

Responses to Reviewers

We thank the two anonymous Reviewers for their suggested revisions to our manuscript. These recommendations have been incorporated into the updated manuscript as explained in our responses below. In these responses, the Reviewer comments are displayed in italicized font and our responses immediately follow in standard font.

Reviewer #2

Review of Observed impacts of aerosol concentration on maritime tropical convection within constrained environments using airborne radiometer, radar, lidar, and dropsondes by Amiot et al.

Recommendation: Publish subject to minor revisions

The authors have provided a much-improved manuscript based on the reviewers' comments. Especially, the introduction and methodology section are now much more suitable for publication. Overall, I am satisfied with the responses. I think the writing could be tightened up in certain parts. For example, there is a quite extensive description of results in the supplementary material (466-483). This part could be shortened quite a bit. In general, I suggest carefully reading the manuscript and editing it to shorten the text.

Below, I list a few more comments that the authors may want to consider before publication. These are mostly suggestions and are up to the authors if they want to include them.

We thank the Reviewer for their helpful comments and suggestions. We have removed approximately 600 words from the manuscript, primarily from sections 2–4, without altering the science content or message of our study. This includes significantly reducing the description of results in supplemental material (now on lines 457–467) that you've noted.

Comments

1. 129: 'radar-based proxy'

Modified to "...radiometer- and radar-based proxies...".

2. 416: 'is capturing'

Modified as suggested.

3. *Can the corresponding parts of Figure 2 shown in Figure 3 be indicated somehow? For example, by putting a thicker box in Figure 2 around the three values for Mean 355-nm Bsc binned by LCL shown in Figure 3a. The same can be done for Figures 4, 6, and 7. That should make it easier to find the parts of the figures that correspond to each other.*

Boxes have been added to each of these figures, along with Figs. S1 and S3 in the supplemental material, to highlight which correlation sets are represented in the corresponding scatterplots, as suggested.

4. *In general, I would suggest flipping x-axis and y-axis in Figures 3, 5, and 8 since technically the authors are investigating the convective variables as a function of the aerosol variables.*

We have flipped the x- and y-axes in each of these figures (along with Fig. S2 in the supplemental material) as suggested, and we have made minor updates to the figure captions to provide additional clarity about the scatterplots and data shown therein. The x-axis range in Fig. 3a has also been updated to avoid erroneously cutting off data points with $Bsc_{355} > 6 \text{ Mm}^{-1} \text{ sr}^{-1}$; all other scatterplots have been checked for this same mistake. Also, in Fig. 1, we have increased font sizes of the y-axis labels for easier viewing and corrected the HSRL2 title from “355-nm” to “532-nm.”

5. *525: K-index looks like it has the lowest correlations in Fig. 6.*

We have removed K-Index from this list (lines 503–504), which had been accidentally left in the list from a prior version of the manuscript.

Reviewer #3

The authors clearly improved the manuscript through the rounds of the review process and eliminated major concerns about interpretations of the results (I agree that the results are inconclusive and do not present an indisputable trend). I have the following minor comments regarding the abstract and introduction sections:

We thank the Reviewer for their helpful recommendations.

- I object "directly related" in line 25 : "radar- and radiometer-based parameters directly related to convective intensity...". The authors also call them "indirect" indicators in lines 116 and 128, which I believe is more appropriate.

We have modified this phrase to “radar- and radiometer-based parameters with physical implications for convective intensity...” on lines 25–26.

- I believe line 74: "The impacts of aerosol warm-phase and cold-phase invigoration of convection have received mixed results in prior observational and numerical modeling studies." reads as if "aerosol warm-phase and cold-phase invigoration of convection" is a proven fact as was pointed out in previous review round. I suggest that this sentence is restated.

We have modified this sentence (lines 74–75) to “Potential impacts from hypothesized aerosol warm-phase and cold-phase invigoration of convection have received mixed results in prior observational and numerical modeling studies.”.

- The following statements in the same paragraph (starting at line 74) describes previous observational or modeling studies. I think it is important and relevant information to state which work uses observations and which work uses modeling to arrive at the described result/conclusion.

We have added a few words throughout this paragraph (lines 74–92) to note which studies primarily used numerical simulations and which studies focused on observations.