Atmos. Chem. Phys. Discuss., 15, C4505–C4507, 2015
www.atmos-chem-phys-discuss.net/15/C4505/2015/
© Author(s) 2015. This work is distributed under
the Creative Commons Attribute 3.0 License.

Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Seasonal trends in black carbon properties and co-pollutants in Mexico City" *by* A. Retama et al.

**Anonymous Referee #2**

Received and published: 7 July 2015

This manuscript documents the temporal variation in concentration of black carbon and related pollutants (CO, $NO_x$, and $O_3$) over the course of a year in Mexico City. The authors describe trends according to season, day of week, and hour of day. The hourly resolution measurements show that CO, $NO_x$, and eBC are likely co-emitted from a common source (traffic), and the lagged correlations with $O_3$ and SSA show the influence of this source on photochemical products and aerosol properties. The authors show a robust weekday/weekend effect for co-emitted pollutants for vehicle emissions across all seasons. The analysis is of high quality and generally well-presented, and addresses a gap in our knowledge regarding BC climatology in an otherwise well-studied city. The manuscript is recommended for publication in *Atmospheric Chemistry and Physics* with minor revisions.



Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

General comments:

The conclusions regarding the lack of change in BC concentrations over a 10+ year period seems to be stated a bit strongly, given uncertainties regarding differences in measurement artifacts by each method used (PSAP, PAX); combined with the the short duration and inconsistent sampling strategy during which BC concentrations were characterized in the past. The main conclusions from the year-long measurements that the estimated eBC concentrations are alarmingly high, and the magnitude of eBC concentrations to traffic of the region (over all seasons regardless of different conditions of atmospheric mixing, and so on) is still valid, and the authors should take care to stress this analysis more than the decadal comparison, which appears to be written with more authority than the present study merits.

The rapid dispersion of eBC and $PM_{2.5}$ is surprising; does this imply that the PAX measurement station is upwind of the bulk of traffic in Mexico City? This also suggests that averages of previous eBC measurements taken at different stations may not be comparable to the present site, if there is a strong spatial gradient in concentrations.

Can the authors comment on the general divergence in diurnal profiles BC, $PM_{2.5}$, and SSA? Given the debate about the "lensing effect" of scattering components of $PM_{2.5}$ on the absorption of light by BC, is it surprising that the SSA decreases with the formation and condensation of photochemical oxidation products in the afternoon? For instance, Johnson et al. (2005) found that BC particles were rapidly coated by ammonium sulfate in the Mexico City (MC) urban environment, while Adachi et al. (2010) estimated the observed internal mixing configurations in particles from MC would have a weaker lensing effect than typical core-shell models.

Johnson, K. S., Zuberi, B., Molina, L. T., Molina, M. J., Iedema, M. J., Cowin, J. P., Gaspar, D. J., Wang, C., and Laskin, A.: Processing of soot in an urban environment: case study from the Mexico City Metropolitan Area, *Atmos. Chem. Phys.*, 5, 3033-3043, doi:10.5194/acp-5-3033-2005, 2005.



ACPD

15, C4505–C4507, 2015



CC BY

Adachi, K., S. H. Chung, and P. R. Buseck (2010), Shapes of soot aerosol particles and implications for their effects on climate, *J. Geophys. Res.*, 115, D15206, doi:10.1029/2009JD012868.

Minor comments:

Figure 4 and 5: lines should not be connected since the data presented is not necessarily sequential.

Figure 7a and b: the difference in units between the two figures is not explained.

The seasonal differences would be made clear if precipitation and temperature for are also included in Figure 7.

Was there a size-selective inlet on the PAX? Presumably the bulk of black carbon mass is less than $PM_{2.5}$, but may be worth mentioning as they are directly compared with each other.

p. 12561, line 9-11. strange wording: "The very long integral time scale is connected to the same secondary processes that led to the greater than 10h time scales for the eBC and $PM_{2.5}$ (Fig. 11b)."

p. 12561, line 14-16. "The correlations are higher in the dry months than in the rainy season because of the additional contribution of light scattering particles formed under conditions of high humidity." This wording is also not very clear, and would benefit from explicit mention of the components contributing to light scattering. This is both due to chemical products of aqueous-phase uptake and reaction and also water itself?

Figure 8 $y$-axis labels are not formatted correctly.

p. 12543, Johnson et al. 2007 should be Johnson et al. 2005

---

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 12539, 2015.





CC BY