Atmos. Meas. Tech. Discuss., 6, C26–C28, 2013
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Atmospheric Measurement Techniques Discussions

Interactive comment on "Broadband measurements of aerosol extinction in the ultraviolet spectral region" *by* R. A. Washenfelder et al.

Anonymous Referee #3

Received and published: 3 February 2013

Washenfelder et al. present a new method for the measurement of wavelength dependent aerosol optical properties in the near-UV wavelength region. The demonstrate the utility of this instrument through the measurement of wavelength dependent refractive indices for a variety of absorbing and non-absorbing substances. The manuscript is exceptionally well written and the results presented clearly. I recommend publication after the authors address the below questions.

Are the LED's mounted on adjustable mirror mounts or are they fixed position?

P126, Line 19: Although it is certainly challenging to account for the effects of multiply-charged particles on the extinction for "monodisperse" size-selected particles, it should

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be noted that the actual assumption that needs to be made is that the multiply charged particles have the same refractive index as the singly charged particles. A minimization can then be done that accounts for the contributions of the multiply charged particles in a self-consistent manner.

P126, Line 24: Do the authors know if the method they apply here for multiple charge correction is essentially the same as clicking the button “multiple charge correction” on the TSI SMPS AIM software? An answer to this question would benefit the community as there are many such systems in use. My interpretation is that it is the same (or at least similar).

Section 4.2.1: The authors discuss here multiple-charge corrections that are necessary. It would be helpful if they were to indicate (i.e. remind the reader) that this is because the wavelength-independent approach necessitates the use of size-selected particles, and thus they must use the method that they do not favor (as discussed in 3.3.2) to derive the refractive index values.

Section 4.2.3: Can the authors offer an explanation for the difference in the Trainic et al. ammonium sulfate refractive index?

Section 4.3 and 4.4: The authors do not correct their Nigrosin dye or Suwanee River fulvic acid measurements for multiply charged particles because literature refractive index values do not exist. I would encourage them to think about including the multiple charge correction as part of their fitting algorithm explicitly, where the RI being tested during the fitting is used to determine the multiple-charge correction. This allows for correction of multiple-charged particles even if the refractive index is not known a priori with the only assumption being that the single and multiply charged particles have the same refractive index (which is a very reasonable assumption). Alternatively, they could use the results from their multi-wavelength retrieval.

Section 4.4.2: Can the authors put forward a reason for why the Dinar et al. refractive index for the same Suwanee River fulvic acid is so different than in this study?

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Section 5: This is a very useful discussion.

Section 6, P138, L20: Although it is useful to note that uncertainties with respect to particle mixing state, composition of single vs. multiple charges, etc. can be overcome by using the method of Beranek et al. (2012), which uses a DMA in tandem with an aerosol particle mass analyzer, I question whether the BAES method would have the requisite sensitivity to deal with the particle losses that would occur going through both a DMA and APM for ambient measurements (certainly such an approach would work in the lab). That said, the authors are encouraged to try!

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 113, 2013.