

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC2
<https://doi.org/10.5194/nhess-2021-292-AC2>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Reply on RC2

Bastian van den Bout et al.

Author comment on "Physically based modeling of co-seismic landslide, debris flow, and flood cascade" by Bastian van den Bout et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-292-AC2>, 2022

Dear Reviewer,

We would like to express our gratitude for the work in providing constructive feedback to our manuscript. We appreciate the feedback and are convinced the quality of the manuscript will be improved as a result.

For the purpose of the manuscript: We primarily wanted to focus on option ii) the possibility to simulate the mass flow process cascade around Yinxiu. We will adapt the title if possible, and clarify further in the text of the revised manuscript.

As a response to the some of the detailed comments:
All other comments will be followed in the revision of the manuscript.

65-66 Please add at least a reference supporting this statement. e.g. Baggio et al. (2021) simulated the process of debris flow initiation through bed erosion releasing an input hydrograph characterized by a solid concentration equal to the 10 % respect the total input volume. (Baggio, T., Mergili, M., & D'Agostino, V. (2021). Advances in the simulation of debris flow erosion: The case study of the Rio Gere (Italy) event of the 4th August 2017. *Geomorphology*, 381, 107664.)

- We will clarify this part with the references specified by the reviewer.

99-100 It is not clear if the entire model is presented in the study for the first time or if in the study is presented an updated version of the model characterized by new important features.

- The model is an updated version of the OpenLISEM model. More information on this model can be found on lisemmodel.com We will also clarify this in the text.

339 Please specify the range of the terrain slope of the watershed instead of "> 30 degrees". If possible provide information about the type of vegetation (dense forest, shrubs,...)

- We will add this to the manuscript text.

345 Is there an estimation of the total volume of the moved material?

- We don't know of any such estimate in the literature. This is a difficult quantity to estimate, even with the model in place, as erosion and deposition overlap spatially. Erosion might occur first with deposition later. Of course, the model can state total erosion, which could be calculated from the erosion map, but this can better be compared to observed elevation differences.

Fig.4 To improve the understanding of the process you may consider to add a dem of difference map involving the pre- and post-earthquake DTMs.

351 satellite instead of "ssatellite"

- We will adapt the text accordingly

356 Please provide also the value of the second highest peak in rainfall and the total duration of the storm event. Here you can directly refer to Figure 12 for the rainfall pattern and to Table 1 for the rainfall source.

358 Can you provide also the length and width of the debris dam?

- We will add these to the revised manuscript text.

Tab. 1 Please provide the acquisition dates of the DTMs and the position of the rainfall station in terms of distance to the watershed outlet.

385 The end of the sentence is not really clear. A suggestion could be "..., we resampled the input base maps to the final resolution of 10 meters."

- We will adapt the text accordingly

391 These inputs refer to simulation 1? Please specify it

-they do, except for the NDVI, which was provided based on the appropriate moment in time, as the event took place over the duration of several years.

499 I suppose the correct number of the figure is 9D instead of 12

- We will adapt the text accordingly

528 Please provide the value of the simulated deposit volume producing the debris dam and make a comparison with the observed one if possible.

- We would like to refer to line 630-640 in the manuscript text.

529 I suppose the correct figure number is 10.

- We will adapt the text accordingly

Fig. 11 In the legend I would substitute "water depth" with "flow depth" since the model is biphasic.

- We will adapt the text accordingly

548 regarding the Min river, what is the discharge value used to reproduce the flow of the river? Could you also provide the location of the input hydrograph in Figure 11?

- The discharge was estimated to be at bankfull conditions based on local reports, thus a fixed-height boundary conditions was added to the Min-River for the height of the embankments. We will specify this in the text.
- For the location of the hydrograph, We will adapt the text accordingly

Fig. 12 The scale of the rainfall intensity is not reported. Please also consider to use another colour for the rainfall intensity since the figure is not clear. Moreover, I noticed a constant value equal to 0 in correspondence of the first rainfall peak regarding the fluid height, while the fluid+solid height is around 3 meters. Is it correct?

- We will adapt the text accordingly. The lack of solids during the first rainfall peak is correct. There is not yet sufficient shear stress on the available sediment with vegetation to induce erosion. The only erosion taking place is upstream, and doesn't travel to the outlet yet. Only after the main rainfall peak does the erosion reach downstream, but more importantly, the sediment from upstream travels downstream.

626 I think it is Figure 14. Please check.

- We will adapt the text accordingly

610 It would be interesting to calculate the total volume of simulated eroded material entrained downstream the dam breach and to successively compare it with the original dam-debris volume. Furthermore, consider also to derive the mean eroded volume for channel length (downstream the dam breach) in order to compare it with other studies involving debris flow erosion.

642 If available please report the estimated return period of the rainfall event to assess its magnitude.

- We have heard unverified estimates from local hydrologists, and those responsible for the warning system in that area, but have not been able to find any data to back up these claims. We will check again if any information on this is available in the literature.

691 "Were" is repeated two times.

- We will adapt the text accordingly