Supplemental Material

Current and future prediction of inter-provincial transport of ambient PM$_{2.5}$ in China

Shansi Wang$^1$, Siwei Li$^{1,2,*}$, Jia Xing$^3$, Yu Ding$^1$, Senlin Hu$^1$, Shuchang Liu$^2$, Yu Qin$^4$, Zhaoxin Dong$^3$, Jiaxin Dong$^1$, Ge Song$^1$, Lechao Dong$^1$

1 School of Remote Sensing and Information Engineering, Wuhan University, Wuhan, 430079, China
2 State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan, 430079, China
3 School of Environment, Tsinghua University, Beijing, 100084, China
4 Map Institute of Guangdong Province, Guangzhou, 510075, China

Corresponding author:
Siwei Li (siwei.li@whu.edu.cn)
**Figure S1.** The quasi-provinces administrative division and topography in China

(a) 21 tagged regions, including five principal regions, are differentiated by color.

21 tagged regions are Beijing, Tianjin city and Hebei Province noted as BTH. Jiangsu-Shanghai including Jiangsu Province and Shanghai city. Southeast (SE) including two Province (Fujian and Taiwan Province). South including three Province (Guangdong, Guangxi and Hainan Province, Hong Kong special administrative region). Southwest (WE) including two Province (Yunnan and Guizhou Province). Northwest (NW) including three province (Qinghai, Gansu, and Ningxia Province). Northeast (NE) including three Province (Heilongjiang, Jilin and Liaoning Province).

Other provinces are tagged individually. Thus all 21 tagged regions are NE, Neimenggu (NMG), BTH, Shandong (SD), Shanxi (SX), Shaanxi (QIN), Henan (Henan), Hubei (HUB), Hunan (HUN), Jiangxi (JX), Anhui (AH), Jiangsu-Shanghai (JS) Zhejiang (ZJ), SE, S, SW, NW, Xizang (XZ), Xinjiang (XJ), Chongqing (CQ), Sichuan (SC), respectively.

(b) Five key regions discussed, including the North China Plain (denoted as NCP, including Beijing-Tianjin-Hebei region, Shandong and Henan province), the the Yangtze River Delta (denoted as YRD, including Jiangsu-Shanghai region, Zhejiang and Anhui province), the Central China (denoted as HH, including Hubei and Hunan province), Chengyue area (denoted as CY, including Sichuan province and Chongqing region) and the Feiwen Plain (denoted as FW, including Shanxi and Shaanxi province).

(c) The Digital Elevation Model (DEM) of China (unit: meters)
Figure S2. Model performance

RMSE: root mean square error
MFB: the mean fractional bias
MFE: mean fractional error
Figure S3. Simulated and observed PM$_{2.5}$ concentration in 2015 baseline
(a)-(b) January, (c)-(d) April, (e)-(f) July, (g)-(h) October
Figure S4. Transport matrix (percentage) for 4 month in 2015 baseline
Figure S5. Similar to Figure S3, this shows the 2050 SSP585 scenario and (e) shows the annual mean of SSP585.
Figure S6. Similar to Figure S4, this shows the 2050 SSP585 scenario and (e) shows the annual mean of SSP585.
Figure S7. Similar to Figure S3, this shows the 2050 SSP126 scenario and (e) shows the annual mean of SSP126.
Figure S8. Similar to Figure S4, this shows the 2050 SSP126 scenario and (e) shows the annual mean of SSP126.
Figure S9. Near surface wind field simulation in various scenarios. The left, middle, and right panels show the 2015 baseline, SSP 585, and SSP126 scenarios, respectively. From top to bottom row represent January, April, July, and October, respectively. Temperature is represented by shading color (°C).
Figure S10. Similar to Figure S9, the difference of near surface wind field between 2050 and 2015. The left and right panels show SSP 585 and SSP126 scenarios, respectively. From top to bottom row represent January, April, July, and October, respectively. Shading color represents temperature anomalies (°C).