Review comments

Manuscript title:

Changes in extreme precipitation patterns over the greater Caribbean and teleconnection with large-scale sea surface temperature

General comments:

I have thoroughly reviewed your manuscript and appreciate the effort and dedication that went into this research. Overall, the study explores the variation of precipitation characteristics and the impact from teleconnection patterns including regional SST anomaly and large-scale climate variability over the Caribbean region, particularly with the analysis conducted on a regional scale, which stands out as a significant highlight of your work.

However, there are areas that require substantial improvement before this manuscript can be considered for publication. Firstly, the writing needs enhancement to ensure clarity and coherence. Additionally, the visualization of data and results requires attention. Improving the readability and aesthetics of the figures and tables will greatly benefit the overall presentation and help convey your findings more effectively.

Given these considerations, I recommend major revisions to address these issues. Detailed comments are listed below.

1. Line 20: Would you please clarify ‘a few large-scale SST index’: to my understand, SOI and NAO are originally represented by specific patterns derived from pressures instead of SST.
2. Line 28, I would suggest to rewrite sentence ‘In a ddition…’I assume it means the positive correlation between them are found, however, ‘+SOI significantly increases with RR1…’ does not sounds the same meaning.
3. In the text, at many place the names for regions/countries are mentioned, I strongly suggest to add names for major locations in Figure 1.
4. Line 64-65: would you clarify the details about what ‘climate extremes’ were found have been increased over the region? Which I think this information is essential for building up the initiation of this research.
5. Line 74: I would suggest delete ‘in’. I would suggest checking the references with brackets or not in the text, for example in Line 76, the backets is not necessary.
6. Line 75: would you clarify the meaning of AMO?
7. Line 81: what kind of further research is needed, I would suggest to introduce the research gap more detailed, like to what aspect or what kind of index is needed to be involved, etc.
8. Line84-86, ‘In this context,….sea surface indices.’ I would suggest rewriting this sentence to be clearer. Besides, here the term of ‘sea surface indices’ is used, instead of ‘SST indices’ (Line 20),

would you please consider using consistent terms to avoid any confusions.

9. Line 88: ‘influence of SST indices on extreme precipitation’, the indices are numbers used to represent the large scale climate phenomena, the impact should come from the phenomena, instead of the indices.
10. Line 98, what does ‘They’ refer to?
11. Line 99: Fig 1b shows the average annual rainfall, so it will not give any information on monthly maximum.
12. Line 99: The reference to figures is not correct. There is a lack in serial number for the sub plots in suppl.Fig2b, and this figure is seasonal decadal SST anomaly, not seasonal rainfall.
13. Line 104, ‘because of topograpgy’ I would suggest to describe the mechanism with more details.
14. Line 122: would you please clarify about the ‘best result’? what kind of result, and best compared to what?
15. Line 124: would you please clarify ‘heavy precipitation’, does it refer to high intensity or large volume?
16. Line 133: I would suggest to rewrite the first sentence about the aim of developing extreme climate indices.
17. In Methodology, I suggest describing the calculation process of the indices, I wonder is it based on each grid or on regional average precipitation data.
18. Line 138: I would suggest delete ‘(6)’.
19. Table 1: would you describe the definition of indices with more detail? For example, it is unclear to define PRCPTOT with ‘Annual total rainfall ≥ 1mm’.
20. Line 166, I would suggest to delete ‘that is, whether the two variables are really correlated or not,’ just want to clarify that 0,05 is a level of significance, threshold less than 0,05 means higher confidence in significant level.
21. Please clarify the meaning of n in equation 3.
22. Line 174: misspelling PRCPTOT
23. Line 177: Could you please clarify why ‘a decline in total annual precipitation in the first decade’ is concluded? I assume that the bar plot shows annual mean anomaly of extreme precipitation indices, and I would suggest to apply a trend analysis to see if it exists any increase/decrease.
24. Line 185: I would suggest use ‘percentage’ instead of %. Please consider to give each subplot a number to make it easier and clearer to indicate to specific ones. In Figure 3, I personally have curious in the change not only between decade1-2 and decade 2-3, but also 1-3. Moreover, there seems no discussion in text about the difference between each decades, I would suggest to reconsider the methodology and data visualization of this figure.
25. Line 204, To my understanding in this study there is no calculations in difference phase of climate indices (the correlation analysis should be done with continues climate indices instead of separating them into different phases), if so, please rewrite the sentence. Similar statement can be found in Line 243, ‘positive phase of +NAO….’, also in Discussion section, eg, Line 262, Line

266. Please check an example of analysing the different phase of climate indices:

26. Line 211: the * and ** symbol needs to be defined better, for example, * could be used to represent the regions with less than 50% of the area significant, if larger, than marked as **.
27. In supplement Table 1, should be INDEX-NAO, Haitu should be Haiti?
28. Line 224: there exists no Suppl.Table 2.
29. Line 254: the effect of sea surface anomalies. I would suggest to consider using the term ‘impact or influence’ other than ‘effect’.
30. Line 317: ‘…and cooling in the eastern Pacific (La Niña) have positive and significant effects on extreme precipitation indices.’ Would you please clarify the basis/evidence for this conclusion?