

Review of Manuscript egosphere-2023-1740

Testing the 2020 European Seismic Hazard and Risk Models using data from the 2019 Le Teil (France) earthquake

The manuscript is a research study devoted to carry out a testing and validation study of components involved in the seismic hazard and seismic risk estimation. The testing of ground motion and damage to building is done using several models, observations of ground shaking and observed damage from past earthquakes. The authors investigate if the obtained scenarios are consistent with observations and the reason for the obtained differences.

The topic of the paper is very interesting and suitable for the readers of the journal. However, the title and the redaction of the manuscript do not help to get this goal. The focus on European Seismic Hazard and Risk Models distracts from the very interesting part of the manuscript. The manuscript should be focused as a sensitivity study of the ground motion estimation and damage estimation using different input models and how these are closest or not to the observed data from Le Teil earthquake.

Therefore, each section must be introduced with the models that are going to be compared, why are those comparisons going to be done in that section?. Additionally, each comparison must be explained more in detail so the reader can see clearly which models are kept constant and which are compared. Finally, the author must try to rewrite the conclusions according to the comparisons they are doing. My final recommendation is to reconsider the publication of the manuscript after major revisions.

MAIN COMMENTS

The concept ShakeMap analysis is not clear. The authors cite Wald et al. 2022, but they should explain better.

Line 62. When describing the earthquake, you have to indicate also the registered magnitude and focal depth. Also, they indicate a estimated near-faults PGAs with a 68% confidence interval of 0.3-1.9g . Is this a range in the rupture area? Which is the size of the rupture? How can you explain such a high attenuation because the at 15 km the recorded PGA was only 0.04 g (that is a reduction of 77% of the PGA in 15 km if compared with 0.3g).

Line 75. Do not use number for macroseismic intensity, it is better to say VII-VIII instead 7-8

Line 110. Regarding the test based on the intensity of the seismic ground motion.

The authors compare the different scenarios pointing that the lowest PGA and Sa0.3s must be due to differences in the rupture distance but they do not say anything about which scenarios is closest to the observed ground motion. Which models fit better the observations?

Line 160. Regarding the test based on the macroseismic intensity.

I do not understand what the authors are trying to demonstrate. If you are using correlations from Ground Motion to Intensity the results that you are going to obtain should be similar to the obtained in the previous section. If the idea is to see which is the best GMICES for the region, then using only those scenarios is not enough, the authors should look for the most recent correlation (using a higher number of observations ground motions and macroseismic intensity) and simply use that relationship with the corresponding standard deviation and probably the observed intensity at Le Tail will be in that range.

Line 209. Estimation of damage using different risk analysis tools

Here the authors compare the damage results using Armagedom and OpenQuake but the section should be explained better. As far as I understand the damage obtained with Armagedom is obtained using the ground motion modelled by the deterministic scenarios (all of used in the previous sections?, one of them?) and the semi-empirical macroseismic method, but regarding Openquake the authors indicate the use of the ESHM20 ground motion logic tree (is this meaning you are comparing damage using a deterministic scenario with damage from a probabilistic hazard map? It sounds strange to me. Can you clarify? Which is the method used in OPENQUAKE for the damage estimation is also the same used in Armagedom? Is it a different method? You have explained how this is done to be sure that you can compare the results.

Line 237. Regarding the Damage based on observations.

Again, this is rather difficult to understand. The paragraph starts speaking about a test related to vulnerability and risk modelling, but the conclusion of the paragraph is simply a table assigning building taxonomies to the building database. If the author wants to create different taxonomies to their database, they should name the section: Vulnerability estimation or something related to that.

Line 248. Regarding Estimated damage based on a "building-by-building"

Here the authors compare the building-by-building damage results using OPENQUAKE when using Ritz et al. scenario and Shakemap analysis (try to find a better name for this). Initially those analyses use the same Vs30 model and they also include a new Vs30 model (named ESHM20 Vs30) to the Ritz et al. scenario. Again, this is very messy. If you want to compare the influence of the ground motion scenario, it is clear the comparison between Ritz and Shakemap using the same Vs30 model but if you want to compare the Vs30 influence you should also include the Shakemap scenario with the ESHM20 Vs30 model to be consistent.

Line 287. Regarding Estimated damage based on aggregated exposure model.

Here the authors carry out many different comparisons. Again, it is very messy, and it is not clear why you are doing it and what are you looking for.

Conclusions: The first conclusion is that the FM2010 model is the best to estimate macroseismic intensity since it is closer to Schlupp et al. (2022). Is this the model used in your national seismic hazard maps or shakemaps to convert from ground motion to macroseismic intensity? Is it only appropriate for the Le Teil region?

Along the paper you have made multiple comparison, so it would be nice if the conclusions also indicate the main conclusion about those comparisons. At the moment, 11 lines are conclusions regarding the ground motion comparisons (sections 3.1 and 3.2) and 11 lines are conclusions regarding the rest of comparisons (3.3.1 to 3.3.4).