Atmos. Chem. Phys. Discuss., 13, C4896–C4898, 2013
www.atmos-chem-phys-discuss.net/13/C4896/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Secondary organic aerosol formation and primary organic aerosol oxidation from biomass burning smoke in a flow reactor during FLAME-3" *by* A. M. Ortega et al.

Anonymous Referee #1

Received and published: 17 July 2013

This paper presents measurements primarily from the high resolution AMS on several burns from the Missoula Fire Lab using the Potential Aerosol Mass flow Chamber. An important finding from this study is that the enhancement ratio for wildfire smoke decreases with increasing POA concentrations, providing an explanation for the variety of recent field observations of OA from wildfire plumes. This paper characterizes wildfire smoke using current AMS analysis techniques (elemental analysis, f44 vs f43, and f44 vs f60 plots) and provides a technique for correcting the AMS unit mass resolution fragmentation table for instances when organic mass is high and sulfate mass is low. Using the PAM chamber provides an upper limit of SOA mass expected from wildfire

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

smoke, and thus these results will constrain how SOA from wildfire sources in models is evaluated.

After the comments below are addressed, I recommend this paper for publication in ACP.

Comments:

Page 13801, Line 14: "This study confirms that the net SOA to POA ratio of biomass burning smoke is far lower on average than that observed for urban emissions." To this I would add the discussion that the ratio of net SOA to CO can be similar for both sources, as noted on page 13826, Line 14, since this ratio is what is often reported.

Page 13808, Line28: "Although the AMS samples particles 107 times more efficiently than gases. . ." please provide reference.

Page 13809, Line 23: Why not consider using Argon at m/z 40 as ion for the airbeam correction? Was there organic interference at m/z 40 also?

Page 13810, Line 7: This comment is regarding the choice of CE of 1. For the concentrations of POA up to 104 μg/m3, it seems unlikely that the AMS could accurately quantify all of the aerosol. For the times during the high organic loadings (say for 1,000 μg/m3), does the closed signal go to zero? Do the filament and/or heater properties inside the AMS change?

Page 13810, Line 18: Why not also include Na+?

Page 13816, Line 18: ". . .that leads to evaporation of particle-phase species. . ." it would be nice if a future paper incorporated size resolved data to confirm evaporation of the particle distribution. With such high loadings, processing of particle time-of-flight AMS data would seem possible. It is not necessary for the scope of this paper.

Page 13817, Line 15: "Most ER were reproducible within. . .although a few showed more variability." Can you make a hypothesis as to why there was variability?

ACPD

13, C4896–C4898, 2013

Section 3.2: Why is the concentration of initial POA higher for some burns rather than others? Perhaps the modified combustion efficiency was different? Does the initial CO (g) trend with initial POA level? If you plot 8b versus initial CO instead of initial POA does it show the same trend?

Figure 4: There is an overlap in the axis for b.) and c.)

Figure 5: Please check the legend for part a.). It looks like the aged and unprocessed have been mis-labeled in the legend.

Figure 9: The axis is overlapping on the Ponderosa Pine data

Supplemental Material Comments

Page 1 Line 22: Please reference Figure S3 for the C4+ to SO+ ratio as a function of organic mass loading.

Figure S5. Is some of the CO+ possibly from gas-phase CO? The correction for CO2+ gas-phase interference is discussed in section 2.3, but what about for gas-phase CO?

It would be nice to see a plot of O:C vs f44 for all of the burns with regressions to see if the different fuels produce difference regressions.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 13799, 2013.