

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC2
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Reply on RC2

Mohamadreza Hosseini and Habib Rahimi

Author comment on "Probabilistic fault displacement hazard analysis for the north Tabriz fault" by Mohamadreza Hosseini and Habib Rahimi, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-351-AC2>, 2022

Thank you very much for reading our manuscript in full detail. We edited the manuscript but later realized that at this stage, we only need to answer the questions. We read and considered your comments item by item as follows.

1- The introduction is missing several worth-to-mention papers and should be improved

Answer 1:

Yes - In this section, by studying and reviewing several articles, including (mentioned below), they were added to our introduction so that we can have a better and more up-to-date literature review.

*Baize, S., Nurminen, F., Sarmiento, A., Dawson, T., Takao, M., Scotti, O., Azuma, T., Boncio, P., Champenois, J., Cinti, F.R. and Civico, R., 2020, A worldwide and unified database of surface ruptures (SURE) for fault displacement hazard analyses: Seismol. Res. Lett, **91**(1), 499-520.*

Goda, K., 2021, Potential Fault Displacement Hazard Assessment Using Stochastic Source Models: A Retrospective Evaluation for the 1999 Hector Mine Earthquake: GeoHazards, 2(4), .398-414. <https://doi.org/10.3390/geohazards2040022>.

Nurminen, F., Boncio, P., Visini, F., Pace, B., Valentini, A., Baize, S. and Scotti, O., 2020. Probability of occurrence and displacement regression of distributed surface rupturing for reverse earthquakes: Front. Earth Sci. 8, 456.

2) The input data must be clearly described both in the main text and in the figure. Fault length and selected site are just two examples.

Answer 2):

Yes - In this section, in addition to re-editing Figure 1, to introduce the input parameters, we also briefly explained these parameters in the introduction. We also mentioned this

because our study is based on the study (Petersen 2011) and his code, and according to your positive opinion, our view in this manuscript changed somewhat compared to the past, we examined the strengths and weaknesses of (Petersen 2011) study and we will explain about it in the following paragraphs.

3) The section Methodology of probabilistic fault displacement hazard analysis needs a deep review. I suggest focusing only on the approach used (i.e., Petersen et al.) and I would like to see all equations used (and how).

Answer 3): In this section, as mentioned, we first reviewed the history of the method (PFDHA) from (2003), reviewed and introduced on Petersen 2011. Our purpose in this section has been to examine Petersen's method (2011), and we have no claim to change this method in this manuscript.

4) The section Results and Discussions is very poor. There is no discussion about the results and, for me, it has been very hard to understand how input parameters are considered and which equations are used. This paper could help the seismic hazard local community but it need a major review in order to make the manuscript clear and readable. Reading the paper I have the feeling that most of things are omitted and not well described.

Answer 4): Yes - We did our best to revise this section of the manuscript. In this manuscript, we have examined these positive and negative features of Petersen's introduced method, which we have discussed in detail in the Results and Discussions and Conclusion section.

To explain the obtained results more clearly, we added Figure 9 to the article, which examines and compares the results obtained for two different scenarios and identifies the worst case, and will have a better description of the results obtained.

5) As it is, this work is just an application of an already published work (Petersen et al., 2011). Which is the contribute to the scientific community? even if the authors are in position that they cannot contribute from a methodological point of view, a good discussion section can help to improve the quality of the manuscript, for example, highlighting the critical aspects of this approach, the difficulties that they have found in its application, area that need further and future works, implication in the hazard of the area, and so on.

Answer 5): yes - This comment was very effective and useful for us. We examined the strengths and weaknesses of the work and also examined the applications of this method in northwestern Iran, how they can be effective in the future. This fault has a high level of risk and lacks high instrumental data, and causes uncertainty in studies. For this reason, different scenarios have been considered for displacement estimates.

6) Several references (more than 15!!) are in the reference list but they are not in the manuscript. This is a little bit embarrassing. Reference list is important as well figure and main text as.

Answer 6): Yes – we considered your comments and all the mentioned parts has been revised.