Atmos. Chem. Phys. Discuss., 13, C3149–C3151, 2013
www.atmos-chem-phys-discuss.net/13/C3149/2013/

Atmospheric Chemistry and Physics Discussions

Open Access

ACPD

13, C3149–C3151, 2013

Interactive Comment

Interactive comment on "Recommendations for the interpretation of "black carbon" measurements" *by* A. Petzold et al.

H. Moosmüller (Referee)

hansm@dri.edu

Received and published: 6 June 2013

The manuscript gives an excellent review of the current status, a clear statement of what should be done, and well-defined suggestions for future use of terminology. The manuscript should be published in ACP after the following suggestions and comments are taken into account:

1. The title referring to "interpretation of black carbon measurements" does not connect well to the content of the manuscript. I would suggest something along the lines of "Recommendations for black carbon-related terminology.

2. P 9488, L 24: I suggest replacing "thermal methods" with "thermal-optical methods" here and elsewhere in the manuscript. Virtually all of these methods use an optical

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

reflection or transmission correction for pyrolized carbon as stated in Table 2 (P 9517) of the manuscript.

3. P 9489, L 26: Replace "formed in incomplete combustion" with "formed in incomplete combustion of carbonaceous material".

4. P 9490, L 26: Table 1 (P 9516):

a) Morphology: Mention fractal-like chain aggregates and the change of fractal dimension (fractal collapse, fractal dimension changes from 1.8 to ~3) during aging in the atmosphere.

b) Solubility: Nice list of solvents, but isn't it true that BC is insoluble in any solvent as stated on P 9500, L 22-23?

5. P 9491 L 19: In most thermal-optical methods evolved CO_2 is quantified as CH_4 through FID.

6. P 9492, L 5-10: Mention that the pyrolysis correction is done through optical methods and depends strongly on the method used (i.e., TOR vs. TOT and temperature protocol).

7. P 9492, L 5-10: Another commonly used term that should be defined for completeness is "pyrolized carbon".

8. P 9492, L 18-20: The "extinction minus scattering method" is not limited to the laboratory but certainly to elevated concentrations as found in atmospheric plumes. The UW extinction cell has been used for BC measurements in combination with a nephelometer during airborne deployment, characterizing smoke in oil fire plumes (Weiss and Hobbs 1992).

9. P 9433, L 27: Include the upper wavelength of the red spectral region (i.e., 700 nm).

10. P 9494, L 15: I strongly suggest replacing "laser incandescence" with" laser-induced incandescence", here and elsewhere in the manuscript. It is not the laser that

ACPD

13, C3149–C3151, 2013

is incandescing :-).

11. P 9495, L 22: Briefly explain what limits the use of Raman spectroscopy for quantitative measurements.

12. P 9497, L 1-2: These limitations of electron microscopy are greatly reduced by computer-controlled electron microscopy, enabling us to automatically characterize the morphology of thousands of particles deposited on a filter. On the opposite, tomography is very labor intensive and limited to individual particles.

13. P 9498, L 9: “60% carbon” Please specify if this is a mass or mole percentage.

14. P 9501, L 1-2: “ almost uniform absorption of light over the entire visible spectrum”. This doesn’t seem to be all that uniform! If we use the range of BC absorption Angstrom exponents given in this manuscript (i.e., 1.0 – 1.5) and a visible range from 400 to 700 nm, we get a change in absorption coefficient ranging from a factor of 1.75 to 2.3 between 700 and 400 nm.

Reference:

Weiss, R. E., and P. V. Hobbs (1992). Optical Extinction Properties of Smoke from the Kuwait Oil Fires. J. Geophys. Res., 97, 14537-14540.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 9485, 2013.