Natural Hazards
and Earth System
Sciences

Discussions

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

Anonymous Referee #2

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GENERAL COMMENTS

The manuscript deals with tsunami hazard assessment in the Indian Ocean, for the Island of La Reunion. Apparently, there is a relatively low number of such assessments in this area, so the topic is interesting and authors seem to tackle a knowledge gap. However, there are some major issues that in my opinion need to be addressed before publication on NHESS. These are:

1. Some of the choices and assumptions made by the authors are not properly justified. For example, the selection of the tsunami scenarios to be modeled is not explained. The authors select 4 historical tsunamis for simulations at the regional scale (namely the 1883, 1945, 2004 and 2006) and then they focus only on two of these events

(the 1883 and the 2004). But why did they choose those 4 events? This is not clear. Further, the Authors briefly state that there is knowledge gap about tsunami hazard assessments in La Reunion, hence motivating the significance of this study. However, I feel this part should be widened and described with more details and references. It is important to emphasize why this study is needed.

2. The aim of the paper is (or at least seems to be) to undertake a tsunami hazard assessment in order to find out, across all the potential seismic sources in the Indian Ocean, which ones are the most dangerous for La Reunion. If this is the actual aim of the paper (as stated in the abstract and in the introduction - lines 20 to 24), the authors fail to achieve it. In order to reach this aim, the authors should have undertaken a probabilistic tsunami hazard assessment in the whole Indian Ocean. Then, the study should have investigated how tsunami scenarios with the same return time (but with different sources) would affect the study area. This study is solely deterministic and focuses only on 4 historical tsunamis, triggered by earthquakes with different magnitudes. This analysis does not allow to tell which tsunami source - within the Indian Ocean - is the most dangerous to La Reunion. It is just a simple comparison between very different historical events, with different magnitues and (most likely) with different return times. This may still be interesting to NHESS readers, but the aim needs to be "downgraded" a little.

3. The language is not sufficiently scientific. Several sentences miss a reference and there is widespread use of qualitative terms. For instance, the 1945 Makran earthquake is described as "pretty large". Further, the impact of the 2004 tsunami on Le Port Est is defined "spectacular", which I find to be excessive, not scientific and unnecessary. These are only two examples, but the use of qualitative language can be found in many parts of this work.

4. English needs to be revised by a native speaker. Several sentences are too long and twisted, therefore very hard to follow. There are also several spelling and grammar mistakes. I made some suggestions but these are not enough and the paper needs a

throughout revision by an english speaker.

SPECIFIC COMMENTS:

INTRODUCTION:

PAGE 1824 Line 25: change "have shown" to "showed"

PAGE 1825 Line 1: Please assume readers are not familiar with how the 1833 Sumatra tsunami was and do not use it as an example without providing a brief description of what happened. Line 3: How these 7 events were identified? Which catalogue was used? Provide references. Line 6: delete "identified" Line 8-9: "probably" is not a scientific term. If there is uncertainty on the 1883 tsunami, provide references to support the statement. Line 20-24: please see comment number 2 in the general comment section Line 24-25: Please explain why you picked these events. Magnitude>7.7 is not the criterion. The 2005 Sumatra tsunami - for instance - was triggered by a 8.6 earthquake and it is not included in the selection made by the authors. Line 26: change "great" to "greatest", or "largest".

PAGE 1826 Line 1: "where tsunamis are the most powerful", please revise English and add references.

2. TSUNAMI MODELING APPROACH

Line 1-2: this definition is simplistic. Tsunami can also be triggered by other causes such as meteorites impacts or explosions. Please revise and provide references.

PAGE 1827 3 . SCENARIOS OF TSUNAMIS.... change the title to: SCENARIOS OF HISTORICAL EARTHQUAKE-GENERATED TSUNAMIS LINE 14-20: Revise English, very hard to follow. Line 21: change "undergone" to "was interested by" Line 15-17: I disagree, authors are not examining the tsunamigenic potential of all the subduction zones in the Indian Ocean. See general comment number 2.

PAGE 1829 Line 7-10: Hard to follow, revise English. Line 10: I would NOT use the

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term "spectacular" here. Line 12-17: Why are authors talking about the 2010 Mentawai evet here? This section is about the 2004 IOT! Line 26: Do not use expressions such as "pretty large" or "important" to describe a tsunami. This is a scientific paper. Provide numbers and references.

4. GLOBAL IMPACT ANALYSYS I would change the title to "regional-scale impact analysis".

PAGE 1830 Line 13: change "examine" to "examined" Line 15: What is an "impact offshore"?? Are youreferring to the wave amplitude? There is no impact offshore!

5. DETAIL STUDY ANALYSIS

PAGE 1832 Line 7: change "along which" to "where" Line 7-9: this is not vulnerability, this is exposure. Line 12: 100,000 inhabitants is not a measure of population density

6. RESULTS PAGE 1833 Line 21: this is not tsunami impact, this is wave amplitude, or tsunami intensity.

PAGE 1836 Line 5: Please do not use the word "spectacular". Line 12: Need to provide references on that. Why 1m/sec is consistent with a breaking of moorings? It seems not much to me. Line 26: "These heights are consistent with a maximum flow velocity of 15 m/sec". Why? Explain better and provide references.

7. DISCUSSION PAGE 1837

Title: change "liable" to "exposed" Line 1: "Our models allow us to determine which areas are protected or EXPOSED to inundation". This is NOT TRUE as a general statement. It may be true ONLY for the tsunamis modeled in this work. This has to be clearly stated.

8 CONCLUSIONS PAGE 1838

Line 8: "great historical tsunamis". What is "great" and what is "small"? Don't use this qualitative language, provide numbers and references instead. How great are

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they? Line 16-17: I disagree with this sentence, it is too general. Your models show that, among the historical tsunamis simulated here, the most destructive are those generated in the Sumatra zone.