Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2019-343-AC1, 2020

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Storm Tide Amplification and Habitat Changes due to Urbanization of a Lagoonal Estuary" *by* Philip M. Orton et al.

Philip M. Orton et al.

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Received and published: 9 June 2020

The authors thank the reviewers for a very detailed reading of the paper and substantive comments that have clearly improved the research and its presentation. Below are the original comments and our responses below them. The responses are also uploaded as a supplement PDF with better differentiation.

Anonymous Referee #1 Received and published: 3 March 2020 This paper compiles historic datasets on land cover, topography and coastal water levels and combines these with statistical and coastal models of extreme water levels and storm tides to understand how human modifications have changed the signal of extreme water levels in Jamaica Bay between 1870 and now. The paper is well-written and addresses a

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highly relevant topic.

My main comments on the paper are: 1. the authors should include at least 1 paragraph outlining the underlying processes incorporated by the seCOM model. While this information exists in the cited publications (e.g. Orton et al., 2016), it will be helpful to have some of this information in this paper as well.

Change made – We have added a paragraph that elaborates on the model: "The Stevens Estuarine and Coastal Ocean Model (sECOM) is a free-surface, hydrostatic, primitive equation model, with terrain-following (sigma) vertical coordinates, set on an orthogonal, curvilinear Arakawa C-grid (Georgas and Blumberg, 2010; Blumberg et al., 1999). The model has been further developed with regard to wind stress formulations (Orton et al., 2012), coupled wave modeling (Georgas et al., 2007), and land wetting and drying (Blumberg et al., 2015). It has been used to provide validated and accurate ensemble 3D storm tide predictions as part of the NY Harbor Observation and Prediction System (NYHOPS; Georgas and Blumberg, 2010) and the Stevens Flood Advisory System (Jordi et al., 2018). Typical errors in hindcasts of extreme storm tides (e.g. Hurricane Sandy) are 0.15-0.20 m (Orton et al. 2016)."

2. In Section 2.3, the authors should include a few sentences describing how the synthetic storm set from Orton et al., 2016b was abbreviated for the purposes of this study. How were the random tide permutations for the ETCs or the storm tide events for the TCs abbreviated?

Changes were made to give more detail, revising the text to read: "The abbreviated set of 80 ETCs includes all the same storm events, but fewer random tide permutations for each storm. Instead of 50 simulations for the top 19 historical ETC storm tide events, there were 5 or 10 simulations each for the 11 highest ETC storm tides that are most relevant for the 5-year and higher return periods. The abbreviated set of 64 TCs includes a range of storm tide events from low to high magnitude (1.5 to 6.0 m). Model results for simulated TC events at a given magnitude are then used as a proxy for all

the events at that magnitude, thus representing all 606 storms."

3. I recommend moving the results from the leverage experiments described in Section 4.3. to Section 3, Results.

Change made – I kept hearing this and capitulated – see Section 3.3. The methods were also moved to the methods section (Section 2.4).

4. Sentence on Page 3, L13 is incomplete.

Change made, fixing the error.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2019-343/nhess-2019-343-AC1-supplement.pdf

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