

## REVIEW, “COASTAL EXTREME SEA LEVELS ...”

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In their manuscript “Coastal extreme sea levels in the Caribbean Sea induced by tropical cyclones,” the authors Martín *et al.* use a new database of synthetic tropical cyclones as forcing to simulations of wind waves and storm surges in the Caribbean Sea. It is shown that the wind waves and storm surges vary significantly at coasts around the basin, due to differences in storm evolution, local bathymetry, and other characteristics.

It is my recommendation that this manuscript should be **revised**.

The authors should be commended for revising the Validation to use a consistent atmospheric forcing and to include comparisons to as many observations as possible. That said, the validation for the water levels is unconvincing, with some large errors between observation and model. The authors have selected a threshold water level of 0.4 m to identify observations to include in the validation. This value is somewhat arbitrary? Can the set of available observations be expanded if this threshold is relaxed?

This reviewer also wants to push again on the novelty of the study. The authors have done a better job of emphasizing the lack of comprehensive studies in this region with large numbers of storms and a large geographic coverage, and thus this study does fill a gap in terms of available data. But what does it add to our scientific understanding of storm-induced hazards in the region? As-is, the Discussion confirms findings from observations and other studies. The largest waves affect the Lesser Antilles, West Indies, and northern Caribbean ... which is known from historical storms Hugo, Maria, Irma, and David and recent studies by Pillet and Montoya. The largest water levels are found in Cuba, Mexico, and Belize ... which matches the findings by Torres and Dullaart. The atmospheric pressure has its largest effect along the storm track, whereas the wind forcing has its largest effect in shallow coastal areas ... again, this is known. Is it possible for the authors to extract more understanding from this great new database?

The following major comments can be considered in a revised manuscript:

- For the Validation, it is not clear if tides are included. This reviewer guesses not – can this be clarified?
- Relatedly, for both the Validation and Results, if the tides are excluded, then maybe ‘sea surface elevation’ is not the best term. It would be better to refer to ‘storm surge’ or ‘non-tidal residual.’

- Lines 75–84 and Table 1: For the water levels, it is mentioned that the gauges were selected if they had observed peaks larger than 0.4 m. For the wind-waves, how were the buoys identified in Table 1 – was there a similar threshold for the peak in significant wave height?
- Lines 93–94: There are newer ways to reduce momentum transfer in overland regions based on land-use/land-cover data. The method in this study (with a uniform 20 percent reduction) is likely okay because the computational domain does not contain a significant amount of overland regions, and the analyses do not focus on them. Can these points be noted here?
- Lines 117–118: Can the authors provide a reference to support this statement?

The following minor comments can also be considered:

- Lines 16 and 156: “over” is a spatial relation, better to use ‘more than’ here.
- Line 20: ‘nations’ should be plural.
- Lines 26 and 186: “since” is a temporal relation, better to use ‘because’ here.
- Line 82: “are” should be ‘area’.
- Line 84: ‘Figure’ should be capitalized.
- Line 97: “lastest” is misspelled.
- Lines 101–102 and 106–107, and page 9 footnote: Can the URLs be moved into the list of references?
- Line 109: Here, “Fig.” is abbreviated, but on the preceding page, “Figure” is spelled fully. Please be consistent. See also line 152, etc.
- Line 122: “In order” can be deleted.
- Line 163: “Tcs” is mis-capitalized.
- Line 186: “fullfil’ is misspelled.
- Line 187: “Figure Fig.” is redundant.
- Line 220: When the letter ‘m’ is shown in italic font, this reviewer assumes it is a variable, e.g. 25 times m. If it is meant to be a unit (meters), then it should not be in italic font.
- Line 239: Add spaces between the years in this list.
- Line 250: “a” can be deleted.
- Line 268: “hurricane” should be capitalized.
- Lines 299–300: Can this sentence be rewritten for clarity?
- Line 300: “In fact” can be deleted.

- Figure 1 caption: In the second sentence, starting with "Where" is awkward – should this instead be a continuation of the first sentence? In the third sentence, the word "represents" should not be plural.
- Figure 3: For panels (a) and (b), why not use 'intensity' or 'maximum wind speeds' as labels for both plots?
- Figure 3 caption: "when if is within" should be corrected.
- Figure 6 caption: "taht" is misspelled.
- Figure 7 caption: "Levels" should not be capitalized.