REVIEW – nhess-2019-209 (Tedesco *et al.*)

This manuscript aims to quantify an "expanding bull's-eye effect" in the densely developed region of the US Atlantic Coast hit hardest by Hurricane Florence in 2018.

Overall, the concept for the article is engaging, and represents a useful analysis of how exposure of physical property to coastal flood risk has changed over time.

I have some broad suggestions (organised by line number) for the authors that I hope might improve the manuscript. I do think there is one major issue (see remarks on Section 3.3, below) that will need to be resolved before this work is ready for publication.

- L45 – the "now problem" phrase is cumbersome and seems unnecessary. Consequences of flooding from sea-level rise has been a fixture of IPCC reports, etc – I think the authors should simplify/clarify this rhetorical line or cut it for a straighter delivery.

- L50 – I don't understand the counterpoint in this sentence/paragraph. This work is also examining "damaged areas over large regions, hence missing the details necessary to capture the impact of disasters on single unit houses or small areas". Or are the authors suggesting that their remote-sensing work, by contrast, is able to isolate individual buildings? If so, they are missing a significant body of academic literature that examines parcel-by-parcel damages from hurricanes. For example (and works related):

  - Deyle, R. E., Chapin, T. S., & Baker, E. J. (2008). The proof of the planning is in the platting: An evaluation of Florida's hurricane exposure mitigation planning mandate. *Journal of the American Planning Association*, *74*(3), 349-370.

  - Highfield, W. E., Peacock, W. G., & Van Zandt, S. (2014). Mitigation planning: Why hazard exposure, structural vulnerability, and social vulnerability matter. *Journal of Planning Education and Research*, *34*(3), 287-300.

  - Hamideh, S., Peacock, W. G., & Van Zandt, S. (2018). Housing Recovery after Disasters: Primary versus Seasonal/Vacation Housing Markets in Coastal Communities. *Natural Hazards Review*.

- L65 – Revisit this sentence? The deaths of 51 people did not leave homes without power – just needs a grammatical fix.

- L70 – "how the locals are dealing with these trends" – rework this sentence for better precision.

- L74 – Statement needs references.

- L94 – Saying that "permanent water bodies are excluded" here confuses a later calculation of distance to permanent water bodies. Suggest rewriting this to clarify that permanent water bodies are effectively set aside as their own category. They need to be differentiated from the flood extent, but they're still saved for another stage of the analysis.

- Section 2, more generally – The methods section sits as a big technical block, relative to the rest of the manuscript, as though a tool-based remote-sensing exercise has been jammed into an analysis that is otherwise conceptually straightforward. (That is, what was the total exposure of properties that ended up inside the flood footprint of Hurricane Florence near its landfall?) The authors might want to relegate much of the technical detail to a supplement, for readers who want to follow along, and only retain a stripped-back version in the main text.

  Furthermore – and more importantly – it's not clear from the text WHY the authors undertake the merger of satellite-based and FEMA data for flood extent. The merger forces the authors to spend significant page space trying to explain inconsistencies and uncertainties. That's fine, and important to do, but only if it's clear to the reader why this data synthesis (and remote-sensing exercise) is necessary in the first place. There is a sense that the authors are working with two papers here: one on the data-synthesis approach they describe, and another on the property stock under the flood footprint they derive. At the moment, these two elements are more competitive than mutually supportive.

- P11, LX00 [the line numbers get cut off once there are more than two digits, so I've switched convention] – Could the authors clarify here whether "total area" of the properties affected is the total taxed area of the building? Or the simple, plan-view physical footprint?

- P12, LX07 – first sentence is ungrammatical (and unclear as a result). Given those numbers (and the authors' explanation in that paragraph) FEMA's extent is by far more complete – which further begs the question, described above, about the utility of the satellite method here? Given the limitations to the image analysis the authors lay out, how confident are the they in the $3.3B that the satellite identified but FEMA did not?

  Does that render the satellite aspect of this work unnecessary (and a confusing addition), leaving the authors able to focus on FEMA's flood footprint and the property data?

- P13, LX35 – Why use Zillow for a median house price and not the ATTOM property dataset (and thus apples to apples)?

- P13, L55 – Suggest that this explanation of the expanding bull's-eye effect needs to go up to the beginning of the document, at first mention (around P5, LX30).

- **Section 3.3 – There is a significant issue with the analysis here that the authors will need to explain or address.** At P9, L38, the authors state, "Beside property values, the database also contains the year when each property was built, which we use for our expanding bull's-eye effect analysis."

  Information for year built is useful, but it is not a time-series. Unless I missed it (and apologies, if so), the authors do not say when their property data were compiled – but it looks like the dataset is housing stock as of 2018. In that case, they have a current snapshot of stock, not a continuous record of stock through time (i.e., annual records of all properties). That

means that the dataset will be inherently skewed toward newer properties, as old buildings get replaced. (See the same issue in Armstrong, S. B., Lazarus, E. D., Limber, P. W., Goldstein, E. B., Thorpe, C., & Ballinger, R. C. (2016). Indications of a positive feedback between coastal development and beach nourishment. Earth's Future, 4(12), 626-635.)

To demonstrate their bull's-eye effect, Ashley & Strader (2016) work with a semi-empirical spatio-temporal model of housing stock in tornado zones over time. Year-built records are not the same. Unless the authors can imagine a way to overcome this limitation in their analysis, they may not have the information they need to actually measure an expanding bull's-eye. The housing stock in their area of interest has certainly grown dramatically over time – the bull's eye is evident from space – but their properties dataset can only capture it indirectly.

- P15 – Conclusions section is overlong, I think, and can be distilled more succinctly into key points.