

1 ***Supporting information***

2 **Large particulate nitrate formation from N<sub>2</sub>O<sub>5</sub> uptake in a**  
3 **chemically reactive layer aloft during wintertime in Beijing.**

4 *Haichao Wang<sup>1</sup>, Keding Lu<sup>1\*</sup>, Xiaorui Chen<sup>1</sup>, Qindan Zhu<sup>1,#</sup>, Zhijun Wu<sup>1</sup>, Yusheng*  
5 *Wu<sup>1</sup>, Kang Sun<sup>2</sup>*

6 <sup>1</sup>State Key Joint Laboratory of Environmental Simulation and Pollution Control, College of  
7 Environmental Sciences and Engineering, Peking University, Beijing, China

8 <sup>2</sup>China National Environmental Monitoring Centre, Beijing, China

9 <sup>#</sup>Now at the Department of Chemistry, University of California, Berkeley, CA 94720, USA

10

11 \*Correspondence to: *Keding Lu* ([k.lu@pku.edu.cn](mailto:k.lu@pku.edu.cn))

12

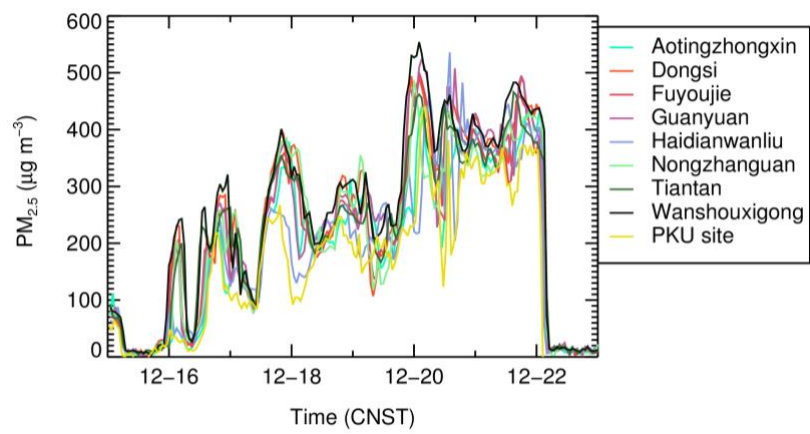
13 **Lists of support information:**

14 **Figure S1.** The time series of PM<sub>2.5</sub> from December 16 to 22, 2016 observed by PKU  
15 and a number of national monitoring sites in Beijing.

16 **Figure S2.** Intercomparison of NO<sub>x</sub> and O<sub>3</sub> at PKU and IAP site.

17 **Figure S3.** The vertical profiles of NO<sub>x</sub> and O<sub>3</sub> in the noon on December 18, 2016 at  
18 IAP site.

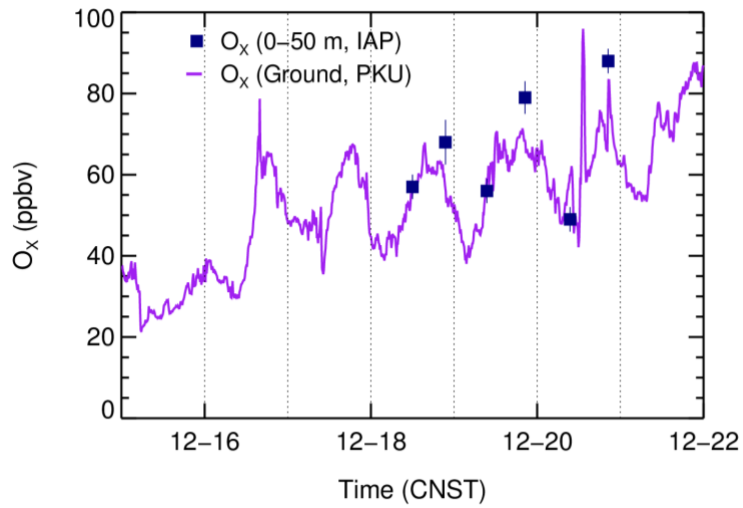
19 **Table S1.** The instrumentation and parameter details at PKU site.



21

22 **Figure S1.** The similarity of the PM<sub>2.5</sub> concentrations at different sites throughout  
23 urban Beijing demonstrated that the observed PM pollution was a regional event.

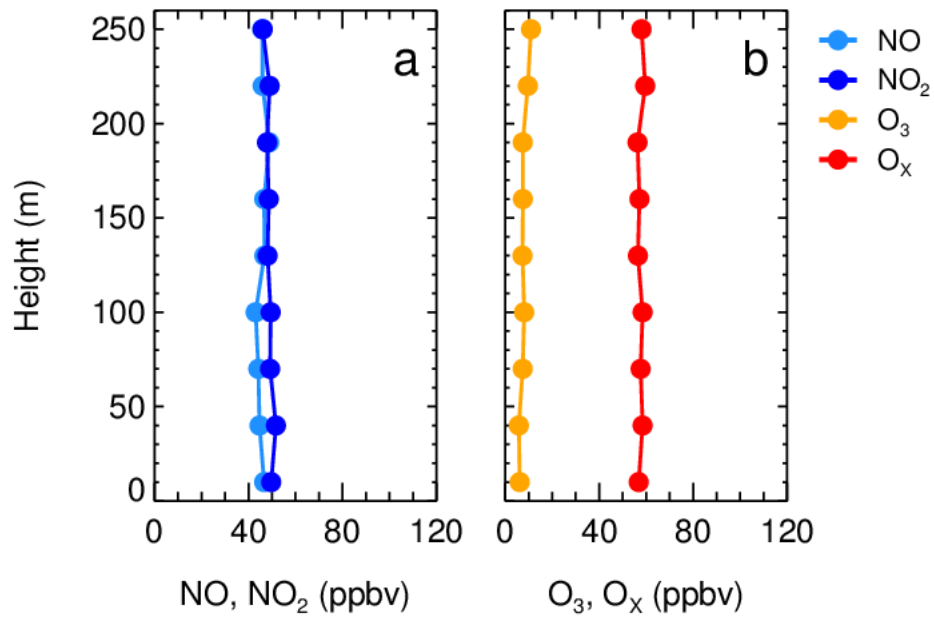
24



25

26 **Figure S2.** The intercomparison of the  $O_x$  concentrations at PKU (purple line) and IAP  
 27 site (navy square), the navy line shows the standard deviation at IAP site, the  
 28 consistency in the two sites demonstrated that the observed  $O_x$  pollution was also a  
 29 regional event.

30



32

33 **Figure S3.** Vertical profiles of NO<sub>2</sub>, NO, O<sub>3</sub>, and O<sub>x</sub> at 11:31-12:00 in the morning of  
34 December 18, 2016. Suggesting the trace gases was well mixed in the noon.

35

36 **Table S1.** Measured parameters and the corresponding measurement instruments from  
37 PKU site.

Species	Detection of limit	Method	Accuracy
NO	60 pptv ( $2\sigma$ , 1min)	Chemiluminescence (CL)	$\pm 20\%$
NO <sub>2</sub>	0.3 ppbv ( $2\sigma$ , 1min)	Photolytic converter + CL	$\pm 20\%$
O <sub>3</sub>	0.5 ppbv ( $2\sigma$ , 1min)	UV photometry	$\pm 5\%$
PM <sub>2.5</sub>	0.1 $\mu\text{g m}^{-3}$ (1 min)	TEOM 1400A analyzer	$\pm 5\%$
PNSD	14 nm -600 nm (4 min)	SMPS	$\pm 20\%$

38