

Interactive comment on “Fast airborne aerosol size and chemistry measurements with the high resolution aerosol mass spectrometer during the MILAGRO Campaign” by P. F. DeCarlo et al.

Anonymous Referee #1

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This manuscript reports aerosol and supporting trace gas measurements from the C130 aircraft during the MILAGRO field campaign. The centerpiece of this study is the high resolution AMS with many findings of general interest reported here in the context of measurements in and downwind of Mexico City. Results on the changing O to C ratios could not be obtained without high mass resolution capability. Data quality as judged by comparisons between the AMS, nephelometer, and SMPS is excellent. The paper is well written and I recommend publication after the following comments are considered.

General comments: The reader needs to know more about the flights and the data set

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used in this study. Does the data set include free tropospheric air. It looks like it might from Fig. 6. If so, how does this effect results such as the pie diagrams in Fig. 3. Time of day is an important parameter, especially for the near city observations – less so for plumes that are more than 1 day old. Information on chemical conditions corresponding to the 3 C-130 pie charts (Fig. 3) would serve to put the aerosol observations in perspective. Aside from the comments above, I think that the authors have done a good job in constraining the material presented. There are obviously many more features of the AMS data set that could be written about. Here we have some select topics. I look forward to additional publications from this group.

Specific comments: Abstract line 5-6 need to be re-worded. "... the first aircraft deployment of the HR-ToF-AMS, in which the instrument performed very well ...", implies that there were other deployments in which it did not perform well

p 18280, line 1 CE for AMS was assumed to be 0.5 Whether or not this value was assumed according to literature references, it would be useful to alert reader to the instrument comparisons in Fig. 2.

p 18284 line 18. Primary organics are higher in the evenings, nights, and early mornings. Does this out weigh the higher SOA in photochemically active periods?

p 18285, line 24 and Figure 5. The ratio of organic and nitrate aerosol to excess CO is presented. How is excess CO defined? How sensitive are results to the definition? At 600 km downwind of Mexico City is there sufficient "excess" CO to give a robust result?

p 18288 Discussion of vertical profiles downwind of volcano. Text says that profiles were made in the same area. Are there differences in exact location, wind speed, or trajectory that yield a difference in atmospheric processing time?

p 18288 Figure 8 shows that O/C ratios increase with distance from Mexico City. The explanation of addition of SOA makes sense. But Fig. 5 shows that, if anything, OA/CO decreases with distance from the City. Can these observations be reconciled?

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p 18289 line 22 "formation" should specify what is being formed.

p 18290 O/C ratio approximately 0.55 tied to late arrival of C-130 into the city. Reader needs to know altitudes and times.

p 18291 Discussion of research flight 2. A map would be useful. Is time on the axis in Fig. 11, UTC? It would be useful to identify time of day in text.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 18269, 2007.

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