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Simultaneous measurements of particle number size distributions at ground level and 260 m on a meteorological tower in urban Beijing, China

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Table S1. Average CS, number and volume concentrations at 260 m and ground level for the entire study and four periods.

		CS (s^{-1})	$N_{15\text{-}40}$ (cm^{-3})	$N_{40\text{-}100}$ (cm^{-3})	$N_{100\text{-}400}$ (cm^{-3})	$N_{15\text{-}400}$ (cm^{-3})	$V_{15\text{-}40}$ ($nm^3\ cm^{-3}$)	$V_{40\text{-}100}$ ($nm^3\ cm^{-3}$)	$V_{100\text{-}400}$ ($nm^3\ cm^{-3}$)	$V_{15\text{-}400}$ ($nm^3\ cm^{-3}$)
Entire Study	260 m	0.028	1382	3233	2858	7473	2.21E+07	5.96E+08	1.07E+10	1.14E+10
	Ground	0.029	3379	4188	2567	10134	4.58E+07	6.84E+08	1.11E+10	1.18E+10
	$R_{260m/ground}$	0.93	0.40	0.83	1.06	0.75	0.48	0.92	0.93	0.92
Control Period	260 m	0.017	1562	2987	1590	6139	2.46E+07	5.01E+08	5.23E+09	5.76E+09
	Ground	0.019	3452	3779	1477	8708	4.61E+07	5.80E+08	5.47E+09	6.10E+09
	$R_{260m/ground}$	0.93	0.43	0.83	1.07	0.72	0.52	0.91	0.94	0.93
non-Control Period	260 m	0.033	1296	3351	3469	8116	2.09E+07	6.41E+08	1.34E+10	1.41E+10
	Ground	0.033	3343	4386	3095	10824	4.57E+07	7.35E+08	1.38E+10	1.46E+10
	$R_{260m/ground}$	0.93	0.39	0.82	1.06	0.76	0.46	0.92	0.93	0.92
Clean	260 m	0.024	1328	3203	2475	7006	2.15E+07	5.88E+08	8.03E+09	8.64E+09
	Ground	0.027	3480	4338	2441	10258	4.70E+07	7.11E+08	8.83E+09	9.58E+09
	$R_{260m/ground}$	0.87	0.37	0.78	0.98	0.68	0.44	0.86	0.89	0.88
Polluted	260 m	0.054	1218	3702	5828	10748	1.94E+07	7.69E+08	2.61E+10	2.69E+10
	Ground	0.049	3022	4501	4633	12156	4.25E+07	7.93E+08	2.54E+10	2.63E+10
	$R_{260m/ground}$	1.08	0.43	0.93	1.24	0.94	0.49	1.06	1.02	1.02

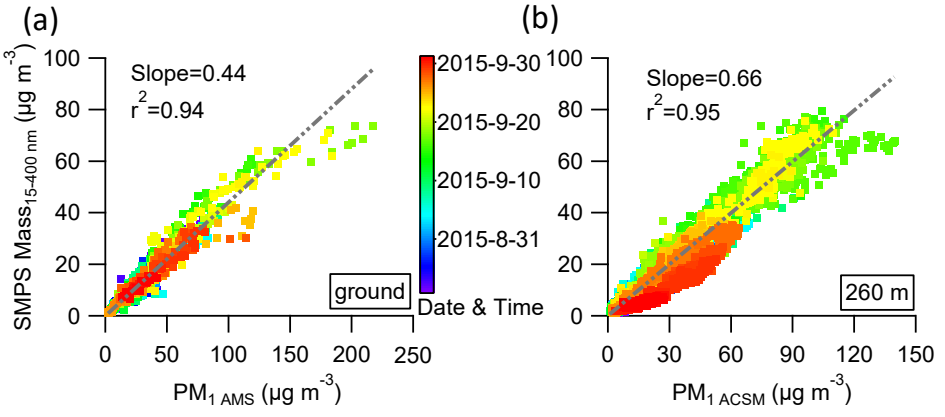


Figure S1. Comparison of the mass concentrations of PM_1 (= NR-PM_1 + BC) with those derived from SMPS measurements (D_p = 15 – 400 nm) at (a) ground level and (b) 260 m.

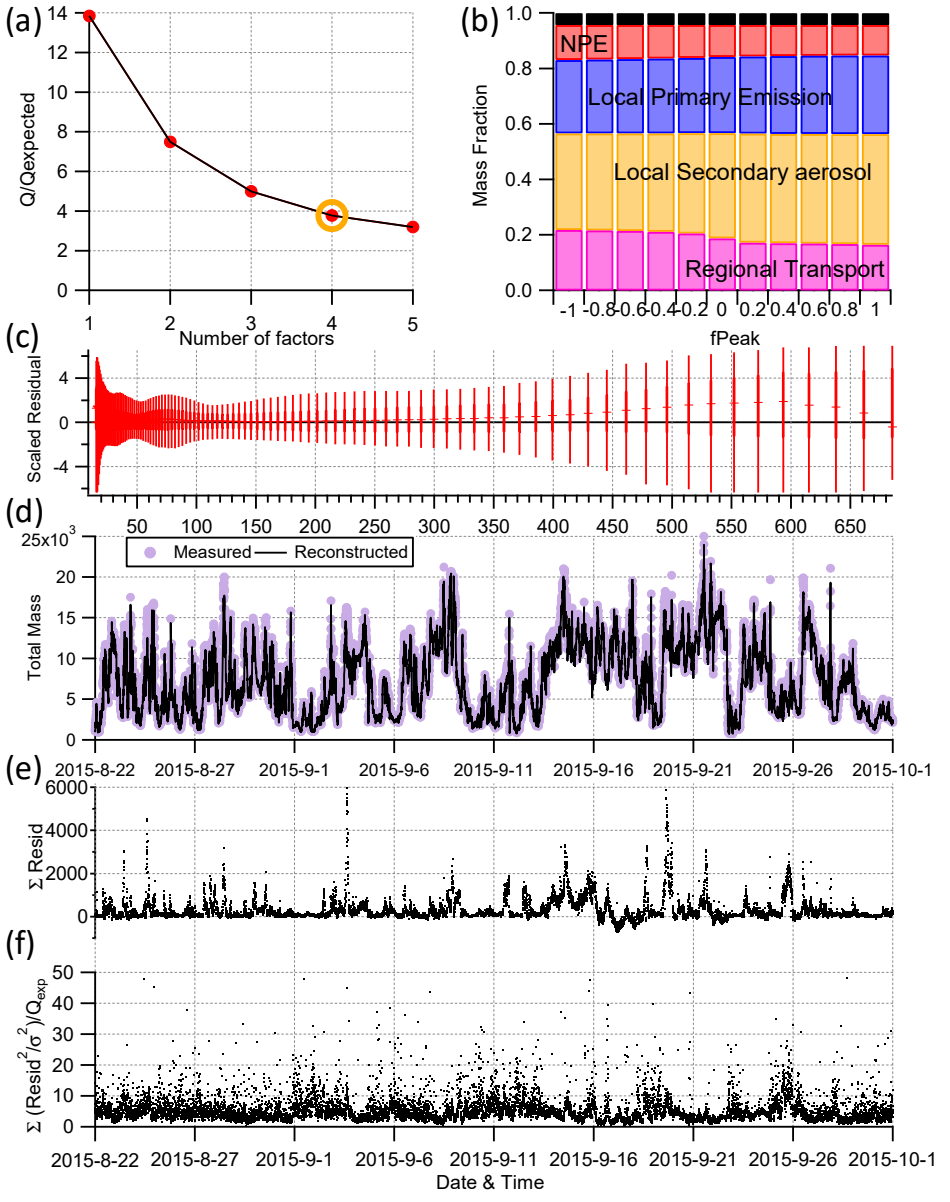


Figure S2. A summary of PMF diagnostic plot at 260 m: (a) Q/Q_{exp} as a function of number of factors, (b) number fractions of factors as a function of fpeak, (c) scaled residual for each fragment ion, (d) a comparison of measured and PMF reconstructed number concentration, (e) time series of residual, and (f) time series of Q/Q_{exp}.

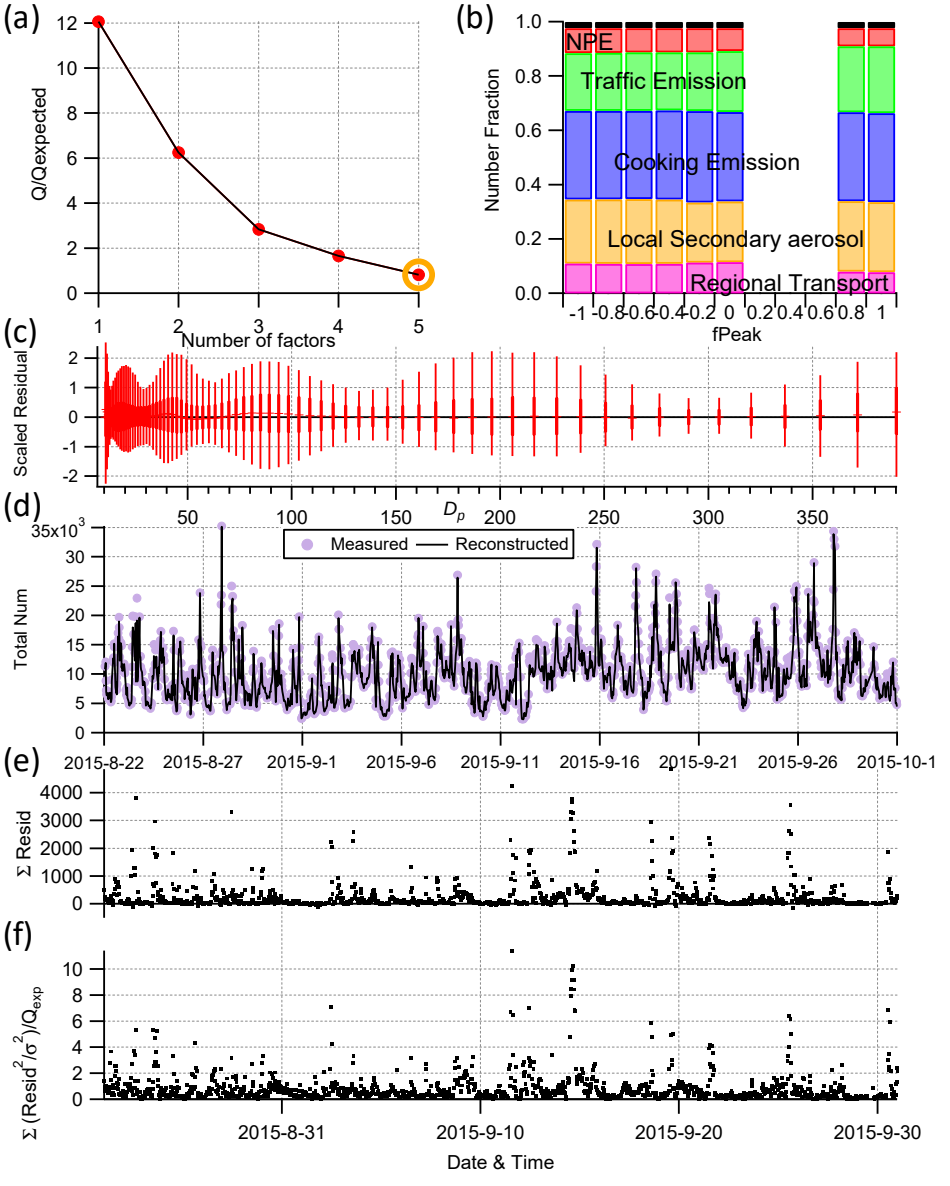
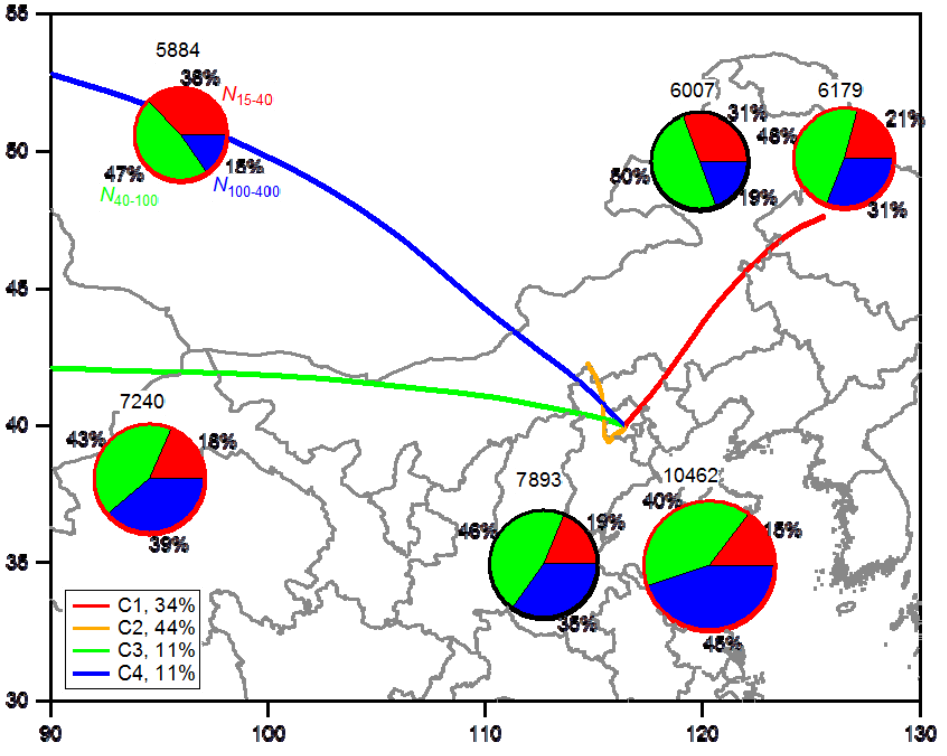


Figure S3. A summary of PMF diagnostic plot at the ground level: (a) Q/Q_{exp} as a function of number of factors, (b) number fractions of factors as a function of fpeak, (c) scaled residual for each fragment ion, (d) a comparison of measured and PMF reconstructed number concentration, (e) time series of residual, and (f) time series of Q/Q_{exp}.

(a)



(b)

	Control Period		Non-control period				Change (%)	
	C1	C2	C1	C2	C3	C4	C1	C2
N_{15-40}	1835	1476	1281	1536	1336	2212	43%	-4%
N_{40-100}	3003	3669	2991	4230	3104	2768	0%	-13%
$N_{100-400}$	1169	2748	1908	4697	2800	904	-39%	-42%

Figure S4. (a) Average number composition for each cluster during (black circles) and after (red circles) the control period. Note that air masses during the control period were only from C1 and C2. (b) Summary of the number concentration for each cluster and also the changes compared with those after the control period. The 3-day (72 h) back trajectories were calculated every hour at 260 m height using the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT, NOAA) 4.9 model (Draxler and Hess, 1997). The trajectories were then grouped into four clusters for the entire study using the algorithm of cluster analysis.

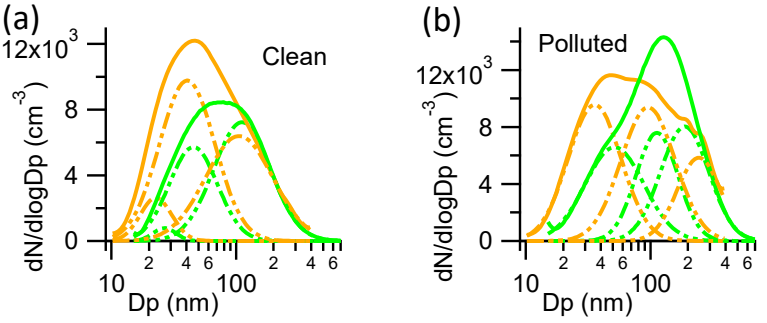


Figure S5. Average particle number size distributions during (a) clean days and (b) polluted days.

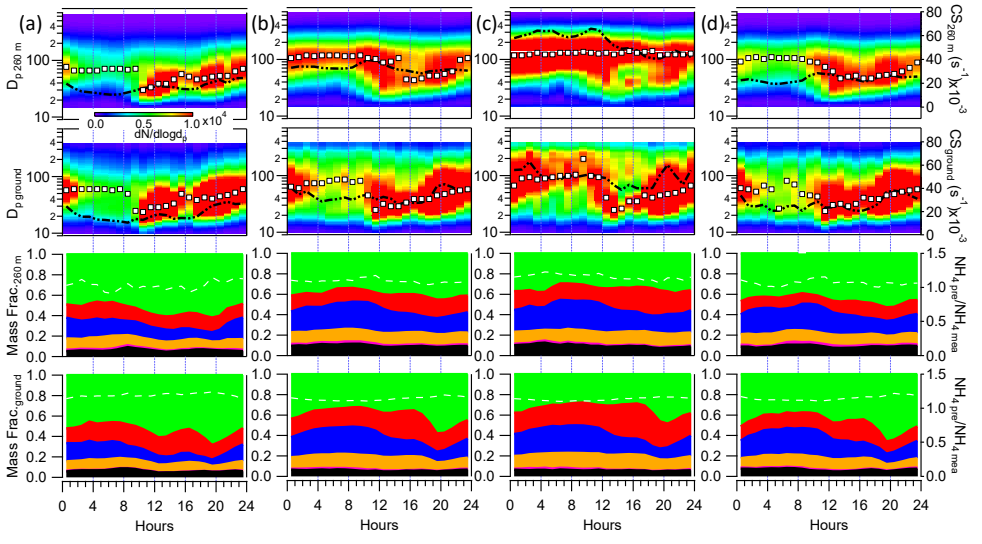


Figure S6. Diurnal variation of mass fraction of PM_1 species and particle number size distributions at two heights during (a) control period, (b) non-control period, (c) polluted days and (d) clean days.

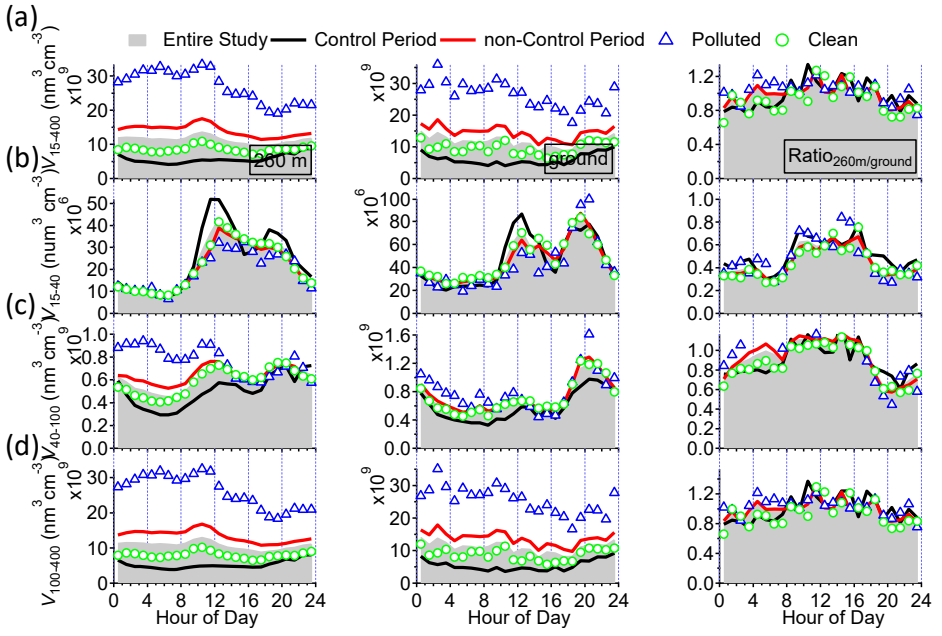


Figure S7. Average diurnal cycles of particle volume concentrations (*V*) for different size ranges, i.e., (a) 15 – 400 nm, (b) 15 – 40 nm, (c) 40 – 100 nm, and (d) 100 – 400 nm at 260 m and ground level, and the ratio of 260 m to ground.

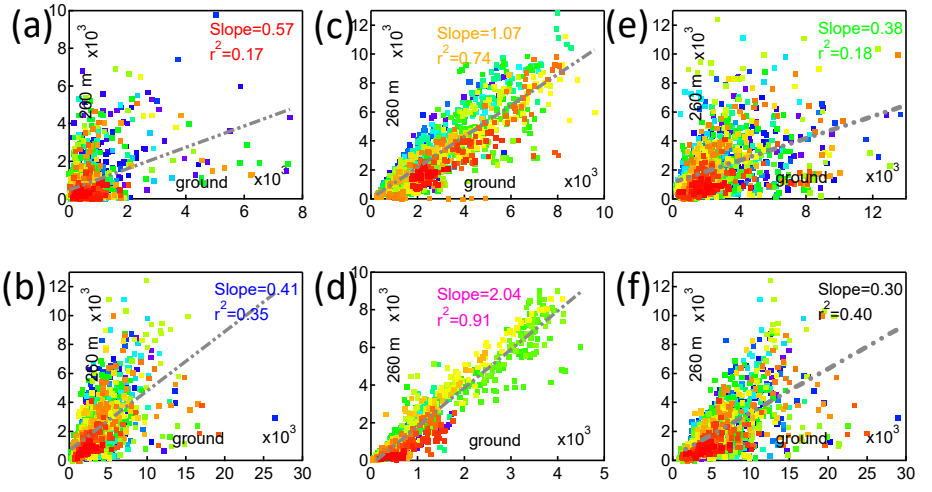


Figure S8. Correlation between two heights for pmf resolved factors including (a) factor 1, (b) factor 3, (c) factor 4, (d) factor 5, scatter plot of (e) factor 3 at 260 m versus factor2 at ground, and (f) factor 3 at 260 m versus factor2 add on factor3 at the ground level.

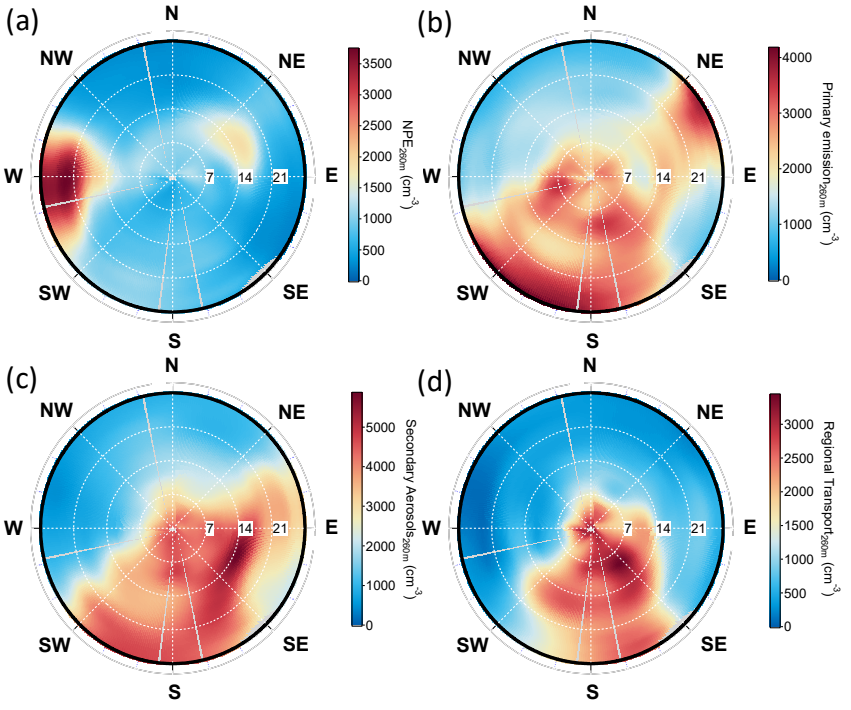


Figure S9. Bivariate polar plots of four PMF factors at 260 m, including (a) new particle events (NPE), (b) primary emissions, (c) local secondary aerosols, and (d) regional transport aerosols.

References

Draxler, R. R., and Hess, G. D.: DESCRIPTION OF THE HYSPLIT_4 MODELING SYSTEM, National Oceanic & Atmospheric Administration Technical Memorandum Erl Arl, 1997, 197-199.