

Interactive comment on “Optical properties of elemental carbon and water-soluble organic carbon in Beijing, China” by Y. Cheng et al.

Anonymous Referee #2

Received and published: 16 March 2011

Optical properties of elemental carbon and water-soluble organic carbon in Beijing, China by Cheng et al. provides an estimate of mass absorption cross section (MAC) of elemental carbon sampled in Beijing. Their approach is to divide the absorption coefficient by the mass, both derived from filter-based measurements.

I recommend rejection, for the lack of proper evaluation of the uncertainty in their absorption measurement. Light absorption by atmospheric particles is notoriously difficult to measure. Filter based instruments are typically confronted by two factors – changes in physical properties upon deposition and interference of light scattering. Efforts have been made over more than a decade to confine these effects (Bond et al., 1999; Lack et al. 2008; Virkkula 2010). These studies all find that the effects are significant and require adjustment of the obtained data.

The present study neglects all these efforts. It employs a DRI Model 2001 thermal/optical carbon analyzer (Atmosphytic Inc., Calabasasa, CA), an instrument not tested in the previous studies listed above. The present study does not include, or refer to, an evaluation of the performance of this instrument.

In Section 3.2 the authors develop an approach “to account for the discrepancy caused by measurements methods of both ATN and ECs”. However, the two factors I raised above are not addressed. “transmittance correction” mentioned in Section 3.2 (2) Wavelength measurement correction may be meant to address the scattering interference, one of the two factors. If so, this mention should have been accompanied by a proper explanation and/or reference, in a subsection separate from that of wavelength adjustment.

I encourage the authors to carefully assess the quality of the measured absorption coefficient, before discussing its ratio to the particle mass.

References

Bond, T. C., Anderson, T. L., and Campbell, D.: Calibration and intercomparison of filter-based measurements of visible light absorption by aerosols, *Aerosol Science and Technology*, 30, 582-600, 1999.

Lack, D. A., Cappa, C. D., Covert, D. S., Baynard, T., Massoli, P., Sierau, B., Bates, T. S., Quinn, P. K., Lovejoy, E. R., and Ravishankara, A. R.: Bias in Filter-Based Aerosol Light Absorption Measurements Due to Organic Aerosol Loading: Evidence from Ambient Measurements, *Aerosol Science and Technology*, 42, 1033-1041, 2008.

Virkkula, A.: Correction of the Calibration of the 3-wavelength Particle Soot Absorption Photometer (3λ PSAP), *Aerosol Science and Technology*, 44, 706-712, 2010.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 11, 6221, 2011.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)