Review : Rapid Assessment of Damaged Homes in the Forida Keys after Hurricane Irma

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1. Does the paper address relevant scientific and/or technical questions within the scope of NHESS?

   Yes because the subject is hurricane damages assessment and damages analysis with a discussion on possible remediation recommendations linked to the social framework.

2. Does the paper present new data and/or novel concepts, ideas, tools, methods or results?

   New data, no novel concepts or ideas, but a combination of methods to acquire data both on hazards and induced damages (cf. point 4).

3. Are these up to international standards?

   ?

4. Are the scientific methods and assumptions valid and outlined clearly?

   The paper is based on.

   - Hydrodynamic hurricane storm surge and waves modeling providing the hazard description assessed by coastal measures (3 points) and off-shore measures (3 Buoys). This modelization already published is not the subject of the paper, but is used to state the intensity of the hazards which have affected the two areas of interest.
   - Satellite images are exploited by photo interpretation and used to provide: i) the overall geographic context and ii) to inform the Hurricanes' damages, with a focus on wind damages to buildings' roofs.
   - Field work producing GPS-informed pictures (3700 pictures for 1600 buildings) is providing information on: i) building typology, ii) wind and ocean surge (building) damages, iii) interpretations on the possible origin of damages.
   - Field analysis is validated using the p-value method, applied to the considered critical damages governing factors-parameters: building size and distance to the coast It seems to be considered that wind strength is more or less homogeneous for each site, by the way not a discriminating factors for damages.

   There is a discussion on the relevancy of doing a <u>Rapid</u> assessment of damages causes. Post event damage assessment provide for sure indispensable information necessary for risk management. Nevertheless "vulnerability" analysis of damages causes should rely on thorough analysis rather than on <u>rapid</u> evaluations which are usually oriented toward management of the crisis response. Yet, an argument for <u>rapid</u> mapping could be the necessity to get field damages observations before the starting of clearing operations, complementing, from ground, imagery and particularly satellite and aerial imageries which, when they are timely acquired, are established means to record event's memory for further analysis.

5. Are the results sufficient to support the interpretations and the conclusions?

   Restrictions are: i) statistical method used to assess the conjectural results is sometimes considered as controversial (but I am not specialist), ii) the reduced number of considered damage factors (coherent with the used statistical method):

   - Distance to coastline
   - Building types, but we have no idea on the exact used number of building types. In the discussion two types of buildings are considered: 'true buildings' and trailers.
   - Building size, but this third attribute is very close to the previous one (Building type), because trailers are smaller than buildings; hence there is certainly a (very) strong correlation between type and size.

6. Does the author reach substantial conclusions?

Conclusions are:

1. Buildings close to coast line are more damaged
2. Small buildings are more damaged than big ones
3. Reducing vulnerability is dependent on financial resources, hence social considerations should be taken in account in hurricane risk management

Comments:
1. In the explanations-discussions, damages related to wind and damages related to water surge are distinguished to explain the results, and this is of course relevant and could guide the approach.
   A question is: if this is an observation or an inferred result?
2. If it is possible to distinguish in the database, combining field survey and remote imagery, the two damage types (produced by wind or by surge), then it should be possible to test if ocean surge damages are maximum close to the coast line !!
   I.e. the fact that buildings close to the coast line, including coastal waterways, are more vulnerable to ocean surge will be easily inferred from spatial distribution of the ocean surge damages and it is not exactly the same conclusion than saying that undifferentiated damages are more important close to the coastline.
3. It would be interesting also to test the correlation between the damage severity and the damage type. Intuitively, from the figure 3c in Big Pine Key: it can be imagined a rough equivalence between minor damages and roof damages = wind damages = spatially scattered and widespread damages, contrary wise major damages are close to the coast line and are mainly induced by ocean surge ?
   From Marathon example (Figure 3d), major damages are almost entirely linked with landlocked trailers close to the coast line. More or less all the other buildings are showing minor damages (yellow). Again, it would be interesting to check if these moderate damages are mainly due to the wind or not.
4. Regarding conclusion 2: Small buildings are more damaged than big ones, most of the time (always ?) small buildings are trailers ; hence the conclusion could be as well that trailers are more affected than true (solid) buildings !
5. Regarding conclusion 3: this seems to be a quite obvious observation, but reasserting a correlation between vulnerability (building location and building strength) and income can be added to the risk management discussions.

As a recommendation following comments 1 to 4; stating in the beginning of the paper that two hazards linked to the hurricane event are considered: the wind and the ocean surge would be an important improvement, because both the spatial distribution and the severity of the damages are dependent on the nature of the hazardous phenomena.

7. Is the description of the data used, the methods used, the experiments and calculations made, and the results obtained sufficiently complete and accurate to allow their reproduction by fellow scientists (traceability of results)?

8. Does the title clearly and unambiguously reflect the contents of the paper?

Yes.
Why using 'Homes' instead of 'buildings' in the title ?

9. Does the abstract provide a concise, complete and unambiguous summary of the work done and the results obtained?

Yes, the abstract is coherent with the paper

10. Are the title and the abstract pertinent, and easy to understand to a wide and diversified audience?

Yes

11. Are mathematical formulae, symbols, abbreviations and units correctly defined and used? If the formulae, symbols or abbreviations are numerous, are there tables or appendixes listing them?

    Yes

12. Is the size, quality and readability of each figure adequate to the type and quantity of data presented?

    - Globally, figures are correct and understandable; it would be great to publish them with a proper size.
    - For the figures with the spatial distribution of hazards (3a. 3b) a magnifying for both sites would be welcome to better see the local environment of the use cases. Would be also informative to show waterways on the map in Pine Key to highlight the proposed correlation with damages (and the coastline?). Background images are a bit dark (size?)

13. Does the author give proper credit to previous and/or related work, and does he/she indicate clearly his/her own contribution?

    ?

14. Are the number and quality of the references appropriate?

15. Are the references accessible by fellow scientists?

    Yes

16.
17. Is the overall presentation well structured, clear and easy to understand by a wide and general audience?

    - Easy to understand for a general audience
    - Line 92 A title introducing this new part (discussion, or ..) in bold characters would be welcome

18. Is the length of the paper adequate, too long or too short?

    Additional information could be given on the following elements:

      - Confirm that for the sites building state evaluation is exhaustive, otherwise please give order of magnitude of the studied sample
      - Line: 55-58: a more detailed explanation of satellite imagery exploitation would be welcome. Have the flood surge traces been mapped using these images?
      - Line 73: if possible precise if these trailers 'debris are mainly linked to wind or ocean surge effects?
      - Line 80: But a few buildings, near the coast line are only moderately damaged, this element could perhaps be used in the lessons learnt discussion.
      - Line 86: what is the list of the building types
      - Line 86: What about the correlation between building size and building types and its impact on statistical values? This is confirmed by table 1.b, where p-values are 0.000 both for House Type and House Size
      - Line 95: Perhaps the correlation between income and house type (true building of trailer) would be interesting-better? Would be interesting to have the ratio trailers/Buildings for both sites. And also an idea of their spatial distribution

19. Is there any part of the paper (title, abstract, main text, formulae, symbols, figures and their captions, tables, list of references, appendixes) that needs to be clarified, reduced, added, combined, or eliminated?

See previous comments

20. Is the technical language precise and understandable by fellow scientists?

Yes

21. Is the English language of good quality, fluent, simple and easy to read and understand by a wide and diversified audience?

Not able to judge this point

22. Is the amount and quality of supplementary material (if any) appropriate?

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