EGUSphere Preprint Responses: June 2024

CC1:

This manuscript conducts the risk analysis of subaqueous landslides and tsunami. Generally, this manuscript is not well organized and the novelty is very limited. As a result, a rejection is recommended.

1. *The Introduction section requires to be reorganized. The current version looks a little chaotic. The current research status should be organized in a more logistic way and then the research potentials should be outlined clearly.*

   Response: Thank you for the helpful feedback. We will happily combine and shorten the introduction and background/literature review sections into a single section of 2-3 pages, which will improve the readability of the manuscript.

2. *The Background section is too superfluous. Simplification is recommended.*

   Response: our revisions to the introduction and background (see response 1 above) will streamline and simplify the background.

3. *For the results in Fig. 1: Please explain how the excess pore water pressure to trigger slope failure is calculated.*

   Response: Thank you for identifying this as an area of confusion in the manuscript. We will revise the manuscript to be clearer. Excess heads required to trigger slope failure ($h*$) were measured directly during experiments by monitoring and documenting head throughout experiments including at the time of failure. The moment of failure initiation was identified in video recordings. We will revise the manuscript to detail these methods and experiment findings. We will also convert excess head to unitless normalized overpressure ($\lambda*$):

   $$\lambda^* = \frac{\rho_w g h^*}{(\rho_b - \rho_w) g h}$$

   where ρ_w is water density, g is gravitational acceleration, ρ_b is bulk density, and h is the depth from the water-sediment interface to the sediment-cobble interface. This normalized overpressure includes data on total stress, hydrostatic pressure ($\rho_w gh$), and overpressure ($\rho_w gh^*$), making it scalable and more relevant to global applications in natural submarine slopes. This will be detailed and included in the revised manuscript, as well as relevance to hazard assessment.

4. *Fig 1: Smectite and Silica Powder are used for comparison. However, the authors seem not to describe the differences between these two cases.*

Response: we will expand our explanation of why we chose quartz, smectite, and silica powder and use this to improve our discussion on the importance of these two investigations, their differences, and their impacts.

5. *As the title indicated, the risk analysis should be the focus of this study. As for risk analysis, the estimation index should be failure probability, reliability index, sliding volume, etc. However, in the current version, such contents are all missing.*

   Response: Thank you for helping us understand how we can improve clarity of the study's focus and utility. It was our intent to provide two key findings: the first to demonstrate that the accounting of excess pore pressures in simple, effective numerical models for slope stability (e.g., the Factor of Safety equation) is unreliable and importantly over-predicts slope stability conditions under clay concentrations relevant to natural marine environments, and 2) that clay concentration can be used as a first-order estimate of slope failure behavior for hazard assessment. It is not our intention to reorganize or revise specific failure probability indices, but rather to provide an important geotechnical perspective that the hazard assessment community can incorporate into their assessments. We will therefore change the title of the paper to better reflect these aims. We propose instead: "The importance of clay and pore pressure in submarine slope failures; implications for forecasting."