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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Primary and secondary contributions to aerosol light scattering and absorption in Mexico City during the MILAGRO 2006 campaign" *by* G. Paredes-Miranda et al.

Anonymous Referee #1

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This manuscript summarizes aerosol optical measurements from the MILAGRO field campaign and correlates the optical changes to formation of secondary aerosol through photochemical processes. The data are well presented and the analysis of the data to extract fractions of aerosol scattering and mass is unique. I believe the manuscript could be improved by adding and assessing the uncertainties within the measurements and derived parameters. Most comments below are related to adding and assessing uncertainties. The correlations between measured parameters are robust and so this would be an appropriate data set to assess measurement uncertainties.

Specific comments:

* P16956, Section 2.2. Please include estimates of measurement uncertainty for all of the instruments used.

* P16957, Line 1- 5. What wavelength dependence for absorption do you apply to convert from 520nm to 532nm? The choice isn't critical, just curious as to the number and justifications. In converting the Aethelometer mass back to absorption, what is an appropriate uncertainty range? It seems like a rather uncertain transformation process.

* 16957 Line 10. What collection efficiencies were applied to the AMS data and were they based on determinations from this field campaign?

* Figures 1 and 2. Why not report data at 1 standard wavelength? Conversion to 532nm should be available. I am confused as to what wavelength the Aethelometer data are reported. The text says there is a conversion from 520nm to 532nm but the figure has both.

* Figure 4. Can you put uncertainty bars on the SSA or mention the propagated uncertainty in this value?

* P16959 Line 14. There are several references to photochemically generated SOA. I believe this mechanism in explaining much of the data and the latter section on fraction of secondary contribution demonstrates this nicely. I would make a reference early on to say that you investigate the contribution of secondary processes. The last paragraph of the introduction may be the best location for this statement.

* Figures 3 and 4. The darker shaded regions for nighttime should have more contrast.

* P16959 Line 14. The McKomiski work demonstrates that SSA uncertainty is a large uncertainty in radiative forcing calculations. Can you demonstrate your SSA uncertainty (ideally on the figure and in the text) and comment if your measurements will help in this regard?

* P16960 Line 3. "our 2006 study" should refer to this manuscript. It sounds like there is some other body of 2006 work.

ACPD

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Interactive Comment

* P16960 Line 10. Uncertainty for the mass scattering efficiency? I think it is necessary to put uncertainties on all derived parameters to get a sense of the measurement uncertainty relative to the absolute change you are reporting (i.e. for SSA and mass scattering efficiency).

* Figure 7. The sigma values have a lot of variation and a significant drop at about hour 12 for 2 hours. Is this drop real? Is there a change in meteorology that accounts for a different air mass at that point or are we looking at measurement variability?

* P16960 Line 21. An MAC number of 8.8 m2/g was derived from Las Vegas data. Does this represent the data from Mexico City? I assume it indicates some form of processing if an MAC for fresh soot is ˜7.5 m2/g?

* P16961. I like the analysis of the fraction of scattering and mass from secondary processes. However, as the authors point out there is some uncertainty here. I am curious as to just how much there is. When all of the uncertainties are propagated through I feel that this could be rather large. This does not take away from the analysis however it must be presented with necessary uncertainty. I am also not 100% clear on the definitions for this analysis. The background aerosol prior to initiation of photochemical processes will dictate the fractions of primary vs secondary. Do you suspect that the conditions you sampled under are representative of the primary background? You assume that secondary contribution only results from a single photochemical cycle right? There are a number of variables that will determine your background. Primary emissions vs second-day carry over vs rain out vs differences in boundary layer dynamics.

* Figure 9. The percentage difference between the two goes from +15 % to -10%. This is really a change of -25% right?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 16951, 2008.