

Interactive comment on “Probabilistic seismic hazard analysis using logic tree approach – Patna District (India)” by Panjamani Anbazhagan et al.

Anonymous Referee #2

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The Manuscript entitled “Probabilistic seismic hazard analysis using logic tree approach- Patna District (India)” presents a comprehensive PSHA study for one specific region in north India. Authors employ different alternatives for main PSHA-analyse components including, e.g., M_c , maximum magnitude, GMPE-set, zonation model, etc. to populate the epistemic logic tree. The study is confident, uses extensive local sources dataset and employs up-to-date PSHA analytical tools incorporated into the logic tree approach to treat the epistemic uncertainty.

In general, I would recommend publishing present study in NHSS. Nevertheless, I would recommend “major revision” because of the two issues. Both issues deal with the art of presentation, so, I think, Authors could easily accommodate them. First- the manuscript has too many figures in the results section, namely 23! Some of them could

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be combined together into one plot. For example figures presenting PGA maps for the three approaches: ‘classical’, ‘areal seismic zone’ and ‘Frankel’ (Fig. 8a, 11a, 16a). Same for the deaggregation diagrams, and so on. Such a combination, if possible, would make presentation more structured and comparison between methods more evident. Alternatively, Authors may think of moving some figures into the supplementary material.

The second issue is writing style. English is generally OK, but the writing style is somewhat sloppy. Especially in the beginning of the manuscript. Please read thoroughly statement-by-statement and put attention at clarity and correctness of the text. To avoid dubious statements like that on Page 2, Lines 10-11.

Following are some more specific comments (referred by page and line number).

1-17: tsunami

1-18: Triggering tsunamis is nothing to do with ground shaking because tsunamis respond to residual, static deformation of the seabed, not to PGV or PGA.

1-20: “subduction”

1-20: I am not sure if you can call the India-Eurasia collision as “subduction zone” because the latter term commonly implies subduction of the oceanic lithosphere whereas in this case we actually have continent-to-continent collision.

2-6: Does aleatoric uncertainty include “randomness of ground motion prediction”? GMPE’s are derived by people, not by nature. Maybe, better to say that it includes randomness of wave propagation and site amplification?

2-11: I do not see the logical connection between the sentence starting with “Generally, ground motion. . .” and the next one. Logic tree is used to quantify all kinds of epistemic uncertainty, not only that related to GMPE’s. Please consider re-formulating these paragraph.

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2-15: if weight is assigned, we cannot speak about “qualitative” assessment any more

2-21: “As per Bilham” – what is “per”?

2-28: “determined weighted mean”?

2-31: “viz.” ?

3-7: what is “SSA”. Define explicitly before using abbreviation for the first time.

3-8: an area cannot have only one single value of lon and lat. A point can, area – not.

3-10: give reference to Figure 1 in the beginning of Patna region description

Figure 1: source labels not readable I suggest to add a supplementary table describing individual faults. Or, alternatively, to extend Table S1 with additional parameters like position, rupture length.

3-16/17: redundancy

3-28: this sentence looks redundant. The whole paragraph is better to move to the beginning of the current chapter.

4-21: it is still worth to provide GR-expression with ‘a’ and ‘b’ parameters

Seismicity parameters ‘a’ and ‘b’ are discussed in both Sections 3.1 and 3.2. That is why present Section titles look somewhat misleading. Consider renaming these sections, for example, according to the derivation approach: period of completeness (3.1) vs magnitude of completeness (3.2).

5-13: why M4.5 was finally accepted as Mc? This statement comes into contradiction with following statements where Authors accept M6-model to be their reference model. M6 has different Mc values for the two regions.

General Remark to Section 3.2: Authors employ 9 different methods to estimate ‘a’, ‘b’, and Mc. But finally accept only one model, M6, giving the corresponding logic tree node weight = 0.5. That means all other models were given zero weights despite some

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of them (M1,3,5) show results similar to M6. Authors should more clear justify why they do neglect all other 8 models.

9-29: vulnerable?

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