Supplement of:

Aerosol chemistry and particle growth events at an urban downwind site in North China Plain

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Date	GR	CS	SO_2	O ₃	RH	Т	Total SR	Diffuse SR
	$(nm h^{-1})$	(s^{-1})	(ppb)	(ppb)	(%)	(°C)	$(W m^{-2})$	$(W m^{-2})$
5.1	2.4	0.038	-	-	34	30	679	341
5.2	3.1	0.011	-	-	49.4	18.3	452	405
5.3	1.6	0.01	-	-	7.8	26.7	823	133
5.4	4.9	0.054	-	-	24.1	29	492	376
5.5	2.2	0.05	-	-	36	25.8	594	385
5.6	3.2	0.013	-	-	21.4	21.4	568	370
5.8	1.2	0.027	11.9	77.5	47.5	19.4	481	443
5.13	3.1	0.018	3.9	83.4	23.4	21	550	409
5.15	2.9	0.015	0.5	71.6	13.7	23.3	747	181
5.20	4.6	0.051	15.4	155.2	34.5	26	602	437
5.21	1.8	0.047	7.8	135	37.1	26.9	712	310
5.22	3.1	0.034	10.5	145.2	29.3	25.9	676	363
5.24	4.8	0.037	12.1	101.5	19.2	27.1	795	190
5.26	3.6	0.033	9.1	95.8	27.9	26	354	350
5.29	1.5	0.053	20.5	166.8	37.5	28.4	746	311
5.30	1.8	0.042	14.6	154.5	28.2	33.5	769	247
6.1	4.7	0.042	8	120.6	34.1	25.9	621	474
6.2	3.8	0.041	-	-	27.3	28.1	640	382
6.3	2.5	0.057	36.3	116.8	46.2	26.2	373	381
6.8	1.6	0.047	32.2	165.8	43.1	29.5	726	392
6.9	3.7	0.044	-	-	35.7	32	695	379
6.10	2.9	0.064	-	-	51.3	29.6	311	198
6.11	3.7	0.031	-	-	30	29.2	738	365
6.12	3.5	0.053	14.6	153.2	29	31.3	-	-
6.15	3.2	0.013	0.5	92.2	25.5	30	-	-
6.16	4.4	0.01	1.7	98.8	18.6	34.3	-	-
6.17	3.5	0.04	6.4	128.1	17.5	35.8	684	347
6.18	4.6	0.056	9.1	171.1	33.8	32.8	706	343

Table S1. Average CS, SO_{2} , and O_{3} concentrations, RH, *T*, and solar radiation (SR) for the particle growth period (1400–1600 LT).



Figure S1. Yearly average variations of ambient pollutants (PM_{2.5}, PM₁₀, CO, NO₂, SO₂, and O₃) for (a) the entire year and (b) observational periods. Data are from four monitoring sites in Xingtai.



Figure S2. SMPS volume as a function of the total PM_1 mass. Colors represent the dates of the study period. The linear best-fit line through the points is shown in black.



Figure S3. (a) Values of Q/Q_{exp} and (b) mass concentrations of each factor for different model runs.



Figure S4. Factor profiles of (a) HOA, (b) COA, and (c) OOA for different model runs.



Figure S5. Time series of (a) HOA, (b) COA, and (c) OOA for different model runs.



Figure S6. Mean diurnal variations of (a) HOA, (b) COA, and (c) OOA for different model runs, with the variations of their external tracers on the right axis.



Figure S7. Correlations between the time series of OA factors and external tracers as a function of model run.



Figure S8. Mass concentration and average composition of PM_1 in summer at four sites in the NCP. BBOA: biomass burning OA; LV-OOA, low volatility OOA; SV-OOA, semi-volatile OOA.



Figure S9. Monthly variations in $PM_{2.5}$ concentration in Xingtai. Data were collected by the environmental monitoring center at four urban sites from 2013–2016.



Figure S10. (a) Wind rose plots, colored by wind speed (m s⁻¹) and (b) fractional contributions of each species to the total PM_1 mass during polluted periods (on the left) and clean periods (on the right).



Figure S11. Diurnal patterns of gaseous pollutants, i.e., (a) CO, (b) O_3 , (c) SO_2 , (d) NO, (e) NO_x), meteorological parameters, i.e., (f) WS, (g) *T*, and (h) RH, and (i) total solar radiation (TR), and (j) diffuse solar radiation (DR). Overall mean cycles are shown as black lines. Mean cycles for polluted events (PE) and clear periods (CP) are shown as red and blues lines, respectively.



Hour of Day

Figure S12. Diurnal pattern of average $PM_{2.5}$ concentrations in Xingtai. Data were collected by the environmental monitoring center at four urban sites.



Figure S13. Average compositions of PM_1 size modes during the entire study, on new particle event (NPE) days, and on non-new particle event (NNPE) days.



Figure S14. Particle number size distributions during two nights (2 May and 3 May) with significant cooking emissions. The size distribution was calculated as the difference between dinnertime and one hour before.



Figure S15. Bivariate polar plots of particle number concentrations for (a) N_{7-15} calculated from the differences between MCPC and SMPS measurements, (b) N_{15-40} (15–40 nm), (c) N_{40-100} (40–100 nm), (d) $N_{100-685}$ (100–685 nm), (e) all particles, N_{15-685} (15–685 nm), and (f) CS.



Figure S16. Particle growth rate (GR) as a function of OOA/PM₁ (left) and SO₄/PM₁ (right). The two dashed lines are used for visual reference.P