



EGUsphere, referee comment RC1
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Comment on egusphere-2022-130

Anonymous Referee #1

Referee comment on "Identification and ranking of subaerial volcanic tsunami hazard sources in Southeast Asia" by Edgar U. Zorn et al., EGU Sphere,
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The manuscript entitled "Identification and ranking of volcanic tsunami hazard sources in Southeast Asia" by Zorn et al. proposed a catalogue of potentially tsunamigenic volcanos in Southeast Asia and ranked these volcanoes by their tsunami hazards. The evaluation is based on a Multicriteria Decision Analysis (MDA) composed of five weighted factors. They identified 19 volcanoes with high tsunami hazard and 48 with moderate tsunami hazard. The proposed ranking system can identify the hazards of Anak Krakatau and Kadovar before a tsunami occurs as a retroactive study.

I agree that this study is meaningful to disaster mitigation of volcanic tsunamis. However, the ranking system proposed in this study is not objective and in lack of quantitatively evidence to support the assessment. Meanwhile, the linear combination of five individually weighted factors for MDA are questionable. Unfortunately, the present form is not suitable for publication in *Natural Hazards and Earth System Sciences*. Significant additional work is required to improve the methodology and contents. My suggestion is that the manuscript should be revised substantially and resubmitted. I am willing to review this manuscript again after their revision. Here are my comments on this manuscript.

1. My first concern on this manuscript is that the ranking system is not objective. The scoring (F) is based on qualitative analysis. There is not physical or experimental evidence to prove the reasonability of such scoring. For example, the scoring of H/D-Ratio has values ranged from 0.02 to 0.89 and these values are multiplied by 100 to get a 0–100-point scale linearly. In that case, it means that a H/D-Ratio of 0.4 has twice the score (i.e., risk) to a value of 0.2. However, such assumption lacks evidence. No numerical simulation or geological evidence are presented to support the scoring method. This problem also occurs in other four factors.

2. Similarly, the weighting (W) of the ranking system is also subjective. I agree that the results of robustness testing are satisfactory. But the testing itself cannot show the importance (or contribution) of each factor for MDA. Therefore, the total weighted score

can only be used as a rough estimation rather than a strict criterion. The authors may add a confidence level to each total weighted score.

3. The MDA of the ranking system is based on a linear combination of five individually weighted factors (Equation 1). However, these factors are not mutually independent. For example, a higher slope angle may result in a higher tsunami activity, and therefore, also increases the score of tsunamigenic history. The scoring and weighting of five factors may overlap, which is not appropriate to be represented by a linear combination.

4. The heat map (Figure 7) and travel-distance plots (Figure 8) cannot accurately represent the potential volcanic tsunami hazards because they do not incorporate the information of tsunami amplitude. It makes the hazard assessment less powerful. A tsunami with 1 m amplitude has evidently different impact from the one with 0.1 m amplitude. I believe it is a MUST to consider the potential maximum amplitude when analyzing volcanic tsunami hazards.

5. The conclusion of this manuscript is too simple. It is necessary to discuss the limitation of this ranking system.

Other minor comments:

Line 71: I agree that "the inherent problem of volcanogenic tsunamis is the lack of warning time and quick response options". However, even if we successfully identified the high-tsunami-risk volcanoes, this problem still exists. Please discuss potential solutions (e.g., radar, bottom pressure gauges) to fix this inherent problem.

Line 105: Add a figure and use an example to show the process of defining the edifice boundary.

Line 332: Remove the repeated word in "high high-hazard".

Line 333: Please explain the reason why there are some volcanoes with high scores but not prominently considered for their tsunamigenic potential.

Figure 5: Please add a subpanel to show the respective distribution between the countries for all considered volcanoes.

Figure 6: What are the different meanings between dark red and light red (also blue, yellow, green, etc.)? Please specify.

Section 4.3: This section seems verbose. The authors may present Batu Tara here and move others to supplementary material. Instead, it is better to have more discussions on potential tsunami scenarios of Batu Tara.