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Interactive comment on “Mexico City aerosol analysis during MILAGRO using high resolution aerosol mass spectrometry at the urban supersite (T0) – Part 1: Fine particle composition and organic source apportionment” by A. C. Aiken et al.

Anonymous Referee #3

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Summary

In their manuscript, Aiken et al. provide an extensive description of High-Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS) measurements and analysis of the composition of particulate matter present in the atmosphere at the T0 urban supersite in Mexico City during the MILAGRO field campaign in March 2006. This is one of the first reports of urban aerosol analysis using the HR-ToF-AMS and compares

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the results from that instrument with measurements made by more conventional fine aerosol instrumentation such as an SMPS, an aethalometer, a nephelometer optical particle counters and filter samples for elemental and organic composition analysis. The high resolution mass spectra are analyzed using Positive Matrix Factorization to understand the apportionment of organic aerosol (OA) matter, leading to better understanding of sources and aerosol aging processes. A new technique of extracting elemental composition from OA data was applied as well. The comparison of PMF components from this data set and previous AMS PMF analyses was well-done and adds significant understanding of the utility of PMF, as does the use and analysis of tracer compounds. This extensive set of measurements and analysis is applied to the complex and significant role of fine particulate matter in the poor air quality in Mexico City due to numerous and varied emissions sources. The comprehensive review and comparison of results presented in this manuscript to existing emissions inventories provide fresh insight into the sources and evolution of the particulate air quality issue in Mexico City and other mega-cities in general and is highly recommended for publication in ACP.

General Comments

Page 8384, line 21

The authors missed an opportunity to contribute to the understanding the role of collection efficiency (CE) in HR-ToF and other AMS data. Although CE was briefly mentioned and referenced, a detailed investigation into possible variations of CE and correlations with other measurements would have been extremely useful.

Page 8389 line 12-16

A quantification and perhaps a plot of the improvement in NH_4^+ measurement noise would have been illuminating. Given the possible importance of organic nitrates, further discussion and quantification of their contribution would have been valuable.

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Minor Comments

Page 8390, line 22

A more detailed discussion of the differences in non-refractory mass between aircraft and ground data would be helpful.

Page 8399 – sec 3.2.3

More explanation of the significance of OA/ Δ CO plots would help

Page 8402 line 4

The reference to possible differences in relative ionization efficiencies or CE's underscore the need for further analysis and discussion in these areas

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9, C1740–C1742, 2009

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