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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Tsunami evacuation plans for future megathrust earthquakes in Padang, Indonesia considering stochastic earthquake scenarios" *by* Ario Muhammad et al.

Anonymous Referee #2

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GENERAL COMMENTS The paper by Muhammad A. and coauthors reports an assessment of tsunami consequences on the coastal city of Padang (Indonesia), basing on stochastic simulations of tsunami sources, and evaluation of the consequences on the buildings that have been identified as vertical evacuation shelters. In this way, the authors assess the evacuation capability of the community in case of major tsunamis, the possible evacuation route and the time needed for people to evacuate, basing on the three selected earthquake-magnitude scenarios. An interesting issue is also represented by the evaluation of the effects of different levels of topographic data detail on the computation of tsunami inundation effects. The paper is in general very well written, well structured, and presents interesting results in the field of natural hazard

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assessment and consequences on coastal communities. On the other side, some main issues need, on the referee opinion, to be address and clarified, as reported in the section below “Specific Comments”, in order to be published on NHESS.

SPECIFIC COMMENTS 1. When dealing with building vertical evacuation, is it also considered the possibility of building collapses due to the earthquake itself? Such major earthquake often have considerable effects on edifice stability and integrity. 2. Explain the choice of the magnitudes (8.5-8.75-9) for the stochastic simulations. Does it mean that for lower values no tsunamis are generated? Provide some more details on tsunami numerical simulation (finite difference? Inundation with moving boundary?) 3. The probabilistic approach surely presents some advantages with respect to the deterministic one, taking into consideration also different possible features that the second cannot contemplate, but suffers from some main limitation: first of all, it can be applied only in coastal areas with a detailed knowledge of the seismic structures and a populated seismic and tsunami catalogue. Moreover, the paper refers to the 1797 event when reconstructing the fault geometry: for sure, it is one of the most reasonable mechanism, but it is not the only one and different events with different characteristics can produce different tsunamis. Please mitigate in general the sentences concerning the probabilistic vs deterministic approaches, highlighting also the problems of the first. The text repeatedly reminds that the deterministic approach produces over-simplification, but this is true for over-simplified applications of this methodology, not meaning that the whole procedure is wrong. 4. How do you expect authorities should use such probabilistic results? Can a decision-makers deal with scientific concepts like probability?

TECHNICAL CORRECTIONS Instead of using the word “depth” when referring the water column, use “flow depth”. Line 43: Mueller et al paper year is 2015, not 2014 (ok in references) Line 78: “improve” instead of “improving” Line 160: “basing” instead of “based” Figures 9 to 12: what is intended for “inundation height in the coastal line”? Is it the height of the wave on the coast, before land flooding? Or is it the maximum

inland elevation reached by the water? In the first case it should be addressed as "maximum wave height on the coast", in the second it is simply "run-up height". Please clarify this point. Line 338: is the Padang population referred to an average value? Does this esteem take into account tourist period, seasonal variation and so on? Lines 372-3: "... to estimate the tsunami hazard level in Padang adopting three magnitude scenarios (Mw 8.5, Mw 8.75, and Mw 9.0)" FIGURES 3 to 8: use different palettes for the different figures, addressing different quantities (slip, land elevation, elevation difference, inundation-tsunami depth), it can create confusion.

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