

FigureS1. Distribution of major vegetation types in Central and Eastern China (ECVMC, 2007).

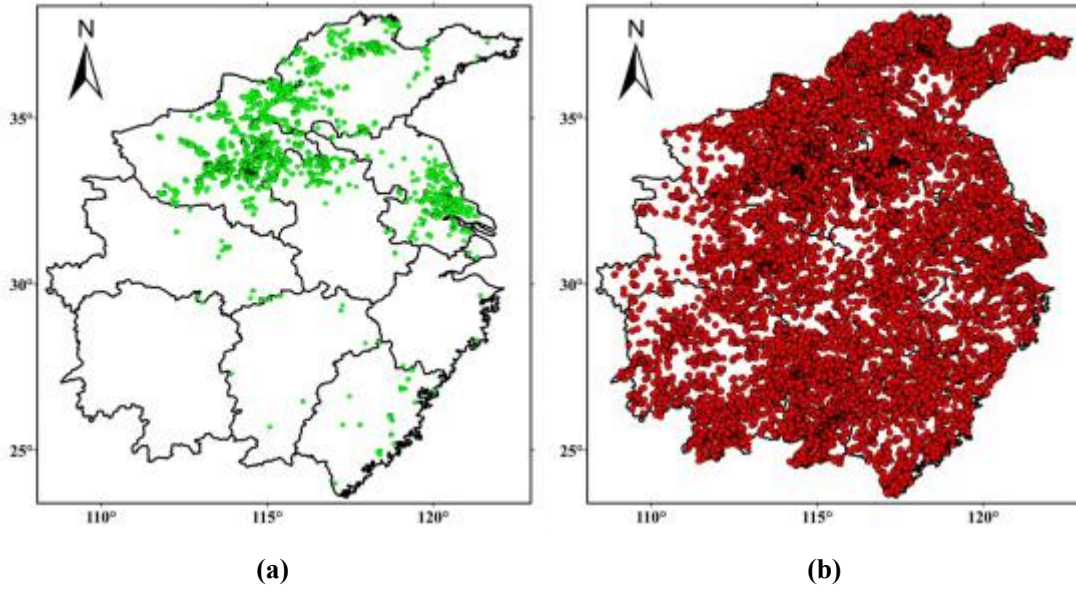


Figure S2. Distribution of open biomass burning fire in Central and Eastern China for two satellite products in 2015 (a: MODIS burned area product MCD64A1; b: MODIS active fire product MCD14ML).

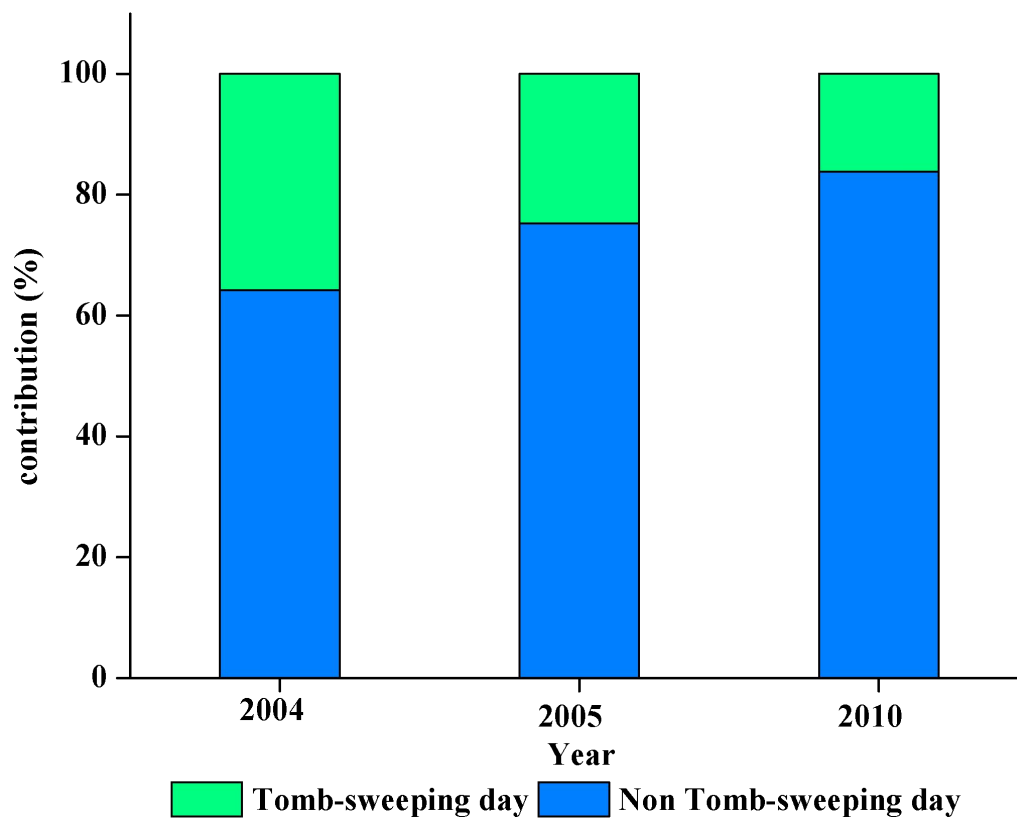


Figure S3. The contribution of fire points in Tomb-sweeping and non-Tomb-sweeping day to the whole April in Central and Eastern China.

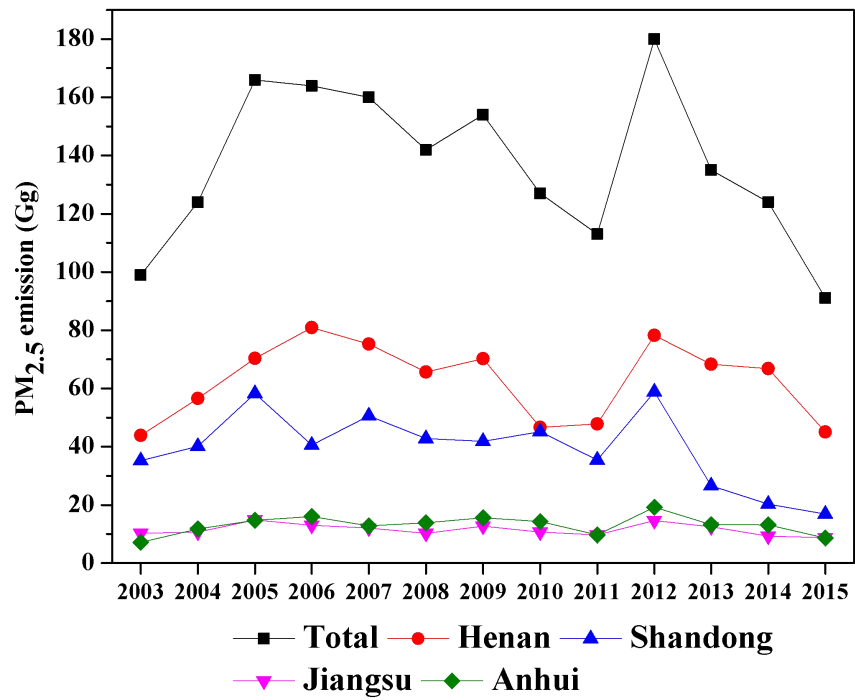


Figure S4. The PM_{2.5} emission from OBB in harvest time in Central and Eastern China from 2003 to 2015.

The details about questionnaire field investigation.

In order to obtain the biomass burning information about anthropogenic activities, burning habit and comprehensive utilization in research area, questionnaires were designed to conduct 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. Consider of the different economic development level, population intensity and biomass density, all the investigation were mainly developed in the representative regions in each province. Each questionnaire was collected in rural area by face to face and the surveyors were trained to thorough understanding of the questionnaire content. Finally, more than 200 valid questionnaires were received in each province.

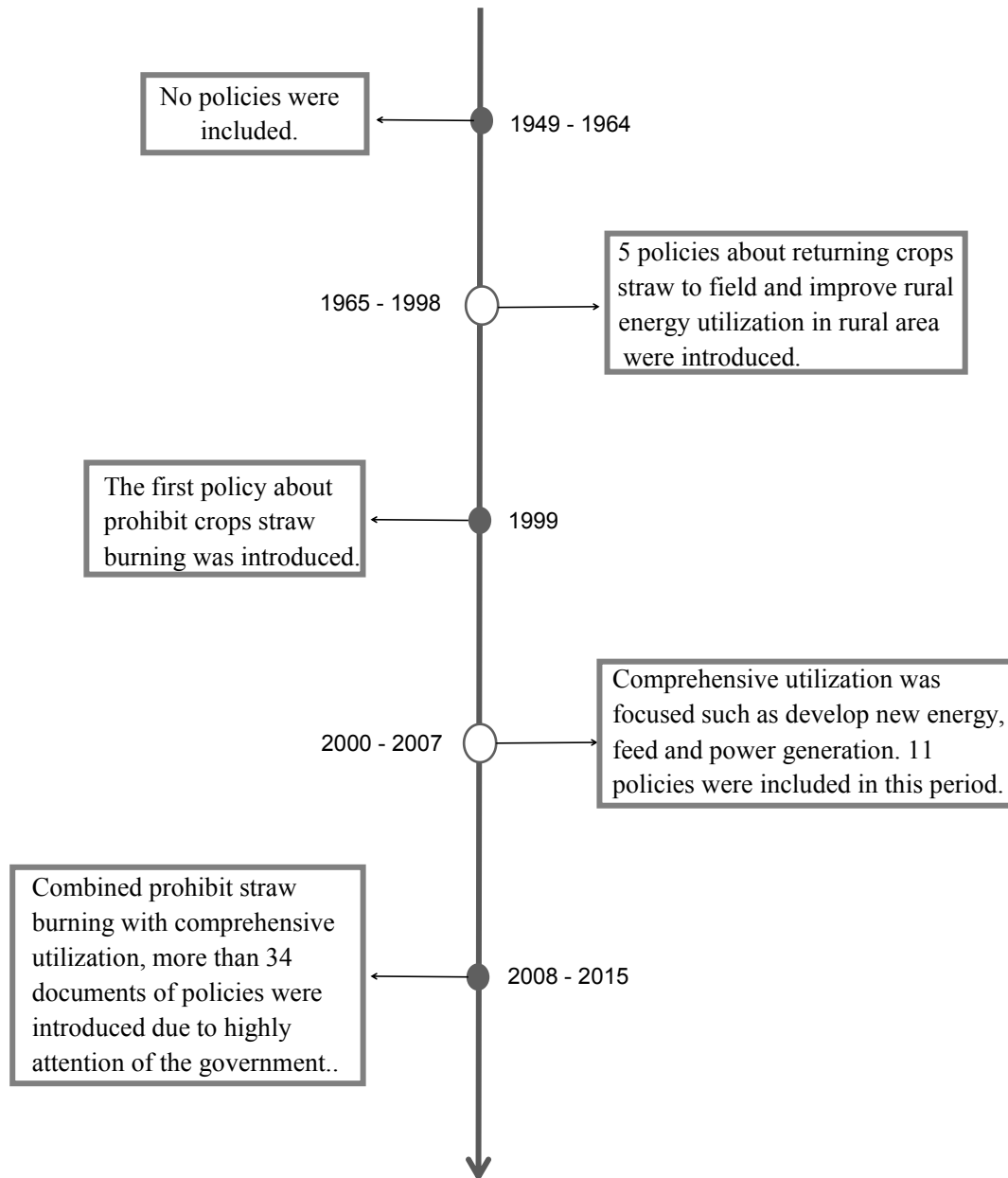


Figure S5. The crop residue burning management policies from 1949 to 2015 in China.

Table S1. The 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_yZVvzLDze7rC;zn7-Gd6Wj_1Likps2rY00AL1N3y7MhaYApL7B-Lbpw7a&wd=&eid=d1c7a1710000729f000000255a5b559 (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). 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/ztzl/2006-01/20/content_165910.htm (in Chinese) |

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- 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/xfg/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)
- 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)
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- 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).
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/zwgg/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).
http://www.gov.cn/gongbao/content/2014/content_2574736.htm (in Chinese)
- 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/zwgg/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).
http://www.moa.gov.cn/zwllm/cwggk/zdxm/201306/t20130606_3485494.htm (in Chinese)
- 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/zwdt/201301/t20130125_3208634.htm (in Chinese)
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- 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)
- 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/zwllm/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/zwllm/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 (unit Gg yr⁻¹) of various pollutants from open biomass burning in Central and Eastern China from 2003 to 2015.

| Province | OC | EC | CH ₄ | NO _x | NMVOC _s | SO ₂ | NH ₃ | PM _{2.5} | CO ₂ | CO |
|-------------|-------|------|-----------------|-----------------|--------------------|-----------------|-----------------|-------------------|-----------------|-------|
| 2003 | | | | | | | | | | |
| Anhui | 12.14 | 1.16 | 11.90 | 6.60 | 25.08 | 0.83 | 1.86 | 172.5 | 3817 | 16.84 |
| Fujian | 8.32 | 1.25 | 12.14 | 5.93 | 28.79 | 1.09 | 2.90 | 189.0 | 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 | 348.0 | 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 | 27.90 | 0.95 | 2.59 | 204.3 | 3575 | 16.10 |
| 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 | 25.80 | 0.92 | 2.40 | 177.6 | 3387 | 15.02 |
| Shanghai | 0.8 | 0.15 | 1.29 | 0.60 | 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 | 11.80 | 46.97 | 1.40 | 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 | 7.20 | 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 | 44.30 | 31.34 | 99.31 | 3.53 | 6.29 | 712.1 | 15009 | 67.10 |
| Zhejiang | 8.60 | 1.42 | 13.33 | 6.42 | 27.68 | 1.00 | 2.60 | 190.6 | 3638 | 16.23 |
| Shanghai | 0.87 | 0.16 | 1.40 | 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 | 5.50 | 1.09 | 9.61 | 4.77 | 19.07 | 0.61 | 1.66 | 136.7 | 2556 | 10.60 |
| Henan | 71.90 | 4.36 | 50.37 | 34.70 | 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 | 29.30 |
| Hunan | 13.00 | 2.80 | 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 | 3.50 | 48.65 | 34.68 | 109.4 | 3.96 | 6.96 | 786.8 | 16426 | 72.69 |
| Zhejiang | 7.21 | 1.29 | 12.00 | 5.81 | 23.63 | 0.77 | 2.08 | 164.0 | 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 | 15.90 | 1.46 | 14.24 | 8.04 | 28.90 | 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 | 38.10 | 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 | 12.40 | 46.38 | 1.41 | 3.81 | 343.5 | 6442 | 26.53 |
| Jiangsu | 14.20 | 1.51 | 13.68 | 7.39 | 26.16 | 0.71 | 1.84 | 191.9 | 4052 | 17.40 |
| 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 | 27.90 | 1.08 | 2.89 | 182.3 | 3127 | 15.49 |

| | | | | | | | | | | |
|-------------|-------|------|-------|-------|-------|------|------|-------|-------|-------|
| Henan | 82.69 | 4.93 | 57.91 | 40.30 | 127.8 | 4.25 | 7.95 | 930.6 | 20339 | 90.88 |
| Hubei | 18.00 | 2.47 | 23.95 | 12.46 | 46.70 | 1.38 | 3.44 | 326.3 | 6950 | 30.15 |
| Hunan | 15.32 | 3.00 | 27.03 | 12.95 | 53.09 | 1.81 | 4.82 | 386.0 | 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 | 2.10 | 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 | 825.0 | 17184 | 76.69 |
| Zhejiang | 6.40 | 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 | 18.80 | 8.37 | 55.79 | 2.38 | 6.26 | 327.8 | 5273 | 30.20 |
| 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 | 12.90 | 48.77 | 1.45 | 3.58 | 337.9 | 7243 | 31.06 |
| Hunan | 19.04 | 3.33 | 31.48 | 14.82 | 67.00 | 2.46 | 6.38 | 465.5 | 8122 | 38.63 |
| Jiangsu | 15.97 | 1.53 | 13.56 | 7.57 | 26.00 | 0.70 | 1.82 | 195.0 | 4066 | 17.62 |
| Jiangxi | 13.00 | 2.34 | 20.62 | 9.64 | 43.42 | 1.56 | 4.25 | 306.4 | 5252 | 24.70 |
| 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 | 181.0 | 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 | 21.50 |
| 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 | 41.40 | 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 | 26.40 | 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 | 1.30 | 0.17 | 1.39 | 0.71 | 2.43 | 0.06 | 0.18 | 19.15 | 362.8 | 1.50 |
| 2010 | | | | | | | | | | |
| Anhui | 19.65 | 1.62 | 15.51 | 9.03 | 32.38 | 1.04 | 2.40 | 233.8 | 5020 | 22.70 |
| Fujian | 6.05 | 1.07 | 9.98 | 4.81 | 21.74 | 0.75 | 2.05 | 148.3 | 2630 | 11.80 |
| Henan | 85.42 | 5.07 | 59.79 | 41.50 | 131.8 | 4.41 | 8.22 | 960.1 | 21012 | 92.93 |
| Hubei | 18.87 | 2.64 | 26.59 | 13.70 | 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 | 7.70 | 26.49 | 0.72 | 1.86 | 198.9 | 4130 | 17.84 |
| Jiangxi | 9.50 | 2.13 | 17.81 | 8.14 | 32.44 | 0.97 | 2.83 | 243.0 | 4280 | 18.20 |
| Shandong | 61.76 | 3.79 | 52.90 | 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 | 5.80 | 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 | 985.0 | 21415 | 94.91 |
| Hubei | 19.53 | 2.74 | 27.31 | 14.30 | 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 | 11.20 | 2.31 | 19.90 | 9.08 | 38.67 | 1.23 | 3.53 | 279.7 | 4869 | 21.60 |
| Shandong | 63.41 | 3.89 | 54.39 | 38.95 | 122.8 | 4.50 | 7.88 | 886.9 | 18354 | 81.58 |
| Zhejiang | 6.77 | 1.23 | 11.03 | 5.22 | 21.49 | 0.67 | 1.90 | 151.8 | 2867 | 12.14 |

| | | | | | | | | | | |
|-------------|-------|------|-------|-------|-------|------|------|--------|-------|-------|
| Shanghai | 1.36 | 0.17 | 1.36 | 0.71 | 2.38 | 0.06 | 0.18 | 19.20 | 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 | 5.20 | 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 | 378.0 | 8044 | 34.64 |
| Hunan | 14.28 | 3.19 | 29.30 | 14.20 | 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 | 2.90 | 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 | 11.40 | 5.43 | 22.45 | 0.78 | 1.96 | 160.3 | 3055 | 13.42 |
| Shanghai | 1.30 | 0.17 | 1.33 | 0.69 | 2.32 | 0.06 | 0.18 | 18.76 | 345.0 | 1.44 |
| 2013 | | | | | | | | | | |
| Anhui | 21.19 | 1.68 | 16.45 | 9.91 | 34.32 | 1.12 | 2.50 | 250.3 | 5368 | 24.04 |
| Fujian | 6.17 | 1.08 | 10.26 | 4.90 | 22.46 | 0.78 | 2.10 | 152.7 | 2718 | 12.29 |
| Henan | 90.44 | 5.35 | 64.05 | 44.33 | 141.9 | 4.90 | 9.00 | 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 | 448.0 | 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 | 893.0 | 18554 | 82.24 |
| Zhejiang | 6.31 | 1.13 | 10.54 | 4.95 | 20.90 | 0.66 | 1.80 | 145.2 | 2756 | 11.68 |
| Shanghai | 1.12 | 0.16 | 1.25 | 0.64 | 2.15 | 0.05 | 0.17 | 17.49 | 314.3 | 1.30 |
| 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 | 4.60 | 8.55 | 1007.9 | 21981 | 96.53 |
| Hubei | 21.52 | 2.90 | 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 | 4.50 | 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 | 33.50 | 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 | 35.00 | 1.09 | 2.43 | 257.0 | 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 | 55.90 | 40.34 | 125.7 | 4.60 | 7.97 | 915.0 | 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 | 1.20 | 0.62 | 2.06 | 0.05 | 0.16 | 16.95 | 304.9 | 1.26 |

Table S4. Correction analysis between PM_{2.5} emissions from open biomass burning in each provinces and rural population, forestry output and per capita incomes of rural residents.

| 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 | $y = -0.0006x + 3.7$ $R^2 = 0.23$ $P > 0.05$ | $y = -5E-06x + 1.44$ $R^2 = 0.09$ $P > 0.05$ | $y = 0.0078x + 0.038$ $R^2 = 0.31$ $P > 0.05$ |