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Atmospheric Measurement Techniques Discussions

Interactive comment on "Minimizing light absorption measurement artifacts of the Aethalometer: evaluation of five correction algorithms" *by* M. Collaud Coen et al.

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Review of "Minimizing light absorption .." by Coen and all. This review will be general rather than specific, as the technical contents and discussions are clear to this reader. 1. First, the authors ignore one very important fact of the Aethalometer: It has a variable starting point for filter transmittance because the instrument conditions the new filter spot using ambient air (discussed in the Arnott 05 paper). 2. The Arnott 05 paper gives a prediction for a scattering correction based on aerosol scattering and asymmetry coefficients (see Eq. 15). Scattering corrections depend on scattering optical depth

and asymmetry parameter, so comparisons with TSI neph estimated asymmetry parameters should also be considered. 3. The authors do not mention relative humidity. Were all measurements performed at low RH? RH is known to cause serious issues with PSAP absorption measurements. 4. With a plethora and proliferation of choices for corrections to the filter based methods, is it not better to simply divide ATN by one number for each wavelength and call it good? All the corrections have advantages and disadvantages, and require a lot more analysis. I find that when averaged over sufficiently long periods to allow for aerosol uniformity and at least on full cycle of aerosol measurement between new and loaded filter, the averages from the Aethalometer compare well with reference methods. The Aethalometer does not do well with plumes and very low single scattering albedos (below 0.5). 5. The MAAP is taken as a reference method, and the Aeth. is interpolated to its wavelength (which Aeth. measurements were used – which wavelengths?). Is the MAAP a reference method? As a filter based method, it suffers from RH effects and from unknown particle penetration depth in the filter media. 6. In the Arnott 2005 paper, it was acknowledged that the fit parameters were site dependent and filter starting point dependent. The intention of that paper was to develop a formalism based on multiple scattering theory. The authors, and others, are encouraged to explore their own choices for the empirical fitting parameters. 7. The Aeth would be improved if it conditioned after filter change using filtered ambient air. It would also be improved if a thermal denuder was used up front to remove most of the scattering aerosol and particle bound organics and inorganics. Then many of these issues would be mitigated, assuming the primary absorber is elemental carbon. However, as is now becoming clear in the work of Subramanian and others, liquid phase aerosol light absorption is going to be a real challenge for filter based measurement methods.

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