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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Deep Submarine Landslide Contribution to the 2010 Haiti Earthquake Tsunami" *by* Adrien Poupardin et al.

Anonymous Referee #1

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Poupardin et al. investigate the observation of 2 m tsunami run-up height at a distance of about 100 km away from the epicenter of the Haiti, Mw 7.0 strike slip earthquake, and the tide gauge signal recorded by the DART buoy 42407, about 600 km away from that epicenter.

The authors "... demonstrate that these observations require a secondary source, most likely a submarine landslide" and suggest a probable candidate off the southern coast of Haiti, about 30 km away from the epicenter. They conduct detailed modeling and are able to explain fairly well the unique observations.

The added value of this project is the better understanding of the potential of strike-slip earthquakes to generate tsunamis via submarine landslides.

This is an important paper, it is well structured, and points towards tsunamis that follow strike-slip earthquakes, a mechanism sometimes overlooked that deserves focused attention.

There are several comments I would like to suggest, mostly technical, and hope they will improve the manuscript. Overall, I do recommend the publishing of this work.

Comments

Line 12 and Figure 1: The magnitude in the text is Mw 7, and in Fig. 1 is Mw 7.1...

Line 48: "..., but the Haiti earthquake did not exhibit such a slow thrust rupture". Please give a reference.

Line 77: "... All finite-source models show that rupture occurred...": I would suggest the adding of a table of source parameters as well as 'beach balls' (fault plane solutions) in order to show the differences among the given models. This will also enable a better understanding of the various patterns of the coseismic seafloor deformation exhibited in Fig. 2.

Lines 98 – 99 and/or in the discussion: "... An offshore landslide comes to mind, as they are well known to trigger tsunamis even at large distances ..." (also line 147): It would be interesting to compare the Haiti 'earthquake-submarine landslide-tsunami' sequence with the M-D relationships proposed by Salamon and Di-Manna (2019).

Lines 204-205: "It has been noted that tsunamis in strike-slip tectonic regimes were more frequent than expected...": This notion should be further elaborated, for that there are several modes of tsunami generation in strike-slip environments. For example, tsunamis due to: coseismic deformation (e.g. Imamura et al., 1995; Frucht et al., 2019); subaerial landslides; submarine landslides (e.g. Hoffmann et al., 2014); and all these three modes are relevant for both on-land and offshore sesimogenic sources.

Figures

Fig. 1: Should be Santo Domingo on the map?

Geographical coordinates are not easy to recognize.

Fig. 2: Abbreviations mentioned in the caption do not appear on the maps. . ..

Fig. 5: Please note whether the white areas are land or sea (although intuitively it looks like unmapped seafloor areas). Left side map: The blue color is missing from the bathymetry scale. Right side map: Legend font size is too small.

Fig. 8: Please round the coordinates' numbers, no need for four digits after the decimal point, one or two is enough.

Fig. 10: Please note which of the models is simulated here; The DART buoy is the upper diagram; Repeat explanation of the high amplitude signal of the DART buoy before $\sim$0.7 hour.

Fig. 11: Campbell and Bozorgnia state that their 2014 work supersedes their previous 2008 publication. Would this make any change in here? Is it important to note 'Mw 7.09' or Mw 7.1 is enough?

References (not mentioned in the text)

Campbell and Bozorgnia (2014) Earthquake Spectra, Volume 30, No. 3, pages 1087–1115.

Frucht, E., Salamon, A., Gal, E., Ginat, H., Grigorovitch, M., Shem Tov, R., Ward, S., (2019). A Fresh View of the Tsunami Generated by the Dead Sea Transform, 1995 Mw 7.2 Nuweiba Earthquake, along the Gulf of Elat-Aqaba. Seismological Research Letters, 90 (4): 1483-1493.

Hoffmann, G., Al-Yahyai, S., Naeem, G., Kociok, M., Grützner, C., 2014. An Indian Ocean tsunami triggered remotely by an onshore earthquake in Balochistan, Pakistan. Geology 42 (10), 883–886.

Imamura, F., Gica, E., Takahashi, T., Shuto, N., 1995. Numerical Simulation of the 1992 Flores Tsunami: Interpretation of Tsunami Phenomena in Northeastern Flores Island and Damage at Babi Island. Pure and Applied Geophysics 144, 555–568.

Salamon, A. and Di Manna, P., (2019). Empirical constraints on magnitude-distance relationships for seismically induced submarine tsunamigenic landslides. Earth-Science Reviews, 191: 66–92.

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