

Supplementary Material

Carbonaceous aerosols in Lvliang, China: seasonal variation, spatial distribution and source apportionment

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1 Table S1. The TC/PM_{2.5}, OC/PM_{2.5}, and EC/PM_{2.5} mass ratios of Typical Cities of
2 China

Sampling site	TC/PM _{2.5}	OC/PM _{2.5}	EC/PM _{2.5}	Reference
Lvliang	20.9%,	12.7%,	8.2%	This study
Beijing	19.3%	14.9%,	4.4%	(Ji <i>et al.</i> 2016)
Lanzhou	13.2%,	10.1%,	3.0%	(Zhang <i>et al.</i> 2020)
Heze	21.9%,	15.7%,	6.1%	(Liu <i>et al.</i> 2017)
Taiyuan	25.9%,	17%,	8.9%	(He <i>et al.</i> 2015)
Zhengzhou	26%,	18.5%,	7.5%	(Wang <i>et al.</i> 2017)
Guangzhou	25.4%,	17.1%,	8.3%	(Tao <i>et al.</i> 2017)

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4 Table S2. The OC/EC ratio of Typical Cities of China

Sampling site	OC/EC	Reference
Lvliang	1.72	This study
Taiyuan	1.9	(He <i>et al.</i> 2015)
Zhengzhou	3.0	(Wang <i>et al.</i> 2017)
Jinzhong	1.5	(Mu <i>et al.</i> 2019)
Shuozhou	1.3	(Liu <i>et al.</i> 2015)
Wuhan	2.8	(Zhang <i>et al.</i> 2019)
Beijing– Tianjin–Hebei	2.4-3.0	(LI <i>et al.</i> 2018)
Xian	2.25	(Zhang <i>et al.</i> 2018)

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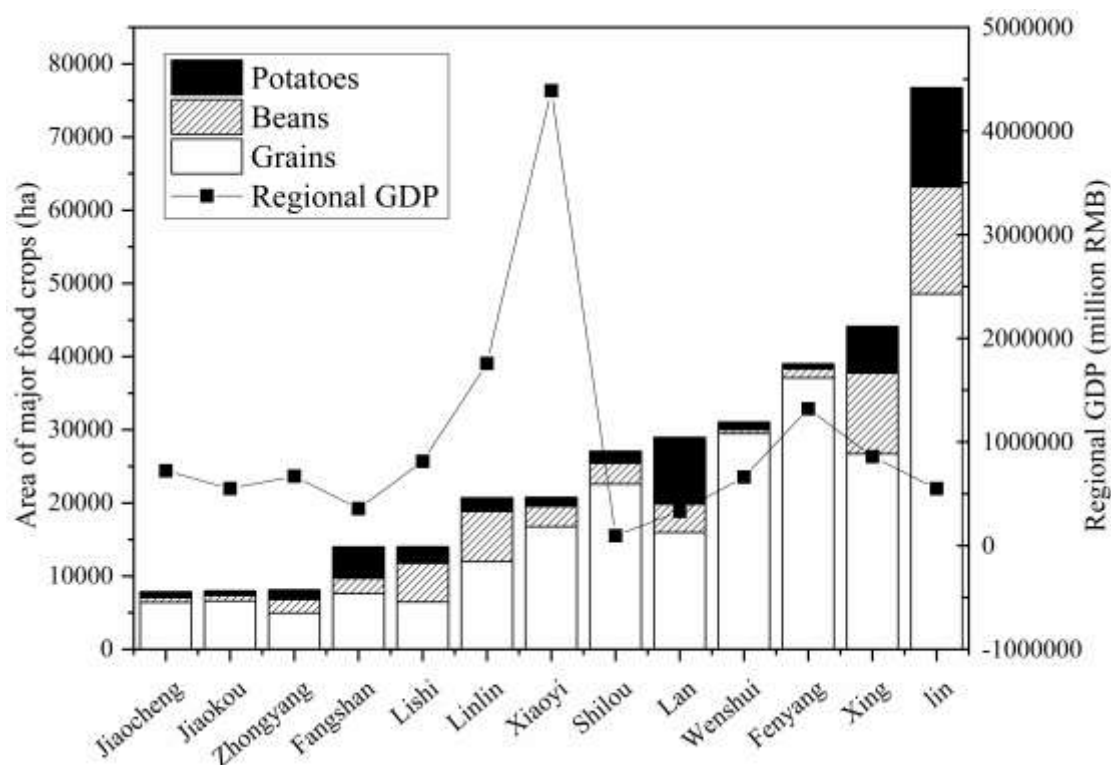


Figure S1 2017 gross domestic product (GDP) and area of major food crops in Lvliang(Data source: Shanxi Statistical Yearbook 2018 <http://tjj.shanxi.gov.cn/tjsj/tjnj/nj2018/indexch.htm>)

References

- He QS, Guo WD, Zhang GX, Yan YL, Chen LG (2015) Characteristics and Seasonal Variations of Carbonaceous Species in PM_{2.5} in Taiyuan, China. *Atmosphere* **6** (6), 850-862. doi:10.3390/atmos6060850
- Ji DS, Zhang JK, He J, Wang XJ, Pang B, Liu ZR, Wang LL, Wang YS (2016) Characteristics of atmospheric organic and elemental carbon aerosols in urban Beijing, China. *Atmospheric Environment* **125**, 293-306. doi:10.1016/j.atmosenv.2015.11.020
- LI L, Xiao Z, Chen K, XU H, LI P, Deng X, Yang W, SUN R (2018) Characteristics of carbonaceous species of PM_{2.5} in the region of Beijing, Tianjin and Hebei, China. *Acta Scientiae Circumstantiae* **38** (4), 1306-1316. doi:10.13671/j.hjkxxb.2017.0477
- Liu B, Wu J, Zhang J, Wang L, Yang J, Liang D, Dai Q, Bi X, Feng Y, Zhang Y,

24 Zhang Q (2017) Characterization and source apportionment of PM_{2.5} based on
 25 error estimation from EPA PMF 5.0 model at a medium city in China.
 26 *Environmental Pollution* **222**, 10-22. doi:10.1016/j.envpol.2017.01.005
 27 Liu Fx, Peng L, Bai Hl, Mu L, Liu X, Li Lj, Liu X (2015) Characteristics of Organic
 28 Carbon and Elemental Carbon in PM_{2.5} in Shuozhou City. *Environmental*
 29 *Science* (3), 787-793. doi:10.13227/j.hjlx.2015.03.005
 30 Mu L, Tian M, Zheng L, Li X, Jing D (2019) Characterisation and source
 31 apportionment of atmospheric organic and elemental carbon in an urban–rural
 32 fringe area of Taiyuan, China. *Environmental Chemistry* **16** (3), 187-196.
 33 doi:10.1071/en19002
 34 Tao J, Zhang L, Cao J, Zhong L, Chen D, Yang Y, Chen D, Chen L, Zhang Z, Wu Y,
 35 Xia Y, Ye S, Zhang R (2017) Source apportionment of PM_{2.5} at urban and
 36 suburban areas of the Pearl River Delta region, south China - With emphasis
 37 on ship emissions. *Science of The Total Environment* **574**, 1559-1570.
 38 doi:10.1016/j.scitotenv.2016.08.175
 39 Wang Q, Jiang N, Yin S, Li X, Yu F, Guo Y, Zhang R (2017) Carbonaceous species in
 40 PM_{2.5} and PM₁₀ in urban area of Zhengzhou in China: Seasonal variations and
 41 source apportionment. *Atmospheric Research* **191**, 1-11.
 42 doi:10.1016/j.atmosres.2017.02.003
 43 Zhang H, Tian Y, Liu B, Yang J, Yu J, Gong P, Wu J, Zhang Y (2019) Spatial
 44 Temporal Characteristics and Cluster Analysis of Chemical Components for
 45 Ambient PM_{2.5} in Wuhan. *Environmental Science* **40** (11), 4764-4773.
 46 doi:10.13227/j.hjlx.201904069
 47 Zhang X, Li Z, Wang F, Song M, Zhou X, Ming J (2020) Carbonaceous Aerosols in
 48 PM₁, PM_{2.5}, and PM₁₀ Size Fractions over the Lanzhou City, Northwest China.
 49 *Atmosphere* **11** (12) doi:10.3390/atmos11121368
 50 Zhang Y, Jia Y, Li M, Hou La (2018) Characterization of carbonaceous species in
 51 PM_{2.5} in Xi'an during spring. *Environmental Forensics* **19** (2), 150-154.
 52 doi:10.1080/15275922.2018.1448910