Atmospheric
Chemistry
and Physics
Discussions

Open Access

Interactive comment on "Investigating types and sources of organic aerosol in Rocky Mountain National Park using aerosol mass spectrometry" by M. I. Schurman et al.

Anonymous Referee #1

Received and published: 2 September 2014

This manuscript reports the characterization of submicron aerosols with an Aerodyne HR-ToF-AMS at a remote site in the Rocky Mountain National Park (RMNP) in summer 2010. By applying PMF to the organic aerosol mass spectral data, the authors identified three OA factors, including a low volatility OOA that correlates with sulfate, a semivolatile OOA that correlates with nitrate, and a local BBOA that shows enhanced signal at m/z 60 and 73 in the factor mass spectrum and appeared to be related to campfire burning. The sources of the particles at RMNP are discussed based on particle composition, size modes, and meteorological measurements. The authors also mentioned that the results of this study appear to be representative of typical summer-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

time condition at this location according to historical measurement data in this region. This work provides important, new information about aerosol chemistry and sources at a background site in the Front Range area. The work is carefully conducted and the manuscript well written. The scope of the work also fits well to ACP. I thus recommend publication on ACP after the authors respond to the following comments.

A main portion of this manuscript deals with organic factors determined from PMF analysis of the AMS organic matrix and the usage of this information to interpret aerosol sources. However, some aspects of the PMF results are questionable. For example, The Q/Qexpected values (Fig. S1) are much lower than 1, suggesting an overestimation of the errors. The SV-OOA and BBOA factors are very similar, in terms of both mass spectra and time series. A large fraction of the m/z 60 and 73 signals goes to the SV-OOA factor. All of these suggest factor mixing. Recombining factors from the solution of a larger number of factors seems promising, but more information should be given. It is important to show the mass spectra and time series of the 6 factors and offer details on how the recombination was performed. How do the BBOA* calculate from recombining the 6-factor solution compare to BBOA from the 3 factor solution?

Detailed comments:

The abstract and the summary both make references to historical measurement, it will helpful to give some details.

Page 19878, Line 1, replace Zhang et al. 2005 with Zhang et al., 2011.

Page 19879, line 9 -10, it says "a DMPS study-average submicron size distribution shows that the AMS aerodynamic lens transmits $\sim$ 98.7% of submicron mass". What is 98.7% corresponding to? How was this determined? Note that the AMS lens transmission is size dependent.

Page 19880, give information about how CPF is performed.

Page 19880, line 22, saying that the sulfate "timeline less featured" is vague. Please

be specific.

Page 19909, Figure 5, it will be interesting to add the ratios of other elements too, e.g., C/H, C/N.

Page 19883, line 22 -25, the logic is not clear – why is the fact that S(VI) species result from S(IV) oxidation the reason that particles containing sulfate have been subject to advanced oxidation?

Page 19884, line 3-4, if thermal partitioning is the reason for LV-OOA increase at night, why nitrate does not show the behavior? In fact, all OA factors increase at night, suggesting a BB influence that "contaminates" the OOA factors.

Page 19885, line 26, what does "arbitrary" mean?

Page 19886, the organic nitrogen results are very interesting. It might be interesting to report the comparison of the AMS total CHN signal to the total WSON measurements from PILS, e.g., correlation coefficient and scaling factors etc.

Page 19889, line 9-10, it is helpful to show the size distribution image results in the supplementary.

Figure 5, the huge m/z 29 peak in the BBOA factor is strange.

Figure 10, the purple trace on NO3 plot is hard to see.

Figure S3, how do the time series of the two OOA factors derived from data with f60<0.003 look like? What are their correlation behaviors with nitrate and sulfate?

Figure S4, is this the solution of PMF performed on the entire org. matrix?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 19875, 2014.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper