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Atmospheric Measurement Techniques Discussions

Interactive comment on "On the accuracy of aerosol photoacoustic spectrometer calibrations using absorption by ozone" *by* Nicholas W. Davies et al.

Anonymous Referee #2

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This is a very interesting and important manuscript that seeks to explore the problems with ozone calibration experienced by Bluvshtein et al. (2017). It is suitable for publication in AMT and should be published after the following comments are taken into account:

1. P1L10-11: "Photoacoustic instruments require calibration, which is often achieved by measuring the photoacoustic signal generated by known quantities of gaseous ozone." I'm not sure how often ozone is really used to calibrated photoacoustic instruments. Please quantify or replace with "Photoacoustic instruments require calibration, which can be achieved by measuring the photoacoustic signal generated by known

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Discussion paper

quantities of gaseous ozone."

2. The ozone calibration of photoacoustic instruments for the measurement of aerosol absorption coefficients needs to put into the context of the calibration of such instruments with aerosols and other calibration gases. I recommend adding a short paragraph to the introduction. The following references, in addition to those already in the manuscript, come to mind: (Arnott et al., 2000;Gillis et al., 2010;Nakayama et al., 2015;Tian et al., 2009).

3. P4L28: "without the need for instrument calibration". This is not entirely correct; one needs to calibrate for mirror losses and the effective cavity length needs to be determined especially as the mirrors are purged with clean air.

4. P5L3-4: Please give the radius of curvature of the cavity mirrors.

5. P5L13: Please explain how the RL factors were determined.

6. P5L14-15: Replace "extinction cross sections" with "average extinction cross sections".

7. P5L19-20: "Teflon tubing was used throughout the flow system to minimize contamination.". Add "and reduce ozone losses". Please also specify the material used for the insides of the CRDS and PAS cells.

8. P8L1-3: Please also discuss the zero-offset of the linear regressions here and elsewhere unless the regressions were forced through zero; if this is the case please note this.

9. P8L11 Eq. 4: This seems to assume that the wavelength dependence of absorption equals that of extinction. How large is the influence of scattering (Rayleigh plus particle contamination)?

10. P15L6: "Our result is robust for optical wavelengths between 405 and 658 nm." This seems to be overstating the results as measurements at only one wavelength

(i.e., 514 nm) between 405 and 658 nm were discussed.

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