

Response to Reviewer #2 comments:

This manuscript focuses observations of aerosol over the southeast Atlantic and how it impacts the cloud droplet number concentration in the stratocumulus clouds during the ORACLES 2017 deployment. The work includes data that covers low, intermediate, and high aerosol conditions and allows for analysis of the impact aerosol has over a range of vertical velocities and k parameters. This is a well written work that contributes to our understanding on aerosol limited and vertical velocity limited regions when considering cloud droplet formation. There are minor edits required and come confusion with alone of the figures, other than that it is a well written manuscript that is important for publication.

We want to thank the reviewer for the overall assessment and the insightful comments that have clearly improved the manuscript. Below, we include the response to comments and questions raised.

Reviewer comment: “Check your figure numbers. You mention a “Figure 9” that doesn’t match Figure 7 (the last figure) and it’s not one of the supplemental figures.”

Answer: Thank you for pointing out this oversight.

Reviewer comment: “There are instances where you make assumptions but do not justify them. Be specific in your reasoning behind using certain thresholds or cite a reference that has used them previously.”

Answer: Good point! We have gone through the manuscript and have provided support for the values of threshold used.

Reviewer comment: “Line 184: Add a space between “-“ and “assuming””

Answer: Done

Reviewer comment: “Line 184-185: What are these assumptions from? Are there references for these numbers?”

Answer: Reviewer #1 also raised this issue – please see our response there as well.

Reviewer comment: “Line 195: You need to break out “BBOA” to at least “BB Organic Aerosol”

Answer: Done

Reviewer comment: “Line 238: What altitude range are you using for the MBL? Mark this on your Figure 2.”

Answer: The MBL altitude varies with each flight, within a range from 500~1000m. We have added this to Figure 2.

Reviewer comment: “Line 240: Add a space between “-“ and “derived””

Answer: We removed the space between “CCN” and “-“ here, as it was meant to be one compound word (“CCN-derived”) as opposed to two separate ones. The space that was between “CCN” and “-“ was a typo.

Reviewer comment: “Line 243-244: Is there a reference for your thresholds for “clean,” “intermediate,” and “polluted” or did you arbitrarily decided on them, or are they based on something in the data?”

Answer: The concentration thresholds were simply based on the concentrations themselves that were seen in the MBL throughout the 2017 campaign, as they dramatically decreased from the beginning of the campaign to the end. MBL concentrations provided a simple, straightforward way to categorize the different flights. The threshold for the “polluted” flights corresponds to the concentration above which droplet number becomes insensitive to increases in aerosol number.

Reviewer comment: “Line 276: In line 243 you used “exceeding 800” why are you switching to ~900 here? Why not use either 800 or 900 for both?”

Answer: This is a good point. The value of 800 is used consistently throughout.

Reviewer comment: “Line 325: add a space between “E.” and “Mediterranean””

Answer: Done

Reviewer comment: “Line 352: Did you mean Figure 6 here instead of Figure 5?”

Answer: Yes, indeed. Thank you for pointing this out.

Reviewer comment: “Line 365: The next figure should be 7, but the description doesn’t seem to match what you have in Figure 7. Is this sentence left over from a previous version, did you include an old figure or one you didn’t mean to use?”

Answer: Yes, this figure is leftover from a previous version in which we referenced right after this point an ability to spatially visualize the extent that the BB aerosol has on the SEA cloud deck. We really liked the figure and forgot to take it out after we removed that reference from the text. Thank you for pointing it out.

Reviewer comment: “Line 432: add a space between “-“ and “the””

Answer: Done

Reviewer comment: “Figure 1) The fire map is great, tough by including the entire South African continent it makes it difficult to see the actual flight paths. Perhaps have the flight paths zoomed in and include the fire map as an inset?”

Answer: Done. AOD was also added per Reviewer #1’s suggestion.

Reviewer comment: “Figure 2) It’s hard to see the markers in the back. Usually I encourage folks to make larger markers, but in this case perhaps a bit smaller would be helpful. Also, it would be helpful to include a line to show what you consider the MBL.”

Answer: We made the markers smaller, used time-averaged data to decrease the number of points on the graph, and rearranged the order of the series to hopefully make the differences in the data more visible. We also added the range of MBL heights seen throughout the flights.

Reviewer comment: “Figure 3) You need to add a) and b) to the figures. It would be helpful to mark off the low, intermediate and high ranges on these figures.”

Answer: Good point! Done.

Reviewer comment: “Figure 7) Doesn’t seem to fit in the paper. There is no reference to this at all.”

Answer: Thank you for pointing this out. We have now addressed this issue.