SUPPORTING MATERIAL

Journal: Atmospheric Chemistry and Physics

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Table S1. Database of NO_X emission factors of Chinese vehicles obtained through instrumental measurements.

Source	Location	Method (instrument)	Vehicle type	Control stage	Sampling Size	Original EF	Unit	Uncertainty[1]	EF (kg/t)
Chen et al. (2007)	Shanghai	On-road test (SEMTECH-D)	HDDV	Not stated	10	6.5	g/km	4.0-9.6	43.3 [2]
Yao et al. (2007)	Seven cities in China	On-road test (AVL Five-Gas Analyzer)	LDGV	Carburetor	11	2.3	g/km	±1.8	35.0 [3]
			LDGV	Electronic ejection	3	2.3	g/km	±1.4	35.0
			LDGV	Stage I	25	1.3	g/km	±1.3	19.8
			LDGV	Stage II	9	0.9	g/km	±0.7	13.7
Oliver (2008)	Tianjin	On-road test (OBS-2200)	LDGV	Stage 0	12	2.3	g/km	±0.9	35.0 [3]
			LDGV	Stage I	58	0.7	g/km	±0.5	10.9
He et al. (2010)	Beijing Xi'an Shenzhen	On-road test (SEMTECH-DS)	LDGV	Stage 0	2	48.0	kg/t	±24.0	48.0
			LDGV	Stage I	5	23.5	kg/t	±26.5	23.5
			LDGV	Stage II	19	6.5	kg/t	±4.5	6.5
			LDGV	Stage III	9	3.5	kg/t	±5.5	3.5
			LDGV	Stage IV	5	1.0	kg/t	±0.5	1.0
			LDDT	Stage 0	1	28.5	kg/t	N/A	28.5
			LDDT	Stage I	5	40.0	kg/t	±13.0	40.0
			LDDT	Stage II	20	53.5	kg/t	±16.5	53.5
			LDDT	Stage III	3	65.0	kg/t	±15.0	65.0
			MDDT	Stage I	16	45.8	kg/t	±15.5	45.8
			MDDT	Stage II	14	42.5	kg/t	±16.8	42.5
			MDDT	Stage III	7	41.0	kg/t	±15.5	41.0
			HDDV	Stage I	6	41.0	kg/t	±11.5	41.0
			HDDV	Stage II	5	40.5	kg/t	±10.0	40.5
			HDDV	Stage III	15	46.3	kg/t	±11.5	46.3
			RV-3w [4]	Not stated	10	55.3	kg/t	±24.0	55.3
			RV-4w [5]	Not stated	10	56.8	kg/t	±20.5	56.8
Yao et al. (2011)	Beijing	On-road test (SEMTECH-DS)	RV-3w	Before 2007	8	44.0	kg/t	±15.0	44.0
			RV-3w	After 2007	2	70.0	kg/t	±5.0	70.0
			RV-4w	Before 2007	4	43.0	kg/t	±12.0	43.0
			RV-4w	After 2007	6	65.0	kg/t	±21.0	65.0

Table S1. Database of NO_X emission factors of Chinese vehicles obtained through instrumental measurements (continued).

Source	Location	Method (instrument)	Vehicle type	Control stage	Sampling Size	Original EF	Unit	Uncertainty	EF (kg/t)
Wu et al. (2012)	Beijing	On-road test (SEMTECH-DS)	HDDV-bus	Stage II	9	11.3	g/km	±3.3	45.2 [6]
			HDDV-bus	Stage III	22	12.5	g/km	±1.3	50.0
			HDDV-bus	Stage IV	24	11.8	g/km	±2.0	47.2
			HDDV1-truck [7]	Stage I	8	4.8	g/km	±1.5	30.9
			HDDV1-truck	Stage II	9	4.6	g/km	±1.8	29.6
			HDDV1-truck	Stage III	4	2.0	g/km	±0.7	12.9
			HDDV2-truck [8]	Stage I	3	7.8	g/km	±14.0	50.3
			HDDV2-truck	Stage II	6	4.3	g/km	±2.0	27.7
			HDDV2-truck	Stage III	5	6.0	g/km	±2.9	38.7
			HDDV3-truck [9]	Stage I	11	9.2	g/km	±2.8	40.2
			HDDV3-truck	Stage II	6	6.7	g/km	±1.7	29.2
			HDDV3-truck	Stage III	28	7.2	g/km	±1.2	31.4
Guo et al. (2007)	Hangzhou	Remote Sensing	LDGV	Stage 0	2506	9.2	g/l	7.0-11.5	12.6
			LDGV	Stage I	10910	7.1	g/l	5.4-8.8	9.7
			LDGV	Stage II	10376	3.8	g/l	3.0-4.7	5.2
			LDGT	Stage 0	798	9.4	g/l	±1.2	12.9
			LDGT	Stage I	812	5.1	g/l	±0.8	6.9
			LDGT	Stage II	384	3.8	g/l	±0.9	5.2
			HDGV	Not stated	381	4.2	g/l	±1.1	5.8
			MC	Not stated	222	4.1	g/l	±1.0	5.6
Zhou et al. (2007)	Beijing	Remote Sensing	LDGV	Stage 0	Not stated	2.1	g/km	1.4-3.0	32.0 [3]
			LDGV	Stage I	Not stated	1.2	g/km	0.8-2.2	18.3 [3]
			LDGV	Stage II	Not stated	0.6	g/km	0.3-0.8	8.5 [3]

[1] Uncertainties are given either in ranges or in standard errors, according to original studies; [2] Converted based on a fuel economy of 18 L/100km provided by the original study; [3] Converted based on a fuel economy of 9 L/100km suggested by Huo et al. (2011); [4] Three-wheel rural vehicle; [5] Four-wheel rural vehicle; [6] Converted based on fuel economy data provided by Huo et al. (2012); [7] 3.5≤Gross vehicle weight (GVW)<4.5 tons; [8] 4.5≤Gross vehicle weight (GVW)<12.0 tons; [9] Gross vehicle weight (GVW)>12.0 tons.

Table S2. Database of $PM_{2.5}$ emission factors of Chinese vehicles obtained through instrumental measurements.

Source	Location	Method (instrument)	Vehicle type	Control stage	Sampling Size	Original EF	Unit	Uncertainty	EF (kg/t)
He et al. (2010)	Beijing Xi'an Shenzhen	On-road test (SEMTECH-DS)	LDDT	Stage 0	1	7.5	kg/t	N/A	7.5
			LDDT	Stage I	5	3.4	kg/t	±2.3	3.4
			LDDT	Stage II	20	1.5	kg/t	±1.0	1.5
			LDDT	Stage III	3	0.5	kg/t	±0.3	0.5
			MDDT	Stage I	16	1.8	kg/t	±1.0	1.8
			MDDT	Stage II	14	1.3	kg/t	±1.0	1.3
			MDDT	Stage III	7	0.3	kg/t	±0.1	0.3
			HDDV	Stage I	6	3.6	kg/t	±1.6	3.6
			HDDV	Stage II	5	1.9	kg/t	±1.2	1.9
			HDDV	Stage III	15	0.5	kg/t	±0.4	0.5
			RV-3w [2]	Not stated	10	4.2	kg/t	±1.8	4.2
			RV-4w [3]	Not stated	10	2.7	kg/t	±1.3	2.7
Yao et al. (2011]	Beijing	On-road test (SEMTECH-DS)	RV-3w	Before 2007	8	4.3	kg/t	±0.2	4.3
			RV-3w	After 2007	2	3.7	kg/t	±0.3	3.7
			RV-4w	Before 2007	4	2.7	kg/t	±0.8	2.7
			RV-4w	After 2007	6	2.1	kg/t	±1.0	2.1
Wang et al. (2011)	Around Beijing	Carbon balance (Q-Trak Model 7565, TSI Inc)	HDDV	Stage II	18	0.7	kg/t	0.1-1.7	0.7
			HDDV	Stage III	14	0.4	kg/t	0.1-1.2	0.4
			HDDV	Stage IV	10	0.2	kg/t	0.1-0.6	0.2
Wu et al. (2012)	Beijing	On-road test (SEMTECH-DS)	HDDV-bus	Stage II	9	1.1	g/km	±0.6	4.3
			HDDV-bus	Stage III	22	0.4	g/km	±0.1	1.8
			HDDV-bus	Stage IV	24	0.2	g/km	±0.1	0.7
			HDDV1-truck	Stage I	8	0.2	g/km	±0.2	1.5
			HDDV1-truck	Stage II	9	0.2	g/km	±0.1	1.4
			HDDV1-truck	Stage III	4	0.1	g/km	±0.3	0.9
			HDDV2-truck	Stage I	3	0.5	g/km	±0.6	3.5
			HDDV2-truck	Stage II	6	0.2	g/km	±0.4	1.6
			HDDV2-truck	Stage III	5	0.1	g/km	±0.1	0.9
			HDDV3-truck	Stage I	11	0.5	g/km	±0.2	2.2
			HDDV3-truck	Stage II	6	0.4	g/km	±0.2	1.9
			HDDV3-truck	Stage III	28	0.2	g/km	±0.1	0.8

Figures

Figure S1

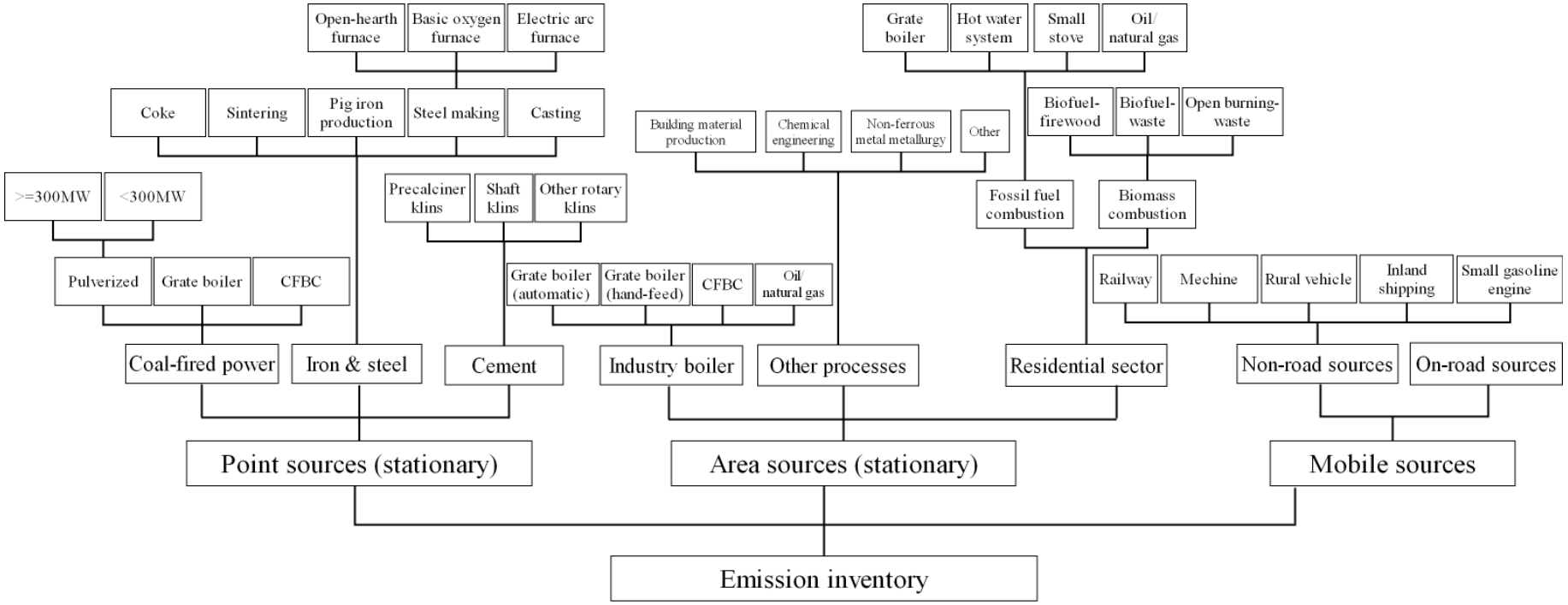


Figure S2.

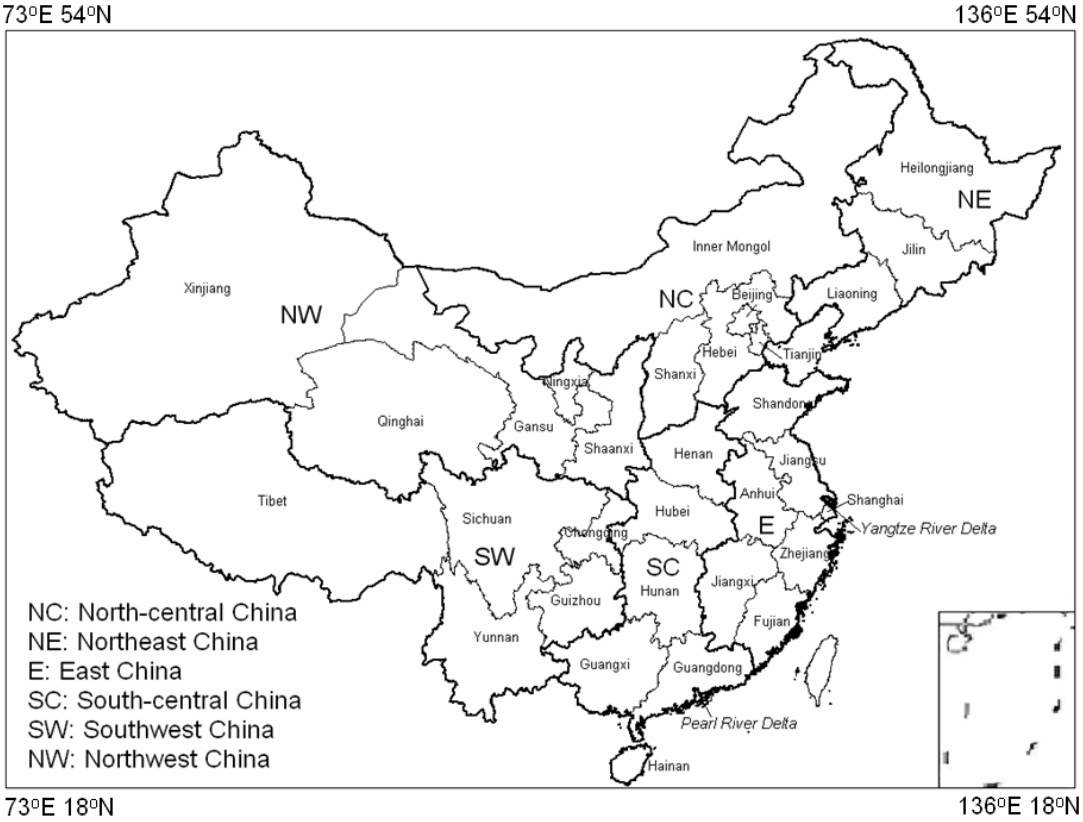
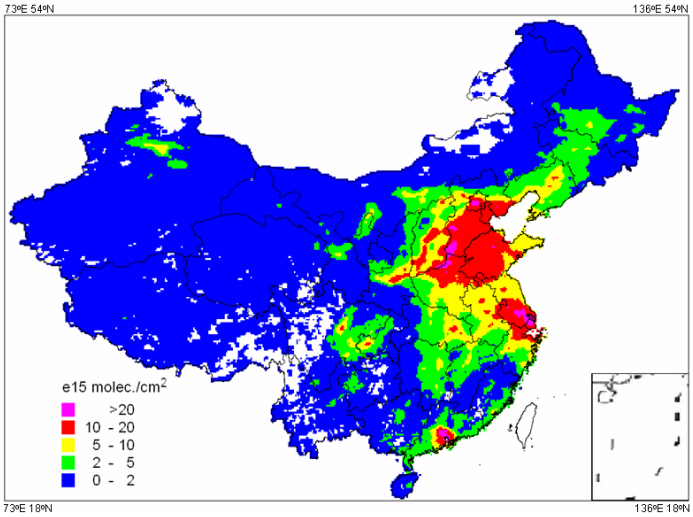

73°E 54°N
136°E 54°N
Heilongjiang
NE
Jilin
Inner Mongol
Xinjiang
NW
NC
Beijing
Liaoning
Hebei
Tianjin
Shanxi
Ningxia
Shandong
Qinghai
Gansu
Shaanxi
Henan
Jiangsu
Tibet
Anhui
Shanghai
Sichuan
Hubei
E
Yangtze River Delta
Chongqing
Zhejiang
SW
SC
Hunan
Jiangxi
Guizhou
Fujian
Yunnan
Guangxi
Guangdong
Pearl River Delta
Hainan
NC: North-central China
NE: Northeast China
E: East China
SC: South-central China
SW: Southwest China
NW: Northwest China
73°E 18°N
136°E 18°N

Figure S3.



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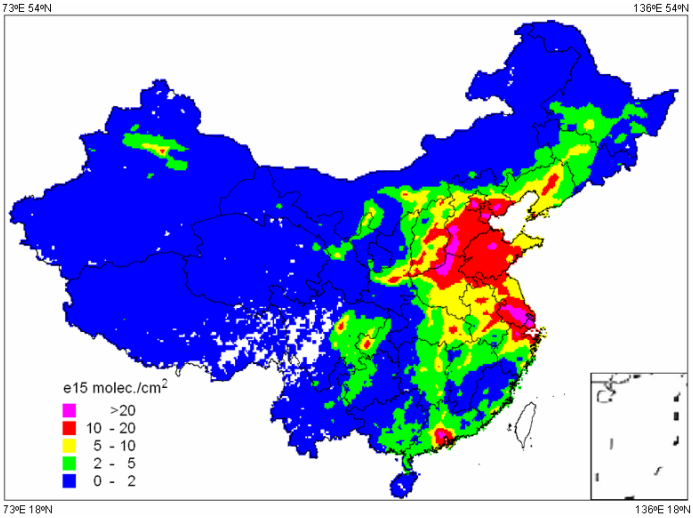

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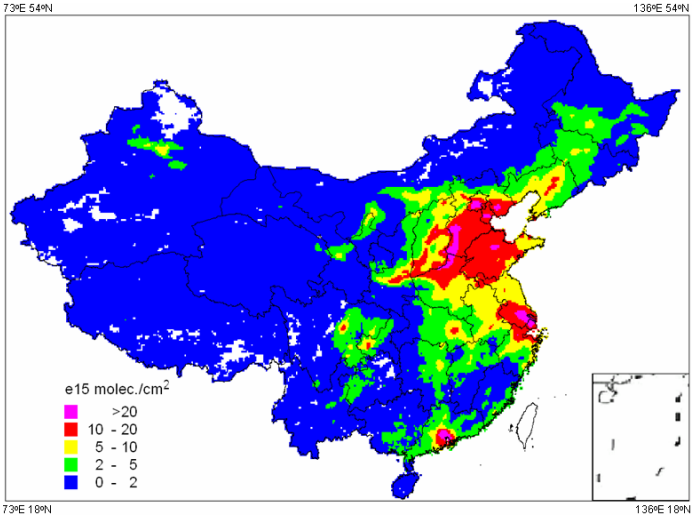

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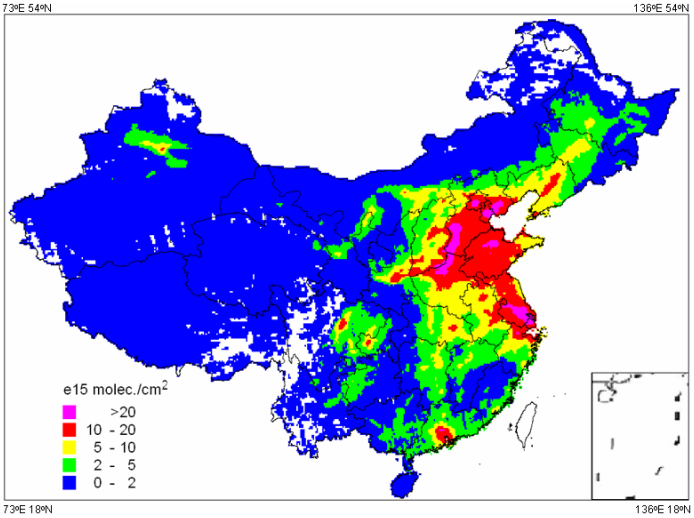

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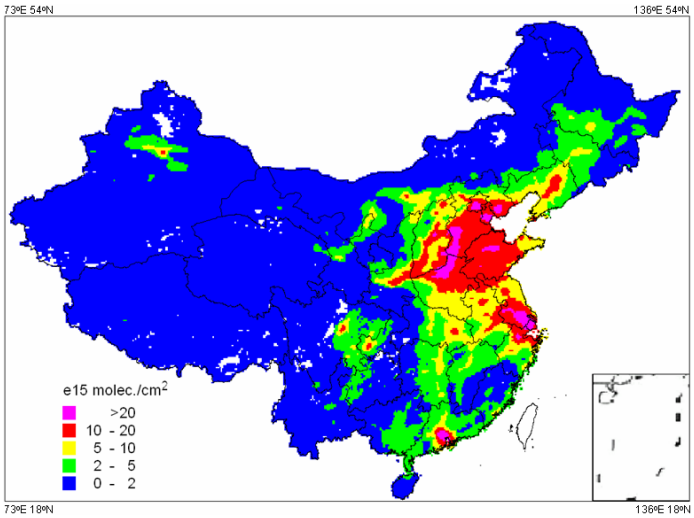

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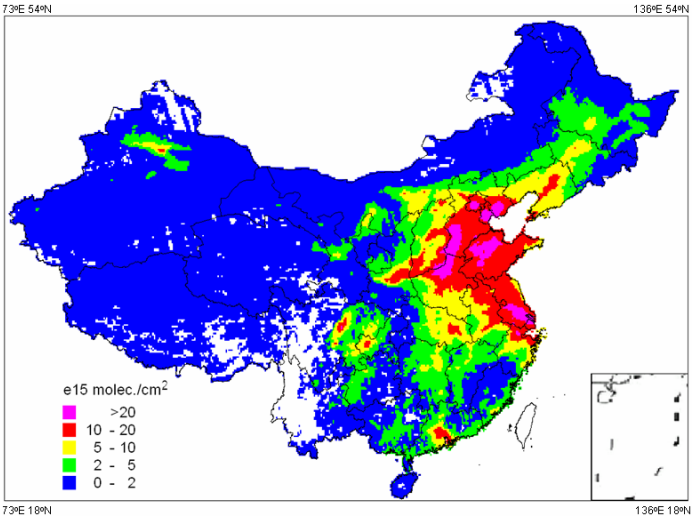

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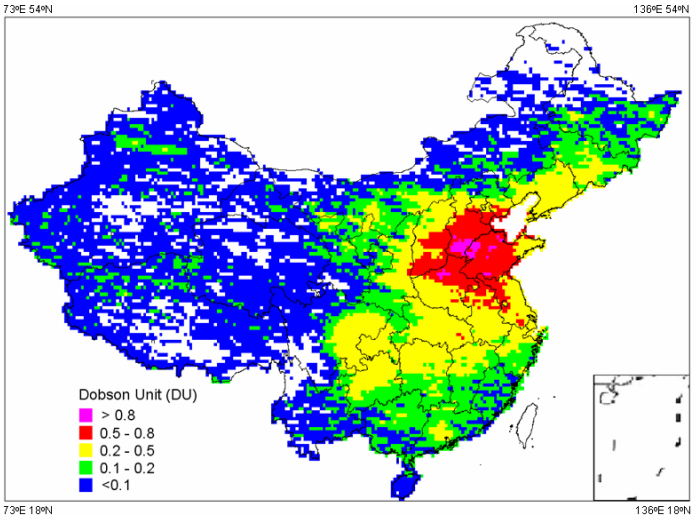

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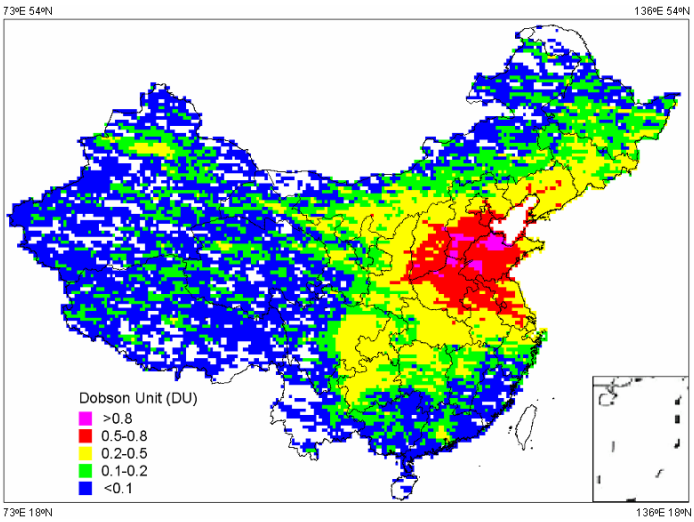

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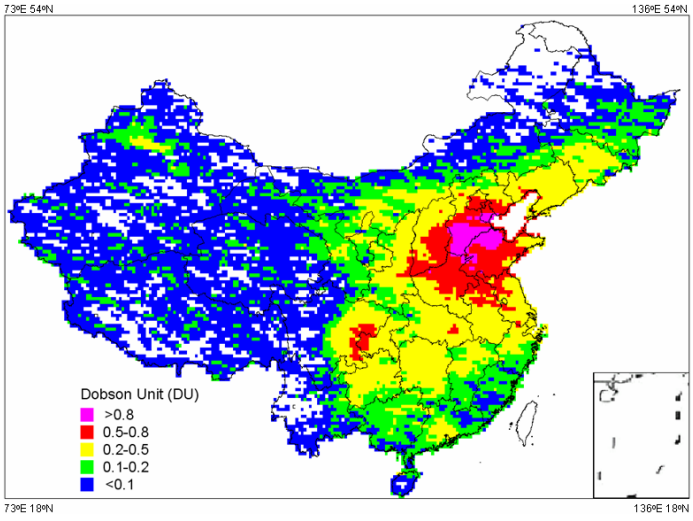

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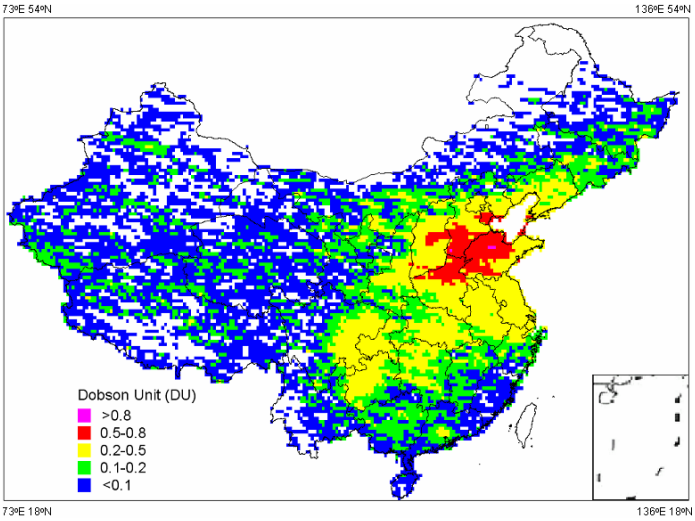

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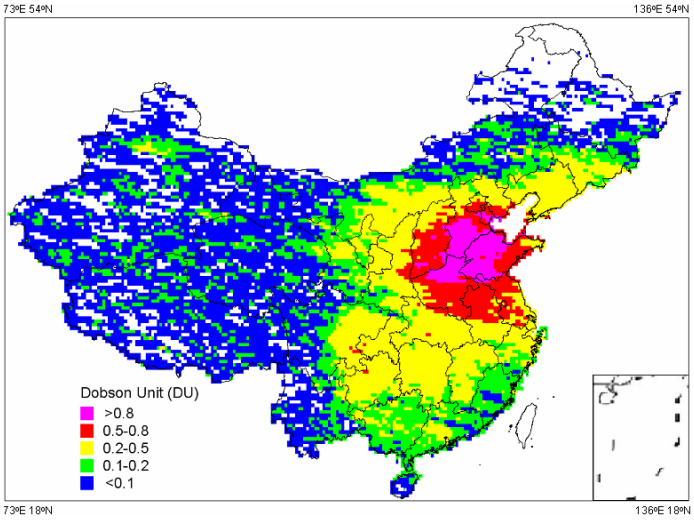

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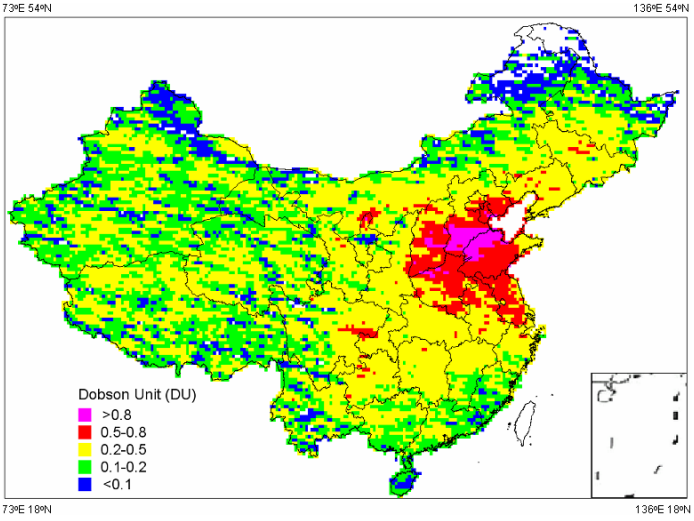

(f) 2010

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