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Natural Hazards and Earth System Sciences
Discussions
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EGU

Interactive comment on "Assessing storm surge hazard and impact of sea level rise in Lesser Antilles-Case study of Martinique" *by* Yann Krien et al.

Anonymous Referee #2

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General comments:

The authors present an interesting study case paper about storm surges modeling at large scale. They deal with a complex and challenging topic which is the assessment of the storm surge hazard, including atmospheric and wave process in cyclonic context. I think this paper can be a substantial contribution but need some major reworking before publication. Generally, the bibliography is not enough developed. Second, a more in deep analysis of the results must be done and a discussion must be written in order to propose more convincing conclusions. Some figures need to be rework in order to be more explicit and serve the demonstration. Citation form must be harmonized in text and corrected according to the review recommendations.

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Discussion paper

Specific comments:

The introduction must be consolidated. Many studies using modelling tools and coupled models were achieved last years. The methods and tools used in this paper must be contextualize relative to the abundant bibliography on the topic. The paper deal with the influence of sea level rise on storm surge. Nevertheless there is no considerations made about climate change manifestations on coastal hazards especially on inundation risk. No information either on sea level rise trends in the Caribbean basin for example. Finally, a more in deep presentation of historical cyclones knowledge will be useful for the reader.

p.2/l.15 : Harmonize and correct citation form p.2/l.30 : Replace heart by center

Figure 1 : The figure need to be rework. Location are not readable, scale are not homogeneous. The figure don't look realized from raw data. Site the source of the maps if there are not fully realized by the authors.

p.3/l.9 : What about tsunami potential impact ?

p.3/l.16 : Precise that Dean were a category 5 hurricane but only category 2 when it circulate near to the Martinique island.

p.3/l.20 : The logical connection between the two sentences is not appropriated.

p.4/l.8-9 : Can you plot the historical track for comparison ? Land fall simulated tracks are not clearly visible on the figure.

p.4/l.39-43 : Unless I am misinterpreting, the full data base contain various cyclone intensity and trajectory. We suggest that it will be relevant to illustrate the track and the intensity of the cyclone contained in the data base.

p.5/l.3 : Tightly don't look as the proper term.

p.5/l.7 : You speak about sensitivity tests, explain more in detail what was the objective of the test and what elements are validated and what deduction are made.

p.5/l.20 : LIDAR data to what depth ?

p.5/l.22 : Are also available/used ?

p.5/l.25 : Integration in Figure 1 of the mesh and the a representation of the special variability of the friction coefficient would be very interesting for interpretation of the results.

p.5/l.30 : Modify reference Lerma et al 2014 to Nicolae Lerma et al., 2014

p.5/l.35-38 : It is not clear whether the model reproduces correctly the observations made during the hurricane Dean (even if an only small storm surge was recorded). The model does represent this small storm surge or a more important values? In this section, the author need to be more explicit even if the validation is only qualitative.

Please explain more in detail the conclusion of the report Krien 2013.

p.6/l.7 : Locations mentioned in text must be placed on the plot (figure 2).

p.6/l.3-8 : Is not clear why the storm surge is so much higher in the Bay of Fort-de-France for northern track than for the southern. Please, give a more complete explanation.

p.6/l.13 : The values of 1m was used arbitrarily or based on some references ?

Figure 2 please put the main location in the figure

Figure 2,b,d,f : There is some strange pattern in the northern coast. Are they artefact due to the computational mesh? Please explain this.

Figure 3 : Based on the figures, the model look to allow inland overflowing (i.e. there is no inland boundaries). If this true, it would be relevant to mention it. It would be also important to figure the coastline without surge on the plot.

p.8/l.13-14 : Please be more precise about this. Is this an historic reference ? Why this reference is relevant instead of indicate a % of flooded urban areas, for example?

p.9/l.15-17 : not clear, please reformulate.

p.9/l.23 : What do you mean by Âń simply changing manually the elevation data Âż ?

p.10/l.1-3 : This affirmation should be illustrated by a figure. A zoom on the mentioned area for example.

p.10/l.4-5 : Do you think the spatial resolution of your model (50 m at the coast) is in accordance with this perspective (i.e. evacuation plan, coastal urbanism. . .) ?

Discussion:

An extended chapter must be dedicated to discuss the results and the methodology. Did you test the impact of a West to East track hurricane? In reference to historical events, the authors must consider the impact of this kind of event? More generally, what can be the effect of a different track than considerate here? The affirmation of the integration of the wave setup or wave process must be tempered. A 50 m mesh resolution at the coast can be insufficient ton properly represents wave setup component (in steep beach or in coral reef area for example). Furthermore, spectral wave model do not deal with infragravity wave which can be important in reef coast. It is surprising to refer to very precise urban site in order to describe results in case of seal level rise scenario. What is the purpose? The model is it considerate as efficient to simulate floods?

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