

Response to Editor and Referee #3

“Seasonal variations in photooxidant formation and light absorption in aqueous extracts of ambient particles” by Lan Ma et. al.

Dear Dr. Sullivan,

Thank you for your review of our manuscript and for soliciting the opinion of a third reviewer. Based on your suggestions, we slashed the abstract to meet the new maximum length requirement. We did not alter our title or conclusions section as these both seem to fit with ACP guidelines.

Below are our responses to the review from Referee #3. Each reviewer comment is listed in *italics* and our response, in plain text, is directly below it. Line numbers in the revised version are different from the original (e.g., in the reviewers’ comments) due to changes in the manuscript.

Anonymous Referee #3

I read the revised version of this manuscript after it was reviewed by two reviewers. Reviewer 1 requested relatively minor changes. Reviewer 2 suggested that the presented data overlap with the already published results from the same group in Jiang et al. (2023) and Ma et al. (2023). The methods and results described in this paper are indeed linked to the results presented in Jiang et al. (2023) and Ma et al. (2023), especially the latter. However, the authors provided a convincing explanation in the response about how these three manuscripts are connected and how they are different. This is a very large data set resulting from years of work, so it is understandable that the authors are trying to split into more focused, digestible stories. I recommend publishing the revised paper. I have additional minor comments:

1. The abstract is unreasonably long, to the extent it had to be split in two paragraphs. While long abstracts have appeared in published in ACP papers, it is not in a general a good practice. I would strongly recommend condensing it to a more reasonable length focusing on the most important message of this paper and omitting less important details.

Response: We thank the reviewer for their thoughtful comments and for understanding the connection and differences among the three papers. We agree that the abstract is too long and we have rewritten it to be much shorter.

2. L120: I would mention that this work builds on the previous study by Kaur et al. (2019) since these data are used in the figures

Response: Thank you for your suggestion. We have added this information.

3. L143: the unit for hour is “h” not “hr” (it is used correctly in most other places in the text)

Response: Thank you for pointing this out. We have corrected it.

4. L358 and Figure S13: is there a physical reason to expect a linear relationship here? And regardless of the model, should no the fitting curve pass through zero at zero PM/water ratio?

Response: We think you are referring to Figure S14 instead of Figure S13 here. The three samples that we studied in our past work showed two different behaviors with increasing PM mass/water mass: two showed essentially a constant [$\cdot\text{OH}$], while the third showed a non-linear (second-order polynomial) increase. Thus the samples in Figure S14 might exhibit a range of relationships between [$\cdot\text{OH}$] and extract concentration, making it impossible to know the correct function for the assemblage. Because of this, we chose a simple linear relationship with a non-zero intercept. We chose to fit the intercept because it provides a better fit to the data and because it allows the regression to account for the small but non-zero formation of $\cdot\text{OH}$ in our blanks.

5. L494. *“Figure S15 shows the equivalent plot of Figure 3”. I think you mean Figure 4. In the caption of figure S15, I would explain how it is different from figure 4.*

Response: Thank you for pointing this out. Yes, it should be Figure 4 and we have corrected it. We also now explain in the caption of Figure S15 how this figure is different from Figure 4 in the main text.

6. L669 and below: *instead of using “compound (X)” why not use the actual names of these compounds? It will not make the text longer but will make it easier to read. You can still use 1,2,3,4,5 in the figure since the structures are shown right there so the labels are not too confusing.*

Response: Thank you for your suggestion. We have added the compound names to most of these instances.

7. *The same reference for Jiang (2023) in ACS Earth Space Chem. is listed twice in the reference section under indexes “a” and “b”. Please fix.*

Response: Thank you for pointing this out. We have corrected it.