Response to the editor and reviewers:

Thank you for taking the time to review this manuscript once again and provide further feedback. We have addressed the concerns of reviewer #2, Dr. Bloemendaal, and believe these changes have further improved the clarity and impact of our results.

Starting on the following page, we provide point-by-point responses to all questions and suggestions from Dr. Bloemendaal.

- The reviewer comments are in black.
- **Our responses are indented and written in a bold blue.**
- **The line numbers in the revised manuscript that correspond to the changes made are added to the end of each comment as [L#-#].**

Response to RC2 on nhess-2021-251

I applaud the authors for the thorough revisions of their manuscript. The current manuscript has certainly improved compared to the previous version and I feel that it is almost ready to be accepted for publication. Please find below some minor comments:

Line 40: a temperature isn't warm or cold, but high or low

We have changed "cooler sea surface temperatures" to "lower sea surface temperatures." [L41]

Line 122: You could also argue that a TC passing > 500 km from a site generally has a limited impact

Good point, we have added this to the end of the sentence as follows:
"Generally, a search radius beyond 500 km is too large when considering the spatial size of TCs (e.g., Booth et al., 2016) as TCs located beyond 500 km from a location will have limited impacts." **[L128 – 129]**

Line 126: Could you add the respective wind speed threshold on the Saffir-Simpson Hurricane Wind Scale here?

We have added this threshold to the end of the sentence as follows:
"We consider all TCs in the HURDAT2 database that are categorized as a tropical storm or hurricane when the storm is within 500 km, meaning their maximum sustained wind speed is at least 34 knots." **[L131 – 133]**

Line 142: I would leave out the mention of ETCs here, as this is confusing

We agree and have removed this mention of ETCs.

Table 2: Strictly speaking is this table showing results; I would therefore move this to the Results-section (as you discuss the table there).

Agreed – we have now moved this table to the Results section. [L292]

Line 208 – 209, Line 224-225: I thought you left out the extratropical cyclones? If this is the case, I would try to limit the mentioning of ETCs or ET transition, as these sentences seem to imply that ETCs are also being investigated (plus, I believe the storm surges you are looking at are solely those of storms classified as TCs?)

The non-ET TCs are the primary focus of the paper, but in these instances we refer to supplemental figures that compare non-ET TCs and ET TCs for select sites. We have made the following clarifications:

"Since we focus only on TCs that are considered purely tropical, i.e., they do not undergo ET (non-ET TCs), in this analysis, we include a supplemental figure to compare the relationship between surge and TC proximity for non-ET TCs against ET-TCs for the six most northern sites, which have at least 40% of their TCs undergo ET. When examining storm surge as a function of distance for ET TCs, the fit worsens compared to that for non-ET TCs for these six sites (S2)." **[L211 – 215]**

"This analysis of ET TCs highlights the complexities associated with the change in storm dynamics as a TC transitions into an ETC and is why we exclude these TCs from our primary analysis." **[L230 – 232]**

Line 236: Though I understand you want to mention Sandy and its extraordinary track here, I would rephrase this mentioning of Hurricane Sandy, because the current write-up is confusing to the reader. I would suggest to say something along the lines that "Some readers might be familiar with the most infamous event in this region, Hurricane Sandy, which a SE-NW track orientation that substantially differed from this general northeastern movement (Hall and Sobel 2013). However, as Sandy had underwent extratropical transition upon approaching New Jersey, this event is left out from our analysis as we solely focus on TCs."

Perhaps an interesting feature to help clarify your results for the direction is the orientation of the wind field? (which is counterclockwise in the NH). You do briefly mention this in the paragraph below Figure 6, but perhaps it's helpful for the reader to also be "reminded" of this in the discussion of Figure 5, where you do discuss the orientation of the track and its effect on storm surge heights.

Thank you for this comment. We have adjusted the discussion of Figure 5 to say the following:

"For locations north of Cape May, NJ, the largest storm surge events tend to occur as TCs move toward the northeast, in which onshore winds associated with the counterclockwise flow around the TC would push water toward the coastline. Hurricane Sandy, one of the most infamous events to occur in this region, was a unique system in part due to its southeasterly track toward the New Jersey coastline, which varied considerably from the general track direction toward the northeast that is more commonly observed in this region (Hall and Sobel, 2013). Since our primary focus in this analysis is on TCs that do not undergo ET, Sandy is not included in this analysis as it underwent ET upon approaching New Jersey." **[L242 – 248]**

Line 272 (but also other instances in the Results-section wherever appropriate): Could you please explain (from a physical point of view) what this negative correlation means?

We have added this clarification in the following spots:

> ***"We also examined the influence of propagation speed (S4) and found a negligible correlation with storm surge, suggesting that the magnitude of storm surge does not have a clear relationship with propagation speed."*** **[L258 – 259]**

> ***"This negative correlation suggests that as TC proximity to a location decreases, the magnitude of the storm surge increasing, highlighting the importance of TCs that are close to a location."*** **[L285 – 286]**

Table 3: Could you please use an asterisk (*) instead of italics to indicate the statistically (not) significant results? I had a hard time finding the italicized numbers.

This is now Table 2 due to moving the original Table 2 to the place of Table 3. We have added an asterisk to replace the use of italics in this table – thank you for the suggestion.

Line 292: I would leave out the mention of the hurricane season here, because technically speaking a TC can also occur outside of the hurricane season.

This is true. We have removed this mention of hurricane season.

Lastly, following the Editor's suggestion (See "Editor decision" on 28 November 2021), I would suggest to add a paragraph/a few lines of discussion on how your research can be applied to other types of storms. How can one use your approach to study other type of storms and in other regions, and what kind of data is necessary to conduct such research?

Thank you for this suggestion. We did briefly get to this at the very end of the last paragraph in the Conclusion section, but we have further expanded to the following:

> ***"This type of analysis, while limited to the east coast of the US, can be applied to any region with a record of observations associated with any type of hazard to be used in conjunction with any cyclone dataset. This cyclone-hazard association algorithm has been applied to associating precipitation and streamflow events with both TCs and ETCs in the Catskill Mountains of New York state (Towey et al., 2018). In this instance, ETC tracks were identified by applying a Lagrangian tracking algorithm (Bauer et al., 2016), which follows centers of low sea-level pressure, to reanalysis data.***

Similar to our analysis presented herein, Lionello et al. (2019) linked sea level anomalies to the intensity and position of cyclones in the Mediterranean Sea through the use of a cyclone tracking algorithm. Given any observational dataset for a location and a cyclone tracking algorithm, this type of analysis can be utilized to conduct similar research for any region." **[L422 – 429]**