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Supplement of

Estimating the open biomass burning emissions in central and eastern China from 2003 to 2015 based on satellite observation

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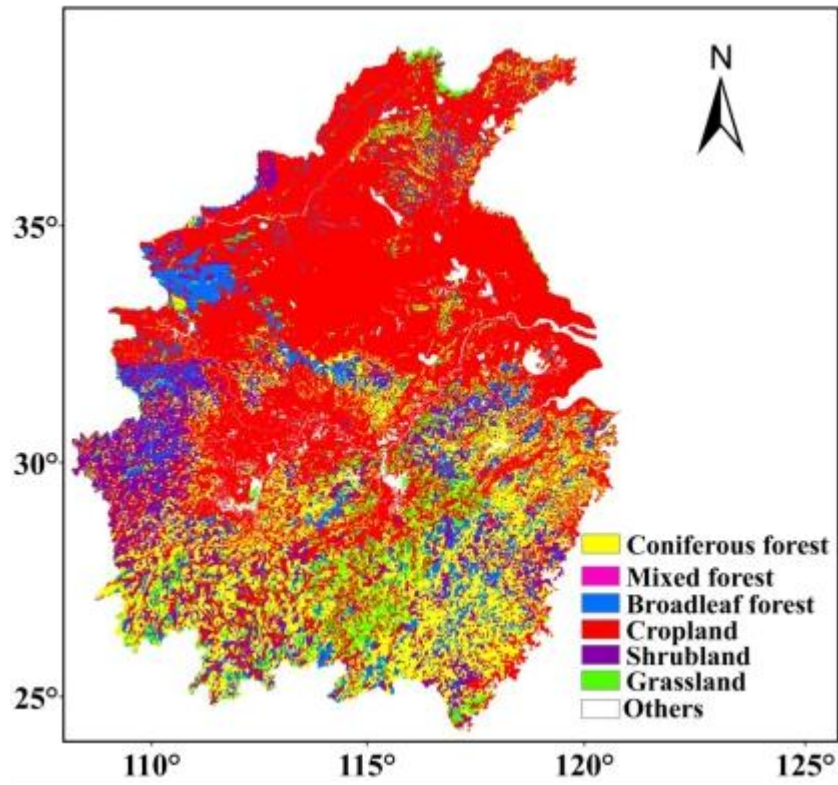


Figure S1. Distribution of major vegetation types in Central and Eastern China (ECVMC, 2007)

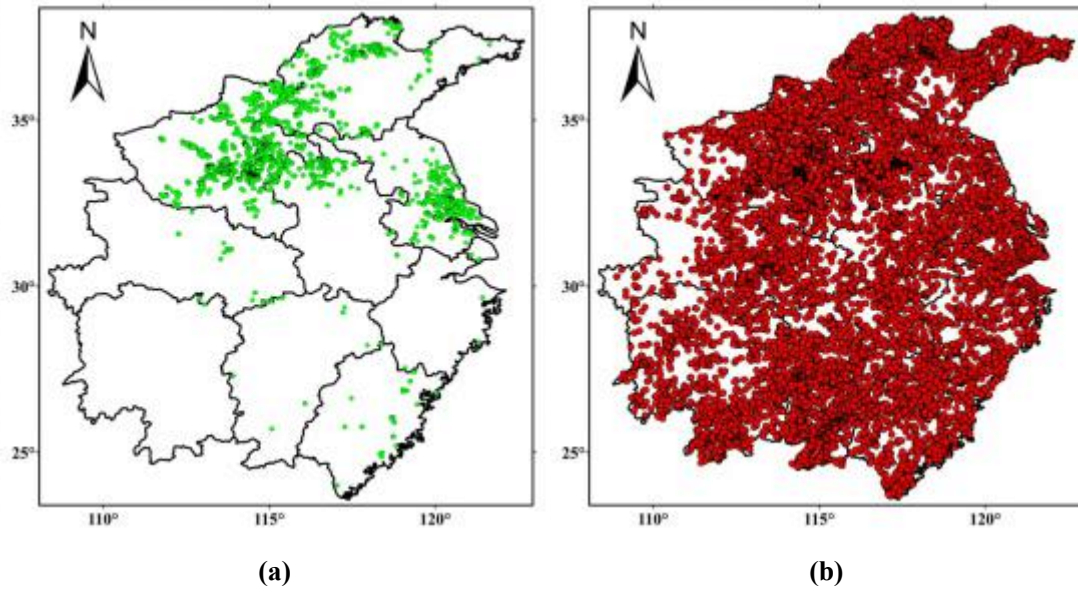
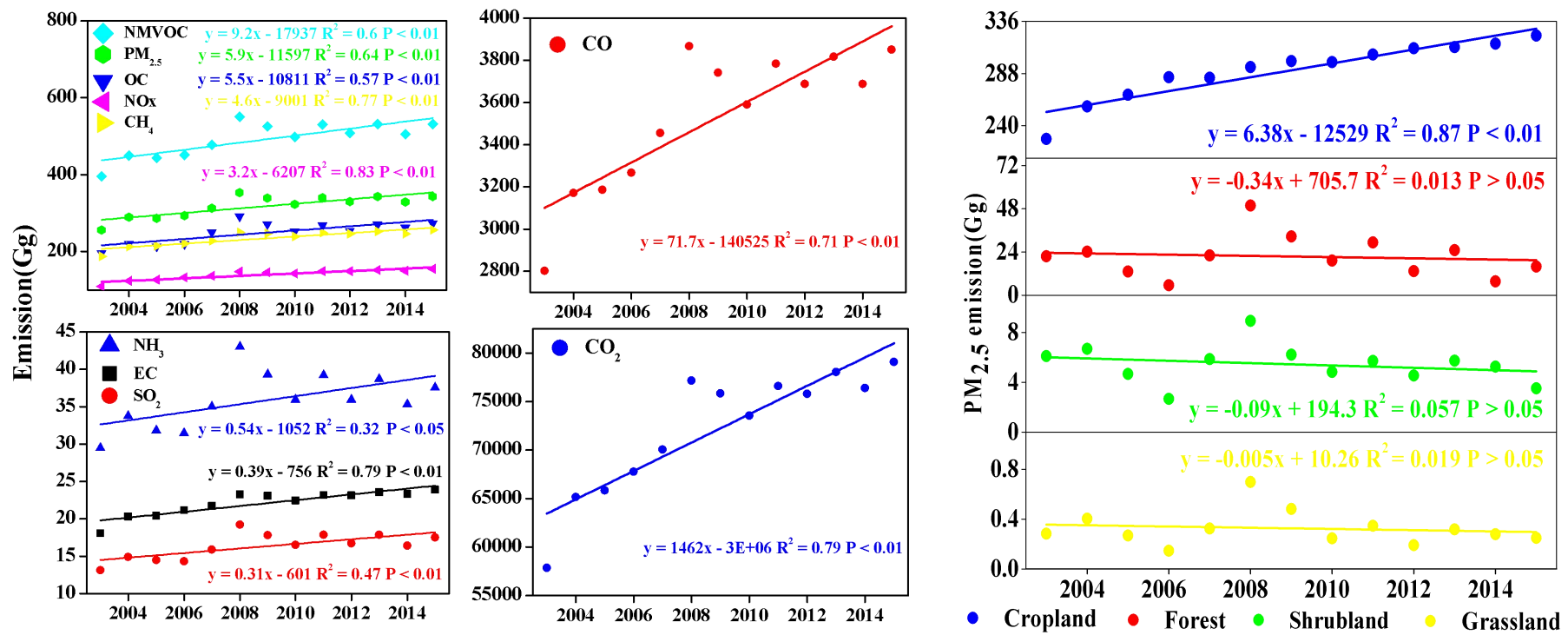


Figure S2. Distribution of open biomass burning fire in Central and Eastern China for MODIS burned area product MCD64A1 (a) and MODIS active fire product MCD14ML (b) in 2015.



(a)

(b)

Figure S3. The changing tendency of different pollutant emissions (a) and PM_{2.5} emission from different biomass types (b) during 2003 to 2015.

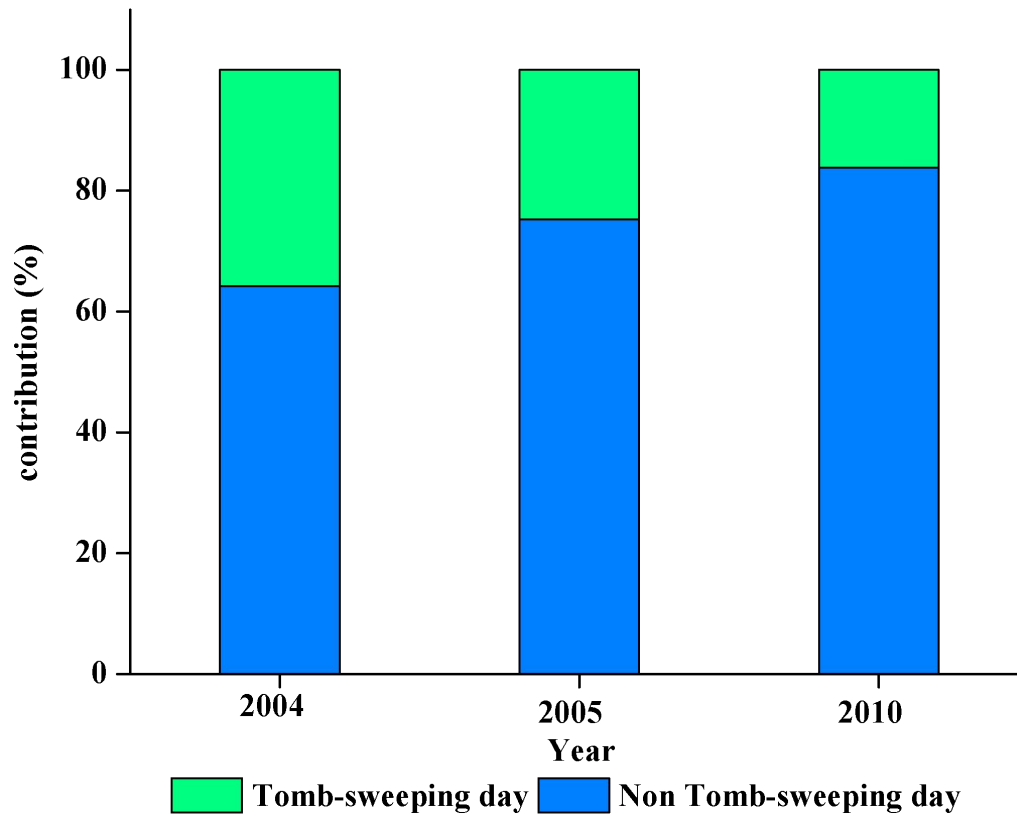


Figure S4. The contribution of fire points in Tomb-sweeping and non-Tomb-sweeping day to the whole April in Central and Eastern China.

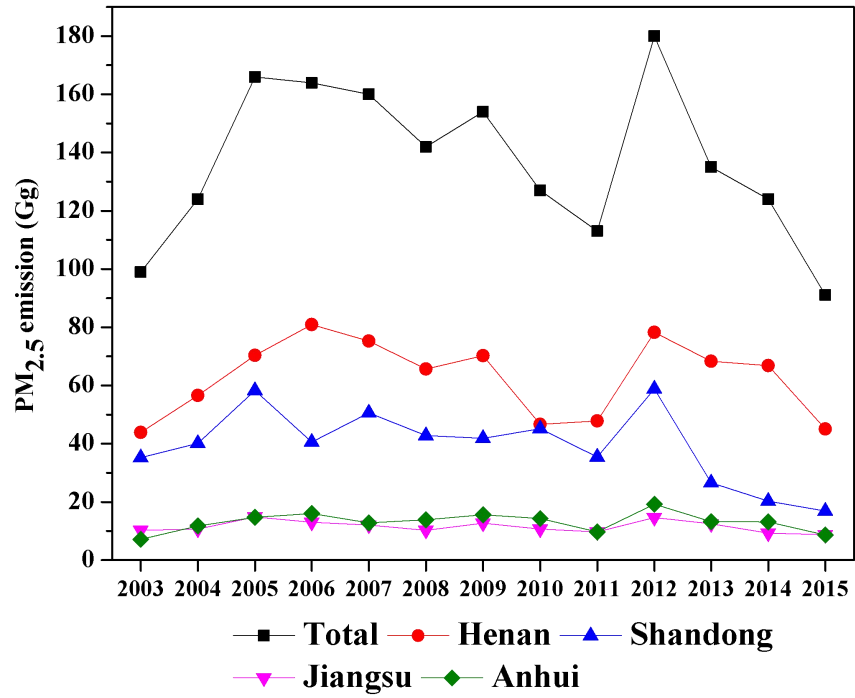


Figure S5. The PM_{2.5} emission from open biomass burning in harvest time in Central and Eastern China from 2003 to 2015.

The details about field questionnaire investigation.

In order to obtain the biomass burning information about burning activities, burning habit and comprehensive utilization in research area, questionnaires were designed for field investigation. The detailed information of address, latitude and longitude, biomass burning types, specific crop straw, straw utilization, monthly biomass burning and burning habits were all included. Considering the different economic development level, population intensity and biomass density, the investigation was conducted in the representative regions of each province. Each questionnaire was done in rural area through face to face method and the surveyors were trained to thoroughly understand the questionnaire content. Finally, more than 200 valid questionnaires were received.

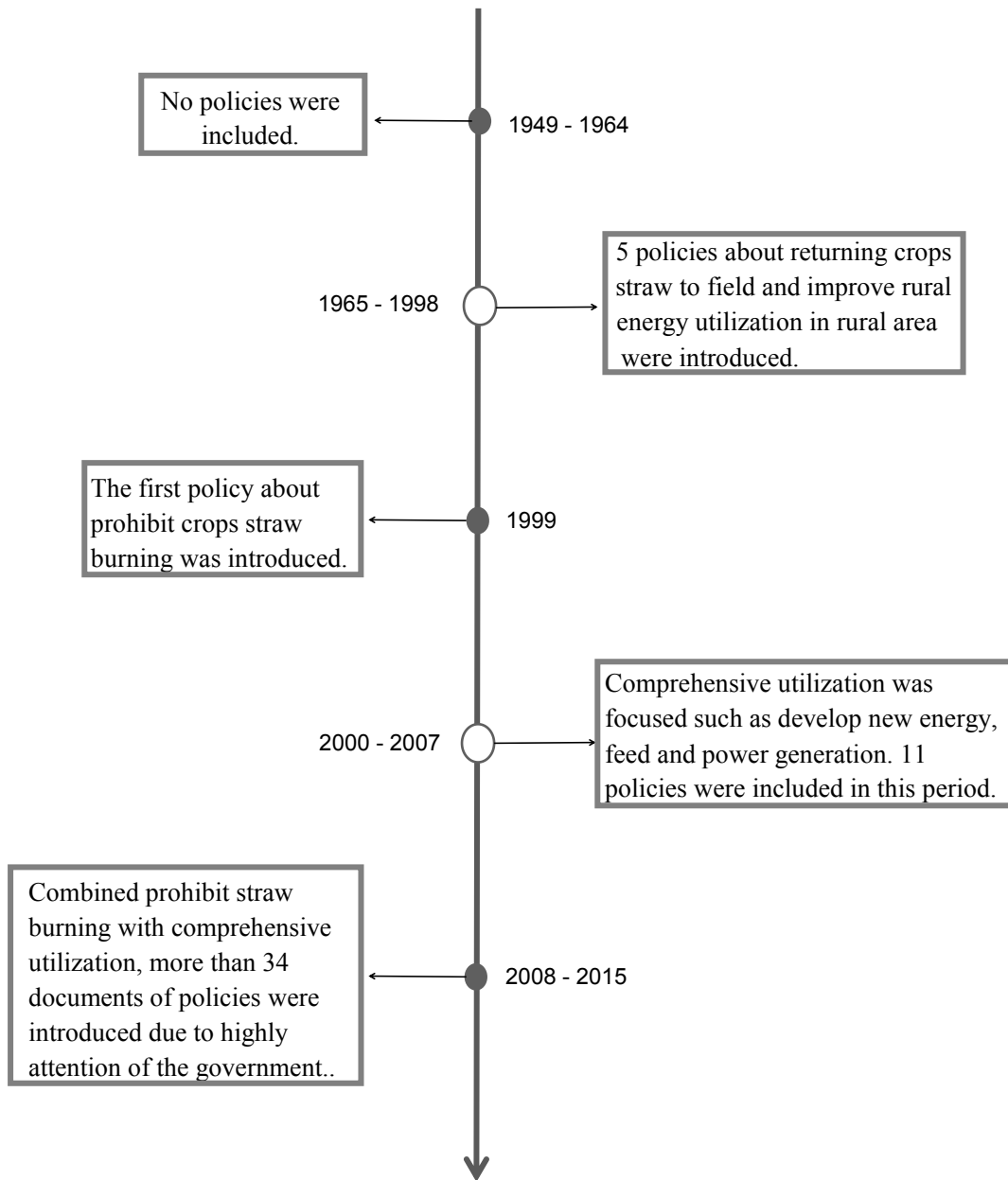


Figure S6. The summary of crop residue burning management policies from 1949 to 2015 in China.

Table S1. Detailed crop residue burning management policies from 1949 to 2015 in China.

Year	Crop residue burning management polices
1965	The Central Committee of the Communist Party of China. Guideline on solving the problem of wood burning in the country [EB/OL]. (1965-08-31). http://www.ce.cni/xwzx/gnsz/szyw/200706/13/t20070613_11732109.html (in Chinese)
1980	Fourth Plenary Session of the Eleventh Central Committee of the Communist Party of China. Decisions on accelerating agricultural development [EB/OL]. (1979-09-28). http://www.people.com.cn/GB/shizheng/252/5089/5103/5206/20010428/454999.html (in Chinese)
1992	The State Council. Report on developing herbivorous livestock straw resource by the Ministry of Agriculture [EB/OL]. (1992-05-29). https://www.baidu.com/link?url=sb90DY1M19R5tkxiTRtBWcHbosQ2_vZVvzLDze7rC;zn7-Gd6Wj_1Likps2rYO0AL1N3y7MhaYApL7B-Lbpwwt7a&wd=&eyid=d1c7a1710000729f0000000255a5b559 (in Chinese)
1995	National Development and Reform Commission, Ministry of Science and Technology, Ministry of Commerce of the People's Republic of China. Outline of development of new and renewable energy from 1996 to 2010 [EB/OL]. (1995-01-05). http://www.chinaperlite.org.cn/news_p/detail_p.asp?id=602 (in Chinese)
1996	The State Council. Outline of development of straw maturing of pass rumen project by Ministry of Agriculture [EB/OL]. (1996-10-05). http://govinLo.nlc.gov.cn/lssj/xxgh/abszfgb/199611/201104/t20110414_704752.html?classid=383 (in Chinese)
1999	Ministry of Environmental Protection. Ministry of Agriculture, Ministry of Finance, National Railway Administration, Ministry of Transport. Management regulations on straw banning and comprehensive utilizations [EB/OL]. (1999-04-12). http://www.zhb.gov.cn/gkml/zj/wj/200910/t20091022_171920.htm?C'OLLC'C=3073420356& . (in Chinese)
1999	Ministry of Science and Technology, National Development and Reform Commission. Opinions on the accelerating development of renewable energy [EB/OL]. (1999-01-12). http://law.fayi.com.cn/64242.html (in Chinese)
2000	Order of the President of PRC. Law of prevention of air pollution [EB/OL]. (2000-04-29). http://www.gov.cn/ziliao/flfg/2005-08/05/content_20945.htm (in Chinese)
2003	Ministry of Environmental Protection. Management regulations on straw banning and comprehensive utilizations [EB/OL].
2005	Ministry of Agriculture, Ministry of Finance. Measures for management of agricultural machinery purchase subsidy [EB/OL]. (2005-02-25). http://www.mof.gov.cn/pub/nongyesi/redianzhuanti/czzxzyzf/201108/t20110818_587276.html (in Chinese)
2005	National Development and Reform Commission. Guidance on renewable energy industry [EB/OL]. (2005-11-29).

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- <http://www.cnki.com.cn/Article/CJFDTotal-XDK200601002.htm> (in Chinese)
- 2006 National Development and Reform Commission. Opinions on management of allocation of prices and expenses for renewable energy generation [EB/OL]. (2006-01-04).
http://www.gov.cn/ztl/2006-01/20/content_165910.htm (in Chinese)
- 2006 Order of the President of PRC. Renewable energy law of PRC [EB/OL]. (2005-02-28).
http://www.gov.cn/ziliao/flfg2005-06/21/content_8275.htm (in Chinese)
- 2006 Ministry of Finance, National Development and Reform Commission, Ministry of Agriculture, State Administration of Taxation, The State Forestry Administration. Opinion on the policy of supporting the development of biological energy and biological chemical industry [EB/OL]. (2006-09-30).
http://www.mot.gov.cn/zhengwuxinxi/caizhengwengao/caizhengbuwengao2007/caizhengbuwengao20071/200805/t20080519_6018.html (in Chinese)
- 2006 Ministry of Environmental Protection. Notice on strengthening the management of biomass power generation project environmental impact assessment work [EB/OL]. (2006-06-01).
<http://www.mep.gov.cn/gkml/zj/wj/200910/t20091022-172397.htm> (in Chinese)
- 2007 National Development and Reform Commission. Middle and long-term programme of renewable energy development [EB/OL]. (2007-08-31).
http://www.ndrc.gov.cn/zclb/zclbghwb/200709/t20070904_579685.html (in Chinese)
- 2007 Ministry of Agriculture. Plan on agricultural biomass industry development from 2007 to 2015 [EB/OL]. (2007-01-01).
http://www.moa.gov.cn/govpublic/FZJHS/201006/t20100606_1533134.htm (in Chinese)
- 2008 The State Council. Comments on accelerating the utilization of crop straw [EB/OL].(2008-07-27).
<http://www.chinalaw.gov.cn/article/fgkd/xfj/fgxwj/201003/20100300251211.html> (in Chinese)
- 2008 Ministry of Finance. Measures for subsidy funds management of straw energy utilization [EB/OL]. (2008-10-30).
http://www.gov.cn/gzdt/2008-11/18/content_1153122.htm (in Chinese)
- 2008 National Development and Reform Commission. The eleventh five-year plan of renewable energy development [EB/OL]. (2008-03-03).
http://www.moa.gov.cn/zwl/m/zclg/111g/200806/t20080612_1060385.htm (in Chinese)
- 2008 Ministry of Environmental Protection, National Development and Reform Commission, National Energy Administration. Notice on strengthening the environmental impact assessment of biomass power generation projects [EB/OL]. (2008-09-04).
http://www.zhb.gov.cn/info/bgw/bwj/200809/t20080908_128308.htm (in Chinese)
- 2009 The State Council. Notice on the arrangement of energy conservation and emissions reduction work in 2009 [EB/OL]. (2009-07-19),
http://www.gov.cn/zwgk/2009-07/31/content_1380418.htm (in Chinese)
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- 2009 National Development and Reform Commission, Ministry of Agriculture. Guidance on residue utilization program [EB/OL]. (2009-02-09), http://www.sdpc.gov.cn/zclb/zclMghwb/200902/t20090219_579696.html
- 2009 Ministry of Agriculture, Ministry of Finance. Guideline on increasing the subsidy of soil organic matter program in 2009 [EB/OL]. (2009-07-07). http://www.moa.gov.cn/govpublic/CWS/201006/t20100606_153344.htm (in Chinese)
- 2010 Ministry of Agriculture, Ministry of finance. Guideline on increasing the subsidy of soil organic matter program in 2010 [EB/OL]. (2010-07-06). http://www.moa.gov.cn/govpublic/CWS/201007/t20100707_1595696.htm (in Chinese)
- 2010 National Development and Reform Commission, Ministry of Finance, Ministry of Agriculture, Ministry of Environmental Protection. Notice on the management of biomass power generation projects [EB/OL]. (2010-08-18). http://nyj.ahpc.gov.cn/info.jsp?xxnr_id=10082643 (in Chinese)
- 2010 National Development and Reform Commission. Notice on improving the price policy of agricultural and forestry biomass power generation [EB/OL]. (2010-07-18). http://bgt.ndrc.gov.cn/zclb/201007/t20100728_498779.html (in Chinese)
- 2011 National Development and Reform Commission, Ministry of Agriculture, Ministry of Finance. The embodiment of crop residues in the 12th Live-year plan [EB/OL]. (2011-11-29). http://www.mof.gov.cn/zhengwuxinxi/zhengcefabu/201112/t20111221_617842.htm (in Chinese)
- 2011 Ministry of Finance, State Administration of Taxation. Notice on the policy of adjusting and improving the labor VAT and the comprehensive utilization of resource [EB/OL]. (2011-11-21). http://szs.mot.gov.cn/zhengwuxinxi/zhengcefabu/201111/t20111123_609990.html (in Chinese)
- 2011 Ministry of Agriculture, Ministry of Finance. Guideline on subsidy program of improvement of soil organic matter in 2011 [EB/OL]. (2011-9-8). http://www.moa.gov.cn/govpublic/CWS/201109/t20110908_2201201.htm (in Chinese)
- 2011 National Energy Administration. The 12th five-year plan of development of renewable energy [EB/OL]. (2012-08-06). <http://www.abd.cn/e/DoPrint/?classid=2&id=31644> (in Chinese)
- 2011 Ministry of Agriculture. The 12 five-year plan on the national livestock development [EB/OL]. (2011-09-02). http://www.moa.gov.cn/govpublic/XMYS/201109/t20110921_2292641.htm (in Chinese)
- 2012 Ministry of Science and Technology, National Development and Reform Commission, Ministry of Industry and information Technology, Ministry of Environmental Protection. Chinese Academy of Sciences. The 12th five-year special plan on scientific project of waste recycling usage [EB/OL]. (2012-04-13).
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- http://www.zhb.gov.cn/gkml/hbb/gwy/201206/t20120619_231910.htm (in Chinese)
- 2012 The State Council. National strategic emerging industry development in the 12th five-year plan [EB/OL]. (2012 07-09).
http://www.gov.cn/zwgk/2012-07/20/content_2187770.htm (in Chinese)
- 2012 Ministry of Agriculture, Ministry of Finance. Guideline on subsidy program of improvement of soil organic matter in 2012 [EB/OL]. (2012-06-12).
http://www.moa.gov.cn/govpublic/CWS/201206/t20120606_2751150.htm (in Chinese)
- 2012 Central Committee of the Communist Party of China. The State Council. Opinions on comprehensively deepening rural reform and accelerating agricultural modernization [EB/OL]. (2014-01-19).
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- 2013 The State Council. Guideline on speeding up the development of energy conservation and environmental protection industry [EB/OL]. (2013-08-11).
http://www.gov.cn/zwgk/2013-08/11/content_2464241.htm (in Chinese)
- 2013 Ministry of Agriculture, Ministry of Finance. Guideline on subsidy program of improvement of soil organic matter in 2011 [EB/OL]. (2013-06-06).
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- 2013 Ministry of Agriculture. Measures for management of agricultural machinery purchase subsidy in 2013 [EB/OL]. (2013-01-25)
http://www.moa.gov.cn/zwllm/zwtd/201301/t20130125_3208634.htm (in Chinese)
- 2014 The State Council. Notice on implementation of the policies and measures for comprehensively deepening rural reform and accelerating agricultural modernization by Central Committee of the Communist Party of China [EB/OL]. (2014-05-10).
http://www.gov.cn/zhengce/content/2014-03/10/content_8705.htm (in Chinese)
- 2014 National Development and Reform Commission. Notice on strengthening the work of straw banning and comprehensive utilizations [EB/OL]. (2013-05-14).
http://www.tzhl.gov.cn/art/2013/5/27/art_9286_202934.html (in Chinese)
- 2014 National Development and Reform Commission, Ministry of Agriculture. Notice on promoting straw comprehensive utilizations in key areas for the control of air pollution and major grain producing areas [EB/OL]. (2014-05-09).
http://www.jxdpc.gov.cn/departmentsite/hjbh/tztg/gztz/201405/t20140509_105463.htm (in Chinese)
- 2014 The State Council. Guidance on how to improve the living environment in village [EB/OL]. (2014-05-29).
http://www.gov.cn/zhengce/content/2014-05-29/content_8835.htm (in Chinese)
- 2014 Ministry of Environmental Protection. Notice on the work on straw banning in the summer of 2014 [EB/OL]. (2014-09-15).
http://www.zhb.gov.cn/gkml/hbb/bgth/201409/t20140918_289253.htm?COLLCC=30736395888& (in Chinese)
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- 2014 Ministry of Agriculture, Ministry of Finance. Notice on the cultivated land protection and soil quality improvement in 2014 [EB/OL]. (2014-08-01).
http://www.moa.gov.cn/zwl/m/tzgg/tfw/201408/t20140804_3989342.htm (in Chinese)
- 2014 Ministry of Agriculture. 50 categories of strengthening rural reform, supporting grain production, and increasing farms' income [EB/OL]. (2014-04-25).
http://www.moa.gov.cn/zwl/m/zclg/qnhnzc/201404/t20140425_3884555.htm (in Chinese)
- 2014 National Development and Reform Commission. Notice on organizing the investment project options of resource saving and environment protection in the central budget of 2015 [EB/OL]. (2015-03-20).
http://www.sdpc.gov.cn/gzdt/201503/t20150320_668108.html (in Chinese)
- 2014 Ministry of Finance. Announcement about companies conform to subsidy funds management of straw energy utilization [EB/OL]. (2012-06-21).
http://www.gov.cn/zwgk/2012-03/14/content_2091815.htm (in Chinese)
- 2015 The People's Republic of China. Law of air pollution prevention [EB/OL]. (2015-08-29).
http://www.zhb.btm.gov.cn/ztbd/rdzl/gwy/wj/201509/t20150906_309355.htm (in Chinese)
- 2015 Ministry of Agriculture, Ministry of Finance. Measures for management of agricultural machinery purchase subsidy from 2015 to 2017 [EB/OL]. (2015-01-27).
http://www.moa.gov.cn/govpublic/CWS/201501/t20150129_4356487.htm (in Chinese)
- 2015 Ministry of Finance. Management regulations on the special funds of renewable energy development [EB/OL]. (2015-04-02).
http://jjs.mof.gov.cn/zhengwuxinxi/zhengcefagui/201504/t20150427_1223373.html (in Chinese)
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Table S2. The forestry fire burning management policies in China.

Year	Forestry fire burning management polices
1998	The NPC Standing Committee. The forest law of the people's republic of china (1998 Revision) [EB/OL]. (1998-04-29). http://www.gov.cn/banshi/2005-09/13/content_68753.htm
2004	The State Council. Notice on further enhance forest fire prevention. [EB/OL]. (2004-04-14). http://www.gov.cn/xxgk/pub/govpublic/mrlm/200803/t20080328_32370.html
2008	The State Council. Notice on safety sacrifice and renovate the tomb in the tomb-sweeping day [EB/OL]. (2008-04-16). http://www.gov.cn/zhengce/content/2008-04/16/content_6238.htm
2008	The State Council. Notice on Strengthening the current forest fire prevention. [EB/OL]. (2008-03-28). http://www.gov.cn/zhengce/content/2008-03/28/content_2772.htm
2008	The State Council. Regulations on forest fire prevention (2008 Revision) [EB/OL]. (2008-12-05). http://www.gov.cn/zhengce/content/2008-12/05/content_2748.htm
2008	The State Council. Regulations on Grassland Fire Prevention (2008 Revision) [EB/OL]. (2008-11-19). http://www.gov.cn/zhengce/content/2008-12/05/content_2756.htm
2012	The State Council. National forest fire contingency plan [EB/OL]. (2012-12-25). http://www.gov.cn/zhengce/content/2012-12/25/content_2730.htm

Table S3. Emissions of various pollutants from open biomass burning in Central and Eastern China from 2003 to 2015 (Gg).

Province	OC	EC	CH ₄	NO _x	NMVOCs	SO ₂	NH ₃	CO	CO ₂	PM _{2.5}
2003										
Anhui	12.14	1.16	11.9	6.6	25.08	0.83	1.86	172.5	3817	16.84
Fujian	8.32	1.25	12.14	5.93	28.79	1.09	2.9	189	3363	16.06
Henan	60.09	3.35	35.58	24.62	78.38	2.42	4.72	573.5	13067	58.86
Hubei	12.87	2.15	21.36	10.58	41.39	1.23	3.02	281.6	6126	25.43
Hunan	13.75	2.66	24.67	11.84	48.72	1.64	4.28	348	6355	27.85
Jiangsu	11.06	1.22	11.49	6.15	22.21	0.62	1.55	159.1	3426	14.51
Jiangxi	8.47	1.66	14.24	6.63	27.9	0.95	2.59	204.3	3575	16.1
Shandong	48.1	3.16	42.3	29.86	94.77	3.36	5.97	679.3	14418	63.93
Zhejiang	8.02	1.33	12.47	5.97	25.8	0.92	2.4	177.6	3387	15.02
Shanghai	0.8	0.15	1.29	0.6	2.27	0.06	0.17	16.68	326.7	1.28
2004										
Anhui	15.1	1.48	14.99	8.35	31.44	1.02	2.34	217.3	4757	21.09
Fujian	8.65	1.28	12.85	6.13	31.32	1.16	3.17	200.6	3502	16.87
Henan	67.97	4.07	45.15	30.91	99.38	3.18	6.13	720.8	16164	72.56
Hubei	14.37	2.41	24.07	11.8	46.97	1.4	3.47	315.9	6921	28.96
Hunan	14.82	2.89	26.73	12.75	52.98	1.76	4.69	376.2	6825	29.94
Jiangsu	12.81	1.44	13.47	7.2	26.05	0.73	1.83	187.3	3991	17.23
Jiangxi	9.55	1.88	16.09	7.55	32.02	1.06	3.03	231.2	3975	17.71
Shandong	49.35	3.29	44.3	31.34	99.31	3.53	6.29	712.1	15009	67.1
Zhejiang	8.6	1.42	13.33	6.42	27.68	1	2.6	190.6	3638	16.23
Shanghai	0.87	0.16	1.4	0.65	2.47	0.06	0.19	18.04	357.6	1.41
2005										
Anhui	15.43	1.45	14.37	7.99	30.48	1.03	2.36	212.2	4604	20.91
Fujian	5.5	1.09	9.61	4.77	19.07	0.61	1.66	136.7	2556	10.6
Henan	71.9	4.36	50.37	34.7	111.3	3.67	6.92	806.4	17806	79.73
Hubei	15.16	2.44	24.38	12.05	47.62	1.43	3.53	323.5	6971	29.3
Hunan	13	2.8	25.31	12.17	47.26	1.44	3.94	344.5	6361	26.41
Jiangsu	12.97	1.42	12.91	6.85	24.68	0.68	1.75	179.5	3809	16.29
Jiangxi	8.48	1.89	15.55	7.18	27.98	0.85	2.46	214.2	3714	15.77
Shandong	55.07	3.5	48.65	34.68	109.4	3.96	6.96	786.8	16426	72.69
Zhejiang	7.21	1.29	12	5.81	23.63	0.77	2.08	164	3254	13.54
Shanghai	0.91	0.16	1.38	0.65	2.45	0.06	0.19	17.83	356.6	1.41
2006										
Anhui	15.9	1.46	14.24	8.04	28.9	0.84	1.99	204.1	4527	19.64
Fujian	5.13	1.05	9.23	4.57	18.07	0.55	1.54	129.8	2451	9.97
Henan	78.44	4.76	54.97	38.1	121.1	3.96	7.49	880.5	19350	86.62
Hubei	15.47	2.44	24.14	12.15	46.58	1.35	3.36	320.3	6903	28.94
Hunan	13.04	2.84	25.42	12.4	46.38	1.41	3.81	343.5	6442	26.53
Jiangsu	14.2	1.51	13.68	7.39	26.16	0.71	1.84	191.9	4052	17.4
Jiangxi	7.87	1.91	15.45	7.17	26.44	0.71	2.24	206.2	3572	14.28
Shandong	57.57	3.67	50.13	35.77	112.6	4.05	7.15	811.6	16962	75.64
Zhejiang	6.74	1.33	12.08	5.67	22.52	0.68	1.85	160.5	3146	12.67
Shanghai	0.97	0.16	1.37	0.66	2.41	0.06	0.19	18.13	349.6	1.39
2007										
Anhui	17.52	1.49	13.77	8.04	27.72	0.82	1.96	202.8	4436	19.61
Fujian	8.04	1.16	11.48	5.53	27.9	1.08	2.89	182.3	3127	15.49
Henan	82.69	4.93	57.91	40.3	127.8	4.25	7.95	930.6	20339	90.88

Hubei	18	2.47	23.95	12.46	46.7	1.38	3.44	326.3	6950	30.15
Hunan	15.32	3	27.03	12.95	53.09	1.81	4.82	386	6794	30.57
Jiangsu	15.64	1.51	13.34	7.45	25.48	0.68	1.78	191.8	3992	17.35
Jiangxi	9.93	2.1	17.66	8.06	33.27	1.06	3.01	248.7	4254	18.89
Shandong	59.72	3.71	50.77	36.51	113.8	4.09	7.19	825	17184	76.69
Zhejiang	6.4	1.18	10.28	4.85	19.66	0.66	1.79	143.6	2637	11.48
Shanghai	1.03	0.16	1.28	0.63	2.23	0.06	0.17	17.39	325.4	1.32
2008										
Anhui	18.92	1.59	15.11	8.71	31.42	0.98	2.31	225.4	4867	21.89
Fujian	15.11	1.57	18.8	8.37	55.79	2.38	6.26	327.8	5273	30.2
Henan	84.71	5.04	59.39	41.15	131.1	4.38	8.17	953.3	20876	93.09
Hubei	17.86	2.54	24.99	12.9	48.77	1.45	3.58	337.9	7243	31.06
Hunan	19.04	3.33	31.48	14.82	67	2.46	6.38	465.5	8122	38.63
Jiangsu	15.97	1.53	13.56	7.57	26	0.7	1.82	195	4066	17.62
Jiangxi	13	2.34	20.62	9.64	43.42	1.56	4.25	306.4	5252	24.7
Shandong	61.37	3.83	52.65	37.78	118.3	4.28	7.52	856.5	17793	79.61
Zhejiang	8.27	1.33	12.46	5.86	26.72	0.95	2.59	181	3319	15.22
Shanghai	1.17	0.16	1.34	0.67	2.32	0.06	0.18	18.28	343.1	1.41
2009										
Anhui	18.66	1.58	15.13	8.68	30.94	0.93	2.19	222.3	4854	21.5
Fujian	9.36	1.26	13.09	6.26	33.66	1.31	3.55	211.7	3593	18.18
Henan	84.87	5.05	59.63	41.4	131.6	4.41	8.21	957.3	20959	92.91
Hubei	18.49	2.64	26.35	13.52	51.74	1.55	3.81	355.4	7646	32.66
Hunan	18.64	3.38	32.49	15.15	67.76	2.42	6.22	468.7	8408	38.87
Jiangsu	16.09	1.55	13.81	7.69	26.4	0.71	1.84	197.9	4140	17.79
Jiangxi	12.19	2.33	20.39	9.31	41.28	1.42	3.91	295.2	5090	23.53
Shandong	61.65	3.83	53.01	38.06	119.1	4.33	7.56	862.4	17901	79.69
Zhejiang	6.64	1.25	11.09	5.16	21.06	0.67	1.83	151.2	2875	12.18
Shanghai	1.3	0.17	1.39	0.71	2.43	0.06	0.18	19.15	362.8	1.5
2010										
Anhui	19.65	1.62	15.51	9.03	32.38	1.04	2.4	233.8	5020	22.7
Fujian	6.05	1.07	9.98	4.81	21.74	0.75	2.05	148.3	2630	11.8
Henan	85.42	5.07	59.79	41.5	131.8	4.41	8.22	960.1	21012	92.93
Hubei	18.87	2.64	26.59	13.7	52.55	1.61	3.87	361.2	7751	33.29
Hunan	15.95	3.17	29.95	14.16	58.98	1.95	5.12	415.4	7681	33.52
Jiangsu	16.18	1.55	13.81	7.7	26.49	0.72	1.86	198.9	4130	17.84
Jiangxi	9.5	2.13	17.81	8.14	32.44	0.97	2.83	243	4280	18.2
Shandong	61.76	3.79	52.9	37.97	118.9	4.35	7.57	861.2	17869	79.06
Zhejiang	6.76	1.24	10.86	5.17	20.65	0.67	1.82	149.8	2845	12.16
Shanghai	1.21	0.17	1.34	0.69	2.33	0.06	0.18	18.73	343.1	1.42
2011										
Anhui	19.82	1.63	15.93	9.29	33.63	1.08	2.49	241.4	5101	23.19
Fujian	8.29	1.21	12.25	5.8	30.23	1.14	3.09	193.4	3317	16.31
Henan	86.87	5.15	61.12	42.37	135.1	4.58	8.47	985	21415	94.91
Hubei	19.53	2.74	27.31	14.3	53.87	1.67	4.02	374.7	7946	34.37
Hunan	17.03	3.29	32.09	14.93	65.53	2.17	5.76	448.4	8219	36.34
Jiangsu	16.45	1.58	14.03	7.85	26.97	0.74	1.91	202.8	4174	18.01
Jiangxi	11.2	2.31	19.9	9.08	38.67	1.23	3.53	279.7	4869	21.6
Shandong	63.41	3.89	54.39	38.95	122.8	4.5	7.88	886.9	18354	81.58
Zhejiang	6.77	1.23	11.03	5.22	21.49	0.67	1.9	151.8	2867	12.14
Shanghai	1.36	0.17	1.36	0.71	2.38	0.06	0.18	19.2	356.1	1.49

2012										
Anhui	20.84	1.68	16.62	9.93	34.96	1.12	2.57	251.8	5377	24.01
Fujian	5.29	1.03	9.23	4.56	18.62	0.61	1.66	132.9	2425	10.28
Henan	88.02	5.2	62.06	43.19	136.8	4.61	8.53	997.5	21745	95.49
Hubei	19.87	2.78	27.73	14.45	54.37	1.64	3.97	378	8044	34.64
Hunan	14.28	3.19	29.3	14.2	53.49	1.61	4.32	390.4	7406	30.17
Jiangsu	16.81	1.61	14.28	7.99	27.37	0.75	1.93	206.4	4252	18.33
Jiangxi	9.93	2.26	18.79	8.68	33.64	0.99	2.9	254.6	4521	18.98
Shandong	65.14	3.96	54.98	39.38	123.7	4.55	7.89	897.6	18615	82.69
Zhejiang	7.15	1.24	11.4	5.43	22.45	0.78	1.96	160.3	3055	13.42
Shanghai	1.3	0.17	1.33	0.69	2.32	0.06	0.18	18.76	345	1.44
2013										
Anhui	21.19	1.68	16.45	9.91	34.32	1.12	2.5	250.3	5368	24.04
Fujian	6.17	1.08	10.26	4.9	22.46	0.78	2.1	152.7	2718	12.29
Henan	90.44	5.35	64.05	44.33	141.9	4.9	9.	1035	22441	99.36
Hubei	21.08	2.84	28.37	14.66	56.12	1.69	4.13	386.3	8285	35.56
Hunan	17.47	3.34	32.05	15.22	64.54	2.19	5.71	448	8364	36.85
Jiangsu	17.34	1.63	14.34	8.04	27.36	0.74	1.92	207.3	4290	18.49
Jiangxi	11.33	2.36	20.17	9.34	38.43	1.22	3.49	281.6	4960	21.62
Shandong	65.78	3.95	54.66	39.17	123.3	4.51	7.87	893	18554	82.24
Zhejiang	6.31	1.13	10.54	4.95	20.9	0.66	1.8	145.2	2756	11.68
Shanghai	1.12	0.16	1.25	0.64	2.15	0.05	0.17	17.49	314.3	1.3
2014										
Anhui	21.35	1.69	16.52	10.08	33.72	1.04	2.34	248.3	5375	23.53
Fujian	5.09	1.03	9.04	4.56	17.54	0.57	1.51	128.5	2408	9.94
Henan	91.15	5.32	62.54	43.59	137.7	4.6	8.55	1007.9	21981	96.53
Hubei	21.52	2.9	28.94	15.15	56.52	1.74	4.16	393.7	8487	35.93
Hunan	14.66	3.21	29.79	14.25	55.08	1.69	4.5	396.7	7603	30.94
Jiangsu	17.94	1.65	14.51	8.23	27.71	0.75	1.92	210.7	4366	18.75
Jiangxi	10.06	2.31	19.01	8.94	33.5	0.97	2.87	256.3	4613	18.95
Shandong	66.41	3.96	54.72	39.48	122.9	4.46	7.76	892.8	18607	82.16
Zhejiang	6.09	1.13	10.06	4.96	18.63	0.57	1.54	136.9	2640	10.73
Shanghai	1.13	0.15	1.21	0.63	2.09	0.05	0.16	17.05	306.8	1.26
2015										
Anhui	21.71	1.73	17.11	10.36	35	1.09	2.43	257	5520	24.13
Fujian	6.15	1.07	10.15	4.97	22.23	0.77	2.08	151.1	2731	12.19
Henan	95.75	5.55	65.72	45.95	144.8	4.86	8.98	1061	23084	101.4
Hubei	21.16	2.92	29.58	15.38	57.54	1.72	4.15	400.1	8514	35.48
Hunan	14.97	3.24	30.53	14.29	57.61	1.78	4.74	408.1	7759	32.15
Jiangsu	18.17	1.67	14.73	8.36	28.12	0.76	1.96	214.2	4419	18.92
Jiangxi	11.32	2.39	20.44	9.31	38.56	1.23	3.45	284.1	5017	21.93
Shandong	68.54	4.02	55.9	40.34	125.7	4.6	7.97	915	19014	83.95
Zhejiang	6.44	1.13	10.29	5.06	19.72	0.62	1.67	142.1	2723	11.28
Shanghai	1.17	0.15	1.2	0.62	2.06	0.05	0.16	16.95	304.9	1.26

Table S4. Correlation between PM_{2.5} emission from forestry fire burning and rural population, forestry output, per capita incomes of rural residents in each province.

PM _{2.5} emission (Gg)	Rural population (10 thousand)	Per capita income of rural residents (RMB)	Agricultural output (0.1 billion RMB)
Zhejiang	$y = 0.004x - 5.05$ $R^2 = 0.17$ $P > 0.05$	$y = -0.0001x + 4.36$ $R^2 = 0.33$ $P > 0.05$	$y = -0.027x + 5.73$ $R^2 = 0.36$ $P > 0.05$
Fujian	$y = 0.028x - 31.25$ $R^2 = 0.15$ $P > 0.05$	$y = -0.0011x + 24.28$ $P > 0.05$ $P > 0.05$	$y = -0.039x + 23.11$ $R^2 = 0.08$ $P > 0.05$
Jiangsu	$y = 7E-06x + 0.07$ $R^2 = 0.003$ $P > 0.05$	$y = -2E-06x + 0.12$ $R^2 = 0.01$ $P > 0.05$	$y = -0.0002x + 0.11$ $R^2 = 0.01$ $P > 0.05$
Hubei	$y = -0.0006x + 2.87$ $R^2 = 0.12$ $P > 0.05$	$y = 5E-05x + 0.8$ $R^2 = 0.11$ $P > 0.05$	$y = 0.002x + 0.94$ $R^2 = 0.05$ $P > 0.05$
Anhui	$y = 0.0002x + 0.90$ $R^2 = 0.007$ $P > 0.05$	$y = -7E-05x + 2.16$ $R^2 = 0.059$ $P > 0.05$	$y = -0.003x + 2.18$ $R^2 = 0.06$ $P > 0.05$
Hunan	$y = 0.01x - 21.1$ $R^2 = 0.06$ $P > 0.05$	$y = -0.0011x + 20.82$ $R^2 = 0.18$ $P > 0.05$	$y = -0.03x + 20.83$ $R^2 = 0.14$ $P > 0.05$
Jiangxi	$y = 0.003x - 4.01$ $R^2 = 0.06$ $P > 0.05$	$y = -0.0003x + 8.77$ $R^2 = 0.07$ $P > 0.05$	$y = -0.011x + 8.74$ $R^2 = 0.056$ $P > 0.05$
Henan	$y = -0.0005x + 4.24$ $R^2 = 0.12$ $P > 0.05$	$y = 0.0001x + 0.47$ $R^2 = 0.19$ $P > 0.05$	$y = 0.015x - 0.61$ $R^2 = 0.31$ $P > 0.05$
Shandong	$y = -0.0006x + 3.7$ $R^2 = 0.23$ $P > 0.05$	$y = -5E-06x + 1.44$ $R^2 = 0.09$ $P > 0.05$	$y = 0.0078x + 0.038$ $R^2 = 0.31$ $P > 0.05$

Table S5. The uncertainty for the emission factors of various pollutants from open biomass burning in Central and Eastern China.

Vegetation	OC	EC	CO	CH ₄	NO _x	NMVOCs	SO ₂	NH ₃	CO ₂	PM _{2.5}
Corn	0.15 [*]	0.1 [*]	0.19 ^a	0.11 ^b	0.32 ^a	0.25 ^c	0.02 ^h	0.43 ^g	0.05 ^f	0.05 ^c
Rice	0.34 ^a	0.4 ^e	0.52 ^c	0.21 ^b	0.8 ^d	0.17 ^f	0.68 ^a	0.8 ^g	0.02 ^f	0.23 ^d
Wheat	0.25 ^b	0.35 ^a	0.62 ^c	0.15 ^b	0.08 ^d	0.15 ^c	0.68 ^c	0.43 ^b	0.06 ^f	0.25 ^a
Cotton	0.4 ^e	0.42 ^f	0.7 ^c	0.11 ^b	0.3 ^c	0.25 ^c	0.02 ^c	0.44 ^b	0.03 ^h	0.51 ^c
Rapeseed	0.46 ^d	0.43 ^d	0.05 ^d	0.13 ^b	1.39 ^d	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.25 ^c
Soya bean	0.1 ^d	0.5 ^d	0.32 ^d	0.13 ^b	0.11 ^d	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.45 ^d
Sugar cane	0.52 ^c	0.44 ^c	0.23 ^f	0.13 ^b	0.2 ^c	0.09 ^f	0.08 ^c	0.5 ^g	0.03 ^h	0.4 ^f
Peanut	0.52 ^c	0.44 ^c	0.27 ^c	0.13 ^b	0.05 ^c	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.25 ^c
Potato	0.52 ^c	0.44 ^c	0.27 ^c	0.13 ^b	0.05 ^c	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.25 ^c
Tobacco	0.52 ^c	0.44 ^c	0.27 ^c	0.13 ^b	0.05 ^c	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.25 ^c
Sesame	0.52 ^c	0.44 ^c	0.27 ^c	0.13 ^b	0.05 ^c	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.25 ^c
Sugar beet	0.52 ^c	0.44 ^c	0.27 ^c	0.13 ^b	0.05 ^c	0.16 ^c	0.08 ^c	0.5 ^g	0.03 ^h	0.25 ^c
Evergreen coniferous forest	0.62 ^e	1 ^e	0.38 ^e	0.52 ^e	0.39 ^e	0.31 ^e	0.3 ^e	0.66 ^e	0.08 ^e	0.25 ^e
Deciduous coniferous forest	0.62 ^e	1 ^e	0.38 ^e	0.52 ^e	0.23 ^e	0.31 ^e	0.3 ^e	0.66 ^e	0.08 ^e	0.25 ^e
Evergreen broadleaf forest	0.57 ^e	0.6 ^e	0.29 ^e	0.39 ^e	0.54 ^e	- ^e	0.4 ^c	1.58 ^e	0.04 ^e	0.25 ^e
Deciduous broadleaf forest	0.52 ^e	0.33 ^e	0.19 ^e	0.18 ^e	0.46 ^e	0.79 ^e	0.3 ^e	0.27 ^e	0.02 ^e	0.25 ^e
Mixed forest	0.52 ^e	0.33 ^e	0.19 ^e	0.18 ^e	0.46 ^e	0.62 ^e	0.3 ⁱ	0.27 ^e	0.02 ^e	0.25 ^e
Grassland	0.46 ^e	0.5 ^e	0.29 ^e	0.6 ^e	0.28 ^e	0.25 ^c	0.6 ^c	0.8 ^c	0.02 ^e	0.63 ^e
Shrubland	0.18 ^e	0.4 ^e	0.25 ^e	0.33 ^e	0.21 ^e	0.48 ^c	0.43 ^e	0.33 ^e	0.02 ^e	0.37 ^e

References: ^a Cao et al. (2008); ^b Li et al. (2007); ^c He et al. (2015); ^d Tang et al. (2014); ^e Akagi et al. (2011); ^f Zhang et al. (2008); ^g EPD (2014); ^h Wang et al. (2008); ⁱ Andreae and Rosenfeld (2008); * This study.

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