SUPPLEMENT

Journal: Atmospheric Chemistry and Physics

Title: Development of a high-resolution emission inventory and its evaluation through air quality modeling for Jiangsu Province, China

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Tables

Table S1. Source categories of the emission inventory for Jiangsu Province, China.

Sector	Subsector	Fuel/product/process	Technology/type	Burner/engine type
Power plant	-	Coal/oil/gas	Pulverized coal boiler/grate stoker/ circulating fluidized bed combustion	Tangentially-fired/ swirl burner/W-flame
Industry	Iron & steel	Coke/sintering/pig iron/ crude steel/casting	Blast furnace/electric furnace/ basic oxygen furnaces	
	Nonferrous metal smelting	Copper/zinc/aluminum/lead		
	Nonmetal mineral production	Cement	Precalciner kilns/shaft kilns/rotary kilns	
		Brick		
		Lime		
	Oil refinery& chemical industry	Oil refinery/sulfuric acid/nitrate acid/ Ammonia production/resin/rubber/fiber		
	Other industry	glass/food/paper		
Solvent use	Industrial use	Textile/printing/metal work/ wood processing/shoe/leather		
	Domestic use	Building paint/dry-cleaning/ household use/pesticide application		
Transportation	On-road	Gasoline/diesel	Light/heavy/Motorcycle	Stage I /II /III/IV/V
	Non-road	Aviation/ships/train/agriculture machine/ tractor/construction machine		
Residential	Fossil fuel combustion	Coal/gas/ liquefied petroleum gas	Stoker furnace/stove	
	Biofuel	Rice straw/wheat residue/corn residue/ bean residue/tuber residue/cotton residue		
	Open biomass burning	Rice straw/wheat residue/corn residue		
Agriculture	Livestock	Cow/horse/donkey/mule/pig/sheep/rabbit		
		Poultry	Meat hen/laying hen/duck/goose	
	Fertilizer use	Fertilizer-N/fertilizer-P/fertilizer-K		
Other sources	Cooking			
	Waste treatment	Wastewater treatment/landfill		
	Human excrement			

Table S2. The penetration rates of FGD, SCR/SNCR, and dust collectors, and the corresponding average removal efficiencies for SO_2, NOx, and TSP for selected emission sources.

Sector	Device	Penetration	Removal efficiency
Power plant	FGD	96.6%	83.3%
	SCR/SNCR	57.4%	37.1%
	Dust collector	98.9%	98.0%
Iron & steel plant			
Sintering	FGD	64.3%	78.0%
Pig iron production	Dust collector	99.9%	95.7%
Steel making	Dust collector	99.3%	94.0%
Cement plant	Dust collector	99.2%	97.3%
Brick plant	Dust collector	7.1%	78.2%
Other industry combustion	FGD	73.4%	62.0%
	SCR/SNCR	4.5%	47.5%
	Dust collector	90.5%	90.4%

Table S3 Model performance statistics of meteorological parameters in D2 at 9km and D3 at 3km resolution for October 2012.

Variables	Parameters	D2 (9km)	D3 (3km)
WS10 (m/s)	Mean OBS	2.4	2.7
	Mean SIM	3.5	3.9
	Bias	1.1	1.2
	RMSE	1.3	1.4
	IOA	0.85	0.73
WD10 (deg)	Mean OBS	141.3	131.3
	Mean SIM	145.4	135.0
	Bias	4.0	3.6
T2 (℃)	Mean OBS	18.1	19.0
	Mean SIM	18.7	19.1
	Bias	0.6	0.1
	RMSE	1.1	1.1
	IOA	0.97	0.97
RH2 (%)	Mean OBS	65.0	66.2
	Mean SIM	61.4	68.5
	Bias	-3.6	2.3
	RMSE	9.7	9.3
	IOA	0.89	0.90

Note: OBS and SIM indicate the results from observation and simulation, respectively. The Bias, IOA and RMSE were calculated using following equations (*P* and *O* indicates the results from modeling prediction and observation, respectively):

$$Bias = \frac{1}{n}\sum_{i=1}^{n}(P_i - O_i);\quad IOA = 1 - \frac{\sum_{i=1}^{n}(P_i - O_i)^2}{\sum_{i=1}^{n}(|P_i - \overline{O}| + |O_i - \overline{O}|)^2};\quad RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(P_i - O_i)^2}$$

Figures

Figure S1.

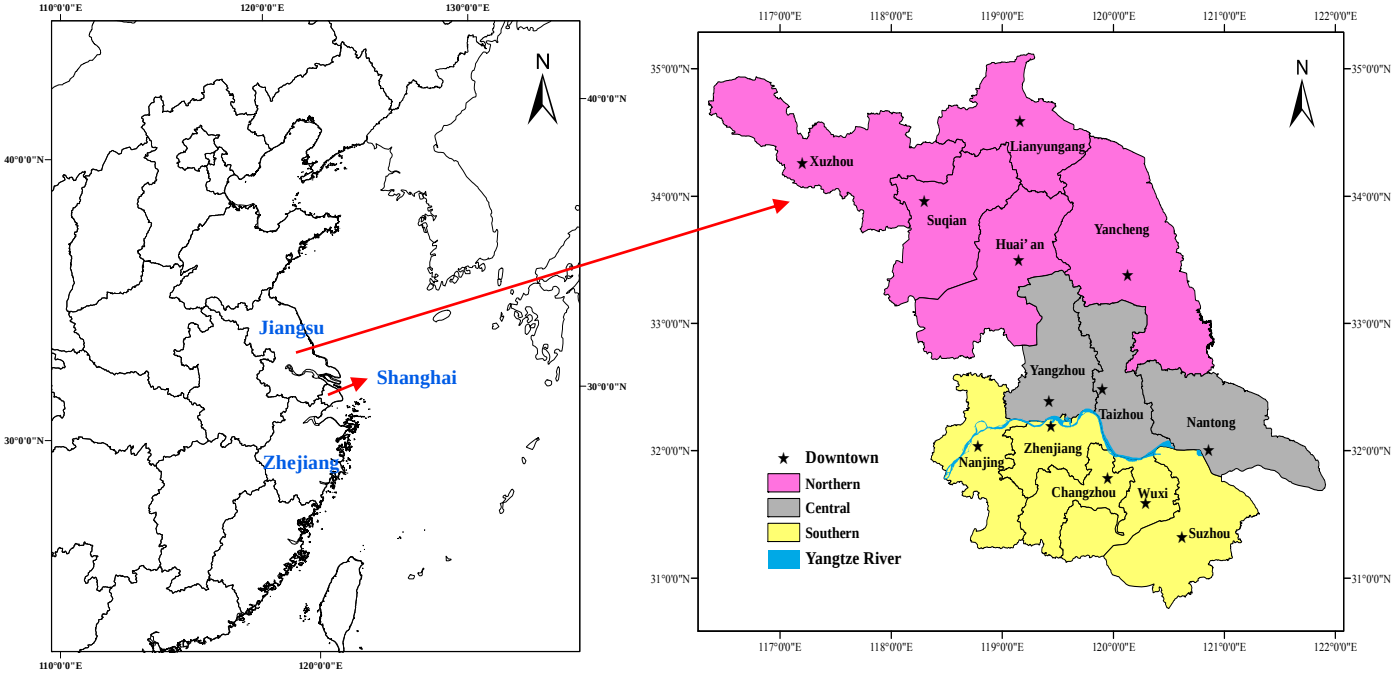
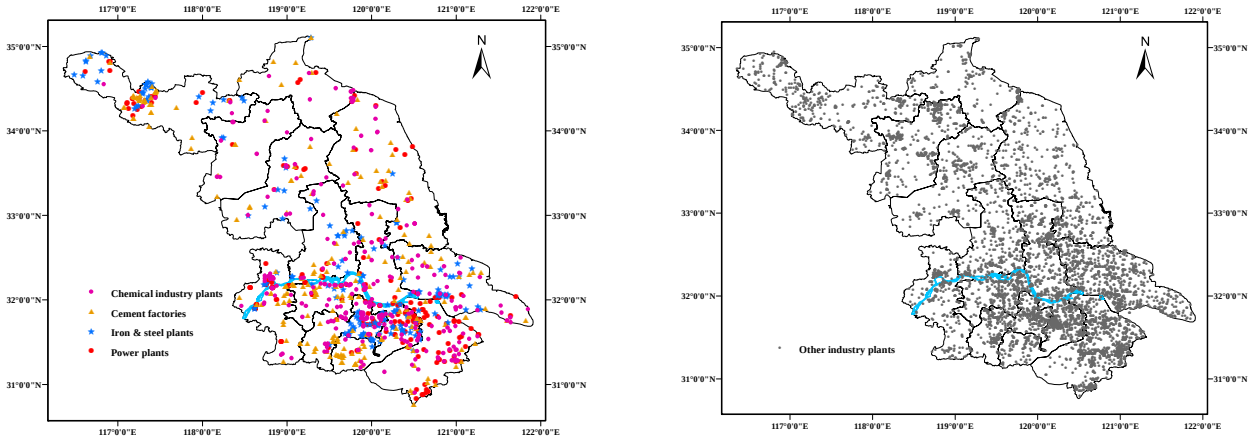
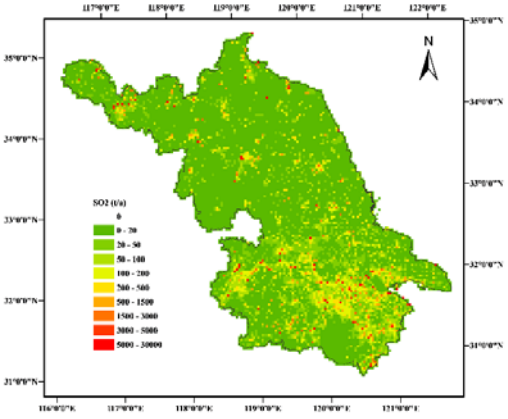


Figure S2.

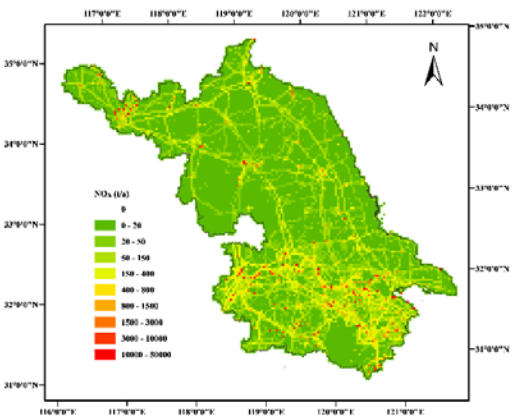

117°0'0"E
118°0'0"E
119°0'0"E
120°0'0"E
121°0'0"E
122°0'0"E
35°0'0"N
34°0'0"N
33°0'0"N
32°0'0"N
31°0'0"N
N
Chemical industry plants
Cement factories
Iron & steel plants
Power plants
Other industry plants

(a) (b)

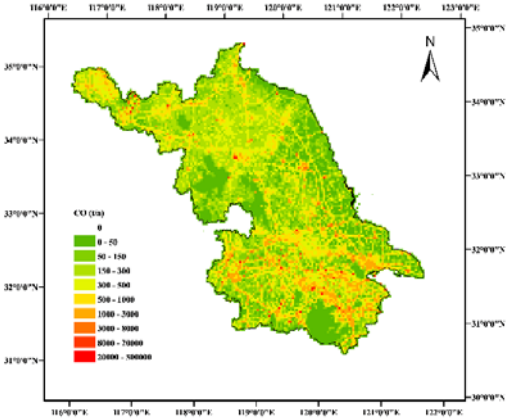
Figure S3.



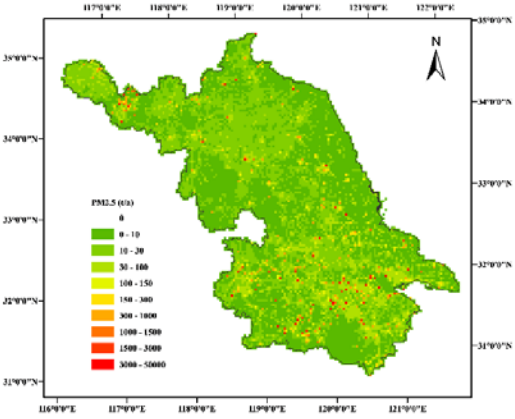
(a) SO_2



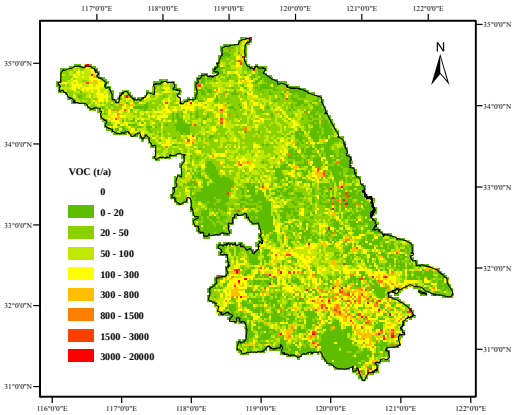
(b) NOx



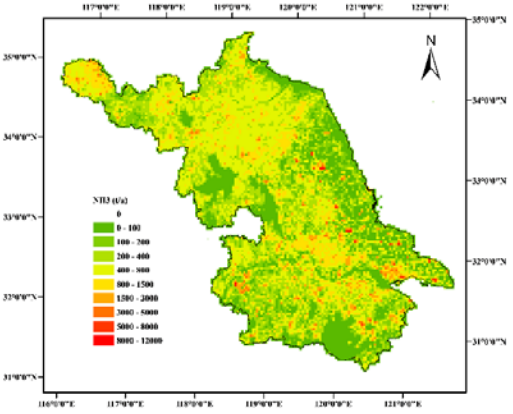
(c) CO



(d) $PM_{2.5}$



(e) VOC



(f) NH_3

Figure S4.

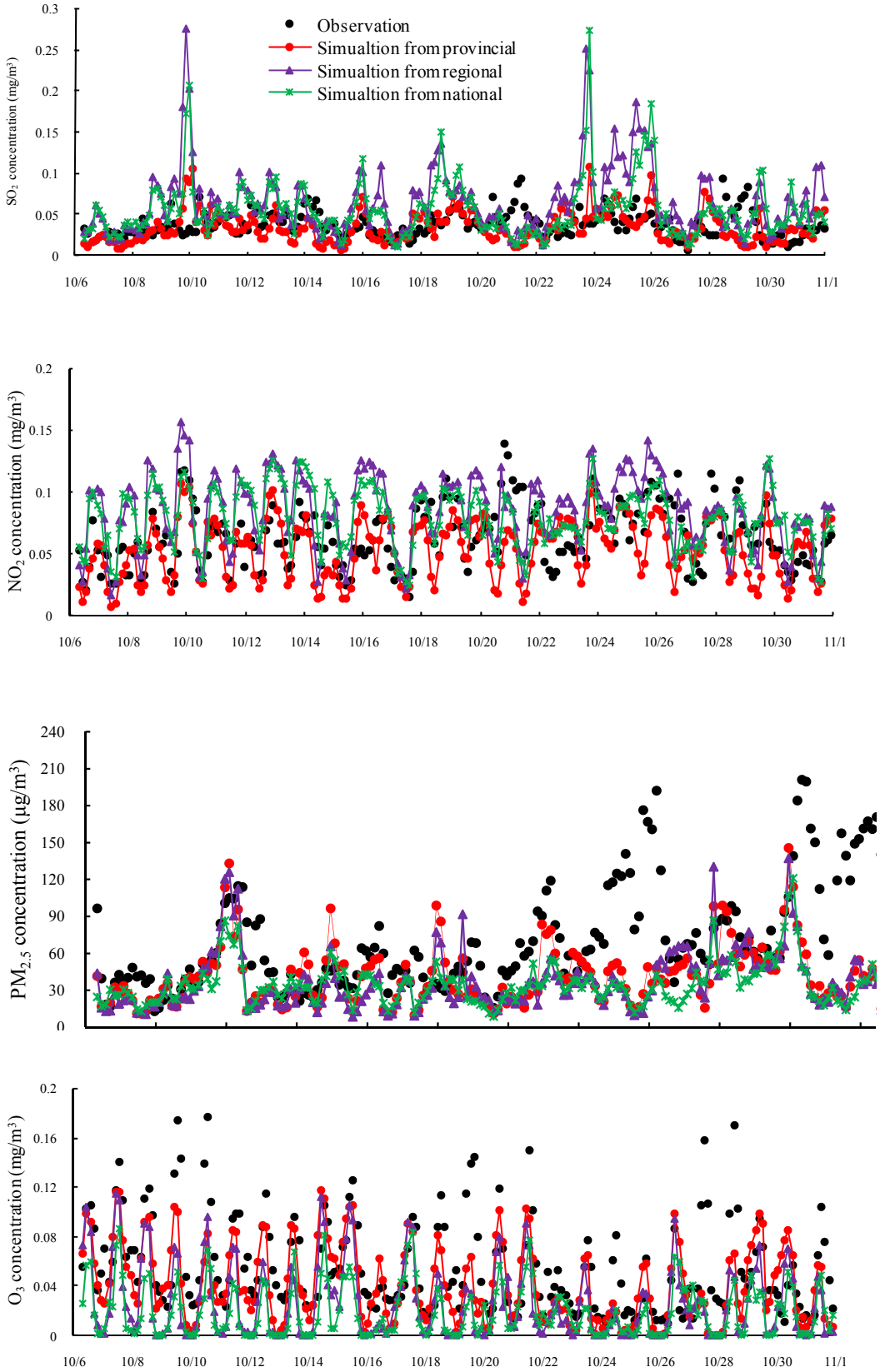
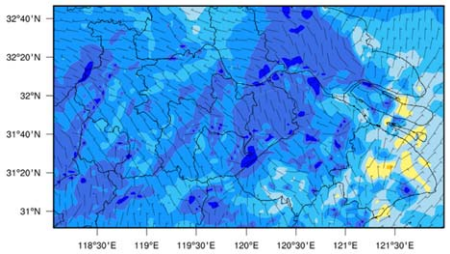
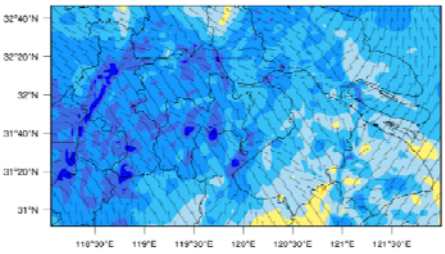

Observation
Simualtion from provincial
Simualtion from regional
Simualtion from national
SO2 concentration (mg/m3)
NO2 concentration (mg/m3)
PM2.5 concentration (μg/m3)
O3 concentration (mg/m3)
10/6
10/8
10/10
10/12
10/14
10/16
10/18
10/20
10/22
10/24
10/26
10/28
10/30
11/1

Figure S5.

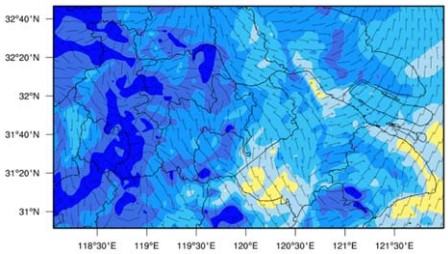
2012/10/9 2pm



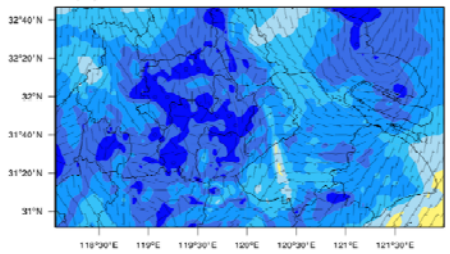
2012/10/9 5pm



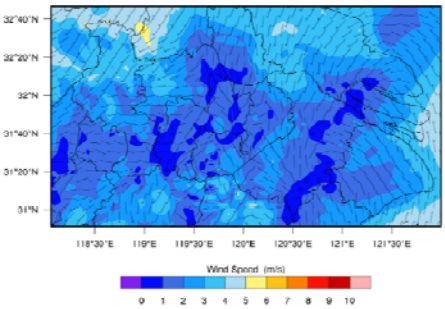
2012/10/9 8pm



2012/10/9 11pm



2012/10/10 2am



2012/10/10 5am

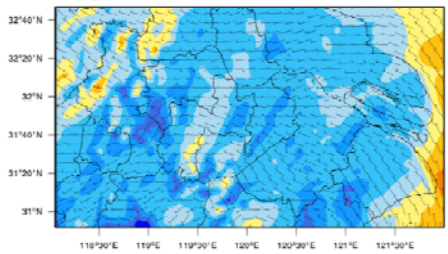


Figure S6.

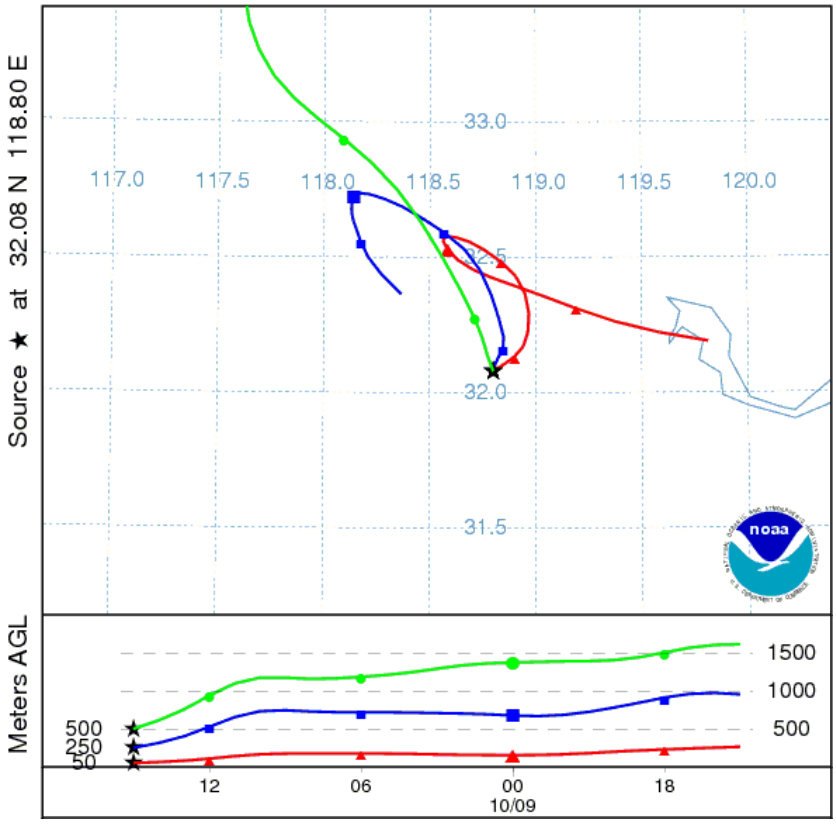
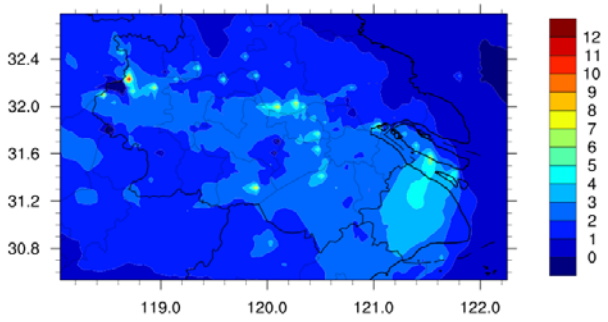
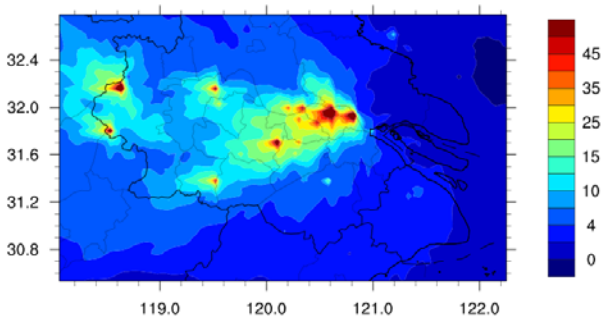

Source ★ at 32.08 N 118.80 E
33.0
32.5
32.0
31.5
117.0
117.5
118.0
118.5
119.0
119.5
120.0
noaa
Meters AGL
1500
1000
500
500
250
50
12
06
00
18
10/09

Figure S7.

(a)



(b)



(c)

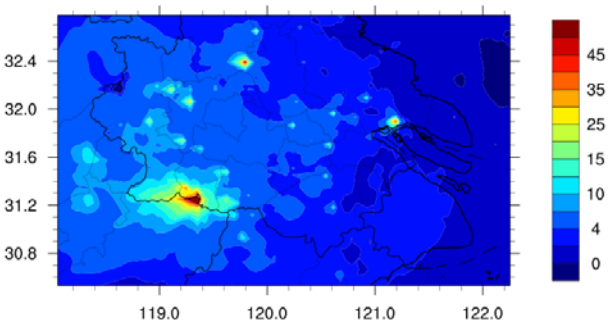
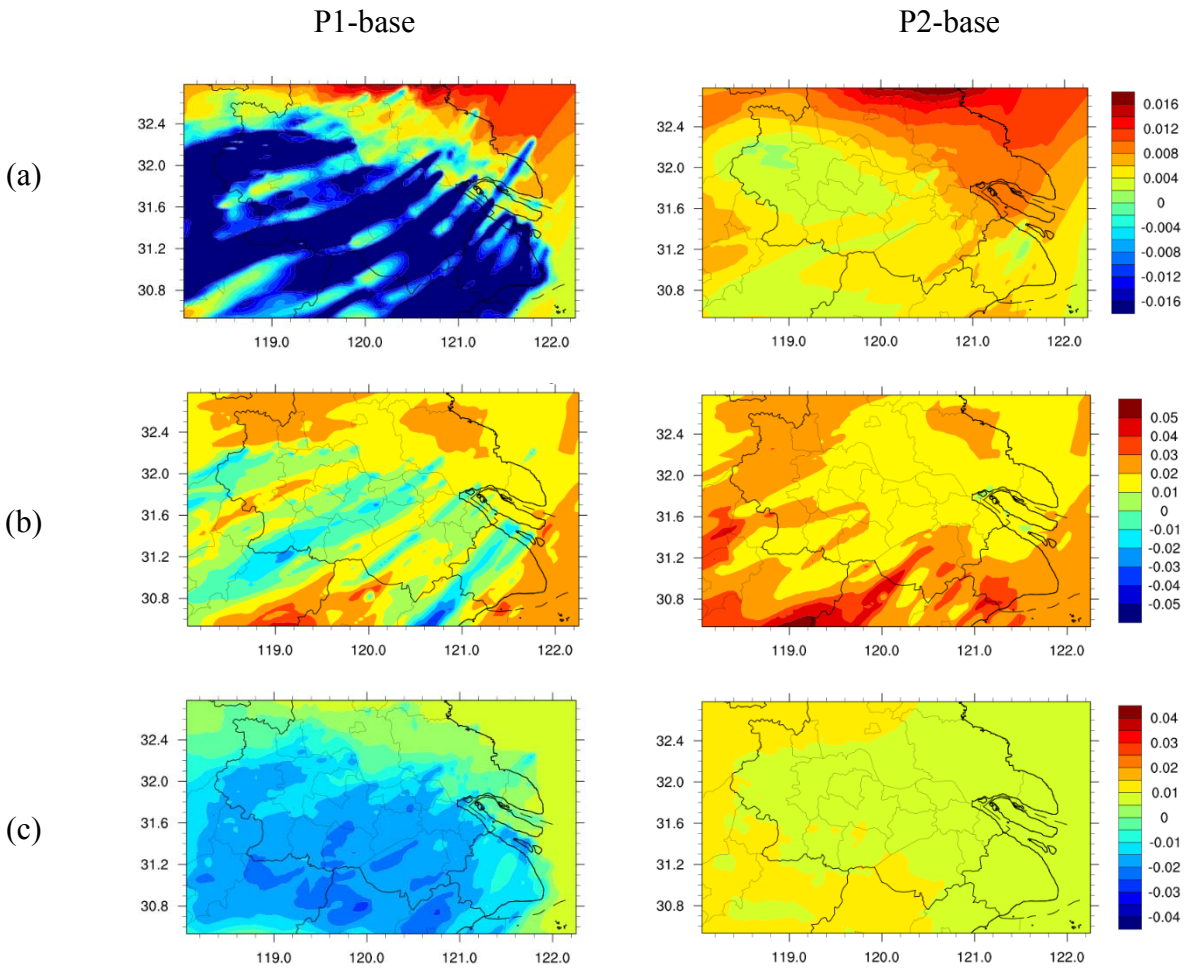


Figure S8.


P1-base
P2-base
(a)
(b)
(c)
32.4
32.0
31.6
31.2
30.8
119.0
120.0
121.0
122.0
0.016
0.012
0.008
0.004
0
-0.004
-0.008
-0.012
-0.016
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04
-0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04