

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
<https://doi.org/10.5194/nhess-2022-208-RC1>, 2022
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Comment on nhess-2022-208

Anonymous Referee #1

Referee comment on "Optimal probabilistic placement of facilities using a surrogate model for 3D tsunami simulations" by Kenta Tozato et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-208-RC1>, 2022

nhess-2022-208

Optimal probabilistic placement of facilities using a surrogate model for 3D tsunami simulations

Evaluation:

This is a good work and I think can be published. But the text is unclear in some places and misses important citations. It is important that authors clarify the items mentioned below, and add the suggested citations in order to make their work more international. My comments are given below. I look forward to reviewing the revised version. Best regards.

Comments:

Abstract:

Abstract is too long and is non-conclusive. Please try to add more quantitative results in your abstract. Also I suggest making your abstract shorter.

Figure is very similar to author team another article (<https://doi.org/10.5194/nhess-22-1267-2022>). Please try to make this figure different from your already-published article.

L26: what is meant by "...are not very compatible with probabilistic...?" please clarify.

L33/34: For PTHA, to give more diversity to your citations, please add the following two good articles: "Gopinathan et al. 2021" and "Heidarzadeh & Kijko 2011".

Gopinathan, D., Hidarzadeh, M., Guillas, S. (2021). Probabilistic Quantification of tsunami current hazard using statistical emulation. *Philosophical Transactions of the Royal Society A*, 477, 20210180. <https://doi.org/10.1098/rspa.2021.0180>.

Hidarzadeh, M., Kijko, A. (2011). A probabilistic tsunami hazard assessment for the Makran subduction zone at the northwestern Indian Ocean. *Natural Hazards*, 56 (3), 577-593. <https://doi.org/10.1007/s11069-010-9574-x>.

L68: For the 2011 event please add a reference for clarity. I recommend the article by Prof Tsuji (Tsuji et al., 2011), as below:

Tsuji Y, Satake K, Ishibe T, Kusumoto S, Harada T, Nishiyama A, Kim HY, Ueno T, Murotani S, Oki S, Sugimoto M, Tomari J, Heidarzadeh M, Watada S, Imai K, Choi BH, Yoon SB, Bae JS, Kim KO, Kim HW (2011) Field surveys of tsunami heights from the 2011 Off the Pacific Coast of Tohoku, Japan, earthquake. *Bulletin of the Earthquake Research Institute University of Tokyo* 86:29–279 (in Japanese with English abstract)

L72: I think it is useful to add a line regarding the importance of this study. I recommend something like this: "The recent 2022 Tonga tsunami, which made global impacts (Heidarzadeh et al. 2022), showed that tsunami is an important coastal disaster and studies like this work are needed".

The reference is:

Heidarzadeh, M., Gusman, A., Ishibe, T., Sabeti, R., Šepić, J. (2022). Estimating the eruption-induced water displacement source of the 15 January 2022 Tonga volcanic tsunami from tsunami spectra and numerical modelling. *Ocean Engineering*, 261, 112165. <https://doi.org/10.1016/j.oceaneng.2022.112165>.

Figure 1: the colour bar cannot be read. Please ensure they can be read easily and add a legend for them. Are they "Wave amplitude (m)?" , add them.

L112: The 3D model is not clear? Please add a few references for that and explain more about it.

L113: What is this boundary condition? Explain more about it by adding the boundary equation and a few references.

L120: What are these data? Sea level? Velocity? Force?

L131: what is λ_k ? what is d_j ? every parameter needs to be defined as soon as they are used.

L139: again some parameters are not defined. Please ensure you define all parameters as soon as they are used throughout the text.

L200-204: it is not clear why authors considered only slip and rake for uncertainty? Please clarify this and try to convince the readers? Why not depth while depth is a very important factor regarding tsunami energy? Please clarify.

L203: regarding rake, you could refer to the following good articles that studied rake variations through teleseismic inversions (Gusman et al., 2014; Heidarzadeh et al., 2017):

Gusman, A. R., Murotani, S., Satake, K., Heidarzadeh, M., Gunawan, E., Watada, S., & Schurr, B. (2015). Fault slip distribution of the 2014 Iquique, Chile, earthquake estimated from ocean-wide tsunami waveforms and GPS data. *Geophysical Research Letters*, 42, 1053-1060. <https://doi.org/10.1002/2014GL062604>.

Heidarzadeh, M., Murotani, S., Satake, K., Takagawa, T., Saito, T. (2017). Fault size and depth extent of the Ecuador earthquake (Mw 7.8) of 16 April 2016 from teleseismic and tsunami data. *Geophysical Research Letters*, 44 (5), 2211–2219. <https://doi.org/10.1002/2017GL072545>.

Figure 5: I assume that the elevation is "Topography elevation (m)". Please modify the legend.

L208: For the 2011 Tohoku data, add reference to Mori et al. (2011):

Mori, N., Takahashi, T., and The 2011 Tohoku Earthquake Tsunami Joint Survey Group, (2012), Nationwide post event survey and analysis of the 2011 Tohoku earthquake tsunami. Coastal Engineering Journal, 54 (1), 1-27. <https://doi.org/10.1142/S0578563412500015>.

Figure 8: what is the colour bar? Please write it in the figure next to the colour bar. This way the figure can be easier and readers can notice it instantly, instead of

reading your caption.

L254: It is not clear how the maximum impact force is calculated? Please write the equation that you used to calculate the impact force here. Also please add a reference for that equation that you used for force calculations.

Figure 10: what is RBF? Mention the full name in the captions.

Figure 11: mention the legend of the colour bar in the Figure. Is that maximum impact force? Add it to the figure.

Figure 13: what is colour bar? Mention it in the figure.

End.