

Weather Clim. Dynam. Discuss., referee comment RC2
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Comment on wcd-2021-64

Anonymous Referee #2

Referee comment on "Extreme Atlantic hurricane seasons made twice as likely by ocean warming" by Peter Pfleiderer et al., Weather Clim. Dynam. Discuss.,
<https://doi.org/10.5194/wcd-2021-64-RC2>, 2021

This manuscript assesses whether extreme hurricane seasons can be attributed to ocean warming and changes to circulation patterns. The authors develop a novel statistical model that utilizes daily weather patterns and average SSTs and find that increases in Atlantic SSTs have led to a higher likelihood that the North Atlantic will have extremely active hurricane seasons (or more extreme hurricanes). This paper is worthy of publication after some major changes to the delivery. There are a few areas worth mentioning.

- I think the manuscript needs to be placed in the context of the literature. The authors cite a few papers related to the topic but there are many others. See my comments below.
- I think the organization of the supplement needs some work. It included a large amount of information and introduced figures in a nonintuitive order. See my comments below.

Minor Comments:

- Line 49: If the data are available, I'd recommend including 2019 and 2020 in your dataset.
- Line 53: Are the grid cells used to average those that are directly around (nearest0-neighbor) or is there a farther extent used for the average? Please clarify this in the text. And what is the temporal resolution of the data you used to average back out to daily? Did it start as daily data?
- Why are the tropical north Atlantic tropical storms being taken from a slightly larger area than the SST data? It would make more sense to have the same region unless there is a reasonable explanation for why it should remain different. It should be mentioned in the text.
- Figure S3 and S7 could be greatly improved. There are no axes labels, north arrows,

scale bars. I think the authors should spend some time here.

- Line 55: check acronym for ITrACS (which should also be spelled out completely for first use).
- What is your definition of an event? Is it all storms over 34 kts? 64 kts? Please add to text.
- How many storms does your analysis include? Please add near line 64.
- Where are you getting your equation for ACE? Please cite.
- You use many acronyms without introducing them first – WMO, NOAA, IBTrACS. Please look through and introduce the first and then use them again after that. Just helps to make the reading a bit easier.
- Your supplementary material figure order isn't intuitive. I'm getting S7 in the text before S1.
- Figure 1 – I love this! I think you made an excellent figure and a great way to visualize the variables across time. Once this is published, I'll be using this in my hurricane class. Nicely done!
- I'm not sure I understand the purple arrow placement on Figure 2. Can you add something to the text that describes this figure to guide a reader how to use it.
- Line 116: extent, not extend
- Paragraph 112-115: I'm not sure I understand the choices you have made for the duration. At the very least, this section needs to be cited for support about why the duration assumptions are made. Even better would be a sensitivity to test to understand how sensitive your model output is to different assumptions. This is also applicable to your intensity discussion.
- Line 134: too not to
- Lines 112-135 need to be better cited. There are many publications that can be used to show support for these things. Trepanier (2020) in Atmosphere utilizes local SSTs in the North Atlantic to estimate the probability of extreme hurricane winds throughout the basin. This is applicable to support your choices here.
- Line 153: Did your data start with 1979 as previously stated or 1982? Please check this.
- In Figure 3, what is your neutral year?
- It is interesting that ACE has the highest correlation and storm formation has the least. This could be related to the way you defined storm formation (and duration) but it could also be related to the notion that SST more predominantly affects intensity and less the formation of storms. Perhaps worth mentioning.
- Disregard my comment above about sensitivity testing. I see you did this in the supplementary. Kudos and thanks for that. I still think it needs additional citations, though, pretty much throughout this whole thing.
- The supplement is difficult to follow and dense. As I was finishing this review, I noticed Reviewer 1 commented. I completely second this individual's 2nd main comment. The amount you have in the supplement looks to be enough for another manuscript. It should be easy to follow and directly relate to the text. You may reconsider restructuring it.
- Figure 6 caption description – I think you mean vertical line, not horizontal
- Since 2019 and 2020 are not represented in here, as I noted earlier, can your emulator be used to estimate the number of storms, etc., for those two seasons? Can you put the known conditions in and see if it produces a similar ACE, duration, etc. for those that aren't in the data set? Could be an interesting addition to the work.
- What are you hoping someone does with this emulator? Can you provide a little broader impact context to the discussion?