

## ***Interactive comment on “Spatial distribution of water level impact to back-barrier bays” by Alfredo L. Aretxabaleta et al.***

**Anonymous Referee #1**

Received and published: 3 January 2019

The authors have proposed a novel approach to combine observed data and numerical model results for spatial characterization of water level transfer inside Barnegat Bay. They use dimensional characteristics of the bay to ensure this combination occurs in a physically consistent way. The idea is interesting and the manuscript is generally well-written, so I think it deserves publishing in NHESS after a major revision. Details are provided below:

Major:

- In page 5, with a harmonic assumption for water level and velocity, jumps into a giant equation (I wish there was an equation number I could refer to!). There is no way I can evaluate the robustness of approach, without knowing the exact steps and detailed assumption made here. I suggest, either providing enough details to enable proving

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the accuracy of equations, or if there is not enough room in the main manuscript (which I think is the case) add supplementary materials and provide the detailed steps in that document.

- M2 is taken as a proxy for internal frictional effects (Page 7, Line 2). As far as I understand, overides (i.e. M4) are better proxies for internal frictional effects. It's already been mentioned in the manuscript (Page 7, line 17) that remaining frequency bands exhibit smaller fluctuations, but their variability given forcing still contains useful information. Please, revise or justify this approach.

Minor:

- In Page 1, Line 33: there are many more recent citations to be cited here, including the revised version of this report in 2013. Also, see the followings for example:

\* Rahmstorf (2017) Rising hazard of storm-surge flooding, PNAS, <https://doi.org/10.1073/pnas.1715895114>

\* Wahl et al. (2017) Understanding extreme sea levels for broad-scale coastal impact and adaptation analysis, Nature Communications volume 8, Article number: 16075.

- In Page 2, Line 32: The following paper may be cited to define the term nuisance flooding for interested readers. \* Moftakhar et al. (2018) What is nuisance flooding? Defining and monitoring an emerging challenge, Water Resources Research 54 (7), 4218-4227.

- In Page 3, lines 3-4: cite more recent literature, as you are pointing to the gap and we need to make sure the gap has not been filled since 2000.

- Please use different notation in harmonic assumption for amplitude and actual fluctuating variable (i.e. saying  $u=u^*\exp(iwt)$  is confusing)

- In Page 5, Line 3: please be specific what kind relationship would be described by phi parameter (linear? nonlinear?...)

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Good luck,

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-320>, 2018.

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