

# ***Interactive comment on “Three-dimensional numerical simulation of mud flow from a tailings dam failure across complex terrain” by Dayu Yu et al.***

**Dayu Yu et al.**

13070895895@163.com

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Dear Referee, thank a lot for your appreciation of our paper and for the work you did on our manuscript. We greatly appreciate your valuable comments as they may contribute to increase the manuscript robustness and, in general, to improve its quality and readability. In the following, we supply a point by point answer to the general and specific comments raised by the referee (see also attached file).

General comment: Simulation results obtained are poorly analysed and describe only in qualitatively way, while a quantitative analysis should be provided.

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Answer: We thank you for this comment. In the revised of the manuscript, we have added some quantitative analysis and describe in the experimental verification and in both dam failures simulations according this comment on page 7, page 9 and page 16-21 (marked in blue).

Comment 2: The figures are generally not clear and too small relating to the information contained. There is a poorly coherence with the text content, especially in figure 2 and 3.

Answer: Thank you for your comment. We have made the corresponding revision according to your comments in the revised manuscript. The specific modifications are as follows: we replaced Fig. 5 and 16 in the previous manuscript with clearer figures; We revised the captions of Fig. 2 and 3 to be consistent with text content in the revised manuscript (marked in blue).

Comment 3: A quantitative analysis of the simulation results is missing in the experimental verification and in both dam failures simulations.

Answer: We thank you for this comment. In the revised of the manuscript, we have added some quantitative analysis and describe in the experimental verification and in both dam failures simulations according this comment on page 7, page 9 and page 16-21 (marked in blue).

Comment 4: Historical results are citated to confirm the goodness of the simulation, but no field data or observations are presented to validate the goodness of the modelling procedure.

Answer: Indeed, there is lack of field data or observations in situ investigation in evaluating the simulation results of real case. Because the occurrence of tailings dam break is uncontrollable and some quantitative information in the process of dam break, it is difficult to collect the data of occurrence process when collapsing. In the revised manuscript, Fig.6 shows satellite images obtained after the Feijiao Dam collapse,

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which recorded destroyed downstream area. Consequently, we measured the submerging area and total travel distance of tailings fluid, and made comparison to the simulation results. Fig.12 showed that simulated and measured submerging area are in agreement.

Comment 5: It is not clear the cell size used in the terrain model and which DEM is used for the A'xi tailing dam event (pre or post event)?

Answer: During the simulation for the A'xi tailings dam, we used two different DEMs (UAV DEM and ALOS DEM) with  $0.5\text{m} \times 0.5\text{m}$  and  $12.5\text{m} \times 12.5\text{m}$  resolutions, respectively. The UAV DEM is mosaiced into the ALOS DEM and forms a final DEM with of cell size of  $0.5\text{m} \times 0.5\text{m}$  resolution. But, the effective precision in the extent of ALOS DEM is still only  $12.5\text{m} \times 12.5\text{m}$ . We have supplied the relevant description on Page 14 of the revised paper.

Comment 6: The authors attributed some rheologic parameters to the modelled flows without performing a back analysis to define such parameters and to justify their choice.

Answer: To justify our choice in rheological parameters, some discussions on the value of rheological parameters are supplemented on page14-15 of the revised version. In this study, the Bingham viscosity and yield stress were determined based on a previous investigation report conducted in testing the rheological properties of tailings using LAMY RM100 rotational viscometer (Liao and Zhou, 2015). Liao (2015) collected several tailings samples and conducted 15 sets of tailings fluid rheology tests, and the test operation complies with the rheological test specification. We selected the test results of one group of the iron ore tailings (Feijiao tailings dam is also an iron ore tailings pond) as rheological parameters for the test.

Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2019-298/nhess-2019-298-AC1-supplement.pdf>

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