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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Tectonic Origin Tsunami Scenario Database for the Marmara Region" *by* Ceren Ozer Sozdinler et al.

Anonymous Referee #2

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The Manuscript titled "Tectonic Origin Tsunami Scenario Database for the Marmara Region" by Ozer Sozdinler et al. presents a first comprehensive high-resolution study of possible tsunami scenarios (in a deterministic sense) within the Marmara Sea based on mapped active faults. This is an important step in better understanding of the tsunami hazard and optimizing early warning in highly populated areas around the Marmara Sea. While fully supporting motivation and general implementation of this study, I would nevertheless recommend major revision aimed, first of all, at better presentation of their work and results.

(1) Table 1: Authors should explicitly write the formulas from W&C94 and Leonard2010 they used to compute fault parameters like magnitude and displacements. Simple citation is not enough in this case. I tried to reproduce their calculations using referenced

papers but failed. For example, let's take the fault number 5. I assume, Authors used fault area (547.5 km^2) to estimate moment (magnitude). According to W&C94's Table 2A (SS faults), M = 3.98+1.02*log(A) which makes magnitude equal to 6.77 which is far below 7.2 listed in Table 1! Another apparent inconsistency: fault number 27 has almost the same area as fault number 5 (540 vs 547 km^2), but much smaller magnitude: 6.9 vs. 7.2.

(2) Please consider better descriptions for Tables 1 and 2. Present captions are too laconic. Why WC1994 shows Dmax and Mw(max), whereas L2010 shows D and Mw? Note – this is not the case for Table 2, where both L2010 and WC1994 show Mw and Davg. Please unify parameters or explain the difference. What means Mw(max) in case of WC1994?

(3) Authors mention they employed both Leonard2010 and W&C94 scaling laws. Which of them was finally used for the tsunami simulations? Both? Or one of them? From Table 2 I can see that Authors used slip values obtained with their W&C94 scaling law (compare slip values for fault 5 from Table 1 and for SN06 from Table 2) . What is then the reason to mention Leonard2010 at all? If you did not use it de-facto in your final simulations – just remove correspondent columns from Tables 1 and 2.

(4) Table 2: Please comment on why you have distributed the slip in a way you did it. Slip distribution is of first order importance for tsunami generation. Maybe Authors could take one selected scenario, say – SN05 – and run several models with different slip distributions to show effect of its uncertainty on tsunami hazard.

(5) Maximum scenario magnitude corresponds to a 7.4 earthquake which is still much smaller than the magnitude estimate of the 1509 earthquake (M8.0 – Page 2, Line 8 of the Manuscript). Do Authors think, their 30 scenarios represent all possible significant earthquakes in the region?

(6) P2 L11: considerable what?

(7) P2 L14: " . . . whether generated solely due to those significant earthquakes or not". What does "or not" mean in this sentence? Do Authors mean possibility of secondary sources like landslides, or another, additional significant earthquakes?

(8) Section 2.1 Paragr.1: by describing the Marmara Sea fault system please refer to a map. This could be your Figure 1 but please label main structural fault units mentioned in the text: PIF, CMF, MMF, SMF, etc.

(9) Please explain better numerical approach to tsunami modeling: did you use uniform grid size of 90 meters derived from 30" GEBCO bathymetry? What means "increasing resolution in coastal areas" (P4 L14)? Did you use nested grids? You used ASTER 30 m data – did you model tsunami inundation on land? If not, what was the reason to use ASTER?

(10) Synthetic gauges at "less than 5 m" (P5 L7). With 90-m resolution, a first wet computational node should usually be located deeper as 5 meter. Did you project wave heights from surrounding grid nodes to 5 meter depth using interpolation? Please explain.

(11) Table 3 is less informative and can be removed from the paper.

(12) Figure 2: faults cannot be recognized from the coloured maps. Better plot simplified maps without topography: just coastal contour plus fault system with actual segments highlighted. This Figure would become much more informative if you add max wave height along the coastal points for each scenario.

(13) Figure 3: non informative in present form. Important POI's could be well shown on Figure 1. No need for this Figure.

(14) There is an obvious contradiction between max wave heights as reported within the text (P10 L9-16) and colours at Fig. 4. In particular, Authors report max wave height of more than two meters in many locations (e.g., Kadikoy or entrance to Izmiz Bay). However, on Figure 4, we can see only yellow/orange colours which correspond

to max 1.5 m wave height. Definitely not red.

(15) Last paragraph Section 2. Not clear why probabilistic assessment should give "naturally higher wave heights" as deterministic studies? Probabilistic treatment also employs scenarios. This statement is simply incorrect. Please consider re-formulation of this paragraph.

(16) Your present "Conclusion" section is rather discussion than conclusions. Discussion on landslides should be better moved from the Conclusions to Discussion section.

(17) Finally, I suggest to simplify map views – no need to use topography maps on Figures 2-5. Just use contour sketches showing coast lines. Coloured topography looks too heavy and masks POI's wave heights and arrival times.

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