

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
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Comment on nhess-2021-279

Anonymous Referee #2

Referee comment on "Sensitivity analysis of input ground motion on surface motion parameters in high seismic regions: A case of Bhutan Himalaya" by Karma Tempa et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-279-RC2>, 2021

Authors have presented a research on Sensitivity analysis of input ground motion on surface motion parameters in high seismic regions: A case of Bhutan Himalaya. This paper is most like a lecturing note has serious drawbacks in both poor presentations and applied technics. This paper deals with a very known approach without any new contribution. A critical drawback of this work is that the reliability of the collected geotechnical data was not comprehensively reviewed. The paper is well structured and written, however, considering the quality of the paper and uniqueness of the research, I have concluded that the manuscript is not suitable for publication in Natural Hazards and Earth Science Systems.

- Abstract and introduction are very general and there is no significant in the scientific border. There is ample room to improve the introduction as "Introduction" is actually weak.
- Presenting facts is not sufficient for a journal paper, there needs to be more direction to the writing and evidence of critical analysis.
- Authors highlighted anomalous damage patterns in various parts of Bhutan due to the earthquake but failed to present any data or photos etc. to highlight the damage.
- Some of the statements presented in the manuscripts are contrary to each other.

e.g. Abstract:....this study is the first attempt to quantify the influence of the 14 local site conditions in the eastern fringe of the Himalaya...

Introduction: In Bhutan, very few studies on local seismic response analysis have been 34 conducted so far. Some of the recent studies

There are many others.....

- I do not see any earthquake greater than Mw 7.0 in Figure 1, but authors mentioned that records of past earthquakes in Bhutan are available since 1713 (Mw 7.0). Authors highlighted at several places that Bhutan is one of the most seismically active regions in the world.
- Page 2, Line 49: Local site conditions during historical earthquakes in Bhutan were identified as the main cause of structural damage. Any documents or reference or photos ?
- Page 5, Lines 129-140: Is this paragraph related to Seismicity and geological setting of the study area? There are some information which seem to be irrelevant for the article.
- Page 6: The groundwater table in the study area is shallow and varies between 0.5 m to 16.0 m. Are you still considered groundwater table at 16 meter as shallow depth? Please double check literature.
- Page 10, Line 195-196. The term liquefaction came out of nowhere.
- What about temporal variation of water table? Groundwater table is highly sensitive to rainfall. Did you consider it? It seems authors consider the groundwater table at the time of geotechnical investigation which can be random throughout the year. This could be attributed to wide range of groundwater table within small area.
- Table 1 shows more than 100 soil samples, but authors presented only 7 particle size distribution curves. Where is PSD curve for Rinchening?
- Table 1: The dry density of soil sample is higher than the bulk density for Rinchening. Even I do not believe the cohesion of the sample having SPT-N value higher than 100 is only 0.18 kg/cm². Where is plastic limit and liquid limit values?
- Soil at Dhamdhara is described as coarse-grained sand with gravel/cobbles and rock piece but authors reported PI value. PI values at Rinchening and Dhamdhara is not reliable based on soil descriptions.
- Double digit for shear wave velocity is not required.
- Quality of Figure 7 can be improved significantly.
- Authors should present the profile of peak ground acceleration (PGA) for the locations presented in Figure 5.
- The manuscript currently lacks a cogent argument / thread. This stems from the introduction, which lacks an aim.
- Could the findings in the study be applied to any countries or only adopt to Bhutan? Please describe the contribution of this study from the viewpoint of local characteristics and universal ones.
- Why not consider one or two ground motion from earthquake in Himalaya?
- Irrelevant self citation. Similarity index is quite high. Some of the text were copied exactly from the following paper and other reports.

Tempa et al. (2021). "Shear wave velocity profiling and ground response analysis in Phuentsholing, Bhutan" , Innovative Infrastructure Solutions.

- Page 17, Lines 282-287: This is like a lecture note, a very well-known statement.
- Figure 12, why not PGA profile is presented up to bedrock? I would suggest to present PGA profile in terms of amplification ratio or factor by normalized PGA of input motion. It will help to visualize the results.