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

Anonymous Referee #3

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General Comments:

This is a well-written and potentially very impactful paper arguing for a submarine landslide origin for a tsunami that struck the south coast of Haiti, relatively distant from the epicenter, after the 2010 earthquake. The authors have identified a likely landslide source and tested whether proposed finite-source models for the earthquake can account for the magnitude and timing of the tsunami as observed at a tide gauge and DART buoy. They compare these results to a model based on a tsunami triggered by the submarine landslide they have identified and argue that with realistic parameters, the submarine landslide model best explains the observed tsunami. The authors make a convincing case that a submarine landslide is indeed the most likely cause, and place their results in context of increasing recognition of the tsunami hazard posed by sub-

marine landslide triggered by strike-slip earthquakes in particular. Their methodology could be beneficial in improving tsunami hazard models in earthquake-prone coastal regions where tsunami hazard models have not been accurately formulated. I recommend publication, and what questions and suggestions I have are mostly minor, although I think readers may have some of the same questions as I do about some of the model results and the authors' assumed parameters for the landslide. Since this manuscript is quite short and to-the-point, I think the authors should be able to clarify some of these points without it losing its punch. Additionally, the geography for some of the figures is a bit unclear (I had to google to figure out where Jacmel is) and should be made explicit.

Specific comments:

Line 112 – Is the feature possibly recognizable using pre-earthquake bathymetry? Such a large landslide should be recognizable in pretty coarse bathymetry, right? Based on Fig. 5, it would seem like the GEBCO 1 arc minute bathymetry available from the pre-seismic might be enough to resolve something. I'm convinced that the recognized slide is a likely source but pre-seismic bathymetric data, even at a low resolution could make it obvious that it's the smoking gun. Or, possibly, could it have been picked up on seismometers?

Line 131 – Should the resulting tsunami be similar if the landslide behaved more as a rigid sliding block than a viscous flow? It's difficult to tell from Fig. 5 whether the deposit is fairly coherent.

Line 139 – Was the tsunami reported anywhere at the southern end of the Caribbean?

Line 144 – Could this also be explained by a more coherent landslide block?

Figure 1 – Where is the Bay of Jacmel exactly?

Figure 2 – It would be nice to have a box on Fig. 1 showing this location.

Figure 3 – Why does the Fritz model show better temporal alignment in the early waves

than does the secondary source model? Is this purely coincidental? It's strange that the first few waves correlate so well with the Fritz model at the Santo Domingo gauge, whereas the landslide model doesn't seem to describe the arrival time quite as well.

Figures 3&10 – It would be helpful when comparing these to have the same X axes and the same order of tide gauge and DART buoy data.

Figure 5 – You have the callback to fig. 1 here, but I don't see fig. 5 outlined there.

Figure 6 – What would an even higher viscosity look like? Why choose 2e5 as a best-fit value without showing what a more viscous slide would produce?

Figure 10 – What happens after 1.5 hours at the Santo Domingo gauge? Why does the simulation build to its maximum amplitude at the very end? I don't know whether this actually matters, but I'd be curious to see what happens if the model is allowed to run a bit longer.

Technical corrections:

Line 115 – In this paragraph you switch between present and past tense frequently, try to keep the tense consistent.

Line 117 – should be "It consists of", also don't need the hyphen between filling and in.

Line 152 – Terrestrial instead of "on-land"

Line 156 – Capitalize "Holocene"

Line 184 – "associated with" instead of "associated to"

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