



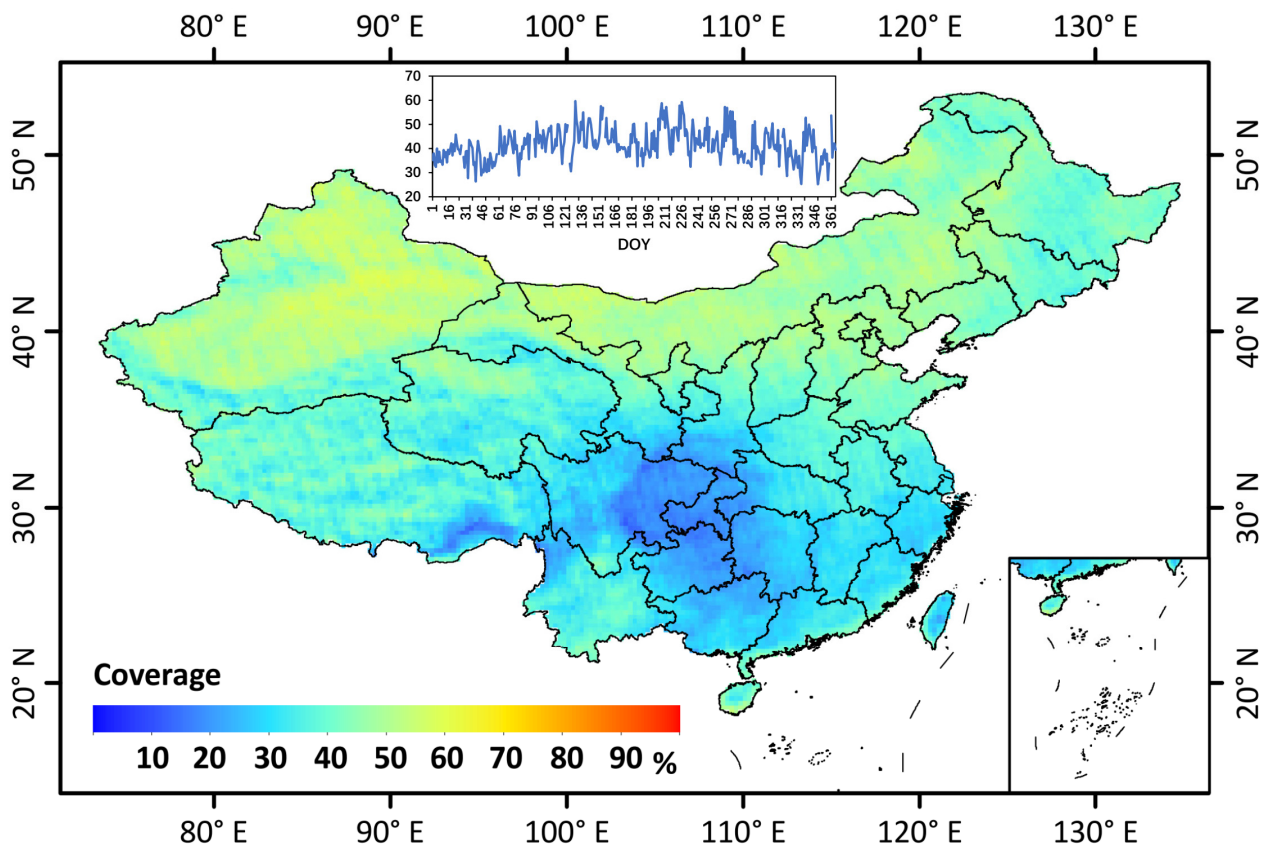
*Supplement of*

## **Ground-level gaseous pollutants (NO<sub>2</sub>, SO<sub>2</sub>, and CO) in China: daily seamless mapping and spatiotemporal variations**

**Jing Wei et al.**

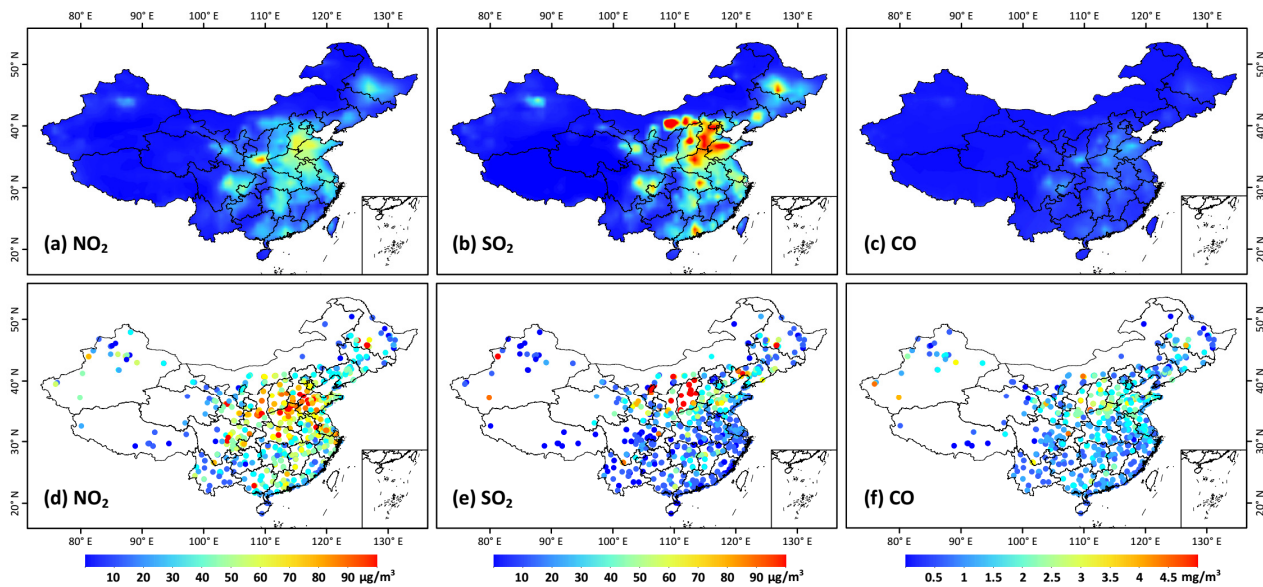
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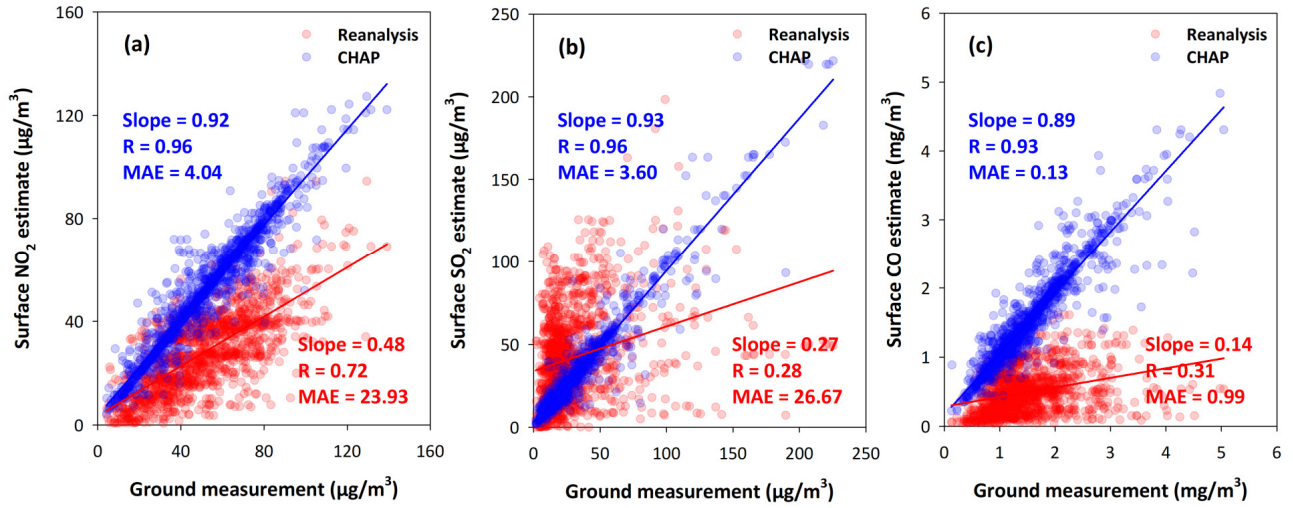
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**Figure S1.** Spatial coverage (%) of official OMI/Aura daily tropospheric NO<sub>2</sub> retrievals in China, averaged over the period 2013–2020. The inset figure shows the average coverage on each day of the year.

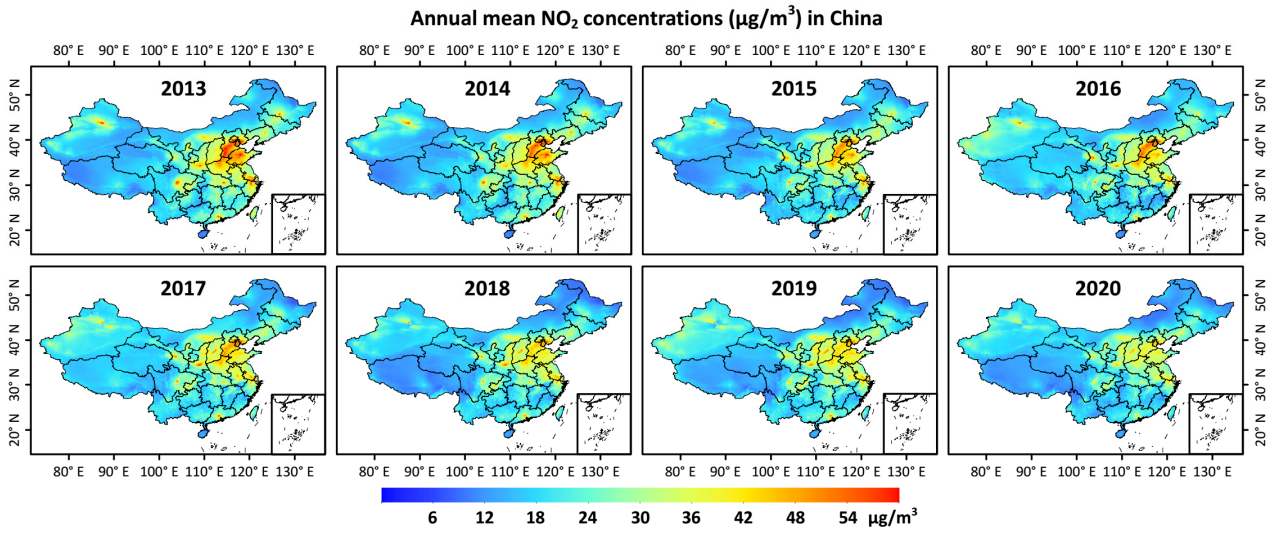


**Figure S2.** Similar to Figure 2, but for CAMS NO<sub>2</sub> (µg/m<sup>3</sup>), SO<sub>2</sub> (µg/m<sup>3</sup>), and CO (mg/m<sup>3</sup>) simulations modelled on the Earth's surface on 1 January 2018 in China.

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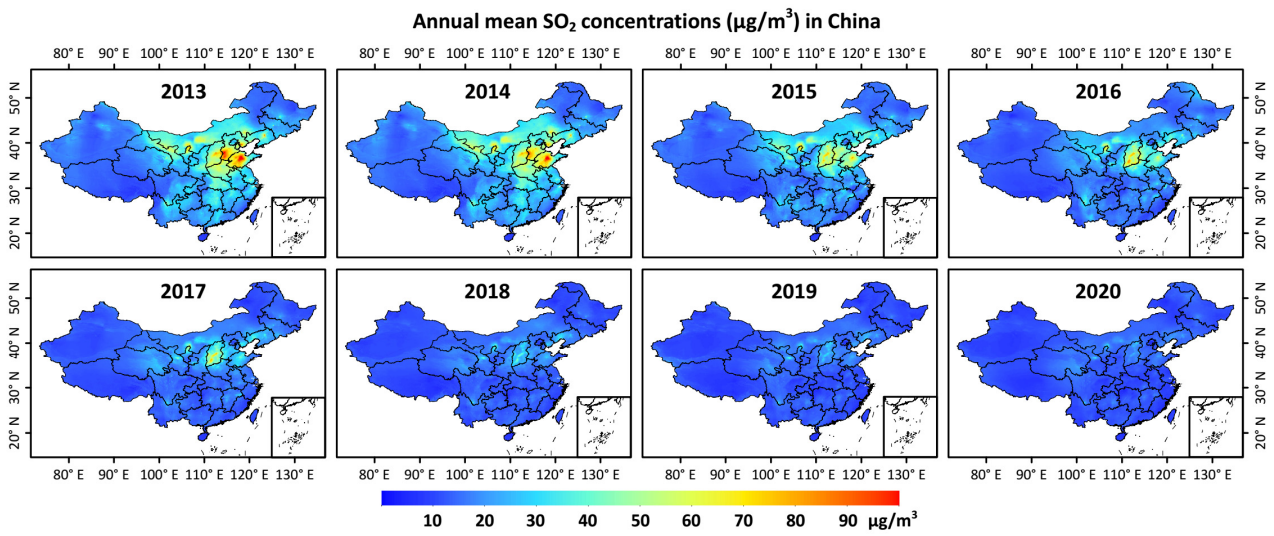


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 34 **Figure S3.** Validation and comparison of surface (a) NO<sub>2</sub> (μg/m<sup>3</sup>), (b) SO<sub>2</sub> (μg/m<sup>3</sup>), and (c) CO  
 35 (mg/m<sup>3</sup>) concentrations collected from CAMS reanalysis (in red) and the CHAP dataset (in  
 36 blue) against ground-based measurements on 1 January 2018 in China.  
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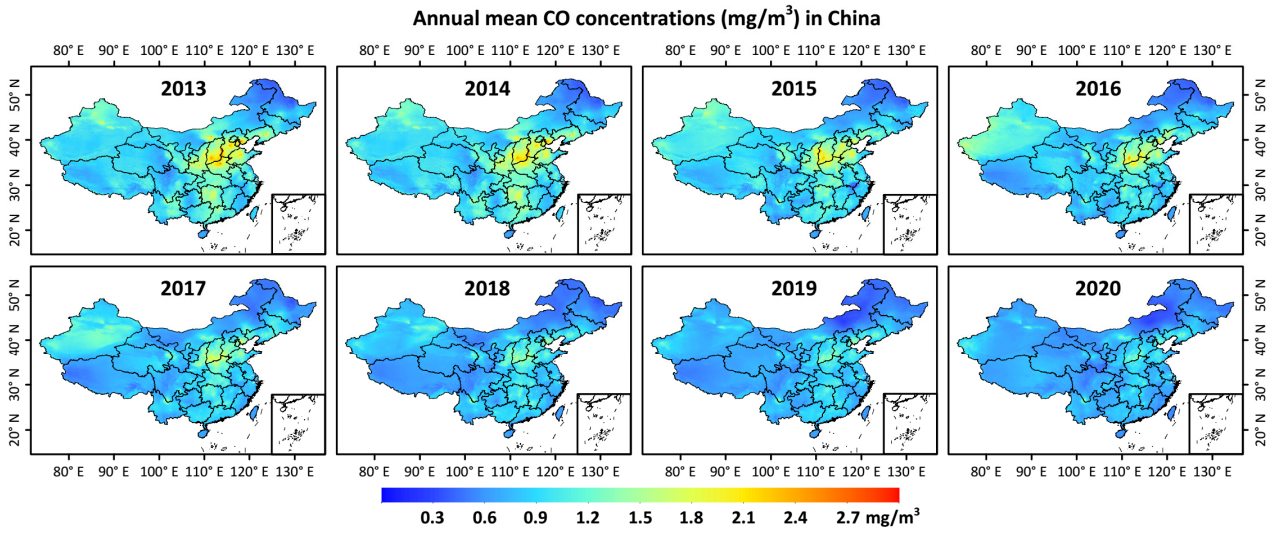
**Figure S4.** Spatial distributions of annual mean ground-level NO<sub>2</sub> concentrations (μg/m<sup>3</sup>, horizontal resolution = 10 km) for each year from 2013 to 2020 in China.

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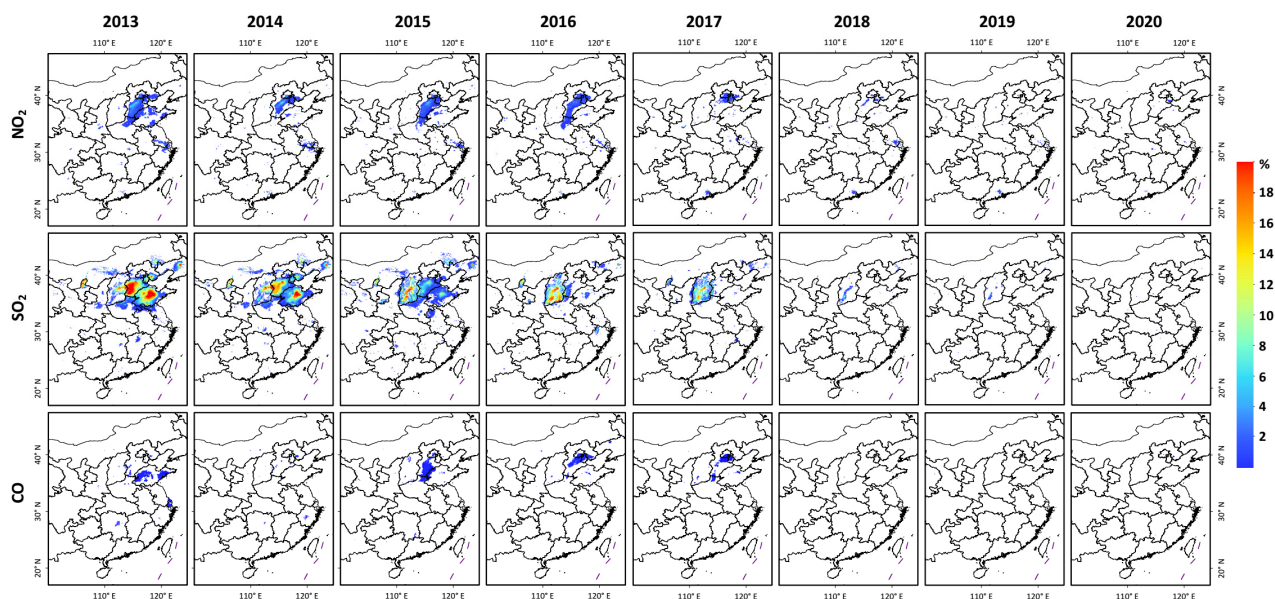
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**Figure S5.** Spatial distributions of annual mean ground-level SO<sub>2</sub> concentrations (μg/m<sup>3</sup>, horizontal resolution = 10 km) for each year from 2013 to 2020 in China.



**Figure S6.** Spatial distributions of annual mean ground-level CO concentrations (mg/m<sup>3</sup>, horizontal resolution = 10 km) for each year from 2013 to 2020 in China.

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**Figure S7.** Spatial distributions of the percentage of days exceeding the WHO recommended short-term minimum interim target for ground-level NO<sub>2</sub> (daily mean > 120  $\mu\text{g}/\text{m}^3$ ), SO<sub>2</sub> (daily mean > 125  $\mu\text{g}/\text{m}^3$ ), and CO (daily mean > 7  $\text{mg}/\text{m}^3$ ) for each year from 2013 to 2020 in populated areas of eastern China.

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**Table S1.** Summary of big data used in this study.

Category	Scientific Dataset	Abbreviation	Spatial Resolution	Temporal Resolution	Time Period	Data Source	Version
Measurements	NO <sub>2</sub> , SO <sub>2</sub> , CO	-	In situ	Hourly	2013–2020	MEE	–
Satellite remote sensing products	Tropospheric NO <sub>2</sub> column	NO <sub>2</sub>	0.25°×0.25°	Daily	2013–2020	OMI	–
	Normalized difference vegetation index	NDVI	0.05°×0.05°	Monthly	2013–2020	MOD13C2	6.1
	Surface elevation	DEM	90 m	-	-	SRTM	4.1
	Population distribution	POP	1 km	Annual	2013–2020	LandScan™	–
Meteorological reanalysis	2-m air temperature	TEM	0.1°×0.1°	Hourly	2013–2020	ERA5	–
	Precipitation	PRE					
	Evaporation	ET					
	Surface pressure	SP					
	10-m u-component of wind	WU					
	10-m v-component of wind	WV					
	Boundary-layer height	BLH	0.25°×0.25°	Hourly	2013–2020	ERA5-Land	–
	Relative humidity	RH					
Model simulations	SO <sub>2</sub> surface mass concentration	SO <sub>2</sub>	0.3125°×0.25°	3-hourly	2015–2020	GEOS-FP reanalysis	1
	CO surface concentration	CO					
	SO <sub>2</sub> surface mass concentration	SO <sub>2</sub>	0.625°×0.5°	Hourly	2013–2020	MERRA2 reanalysis	5.12.4
	CO surface concentration	CO					
	Nitrogen dioxide (model level 60)	NO <sub>2</sub>	0.75°×0.75°	3-hourly	2013–2020	CAMS reanalysis	–
	Sulphur dioxide (model level 60)	SO <sub>2</sub>					
	Carbon monoxide (model level 60)	CO					
Emission inventory	Carbon monoxide	CO	0.1°×0.1°	Monthly	2013–2020	CAMS emission	2.1
	Nitrogen oxides	NO <sub>x</sub>					
	Sulphur dioxide	SO <sub>2</sub>					

57 **Table S2.** Statistics of temporal trends of surface NO<sub>2</sub>, SO<sub>2</sub>, and CO concentrations during the  
 58 whole study period (T<sub>All</sub>, 2013–2020), the Clear Air Action Plan (T<sub>CAAP</sub>, 2013–2017), the 13rd  
 59 Five-Year-Plan (T<sub>FYP</sub>, 2016–2020), and the Blue Sky Defense War (T<sub>BSDW</sub>, 2018–2020) in  
 60 China and three typical regions.

Region	NO <sub>2</sub> (μg/m <sup>3</sup> /yr)				SO <sub>2</sub> (μg/m <sup>3</sup> /yr)				CO (mg/m <sup>3</sup> /yr)			
	T <sub>All</sub>	T <sub>CAAP</sub>	T <sub>FYP</sub>	T <sub>BSDW</sub>	T <sub>All</sub>	T <sub>CAAP</sub>	T <sub>FYP</sub>	T <sub>BSDW</sub>	T <sub>All</sub>	T <sub>CAAP</sub>	T <sub>FYP</sub>	T <sub>BSDW</sub>
China	-0.23***	-0.06	-0.46***	-0.10	-2.01***	-2.28***	-1.54***	-0.46	-0.05***	-0.04***	-0.05***	-0.03***
BTH	-1.21***	-1.04***	-1.43***	-1.07	-6.01***	-7.78***	-3.78***	-0.88	-0.11***	-0.11***	-0.10***	-0.07*
YRD	-0.58***	-0.88***	-0.33	-0.45	-3.13***	-3.53***	-2.57***	-1.16*	-0.04***	-0.05***	-0.03***	-0.02
PRD	-0.51***	-0.93**	-0.21	-1.30	-2.01***	-3.11***	-0.80***	-0.72**	-0.06***	-0.08***	-0.02***	-0.02

61 Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , and \*\*\*  $p < 0.001$ .