

Interactive comment on “Development of an incoherent broadband cavity-enhanced absorption spectrometer for measurements of ambient glyoxal and NO₂ in a polluted urban environment” by Shuaixi Liang et al.

Anonymous Referee #2

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This paper describes the development of incoherent broadband cavity-enhanced absorption spectrometer (IBBCEAS) for simultaneously measuring CHOCHO and NO₂ in a polluted atmosphere in extractive mode. The study and its results are very interesting especially the continuous measurements made in the city of Beijing during summer of 2017. Also of interest is the use of measured absorption cross-section of NO₂ to avoid non-linear absorption effects of the CCD array detector. The manuscript is suitable for publication in AMT. The following are my specific comments, and I suggest minor revision to address these queries before publishing the manuscript.

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1. Page-4: In the experimental setup, more details of the components may be of benefit to readers, for eg., makes and models, LED power details, cavity high-reflective mirrors' diameter, radius of curvature, manufacturer specified reflectivity at a specified wavelength, was the ccd array TE cooled and if so to what temperature, etc. Cavity (mirror-to-mirror) length may also be indicated in the schematic figure (Fig. 1)
2. In the experimental details, it may be specified whether the optical alignment was stable throughout or occasional alignments were necessary, and if so how calibrations were ensured each time.
3. Page 5, line 16: Mention of any specific/standard non-linear fitting procedures used may be beneficial. Also did the analysis take care of any spectral shifts from different cross sections (from different sources)?
4. In Fig. 3, the noise seems to be increasing from 475 nm up. Is it due to low light levels of LED in this region?
5. Page 8, line 20: How often I0 spectrum was measured?
6. On Fig.11, panel g, The CHOCHO concentration was not legible as it falls on the peak. Could this be shifted to the right or left side?
7. Page 16, line 19: “Overall this 3% deviation...”. The 7.3% uncertainty in Section 3.5.3 was for glyoxal. For NO₂ shouldn't it be 6.9%? The comparison here is between CAPS and IBBCEAS measurements of NO₂.
8. While NO₂ line shape was measured by the CCD array used for measurements to cover for the shape differences (residuals) this was not done for glyoxal. Would it matter?
9. The last sentence of the conclusions section state that measurements under high-load PM conditions are possible. Does this mean that presence of PM is OK because aerosol filter was used? Were there any quantitative measurements to characterise sampling losses against aerosol loadings in the surrounding atmosphere?

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