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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterization and intercomparison of aerosol absorption photometers: result of two intercomparison workshops" *by* T. Müller et al.

Anonymous Referee #1

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Review of "Characterization and Intercomparison of Aerosol Absorption Photometers: Results of Two Intercomparison Workshops"

This paper summarizes the comparison of many hours of aerosol absorption intercomparison work using filter-based absorption photometers. It makes a great contribution to the field and I am recommending it be published. I have a couple of bigger picture issues some requests for minor changes, however I feel like this can be published with minor revision and consideration.

One of the major conclusions that I drew from this paper was that the experiments present precision and 'accuracy' (based on the MAAP) that appears to increase the

uncertainty of filter based techniques. Is the variability between the same instrument types shown here currently included in the uncertainty of reported data? It has been common to report filter-based absorption uncertainty between $\sim$10 – 30% but what is it from these experiments? Could you estimate from this new data what that uncertainty should reasonable be reported as?

Taking a step or two back it seems as though these inter-comparisons need to be simplified. The morphology and size distributions of kerosene soot can be characterized but the community would be better served by developing a simpler absorbing standard. (Lack et al., 2009) successfully used absorbing monodisperse polystyrene spheres for both photoacoustic and filter-based absorption experiments. These absorbing PSLs may not be atmospherically realistic but they can be very accurately characterized optically and physically and surely must constrain the scattering and filter loading issues. One interesting result from that study was a significant sensitivity of the PSAP to the size of the absorbing PSL.

Specific Comments: P1517 L28: Explain why photoacoustic / cavity ring down instruments might be preferable. P1518 L10: "20 high quality" is a little subjective. I am not doubting the ability of the network, however I pause at statements like this without some form of validation. P1522 L3: Does carbon black contain any non-carbon dyes? This could affect the wavelength response. Section 3.3.1: (Massoli et al., 2009) and (Bond et al., 2009) have recently identified uncertainties in scattering measurements by the nephelometer. Can you discuss these in this section and how/if these uncertainties might affect things?

P1524 L12: What is the scattering correction for the non-532nm wavelengths?

P1545 L10 – 25: How does this variability in scattering correction affect an example set of monitoring stations? For example remote, rural, polluted will have different scattering components/magnitudes so will the scattering uncertainty measured here affect one site differently than another site (in terms of the overall uncertainty of measured absorption?

P1548 L8: Do the MAAP data need to be corrected or was it decided not to correct this data?

Figure 7. I don't see the benefit to this figure.

Bond, T. C., Covert, D. S., and Muller, T.: Truncation and Angular Scattering Corrections for Absorbing Aerosols in the TSI 3563 Nephelometer, Aerosol Science and Technology, 43, 866–871, 2009. Lack, D. A., Cappa, C. D., Cross, E. S., Massoli, P., Ahern, A. T., Davidovits, P., and Onasch, T. B.: Absorption Enhancement of Coated Absorbing Aerosols: Validation of the Photo-Acoustic Technique for Measuring the Enhancement Aerosol Science and Technology, 43, 1006-1012, 2009. Massoli, P., Baynard, T., Lack, D. A., Brock, C. A., Murphy, D. M., and Lovejoy, E. R.: Uncertainty in Light Scattering Measurements by Nephelomter: Resulsts from Laboratory Studies and Implications for Ambient Measurements, Aerosol Science and Technology, 43, DOI: 10.1080/02786820903156542 2009.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 1511, 2010.