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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Rapid Assessment of Damaged Homes in the Florida Keys after Hurricane Irma" *by* Siyuan Xian et al.

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1. The title of the brief communication is relevant but I would prefer the word "buildings" to homes" Response: we changed the word from homes to residential buildings in the manuscript. 2. The authors claim that they use "a statistical regression approach to quantify the contribution of specific vulnerability factors to the damage". I would suggest to change the phrase "specific vulnerability factors" to "predictors of damage state" which is the term you use later on (page 4).

Response: thanks for the suggestion. we changed the wording.

3. There are some inconsistencies in the paper. The authors use the damage categories form FEMA (No/very limited damage; Minor damage; major damage; and

Destroyed-page 3) however, when they describe the results they refer to classes such as "slightly and moderately damaged buildings". The damage classed should match the FEMA damage classes and the percentages would be better presented in a table. A bit more detail about the FEMA damage classes would also be helpful. How do you classify a building as "minor damage"?

Response:we adopted the criteria from FEMA. In the description, the 'Slightly and moderately damaged buildings refers to the category of No/very limited damage, minor and major damage category all together (except the destroyed). We made it more consistent by changing the wording in the latter part to match with our category wording and add an explanation in the manuscript. Per suggestion from the reviewer, we added one example building for each damaged category. The minor damage is evaluated using both satellite image and the photos based on the criteria described in detail by FEMA taken for the target building. Two people assessed each house separately. In most cases their results agreed. In some cases, they do not agree, they will have a discussion and determine one category. This measure significantly reduce the human errors.

4. A suggestion: figure 2a and 2b show damaged houses of the area. It would be better to show a damaged house of the area for each of the damage class. Response: thank you for the suggestion. We will add the figure. However, due to the page limit, we need to communicate with the editor to see if the figure can be added. 5. Figure 3 would be more interesting if you would overlay the storm surge height map with the map of the damaged buildings.

Response: thank you for the suggestion. As we indicate in our paper, we do not calculate the inundation height but the storm surge (without taking into account the topography) so we do not have the water height on land. It only indicates the hazard of storm surge (at a resolution of 1km x 1km). If the reviewer thinks it is still necessary to merge the maps, we can do that.

6. Page 4, lines 74-76. It is not clear if the observed and the estimated storm are consistent. Please refer to this earlier in the text to make it clear. For example in page 2 (lines 48..) and 3 (lines 52-53) you are describing the wave heights but it is not clear if they are observed or estimated. An idea would be to move some information given to the figure caption of Figure 3 to the main text. In the following chapter, you say that the case study areas “experienced high water levels and wave heights indicated by hydrodynamic modeling”. What about ground truthing? Why do you need hydrodynamic modelling when you have observed values anyway?

Response: the wave height is the estimated values (or model results) using the hydrodynamic modeling driven by the storm characteristics input from Irma. Based on our comparison, the wave height in tidal gauge (observation) matches well with our modelled results. The underlying reason for that it there is no observation along most of the shorelines. Observation is not available for a few stations where we made a comparison between our model results and the observation. After such validation, it is reliable to report the modeled wave height for the shoreline where observed data is not available.

7. In the last page there are some very general statements (e.g. “many houses there were designed to withstand hurricane hazards”) which need more explanation. Which percentage of the buildings were designed to withstand hurricanes? What happened to them? The discussion about social and institutional issues is very interesting and it should be strengthened.

Response: Usually two-story or three-story buildings are designed as more resilient to withstand hurricane hazards; the homeowners often elevate the home as the first floor is usually used to store goods rather for living. Moreover, before hurricanes, homeowners often strengthen their windows to reduce the direct wind impact. thank you for the comments on the social part. We would like to discuss more but due to page limit we will have a separate paper that investigates the environmental justice issue alone. here is just to raise up the general problem.

8. Please provide the source of information regarding the median annual income for Big Pine Key (page 5, line 95).

Response: we provided the information for the median annual income for Big Pine Key in the manuscript (as the reference below). And also here: https://www.point2homes.com/US/Neighborhood/FL/Big-Pine-Key-Demographics.html. This also includes other socio-demographic information about the area.

9. As a brief communication the papers is expected to be short and not to go into depth as far as literature review of similar events is concerned, however, conclusions and discussion should be of an adequate length. The paper describes the work being done following the landfall of the hurricane however, there are no conclusions to the paper supporting why this was important and what are the possible future developments? In which other way can you use the collected data? (e.g. correlation with income/material/adaptation measures?)

Response: Thank you for the suggestions from the reviewer. We added some more discussions in terms of the future works that can be done by using the collected data. One of the important main points about future work is actually to develop fragility models based on the data (as the target variable) with respect to inundation flood hazards (as the feature variables) that is calculated from higher-resolution simulation and dynamic models. At the same time, we will try to model the wind damage and the water damage, respectively and use the data to validate the model results. The challenge here is actually to model the building-level hazards. The developed fragility models can be used for many flood risk management problems and local planning issues.

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