We respond to the comments made by the referee below with our responses highlighted in red.

Referee 2

This manuscript builds on previous work by Fischer and Smith (2018) and further explores the dependence of PAS sensitivity with ozone as calibrant on the ratio of N2 and O2 in the bath gas at relevant wavelengths, allowing for direct comparison with measurements by Bluvshtein et al. (2017). The paper is very well written. The experiment is well planned and carried out. The language is precise, and the analysis is thorough. I only have a couple of minor comments, as detailed below, for the authors to consider.

Response:

We thank the reviewer for their very supportive comments. We have addressed the reviewer's minor comments below.

The authors calculated extinction coefficient at 514 nm from the extinction measurement at 658 nm since no direct measurements were available, but how reliable is the calculation the what the associated uncertainty is? Have the authors tried calculating extinction coefficient at 405 nm from that at 658 nm and compare the results with the actual measurement of b_{ext} at 405nm? That way the accuracy of the calculated b_{ext} at 514 nm can be assessed.

Response:

We have indeed calculated the 514-nm extinction using the measured b_{ext} at 405 nm in addition to calculating 514-nm extinction from the b_{ext} measurements at 658 nm. However, we discuss in the manuscript (see Sect. 3.1) that there is significant error in the calculated 514-nm extinction when we use the 405-nm b_{ext} measurement caused by the 1 nm uncertainty in the 405 nm laser wavelength. This originates from the strong sensitivity in the ozone cross section to wavelength at short visible wavelengths, while this sensitivity is much reduced at long visible wavelengths approaching ~600 nm. The result of this strong sensitivity of ozone cross section to wavelength uncertainty is that the 514-nm extinction has associated uncertainties of 2.5% and 7.7% when calculated from the measured 658-nm and 405-nm b_{ext}, respectively. However, the reviewer is right that we did not compare in our analysis the 514-nm extinctions directly for calculations using either 405-nm or 658-nm measurements. Therefore, we have added on page 10, line 24 of the manuscript the following:

For completeness, we find that the calculated $\alpha_{ext\text{-}514}$ from extinction measurements at the 405 and 658 nm wavelengths are well correlated (with a linear Pearson correlation coefficient of 0.93) and the average $\alpha_{ext\text{-}514}$ is 14% larger when calculated from 405-nm compared to 658-nm measurements.

Figure 3. Can the authors add vertical uncertainty bars for PAS sensitivity?

Response:

These vertical error bars are already present on the PAS sensitivity plots (Figure 3). However, we had overlooked a statement to describe the error bars included in the figure legend. Therefore, in the figure legend for Figure 3, we have included the following statement:

The measured data include vertical error bars that represent one standard deviation in the measured sensitivity, although these error bars are not visible on the vertical scale shown. Horizontal error bars represent the uncertainty in O_2 mass fraction arising from the standard errors in the mass flow controller flow rates that control concentrations of O_2 and N_2 in the bath gas.

Page 6 Line 17: . . . and the sample passed through only the 514-nm PAS only.

Response:

We thank the reviewer for spotting this mistake. We have re-worded to say '*and the sample passed through the 514-nm PAS only'*.