

***Interactive comment on “Temporal energy partitions of Florida extreme sea level events as a function of Atlantic multidecadal oscillation” by J. Park et al.***

**J. Park et al.**

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On behalf of the authors, I would like to thank this reviewer for their careful consideration of the manuscript. The suggested corrections are relevant, useful, and certainly improve the accuracy and presentation of the material. The reviewer also points out additional reference material of importance, and makes excellent suggestions for further exploration of this issue by applying the method to numerical models. J Park.

1) "I remain a bit puzzled though why this OS paper was planned when its results (null or otherwise) could have been included in their own very recent Park et al Journal of Waterways paper."

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Topically, we agree that the results might have been presented in the previous paper, however, the temporal analysis presented here was conceived and performed subsequent to the submittal of the J.Wtrwy., Port, Coast., and Oc. Engrg. article.

2) "Most references in the text are given with first name only e.g. Bindoff on line 6 of the Introduction should be Bindoff et al. Many other examples."

This has been corrected in the manuscript.

3) "Non-Americans may know where Key West is but I suspect not Pensacola. A map might help. (There is one in Park et al 2010). Why were these two stations chosen anyway, and not one on the Atlantic coast of Florida?"

The Key West and Pensacola stations are two of the three analyzed in the J.Wtrwy., Port, Coast., and Oc. Engrg. article. They were selected for their long-period historical record, on the order of a century. It was shown that the Mayport station extremes (on the Atlantic coast) did not exhibit a statistical link to the AMO index. It was suggested that estuarine and river-outflow influences confounded the data and prevented detection of the AMO link found at the other two stations. Since there was no AMO link apparent in the Mayport data, it was not analyzed in the current article.

We can add a station location map in the revised manuscript.

4) "page 502, line 7 - 'nearly static to dynamic timescales' is meteorological jargon. Suggest you say something normal in brackets like 'into shorter timescales'"

This has been added in the manuscript.

5)"502, 8 - sentence 'Extreme events ...'. I am not sure this is necessarily true. Should this read perhaps 'might be consistent'?"

Thank you for the observation. This assertion is a hypothesis, and the suggested wording is appropriate. This change has been made.

6) "503, 4 - event duration. A recent paper that does that is Haigh et al (Continental

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Shelf Research)"]

Thank you very much for bringing this work to our attention. (Haigh, I., et al., Assessing changes in extreme sea levels: Application to the English Channel, 1900–2006. Continental Shelf Research (2010), doi:10.1016/j.csr.2010.02.002). We have added this reference in relation to our discussion of event durations.

7) "line 14 - I don't like words like 'remarkably'"

Thank you for the comment. As this seems to be a personal preference, we prefer to leave this wording as is. However, we are open to suggestions for alternatives to convey the unusually high hydraulic conductivities, which both exasperate efforts at controlling coastal water resources and facilitate saltwater intrusion.

8) "line 26 - 'such a link'. You mean the link discussed by Park et al?"

Yes. We have clarified this statement by making explicit reference to the climate index – event response statistics.

9) "504,4 - AWP and storm activity"

The suggested addition of 'and storm activity' is sensible, and provides context for the conclusion of the statement. However, this statement is a verbatim quote from Wang et al., and as such, we prefer to leave it as is. (Quoted from the last sentence of the abstract in: Wang, C., Enfield, D. B., Lee, S.-K., and Landsea, C.: Influences of the Atlantic Warm Pool on Western Hemisphere Summer Rainfall and Atlantic Hurricanes, J. Climate, 19, 3011–3028, 2006.)

10) "line 12 - this needs a reference to Park et al 2010 again"

Citation added.

11) "line 25 - what do you mean by 'standard'? In particular does the standard set include annual and semiannual terms which could be decimetres?"

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'Standard' was intended to refer to the set of constants used by NOAA CO-OPS for the online published tidal predictions at the two stations. Both of the station websites list 37 harmonic constants, however, I am unsure if these are the ones used for the published predictions. In this case, it is perhaps best not to refer to the constants as 'standard', accordingly, 'standard' has been deleted.

12) "next line - 'natural' is also odd. The surges being discussed here are also natural. You mean 'astronomical' or similar."

Indeed, they are natural. Thank you for the correction.

13) "page 505, 3 - so why the present paper?"

As discussed in section 3, the previous analysis estimated mean changes in event duration as a function of AMO index. Here we examine the temporal characteristics of the events in relation to the AMO index, is there coherent structure within the changes of mean event duration previously identified? We argue that exploring this question warrants consideration for dissemination.

Another aspect is the development and application of the energy-conservative relative energy metric based on the MODWT. We are not aware of such a metric applied to the analysis of extreme tidal events. Presentation of the method may have utility to others.

From the perspective of coastal water resource managers, it would be useful to have predictive capability (albeit in a statistical sense) of extreme coastal water behavior as a function of (perhaps one day predictable?) regional climate forcing. Indeed, work by Enfield et al. (Int. J. Climatol., 26(7), 885–895, doi:10.1002/joc.1293, 2006) has provided preliminary assessments of AMO phase changes, which, when coupled with coastal tidal response statistics may lead to development of such capabilities. The work presented herein is envisioned as a small step in that direction.

14) "line 5 - the AMO index"

Corrected in the manuscript.

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15) "page 507 - I know the timescales for W1 etc. are in Table 2 but it will help if the text says increasing timescale W1-7"

Thank you for the suggestion.

16) "508, line 19 - centred at the peak"

Thank you. We have used 'surrounded' instead of centered since it may be that the active interval is not symmetric around the time of peak energy.

17) "next line - the comma should be the end of the sentence"

Corrected in the manuscript.

18) "pages 510-511 etc. I was struck by how often the word 'suggest' was used and 'consistent with'. All rather hand-waving. It occurred to me that what is needed is for the same analysis to be made on surge model output."

Thank you for the observation. By my count, 'suggest' was used 6 times on these two pages, this is redundant usage and has been replaced with alternative phrasing. Of course your real point identifies the speculative nature of the data interpretation, which is warranted at this stage. The suggestion to employ numerical models as surrogate sources for the analysis is a very good one. We should make effort to explore this avenue.

19) "Table 1 - explain the 'Water Level' column somewhere."

This represents the mean event high-water levels in relation to the 1988 North American Vertical Datum (NAVD). Clarification has been added in table 1.

20) "I am familiar with general aspects of wavelets but cannot claim to be an expert, so please explain why in Table 2 the 'smooth' V7 has a shorter timescale than the 'detail' W7?"

The details can be viewed as band-pass filters, each successive level of roughly half

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the bandwidth of the preceding level. To analyze even a bandlimited signal would require a large number of filters (dichotomy paradox). Thus the smooth is introduced as a low-frequency bandgap filter (really a lowpass filter) to cover the band from WN (W7 in our case) to near DC. Of course, being discrete data and transform, DC (zero frequency) cannot be obtained. Thus the difference in temporal scales is a reflection of the different filter types (bandpass vs lowpass) and how the MODWT algorithm enacts these filters.

21) "Figure 1 caption - what is the '60' top-left?"

This is an event index we used to identify each event at each tidal station.

22) "What does 'event time' mean? It is referred to in the text but is it time from the start of something?"

It is the time in hours with respect to the beginning of the data record for each event. Each event record was of length 1335 hours, as described in section 4 (pg 507, line 11).

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Interactive comment on Ocean Sci. Discuss., 7, 501, 2010.

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