RC 1

Reviewer comments	Author response
1) P.6, L.1: You mention the local intraplate earthquakes and faults, and plot them on a couple figures. If possible, describe the type of faults these are (strike-slip, normal, thrust, etc.), as this is important for future studies to consider (with regards to directivity, hanging-wall effects, etc.), and I think also important for readers to understand if and how any of these effects have been considered in the GMPEs, later on in the manuscript.	Based on the information available from the literature and the geological map of peninsular Malaysia, the intraplate faults are normal and strike-slip faults. This information will be added in the paper. Due to our limited access to the detailed information, the effects mentioned by the Reviewer were not considered in the GMPEs.
2) P.12: I think it is important for readers to know a little more about the GMPEs, such as what are the basic components of the functional forms (i.e., are there hanging wall effects and other more detailed effects, or just magnitude/magnitude squared/geometric spreading/intrinsic attenuation terms?) What do the attenuation parameters look like, and how does that compare to attenuation in the region (if there are studies of Q here)? How is the site represented – is it basic NEHRP classes in all of these GMPEs? How do the models compare to each other? I don't think this has to be a long discussion, but as the rest of the paper is so comprehensive I don't think an extra paragraph or two here describing the ground-motion models could hurt, as they are a significant component of seismic hazard assessment.	Considering that each GMPE was developed independently by different researchers, providing more details for every GMPE utilized in the current study will inflate the size of the present paper. However, we acknowledge that it is important for readers to at least have a quick understanding of the GMPEs. We will, therefore, include a table with information about the GMPEs used for SHA. The information provided will include the regions, tectonic settings, magnitude ranges, distances, functional forms, and standard deviations of all the GMPEs.
3) P.13, L.19: I noticed in several places in the paper (including this line), the authors mention that they use "mean" values from the ground-motion models. Generally, ground-motion models predict median ground-motion – are the models you are using instead predicting the mean? If so, I encourage you to perhaps add some text in the discussion discussing the implications of this (i.e., it can sometimes inflate the hazard as opposed to using the median value).	Yes we are using mean values (not the median values). Majority of GMPEs listed in John Douglas' GMPE compendium (see http://www.gmpe.org.uk/) deals with the mean values. Strasser et al. (2008) also discuss why ground-motion residual distribution being generally assumed to be normal with a mean of zero and a standard deviation σ.
4) Figure 1: I found this figure a little difficult to interpret. I appreciate that it is required to pack a lot of information into it, so I have a few suggestions that could include all this material, and make it a little easier to interpret: *a. Make the coastlines thicker, and/or color the land/water separately*	We thank the Reviewer for the suggestions to improve the clarity of the Figure. We accept suggestions a, b, and d. Adding topography/bathymetry (suggestion c.) make the map even busier. We prefer to stick with the current map (from ArcGIS Esri. 2015) and make slight modifications to it.

b. Add some longitude/latitude tick marks and/or grid lines to the figure, to orient the reader and help them understand what the map projection is *c. Perhaps add topography or bathymetry? (Though this could make it busier, and harder to read)* *d. Place a box around the approximate area/location of Figures 2,3,4 and 8,9,10, and 12 since I think they are slightly different from what I can tell* *e. Perhaps code the intraplate faults based on the type, and/or add direction of motion* *f. Place direction of motion on the SFZ g. Caption: Add a citation for the intraplate fault database*	The intraplate fault lines (suggestion 4e.) are digitized lines obtained from the Geological Map of Peninsular Malaysia (2014). It would be extremely small if there were to be added in an already crowded map. These lines are clearly shown in the blown up figures of the peninsula (Figures 8 and 9).
5) Figure 2: A few comments – *a. The label "Mantel" should be "Mantle"* *b. Add the direction of motion of the SFZ* *c. It is a little hard to see the Local Intraplate label on the top right – I would suggest adding this to the caption that is already on the bottom left, with "major seismic activities" and "subducting direction"* *d. Caption: Describe the diverging white arrows; I am assuming the numbers ("approx.. 10km", "> 2000km") are thicknesses, but I would suggest explicitly writing this in the caption; Add a citation for the intraplate faults, like Figure 1.*	We thank the Reviewer for the suggestions. All points will be taken onboard in the revised version.
6) Figure 4: There are a few things that made this figure a little difficult for me to interpret, I have a few suggestions: *a. Add some arrows indicating which boxes are Zone 1,2,3,4* *b. Perhaps reduce the opacity on the SSZ and SFZ zoned areas, as it is hard to see the background seismicity through them* *c. It is a little hard to see the text for Zones 5 – 7 in the SSZ, maybe make this text white, or put an opaque gray box behind all these zone texts?* *d. Not a major comment, small, but the last portion of the M in KM is cut off on the scale, bottom right.*	We thank the Reviewer again. All suggestion will be considered in the revision.
7) Figures 8 and 9: I have a few suggestions – most of them are in the interest of making the figures more similar to Figure 12, in the interest of being able to directly compare the results of the DHA vs. PSHA. *a. Making the city labels a little larger, it is hard to see them*	All the suggestions, barring d, will help us improve the figures and will be considered in revising the figures. It is quite difficult to color the ocean as the base map was obtained from ArcMap 10.4. Hence, we will have to find another ocean map and overlay the other information which may lead to some discrepancies especially

b. Make the coastlines, geographic regions lines a little thicker, hard to see *c. Make the fault labels a little larger 3* *d. Perhaps color the ocean like in Figure 12, for consistency?* *e. Add gridlines on the plot, like in Figure 12.*	in terms of boundaries. Nevertheless, we will attempt to make the coastlines and geographic region lines thicker to address this problem.
Specific comments	
1) In abstract, P.1, L.14-15: Perhaps also give these PGA values in percent g? For example, "PGAs of 0.07 – 0.80 m/s2 (0.7 – 8.1 percent g)…"	We prefer to stick with ms^{-2} for consistency throughout the text. However, we are happy to add values in percent g if required by the journal.
2) P.2, L.28 – 29: "This method, nonetheless, is not free of criticism as studies have observed that PSHA is merely a numerical creation with a hazy mathematical concept and the use of it may lead to risky or overly conservative engineering design". Perhaps a bit nit-picky, but I feel this is a bit harsh on PSHA, and a subjective statement. The main criticism of PSHA is that it cannot be validated, and therefore I do not think its criticism can "observe" that it is numerical creation, or has a hazy mathematical concept… but perhaps these studies can "suggest" that is mathematical, and has challenges in validation due to lack of data. I still contend, however, that its mathematical concept is not hazy…probabilities are not hazy, they are used in major financial decisions every day and are at the root of most capitalistic endeavors, and those who apply these "hazy" mathematical concepts seem to profit from them…just as an example.	Although we have paraphrased the above statement from literature, we appreciate the Reviewer's view and we will reword the statements as to be non-controversial.
3) A purely stylistic suggestion, of course authors' choice: The introduction is very well laid out, and has a decent amount of background. My only suggestion would be to place the main study focus before the description of PSHA, i.e., put the material from P.2, L.31 through P.3, L.9 before the discussion of DHA vs. PSHA, which could then motivate this discussion.	We thank the Reviewer for the suggestion. We have added a paragraph in the revision and it reads much better now.
4) P.5, L.17 – 18: "Lying dextral and parallel about 200km away from the trench to accommodate the oblique convergence along the plate margin is the Sumatran Fault Zone. This 1900 km long strike-slip fault…" I found myself a little confused about whether the fault was dextral in its motion, or if dextral referred to its position; perhaps change to: "lying east and parallel… This 1900km long dextral strike-slip…" ?	We will reword the sentences to avoid confusion as suggested by the Reviewer.

5) P.6, L.19: In the paragraph preceding this line, perhaps reference Figure 1 or 2, to indicate where the reader can find the local intraplate faults on a map.	This is done in the revision.
6) P. 8, L.9: "within the same grid in the past.". I am assuming "in the past" refers to since 1797, as described on L.4 – if I am correct, perhaps add that in? "within the same grid since 1797"	We will reword accordingly in the revised manuscript.
7) P.11,L.8-9: I am assuming the b-value was computed on events with M> 4.0 (SFZ) and 5.0 (SSZ) because of the network's magnitude of completeness? It looks like on Figure 5, the event start to fall off here. If I am correct, perhaps state that here to clarify.	The use of the entire magnitude range (4.0 – 9.1) was initially considered based on the observation that earthquakes causing felt ground motion in the peninsula start at M_w 4.0. We therefore assumed that the catalog is complete. However, taking into account that both Reviewer #2 and Reviewer #3 have noted that the completeness analysis is essential for PSHA, we have re-performed a completeness analysis using the Stepp (1972) method and include it in the revised manuscript.
8) P.14, L.8: I suggest changing "local intraplate earthquakes" here to LI earthquakes, since you have an abbreviation for it.	Thank you. Changed in the revised manuscript.
9) Figure 3: I do not see any of the LI greater than M 3.0 events (pink dots) – should there be any?	Perhaps it is confusing. We will revise Figure 3 to make these (LI events of Mw >3.0) more distinct.
10) Figure 6: In the caption, perhaps describe what the recorded data shown is from (dates, etc.); Add a goodness of fit of the GMPEs to the data, if you have them?	We are not showing the recorded data, etc. in the current paper as these data have been used in a separate manuscript (submitted). Having the exact same data/details will increase the size of this paper and possibly lead to plagiarism accusation.
11) Figure 7: Is Beta-value (column heading) supposed to be b-value?	Thank you for alerting us to this typographic error. This is supposed to be b-value and will be revised accordingly.
12) Figure 8: Caption – is "mean" GMPE supposed to be median here?	It is meant to be "mean."
13) Figure 12: Add the study abbreviations (A06, A05, etc.) into the caption.	These will be added in the revised manuscript. Thank you.
14) Table 1: Is PYSM_B9 the site located on a building, which you said was not included in the study? If so, perhaps add an asterisk in the table and caption to specify.	This will be added in the revised manuscript.