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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Microscopic characterization of carbonaceous aerosol particle aging in the outflow from Mexico City" *by* R. C. Moffet et al.

Anonymous Referee #2

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Review of "Microscopic characterization of carbonaceous aerosol particles aging in the outflow from Mexico City" by Moffet et al for ACPD

The authors describe the analysis of single particles by PIXE, electron and X-ray probes. Almost all of the analysis is for March 22, a Lagrangian transport day where material collected at surface sites T1 and T2 is plausibly related to that measured at T0. There is much to be learned by looking at the morphology and composition of individual particles and the authors make good use of their techniques. I was particularly impressed by SEM/EDX data in Fig. 4 showing inorganic particle cores surrounded by carbonaceous material. There is still a disconnect between single particle and bulk

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properties but I sense that the gap is closing.

The article is very close to publishable as is. But please give some consideration to the comments below.

General Please check to see if the acronyms for all analytical techniques have been defined.

Judging from Fig. 1, transport is not from T0 to T1 to T2. Just the mention of Lagrangian transport conveys that impression.

It would be useful to refer to published CTM calculations and (if available) PMF analysis to identify March 22 as a day with low or high biomass burning impacts.

Are the particles with inorganic cores surrounded by carbon containing material due to transport from the Tula complex followed by condensation of OA? A more easily answered question is whether this morphology occurs only when there is transport from Tula to T0.

Can conjugated double bonds be differentiated from isolated double bonds?

In the NEXAFS analysis, can anything be said about the distribution of locations of the "EC phase"?

Specific Page 17000, line 24-25. 500 um by 500 um spot resulting in 3 hour resolution. Is this the amount the TRAC sampler advances in 3 hours?

Page 17001, Sec 2.3.4 STXM/NEXAFS How many particles were analyzed? Is the number similar to 25-35K analyzed by SEM? If much smaller, are there concerns about sampling statistics?

Page 17002, line 21-22. "PIXE and SXRF data confirmed that particles from the same source were sampled..." How so? A distinctive combination of trace elements or a more general urban signature?

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Page 17003, line 5-6. “O3(32 ppb) and SO2 (125 ppb) maximum concentration were not abnormally high on this day” The ozone concentration is implausibly low unless something very strange was happening locally. 125 ppb is a very high SO2 concentration. A few percent oxidation would make sulfate the dominate aerosol species whereas in actuality it is about 10% with a wide spread regional distribution.

Page 17003, line 20-23 “highest carbon concentrations occur at the particle edges” This is a very interesting finding. Fig. 4 presents an x-y two dimensional view. In a three dimensional view, could the carbon in the middle (0.5 relative position) be explained by the carbon in the z direction above and under the core?

Page 17007, line 2-3. What is the possible connection between the increase in homogeneous OC particles and high sulfur concentrations?

Page 17008, line 7 “five analyzed samples” It would help the reader to specify that “samples” refers to 1 at T0, 2 at T1, and 2 at T2.

Fig. 5 I cannot distinguish blue from green on the on the STXM images (at ACPD resolution). Are the aerosol particles in the image subject to the criteria that they be bigger than 0.35 um to be identified? The number distribution peaks at smaller size but I don’t see evidence of it in the picture.

Fig. 9 Trace species cannot be seen in figure at ACPD figure resolution.

Fig. 11 Same question as for Fig. 5. Is the size spectra limited by a 0.33 um cutoff for computer identification?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16993, 2009.