

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2021-381

Anonymous Referee #1

Referee comment on "Modelling the sequential earthquake–tsunami response of coastal road embankment infrastructure" by Azucena Román-de la Sancha et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-381-RC1>, 2022

This paper presents a sequential methodology to analyse the response of transportation infrastructure in an earthquake–tsunami event. The content is undoubtedly interesting, and the work developed falls within the scope of Natural Hazards and Earth System Sciences journal. However, given that most of the aspects of the problem have been treated without the due strictness required to a journal paper, the reviewer has serious concerns about the suitability of this paper for publication on NHESS Journal, also in the light of the observations listed below. Therefore, it is suggested to decline the paper.

Specific Comments:

Introduction – this section needs revision, clarification and the inclusion of some recent publications related to lifelines (e.g. the work of J. Williams, 2019, 2020 related to the tsunami vulnerability of critical Infrastructures, etc.) and geotechnics (e.g. the work of Rossetto, T., Goda, K., & De Risi, R., etc...). In this section (at the end of page 2) the models referred to the infrastructure and its interaction with the soil are mixed and needs revision.

In the different models developed in this study, the software used should be clearly identified and the references added. The models adopted for the soil should be detailed defined.

Section 3.4 "Step 2: simulation of tsunami and wave propagation":

- Page 302-303: GEBCO is not a project of NOAA; this sentence needs revision.
- The grid for the simulation considers the displacements presented in previous section. In lines 289-290 it is referred "Important vertical displacements of the soil were observed, as well as a tendency of lateral displacement of the body of the slope, increasing with depth."
- Line 303: a grid with 15 arc seconds (about 300m grid spacing) is not enough to model the flood phase of the tsunami.
- Line 309: One hour of simulation is not sufficient. The authors should check the recommendations in ASCE 7-16.
- In this study, if the effect is to be considered as cascade, the variables over time have to account for the cumulative effect in the numerical models.
- In this work, to evaluate the effect of the tsunami in the infrastructure it is necessary to consider the hydrodynamics variables: height and velocity of propagation of the wave.
- Figures 24 and 25 need improvement and clarification.

Section 3.5 "Step 3: earthquake-tsunami response":

- The smooth particle hydrodynamics approach (sph) is highly sensitive to the numerical parameters. The smooth particle hydrodynamics approach (sph) is highly sensitive to the numerical parameters. The smooth particle hydrodynamics approach (sph) is highly sensitive to the numerical parameters. Using this approach without a convergence study, without a validation, is assuming that any output is possible. Moreover, characterize the pressure with sph is still more challenging. Some validation is required in order to obtain reliable results.
- How the soil was modelled should be clearly defined.