# Supplementary Information

# Measurement report: Secondary organic aerosols at a forested mountain site in southeastern China

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**Table S1.** Summary of mean mass concentrations (in μg $m^{-3}$) and chemical composition of submicron aerosols measured at selected mountain sites in China.

| **Location** | | **Mt. Wuzhi** | **Mt. Tai** | **Mt. Yulong** | **Mt. Daban** | **Mt. Waliguan** |
|---|---|---|---|---|---|---|
| **Time** | | 3/19/2015–4/15/2015 | 2011 | 3/22/2015–4/14/2015 | 9/5/2013–10/15/2013 | 7/1/2017–7/31/2017 |
| **Org** | Mass | 4.8 | 11.2 | 3.9 | 4.9 | 3.5 |
| | Frac. | 43.8 % | 32.6 % | 68 % | 43.2 % | 38.1 % |
| **$SO_4$** | Mass | 3.4 | 9.2 | 0.8 | 3.2 | 3.1 |
| | Frac. | 30.9 % | 26.7 % | 14 % | 28.2 % | 34.5 % |
| **$NO_3$** | Mass | 0.5 | 7.2 | 0.2 | 1.2 | 0.7 |
| | Frac. | 4.7 % | 20.9 % | 4 % | 10.6 % | 8.1 % |
| **$NH_4$** | Mass | 1.5 | 5.8 | 0.3 | 1.4 | 1.4 |
| | Frac. | 13.7 % | 16.9 % | 5 % | 12.3 % | 15.2 % |
| **Chl** | Mass | 0.03 | 0.95 | | 0.14 | 0.1 |
| | Frac. | 0.3 % | 2.8 % | | 1.2 % | 1.1 % |
| **BC** | Mass | 0.7 | | 0.5 | 0.51 | 0.3 |
| | Frac. | 6.6 % | | 9 % | 4.5 % | 3.0 % |
| **NR-$PM_1$** | | 10.2 | 34.4 | 5.2 | 10.9 | 8.8 |
| **$PM_1$** | | 10.9 | | 5.7 | 11.4 | 9.1 |
| **References** | | (Zhu et al., 2016) | (Zhang et al., 2014) | (Zheng et al., 2017) | (Du et al., 2015) | (Zhang et al., 2019) |

**Table S2.** Summary of main $PM_1$ chemical components, air pollutants, and meteorological parameters (average ± standard deviation) during different periods.

| **Species** | | **Entire study** | **P1** | **P2** |
|---|---|---|---|---|
| | $PM_1$ | 4.45 ± 6.51 | 1.34 ± 0.83 | 9.39 ± 5.57 |
| | Org | 2.01 ± 2.82 | 0.74 ± 0.48 | 4.22 ± 2.54 |
| | $NO_3$ | 1.02 ± 2.38 | 0.13 ± 0.20 | 1.74 ± 1.51 |
| ***$PM_1$ species*** | $SO_4$ | 0.54 ± 0.89 | 0.09 ± 0.10 | 1.54 ± 0.93 |
| ***(μg $m^{-3}$)*** | $NH_4$ | 0.83 ± 2.60 | 0.12 ± 0.10 | 1.01 ± 0.66 |
| | Chl | 0.05 ± 0.20 | 0.01 ± 0.02 | 0.06 ± 0.05 |
| | BC | 0.44 ± 0.36 | 0.25 ± 0.14 | 0.82 ± 0.47 |
| | $O_3$ | 13.70 ± 12.42 | 4.80 ± 4.73 | 15.0 ± 7.15 |
| | NO | 0.55 ± 0.95 | 0.78 ± 1.62 | 0.32 ± 0.09 |
| ***Air pollutants*** | $NO_2$ | 3.45 ± 3.33 | 5.00 ± 4.88 | 2.20 ± 1.03 |
| ***(ppbv)*** | CO (ppmv) | 0.26 ± 0.12 | 0.36 ± 0.09 | 0.26 ± 0.07 |
| | $PM_{2.5}$ (μg $m^{-3}$) | 6.74 ± 7.11 | 2.08 ± 1.67 | 15.27 ± 9.03 |
| | $PM_{10}$ (μg $m^{-3}$) | 15.78 ± 13.23 | NA | 21.19 ± 12.83 |
| | *T* (ºC) | 13.03 ± 6.13 | 11.58 ± 1.92 | 11.93 ± 1.64 |
| ***Meteorological*** | RH (%) | 86.98 ± 16.60 | 100 ± 0 | 93.90 ± 8.11 |
| ***parameters*** | WS (m $s^{-1}$) | 2.42 ± 1.24 | 2.17 ± 1.51 | 3.24 ± 1.83 |
| | *P* (hPa) | 894.28 ± 3.21 | 894.43 ± 1.20 | 893.29 ± 1.07 |

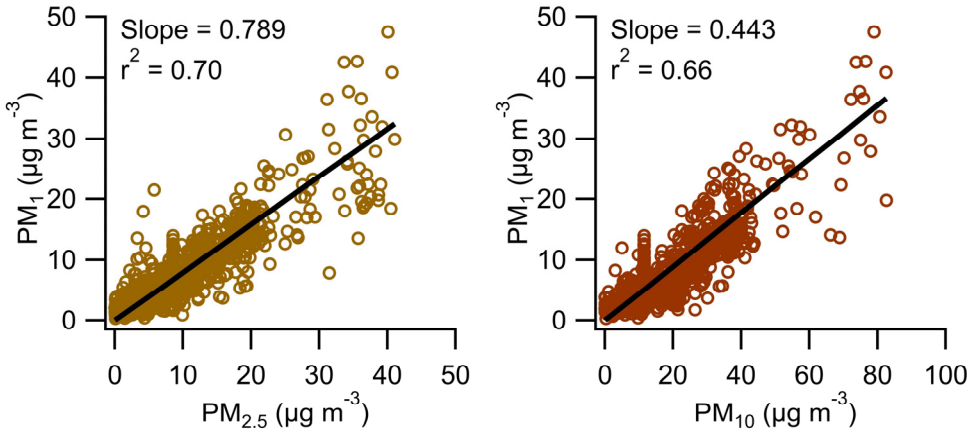


**Figure S1.** Scatter plots of mass concentrations of $PM_1$ vs. $PM_{2.5}$ and $PM_{10}$.

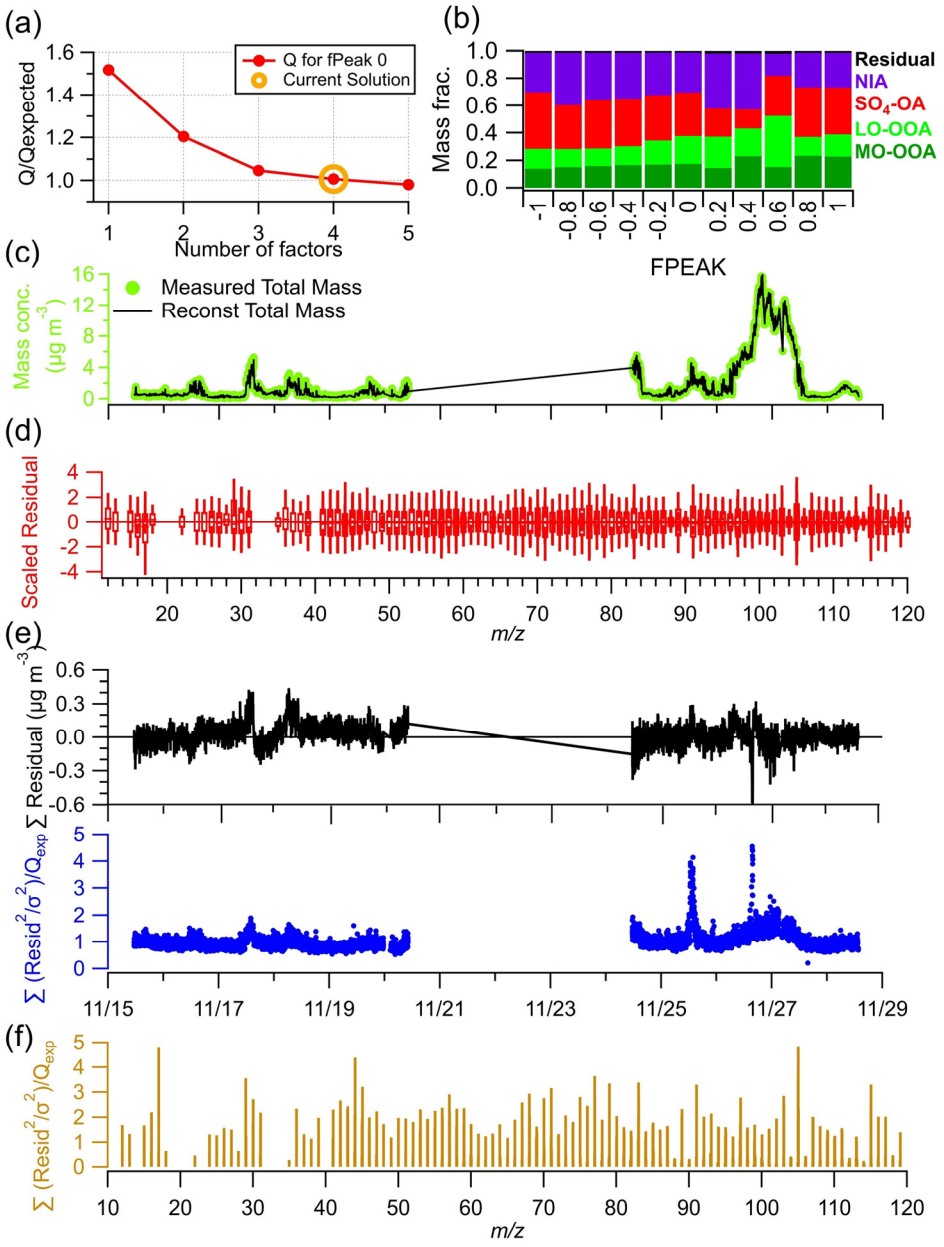


**Figure S2.** Scatter plots of mass concentrations of $PM_1$ vs. $PM_{2.5}$ and $PM_{10}$. PMF key diagnostic plots: (a) $Q/Q_{expected}$ vs. PMF factors at fPeak = 0; (b) mass fraction of PMF factors vs. fPeak; (c) time series of the reconstructed and measured total organic mass; (d) scaled residual for each mass; (e) time series of the residual of PMF solutions and $Q/Q_{expected}$; (f) the $Q/Q_{expected}$ for each mass.

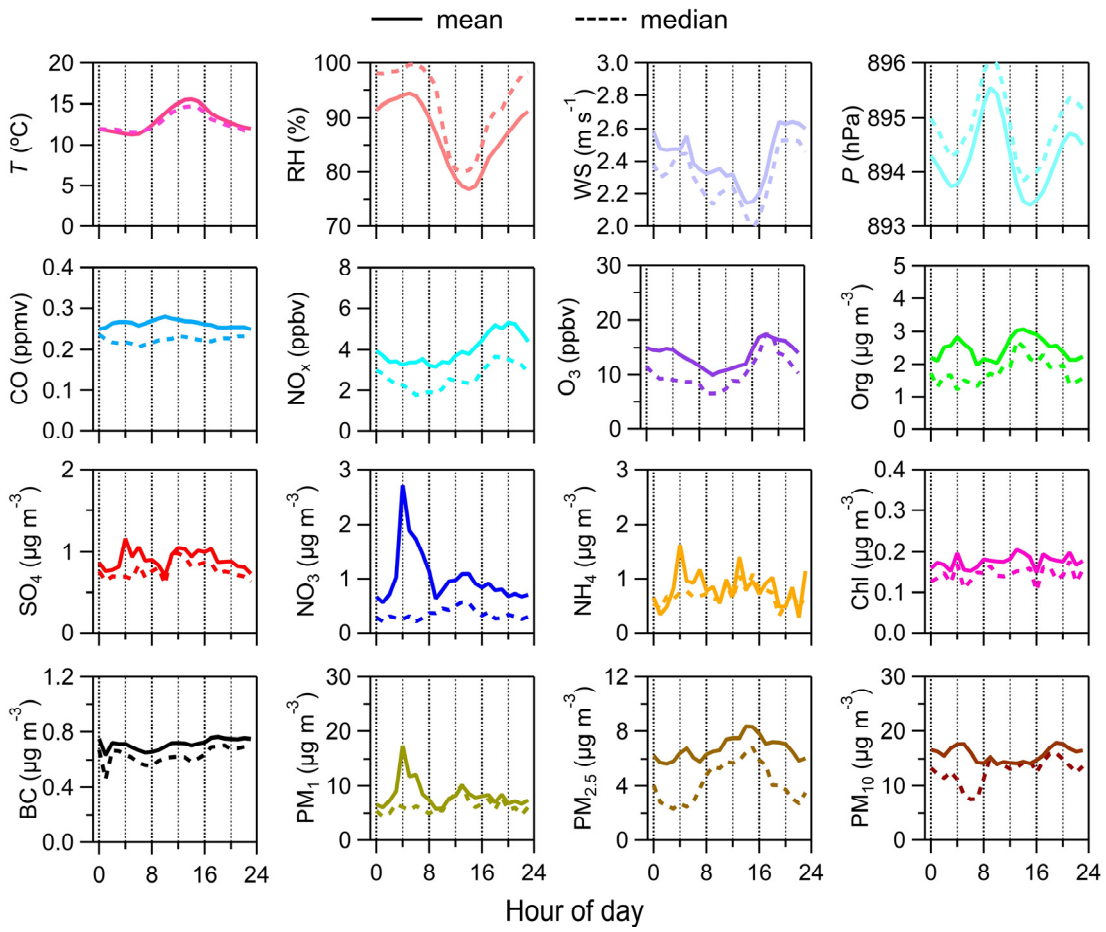


**Figure S3.** Diurnal variations of $PM_1$ species, air pollutants, and meteorological parameters during the entire campaign.

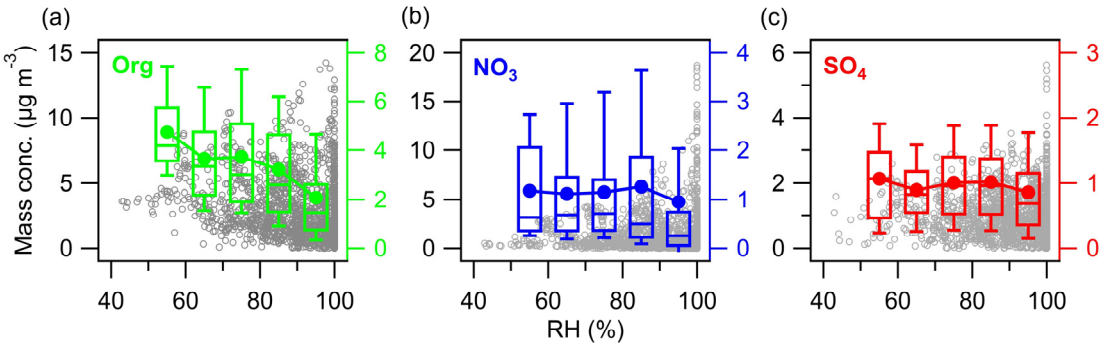


**Figure S4.** Variations of organics, nitrate, and sulfate mass concentrations as a function of RH during the entire campaign. The data points are grouped in RH bins (10 % increment).

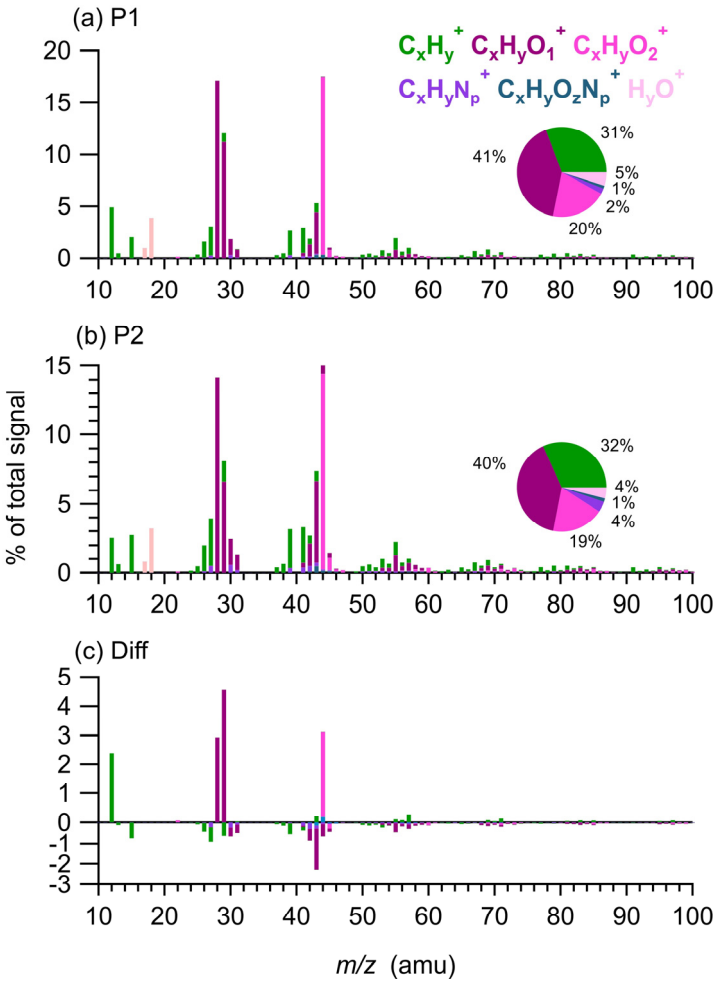


**Figure S5.** The average high-resolution mass spectra of OA sampled at SH site colored by six ion categories during (a) P1 and (b) P2, as well as (c) the difference in these two mass spectra.

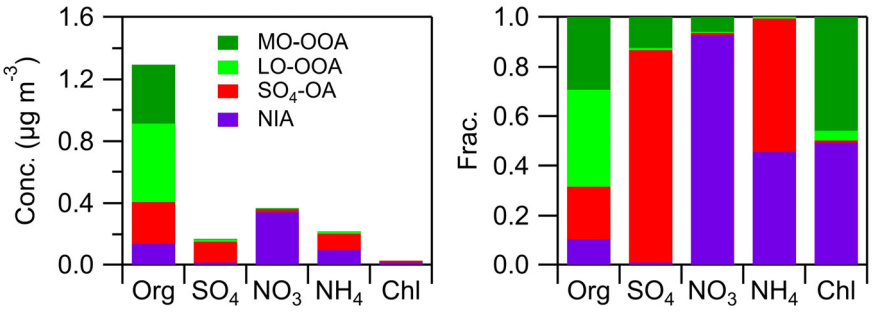


**Figure S6.** Mass concentrations and mass fractions of NR-$PM_1$ species in four PMF factors.

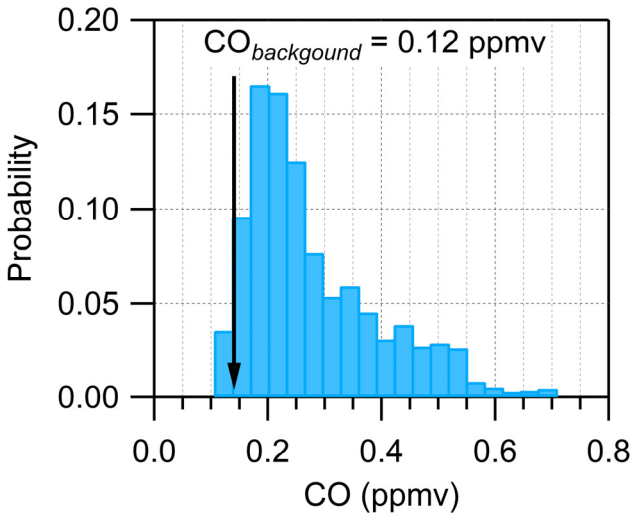


**Figure S7.** Probability distribution of the mixing ratio of CO during the entire campaign.

## References

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