

Supplemental Material

Effects of air pollution control policies on PM_{2.5} pollution improvement in China from 2005 to 2017: a satellite based perspective

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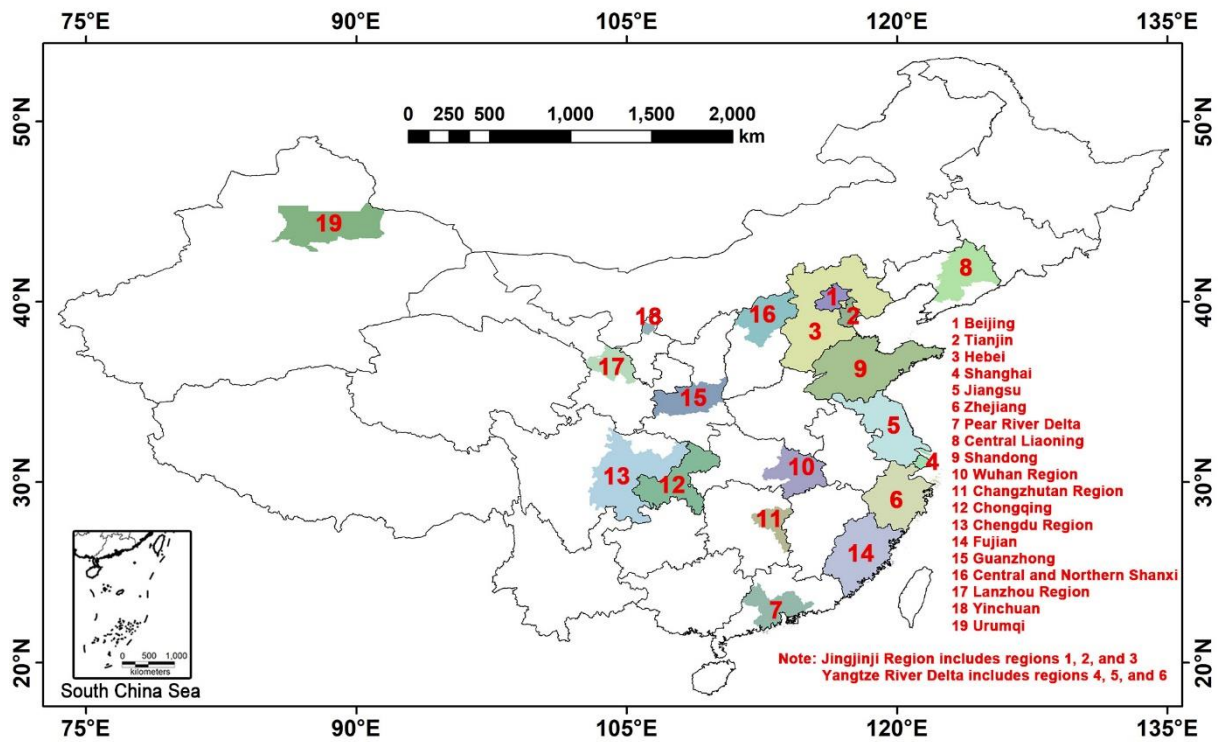


Figure S1. Key regions in 12th Five Year Plan on Air Pollution Prevention and Control in Key Regions

Table S1 Summary statistics of variables for the modeling dataset from 2014 to 2017

Year	Variables ^a	Min	Max	Median	Mean	S.D.
2014 (N=95,649)	PM _{2.5} (µg/m ³)	0.00	517.00	53.45	65.66	47.84
	AOD (unitless)	-0.01	4.51	0.50	0.67	0.61
	WS (m/s)	0.02	18.72	3.82	4.25	2.35
	PBLH (100m)	0.61	52.93	16.22	17.07	5.86
	PS (hPa)	589.22	1037.16	1001.92	980.71	55.83
	RH_PBLH (%)	7.93	96.46	49.05	49.93	18.22
	Precip_Lag1 (mm)	0.00	200.72	0.01	1.29	5.69
	Fire_spots (counts)	0.00	462.00	0.00	2.97	10.64
	ForestCover (%)	0.00	92.52	3.75	13.10	18.74
UrbanCover (%)	0.00	100.00	22.17	27.48	22.68	
2015 (N=110,805)	PM _{2.5} (µg/m ³)	0.50	417.99	43.64	54.02	39.32
	AOD (unitless)	-0.05	4.16	0.44	0.58	0.54
	WS (m/s)	0.03	18.45	3.53	3.97	2.28
	PBLH (100m)	0.63	49.78	15.26	16.05	6.30
	PS (hPa)	558.24	1038.16	996.03	964.45	72.78
	RH_PBLH (%)	5.30	98.81	51.37	51.75	17.74
	Precip_Lag1 (mm)	0.00	283.99	0.02	1.71	6.83
	Fire_spots (counts)	0.00	688.00	0.00	2.58	11.29
	ForestCover (%)	0.00	97.60	4.55	14.23	19.61
UrbanCover (%)	0.00	100.00	19.19	24.23	21.10	
2016 (N=113,490)	PM _{2.5} (µg/m ³)	1.00	520.61	40.00	50.65	38.55
	AOD (unitless)	-0.03	4.25	0.40	0.53	0.48
	WS (m/s)	0.04	15.25	3.43	3.81	2.11
	PBLH (100m)	0.71	52.44	14.13	15.04	6.45
	PS (hPa)	558.16	1042.00	995.34	964.64	72.06
	RH_PBLH (%)	4.86	96.48	52.39	52.56	17.13
	Precip_Lag1 (mm)	0.00	277.79	0.02	2.15	8.69
	Fire_spots (counts)	0.00	330.00	0.00	2.08	7.06
	ForestCover (%)	0.00	97.60	4.58	14.37	19.72
UrbanCover (%)	0.00	100.00	19.20	24.36	21.24	
2017 (N=123,652)	PM _{2.5} (µg/m ³)	2.00	632.00	39.25	48.32	35.68
	AOD (unitless)	-0.03	3.99	0.38	0.50	0.46
	WS (m/s)	0.03	18.22	3.57	3.94	2.18
	PBLH (100m)	0.71	51.45	14.69	15.68	6.85
	PS (hPa)	555.44	1038.19	997.61	968.18	69.90
	RH_PBLH (%)	7.06	97.09	48.70	49.54	16.64
	Precip_Lag1 (mm)	0.00	240.04	0.00	1.48	6.68
	Fire_spots (counts)	0.00	288.00	0.00	2.32	8.98
	ForestCover (%)	0.00	97.60	4.58	14.45	19.81
UrbanCover (%)	0.00	100.00	19.45	24.66	21.32	

^a Abbreviations used for the meteorological variables: WS: wind speed at 10 m above ground; PBLH: planetary boundary layer height; PS: surface pressure; RH_PBLH: mean relative humidity in planetary boundary layer; Precip_Lag1: cumulative precipitation of the previous day.

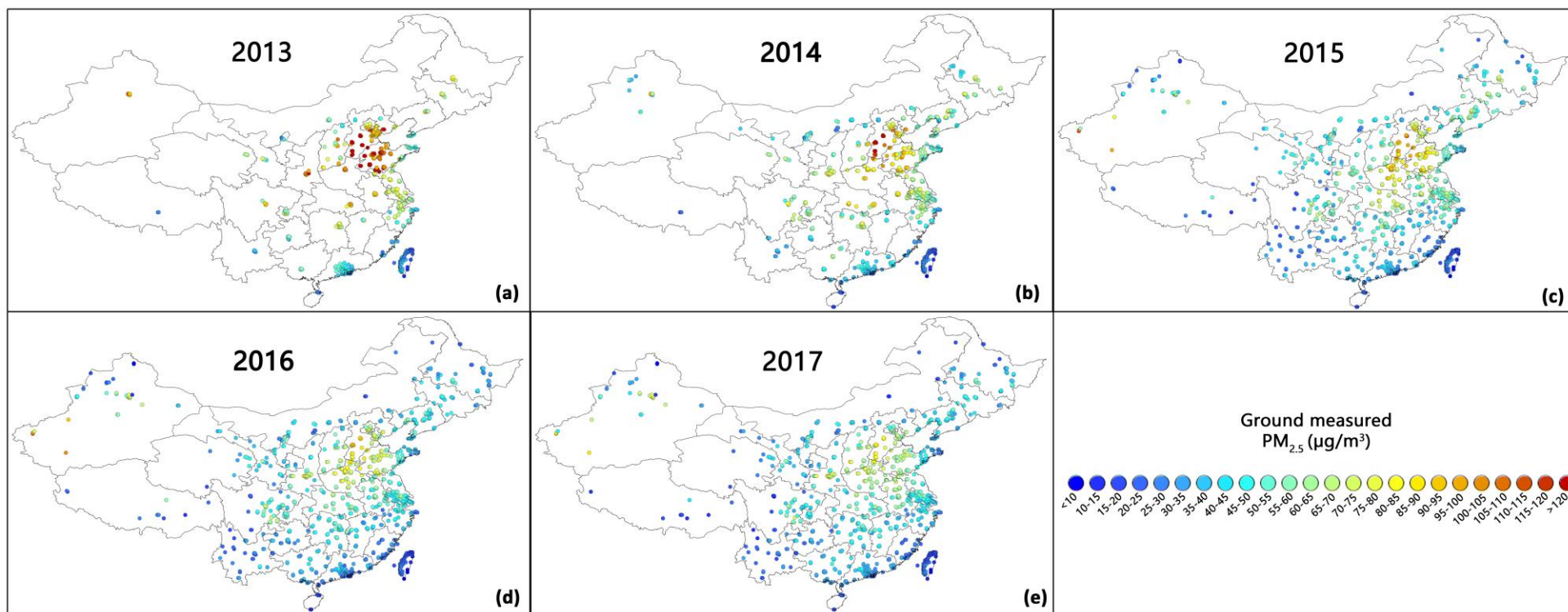


Figure S2. Spatial distributions of annual mean ground measured $PM_{2.5}$ concentrations in China from 2013 to 2017

Table S2 Trends and 95% confidence intervals (CI) of PM_{2.5} concentrations for entire China and Jing-Jin-Ji, Yangtze River Delta, and Pearl River Delta Regions from 2004 to 2017

Period	Trend	Entire China	Jingjinji Region	Yangtze River Delta	Pearl River Delta
2004-2017	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	-1.27	-1.55	-1.60	-1.27
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(-1.50, -1.04)	(-2.06, -1.03)	(-2.02, -1.18)	(-1.66, -0.88)
	Significance	$p<0.001$	$p<0.001$	$p<0.001$	$p<0.001$
2005-2010	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	0.41	0.26	0.61	-1.26
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(-0.01, 0.82)	(-0.83, 1.36)	(-0.31, 1.54)	(-2.73, 0.21)
	Significance	$p=0.055$	$p=0.633$	$p=0.191$	$p=0.091$
2004-2007	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	1.88	3.14	1.12	1.72
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(1.12, 2.64)	(1.07, 5.22)	(-0.51, 2.74)	(-0.79, 4.23)
	Significance	$p<0.001$	$p<0.005$	$p=0.174$	$p=0.174$
2007-2010	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	-0.56	-0.08	-0.37	-4.81
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(-1.12, 0.01)	(-1.80, 1.64)	(-2.10, 1.35)	(-7.06, -2.55)
	Significance	$p=.053$	$p=0.927$	$p=0.664$	$p<0.001$
2010-2013	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	-1.03	-0.45	-0.04	0.89
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(-1.84, -0.21)	(-3.73, 2.83)	(-2.16, 2.08)	(-1.34, 3.13)
	Significance	$p<0.05$	$p=0.783$	$p=0.970$	$p=0.425$
2010-2015	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	-2.89	-3.63	-3.33	-0.90
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(-3.50, -2.28)	(-5.59, -1.68)	(-4.76, -1.89)	(-2.34, 0.54)
	Significance	$p<0.001$	$p<0.001$	$p<0.001$	$p=0.219$
2013-2017	Trend ($\mu\text{g}/\text{m}^3/\text{year}$)	-4.27	-6.77	-6.36	-2.11
	95% CI ($\mu\text{g}/\text{m}^3/\text{year}$)	(-5.20, -3.34)	(-9.46, -4.07)	(-8.38, -4.34)	(-4.14, -0.09)
	Significance	$p<0.001$	$p<0.001$	$p<0.001$	$p<0.05$

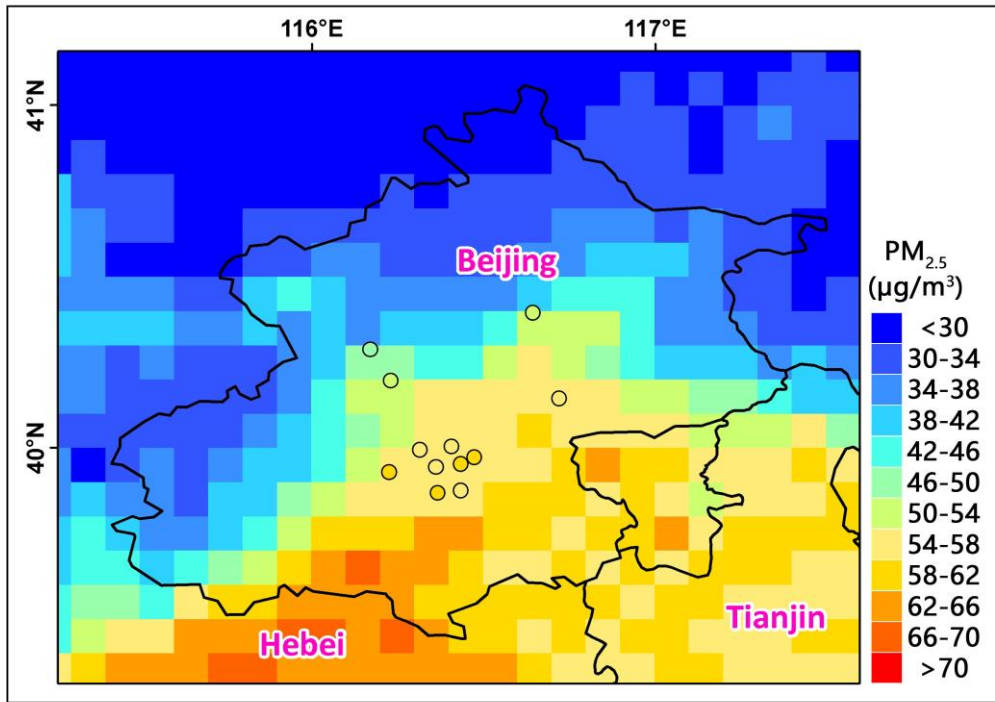


Figure S3 Spatial distribution of satellite and ground PM_{2.5} concentrations of 2017 in Beijing. The circles denote the ground monitoring stations.