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Evaluating the accuracy of NO_x emission fluxes over East Asia by comparison between CMAQ-simulated and OMI-retrieved NO_2 columns with the application of averaging kernels from the KNMI algorithm

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Table S1. As Table 2, except for applying the seasonal variations of NO_x emission fluxes from Han et al. (2009) to the CMAQ model simulations.

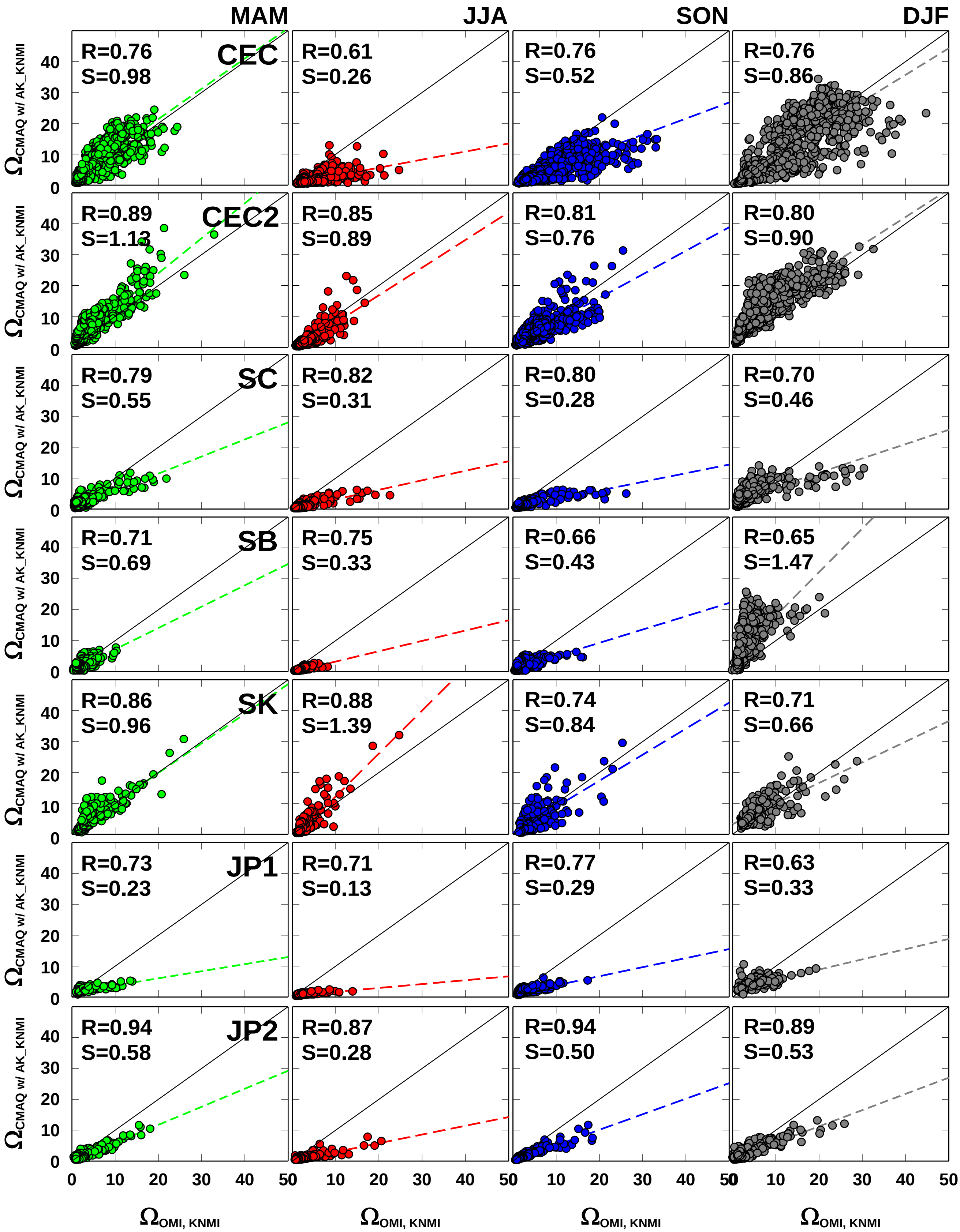
Region	Season	n [1]	Ω_{CMAQ} (w/o AKs) [2]	$\Omega_{CMAQ,AK}$ (w/ AKs) [2]	Ω_{OMI} [2]	NME (w/o AKs)	NME (w/ AKs)
CEC	Spring	900	16.9 (8.59) [3]	8.52 (5.25) [3]	6.89 (4.07) [3]	145.50	43.63
	Summer	900	5.21 (3.16)	1.79 (1.29)	5.29 (3.02)	34.06	66.49
	Fall	900	11.34 (6.19)	5.60 (4.09)	9.49 (5.89)	36.25	41.76
	Winter	900	28.42 (14.26)	13.39 (9.17)	14.18 (8.05)	101.06	33.78
CEC2	Spring	820	15.74 (7.07)	6.35 (5.07)	4.45 (3.98)	253.57	49.83
	Summer	820	4.93 (4.59)	1.64 (2.27)	3.02 (2.15)	66.75	50.88
	Fall	820	11.60 (5.95)	4.50 (3.73)	4.97 (3.97)	133.56	31.34
	Winter	820	30.27 (8.25)	13.75 (6.52)	8.49 (5.79)	256.30	64.36
SC	Spring	1125	7.17 (4.12)	1.60 (1.43)	2.20 (2.03)	226.83	42.38
	Summer	1124	2.03 (1.68)	0.56 (0.65)	1.77 (1.73)	39.68	66.48
	Fall	1125	4.17 (2.52)	0.97 (0.81)	2.20 (2.31)	96.62	56.45
	Winter	1125	15.16 (5.34)	3.94 (2.25)	3.24 (3.39)	368.07	48.69
SB	Spring	408	7.72 (4.67)	2.01 (1.50)	2.56 (1.55)	214.16	37.83
	Summer	420	2.20 (1.47)	0.57 (0.44)	2.14 (0.99)	32.67	73.34
	Fall	418	7.05 (4.52)	1.79 (1.41)	2.71 (2.15)	169.70	46.97
	Winter	403	24.70 (13.80)	8.70 (6.71)	3.43 (3.01)	649.63	150.70
SK	Spring	260	10.11 (6.20)	5.69 (4.16)	5.24 (3.74)	92.87	28.55
	Summer	260	7.18 (8.37)	3.02 (4.09)	3.41 (2.58)	116.74	45.12
	Fall	260	9.50 (7.57)	4.50 (4.13)	4.81 (3.62)	104.01	40.30
	Winter	260	15.60 (6.27)	7.73 (3.82)	6.68 (4.14)	133.63	36.63
JP1	Spring	204	5.88 (1.89)	2.25 (0.78)	3.58 (2.48)	70.09	42.26
	Summer	204	2.82 (1.22)	0.77 (0.35)	2.91 (1.98)	37.94	73.65
	Fall	204	4.85 (2.22)	1.90 (0.95)	3.57 (2.50)	42.78	48.65
	Winter	204	9.64 (2.63)	3.75 (1.60)	4.48 (3.07)	117.23	36.93
JP2	Spring	285	5.07 (3.54)	1.84 (1.84)	3.09 (2.96)	64.47	42.10
	Summer	286	3.12 (2.99)	0.86 (0.90)	2.64 (2.77)	34.70	67.81
	Fall	286	4.27 (3.70)	1.61 (1.69)	3.12 (3.17)	39.09	48.41
	Winter	279	6.98 (4.82)	2.75 (2.48)	3.92 (4.20)	80.81	41.25
Entire domain	Spring	15175	4.59 (6.21)	1.76 (3.12)	1.97 (2.43)	152.65	49.61
	Summer	15207	1.57 (2.61)	0.50 (1.06)	1.59 (1.72)	49.15	70.56
	Fall	15224	3.26 (4.64)	1.18 (2.23)	2.06 (3.05)	77.68	49.21
	Winter	14075	8.85 (10.98)	3.62 (5.55)	3.20 (4.79)	200.21	50.54

[1] The number of data; [2] Unit, $\times 10^{15}$ molecules cm^{-2} ; [3] Standard deviations of the distributions of tropospheric NO_2 columns

Table S2. Average tropospheric NO_2 columns, standard deviations and the ratios of the $\Omega_{NO2/CMAQ/AK}$ to the $\Omega_{NO2/OMI}$, when the INTEX-B and REAS NO_x emissions were applied into China for January.

Region	Inventory for China	n [1]	$\Omega_{CMAQ,AK}$ [2]	Ω_{OMI} [2]	R= $\Omega_{CMAQ,AK}/\Omega_{OMI}$
CEC	INTEX-B	896	12.26 (9.41) [3]	13.92 (9.04)	0.88
	REAS		8.27 (6.49)		0.59
CEC2	INTEX-B	820	11.44 (6.92)	7.85 (6.26)	1.46
	REAS		5.91 (4.47)		0.75
SC	INTEX-B	1124	2.79 (1.86)	2.92 (3.13)	0.96
	REAS		1.91 (1.55)		0.66
SB	INTEX-B	383	5.42 (4.71)	3.34 (2.53)	1.62
	REAS		2.26 (1.75)		0.68
SK	INTEX-B	260	7.32 (4.08)	6.82 (4.64)	1.07
	REAS		7.28 (4.80)		1.07
JP1	INTEX-B	201	3.81 (2.03)	4.72 (2.95)	0.81
	REAS		4.83 (3.10)		1.02
JP2	INTEX-B	180	2.97 (2.84)	5.08 (4.99)	0.58
	REAS		2.93 (2.60)		0.58
Entire domain	INTEX-B	12767	3.24 (5.43)	3.23 (5.11)	1.00
	REAS		2.25 (3.61)		0.70

[1] Number of data; [2] Unit, $\times 10^{15}$ molecules cm^{-2} ; [3] Standard deviations of the distributions of tropospheric NO_2 columns



MAM
JJA
SON
DJF
R=0.76
S=0.98
CEC
R=0.61
S=0.26
R=0.76
S=0.52
R=0.76
S=0.86
R=0.89
S=1.13
CEC2
R=0.85
S=0.89
R=0.81
S=0.76
R=0.80
S=0.90
R=0.79
S=0.55
SC
R=0.82
S=0.31
R=0.80
S=0.28
R=0.70
S=0.46
R=0.71
S=0.69
SB
R=0.75
S=0.33
R=0.66
S=0.43
R=0.65
S=1.47
R=0.86
S=0.96
SK
R=0.88
S=1.39
R=0.74
S=0.84
R=0.71
S=0.66
R=0.73
S=0.23
JP1
R=0.71
S=0.13
R=0.77
S=0.29
R=0.63
S=0.33
R=0.94
S=0.58
JP2
R=0.87
S=0.28
R=0.94
S=0.50
R=0.89
S=0.53
Ω CMAQ w/ AK_KNMI
Ω OMI, KNMI

Fig. S1

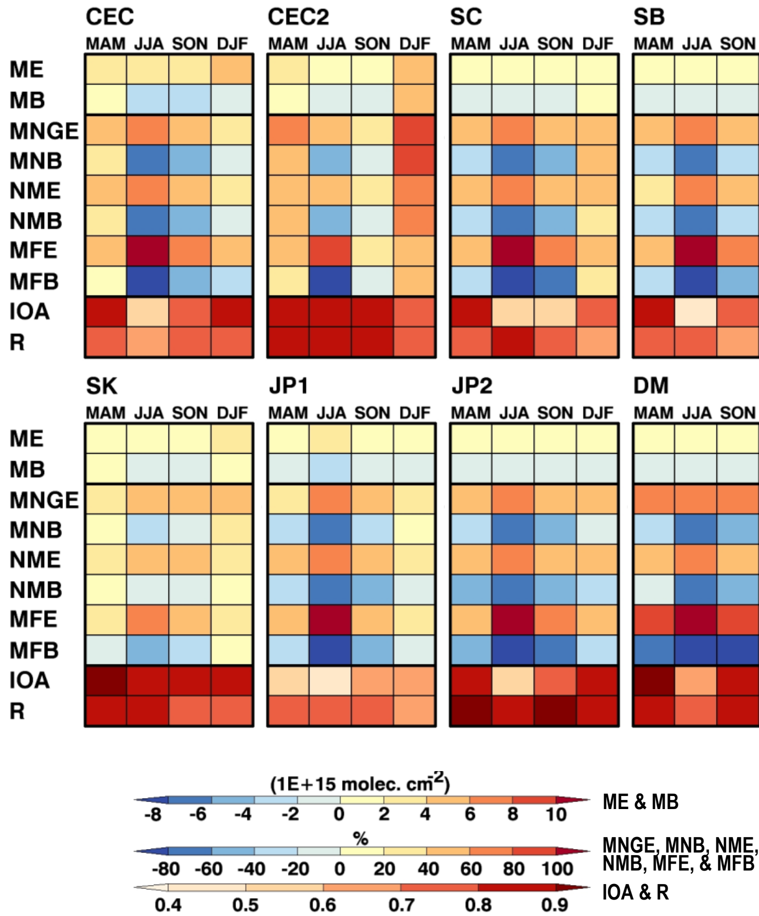

CEC
CEC2
SC
SB
SK
JP1
JP2
DM
MAM JJA SON DJF
ME
MB
MNGE
MNB
NME
NMB
MFE
MFB
IOA
R
(1E+15 molec. cm-2)
-8 -6 -4 -2 0 2 4 6 8 10
ME & MB
%
-80 -60 -40 -20 0 20 40 60 80 100
MNGE, MNB, NME, NMB, MFE, & MFB
0.4 0.5 0.6 0.7 0.8 0.9
IOA & R

Fig. S2