

Supporting Information for

MICS-Asia III: Multi-model comparison and evaluation of aerosol over East Asia

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Table S1. Station information of observed sulfur dioxide (SO₂), nitrogen dioxide (NO₂), black carbon (BC), sulfate (SO₄²⁻), nitrate (NO₃⁻), ammonium (NH₄⁺), PM_{2.5} and PM₁₀ in each defined region.

Region	Station Index	Station Name	Latitude	Longitude
Region_1	1	Rishiri	45.12	141.20
	2	Ochiishi	43.17	145.50
	3	Tappi	41.25	140.35
	4	Sadoseki	38.25	138.40
	5	Happo	36.70	137.80
	6	Ijira	35.57	136.68
	7	Oki	36.28	133.18
	8	Banryu	34.68	131.80
	9	Yusuhara	33.38	132.93
	10	Hedo	26.87	128.25
	11	Ogasawara	27.08	142.22
	12	Tokyo	35.68	139.75
	13	Kanghwa	37.70	126.28
	14	Cheju	33.30	126.17
	15	Imsil	35.60	127.18
Region_2	16	Jinyunshan	29.82	106.37
	17	Hongwen	24.47	118.13
	18	Xiangzhou	22.27	113.57
	19	Beijing_Y2010*	39.97	116.37
	20	Beijing_ZWY_Y2010*	39.87	116.43
	21	Beijing_STZ_Y2010*	40.00	116.33
	22	Beijing_NJ_Y2010*	39.80	116.47
	23	Beijing_SDZ_Y2010*	40.65	117.12
	24	Gucheng_Y2010*	39.13	115.80
	25	Beijing_LS_Y2010*	39.97	115.43
	26	Shijiazhuang_Y2010*	38.04	114.50
	27	SACOL_main_Y2010*	35.95	104.14
	28	Langfang_Y2010*	39.55	116.68
	29	Zhangjiakou_Y2010*	40.77	114.92
	30	Zhengzhou_Y2010*	34.78	113.65
	31	Jinan_Y2010*	36.65	116.97
32	Dongguan_Y2010*	23.02	113.76	
33	Tangshan_Y2010*	39.62	118.15	
34	Shanghai_DT_Y2010*	31.53	121.97	
35	Shanghai_PD_Y2010*	31.23	121.53	
36	Shanghai_QXJ_Y2010*	31.23	121.53	

37	Zhejiang_LA_Y2010*	30.30	119.73
38	Shangdianzi_Y2009to2010*	40.65	117.12
39	Beijing_Y2009to2010*	40.05	116.40
40	Tianjin_Y2009to2010*	39.09	117.31
41	Shijiazhuang_Y2009to2010*	38.04	114.50
42	Chengde_Y2009to2010*	40.96	117.93
43	SCIES_Y2009to2010*	23.12	113.35
44	Beijing_IAP_Y2011to2012*	39.97	116.37
45	Xi'an_Y2010*	34.28	108.84
46	Tianhu_Y2012to2013*	23.65	113.63
47	Beijing_SDZ_Y2010*	40.65	117.12
48	SAES_Y2011to2013*	31.17	121.43
49	Anhui_Y2012to2013*	31.87	117.23
50	YRDNNR_Y2011*	38.03	118.44
51	HBT_BD**	38.82	115.44
52	HBT_BJT**	39.97	116.37
53	HBT_CD**	40.97	117.93
54	HBT_CFD**	39.27	118.44
55	HBT_CZ**	38.29	116.78
56	HBT_DT**	40.09	113.39
57	HBT_GA**	39.15	115.73
58	HBT_HJ**	38.42	116.08
59	HBT_HS**	37.74	115.66
60	HBT_LS**	39.97	115.43
61	HBT_QA**	40.10	118.80
62	HBT_SJZ**	38.03	114.53
63	HBT_TG**	39.04	117.72
64	HBT_TJ**	39.08	117.21
65	HBT_TS**	39.62	118.16
66	HBT_XH**	39.75	116.96
67	HBT_YF**	40.15	116.13
68	HBT_ZJK**	40.77	114.92
69	HBT_ZZ**	39.46	115.99
70	PRD_chengzhong**	23.05	112.47
71	PRD_jinjuzui**	22.82	113.27
72	PRD_huijingcheng**	23.00	113.11
73	PRD_donghu**	22.59	113.08
74	PRD_zimaling**	22.51	113.40
75	PRD_tangjia**	22.35	113.58
76	PRD_haogang**	23.03	113.74

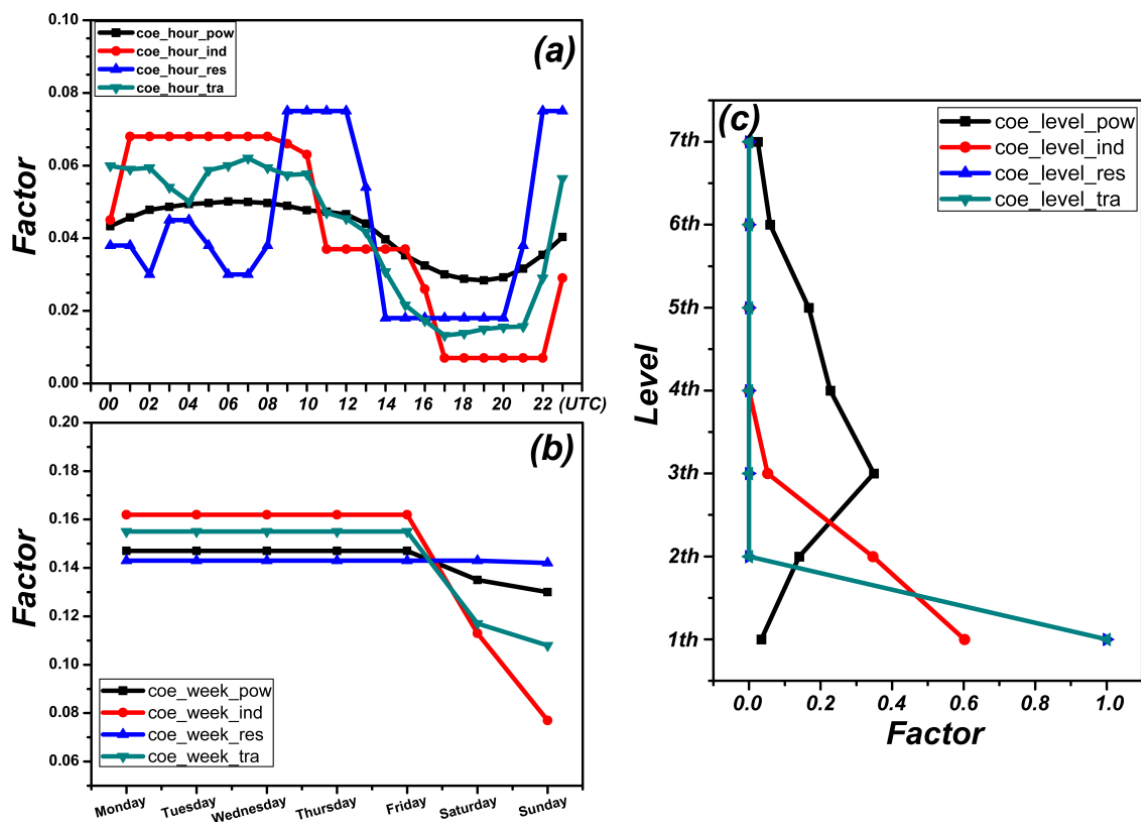
	77	PRD_jinguowan**	22.94	114.38
	78	PRD_xiapu**	23.05	114.42
	79	PRD_liyuan**	22.55	114.10
	80	PRD_luhu**	23.16	113.28
	81	PRD_wanqingsha**	22.71	113.55
	82	PRD_tianhu**	23.65	113.63
Region_3	83	UlaanBaatar	47.90	106.82
	84	Terelj	47.98	107.48
	85	Listvyanka	51.85	104.90
	86	Irkutsk	52.23	104.25
	87	Primorskaya	43.70	132.12
Region_4	88	PhnomPenh	11.55	104.83
	89	Jakarta	-6.18	106.83
	90	Kototabang	0.20	100.32
	91	Bandung	6.90	107.58
	92	TanahRata	4.47	101.38
	93	PetalingJaya	3.10	101.65
	94	DanumValley	4.98	117.85
	95	MetroManila	14.63	121.07
	96	MtStoTomas	16.42	120.60
	97	Bangkok	13.77	100.53
	98	Samutprakarn	13.73	100.57
	99	Patumthani	14.03	100.77
	100	Khanchanaburi	14.43	98.58
	101	Chiangmai	18.77	98.93
	102	NakhonRatchasima	14.45	101.88
	103	Hanoi	21.02	105.85

*Observations are collected from published documents (Chen et al., 2012; Li, 2012; Liu, 2012; Meng et al., 2012; Shao, 2012; Wang et al., 2012; Xu, 2012; Xie et al., 2013; Yu, 2013; Zhao et al., 2013; Tao et al., 2014; Wang, 2014; Li, 2015; Sun et al., 2015; Wang et al., 2015; Zhang, 2015; Lai et al., 2016; Li et al., 2016; Wang et al., 2016; Deng et al., 2016; Yao et al., 2016). “Y2010” means date was observed during the year 2010.

5 **Observations are provided by the China National Environmental Monitoring Center (CNEMC)

Table S2. List of AERONET observation locations in each defined region.

Region	AOD Site Name	Latitude	Longitude
Region_1	Baengnyeong	37.97	124.63
	Gwangju_GIST	35.23	126.84
	Noto	37.33	137.14
	Osaka	34.65	135.59
	Shirahama	33.69	135.36
Region_2	Beijing	39.98	116.38
	Chen-Kung_ Univ	23.00	120.22
	Dongsha_Island	20.70	116.73
	EPA-NCU	24.97	121.19
	Hong_Kong_Hok_Tsui	22.21	114.26
	Hong_Kong_PolyU	22.30	114.18
	Lulin	23.47	120.87
	NAM_CO	30.77	90.96
	NCU_Taiwan	24.97	121.19
	SACOL	35.95	104.14
	Taihu	31.42	120.22
	XiangHe	39.75	116.96
Xinglong	40.40	117.58	
Region_3	Dalanzadgad	43.58	104.42
	Ussuriysk	43.70	132.16
Region_4	Bach_Long_Vy	20.13	107.73
	Bac_Lieu	9.28	105.73
	Chiang_Mai_Met_Sta	18.77	98.97
	ND_Marbel_Univ	6.50	124.84
	Silpakorn_Univ	13.82	100.04
	Ubon_Ratchathani	15.25	104.87
Region_5	EVK2-CNR	27.96	86.81
	Jaipur	26.91	75.81
	Kanpur	26.51	80.23
	Kathmandu_Univ	27.60	85.54
	Nainital	29.36	79.46
	Pokhara	28.15	83.97
	Pune	18.54	73.81



5 Figure S1. Diurnal (a) and weekly (b) profiles of the MIX anthropogenic emissions for the power, industry, residential and transportation sectors. The vertical profiles of the emission factors for the first seven levels are also shown (c).

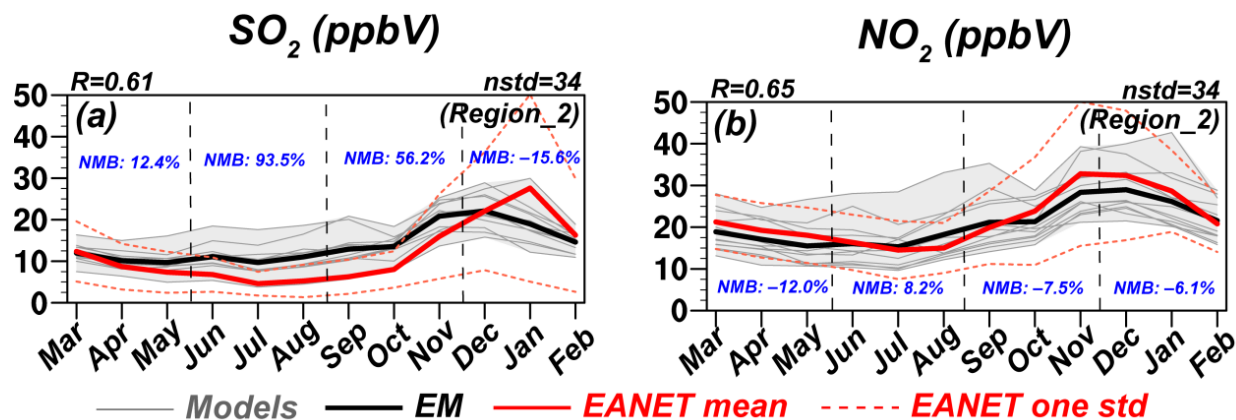
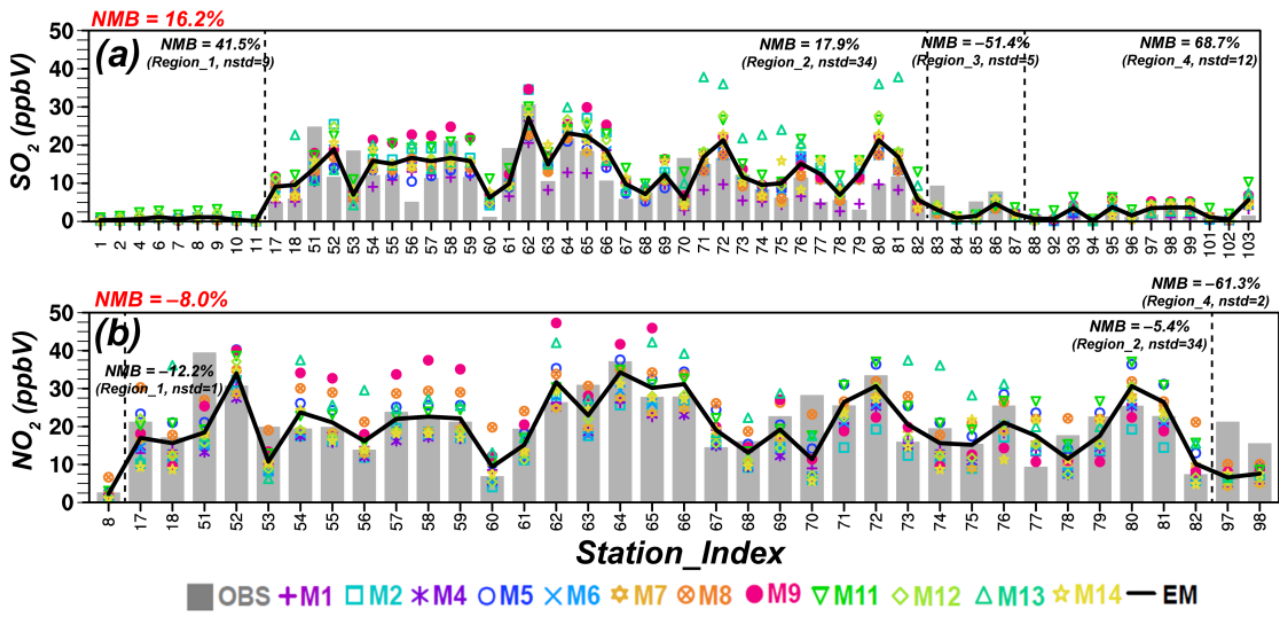


Figure S2. Observed and simulated seasonal cycle of (a) SO₂ and (b) NO₂ in Region_2. Individual models are represented by the thin grey lines, with the grey shaded area indicating their spread. The thick black line is the ensemble mean. The red solid line is the observational mean and the dashed red lines mean one standard deviation. The correlations (Rs, with black color) and normalized mean biases (NMBs, with blue color) for ensemble means versus observations during each season (spring: from March to May; summer: from June to August; autumn: from September to November; winter: January, February and December) and the whole year are shown in each panel. Also shown is the number of monitoring sites participating in calculating statistics. In this picture, observed monthly mean values are from EANET and CNEMC.



5 Figure S3. Comparison of observed and simulated concentrations of (a) SO₂ and (b) NO₂. In each panel, the gray bars show observation data, the colored dots represent simulation results from participating models, and the black solid line is the ensemble mean. The numbers on x-axis represent the monitoring sites, and the information of these sites is listed in Table S1. Normalized mean biases (NMBs) between observations and ensemble means in each defined region (with black color) and the whole analyzed area (with red color) are also shown. In this picture, observed monthly mean values are from EANET and CNEMC.