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Atmospheric Measurement Techniques Discussions

Interactive comment on "The ToF-ACSM: a portable aerosol chemical speciation monitor with TOFMS detection" *by* R. Fröhlich et al.

Anonymous Referee #1

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Frohlich et al. reported an upgraded version of ACSM (ToF-ACSM) for long-term routine measurements of aerosol composition. The ToF-ACSM was well described and the performance of ToF-ACSM was thoroughly evaluated with various collocated measurements. The results are very encouraging. Compared to previous Q-ACSM, the ToF-ACSM shows higher sensitivity with better detection limit and also the capabilities for organic ion fragment analysis, which, I believe, would have wide applications for the future long-term aerosol composition characterization and organic aerosol analysis, in particular in the environments with low concentrations. This manuscript is well written, and has the potential to be a high impact paper. I recommend it to be published on AMT.

Minor comments:

1. Correct the orders of the figures in this manuscript

2. Page 6792, line 8-9, subscript for the numbers

3. Fig. 3 caption: Should "There is a good correlation between Q- and ToF-ACSM (R2 = 0.80)" be "There is a good correlation between scattering coefficient and mass concentration of ToF-ACSM (R2 = 0.87)"?

4. The aerosol species measurements correlated very well between ToF-ACSM and Q-ACSM (Fig. 8). I suggest the authors to have some discussions on the differences of slopes. Particularly, the slope of nitrate comparison is overall lower than sulfate and ammonium. Because the quantification of nitrate from Q-ACSM might be overestimated due to organic interferences at m/z 30 and 46, while ToF-ACSM appears not have such issue. This might have important implications for many Q-ACSM measurements, especially in the environment with high organics.

5. The mass spectra comparison in Fig. 7 is interesting. It should be noted that the OA mass spectra in the case 1 also shows differences for some m/z's in additional to the naphthalene-related m/z's. For example, the ratios of m/z 43/44 or 41/44, 42/44 between Q-ACSM and ToF-ACSM appear to be quite different. While such differences didn't have a large impact on organic mass quantification, it might significantly affect the future organic aerosol source apportionment analysis. Actually, I am very curious on the comparison of PMF results between Q-ACSM and ToF-ACSM in the authors' future work.

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