

## ***Interactive comment on “Risk assessment and management for an extreme accident at a waste slag site” by Shuang Liu et al.***

**Anonymous Referee #1**

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The article deals with a relevant topic, risk management of waste slag repositories. More specifically, a procedure is presented to assess and manage the risk posed by tailing dams failures and a case study is presented. However, the paper does not properly highlight the innovative contribution of the proposal and its application to the case study is not clearly presented. Therefore, I suggest to thoroughly restructure the paper and to resubmit it after a major revision. Detailed comments follow.

### MAIN COMMENTS

The article is difficult to follow for the reader, as its content alternates back and forth between sections describing the features of the proposed procedure and sections illustrating the case study. For instance, the test area is presented right after the Introduction (Section 2.1, Figure 1), yet the results related to the application of procedure appear

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in sections 3.1.3 (Figure 4), 3.2 (Table3, Figure 5) and also in the Discussion section (Figure 6). Moreover, current section 4 “Discussion: risk management schemes for extreme accidents”, include lengthy parts describing key elements of the procedure, including how to use risk acceptability criteria (zone of F-N space) and how to compute the stability of the tailing dams. These parts should be presented before. The article should be thoroughly restructured, so as to present the procedure first, then its application to the case study, then a discussion section clearly highlighting advantages and limitations of proposed contribution.

The procedure is presented as a “risk sharing community” risk management mode. Yet, the role played by the different stakeholders does not clearly emerge from the . More details are needed on this central aspect of the proposed procedure. A section (or subsection) should be devoted to this, when the procedure is presented, including all the text (and the Figure) currently placed at the beginning of the Discussion section (pages 6-7). Figure 6. Improve legibility of Figure. In the current version it is not possible to read most of the text. Retain only what is needed and explained (in the caption and in the text).

The originality of the overall procedure is not clear, as the key innovative elements proposed are not properly highlighted. For instance, the Authors refer to the Canadian Whitehorse Mining initiative (WMI). What are the elements from that initiative that are included in the proposed procedure? How does the proposed procedure differ (or adhere) from WMI? The STRTP regulations are also recalled a couple of times, for the risk zones in the F-N space and for the stability computations. Clearly define where and how they play an essential role in the procedure. Other methods proposed in the literature are also used: the Tsunami-Square method (Xiao et al., 2015), the intensity classification scheme for debris flow (Fiebiger, 1997), vulnerability assessment indexes (Uzielli et al., 2008). Some details on the main features of these methods must be provided and, once again, clearly define if they have an essential role in the procedure or if they are only used to apply the procedure to the case study.

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Figure 2 should be restructured to better highlight the phases of the procedure described in the text. The current version is confusing because it starts at the top with elements that are indicative of the last phase of the procedure (step 6). The same terms should be used in the text and in the Figure. For instance: the term “step”, used in the current version of the text to describe the 6 phases of the procedure, does not appear at all in the Figure; the term “intensity analysis” only appears in the text.

The results of the procedure applied to the case study must be described following the different phases of the procedure, as they are presented in Figure 2. For instance, the subsections of this section could be six, one for each step of the procedure.

The role of the laboratory experiment must be better explained. Many more details on the characteristics of the performed experiment are needed. How does it reproduce the characteristics of the tailing pond of the case study? How many experiments were run? How were they different? The main experimental results (e.g. sections with height of deposited material) must be reported in graphs. A graphical comparison between the experimental test(s) and the numerical analysis with the Tsunami-Square method must also be reported, highlighting the role of the model input parameters and reporting the parameter values for the best-performing model simulation(s).

Introduction. It is too long and not well balanced in terms of topics addressed. For instance, the part reporting a detailed discussion on the failure of the “tailings pond in Xiangfen” and “the spoil ground in Shenzhen” is not appropriate. Also the reference list must be updated. For instance, a significant amount of literature references (too many) are reported dealing with landslide risk analysis, assessment and zoning and not enough references are reported dealing with risk analysis of tailing dams. Moreover, it is necessary to clearly state, before reporting the current landslide risk management practice, what its connection with the topic of the paper.

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