Supplement of

Measurement report: Diurnal variations of brown carbon during two distinct seasons in a megacity in Northeast China

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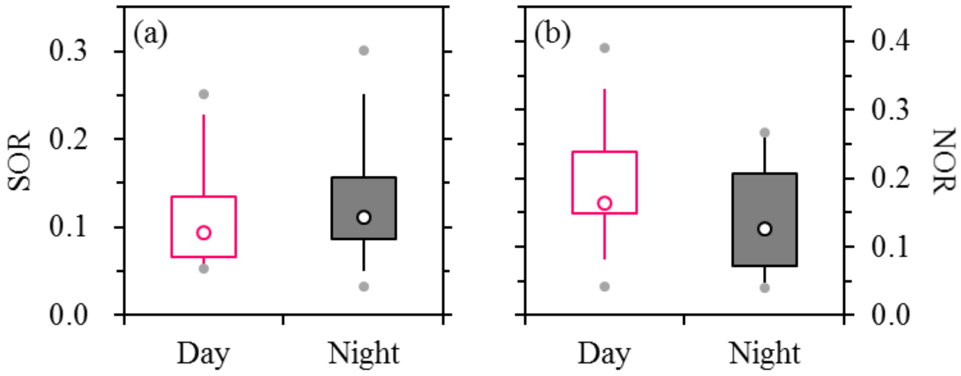

Figure S1. Diurnal variations of **(a)** SOR and **(b)** NOR in spring. NOR were considerably higher during the day, pointing to enhanced photochemistry. Daytime and nighttime SOR were more comparable, presumably due to the rare occurrence of high RH conditions that are favorable for heterogeneous sulfate formation.

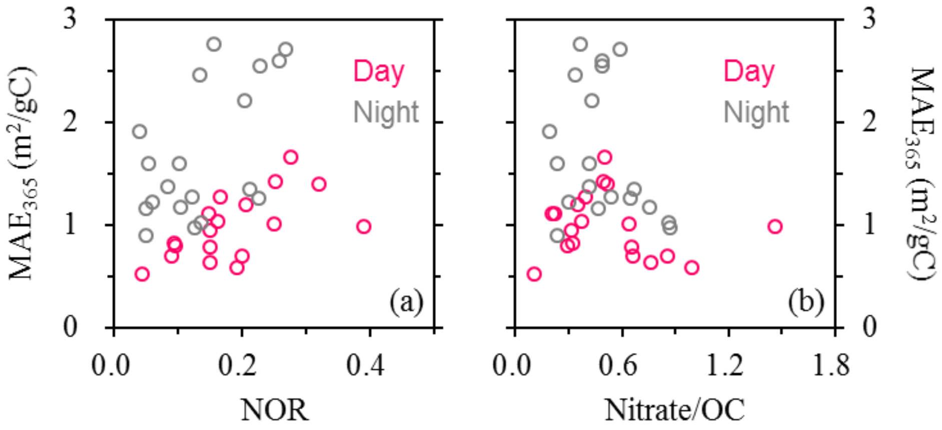

Figure S2. Dependences of MAE_{365} on **(a)** NOR and **(b)** the nitrate to OC ratio in spring. As indicated by the diurnal variations of NOR, nitrate formation was mainly contributed by photochemistry. However, MAE_{365} was independent of NOR or nitrate/OC, suggesting that photochemistry should not be an important influencing factor for the springtime MAE_{365}.

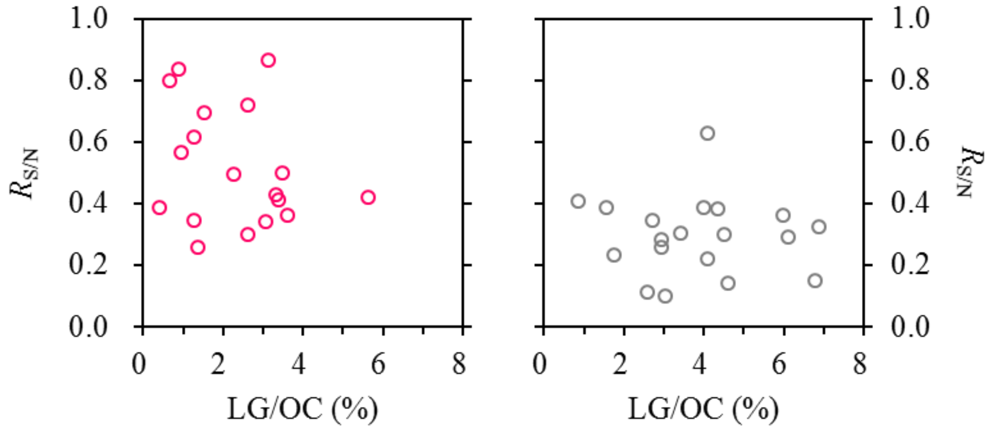

Figure S3. Relationships between $R_{S/N}$ and LG/OC in spring, with daytime and nighttime results shown in the left and night panels, respectively.

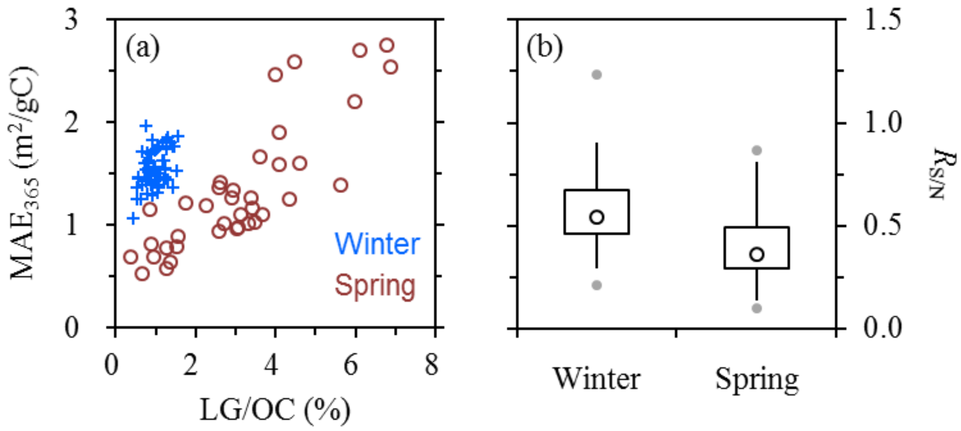

Figure S4. Comparisons of **(a)** the MAE_{365} vs. LG/OC relationship and **(b)** $R_{S/N}$ between winter and spring.

Table S1. Summary of observational results in January, 2021.

	Daytime	Nighttime	All
Temperature (℃)	–16.23 ± 5.13	–21.28 ± 5.54	–18.72 ± 5.87
Relative humidity (%)	70.73 ± 8.10	81.10 ± 5.03	75.83 ± 8.51
OC (μgC/m^3)	21.53 ± 8.54	21.27 ± 11.94	21.40 ± 10.26
MSOC (μgC/m^3)	19.74 ± 7.73	19.56 ± 10.81	19.65 ± 9.29
EC (μgC/m^3)	3.12 ± 1.69	2.62 ± 1.96	2.87 ± 1.83
LG (μg/m^3)	0.45 ± 0.24	0.57 ± 0.44	0.51 ± 0.35
SO_4^{2-} (μg/m^3)	9.49 ± 4.28	7.97 ± 5.03	8.74 ± 4.69
NO_3^- (μg/m^3)	9.53 ± 5.84	9.56 ± 8.24	9.55 ± 7.06
Cl^- (μg/m^3)	2.60 ± 1.22	2.25 ± 1.19	2.43 ± 1.21
NH_4^+ (μg/m^3)	8.10 ± 3.96	7.25 ± 4.80	7.68 ± 4.38
K^+ (μg/m^3)	1.01 ± 0.41	1.08 ± 0.78	1.05 ± 0.62
$(b_{abs})_{365}$ (Mm^{-1})	30.00 ± 13.34	32.48 ± 20.94	31.22 ± 17.39
MAE_{365} (m^2/gC)	1.48 ± 0.18	1.61 ± 0.15	1.55 ± 0.18
AAE[a]	6.76 ± 0.11	7.33 ± 0.14	7.04 ± 0.32
SOR	0.14 ± 0.05	0.16 ± 0.09	0.15 ± 0.07
NOR	0.13 ± 0.05	0.11 ± 0.06	0.12 ± 0.06
$R_{S/N}$	0.69 ± 0.20	0.46 ± 0.13	0.58 ± 0.20
LG/K^+	0.42 ± 0.11	0.50 ± 0.10	0.46 ± 0.11
LG/OC (%)[b]	0.88 ± 0.22	1.10 ± 0.26	0.99 ± 0.26
LG/EC	0.15 ± 0.05	0.22 ± 0.06	0.18 ± 0.07

Note:

[a] Calculated over 310–460 nm;

[b] On a basis of carbon mass.

Table S2. Summary of observational results in April, 2021.

	Daytime	Nighttime	All
Temperature (℃)	13.82 ± 4.47	7.33 ± 4.16	10.58 ± 5.38
Relative humidity (%)	42.65 ± 17.35	62.21 ± 17.43	52.43 ± 19.81
OC (μgC/m^3)	16.64 ± 14.57	22.49 ± 19.99	19.57 ± 17.51
MSOC (μgC/m^3)	14.36 ± 13.06	20.23 ± 18.27	17.30 ± 15.94
EC (μgC/m^3)	1.35 ± 0.94	1.71 ± 0.95	1.53 ± 0.95
LG (μg/m^3)	1.20 ± 1.69	2.53 ± 3.16	1.87 ± 2.59
SO_4^{2-} (μg/m^3)	3.28 ± 2.13	3.38 ± 1.99	3.33 ± 2.03
NO_3^- (μg/m^3)	8.97 ± 9.07	10.79 ± 9.10	9.88 ± 9.01
Cl^- (μg/m^3)	1.79 ± 2.51	4.84 ± 5.88	3.32 ± 4.72
NH_4^+ (μg/m^3)	4.35 ± 3.88	6.33 ± 5.48	5.34 ± 4.79
K^+ (μg/m^3)	1.05 ± 1.21	1.31 ± 1.26	1.18 ± 1.22
$(b_{abs})_{365}$ (Mm^{-1})	17.22 ± 20.53	43.66 ± 53.16	30.44 ± 41.95
MAE_{365} (m^2/gC)	0.98 ± 0.31	1.69 ± 0.65	1.33 ± 0.62
AAE[a]	—	—	—
SOR	0.11 ± 0.06	0.13 ± 0.07	0.12 ± 0.06
NOR	0.18 ± 0.09	0.14 ± 0.08	0.16 ± 0.08
$R_{S/N}$	0.52 ± 0.19	0.30 ± 0.13	0.40 ± 0.20
LG/K^+	0.98 ± 0.45	1.58 ± 0.61	1.28 ± 0.61
LG/OC (%)[b]	2.38 ± 1.36	3.85 ± 1.71	3.11 ± 1.70
LG/EC	0.65 ± 0.46	1.14 ± 1.00	0.89 ± 0.81

Note:

[a] AAE were not provided, since distinct peaks at ~365 nm were frequently observed for the light absorption spectra of BrC.

[b] On a basis of carbon mass.