

## ***Interactive comment on “Modification, Calibration, and Performance of the Ultra-High Sensitivity Aerosol Spectrometer for Particle Size Distribution and Volatility Measurements During the Atmospheric Tomography (ATom) Airborne Campaign” by Agnieszka Kupc et al.***

**Anonymous Referee #3**

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### GENERAL COMMENT

The manuscript describes the results of a well-conducted study on the characteristics of two modified aerosol spectrometers (UHSAS) operated on the NASA DC-8 during the ATom airborne campaign. The implemented modifications concern mainly the stabilization of the sample flow at reduced and variable pressure levels which usually occur during airborne operation, and the introduction of a thermal denuder. The stud-

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ies have been carefully designed and conducted, and the paper is clearly structured and well written. The topic fits well into the scope of AMT and the manuscript deserves publication after few minor revisions have been considered.

Minor revision are requested for these topics:

1. In Section 5, potential uncertainties in particle sizing from the unknown refractive index and the unknown impact of particle non-sphericity are not discussed in detail. For comparison, a detailed study on the impact of refractive index and shape uncertainties on particle size distributions determined by an optical particle spectrometer is reported by Fiebig et al. (2002) for the PCASP which uses almost similar collection optics as the UHSAS. The authors may link their findings to these results to get an estimate of the expected range of uncertainties.
2. Sections 3.5 and 3.6 may be combined since the only effect of pressure on particle sizing will arise from flow variations. A good example for the effect of an instable flow on the calibration of an optical particle counter is given by Bundke et al. (2015). The authors may refer to this instrument characterization study to compare their results.
3. In Section 3.1 the authors may add information on the size range of the produced aerosols. This would complete the information to the reader about the experiments performed in this study.

### MINOR COMMENTS

Abstract: The abstract may be shortened to 250 – 300 words, e.g., the first sentence can be skipped and some details can be shifted to the text body.

Page 2, line 17: you may write: “to a size-proportional voltage pulse”.

Page 2, line 25: I suggest rephrasing: “wished to dry the air sample and to install a thermodenuder used to distinguish non-volatile particles. These sample . . .”

Page 3, line 24: please modify “between 0.06 – 1  $\mu\text{m}$  in diameter”.

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Page 10, line 6: It should read: "life time".

#### REFERENCES

Bundke, U., Berg, M., Ibrahim, A., Tettich, F., Klaus, C., Franke, H., Fiebig, M., and Petzold, A.: The IAGOS-CORE aerosol package: Instrument design, operation and performance for continuous measurement aboard in-service aircraft, *Tellus B*, 67, 28339, doi: 10.3402/tellusb.v67.28339, 2015.

Fiebig, M., Petzold, A., Wandinger, U., Wendisch, M., Kiemle, C., Stifter, A., Ebert, M., Rother, T., and Leiterer, U.: Optical closure for an aerosol column: Method, accuracy, and inferable properties applied to a biomass-burning aerosol and its radiative forcing, 107, doi:10.1029/2000JD000192, doi: doi:10.1029/2000JD000192, 2002.

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