann problems and the waf method for solving the two dimensional shallow water equations, Philos. Trans. R. Soc. London, Ser., A 338, 43–68. 1992".

Q10: p.11, line 255: see comment for p.2, line 71

A10: It has been revised to 2D. Please see p.12, line 259. Q11: p.11, line 266: figure is subtitled with "Thickness". Thickness of deposition is not equal to flow height (if a landslide really "flows"...). Please adapt wording. A11: It has been revised to flow height. Please see p.1, line 15 ;see p.13, line 278 ; p14, line 287; p15, line 289; p.16, line 317; p17, line 327 and 328; p18, line 336; p23, line 411.

Q12: p.12, line 268: subtitle of figure is "Speed", legend says "Velocity". If the blue to green marked zone shows the deposited mass of the landslide, there should be no velocity value (because it’s deposited). In chapter 3 is no indication or estimation about the speed of the landslide mass, therefore figure 6b does not really make sense.

A12: It has been revised to Velocity. Please see p.1, line 15 ;p.13, line 280; p15, line 290 and p.17, line 329.In any case, velocity plays a more important role regarding kinetic energy acting on an obstacle. However, the Miaoba residential area of Red

Village is located at the frontal part of Tazhiping lanslide. Therefore, the maximum flow height of the landslide is one of the direct factors influencing the building's deformation failure status. Please see p.18, line 339-348 and p17, line 329.

Q13: p.12, line 270: not clear, if the colored area shows the maximum pressure or an instantaneous for a given time step. Much more of interest would be a local value (over time) at the position of a building. And why the legend goes up to more than 1000kPa but no reddih or yellowish areas are marked?

A13: The coloredbar shows the maximum values of moving process or an instantaneous pressure for a given time step. As the building of Red Village is located at the frontal part of landslide, the pressure of the middle and lower landslide deposits was about 200kPa. Thus, three-story and lower houses within the deposition range might be buried. The maximum pressure value in the surface gully can be found in the middle and upper slope. According to field survey we have found this gully is in the elevation of about 1,200 m. The maximum pressure value is easy been found from the instantaneous for a given time step figures. Therefore, coupled with field observations and numerical simulation, they are especially helpful in understanding landslide movement process in complex terrain. It has been introduced in p.17, line 324-325.

Q14: p.12, lines 274, 277 and p.13, line 278: not clear what numbers in the circle mean. Is this kind of a list or does it indicate a location in a figure?

A14: No, it does not indicate a location. It has been deleted. Please see p.18, line 339-348.

Q15: p.13, line 279: how is made this separation between houses of different numbers of stories? Please give more information and references to it.

A15: The building is 3m height each floor in China. We have cited some 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.

Q16: p.13, line 293: or indicate "about 1.2 m" or give exact value.

A16: The more exact value has been given . " with an elevation of 1,070-1,072m and a length of 182m." Please see p.15, line 312-313.

Q17: p.13, line 298: same remark as for figure 6a.

A17: It has been revised. Please see A.11.

Q18: p. 14, line 300: same remark as for figure 6b .

A18: It has been revised. Please see A.12.

Q19: p.14, line 305: example of a sentence that has to be rewritten because of wrong word order.

A19:We have revised to "Provided in Fig.7 are the kinematic characteristics of the landslide deposit." Please see p.17, line 324.

Q20: p.14, lines 305, 308, 309: not clear what numbers in the circle mean.

A20: It has been deleted. Please see p.17, line 325-330.

Q21: p.15, line 321/322: not sure, if this statement is really true. There may be examples where entire houses on a landslide mass are moved but not destroyed because of stable base plates. In any case, velocity plays a more important role regarding kinetic energy acting on an obstacle. You are right in the sense that the height of a moving landslide (e.g. the frontal part) plays an important role when it hits a building on a higher level, e.g. the second or third floor. Please clarify this point.

A21: We have clarified this point. "Landslides reflect landscape instability that evolves over meteorological and geological timescales, and they also pose threats to people, property, and the environment. The severity of these threats depends largely on landslide speed and travel distance. There may be examples where entire houses on a landslide mass are moved but not destroyed because of stable base plates. In any

case, velocity plays a more important role regarding kinetic energy acting on an obstacle. However, the Miaoba residential area of Red Village is located at the frontal part of Tazhiping lanslide." Please see p.18,lines 341-348.

Q22: p.15, 16 and 17, table 3: the term "washed away" is not suitable for landslide process. It implies an major influence by a fluid.

A22: It has been revised. Please see p.18,lines 361.

Q23: p.17, line 333: This should be 2D, because you show a map with the different zonations.These different zonations are not defined, by the way.

A23: It has been revised to 2D. Please see p.20, line 362 and p.22,line 375.

Q24: p.17, line 339: There seem to be marked buildings (in the red high-hazard zone). If so,adjust legend and make sure they are better visible. What zone is defined outside the colored area? No hazard or also low-hazard zone?

A24: We have adjusted legend and defined outside the colored area as no-hazard. Please see p.20, line 366-368 and Figure.10 legend.

Q25: p.18, line 342: same as for figure 8a. And this should be 8b instead of 8c.

A25: It has been revised. Please see p.22, line 374.

Q26: p.18, line 350: what is a landslide-debris flow?

A26: It has been defined. Please see p.23, line 410 and answer A5.

Q27: p.18, line 358: this should be 2D.

A27: It has been revised. Please see p.23, line 418.

Q28: p.19, line 411: correct reference would be: Michael-Leiba, M., Baynes, F" Scott, G.,Granger, K. 2003. Regional landslide risk to the Cairns community [J]. NatHazards, 2003,30 (2):233–249. Check reference style for all references according to the journal style!

A28: We have revised all references according to the NHESSD journal style. The reference list has been updated as well. Please see references section.

The text of the manuscript has been revised.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2016-391/nhess-2016-391-AC4-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2016-391, 2017.