Natural Hazards
and Earth System
Sciences

Discussions

Interactive comment on "Revisiting Seismic Hazard Assessment For Peninsular Malaysia Using Deterministic And Probabilistic Approaches" *by* Daniel Weijie Loi et al.

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This paper assesses seismic hazard for Peninsular Malaysia by considering both deterministic and probabilistic approaches. I found the importance of this work since few studies focusing on the seismic hazard of this region and this study could provide a better assessment. However, I have a number of questions about the paper. Below I detail my comments and questions.

Major questions:

DSHA and PSHA: Usually the hazard level determined by DSHA should be higher

than or equal to that by PSHA since DSHA considers characteristic events regardless it occurrence probability. Thus, I am surprised that the DSHA results (Figures 8 and 9) has significant lower hazard than the PSHA ones (Figure 12 b). I am confused how it could happen. I wish authors could have a good explanation for it.

Catalogue completeness: Implementing an incomplete catalogue could result in overestimation of earthquake recurrence for large magnitude. In this study, earthquakes with M$\geq$4.0 since 1907 (or 1976, stated in Line 15 of Page 10) are implemented. However, the catalogue incompleteness is shown in Figure 5b that seismicity with M$\leq$4.2 does not follow the G-R law, resulting in a lower-b-value (shown in Table 3, since it is uncommon having b-value smaller that 0.8, especially in active tectonic environments). A G-R model with a low b-value expect higher occurrence rate for large magnitude and higher hazard.

Fault parameters: The fault parameters (e.g., segmentation, maximum magnitude, slip rate) implemented in this study are obtained from previous researches. These parameters, however, sometimes are different from the Indonesian Hazard Map (the 2010 version can be download through: https://www.google.com.sg/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8& As5RkrIohnA, updated version has been proposed in 2017). For example, the slip rate of the Sumatran Fault implemented in this study (Lines 19-23 of Page 5) is significant higher than those proposed by the Indonesian Hazard Map; segmentation of the Sumatran fault is different. If authors prefer the current setting, some description on the discrepancy between each other is required.

Logic tree branch: Since occurrences of earthquakes with different magnitudes are independent to each other, it is not necessary to be implemented into logic tree (as described in Line 32 of Page 12 and Line 1 of Page 13).

Point source for DSHA: An earthquake could be regarded as a point source when its magnitude is related small, whereas a line or plan source should be implemented for

a large event. Experience (in the form of scaling law) suggests fault length could be longer than 10 km for an M≥6.0 event. Besides, for DSHA of the Bukit Tinggi Fault, the epicenter of a coming event is controversial. Thus, I would suggest conducting a series of scenario considering different rupture lines along the fault and report the highest shaking level for each calculation node (, suggesting the worst case).

Miscellaneous questions and comments:

Some of the references in the references list cannot be found through the internet (e.g., Loi et al., 2016; Loi et al., submitted). It makes audience difficult to evaluate the credibility of this study. Thus, I would suggest detailed description of the referred studies in the text (e.g., credibility of implemented GMPEs).

I feel this study tries to link with design code, thus I would suggest to assess seismic hazard not only in peak ground acceleration, but also spectral acceleration.

Line 4 of Page 4: 'activity' instead of 'recurrence'?

Line 8 of Page 4 and Figure 1: Coordinates are expected in Figure 1 so audience can understand the region described in the text.

Lines 29-30 of Page 5: A locking depth of 15 km is implemented, while the Indonesian Hazard Map utilized 20 km. Although I do not expect significant difference in the results, I am looking forward to an explanation or a reference for this parameter.

Line 31 of Page 5: An unnecessary comma should be removed.

Line 32 of Page 6: Site class E is soft soil, whereas Vs30 ranging from 760 to 1500 ms-1 is defined as site A.

Line 25 of Page 13: 'times' instead of 'fold'?

Lines 12 and 18 of Page 14 and Figure 8: Location of KL should be denoted in Figure 8.

Figure 1: Do orange lines denote active faults? If so, please specify their reference(s). Besides, I am confused on the alignments of 'Tectonic plates boundary'. For the West of Sumatra as example, I expect the boundary should be further to the west (fit the alignment of the Sunda Trench).

Figure 2: What is the meaning of '>2000 km' in the figure? Thickness of Mantle, or the depth of the boundary between crust and mantle? Besides, there is a typo for 'Mantle'.

Figure 3: Some events took place at the West of the Sunda Trench should not belong to the Sumatran subduction zone.

Table 3: Although the epicenter of the 2004 M9.1 event is in Zone2, part of its rupture zone locates on Zone 1. Thus I suggest MwMax of 9.1 (or even 9.2) for Zone 1.

Thus, I suggest this manuscript can be published after a major revision.

Chung-Han Chan, Nanyang Technological University, Singapore, April, 2018.