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Supplement of

Measurement report: Atmospheric nitrate radical chemistry in the South China Sea influenced by the urban outflow of the Pearl River Delta

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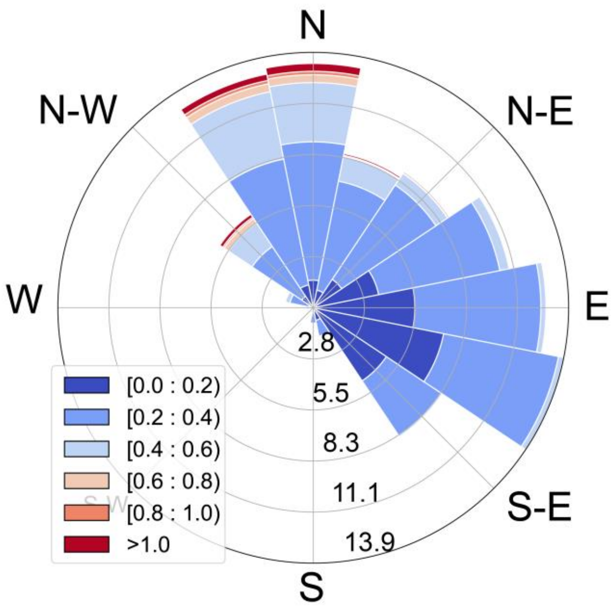

Figure S1. The wind rose plot for nocturnal NO concentrations (ppbv) and wind direction.

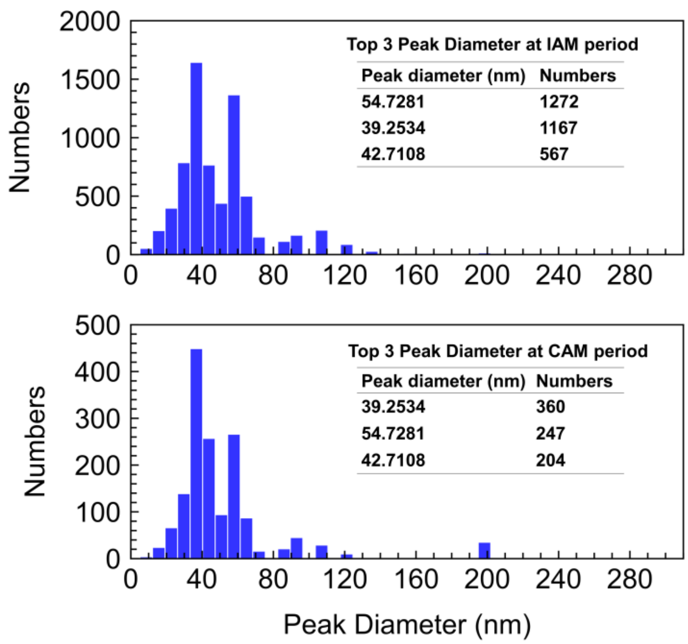

Figure S2. Peak diameter distribution during IAM and CAM period (5 min time resolution).

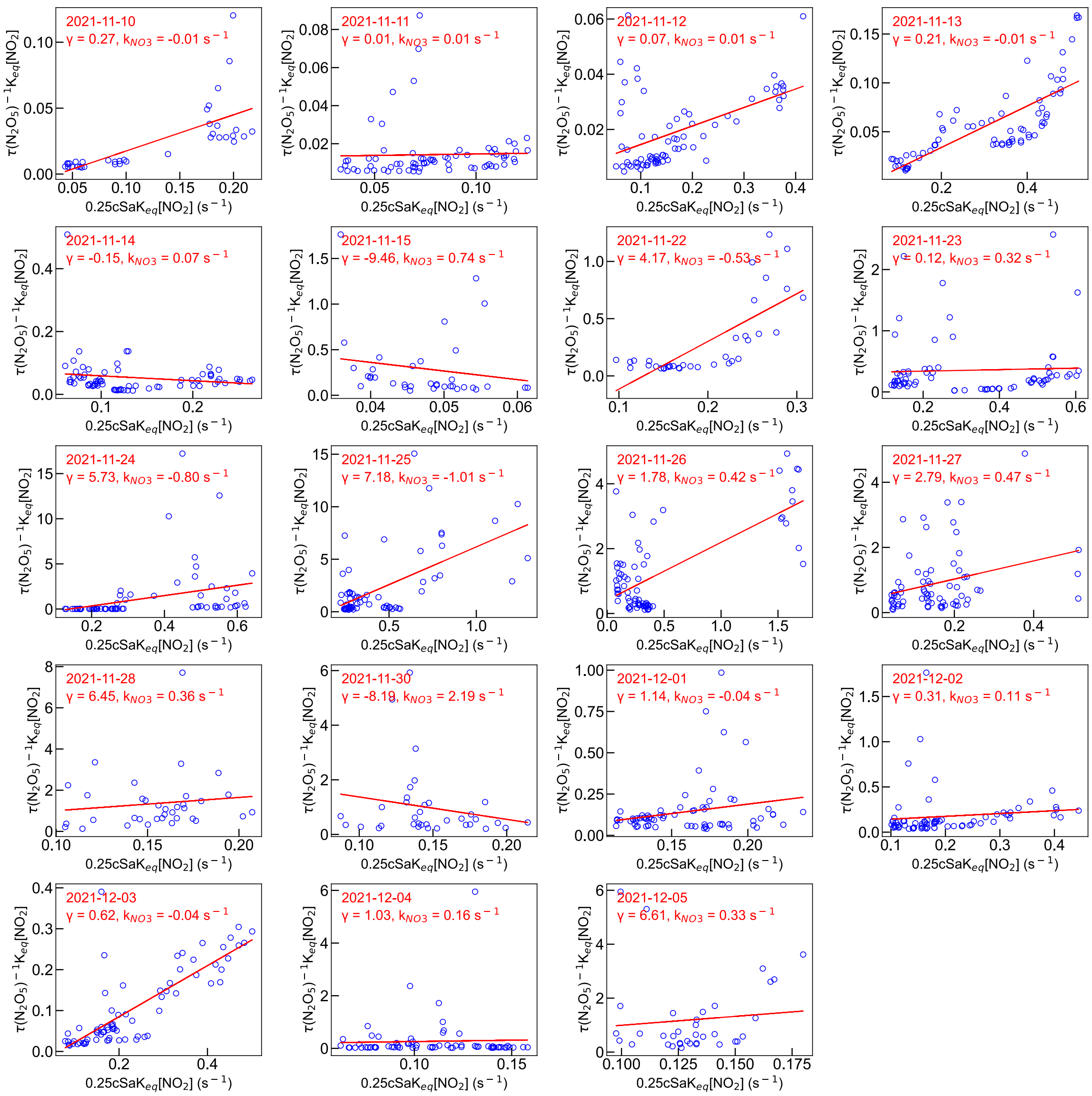

Figure S3. N_2O_5 uptake coefficients derived from scatter plots of K_{eq} [NO_2] $\tau(N_2O_5)^{-1}$ versus 0.25cSaK_{eq} [NO_2], K_{eq}: the equilibrium constant between N_2O_5, NO_2, and NO_3; c: the mean molecular speed of N_2O_5; Sa: the aerosol surface area density; γ: the N_2O_5 uptake coefficient; kNO_3: the indirect NO_3 loss frequency.

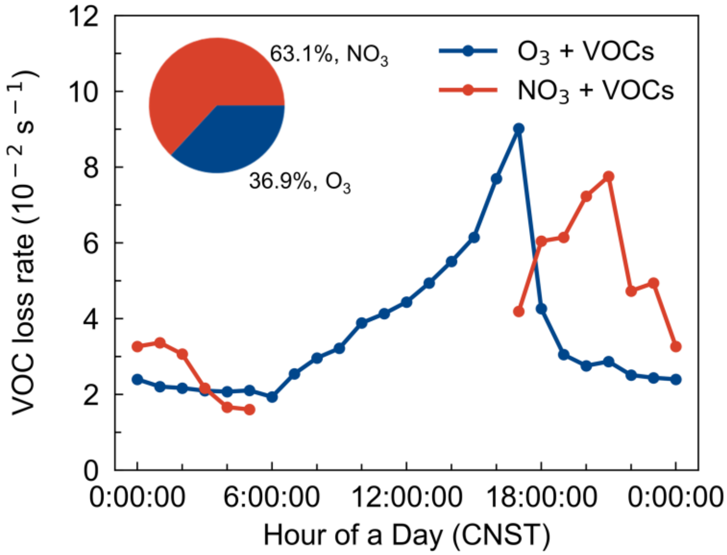

Figure S4. Diurnal profiles (mean ± standard deviation) of VOC oxidation rate by atmospheric oxidants, NO_3 and O_3. The pie chart represents the nocturnal fractions of these two oxidants to VOC oxidation.

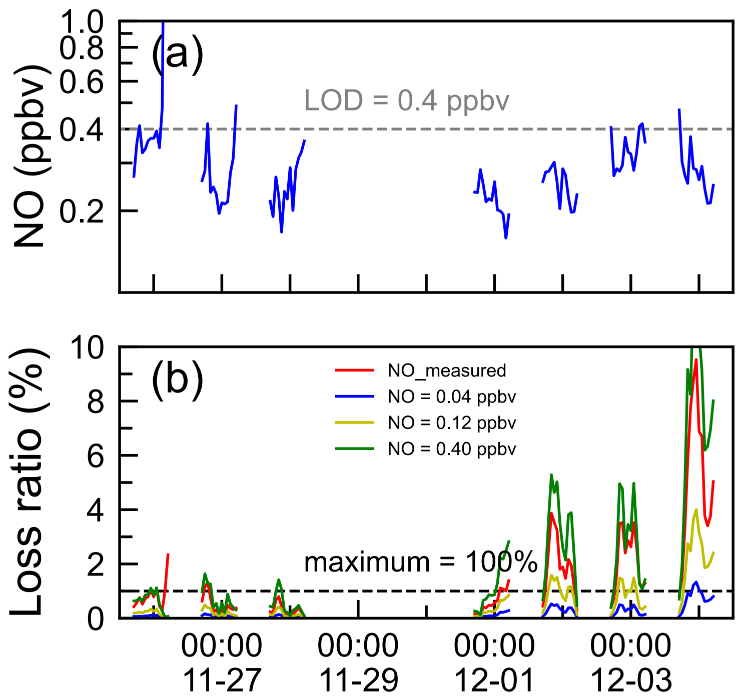

Figure S5. (a) Nighttime NO mixing ratio with the gray dashed line denoting the detection limit of the instrument (0.4 ppbv). (b) The fraction ratio of NO to NO_3 loss, with the black dashed line representing a maximum of 100%.

Table S1. The concentrations of nine most abundant VOCs (pptv) in different air masses.

Species	Period	
	IAM	CAM
Propene	143±90	92±72
Butene	185±130	112±101
Pentenes	14±8	10±6
Styrene	11±20	5±4
DMS	17±6	18±5
Isoprene	38±20	29±20
Monoterpene	6±6	4±3
Phenol	7±3	6±2
Cresol	5±3	3±2

Table S2. Reaction rate coefficients of VOCs with respect to NO_3 used in this study.

	VOC	k (298K) (10^{-12} cm^3 $molecule^{-1}$ s^{-1})	A Factor (10^{-12} cm^3 $molecule^{-1}$ s^{-1})	Ea/R (K)	Ref
	Anthropogenic compound				
1	Phenol	3800	/	/	1
2	Cresol	14000	/	/	1
3	Formaldehyde	0.00056	/	/	1
4	Hexanal	0.0027	/	/	1
5	i-Butane	0.106	/	/	1
6	n-Butane	0.046	/	/	1
7	Indene	4.1	/	/	1
8	Styrene	1500	/	/	1
9	Toluene	0.07	/	/	1
10	cis-2-Pentene	581	/	/	1
11	trans-2-Pentene	647	/	/	1
12	1-Pentene	15	0.39	0	2
13	cis-2-Butene	352	0.35	0	2
14	trans-2-Butene	390	/	/	1
15	n-Pentane	0.087	3.05	3060	2
16	Acetylene	0.21	/	/	3
17	Benzene	0.03	/	/	4
	Biogenic compound				
18	Isoprene	700	3.15	450	1
19	α-Pinene	1190	1.19	-490	1
20	β-Pinene	6160	/	/	1
21	DMS	1100	/	/	5
22	Propane	0.03	/	/	1
23	Propene	9.49	/	/	1
24	1-Butene	14	3.3	2880	2

Ref1: (Atkinson et al., 2003)
Ref2: (Brown et al., 2011)
Ref3: IUPAC
Ref4: Estimated
Ref5: (Brown et al., 2012)

Reference:

Atkinson, R. and Arey, J.: Atmospheric degradation of volatile organic compounds, Chem Rev, 103, 4605-4638, 10.1021/cr0206420, 2003.

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