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## Comment on nhess-2021-287

Anonymous Referee #2

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Referee comment on "Brief Communication: A case study of risk assessment for facilities associated with earthquake-induced liquefaction potential in Kimhae City, South Korea " by Sang-Soo Jeon et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-287-RC2>, 2021

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## Manuscript Review

**Manuscript Number** nhess-2021-287

**Title** Brief Communication: A case study of risk assessment for facilities associated with earthquake-induced liquefaction potential in Kimhae City, South Korea

**Authors** Sang-Soo Jeon, Daeyang Heo, Sang-Seung Lee

**Summary** This article focuses on the assessment of earthquake-induced liquefaction hazard with reference to the City of Kimhae, in Southern Korea. Deterministic analysis is carried out with reference to two scenario earthquakes. The susceptibility of the soil deposits to liquefaction is evaluated starting from the outcomes of Standard Penetration Tests (SPT). The liquefaction hazard is mapped in terms of the widely adopted Liquefaction Potential Index (LPI). Based on such maps, earthquake-induced liquefaction hazard is extrapolated at the locations of specific critical infrastructures.

## **GENERAL COMMENT**

In my opinion, the manuscript in the current version is not of sufficient quality to be published in a peer-reviewed journal. I feel that the manuscript could be reconsidered for publication only if major revisions are incorporated and the article carefully re-structured. Moreover, the authors are asked to address all the following:

## **MAJOR REMARKS**

[1] Abstract and Introduction should be significantly improved to allow the reader understanding the framework in which the topic lies, the relevance of the topic itself and the novelty of the approach proposed in the paper. It is also important to mention the advantages and also the limitations of the proposed methodology and how possible stakeholders would benefit from its application. The Title could also be more appealing.

[2] Confusion exists between the "hazard", "severity", "risk", etc. terms. Please, clarify these concepts according to the international literature (e.g. on risks associated to natural disaster) across the manuscript.

[3] The state of the art within the Introduction needs to be significantly enriched by adding more references. To be honest, I am really surprised that none of the most relevant international references in the field of mapping the earthquake-induced liquefaction susceptibility and hazard are cited. Among others, I would like to mention the manual prepared in 1999 by the Technical Committee for Seismic Geotechnical Engineering (TC4) of the International Society for Soil Mechanics and Geotechnical Engineering, which suggests that the zoning of seismic-geotechnical hazards should be carried out according to three levels of detail and increasing refinement, which are named grade-1, grade-2 and grade-3. Recent relevant experiences in Europe should be also mentioned (see the Special Issue on the H2020 European Project LiqueFACT on Bulletin of Earthquake Engineering, 2021). In the manuscript, starting from a comprehensive and critical review of the literature, the novelty of the approach proposed by the Authors should be highlighted. Advantages and also the limitations of the proposed methodology should be mentioned in the Introduction and also in the Abstract.

[4] Earthquake-induced ground shaking is affected by: (i) source characteristics, (ii) propagation path, (iii) local site conditions, i.e. presence of soft soil deposits, basin structures, surface topography. Within the manuscript, any reference to the complexity of wave propagation is completely missing.

[5] The paper completely lacks specific sections to illustrate the seismo-tectonic setting and the geological framework of the area under investigation. Moreover, I would expect the building of a subsoil model starting from geological information and geotechnical data.

[6] The quality of the figures especially the maps is really poor and the meaning of the map/s showing the results should be better explained within the text.

[7] This study completely lacks of a sensitivity analysis able to address the influence of the several assumptions carried out by the Authors on the results. Uncertainty associated to the different steps is never mentioned.

[8] The Authors adopted only Liquefaction Potential Index (LPI, originally proposed by Iwasaki et al. 1978, 1982), but more recent lumped parameters have been proposed (e.g. Liquefaction Severity Number, LSN, etc.) and widely used in the literature.

[9] Many sentences in the manuscript need to be substantiated by citing bibliographic references from the literature, e.g. available methods for assessing liquefaction potential from SPT, CPT, etc. I strongly recommend to adopt more than one method available for SPT data.

[10] All the steps of the methodology are not clear in the current version of the flowchart (Figure 1), that needs to be improved, in my opinion. Please, check carefully any missing arrows and consequent step/s.

[11] Could you try to validate the map by overlapping the location of manifestations of liquefaction?

[12] I strongly recommend to avoid to extrapolate the liquefaction hazard from such kind of maps at the locations of specific critical infrastructures. In case of specific structures/infrastructures, specific analysis is needed starting from an in-deep ground characterization of soil deposits at the site of interest.

[13] In the Conclusions, limitations and weakness points of the proposed methodology and of the presented application should be discussed in details. Concluding remarks are not fully supported in the study (see also Comment [11]). Can this methodology be applied to other areas? How? Who will be benefit from this type of maps?

## **MINOR REMARKS**

[14] The manuscript should be read carefully for English language.

[15] Please, read carefully the paper for typing errors.

[16] Please, define the symbols, acronyms, etc. the first time you used them in the manuscript and then be consistent in the remaining text.

[17] With reference to the earthquake magnitude of the mentioned seismic events, please provide the source and add the references.