Natural Hazards and Earth System Sciences Discussions

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Reply on RC1

Chatuphorn Somphong et al.

Author comment on "Submarine landslide source modeling using the 3D slope stability analysis method for the 2018 Palu, Sulawesi, tsunami" by Chatuphorn Somphong et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-170-AC1, 2021

First of all, the authors would like to thank the reviewer for their detailed comments and suggestions for the manuscript. The authors found that the comments have identified important areas which required improvements. After completion of the suggested edits, the revised manuscript could be polished by improvements for further publication. The discussion of what and how to respond to reviewers and proceed revision was made among us the authors and concluded as follow;

In general, the authors agree with all the main comments section;

Tsunami generation by a strike-slip earthquake

- **"in my opinion, the potential contribution of the coseismic deformation induced by the Palu-Sulawesi earthquake to tsunami generation should not be ignored, or at least examined if relevant."**

  After discussion, authors agreed with the argument. Although our main focus was on simulating the potential submarined landslide, the cosmic sources should not be ignored and, therefore, should be investigated. Authors have analyzed the USGS fault model with BIG's bathymetry data to simulate the waveform at the Pantoloan gauge and the results did not match well with the observation. We found the coseismic sources have less effect when compared to the submarine landslides sources as was discussed in Pakosung et al.'s (2019) study (https://doi.org/10.1007/s00024-019-02235-y). However, authors understand the importance of considering the coseismic source.

- Authors agreed to revise the discussion after adding coseismic sources.
- Authors agreed to add the literature review of a seismogenic submarine landslide triggered tsunami outside Palu's studies.

Soil data

- **I found it difficult to follow the various soil layers and strata described in the text (Section 2.1.2) and Table 2 (what is the meaning of 'Underground'? Which of the base layer used for the modeling, the dry or saturated**

conditions?) and sketched in Figures 3 (two layers only) and Figure 5 (3 layers).

In this model, soil mass was divided into 3 strata; stratum no. 1, no. 2, and the base layer as shown in Figure 5. Landslide occurs in the first 2 strata (sliding layers). The base layer does not fail. The orange sketched soil mass in Figure 3 is the same soil mass in Figure 5. Figure 3 shows the soil mass in assembly, while Figure 5 shows more details of the soil mass column.

Underground in Table 2 represents the water conditions in the model such as mean sea level, groundwater table. 'Underground' is just naming for modeling's sake. The authors will change to 'water level condition' in the revised version.

- **Was this approach used to identify on-land and coastal slope failures that are well recognized and mapped along the Palu Bay, and thus validate Hovland's approach for identifying potential submarine landslides?**

  The authors used Hovland's approach to identify the coastal landslides and validated them with observed coastal landslides as shown in Figure 1 in the manuscript. The results of our simulated coastal slope failures are presented in the attached figure (*Coastal landslide.pdf*). More than half of simulated landslides were found matched with the observations. However, the configurations of soil parameters in those simulations were different from measured ones as described in section 2.1.2. Coastal landslides are important for tsunami generation in this study. Thus, the authors used the coastal landslides from literature instead of our simulated coastal landslides.

Specific and technical comments

- The authors truly appreciate the reviewer's constructive comments in **specific and technical comments** section and will work on every comment in the revised version.

Please also note the supplement to this comment:
https://nhess.copernicus.org/preprints/nhess-2021-170/nhess-2021-170-AC1-supplement.pdf