We would like to thank this reviewer for reviewing this manuscript and providing valuable feedback. Our responses are provided below (blue) to the reviewer's comments (black).

Page 13, line 233: insert "" before conditions 5 and 6. Corrected

Figure 8: Why does the fraction decrease when errors > 20% are removed? I would assume the opposite case: The more accurate data in a data set, the more valid results. What exactly is the denominator of the presented fractions?

The denominator is the total number of extinction spectra in the SAGE record (for a given latitude/altitude). Therefore, filtering data inevitably reduces the throughput. However, the intent of this figure is to, in part, determine what the overall throughput is for these 3 conditions and determine how much the throughput is reduced by only using data with the lowest uncertainty. The caption of this figure was updated to reflect how the fractions were calculated.

Figure 8: I can clearly see a distribution of the fraction. However, I can hardly distinguish between fractions smaller than 0.7 (line 226) and larger than this limit. Maybe the authors could use a stronger color gradient?

The color scale was modified to enhance contrast.

Figure 9: Maybe the authors could show this Figure before Fig. 8?

We agree that grouping the figures together like this may make sense. However, the figures are listed in the order in which they appear in the text, per the Copernicus guidelines. We made no changes in regard to this comment.

Page 14, line 245: What are "challenging aspects of real-world aerosol compositions and PSD parameters"? Please specify.

The text was updated to provide the reader of some typical examples.

Page 16, line 264: Please give definition of SAD and VD.

The abbreviations SAD and VD are defined within the paper. A table was added to the paper (Table 3 of the new version) to provide a mathematical definition of these terms.

Page 19, line 296: Please specify used UWY OPC data set (e.g. time frame, location, number of profiles, influence of volcanic aerosols, . . .)

The requested information was added.

Sec. 4.4.2 – 5.3: I am not convinced that one can compare the PSD parameters of the first mode of a bimodal distribution with the parameters of a monomodal PSD and draw conclusions about the quality of the retrieval. E.g., page 24, line 389: "though r_2 was underestimated by $\approx 90\%$."

How can something be underestimated if the reference does not even exist? PSD parameters of a bimodal curve and PSD parameters of a monomodal curve are completely different things. In this case, comparisons can only be made on the basis of integrated parameters (SAD, VD, re).

An excellent point. We think the issue the reviewer raised is in regard to Section 5.1 only. All discussion that precedes Sec. 5.1 is critical to the discussion as this relates to the reliability of a single-mode estimation when the atmospheric aerosol is really bimodal. This is critical.

On the other hand, Sec. 5.1 begins the discussion of bimodal solutions within the context of the OPC case studies. We agree that the wording here is ambiguous. The intent of the text that the reviewer quoted (i.e., "though r2 was underestimated by $\approx$ 90%.") was to inform that reader that the inferred PSD parameters for the second mode were substantially different from the OPC's first-mode parameters (e.g., the algorithm isn't saying that r_1 and r_2 have the same value) . . . and the solution algorithm's second mode is not dominating the solution space (e.g., the algorithm isn't trying to minimize the influence of the first mode and forcefully fit all of the OPC spectra into the second mode).

The text was updated to make this clear.

Figure 12: How is N retrieved?

Another reviewer raised a similar concern. Subsection 3.2.3 was added to discuss this. In short, the PSD parameters within the solution space were used to calculate the 1 μm extinction coefficient with N set to 1 cm^{-3} and the observed 1 μm extinction coefficient was divided by the calculated values, which indicates the difference in scale (i.e., N). Equation 2 was also updated to explicitly show that N plays a role.

Page 21, line 335: typo: r1=, sigma1=, r2=, sigma1= -¿ sigma2
Corrected

Figure caption 13: Please specify OPC record.

We believe the information that we added, in response to another of the reviewer's concerns, addresses this question. However, we updated the caption to point the reader to the text for details.

Page 30, line 478: "1. . . . ,2. . . . " -¿ First, . . . , second, . . .
Changed

Page 30, line 484: "PSD estimates are reasonable" -¿ What is this statement based on?
The text was updated.

Page 31, line 495-499: Do the authors see a "jump" in the retrieved data when they change the conditions within the retrieval?

No. The text was updated to inform the reader of this nuance.