

## Supplementary Material

### Sulfur Dioxide and Primary Carbonaceous Aerosol Emissions in China and India, 1996–2010

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Table S1. Emissions of SO<sub>2</sub>, BC, and OC in China by sector and fuel type (Gg/year) <sup>a</sup>

		1996	2000	2004	2008	2010	
SO <sub>2</sub>	Power plants	9104 (-17%–19%)	9959 (-17%–19%)	15655 (-18%–18%)	12486 (-21%–24%)	6587 (-21%–23%)	
	Industry	11436 (-22%–26%)	8559 (-22%–24%)	11890 (-21%–23%)	16370 (-21%–23%)	20388 (-20%–23%)	
	Residential	3212 (-33%–37%)	1947 (-30%–35%)	2048 (-30%–33%)	2365 (-31%–36%)	2931 (-31%–37%)	
	Transport	499 (-18%–20%)	614 (-17%–18%)	865 (-18%–20%)	819 (-19%–21%)	857 (-20%–22%)	
	Coal	22737 (-18%–19%)	19448 (-17%–18%)	27697 (-17%–18%)	28881 (-18%–20%)	27372 (-19%–21%)	
	Oil	709 (-12%–13%)	845 (-12%–13%)	1363 (-13%–14%)	1274 (-14%–15%)	1352 (-15%–15%)	
	Biofuel	89 (-75%–118%)	87 (-74%–118%)	126 (-77%–127%)	129 (-75%–115%)	127 (-75%–123%)	
	Other	716 (-28%–41%)	699 (-33%–55%)	1273 (-37%–64%)	1756 (-37%–66%)	1912 (-38%–65%)	
	Forest & savanna burning	14 (-55%–71%)	23 (-54%–71%)	10 (-56%–72%)	14 (-52%–62%)	14 (-52%–63%)	
	Agricultural waste burning	54 (-86%–120%)	51 (-87%–115%)	52 (-85%–116%)	58 (-84%–113%)	58 (-86%–118%)	
	Total	24318 (-17%–18%)	21153 (-15%–17%)	30520 (-16%–16%)	32112 (-16%–18%)	30834 (-17%–19%)	
	BC	Power plants	12 (-79%–177%)	11 (-80%–188%)	14 (-83%–230%)	19 (-93%–316%)	21 (-93%–324%)
		Industry	527 (-61%–128%)	370 (-61%–140%)	437 (-58%–139%)	510 (-56%–120%)	501 (-58%–128%)
Residential		790 (-68%–196%)	639 (-65%–160%)	826 (-63%–169%)	888 (-63%–154%)	936 (-62%–155%)	
Transport		92 (-38%–54%)	139 (-36%–53%)	194 (-37%–51%)	259 (-38%–57%)	283 (-41%–59%)	
Coal		849 (-66%–171%)	518 (-66%–160%)	576 (-64%–165%)	636 (-62%–143%)	662 (-65%–152%)	
Oil		141 (-34%–50%)	205 (-34%–47%)	290 (-33%–48%)	396 (-35%–50%)	434 (-36%–51%)	
Biofuel		418 (-73%–201%)	417 (-72%–181%)	583 (-72%–197%)	620 (-73%–188%)	619 (-72%–201%)	
Other		14 (-94%–373%)	18 (-93%–364%)	21 (-92%–372%)	24 (-93%–356%)	25 (-93%–352%)	
Forest & savanna burning		12 (-51%–79%)	19 (-46%–65%)	10 (-52%–99%)	13 (-48%–84%)	12 (-46%–69%)	
Agricultural waste burning		90 (-49%–64%)	86 (-48%–62%)	88 (-48%–65%)	97 (-48%–64%)	97 (-48%–64%)	
Total		1524 (-49%–113%)	1263 (-43%–89%)	1569 (-43%–97%)	1787 (-41%–84%)	1850 (-42%–85%)	
OC		Power plants	12 (-85%–170%)	10 (-81%–161%)	11 (-84%–170%)	10 (-87%–182%)	11 (-86%–180%)
		Industry	520 (-64%–127%)	359 (-66%–136%)	405 (-63%–143%)	446 (-60%–130%)	384 (-62%–137%)
	Residential	2150 (-58%–111%)	1893 (-58%–121%)	2519 (-58%–122%)	2670 (-58%–118%)	2790 (-58%–119%)	
	Transport	85 (-57%–155%)	152 (-61%–164%)	197 (-59%–167%)	241 (-60%–159%)	260 (-59%–154%)	
	Coal	1120 (-58%–112%)	685 (-58%–110%)	740 (-56%–105%)	821 (-56%–109%)	850 (-58%–114%)	
	Oil	102 (-51%–131%)	175 (-55%–142%)	229 (-54%–143%)	284 (-54%–138%)	308 (-53%–130%)	
	Biofuel	1528 (-66%–137%)	1533 (-65%–144%)	2138 (-65%–140%)	2234 (-65%–138%)	2257 (-66%–143%)	
	Other	17 (-95%–357%)	21 (-94%–391%)	25 (-94%–372%)	28 (-94%–339%)	30 (-94%–374%)	
	Forest & savanna burning	127 (-45%–53%)	212 (-39%–43%)	88 (-40%–61%)	126 (-35%–49%)	126 (-38%–44%)	
	Agricultural waste burning	427 (-60%–98%)	409 (-61%–104%)	419 (-61%–106%)	467 (-60%–104%)	463 (-60%–105%)	
	Total	3322 (-42%–75%)	3035 (-41%–76%)	3638 (-44%–85%)	3959 (-43%–82%)	4033 (-44%–84%)	

<sup>a</sup> The percentages in the parentheses represent the 95% CI around the mean.

Table S2. Emissions of SO<sub>2</sub>, BC, and OC in India by sector and fuel type (Gg/year) <sup>a</sup>

		1996	2000	2004	2008	2010	
SO <sub>2</sub>	Power plants	2550 (-18%–18%)	3251 (-17%–18%)	3791 (-18%–19%)	4708 (-18%–19%)	5236 (-18%–19%)	
	Industry	1945 (-22%–24%)	1973 (-21%–23%)	2102 (-22%–24%)	2544 (-26%–28%)	2784 (-26%–28%)	
	Residential	374 (-32%–38%)	321 (-29%–34%)	350 (-30%–35%)	543 (-37%–45%)	583 (-38%–47%)	
	Transport	263 (-25%–28%)	225 (-24%–27%)	207 (-24%–26%)	192 (-19%–20%)	144 (-17%–17%)	
	Coal	3375 (-21%–23%)	3779 (-21%–22%)	4559 (-21%–22%)	6019 (-21%–23%)	6730 (-21%–22%)	
	Oil	1533 (-15%–16%)	1732 (-15%–16%)	1593 (-14%–15%)	1638 (-14%–14%)	1661 (-14%–15%)	
	Biofuel	87 (-43%–59%)	84 (-42%–59%)	87 (-44%–59%)	99 (-43%–59%)	99 (-42%–57%)	
	Other	138 (-26%–28%)	175 (-27%–32%)	210 (-29%–31%)	232 (-30%–33%)	257 (-31%–33%)	
	Forest & savanna burning	17 (-56%–68%)	15 (-54%–68%)	17 (-55%–69%)	14 (-52%–63%)	17 (-54%–67%)	
	Agricultural waste burning	36 (-87%–113%)	33 (-84%–113%)	36 (-85%–112%)	42 (-86%–116%)	44 (-87%–113%)	
	Total	5185 (-15%–15%)	5819 (-14%–15%)	6502 (-15%–16%)	8044 (-16%–18%)	8807 (-16%–17%)	
	BC	Power plants	3 (-80%–158%)	4 (-79%–157%)	4 (-81%–172%)	5 (-83%–178%)	5 (-83%–187%)
		Industry	155 (-54%–116%)	168 (-57%–126%)	198 (-60%–134%)	217 (-58%–126%)	227 (-57%–127%)
Residential		402 (-59%–143%)	421 (-62%–157%)	481 (-62%–152%)	563 (-60%–144%)	579 (-60%–133%)	
Transport		80 (-41%–56%)	88 (-40%–52%)	88 (-40%–54%)	107 (-39%–51%)	111 (-40%–53%)	
Coal		177 (-62%–120%)	172 (-64%–134%)	209 (-65%–133%)	276 (-64%–128%)	295 (-65%–127%)	
Oil		117 (-34%–46%)	126 (-34%–43%)	124 (-34%–44%)	153 (-34%–44%)	159 (-34%–45%)	
Biofuel		338 (-65%–169%)	373 (-66%–173%)	426 (-66%–170%)	449 (-66%–176%)	454 (-66%–164%)	
Other		8 (-94%–358%)	10 (-93%–353%)	12 (-92%–343%)	14 (-92%–342%)	15 (-92%–357%)	
Forest & savanna burning		19 (-52%–90%)	17 (-51%–95%)	19 (-51%–88%)	16 (-48%–77%)	19 (-49%–82%)	
Agricultural waste burning		60 (-49%–63%)	56 (-47%–65%)	59 (-49%–62%)	71 (-48%–63%)	74 (-47%–64%)	
Total		718 (-40%–82%)	753 (-41%–90%)	850 (-42%–91%)	979 (-41%–86%)	1015 (-41%–80%)	
OC		Power plants	6 (-89%–233%)	8 (-86%–209%)	10 (-88%–222%)	12 (-90%–238%)	14 (-90%–234%)
		Industry	155 (-58%–112%)	166 (-60%–118%)	195 (-61%–122%)	208 (-61%–114%)	214 (-60%–118%)
	Residential	1379 (-58%–128%)	1476 (-60%–131%)	1725 (-60%–132%)	1899 (-58%–131%)	1946 (-58%–129%)	
	Transport	52 (-42%–69%)	61 (-44%–72%)	56 (-42%–62%)	58 (-38%–53%)	54 (-36%–49%)	
	Coal	203 (-60%–121%)	186 (-60%–119%)	226 (-61%–123%)	322 (-64%–128%)	346 (-63%–126%)	
	Oil	67 (-36%–55%)	76 (-38%–58%)	70 (-37%–52%)	75 (-33%–45%)	72 (-31%–41%)	
	Biofuel	1313 (-60%–135%)	1438 (-61%–136%)	1676 (-61%–136%)	1763 (-61%–141%)	1792 (-60%–140%)	
	Other	9 (-95%–353%)	11 (-94%–349%)	14 (-93%–362%)	17 (-93%–360%)	17 (-94%–368%)	
	Forest & savanna burning	157 (-44%–64%)	142 (-41%–57%)	158 (-42%–59%)	133 (-40%–60%)	157 (-41%–57%)	
	Agricultural waste burning	287 (-60%–103%)	269 (-60%–104%)	285 (-60%–101%)	340 (-60%–105%)	354 (-61%–107%)	
	Total	2035 (-42%–86%)	2122 (-44%–91%)	2429 (-45%–94%)	2651 (-44%–95%)	2739 (-44%–92%)	

<sup>a</sup> The percentages in the parentheses represent the 95% CI around the mean.

Table S3. Net emission factors of SO<sub>2</sub>, BC, and OC for China by sector and fuel type <sup>a</sup>

	Sector	Fuel type	1996	2000	2004	2008	2010
SO <sub>2</sub>	Power plants	Coal	920.9 (782.3–1058.5)	849.3 (719.9–976.2)	795.6 (674.5–913.5)	433.2 (349.5–526.2)	204.1 (166.2–246.1)
		(g/GJ) Oil	211.7 (185.4–239.3)	210.4 (182.4–237.5)	213.2 (185.5–241.4)	198.4 (175.7–222.2)	198.5 (174.7–222.1)
	Industry	Coal	608.7 (496.4–730.6)	549.2 (449.9–660.1)	477.1 (387.1–575.2)	427.8 (349.8–516.1)	438.2 (357.2–527.2)
		(g/GJ) Oil	212.1 (186.8–238.8)	198.6 (175.2–222.7)	206.6 (182.2–231.4)	195.5 (173.3–218.1)	195.6 (173.1–219.3)
	Residential	Coal	746.5 (603.8–905.0)	687.2 (559.7–824.1)	660.0 (539.7–791.0)	662.1 (535.2–798.2)	662.4 (535.9–800.9)
		(g/GJ) Oil	147.8 (128.4–167.2)	146.8 (127.1–166.2)	146.7 (126.8–166.5)	143.8 (124.1–164.6)	143.9 (123.7–164.5)
		Biofuel	12.3 (3.4–23.7)	12.1 (3.4–23.8)	12.5 (3.0–25.5)	12.2 (3.4–24.0)	12.0 (3.4–23.3)
	Transport	On-road diesel	131.2 (105.1–157.9)	91.1 (72.7–109.6)	74.8 (53.6–95.5)	28.1 (19.2–37.6)	5.1 (3.4–7.0)
		(g/GJ) On-road gasoline	23.2 (18.6–27.9)	23.2 (18.5–27.9)	23.2 (18.6–27.9)	10.6 (8.5–12.7)	2.3 (1.8–2.7)
		Off-road oil	216.2 (176.9–261.0)	206.6 (168.2–249.7)	254.8 (203.2–313.2)	251.4 (198.0–310.9)	251.5 (198.5–310.0)
	Open burning	Forest & savanna	0.6 (0.3–1.0)	0.7 (0.3–1.0)	0.6 (0.3–0.9)	0.6 (0.3–0.9)	0.6 (0.3–1.0)
		(g/kg) Agricultural waste	0.4 (0.1–0.8)	0.4 (0.1–0.8)	0.4 (0.1–0.8)	0.4 (0.1–0.8)	0.4 (0.1–0.8)
	BC	Power plants	Coal	1.2 (0.2–3.4)	0.9 (0.2–2.7)	0.7 (0.1–2.3)	0.6 (0.0–2.7)
(g/GJ) Oil			0.8 (0.1–2.6)	0.8 (0.1–2.5)	0.8 (0.1–2.7)	0.6 (0.1–2.1)	0.6 (0.1–2.2)
Industry		Coal	29.0 (10.5–67.6)	23.8 (7.8–59.0)	17.9 (6.4–45.5)	13.3 (4.9–31.3)	10.3 (3.4–25.8)
		(g/GJ) Oil	25.5 (15.2–39.6)	31.9 (18.8–49.1)	28.8 (17.0–45.0)	35.5 (20.9–54.8)	35.3 (21.0–54.7)
Residential		Coal	80.5 (7.3–405.6)	65.2 (6.9–337.9)	62.2 (6.5–333.7)	54.0 (6.0–256.1)	53.0 (6.1–261.3)
		(g/GJ) Oil	58.3 (18.7–138.4)	58.5 (19.0–137.1)	63.8 (20.2–150.5)	70.8 (23.4–171.9)	70.6 (22.6–169.2)
		Biofuel	58.1 (18.0–160.0)	58.4 (18.5–155.1)	58.0 (19.0–157.4)	59.0 (18.3–162.8)	58.8 (18.7–164.0)
Transport		On-road diesel	78.9 (48.0–116.8)	78.1 (48.0–115.0)	71.9 (41.3–110.7)	66.8 (34.0–111.1)	63.8 (30.0–113.1)
		(g/GJ) On-road gasoline	11.6 (2.8–33.0)	15.6 (3.1–51.0)	14.4 (2.6–47.4)	13.3 (2.4–43.0)	12.6 (2.2–39.6)
		Off-road oil	44.9 (25.0–71.8)	39.8 (22.2–64.1)	37.9 (21.3–61.0)	30.3 (18.3–46.2)	30.0 (18.2–45.6)
Open burning		Forest & savanna	0.6 (0.3–0.9)	0.6 (0.3–0.9)	0.6 (0.3–1.1)	0.6 (0.3–1.0)	0.6 (0.3–0.9)
		(g/kg) Agricultural waste	0.7 (0.5–1.0)	0.7 (0.5–1.0)	0.7 (0.5–1.0)	0.7 (0.5–1.0)	0.7 (0.5–1.0)
OC		Power plants	Coal	1.2 (0.1–3.3)	0.8 (0.1–2.2)	0.5 (0.1–1.5)	0.3 (0.0–0.9)
	(g/GJ) Oil		0.4 (0.0–1.4)	0.4 (0.0–1.4)	0.4 (0.0–1.4)	0.3 (0.0–1.2)	0.3 (0.0–1.2)
	Industry	Coal	29.6 (10.4–67.6)	24.7 (7.8–59.8)	17.9 (6.1–43.8)	12.7 (4.7–29.7)	8.6 (2.9–21.4)
		(g/GJ) Oil	7.9 (4.6–12.5)	9.9 (5.8–15.6)	9.0 (5.2–14.2)	11.0 (6.4–17.2)	10.9 (6.4–17.1)
	Residential	Coal	146.7 (36.9–425.2)	129.5 (34.7–375.4)	126.9 (35.4–345.6)	124.4 (35.4–346.7)	121.8 (35.1–334.7)
		(g/GJ) Oil	19.1 (6.9–44.9)	19.2 (6.9–43.6)	20.3 (6.9–47.0)	22.0 (7.2–53.3)	21.9 (7.1–53.4)
		Biofuel	213.3 (84.7–478.4)	213.8 (86.1–483.4)	212.5 (88.0–455.5)	212.0 (86.9–464.2)	215.2 (83.7–486.0)
	Transport	On-road diesel	24.1 (14.4–36.9)	23.9 (14.4–36.1)	22.1 (12.5–34.4)	20.5 (10.3–35.0)	19.6 (9.1–35.2)
		(g/GJ) On-road gasoline	43.7 (8.3–142.5)	73.0 (10.8–242.1)	67.3 (9.6–230.1)	61.0 (8.5–206.7)	58.1 (8.7–200.1)
		Off-road oil	19.8 (12.1–30.3)	20.2 (12.3–31.3)	18.9 (11.6–28.7)	15.5 (9.7–23.3)	15.5 (9.7–23.3)
	Open burning	Forest & savanna	5.9 (4.2–7.6)	6.0 (4.5–7.7)	5.2 (3.5–7.7)	5.7 (4.2–7.8)	5.9 (4.4–7.6)
		(g/kg) Agricultural waste	3.3 (1.5–6.1)	3.3 (1.6–6.1)	3.3 (1.5–6.2)	3.3 (1.5–6.1)	3.3 (1.6–6.3)

<sup>a</sup>The values in the parentheses represent the 95% CI around the mean.

Table S4. Net emission factors of SO<sub>2</sub>, BC, and OC for India by sector and fuel type <sup>a</sup>

	Sector	Fuel type	1996	2000	2004	2008	2010
SO <sub>2</sub>	Power plants	Coal	534.4 (433.8–634.9)	545.9 (444.7–647.7)	551.7 (450.3–655.7)	543.8 (442.5–643.8)	542.2 (443.5–642.5)
		(g/GJ) Oil	1226.9 (1051.0–1403.0)	1249.3 (1068.0–1430.0)	1176.7 (1004.0–1344.4)	1162.7 (997.5–1334.7)	1163.9 (997.9–1333.6)
	Industry	Coal	388.5 (309.2–476.2)	365.2 (284.2–451.9)	377.2 (294.7–469.9)	386.8 (299.2–480.0)	385.7 (299.5–478.9)
		(g/GJ) Oil	1064.6 (874.7–1270.1)	1116.1 (916.3–1337.6)	1109.2 (912.2–1322.1)	984.8 (812.3–1172.0)	985.3 (816.9–1172.4)
	Residential	Coal	432.7 (307.5–574.7)	440.1 (313.9–584.3)	448.4 (318.4–597.4)	451.6 (316.8–598.8)	452.0 (321.4–596.6)
		(g/GJ) Oil	154.5 (128.0–181.3)	148.9 (123.0–174.4)	162.5 (137.2–186.7)	145.0 (122.4–167.5)	131.8 (110.4–153.7)
		Biofuel	13.8 (8.1–21.1)	12.4 (7.1–18.9)	11.1 (6.4–17.3)	12.0 (6.9–18.6)	11.9 (7.0–18.4)
	Transport	On-road diesel	216.2 (173.7–259.1)	155.7 (124.5–186.5)	138.7 (110.8–167.0)	67.8 (54.1–81.3)	23.1 (18.5–27.8)
		(g/GJ) On-road gasoline	80.5 (64.2–96.7)	44.6 (35.6–53.6)	44.7 (35.3–53.6)	38.0 (30.4–45.7)	33.5 (26.7–39.9)
		Off-road oil	209.0 (173.9–247.0)	207.3 (173.5–244.4)	160.3 (133.2–190.0)	166.0 (138.8–196.7)	161.7 (135.0–192.8)
	Open burning	Forest & savanna	0.5 (0.3–0.8)	0.6 (0.3–0.9)	0.5 (0.2–0.8)	0.5 (0.2–0.7)	0.5 (0.3–0.8)
		(g/kg) Agricultural waste	0.4 (0.1–0.8)	0.4 (0.1–0.8)	0.4 (0.1–0.8)	0.4 (0.1–0.8)	0.4 (0.1–0.8)
	BC	Power plants	Coal	0.7 (0.1–1.9)	0.7 (0.1–1.8)	0.6 (0.1–1.7)	0.5 (0.1–1.6)
(g/GJ) Oil			0.4 (0.1–1.2)	0.4 (0.1–1.3)	0.3 (0.1–1.1)	0.3 (0.1–1.0)	0.3 (0.1–1.0)
Industry		Coal	44.3 (13.3–109.9)	52.4 (14.5–136.8)	57.1 (15.2–149.8)	44.2 (12.6–111.3)	41.3 (11.7–105.3)
		(g/GJ) Oil	43.2 (25.5–66.5)	41.1 (24.3–63.1)	41.4 (24.7–63.7)	47.0 (28.1–72.2)	46.9 (28.1–72.8)
Residential		Coal	130.1 (28.4–387.2)	133.1 (29.7–390.2)	134.5 (30.4–400.1)	136.7 (29.7–402.7)	134.1 (28.2–397.2)
		(g/GJ) Oil	5.3 (0.7–17.1)	5.1 (0.7–16.4)	4.5 (0.7–14.4)	4.5 (0.7–14.4)	4.5 (0.7–14.1)
		Biofuel	54.2 (19.2–140.2)	55.4 (19.0–145.8)	55.5 (19.1–149.8)	55.4 (19.2–150.6)	55.4 (19.3–146.7)
Transport		On-road diesel	78.1 (47.7–116.1)	78.1 (48.7–113.6)	77.5 (47.8–114.7)	76.0 (47.0–112.2)	74.9 (46.3–111.8)
		(g/GJ) On-road gasoline	16.0 (2.9–38.0)	14.9 (2.8–35.1)	10.7 (2.2–24.6)	7.5 (1.8–16.8)	6.1 (1.6–13.2)
		Off-road oil	34.8 (18.3–57.2)	36.7 (19.6–59.4)	34.7 (18.4–57.1)	31.7 (17.4–51.1)	31.6 (16.9–51.1)
Open burning		Forest & savanna	0.6 (0.3–1.0)	0.6 (0.3–1.1)	0.6 (0.3–1.1)	0.6 (0.3–0.9)	0.6 (0.3–1.0)
		(g/kg) Agricultural waste	0.7 (0.5–1.0)	0.7 (0.5–1.0)	0.7 (0.5–1.0)	0.7 (0.5–1.0)	0.7 (0.5–1.0)
OC		Power plants	Coal	1.5 (0.2–5.1)	1.5 (0.1–5.0)	1.5 (0.1–5.1)	1.5 (0.1–5.3)
	(g/GJ) Oil		0.2 (0.0–0.7)	0.2 (0.0–0.7)	0.2 (0.0–0.6)	0.2 (0.0–0.5)	0.2 (0.0–0.5)
	Industry	Coal	41.4 (14.5–96.9)	47.4 (15.4–116.0)	51.9 (16.6–126.7)	40.3 (12.8–96.6)	37.4 (11.8–90.5)
		(g/GJ) Oil	13.3 (7.6–21.0)	12.7 (7.3–19.9)	12.8 (7.5–20.1)	14.5 (8.5–22.6)	14.5 (8.5–22.6)
	Residential	Coal	191.9 (42.0–554.4)	193.9 (43.1–574.1)	199.9 (44.3–585.9)	202.9 (43.3–604.6)	200.3 (44.5–600.5)
		(g/GJ) Oil	8.9 (2.4–24.2)	8.4 (2.3–22.5)	7.4 (2.0–20.0)	7.2 (2.0–18.8)	7.2 (1.9–19.7)
		Biofuel	210.7 (88.7–476.1)	213.6 (87.1–486.6)	218.5 (87.9–493.6)	217.3 (88.0–498.1)	218.9 (89.3–509.7)
	Transport	On-road diesel	23.9 (14.2–36.5)	23.9 (14.5–36.0)	23.7 (14.4–35.8)	23.3 (14.1–35.1)	23.0 (13.9–34.7)
		(g/GJ) On-road gasoline	83.1 (36.6–166.4)	76.7 (33.7–151.9)	52.2 (23.7–100.5)	31.7 (15.1–59.7)	23.1 (11.7–41.8)
		Off-road oil	16.2 (9.3–25.4)	17.3 (10.1–27.6)	16.5 (9.5–26.3)	15.4 (9.2–24.4)	15.4 (9.0–24.4)
	Open burning	Forest & savanna	4.9 (3.3–7.2)	5.1 (3.5–7.3)	4.8 (3.1–7.1)	4.6 (3.0–6.8)	4.9 (3.3–7.2)
		(g/kg) Agricultural waste	3.3 (1.6–6.2)	3.3 (1.6–6.3)	3.3 (1.6–6.0)	3.3 (1.6–6.3)	3.3 (1.5–6.3)

<sup>a</sup>The values in the parentheses represent the 95% CI around the mean.

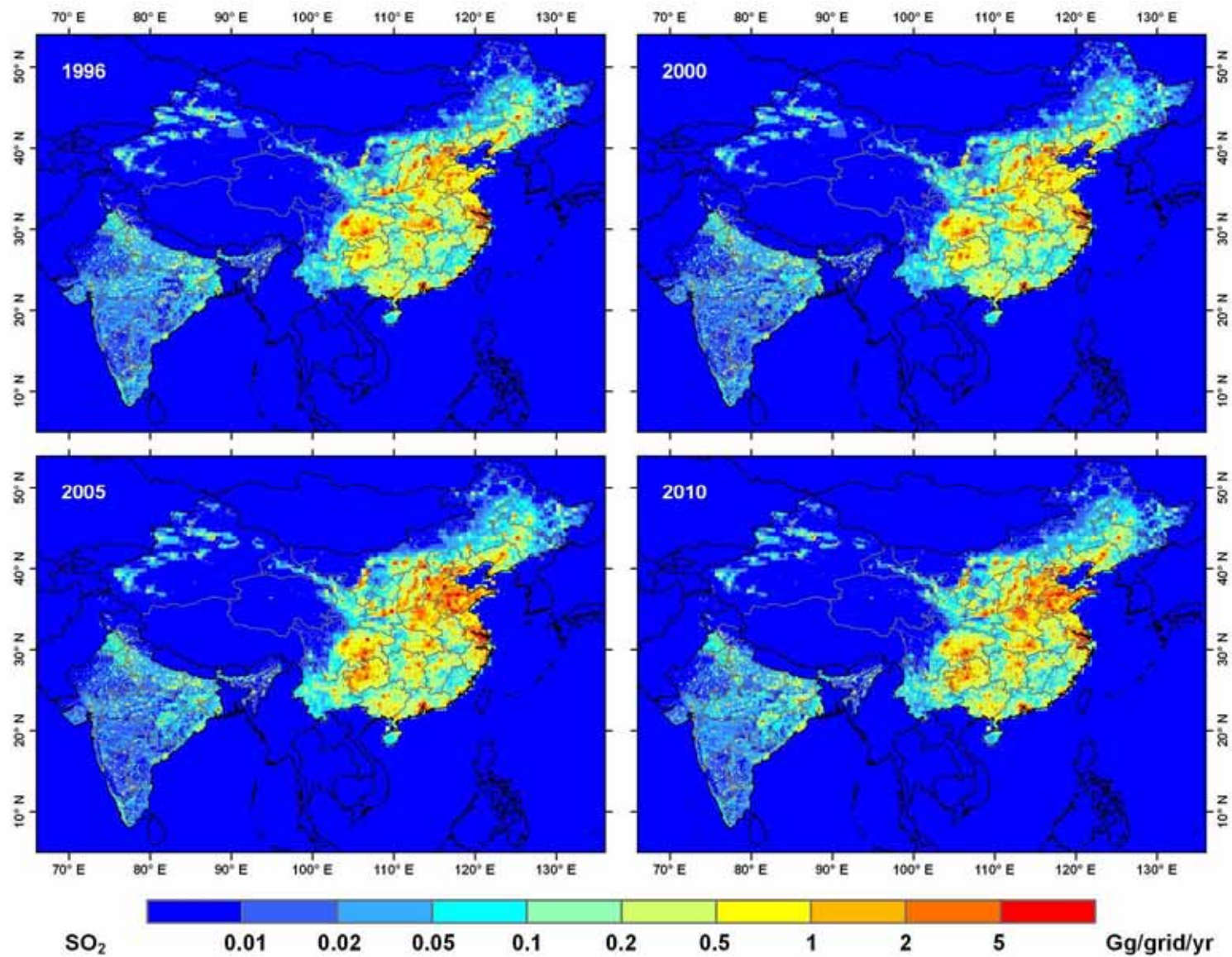


Fig. S1. Emission distributions of SO<sub>2</sub> at 0.1° × 0.1° resolution in 1996, 2000, 2005, and 2010. International shipping and aviation are not included.

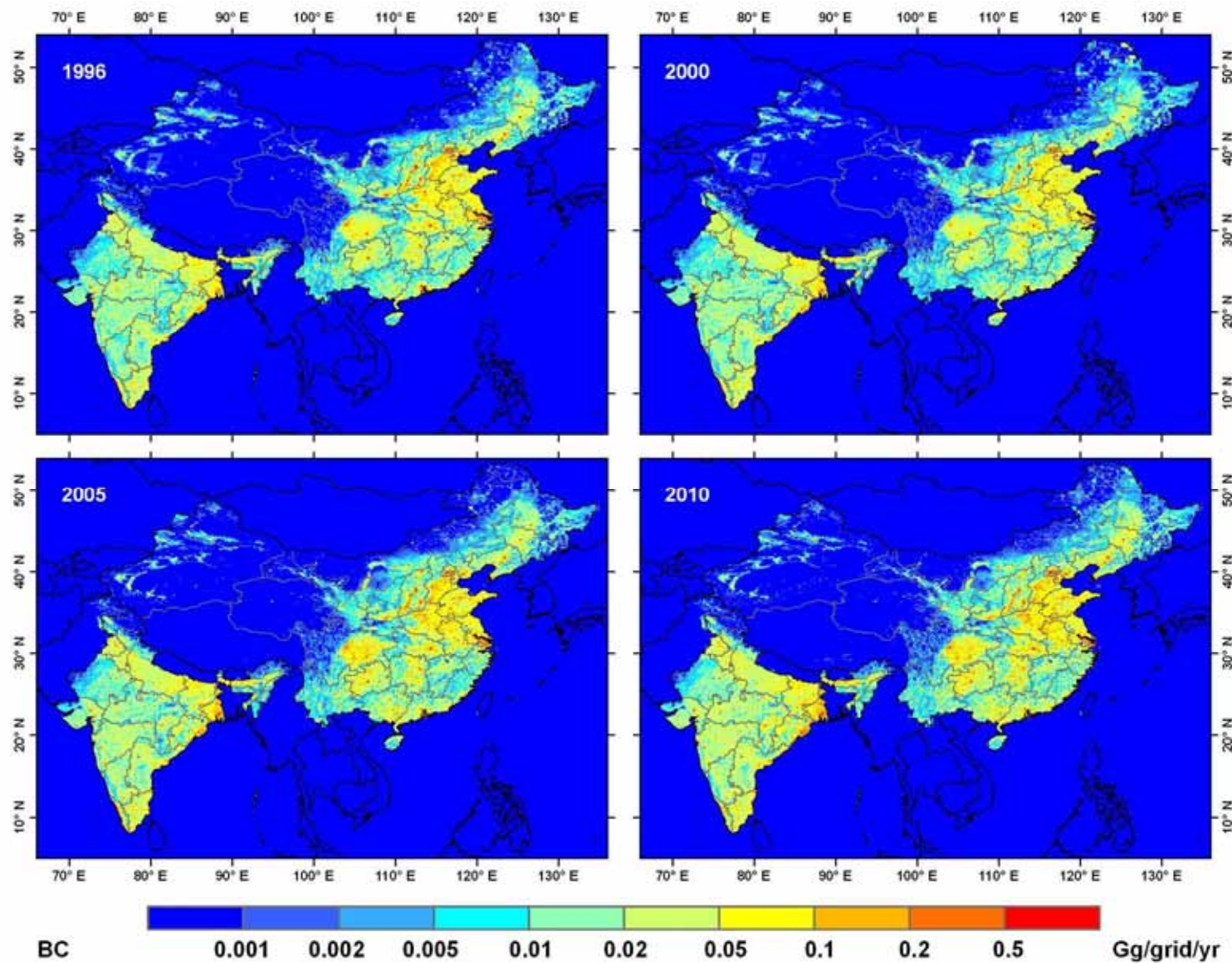


Fig. S2. Emission distributions of BC at  $0.1^\circ \times 0.1^\circ$  resolution in 1996, 2000, 2005, and 2010. International shipping and aviation are not included.

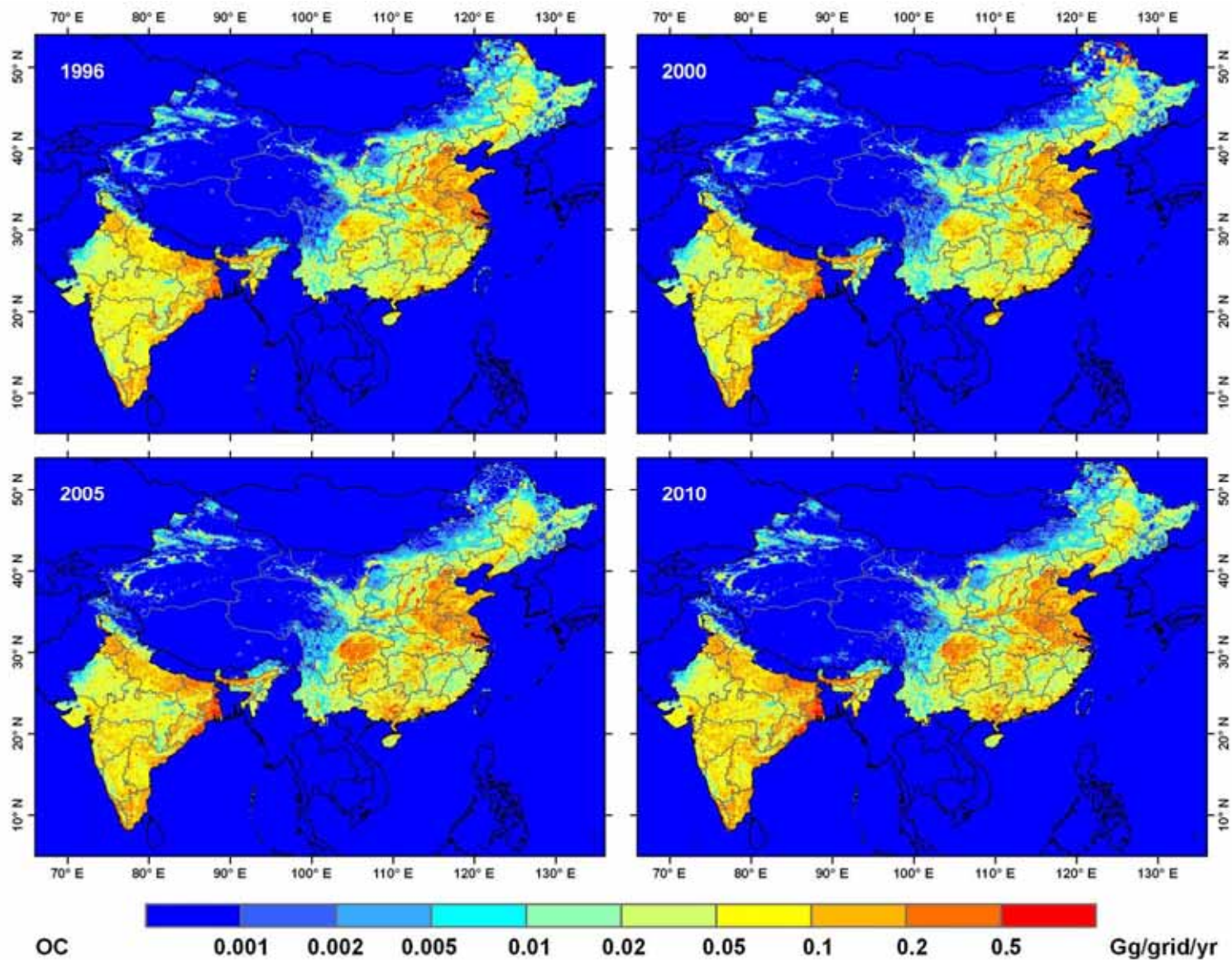


Fig. S3. Emission distributions of OC at  $0.1^\circ \times 0.1^\circ$  resolution in 1996, 2000, 2005, and 2010. International shipping and aviation are not included.