

***Interactive comment on* “On the diurnal variability of particle properties related to black carbon in Mexico City” by D. Baumgardner et al.**

Anonymous Referee #1

Received and published: 12 February 2007

General comments

This manuscript presents diurnal trends in black carbon (BC) physical and optical properties in Mexico City, measured using a unique combination of techniques. The background section makes a strong case for the importance of BC. From their measurements, the researchers derive the number and mass fractions of particles containing BC, the BC equivalent mass diameter, and scattering and absorption coefficients. The results are clearly presented, in both figures and the text, although there is some sloppiness with units. This work makes important contributions to the understanding of BC and merits publication, with minor revisions as noted below. Addressing two more substantial issues will also improve the work. First, additional references to the literature about BC in particles outside the size range detected by the Single Particle

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Soot Photometer, i.e. smaller than 200 nm or especially larger than 700 nm, will place the results in stronger context. Second, the manuscript refers to the thickness of the coating of non-light absorbing material but never explicitly presents an estimate of the coating dimensions. The addition of quantitative information about the thickness of the coating would be very interesting.

Specific comments

1. (p. 1629, line11) It would be helpful if the authors explained the variables or parameters shown in their lognormal fit in Figure 3, C0 and Dg, either here or in the figure's caption.
2. (p. 1629, line 21) The correct size cutoff should be 200 nm, not 200 micrometers. More importantly, it is not clear why in Figure 3, the left edge of the shaded area lies at a BCM equivalent diameter of 0.23 micrometers instead of 0.20 micrometers. Is this due to the use of the optical diameter versus the mass equivalent diameter? If so, please explain.
3. (p. 1631, line 20) Marr et al. (2006) did not claim that other organic compounds can also be ionized by the PAS. However, Matter et al. (Matter, U., Siegmann, H.C., Burtscher, H., Dynamic field measurements of submicron particles from diesel engines, Environmental Science and Technology, 33, 1946-1952, 1999) showed that the PAS response is correlated with BC.
4. (0. 1632, line 26) The researchers combine data from 2003 and 2005 in generating their figures. Were there no significant differences in ambient concentrations between these two periods, either due to differences in meteorology or in source strengths? In some cities, ambient concentrations of vehicle-related pollutants have been shown to change significantly over a two-year period due to turnover in the vehicle fleet to cleaner technologies. The authors should state whether there were differences between the two years.

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

Interactive
Comment

5. (p. 1636, line 8) The claim, “A shift from smaller, primary BCA to larger ones would suggest a shift from primarily auto traffic to a greater frequency of heavy vehicles like trucks and buses that use diesel,” implicitly assumes that BC-containing particles emitted by diesel engines are larger. The authors should provide a reference for this assumption.

6. (p. 1637, line 24) This section refers to the “thickness of the coating material,” but it is never reported. Readers may be very curious about it, and the authors should present quantitative results on it.

7. (p. 1638, line 18) According to the text, the particles shown in Figure 8d contribute 20% to total extinction, but the figure shows a value closer to 17%.

8. In Figure 4, it is not clear why the hourly error bars in b-e are so much larger than the 10-min error bars. The same comment also applies to Figure 5.

9. In Figure 6, the position of a and b should be swapped with c and d.

10. The period 1600-2000 (green line in the legend) does not actually appear in Figure 9. The figure caption claims that averages are shown for every six-hour period, but the legend shows four-hour periods.

Technical corrections

11. (p. 1627, line 11) The size range is probably supposed to be 0.20 to 0.70 micrometers, or 200 to 700 nm, and not 0.20 to 0.70 nm.

12. (p. 1630, line 28) Typo: “mreasured” in Equation 4 here and in the next line.

13. (p. 1636, lines 23 and 28) Typo: “BMC.”

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 1623, 2007.

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