

1 *Supplement of*

2

3 **Measurement report: Variations and environmental impacts**
4 **of atmospheric N₂O₅ concentrations in urban Beijing during**
5 **the 2022 Winter Olympics**

6 Tiantian Zhang¹, Peng Zuo², Yi Chen², Tong Liu¹, Linghan Zeng², Weili Lin^{1,3*}, Chunxiang
7 Ye ^{2*}

8 ¹NEAC Key Laboratory of Ecology and Environment in Minority Areas, College of Life and Environmental
9 Sciences, Minzu University of China, Beijing, 100081, China

10 ²State Key Joint Laboratory for Environmental Simulation and Pollution Control, College of Environmental
11 Sciences and Engineering, Peking University, Beijing, 100871, China

12 ³Institute of National Security, Minzu University of China, Beijing, 100081, China

13 *Correspondence to:* Weili Lin (linwl@muc.edu.cn) and Chunxiang Ye (c.ye@pku.edu.cn)

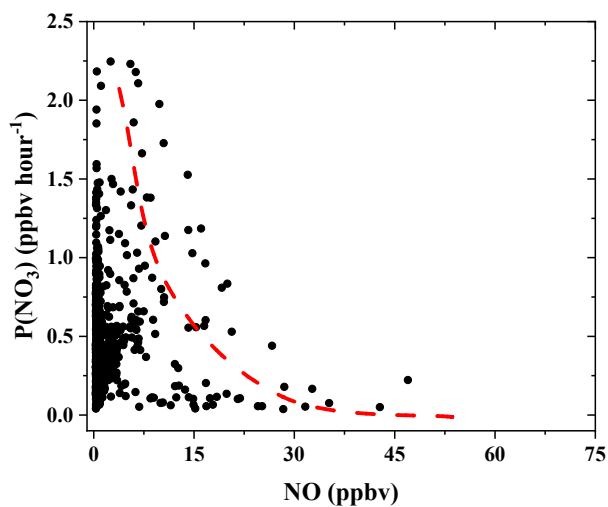


Figure S1. Schematic diagram of the correlation between NO and $P(\text{NO}_3)$.

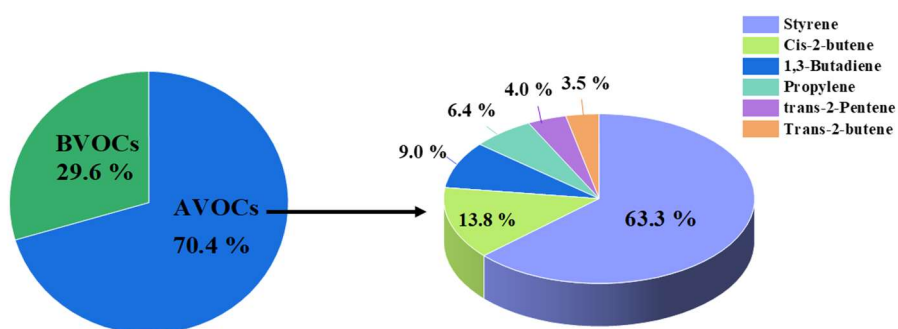


Figure S2. The proportion of reaction activity of NO_3 with different VOCs.

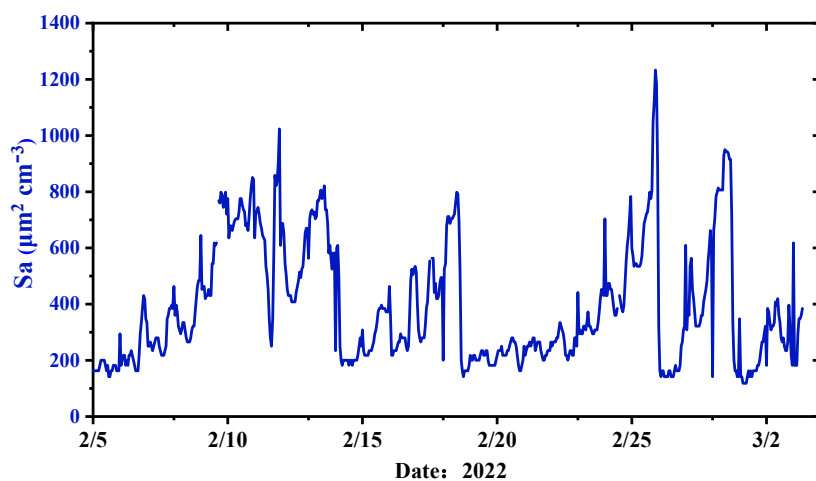


Figure S3. Time-series variations in 1h-mean S_a .

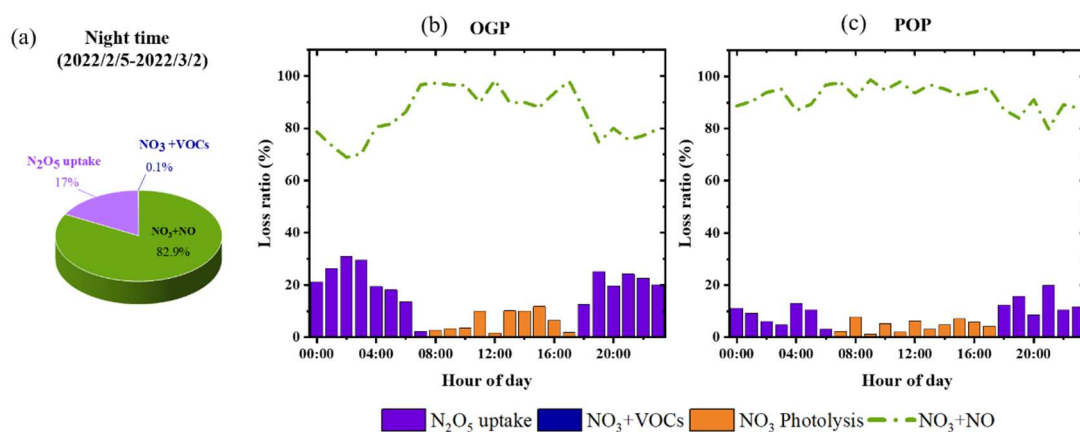


Figure S4. The proportion of NO₃ loss attributed to different loss pathways and average daily variation during the observation period.

Table S1. Reaction rate coefficients of VOCs with respect to NO₃

VOCs	OGP	POP	<i>k</i> (298K)
	Concentration (ppbv)	Concentration (ppbv)	(10 ⁻¹⁵ cm ³ molecule ⁻¹ s ⁻¹)
Ethane	3.61±1.55	4.03±2.12	0.01
Propane	1.91±0.97	2.46±1.67	<0.07
Acetylene	1.41±1.04	1.61±1.09	0.21
Acetone	1.27±0.43	1.55±0.71	<0.03
Ethylene	1.27±1.08	1.44±1.22	0.0049
Styrene	0.006±0.01	0.01±0.01	1500
Cis-2-butene	0.007±0.01	0.01±0.01	352
1,3-Butadiene	0.02±0.01	0.02±0.02	100
Propylene	0.18±0.15	0.22±0.19	9.49
Isoprene (BVOC)	0.01±0.01	0.02±0.02	696

Table S2. N₂O₅ uptake coefficients and NO₃ loss rate coefficients from a nightly steady state analysis

Start Time-End Time	$\gamma(\text{N}_2\text{O}_5)$	$k(\text{NO}_3)(\text{s}^{-1})$	Start Time-End Time	$\gamma(\text{N}_2\text{O}_5)$	$k(\text{NO}_3)(\text{s}^{-1})$
2/06 0:00 - 2/06 05:40	0.0325	0.0713	2/19 20:40 - 2/20 06:00	0.0222	0.1214
2/06 19:00 - 2/07 05:40	0.0216	0.0999	2/20 19:20 - 2/21 06:20	0.011	0.1395
2/07 19:00 - 2/08 06:40	0.0198	0.0868	2/21 20:20 - 2/22 06:00	0.0285	0.1368
2/08 19:20 - 2/09 05:20	0.0296	0.2163	2/22 19:40 - 2/23 06:40	0.0108	0.1847
2/09 18:40 - 2/10 04:00	0.0042	0.3108	2/23 19:00 - 2/24 00:20	0.0053	0.2358
2/10 19:40 - 2/11 04:40	0.0108	0.0384	2/25 19:00 - 2/26 06:40	0.0101	0.062
2/11 18:40 - 2/12 06:40	0.0155	0.0097	2/26 18:20 - 2/27 02:40	0.024	0.1655
2/13 19:00 - 2/14 07:00	0.2244	0.7001	2/27 18:40 - 2/28 20:20	0.0345	0.2158
2/14 18:40 - 2/15 06:20	0.0162	0.3441	2/28 22:00 - 3/01 06:40	0.1232	0.0111
2/15 19:20 - 2/16 05:40	0.0125	0.1554	3/01 18:20 - 3/02 03:00	0.0395	0.0887
2/16 18:20 - 2/17 06:20	0.0043	0.1996	3/02 18:40 - 3/03 04:40	0.0014	0.1186
2/18 19:20 - 2/19 06:40	0.0402	0.1112			