Natural Hazards
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Sciences

Discussions

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Interactive comment on "The Effect of Alternative Seismotectonic Models on PSHA Results – a Sensitivity Study for the Case of Israel" *by* Matan Avital et al.

Anonymous Referee #2

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Comments on the manuscript "The Effect of Alternative Seismotectonic Models on PSHA Results – A Sensitivity Study for the Case of Israel" by Matan, Michael, Ory and Ronnie to be published on NHESS journal

This and similar studies are important and necessary for assessment of potential seismic hazard in Israel as well as the areas with high and low seismic activity. This study presents the alternative seismotectonic and earthquake rate models and their use in PSHA. It performs the seismogenic zonation approach as well as the characteristic earthquake approach as an alternative using the updated seismic and geological database. Moreover, it deals with some parametric sensitivity analysis which may be

used to improve the probabilistic seismic hazard assessment (PSHA) for future seismic hazard assessment in Isreal. The uncertainty analysis suggests that future research is necessary to resolve some of the key issues that affect earthquake occurrence probabilities and ground shaking hazard. Therefore, the topic could be of interest for the readers of NHESS, however, due to several important points discussed below, the manuscript requires some revisions and improvements. The use of English language is well however very colloquial at some parts. The main problem concerns completely missing definition of the whole uncertainty procedure followed in the study in particular, lack of the information and the methodology adopted/performed for the sensitivity analysis as well as the raking procedure related to the seismic sources. I recommend authors including a new section where they explain the uncertainty as well as the sensitivity analysis together with proper equations and clear definitions. 1- In section 2 authors define the range of parametric epistemic uncertainties cautiously (pag 4,5,6,7 and 8) then they suddenly start presenting the results (pag.8, 9 and 10) without given any methodology/approach that follow to obtain those uncertainties. For example figure 11 and figure 13 needs to be explained in a better way. 2- In figure 9 authors presenting hazard curves that are calculated at two sites using four models for two spectral periods (Table1), but there is no uncertainty study dedicated to this section; figure simply presents four hazard curves. Some quantitate presentation and values are needed in order to highlight the differences between the areal sources and the linear fault one (S1413 and DD14); for example what is the percentile change or the absolute peak ground acceleration values. Please also indicate adopted GMPEs for the hazard analysis for these four models. 3-It is not clear to me how the authors utilized the logic tree for the sensitivity study, please indicate clearly how the selected weights (figure 8) associated to each branch are treated during the analysis. How the seismic sources are ranked by their contribution to the hazard uncertainty such that those of most contributing. How many model and parameter combinations did you realized? Here needs some quantitative values. 4-Please explain the use of the three standard deviations in the hazard calculations (Page9 pr.35-40)? 5-In Figure 13 explain

why 25th and 75th percentiles are different around the median values? 6-There are too many input data, parameters and/ or database are mostly acknowledged without given any explanation. For example, how the seismic catalog were pre-processed (completeness analysis, declustering, Magnitude types etc.) and how many event does the catalog contain as a function of magnitude should be given for the benefit of readers. It is fundamental that the single seismicity parameter calculated (b-value, recurrence times for each fault) and assumed during the model construction expressed clearly with the complete and proper equation (use of YC, TN, TE) definition and description. 7-Section 2.1.4 activity rates calculated for 2 sites and given in table 3, but how the Weichert (1980) approach performed using GJI catalog is not clear! as my knowledge the method takes into account the completeness magnitude thresholds by various time periods, I was wondering how authors benefit this to obtain long-term activity rate in the region. Since it is one of the most important parameters it merits to be explained in a better way. Again please present what is the b-value/s calculated for the study area/s. 8-Authors state that the use of slip rates as taken 1-8 mm/yr range in their study but it is not clear how and where they use this information is totally missing (page 5-6). Similarly in the segmentation model, authors claimed that only the eastern segment was chosen to represent the faulting in the Dead Sea basin in order to maintain the correct moment balance but there is no equation, figure, quantitative value that demonstrates this choose (page 6 par.15). Same as the magnitude calculations from different fault segments needs more information and more scientific definitions (page 7 par.10-15). How the fault's depths are taken into account for the Mmax calculation; more information and/or suitable set of equations needs to be provided. There is no information regarding to fault type and the mechanisms (strike-slips or normal faulting?). 9-What are the weights used for 6 GMPEs through the logic tree. 10-Most of the maps are not informative and not always show explicitly city and county/sea names. Figure captions must be more informative. 11-Please insert the seismicity of region into figure 1-2 and 4 12-Abstract: it is necessary describing the important quantitative results obtained in the study. 13-In the discussion section please avoid the colloquial presentations as

under- or overestimates instead present these variabilities with quantitative values.