Characterization of Organic Aerosol at a Rural Site in the North China Plain Region: Sources, Volatility and Organonitrates

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Text S1. Source apportionment for BC

We can identify BC emitted from traffic emissions (BC_tr) and biomass burning (BC_bb) using the following equations in Sandradewi et al. (2008):

$$\frac{b_{\mathrm{abs}}(470)_{\mathbf{tr}}}{b_{\mathrm{abs}}(950)_{\mathrm{tr}}} = \left(\frac{470}{950}\right)^{-\alpha \mathrm{tr}}, \tag{1}$$

$$\frac{b_{\mathrm{abs}}(470)_{\mathrm{bb}}}{b_{\mathrm{abs}}(950)_{\mathrm{bb}}} = \left(\frac{470}{950}\right)^{-\alpha \mathrm{bb}}, \tag{2}$$

$$b_{\mathrm{abs}}(\lambda) = b_{\mathrm{abs}}(\lambda)_{\mathrm{tr}} + b_{\mathrm{abs}}(\lambda)_{\mathrm{bb}}, \tag{3}$$

$$\mathrm{BC_{tr}} = \mathrm{BC_{total}} \frac{b_{\mathrm{abs,tr,950\ nm}}}{b_{\mathrm{abs,total,950\ nm}}}, \tag{4}$$

$$\mathrm{BC_{bb}} = \mathrm{BC_{total}} - \mathrm{BC_{tr}}, \tag{5}$$

where b_{abs} (470 nm) and b_{abs} (950 nm) represent the aerosol absorption coefficients at 470 nm and 950 nm, respectively, α is the absorption exponent, and λ is the wavelength. The values used for traffic and biomass burning are 0.9 and 1.7, respectively, according to Elser et al. (2016).

*The online version of this article can be found at https://doi.org/10.1007/s00376-020-0127-2.

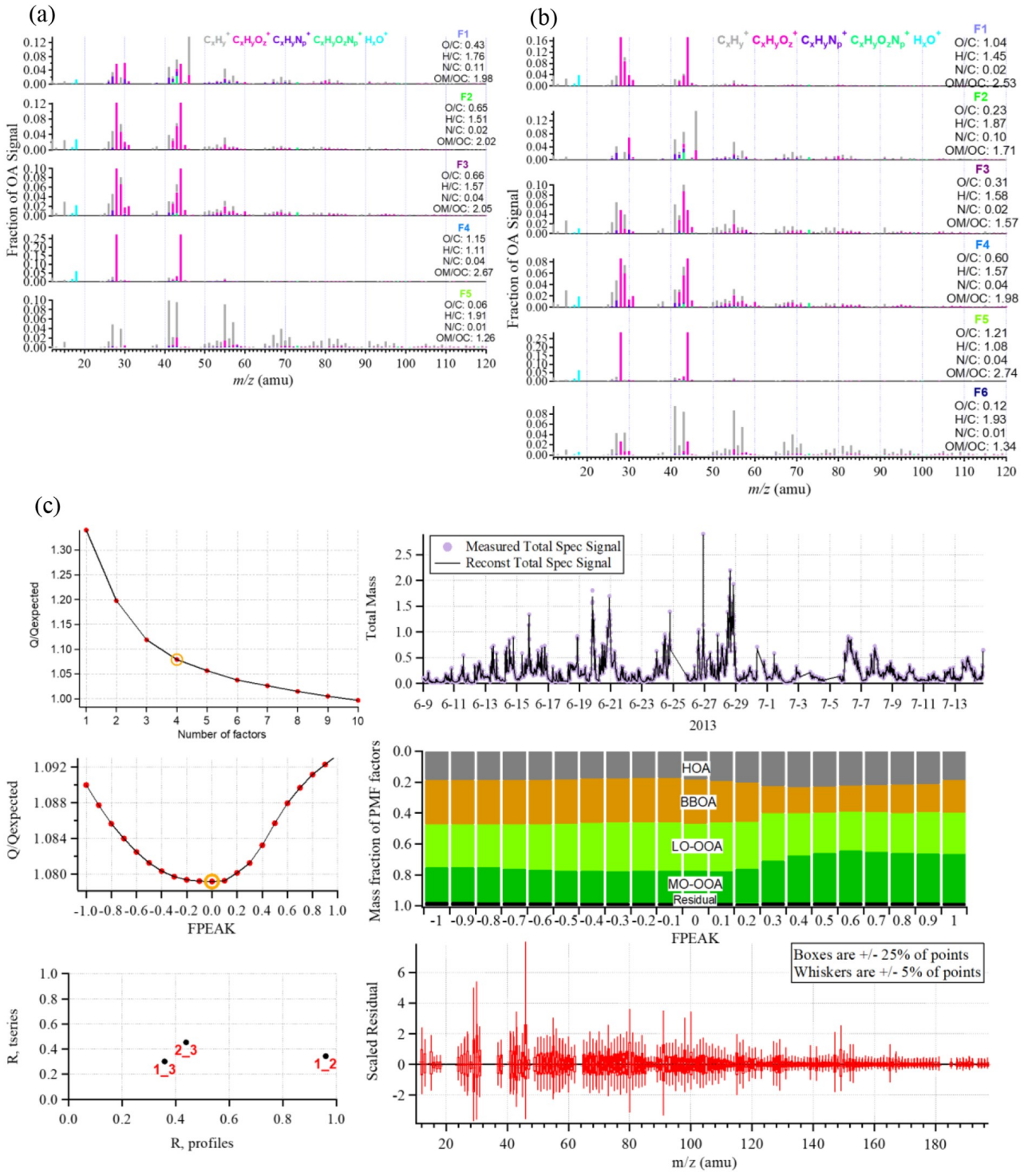

Fig. S1. Mass spectrum profiles of 5 factors (a) and 6 factors (b) based on PMF analysis, and diagnostic plots of the chosen (4 factors) PMF solution (c): (1) Q/Qexp vs number of factors; (2) the time series of the measured and the reconstructed organic mass; (3) Q/Qexp vs. FPEAK for the solution with optimal number of factors; (4) mass fraction of PMF factors vs. FPEAK; (5) correlations of time series and mass spectra among PMF factors; (6) the distribution of scaled residuals for each m/z.

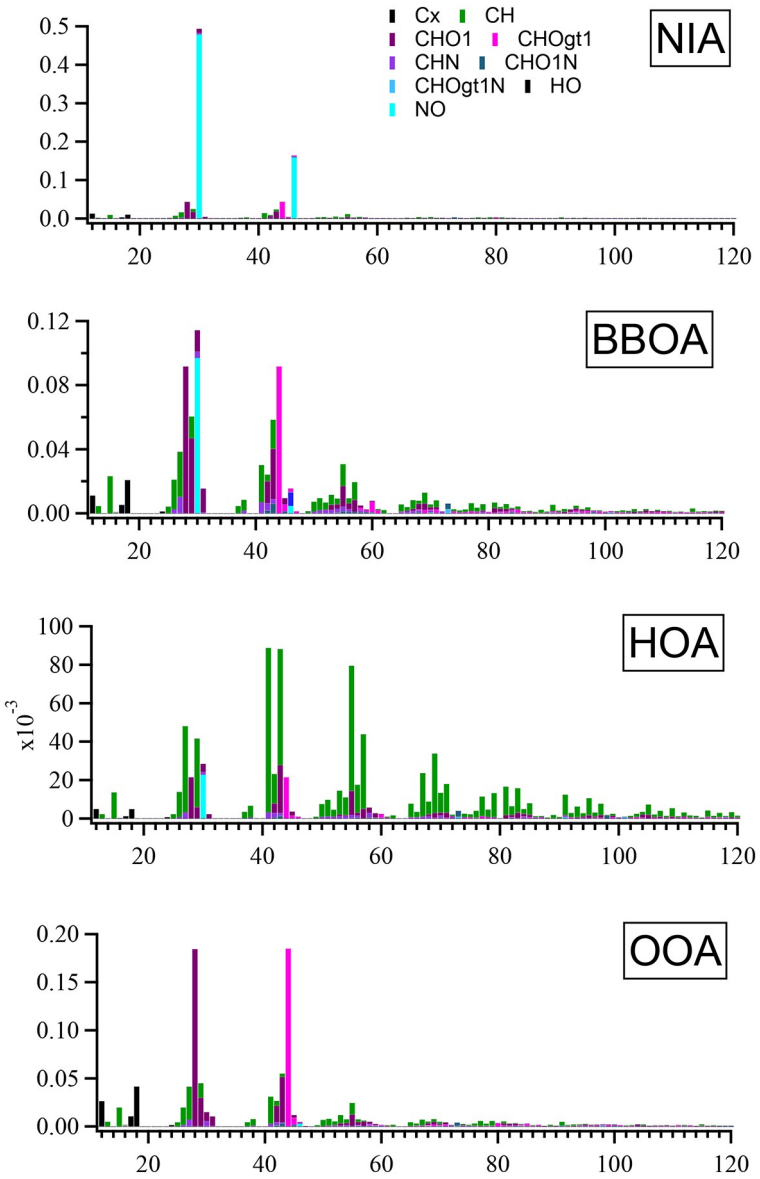

Fig. S2. Mass spectrum profiles of OA factors resolved by the PMF analysis on high-resolution merged organic and NO_x^+ fragments.

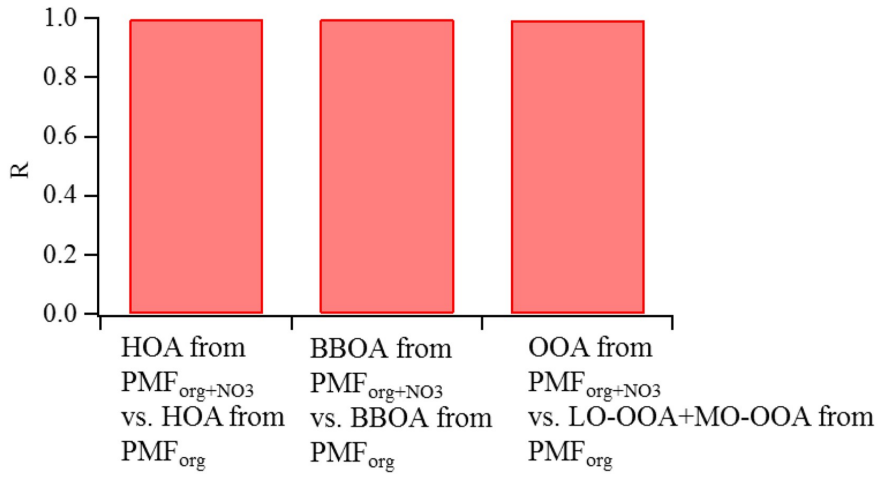

Fig. S3. Correlation coefficients (*R*) between each OA factor resolved from PMF analysis on merged organics and nitrates mass spectrum (i.e., $PMF_{org+NO3}$) and corresponding OA factor from PMF analysis on organics mass spectrum (i.e., PMF_{org}) on time series.

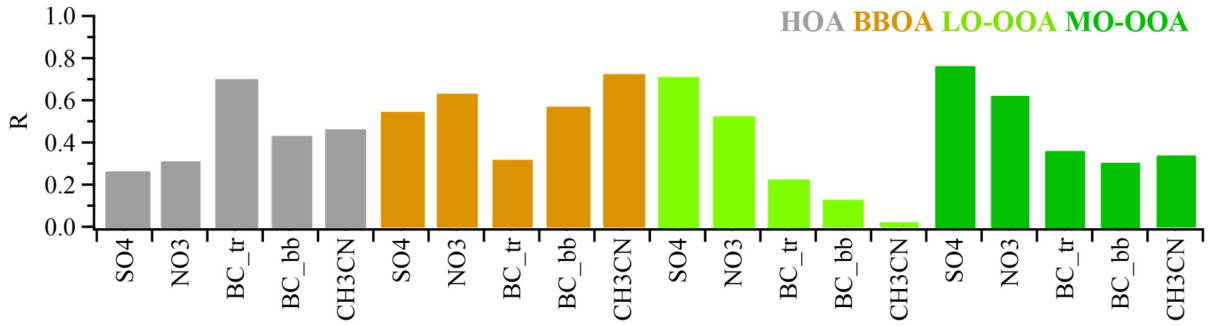

Fig. S4. Correlation coefficients (*R*) between factors resolved from PMF analysis on organics mass spectrum and different tracers.

Table 1. Estimated results of $NO_{3,org}$ at different temperatures using the NO_x^+ ratio and the PMF method and the comparison coefficients between the two methods.

Temperature	NO_x^+ ratio method (μg m^{-3})	PMF method (μg m^{-3})	*R*
50°C	0.31±0.057	0.29±0.041	0.71
100°C	0.22±0.077	0.20±0.031	0.75
150°C	0.14±0.055	0.13±0.038	0.72
200°C	0.14±0.047	0.13±0.039	0.68

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