Response to reviews

Reviewer comments are in **bold**. Author responses are in plain text labeled with [R]. Line numbers in the responses correspond to those in the discussing paper. Modifications to the manuscript are in *italics*.

Reviewer #2

This manuscript reports a thorough study on the characterization of different organic aerosol types using a ToF-ACSM equipped with a capture vaporizer. An important finding from this work is that the POA marker ions identified previously by the standard vaporizer (SV) instruments are valid for the CV instruments and that aerosol mass spectrometers equipped with CV may provide improved mass quantification as well as robust aerosol source apportionment capability in urban areas. This work is of high quality and the paper is well written. I recommend acceptance for publication on AMT after minor revisions.

[R0] We thank reviewer #2 for the constructive suggestions. Detailed responses are given below.

1. Line 92, assigning *m/z* 55 to cooking seems questionable as *m/z* 55 has significant contributions from different types of OA, including combustion POAs and SOA.

[R1] We agree with the reviewer and have revised the statement as follows in Line 94-95: "*Marker ions that are widely used to indicate different types of OA in the analysis of SV spectra have much greater signals in the exhaust spectra than in the spectra of background air. For example, high abundance of serial alkyl fragments (e.g., m/z 57) for vehicle, high f_{55}/f_{57} ratio for cooking, and high peaks at m/z 115, 128, 152, 165, 178, and 189 (i.e., fragmented polycyclic aromatic hydrocarbons (PAHs) ions) for coal combustion, are strongly present, which is in line with previous studies.*"

2. Line 140, were the UMR and HR data from LTOF-AMS used together or separately for PMF analysis? What's the reason for not using organic ions between 12-19 in the PMF analysis?

[R2] The UMR and HR data were used separately for the PMF analysis. We have clarified in Line 144-145 as "*For the LTOF-AMS, the UMR and high-resolution (HR, a mass resolution of >5000) data were used separately in the PMF analysis.*"

As explained in the response [R1] to Reviewer#1, we did include *m/z* 12-19 in the PMF analysis. The mass spectra were shown for *m/z* above 20 because of the space limit. The manuscript has been revised to clarify the range.

3. The paragraph starting at Line 228, how likely was the discrepancy between the ACSM and AMS chloride due to the low mass resolution of ACSM? Was C_3^+ contribution at *m/z* 36 properly subtracted from the ACSM Chl quantification? How was chloride size distribution shown in Fig. S8 determined? If it was based on the ptof data of *m/z* 36, one needs to be aware of that *m/z* 36 may have significant contribution from C_3^+.

[R3] We did not subtract C_3^+ from the ACSM Chloride quantification as well as the PTOF chloride size distribution in Fig. S8. As shown in Figure 1 below, the LTOF-AMS data indicates that C_3^+ was a small peak and its intensity was about 0.1% of the intensity of HCl^+ at m/z 36 during the measurement period. Therefore, the C_3^+ subtraction is negligible and would not affect the current analysis. We have added the following statement in Line 234-235 for clarification.

"*The signal intensity of C_3^+ was about 0.1% of the intensity of HCl^+ at m/z 36 during the measurement period, which should not affect the chloride quantification in the CV UMR analysis.*"
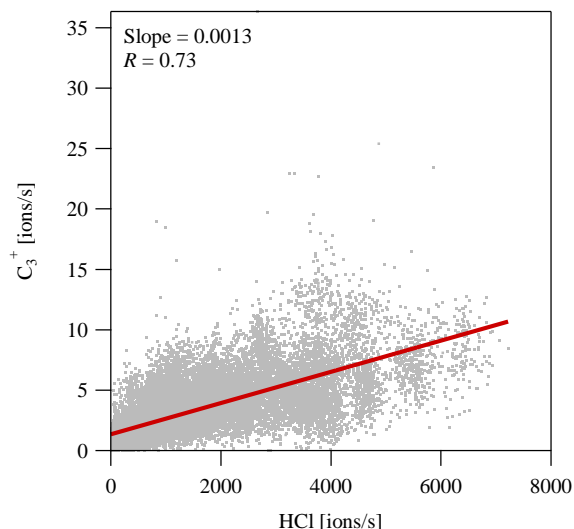
Figure 1. Signal comparisons between C_3^+ and HCl at m/z 36

4. Line 304, it may be helpful that that authors explain the meaning of "related to the mass resolution".

[R4] We have revised the statement in Line 308-310 as "*The slopes between UMR and HR PMF results of the SV data range from 0.66 to 1.16, suggesting that the separate PMF analysis on the same data with different mass resolution may lead to a loading uncertainty of about 20% for primary OA factors and about 40% for OOAs*".

5. Line 304-306, the CV and SV instruments are collocated, thus sampled the same air mass, did not they? Then why is the lower f_{60} and f_{73} in the CV BBOA MS due to aging?

[R5] Yes, the CV-ACSM and SV-AMS sampled the same air mass. However, the CV spectra have much lower f_{60} and f_{73} than the SV spectra due to extensive thermal decomposition. When aging leads to further reduction of f_{60} and f_{73} in both CV and SV spectra, f_{60} and f_{73} become much noisier in the CV than in the SV data and affect the CV PMF analysis. We have revised the manuscript in Line 310-314 to clarify this.

6. Line 316, cite references for the standard PM_1 lens transmission efficiency.

[R6] The reference from Liu et al. (2007) is added.

References

Liu, P. S. K., Deng, R., Smith, K. A., Williams, L. R., Jayne, J. T., Canagaratna, M. R., Moore, K., Onasch, T. B., Worsnop, D. R., and Deshler, T.: Transmission efficiency of an aerodynamic focusing lens system: Comparison of model calculations and laboratory measurements for the Aerodyne Aerosol Mass Spectrometer, Aerosol Sci. Technol., 41, 721-733, 10.1080/02786820701422278, 2007.