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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Multi-hazards risks in New York City" *by* Yaella Depietri et al.

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Interactive comment on "Multi-hazards risks in New York City" by Yaella Depietri et al.

Anonymous Referee #1

Received and published: 2 August 2018 General Comments:

The authors have presented an interesting paper that addresses the important topic of natural hazards risk reduction in a city that faces threats from multiple hazards. Using meteorological data from NOAA to analyze trends in extreme precipitation and high temperatures, a New York Times database of articles to examine the occurrence

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of cumulative events and a survey of local experts and stakeholders to (1) determine sources of multi-hazard risk, and (2) calculate weights for the various hazards and vulnerability indicators considered, the authors seek to improve decision making related to multiple hazards in New York City, and encourage the consideration of adaptation policies that may be helpful for tackling several hazards at once with the ultimate aim of reducing risk and increasing the adaptive capacity of New York and similar cities. The authors find that the magnitude and distribution of hazards, rather than vulnerability, is the primary driver for risk to multiple hazards in New York City. Further, the areas most at risk were found to be coastal communities in Manhattan, Harlem, and Brooklyn, particularly areas near Jamaica Bay, indicating that adaptation measures should focus on protection from coastal flooding, with the goal of finding solutions that will be able to also address other types of hazards. This study highlights the necessity of understanding New York City's vulnerabilities to multiple hazards in order to formulate adaptation strategies that will be able to simultaneously address multiple hazards and provide the greatest risk reduction. I believe that this paper is important and worthy of publication, if the comments below can be addressed.

Specific comments:

1. In line 209, there are a number of additional sources that may be useful to cite, including: Lin et al., 2012 (Physically based assessment of hurricane surge threat under climate change); Reed et al., 2015 (Increased threat of tropical cyclones and coastal flooding to New York City during the anthropogenic era); Lin et al., 2016 (Hurricane Sandy's flood frequency increasing from year 1800 to 2100); Garner et al., 2017 (already cited elsewhere in your paper) Thank you, addressed: added the references as indicated

2. Line 216–a source from 2004 seems extremely out of date for a statistic "since 1998" in 2018. That source likely covers maybe 7 of the 20 years in the range from 1998 to the present. I suggest removing this statistic, or looking for a more current source. Agreed and addressed by removing the sentence

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3. Lines 218 and 219 . . . Are events from 1966 and 1972 really "recent"? Although it may still be appropriate to discuss the 1966 and 1972 heatwaves, I suggest reserving the term "recent" for some of the statistics discussed later in this paragraph (events occurring in 2000 or later). Addressed, we eased the term “recent”

4. Lines 240 and 241–again, these sources seem potentially very outdated for this statistic . . . Surely there are more recent and up-to-date sources published during the past 40 years that could be added here? Deleted old references and inserted more recent ones

5. Consider NYC Special Initiative for Rebuilding and Resiliency (your NYC, 2013 5. Consider NYC Special Initiative for Rebuilding and Resiliency (your NYC, 2013 source), for more recent statistics on the 100-year flood plain for the city than are provided in the current 2009 source Addressed as suggested

6. Where did you get your definition of "nor’easters" from, on lines 287-289? Nor’easters are a kind of extratropical cyclone–they are so-named because their winds typically come from the northeast, not because the storms themselves originate in the Northeast (though this is where they typically have the greatest impacts). Nor’easters typically form along the coast between the latitudes of New Jersey and Georgia, a geographic region that extends far beyond the Northeast to the Southeast. (See definitions from NOAA or NWS). I suggest you find and cite a source for Nor’easters that uses the correct definition, or simply note that tropical and extratropical cyclones tend to generate the greatest storm surge heights in New York City (see sources suggested in point 1 above, as well as Catalano and Broccoli, 2018, Synoptic Characteristics of Surge-Producing Extratropical Cyclones along the Northeast Coast of the United States) Addressed as suggested

7. In your discussion of Hurricane Sandy, between lines 293 and 303, I suggest supplementing the sources you’ve included with additional sources, including the National Hurricane Center official report on Hurricane Sandy (Blake et al., 2013), and poten-

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tially information about the overall flood height and damages from Kemp and Horton, 2013 ("Contribution of relative sea-level rise to historical hurricane flooding in New York City").

Added the reference as suggested

8. Lines 308 - 310, consider including Reed et al., 2015 as a source The reference has been included

9. Line 313, you might consider citing Kopp et al., 2014 ("Probabilistic 21st and 22nd century sea-level projections at a global network of tide-gauge sites") Reference has been added

10. Lines 513-515: Hurricanes do not typically occur in winter. Hurricane Sandy, which occurred in the fall, was an extremely unusual case (for example, see: https://www2.ucar.edu/atmosnews/perspective/8243/hybridization-sandy). Although snowfall with a tropical cyclone is not really something that happens, it can often be the case with extratropical cyclones. I suggest revising this section to clarify.

The section has been revised, thanks 11. Tables 3 and 4 are somewhat confusing and require further explanation of what is presented in each row/column Addressed, the readability of the table has been improved.

12. I suggest adding an additional map as a geographical reference that is labeled to show key parts of the city discussed in the text (e.g., Manhattan, Brooklyn, Queens, Bronx, Staten Island, Harlem, etc.) This will help to orient readers, especially those who may not be intimately familiar with the city Thank you we have inserted a new map of the 5 boroughs

13. In line 334, the authors note that they collected 65 responses for their survey–I question the ability to use this limited number of responses to generate data that has "building-scale" resolution, as indicated on line 602. Perhaps I am misunderstanding something, but it may be useful to provide some clarification in the text about how this

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was achieved. With respect to the quantitative assessment, the survey just aimed at providing weight for the indicators used

14. Figure 6: I find some of the results here a bit odd–for example, respondents ranked the city as relatively well prepared for a snowstorm, but not well prepared to deal with a Nor'easter? This seems inconsistent, give that one of the major hazards with a Nor'easter is snow; it suggests to me some possible confusion or lack of clarity on the part of survey respondents about some of the hazards they were assessing. (I have similar concerns about Hurricane vs. Coastal flooding preparedness ranking.) Is there an explanation for these apparent inconsistencies? I suggest that the authors try to address this. Addressed in the results section

Technical Corrections:

Be consistent in your abbreviation of United States (e.g., U.S. (line 190) vs. US (line 193)) Addressed

There are many typos and grammar issues, in general. For example, consider line 194-196. The sentence spanning these lines is quite long, and also has some grammatical errors. I suggest revising as follows: Approximately 1.4 million people age 60 and older live in the city, representing a particularly vulnerable group, especially for heat-related morbidity and mortality. This group constitutes 17% of the population at present, and is expected to grow in proportion in coming years (Goldman et al., 2014). There are similar issues throughout the paper–I suggest that the authors read the manuscript carefully to find these issues, or else seek additional editing help for grammar in the manuscript.

Thank you, we have done a language check of the manuscript.

Line 254: Consider changing acclimatize to acclimate OK

Line 256: Should projects be projections? YES

Line 263: Remove the word little, or change cannot to can OK

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Table 3: "events" is misspelled in the table header OK Legends on the maps are too small. They are unreadable in their current state. We adjusted the legends of the figure, thanks for your comment. Please note that with this response we resubmitted only a part of the figures as a sample of how we have adapted them.

Line 635: What happened with the word "considers"? Addressed

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-193/nhess-2018-193-AC1-supplement.pdf

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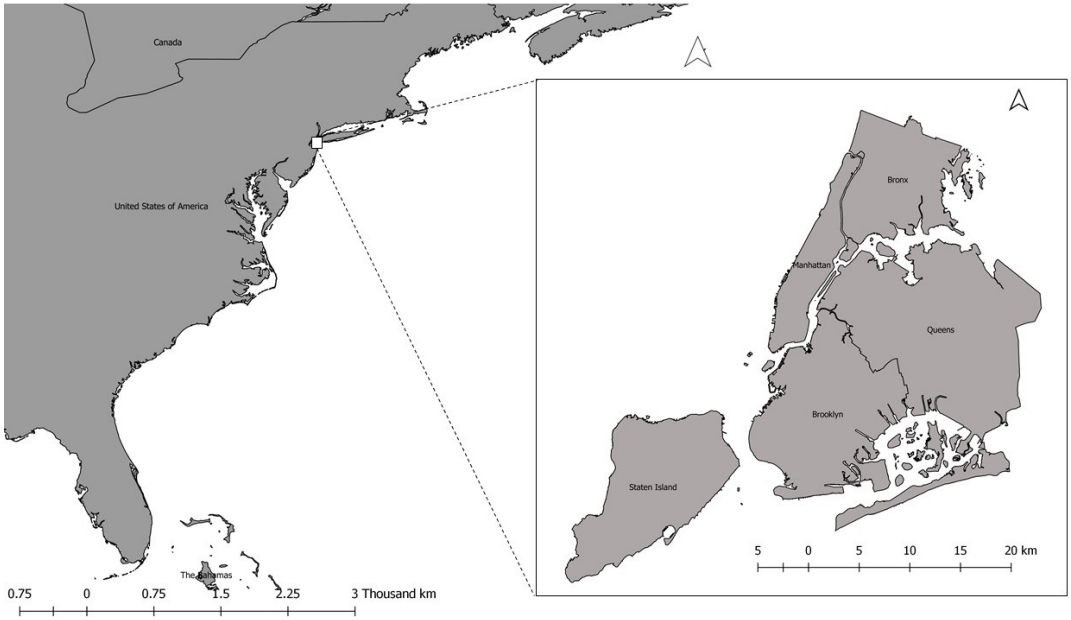

Fig. 1.

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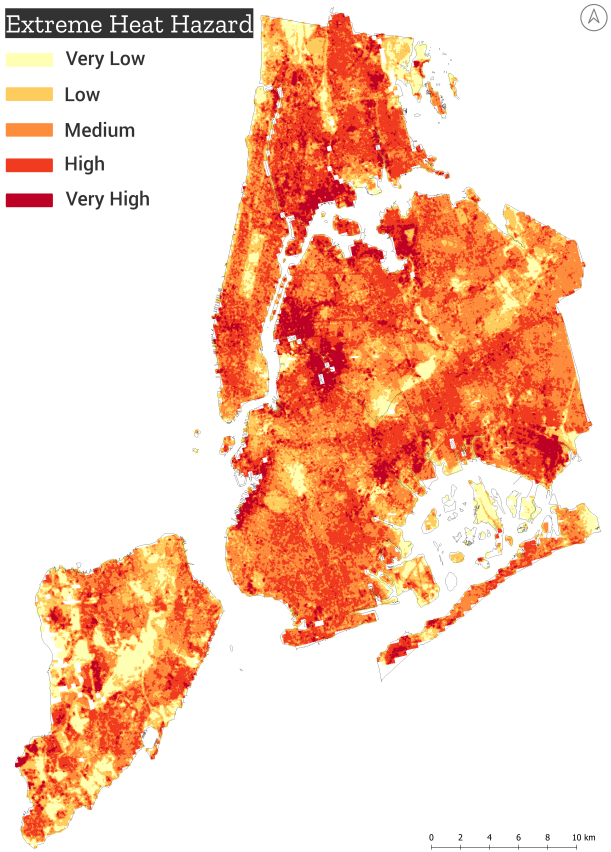

Fig. 2.

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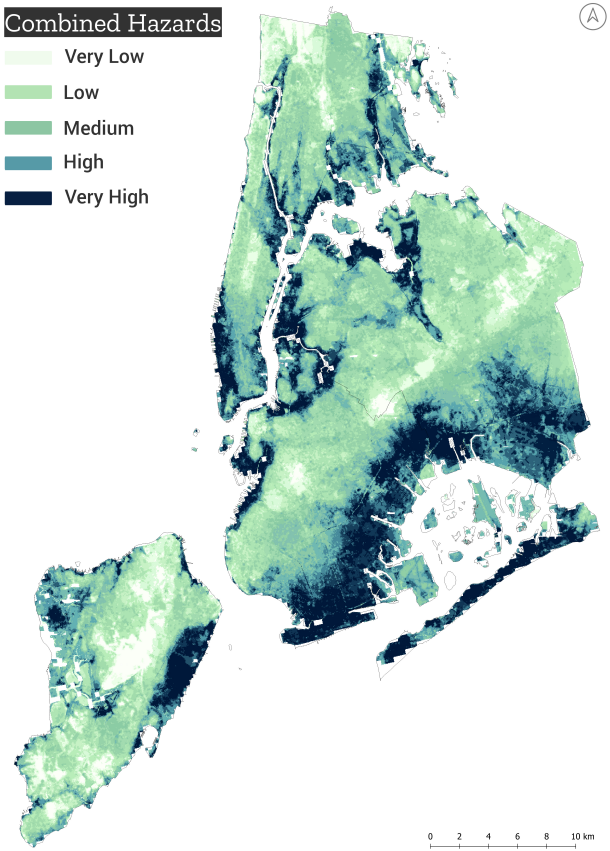
Combined Hazards
Very Low
Low
Medium
High
Very High
0 2 4 6 8 10 km

Fig. 3.

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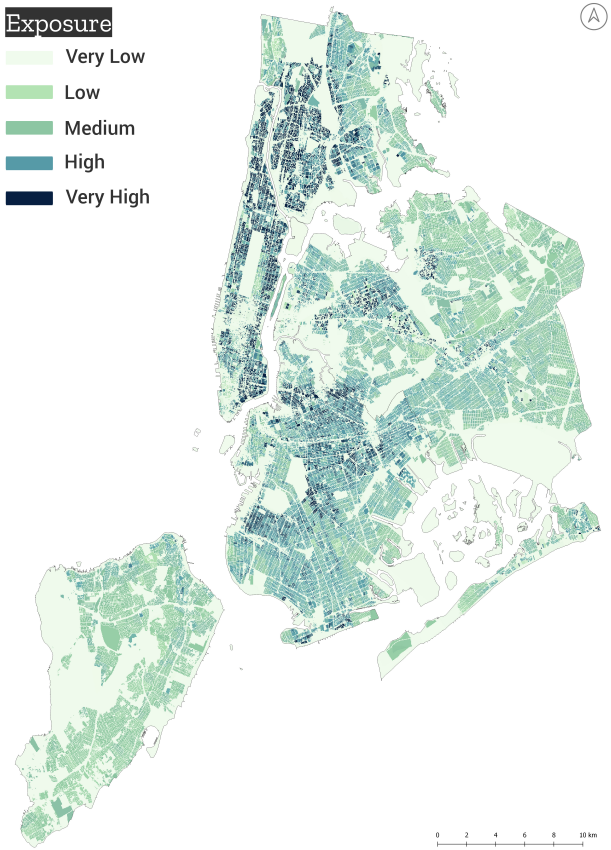

Fig. 4.

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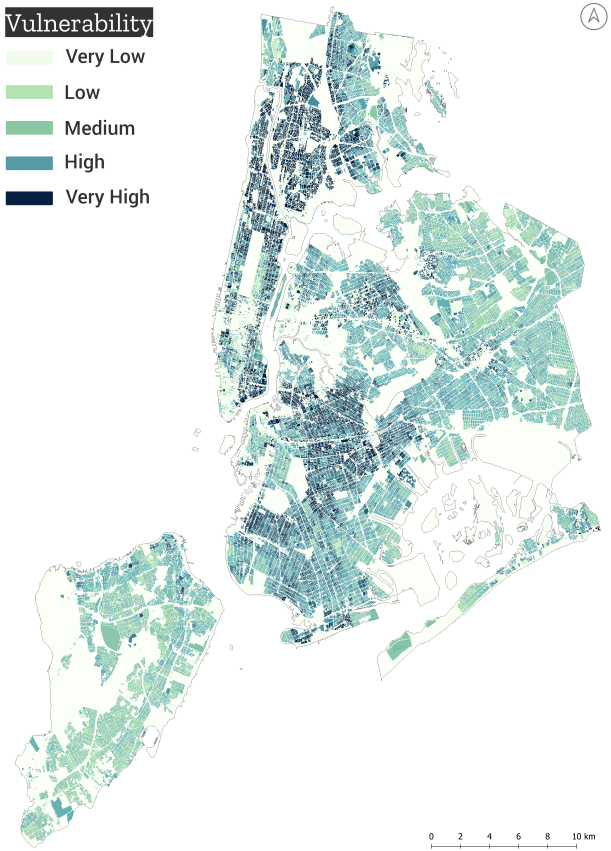
Vulnerability
Very Low
Low
Medium
High
Very High
0 2 4 6 8 10 km

Fig. 5.

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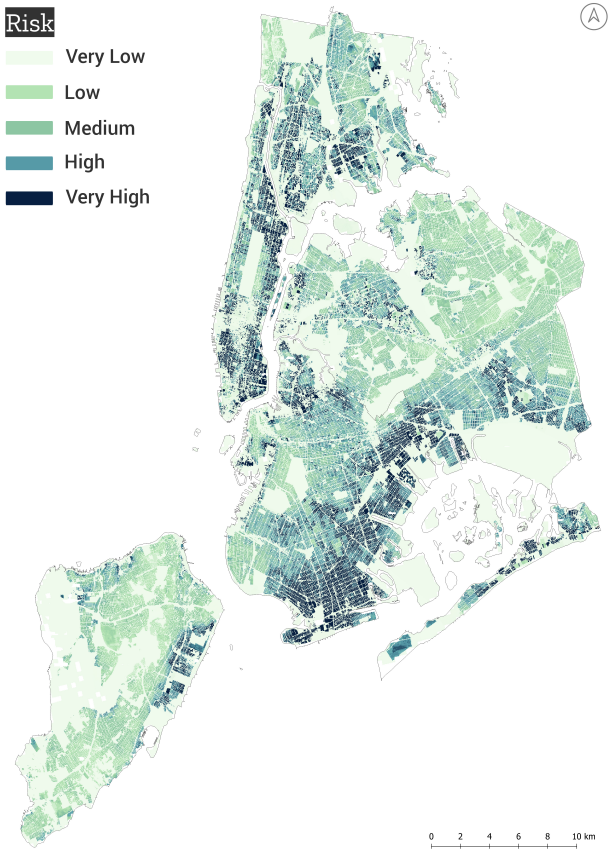

Fig. 6.

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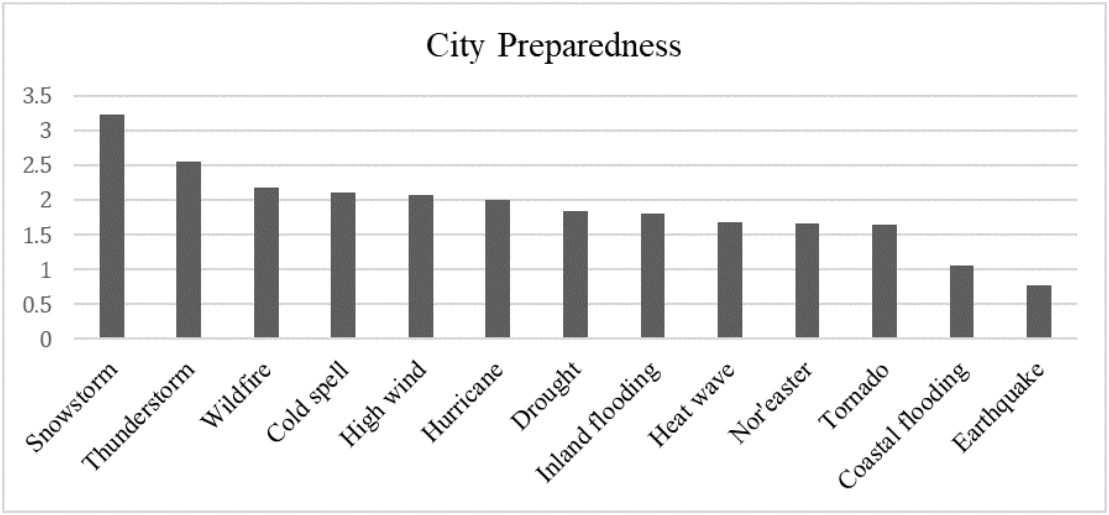

Fig. 7.

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