

Interactive comment on “Aircraft Observations of Aerosol in the Manaus Urban Plume and Surrounding Tropical Forest during GoAmazon 2014/15” by John E. Shilling et al.

Anonymous Referee #2

Received and published: 8 April 2018

This manuscript reports observations from an aircraft study over Manaus, Brazil. The discussions mainly focus on the chemical evolution of aerosol particles in the Manaus plume sampled on March 13, 2014 as it was transported to the surrounding and nearby Amazon tropical rainforest. A particularly interesting observation is that $\Delta\text{org}/\Delta\text{CO}$ ratio stayed nearly constant in the Manaus urban plume although OA oxidation increased continuously during aging. The G1 measurement data from the GoAmazon campaign are very rich and this manuscript provides new and timely information on aerosol particles from an important, but poorly studied, environment. The finding of no net SOA formation in fresh urban emissions that is different from most published results on urban outflows is unique and may motivate future studies. Overall, this manuscript is

C1

worthy of publication and ACP is a suitable journal for it. Following are some detailed comments.

The overview of the G-1 aerosol data is a bit cursory. The discussions could be expanded a bit more and other measurement results are incorporated to give a more in depth view about the atmospheric characteristics and seasonal differences. For example, the authors could consider adding other measurement data on Fig 2 and discuss them in connection with the AMS aerosol data. In addition, in section 3.1, more background information on the dry and wet seasons may be necessary to establish the purpose and the significance of the comparison.

More detailed diagnostic information should be presented to confirm the PMF results.

For the finding of constant $\Delta\text{org}/\Delta\text{CO}$ and increasing aerosol oxidation in an aging urban plumes, one question is the behaviors of VOCs according to PTR-MS measurements? Was the March 13 flight an isolated case or is the phenomenon more general for the Manaus emissions? What are the Δorg vs ΔCO values for other flights? How do they compare? Are there seasonal differences?

1. Page 5, line 15, what does the “13s data sampling interval” correspond to? was the AMS operated under the standard MS mode (equal chopper-open and closed positions) or the fast sampling mode typically used for aircraft sampling?
2. Page 5, line 28, what's the m/z range for the PTR-MS measurement?
3. Page 6, line 1, define E/N.
4. Page 6, what's SAMBBA?
5. Page 6, line 31, mention the year and month for the Chen et al. study.
6. Page 7, Line 13, are there diurnal mixed layer height data to justify the usage of 700 m?
7. Page 7, line 18, what does 'sources' mean in this context?

C2

8. Page 7, line 22, what does “aircraft product distribution’ mean?
9. Page 7 line 24, “suggests”
10. Page 7, line 30 - 31, was biomass burning influence detected during this study? What are the evidences? The citations were clearly not from Go-Amazon 2014/15.
11. Page 7, line 32, spell out MSA.
12. Page 8, line 1-2, give citation.
13. How well is the correlation between IEPOX-SOA and m/z 82?
14. Page 10, line 5, “this date”
15. Page 10, line 15 – 16, might be useful to report the correlation coefficients.
16. Page 10, line 18, clarify the meaning of “transformation of HOA to SOA/OOA”, e.g., through what mechanisms. Is oxidized POA counted as SOA?
17. Page 10, line 23 - 24, this sentence is vague. What chemical mechanism?
18. Page 10, line 26, limit of detection for IEPOX SOA was mentioned. What’s the value and how was it determined?
19. Page 11, line 5 -9, how was Δ_{org}/Δ_{CO} determined, through background subtraction or linear fit? Either way, please provide details, e.g., the choice of background values or quality of linear fit etc. Consider to move some information in the supplementary to main body of the manuscript.
20. Page 12, line 14 – 15, change “occurring” to “is occurring”.
21. Page 13, line 18, speaking of sulfur emissions and oxidation of compounds such as DMS, it would be necessary to check for the presence of methylate /MSA in particles. BTW, DMS should be defined.
22. Page 14, line 5, it is not that aerosol composition “did not change” but rather “did

C3

not change significantly”.

23. Figure 1, consider to mention in the figure caption the duration of the flight.
24. Figure 2, how were the average pie charts calculated, straight averages of the fractions or mass weighted averages?
25. Figure 4, What are the aerosol species concentrations, same as mentioned in Fig. 2 (23C and 1 atm)?
26. According to Figure 4, the time series of O₃ and CO appear to correlate quite well. Figure 5 shows that HOA and OOA go up and down together as well. It would be interesting to know the cross correlations between OOA, HOA, CO and O₃.
27. Figure 5, was NO₂ measured? How does Ox time series look like?
28. Figure 6, consider to add error bars for the data.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-193>, 2018.

C4