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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Tsunami hazard in La Réunion island from numerical modeling of historical events" *by* E. Quentel et al.

Anonymous Referee #1

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========== General Comments ==========

The paper addresses an important issue, namely the evaluation of tsunami hazard in La Réunion island related to seismic events occurring in the Indian Ocean. The authors face the problem by performing numerical modelling of historical tsunami events occurred in the Indian Ocean in order to evaluate the impact of tsunami (in terms of maximum tsunami wave heights) on La Réunion island, and then they perform a more detailed analysis of the tsunami effects in some places of La Réunion (in terms of tsunami waves, flooding, runup and water currents). Even if the issue about the tsunami hazard in La Réunion is important and the methodology proposed here may be appropriate, however this study concerns only few tsunamigenic events and thus the lack of information cannot be fulfilled as it is pointed out in the manuscript; there is

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room to evaluate additional tsunamigenic seismic events occurred in the Indian Ocean that the authors mentioned without modelling (Sumatra 1907, Sumatra 2005, Mentawai 2007, Mentawai 2010). Moreover, some paragraphs within the manuscript needs to be rearranged. In particular, Abstract and Conclusions should be more congruous by attempting to not introduce new elements not opportunely discussed before within the paper (e.g. Mentawai 2010 event). The Introduction section should describe in a better way to the reader the issues faced in this study. Finally, the authors should point out that their work might be an important improvement toward a tsunami hazard in La Réunion, but without emphasizing that this work filled the gap in the lack of information for this island.

========== Specific Comments ==========

Page 1825 – Line 3: Krakatau 1883 is a volcanic event, it can be misleading for the reader; I suggest discussing only tsunamigenic seismic events.

P1825 – L24: The authors introduce suddenly the 1833 and 1945 events that are not listed before, and rule out the 1907, 2005, 2007, 2010 Sumatra earthquakes. The authors should well explain the reason for this selection, the Magnitude as criterion of choice is not sufficient (e.g. Mentawai 2010 is M7.7 and Mentawai 2007 is M8.4).

P1827 – L19: Sahal et al. (2010) compiled a catalogue of tsunami for New Caledonia; please remove or correct this reference.

P1828 – L1: The authors should explain the reason to select these seismic events, or if they decide to include other earthquakes in their study then they have modify the sentence opportunely.

P1828 – L7: Position and depth of the 1833 event are different from those in Table 1.

P1829 – L13: Why the 2010 Mentawai event is mentioned if it is not modelled? Why this event is not modelled (even if it produced many damages)?

P1830 – L16: It could be useful for the reader plotting the tsunami travel times in Figure

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2 for each of the tsunami simulated.

P1831 – L19: The authors here describe water heights (5 meters) observed a La Réunion ensuing the 1833 tsunami, but in paragraph 3.1 they write that there are not tsunami observations associated to this event. Please, correct or better explain.

P1832 – L4: Please, cite opportunely the Litto3D project.

P1838 – L4: The last sentence in paragraph "Discussion" sounds incomplete; probably the authors should better develop it.

P1838 – L6: The authors cite the 2010 event without modelling it, is misleading for the reader.

P1838 – L9: The authors affirm to model great historical events, but Sumatra 2004 and Java 2006 occurred less than 10 years ago. Furthermore, they cannot affirm to have fulfilled the gap in the lack of information on tsunami hazard on La Réunion by considering only 4 events.

P1838 – L16: The seismic source by Hébert et al. (2007) is not simple (6 subfaults with variable geometry), this source is simpler than the one presented in Sladen and Hébert (2008).

P1839 – L8: I did not understand the last 6 rows of the manuscript. Please, correct them.

P1843 – Table1: Why the authors use a rigidity values equal to 20 GPa? They use the source of Hébert et al. (2007) and Sladen and Hébert (2008) that use 45 and 40 GPa respectively for approximately the same zone. In addition, Zachariasen et al. (1999) use 50 GPa in their study. So, by conserving the seismic moment, if the rigidity increases then the slip should consequently decrease, and even the tsunami impact on La Réunion would be different. Please, discuss this point.

========== Technical Corrections ==========

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P1824 – L11: Maybe is better writing tide gauge records instead tide records.

P1829 – L21: 40 mm yr-1

P1832 – L14: The grid resolution is 4.63 m, but in the caption of Figure 4 is 4m. Please, correct.

P1832 – L19: 20.935S, 55.28E

Figure 2: The reference in panel 2004b is Sladen and Hébert (2008)

Figure 2: The colour palette scales for the simulation of 2006 and 1945 tsunami events have to be opportunely modified in order to better distinguish the tsunami maximum wave heights field.

Figure 6: I suppose the reference in the caption should be Sladen and Hébert (2008).

Figure 12: “Maximum” instead of “maximal” within the caption.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1823, 2013.