



## Supplement of

## **Rapid increase in summer surface ozone over the North China Plain during 2013–2019: a side effect of particulate matter reduction control?**

Xiaodan Ma et al.

Correspondence to: Jianping Huang (jianping.huang@noaa.gov) and Tianliang Zhao (tlzhao@nuist.edu.cn)

The copyright of individual parts of the supplement might differ from the CC BY 4.0 License.

## List of Supplemental Figures

Fig. S1 Spatial distributions of a) $NO_x$ and b) VOCs emissions from Multi-resolution
Emission Inventory in China used in this study
Fig. S2 A comparison of spatial distributions of monthly mean of NO <sub>2</sub> ( $\mu$ g m <sup>-3</sup> )
monitored by China National Environmental Monitoring Center between (a)
2013 and (b) 2019 in eastern China (NCP indicated by the
box)
Fig. S3 Long-term changes in monthly mean of observed Ox (NO <sub>2</sub> +O <sub>3</sub> ) averaged over
the North China Plain (a) and urban areas Beijing in daytime (redline) and
nighttime (blackline) in June over the period of 2013-2019
Fig. S4 A comparison of monthly means of (a) the maximum daily 8-h average (MDA8)
O <sub>3</sub> (ppb), (b) particulate matters with aerodynamic diameter of 2.5 micrometers
(PM <sub>2.5</sub> ) ( $\mu g m^3$ ), (c) aerosol optical depth (AOD), (d) Tropospheric Column of
NO <sub>2</sub> (TCNO <sub>2</sub> ) (10 <sup>15</sup> cm <sup>-2</sup> ), (e) daily max temperature at 2 m (T <sub>2max</sub> ) (°C), (f)
short-wave radiation (W m <sup>-2</sup> ), and (g) planetary boundary layer height (PBLH)
(m) in North China Plain over the period of 2013–2019
Fig. S5 Average diurnal profiles of (a) O <sub>3</sub> , (b) NO <sub>2</sub> , (c) PM <sub>2.5</sub> in June of 2013 (black.
lines) and 2019 (red lines)
Fig. S6 Long-term changes in monthly mean of observed $NO_2$ averaged over the North.
China Plain in June over the period of 2013–2019



Figure S1. Spatial distributions of a)  $NO_x$  and b) VOCs emissions from Multi-resolution Emission Inventory in June for year-2013 in China used in this study (<u>http://www.meicmodel.org/</u>).



Figure S2. A comparison of spatial distributions of monthly mean of NO<sub>2</sub> (µg m<sup>-3</sup>) monitored by China National
Environmental Monitoring Center between (a) 2013 and (b) 2019 in eastern China (NCP indicated by the box).



**Figure S3.** Long-term changes in monthly mean of observed Ox ( $NO_2 + O_3$ ) averaged over the North China Plain (a) and urban areas Beijing in daytime (redline) and nighttime (blackline) in June over the period of 2013–2019.



Figure S4. A comparison of monthly means of (a) the maximum daily 8-h average (MDA8) O<sub>3</sub> (ppb), (b) particulate matters with aerodynamic diameter of 2.5 micrometers (PM<sub>2.5</sub>) (μg m<sup>3</sup>), (c) aerosol optical depth
(AOD), (d) Tropospheric Column of NO<sub>2</sub> (TCNO<sub>2</sub>) (10<sup>15</sup> cm<sup>-2</sup>), (e) daily max temperature at 2 m (T<sub>2max</sub>) (°C), (f) short-wave radiation (W m<sup>-2</sup>), and (g) planetary boundary layer height (PBLH) (m) in North China Plain over the period of 2013–2019.



115 Figure S5. Average diurnal profiles of (a) O<sub>3</sub>, (b) NO<sub>2</sub>, (c) PM<sub>2.5</sub> in June of 2013 (black lines) and 2019 (red lines).



Figure S6. Long-term changes in monthly mean of observed surface  $NO_2$  averaged over the North China Plain in June over the period of 2013–2019.