



Supplement of

Estimation of CFC-11 emissions from coal combustion in China

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Table S1 Detailed information on domestic fuels in this study.

Types	Domestic fuels	Sources		Abbreviation
		Province	City	
Coal	Chunk coal	Xinjiang	Wulumuqi	WLMQ
		Gansu	Jiuquan	JQ
		Shanxi	Datong	DT
		Shandong	Jinan	JN
		Guizhou	Liupanshui	LPS
		Yunnan	Kunming	KM
		Heilongjiang	Haerbin	HEB
		Shanxi	Jincheng	JC
		Xinjiang	Zhundong	ZD
			Chongqing	CQ
	Honeycomb	Hubei	Wuhan	WH
		Shandong	Jinan	JN
		Gansu	Tianshui	TS
		Fujian	Fuzhou	FZ
		Zhejiang	Linan	LA
		Anhui	Dingyuan	DY
		Guangxi	Guilin	GL
		Henan	Xinxiang	XX
		Hunan	Changsha	CS
		Henan	Pingdingshan	PDS
		Hebei	Handan	HD

Table S2 The emission factors (average $\pm$ standard deviation, mg kg⁻¹) of domestic coal combustion used for estimating domestic CFC-11 emissions.

Types	Sources	CFC-11
Chunk coal	Northeast Plain	5.5 $\pm$ 0.4
	Arid and semi-arid regions of north China	5.6 $\pm$ 2.1
	Loess Plateau	3.6 $\pm$ 3.0
	North China plain	2.1 $\pm$ 0.3
	Yangtze Plain	2.5 $\pm$ 3.7
	Sichuan Basin	3.4 $\pm$ 0.8
	Yunnan-Guizhou Plateau	1.6 $\pm$ 3.6
	Tibet Plateau	2.2 $\pm$ 1.7
Honeycomb briquette	South China	1.6 $\pm$ 3.3
	Northeast Plain	3.3 $\pm$ 9.3
	Arid and semi-arid regions of north China	1.5 $\pm$ 1.5
	Loess Plateau	3.3 $\pm$ 10.9
	North China plain	3.8 $\pm$ 9.9
	Yangtze Plain	3.2 $\pm$ 12.7
	Sichuan Basin	3.1 $\pm$ 10.9
	Yunnan-Guizhou Plateau	1.5 $\pm$ 1.7
Coal	Tibet Plateau	3.3 $\pm$ 9.3
	South China	4.7 $\pm$ 10.9
	Power plant	0.02 $\pm$ 0.004

Table S3 Comparison of CFC-11 emissions with other studies (t yr⁻¹).

Areas	Emission sources	Year	CFC-11	References
China ^a	Coal	2001–2021	188.5–268.7	This study
China	/	2001	22300	Palmer et al., 2003
China	/	2006–2008	33000	Vollmer et al., 2009
China	/	2007–2008	11000	Li et al., 2011
China	/	2008	12000	Kim et al., 2010
China	/	2009	15800	An et al., 2012
China	/	2010–2011	10500	Wang et al., 2014
China	Obsolete household refrigerators	2011	4600	Zhao et al., 2011
China	/	2009–2019	11900	Yi et al., 2021
China ^a	/	2014	22000	Fang et al., 2018
China	/	2019	5000	Park et al., 2021
Eastern China	/	2008–2012	64000	Rigby et al., 2019
Eastern China	/	2014–2017	13400	Rigby et al., 2019
Eastern China	/	2014–2018	19000	Adcock et al., 2020
Eastern China	/	2017–2018	14700	Huang et al., 2021
PRD	/	2002	1000	Guo et al., 2009
PRD	/	2004	400	Shao et al., 2011
PRD	/	2008	1000	Zhang et al., 2014
PRD	/	2009	500	Zhang et al., 2014
Taiwan	/	2007–2008	300	Li et al., 2011
Korea	/	2007–2008	900	Li et al., 2011

Japan	/	2007–2008	1100	Li et al., 2011
Global	/	2007	82000	Kim et al., 2010
Global	/	2012	50191	Rigby et al., 2014
Global	/	2014–2016	67000	Montzka et al., 2018
Global	/	2014–2016	77600	Lickley et al., 2021

^a: The calculation method was “bottom-up”;

/: Emission source classification is not performed.



Figure S1 The location of eight agricultural regions of China.

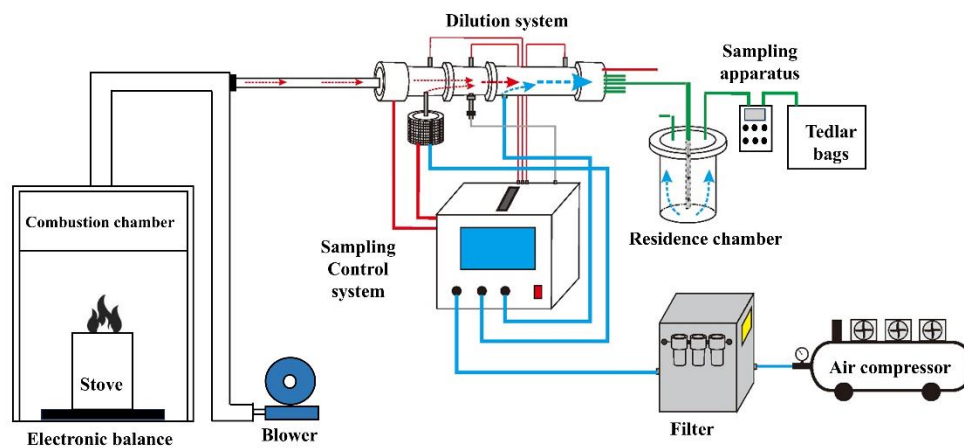


Figure S2 Structure of the combustion and dilution sampling system adopted in this study.

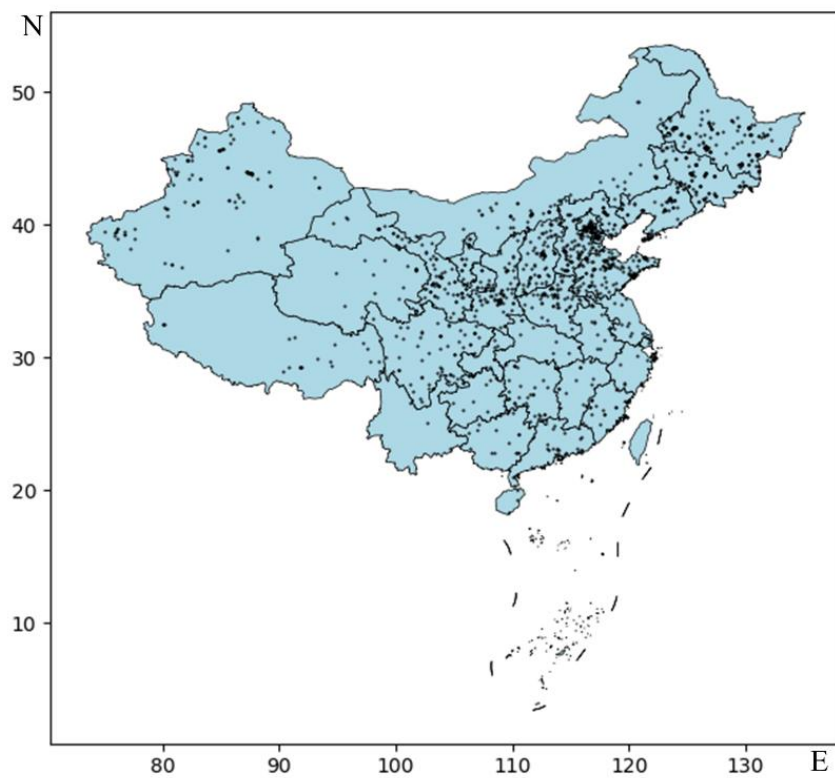


Figure S3 The point of coal-fired power plants.

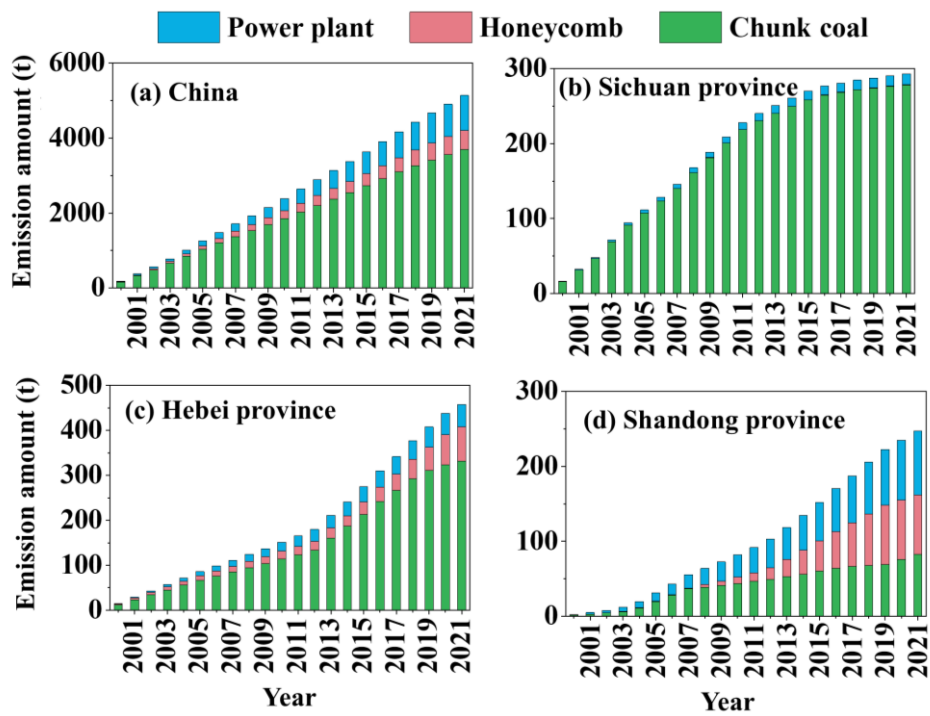


Figure S4 The cumulative CFC-11 emissions from coal combustion in China (a), Sichuan Province (b), Hebei Province (c), and Shandong Province (d) during 2000~2021.

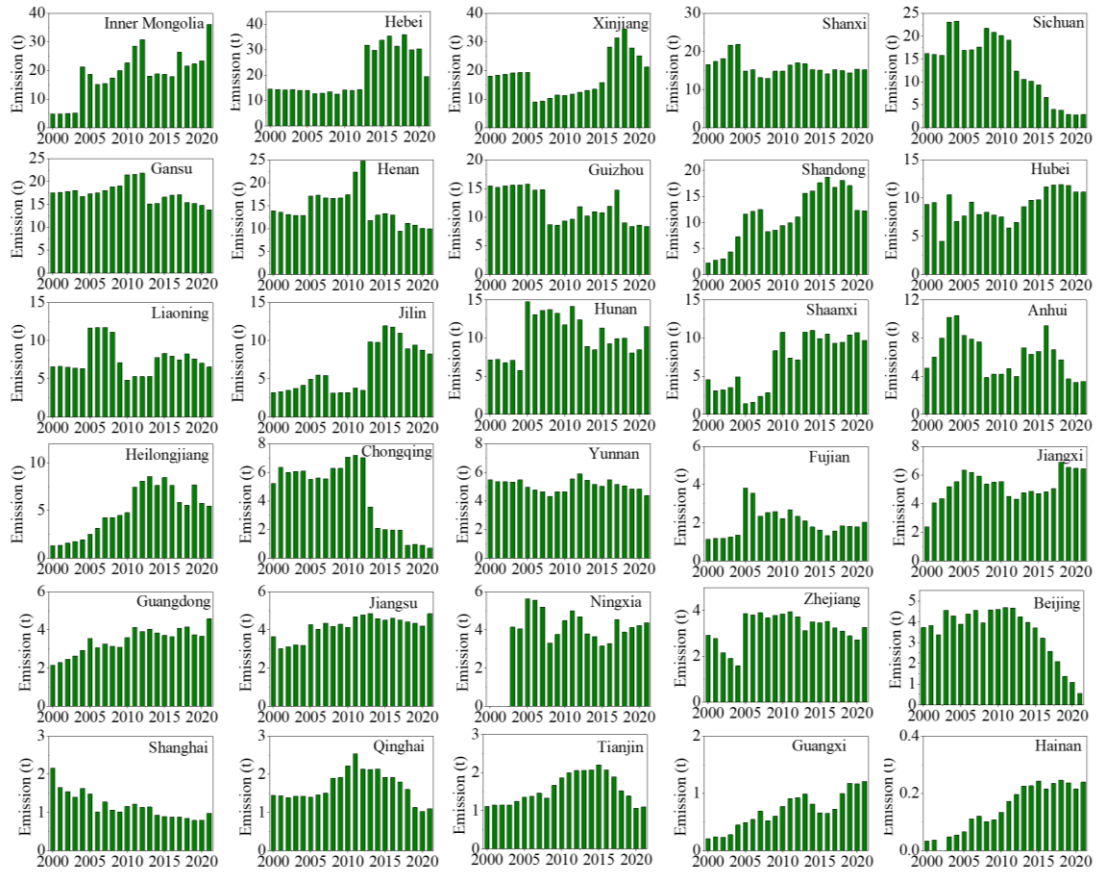


Figure S5 The CFC-11 emissions from coal combustion in different provinces in China, in which Xizang, Taiwan, Hongkong, and Macau were not calculated due to the lack of activity data.

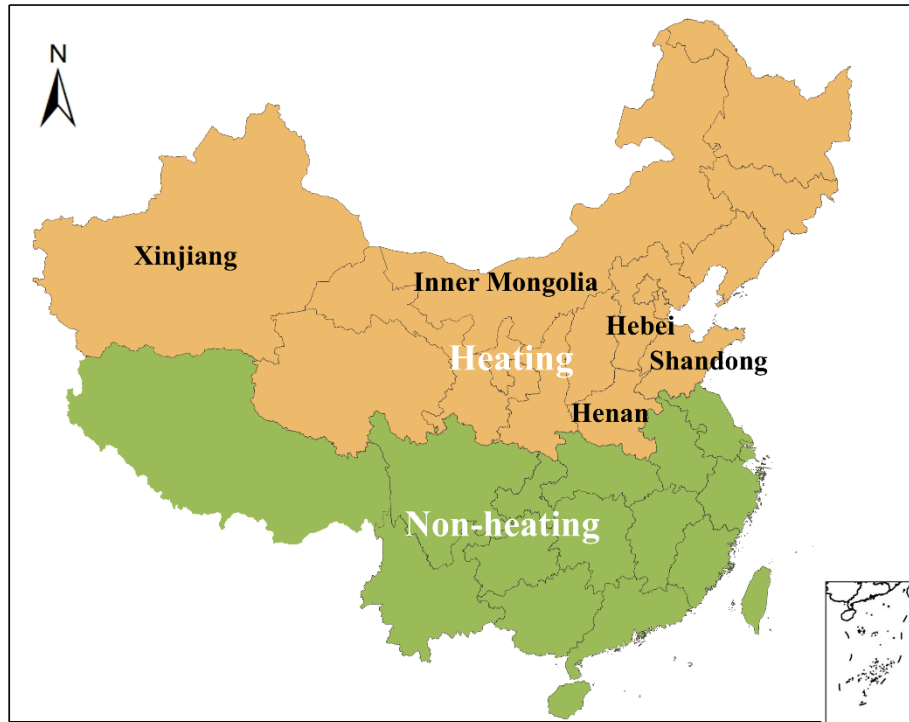


Figure S6 The heating and non-heating areas in China.

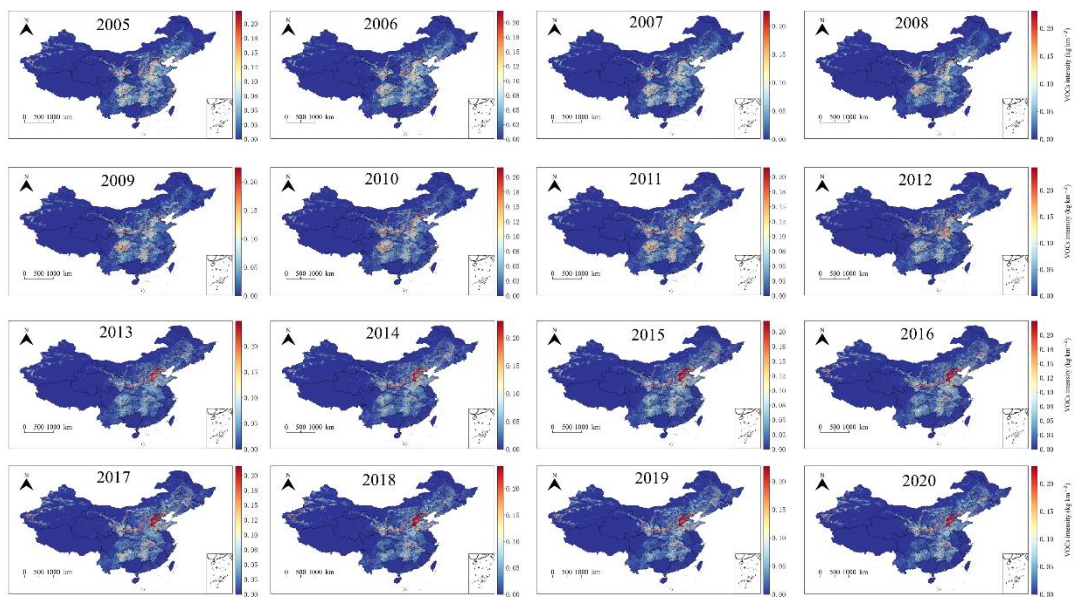


Figure S7 CFC-11 emission intensity of CFC-11 from domestic coal combustion in 2005~2020.

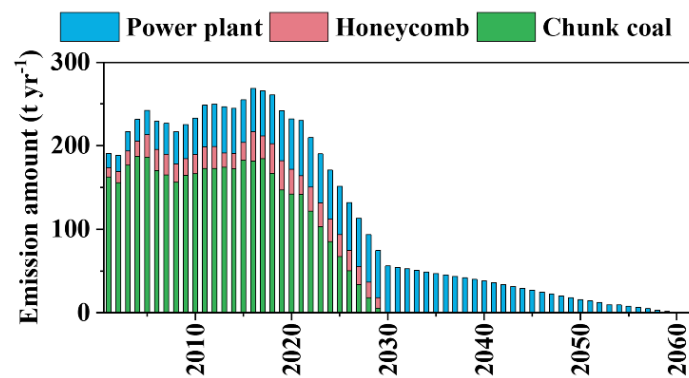


Figure S8 The annual CFC-11 emissions from coal combustion in China from 2001 to 2060.

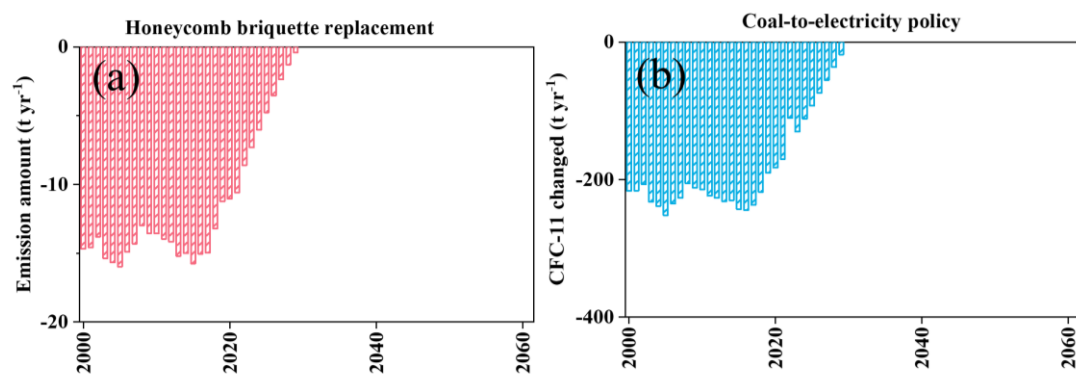


Figure S9 The changes of annual CFC-11 emissions if chunk coal was replaced by honeycomb (a) and if domestic coal was replaced by electricity from coal-fired power plant (b).

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