Atmospheric
Chemistry
and Physics

Supplement of

Aerosol radiative effects and feedbacks on boundary layer meteorology and PM$_{2.5}$ chemical components during winter haze events over the Beijing-Tianjin-Hebei region

Jiawei Li et al.
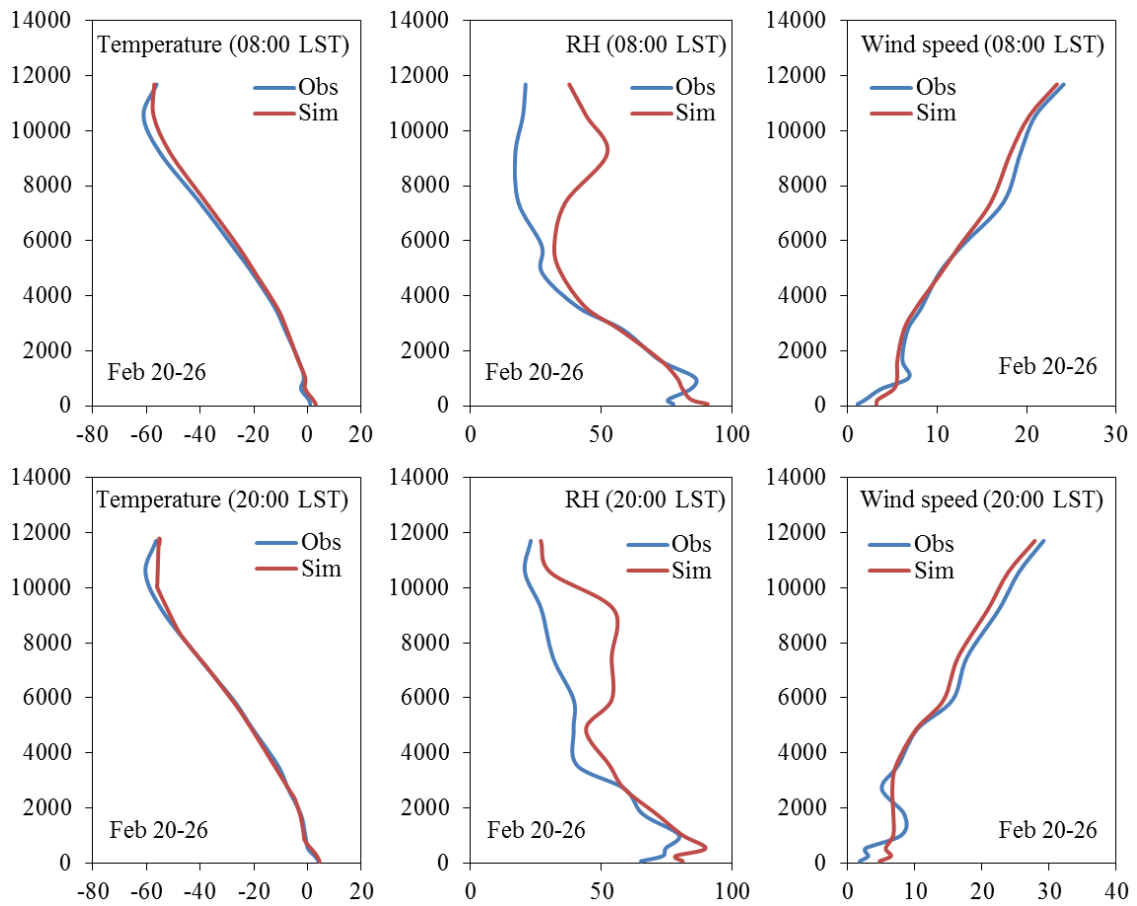
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Figure S1. Period mean vertical profiles of temperature, RH, and wind speed from sounding data at the Beijing Observatory and corresponding model results for the haze episode 1 (20-26 February). The soundings were conducted at 8:00 and 20:00 of local standard time (LST=UTC+8).
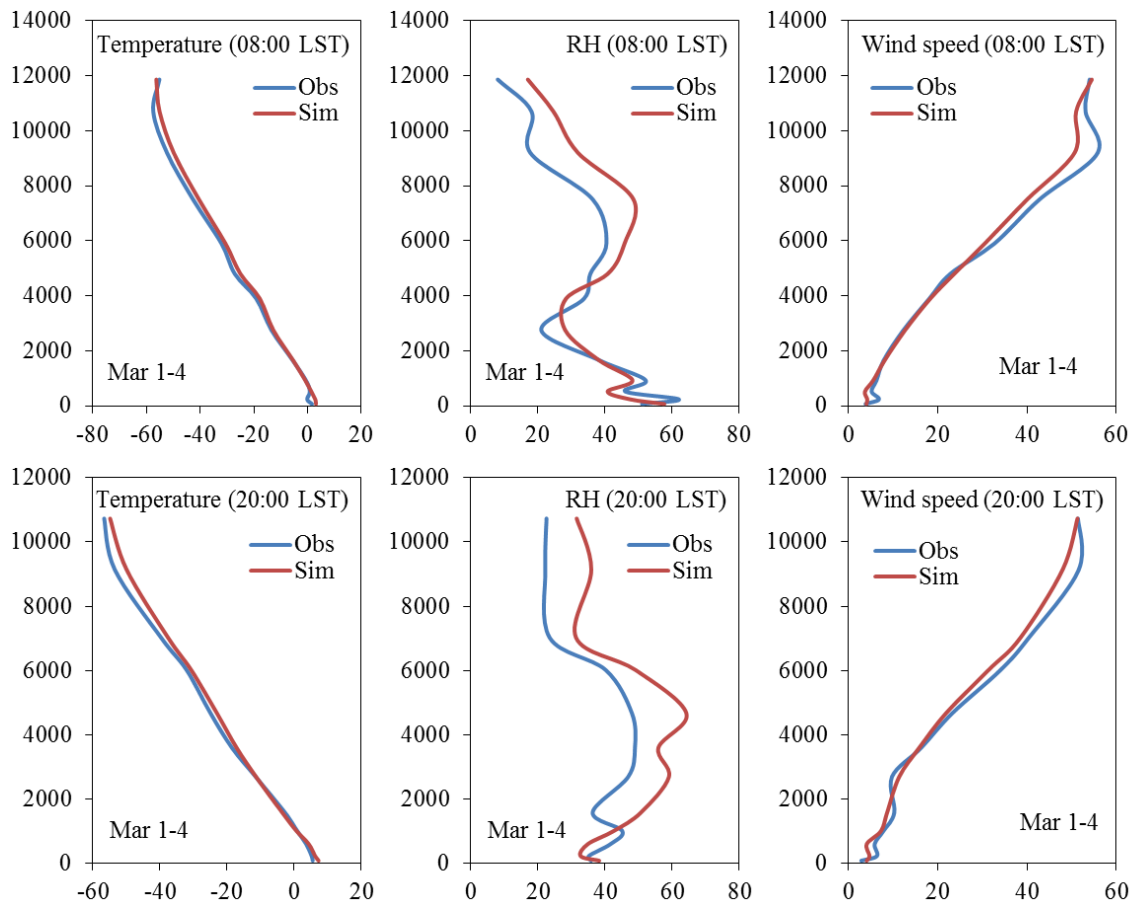
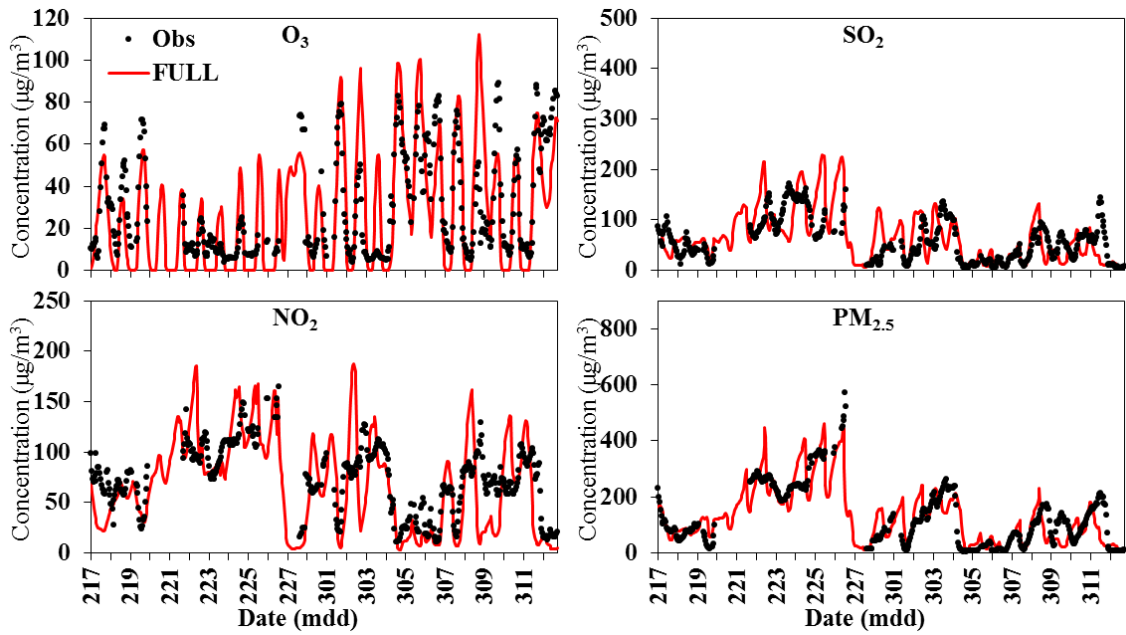Figure S2. Same as Figure S1 but for the haze episode 2 (1-4 March).

Figure S3. Observed and simulated hourly O_3, SO_2, NO_2, and $PM_{2.5}$ concentrations in Beijing. Observations were obtained from the CNEMC (China National Environmental Monitoring Center, http://www.cnemc.cn/). The observations are averages of the 12 measurement sites in Beijing (n=12).

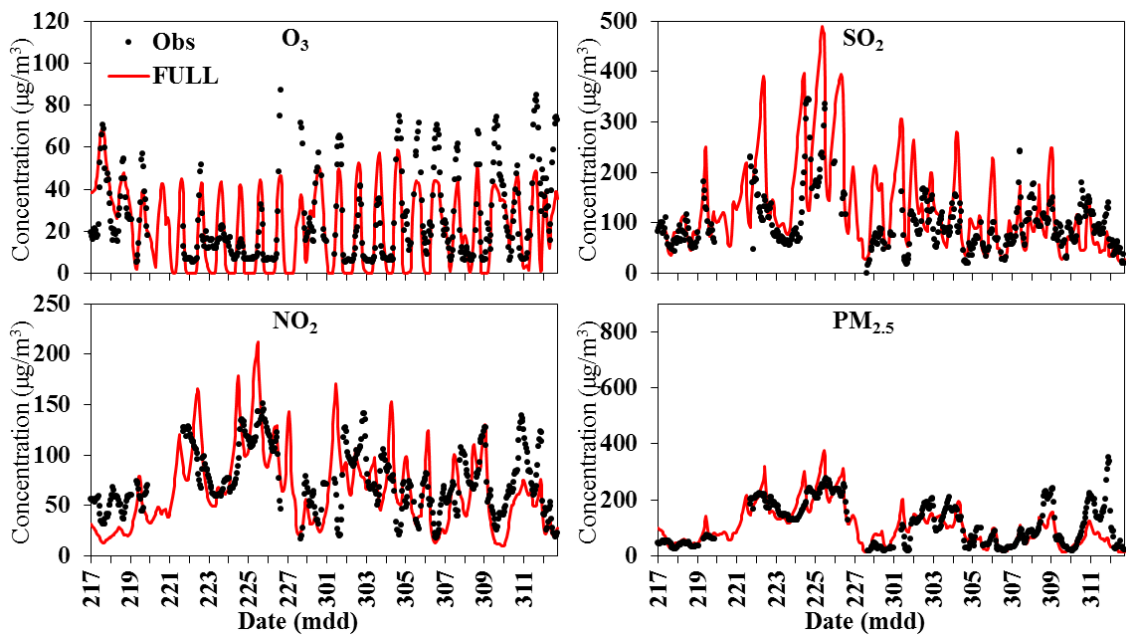Figure S4. Same as Figure S3 but for the Tianjin city (n=15).
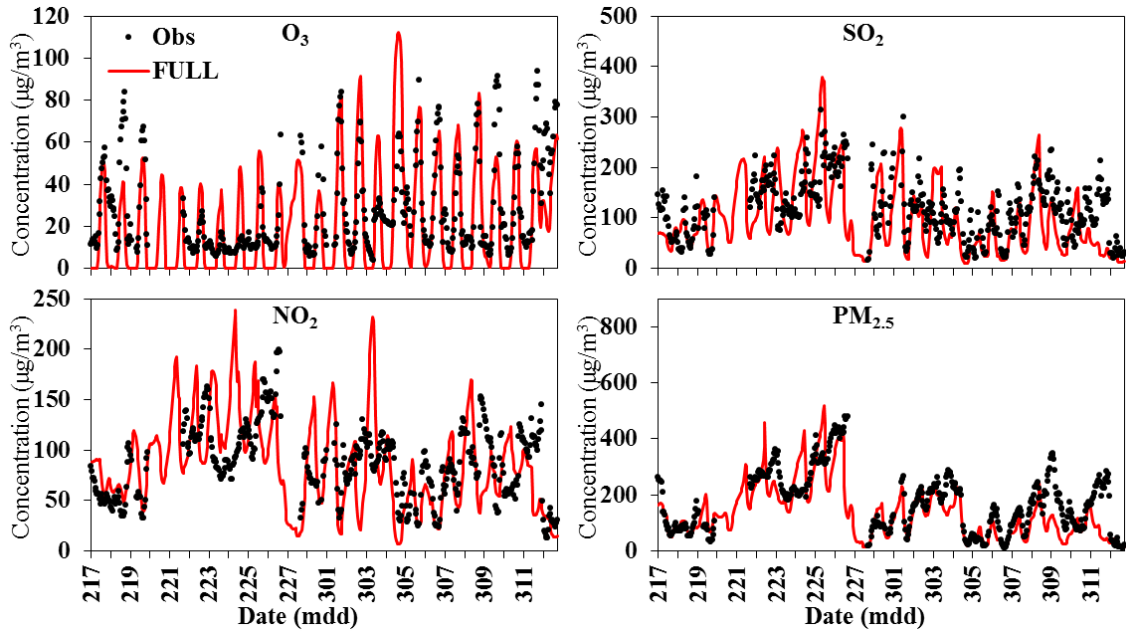
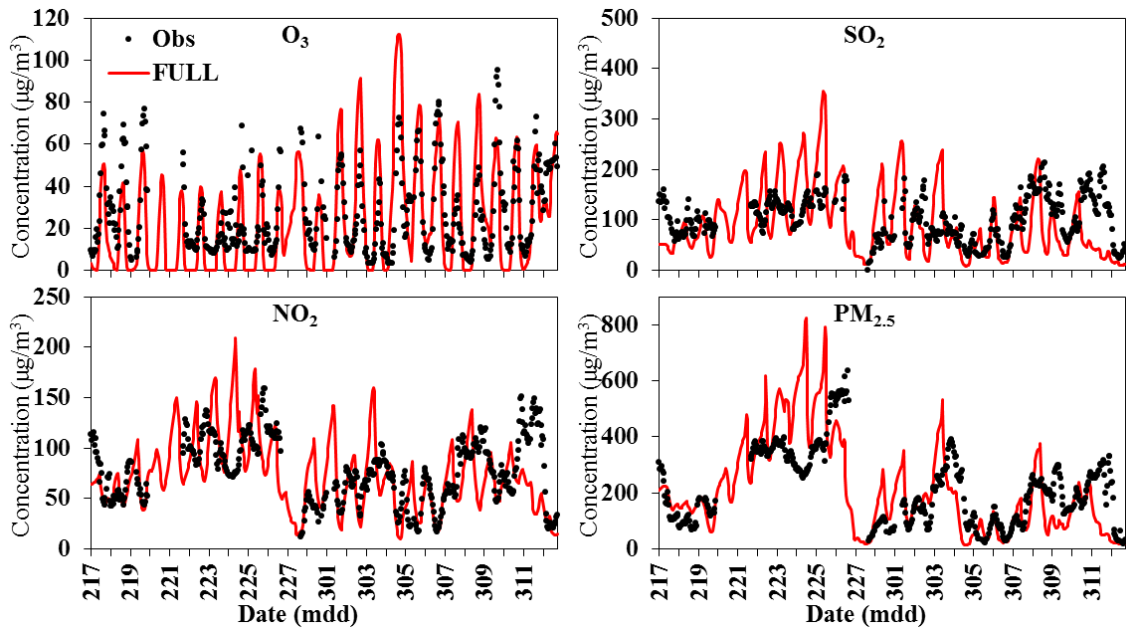Figure S5. Same as Figure S3 but for the Baoding city (n=6).

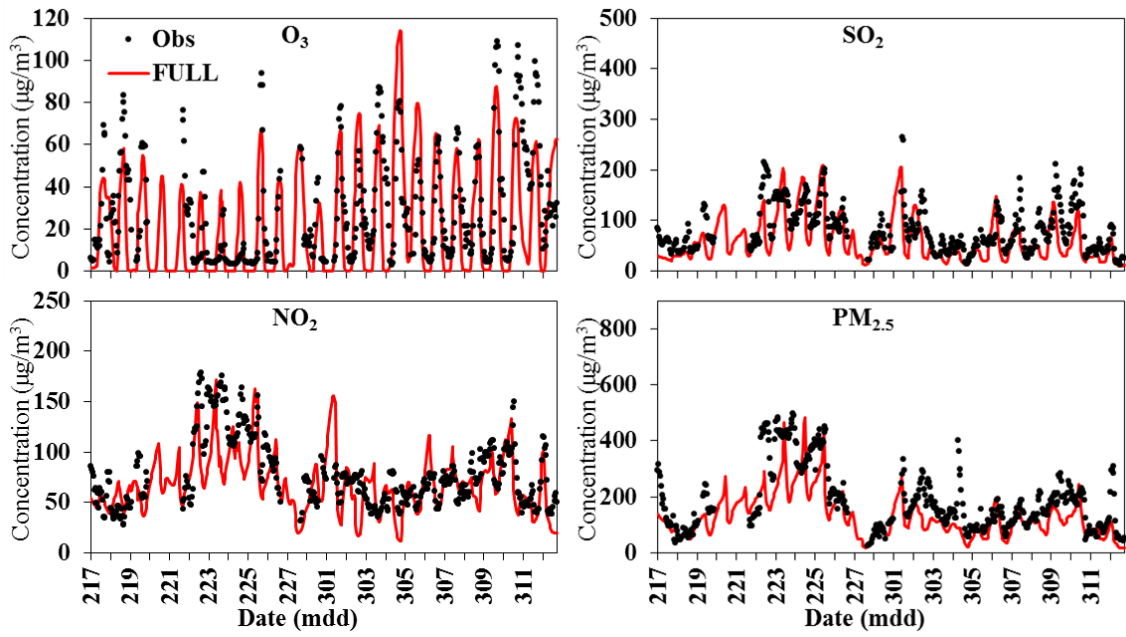Figure S6. Same as Figure S3 but for the Shijiazhuang city (n=8).

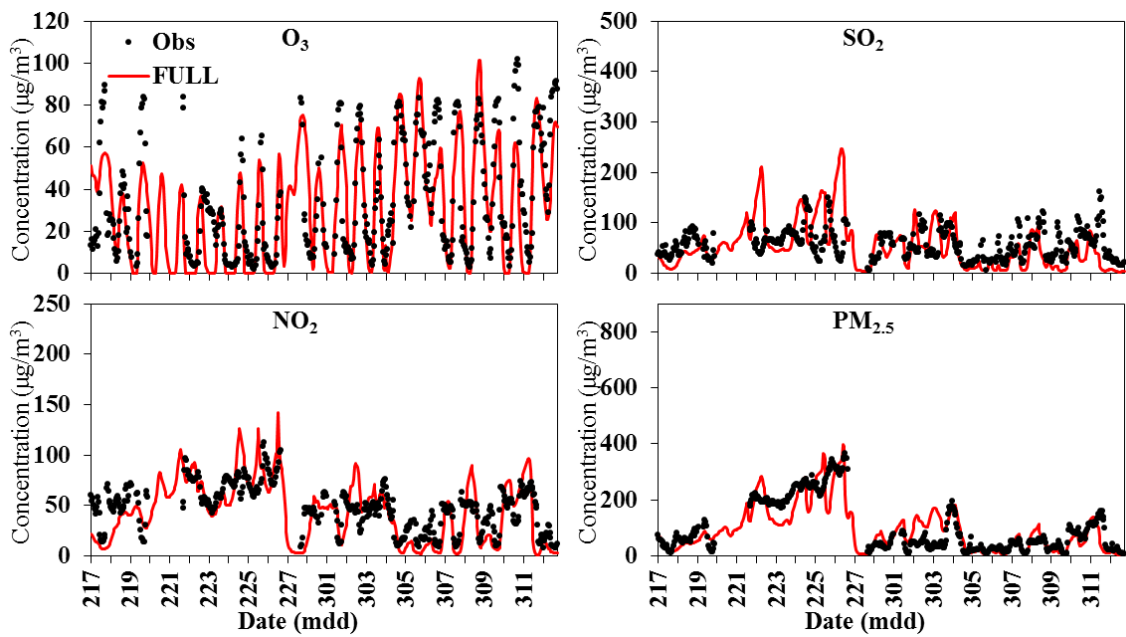Figure S7. Same as Figure S3 but for Handan (n=4).

Figure S8. Same as Figure S3 but for the Chengde city (n=5).

Table S1. Performance statistics for meteorology soundings at the Beijing Observatory for the haze episode 1 (20-26 February). Averages of wind speed (WS), temperature (T), relative humidity (RH), and mixing ratio (Q) from observation (Obs) and model simulation (Sim) as well as correlation coefficients (R) are given.

	WS (m s^{-1})	T (℃)	RH (%)	Q (g kg^{-1})
Troposphere (sample number = 469)				
Obs	11.3	-20.9	53.2	1.6
Sim	11.0	-19.5	59.2	1.6
R	0.97	0.997	0.74	0.95
Below 3km (sample number = 204)				
Obs	5.4	-2.1	73.1	2.8
Sim	5.7	-1.4	75.3	3.0
R	0.68	0.937	0.64	0.78

Table S2. Same as Table S1 but for the haze episode 2 (1-4 March).

	WS (m s^{-1})	T (℃)	RH (%)	Q (g kg^{-1})
Troposphere (sample number = 228)				
Obs	24.7	-23.2	36.9	0.8
Sim	23.5	-21.9	42.3	0.9
R	0.99	0.996	0.72	0.93
Below 3km (sample number = 98)				
Obs	7.6	-2.5	42.0	1.6
Sim	7.1	-1.9	43.1	1.7
R	0.72	0.940	0.73	0.87

Table S3. Performance statistics for hourly O_3, SO_2, NO_2, and $PM_{2.5}$ concentrations in 13 cities of the BTH region for the study period (17 February - 12 March). Mean observation (Obs, unit=μg m^{-3}), mean simulation (Sim, unit=μg m^{-3}), correlation coefficient (R), and normalized mean bias (NMB, unit=%) are presented.

City[a]	$PM_{2.5}$				O_3				SO_2				NO_2			
	Obs	Sim	R	NMB	Obs	Sim	R	NMB	Obs	Sim	R	NMB	Obs	Sim	R	NMB
BJ	125.4	128.2	0.8	2	29.8	29.4	0.74	-1	57.7	64.1	0.51	11	73.2	66.7	0.66	-9
TJ	113.7	107.8	0.75	-5	25.8	22.1	0.72	-14	100.6	133	0.52	32	74.3	67.3	0.62	-9
SJZ	211.7	219.3	0.65	4	26.7	26.6	0.63	0	103.8	93.9	0.25	-10	77.4	73.7	0.42	-5
TS	150.9	234.8	0.78	56	29.8	27.7	0.7	-7	148.1	131.2	0.62	-11	71.5	120.4	0.6	68
QHD	93.3	100.8	0.81	8	41.6	27.8	0.7	-33	71.8	48.8	0.62	-32	46.6	43	0.76	-8
HD	184.7	130.1	0.76	-30	28.6	23.6	0.61	-17	80.8	59.1	0.55	-27	78.1	68.6	0.62	-12
BD	172.7	140.4	0.74	-19	27.4	21.4	0.7	-22	117.3	98.9	0.47	-16	86.3	85.7	0.42	-1
ZJK	109.6	99.6	0.81	-9	41.5	50.9	0.65	23	107.5	26.2	0.41	-76	51.2	29.5	0.74	-42
CD	98.3	96.8	0.84	-2	34.9	32.9	0.77	-6	56.7	55.1	0.18	-3	47.6	43.1	0.73	-9
LF	152.1	140.4	0.78	-8	27.8	28.6	0.71	3	73.6	60.1	0.52	-18	76.3	68.7	0.57	-10
CZ	125.9	119.2	0.72	-5	44.8	38.6	0.4	-14	66.5	74	0.17	11	35.7	75.5	0.51	111
HS	149.7	136.6	0.71	-9	41.6	20.6	0.63	-50	72.2	54.7	0.23	-24	54.6	34.1	0.53	-38
XT	230.9	258.4	0.71	12	32.7	35.7	0.51	9	131.5	91.8	0.37	-30	82.3	82.8	0.4	1
Total	147.9	147.3	0.87	-0.4	33.4	29.7	0.81	-11	91.5	76.3	0.60	-17	65.8	66.1	0.74	0.5

a: Names of the cities, the numbers of the monitoring sites in each city (n), and the latitudes and longitudes of the cities are:

BJ = Beijing (n=12), 40.0°N and 116.4°E;

TJ = Tianjin (n=15), 39.1°N and 117.2°E;

SJZ = Shijiazhuang (n=8), 38.0°N and 114.5°E;

TS = Tangshan (n=6), 39.6°N and 118.2°E;

QHD = Qinhuangdao (n=5), 39.9°N and 119.6°E;

HD = Handan (n=4), 36.6°N and 114.5°E;

BD = Baoding (n=6), 38.9°N and 115.5°E;

ZJK = Zhangjiakou (n=5), 40.8°N and 114.9°E;

CD = Chengde (n=5), 41.0°N and 117.9°E;

LF = Langfang (n=4), 39.5°N and 116.7°E;

CZ = Cangzhou (n=3), 38.3°N and 116.8°E;

HS = Hengshui (n=3), 37.7°N and 115.7°E;

XT = Xingtai (n=4), 37.0°N and 114.5°E.