Supplement of

Assessment of carbonaceous aerosols in Shanghai, China: Long-term evolution, seasonal variations and meteorological effects

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Fig. S2 Bivariate polar plots of seasonal OC concentrations (μg m^{-3}) in Shanghai between July 2010 and December 2014. The center of each plot represents a wind speed of zero, which increases radially outward. The concentration of OC is shown by the color scale.

Fig. S3 Bivariate polar plots of seasonal OC/EC ratios in Shanghai between July 2010 and December 2014. The center of each plot represents a wind speed of zero, which increases radially outward. The ratio of OC/EC is shown by the color scale.

Figure S4. Long-term evolution of annual emissions (green areas; right y axis, unit: 10^4 metric ton) and concentrations of SO_2 (left y axis, unit: μg m^{-3}) in Shanghai. The blue lines indicate the annual SO_2 concentrations (left y axis, unit: μg m^{-3}) measured at Pudong supersite, and the lowest and highest of the vertical line representing the 5^{th} and 95^{th} percentiles, respectively.

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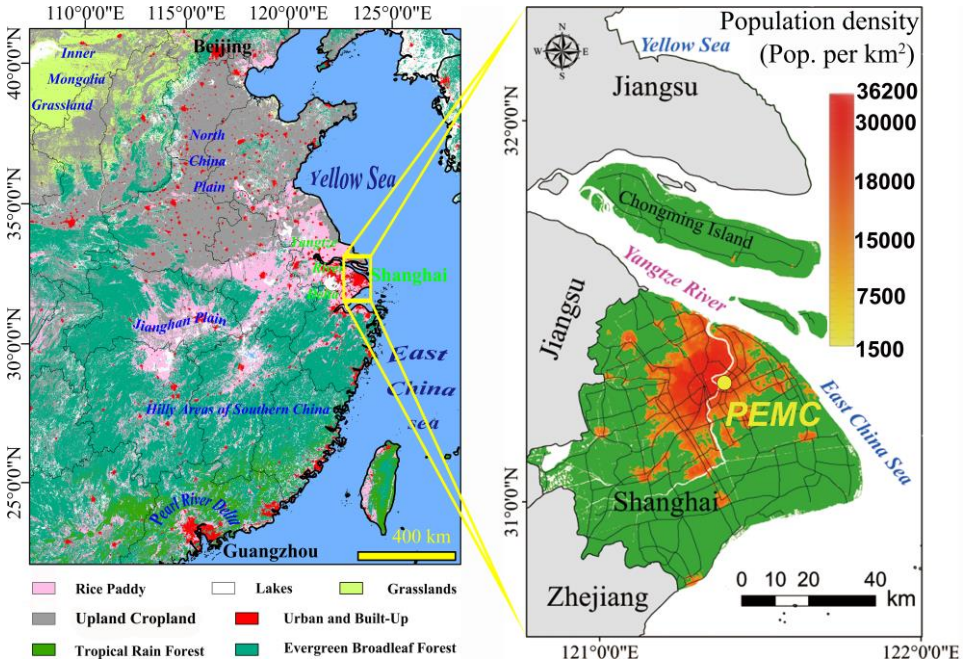

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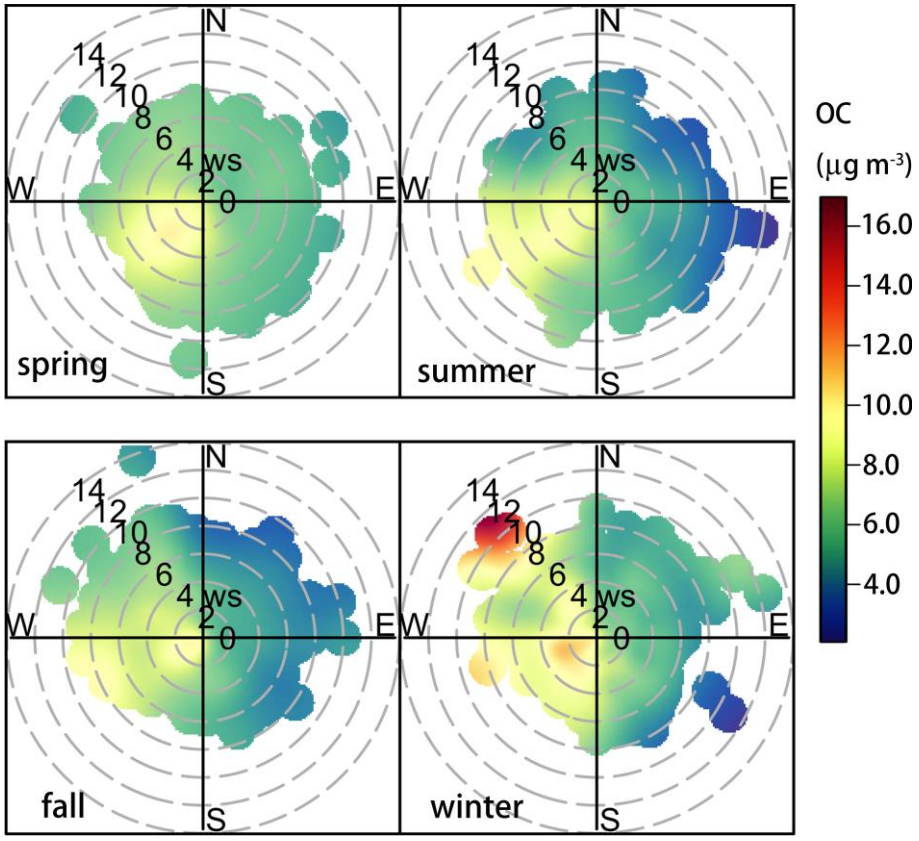

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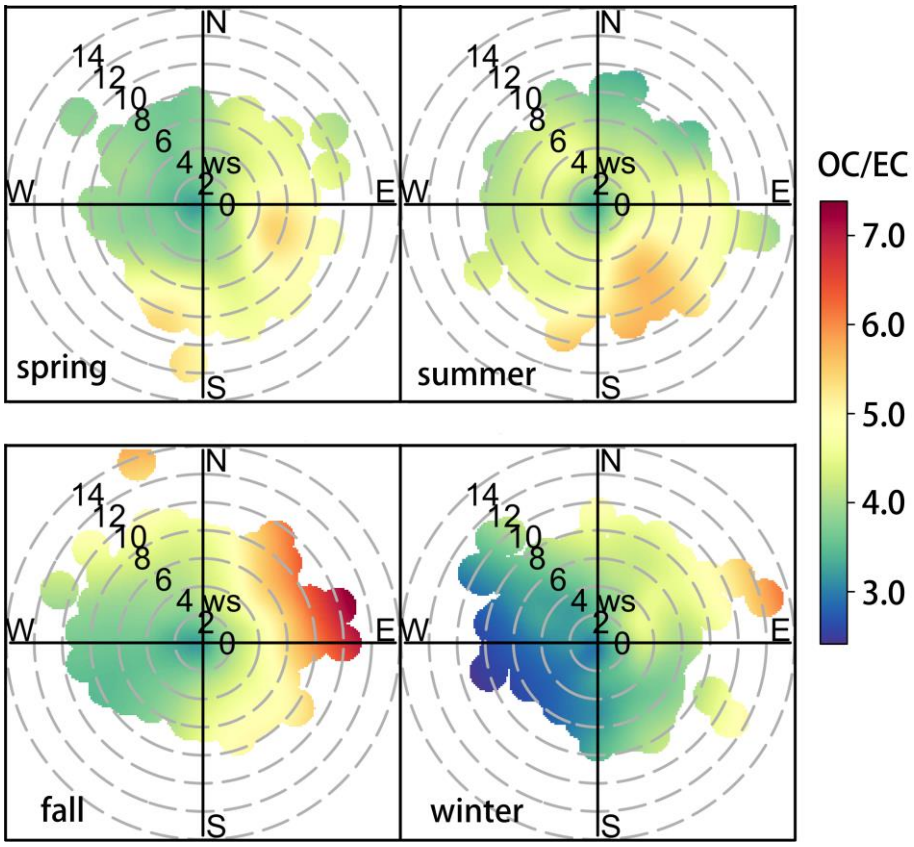

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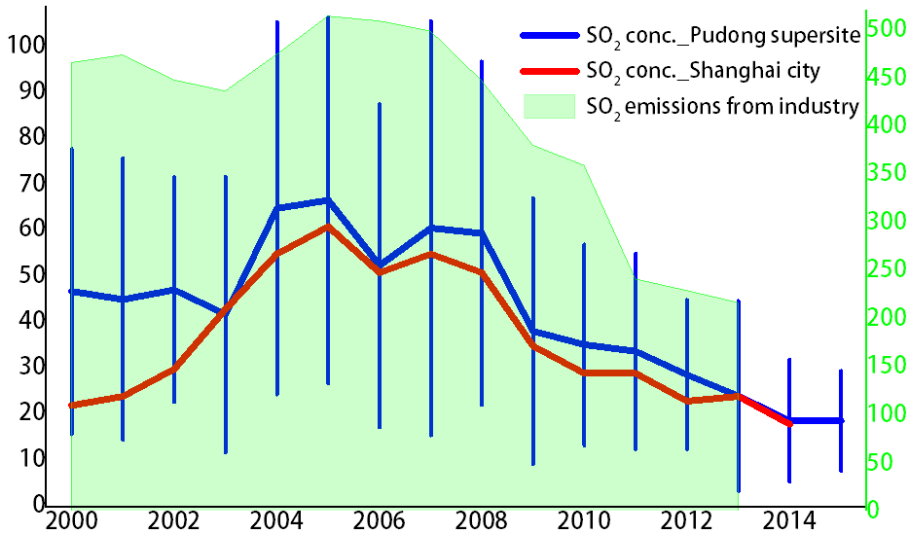

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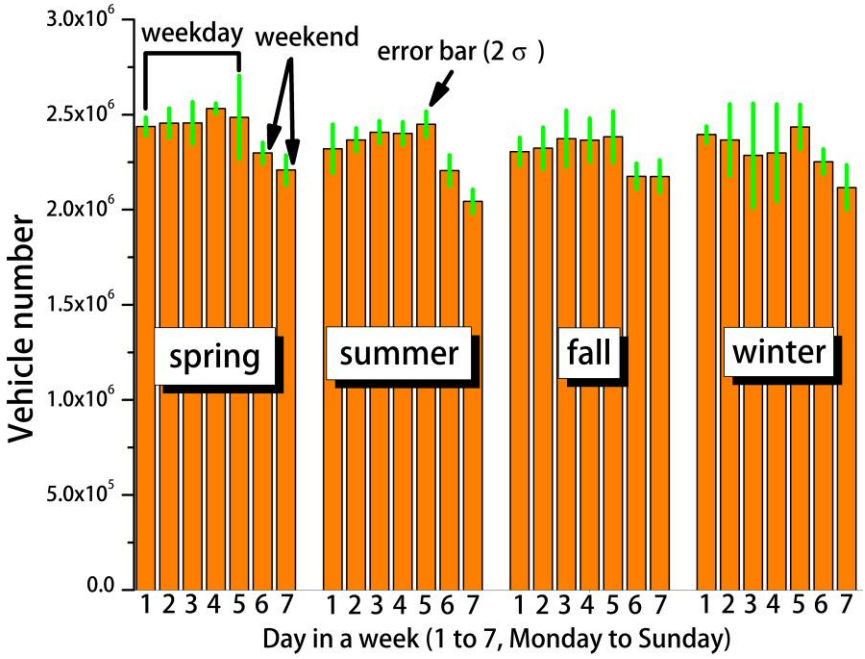

Figure S5. Daily traffic flow during four seasons in Shanghai main streets. The original data was collected by Shanghai Traffic Administration Bureau.

Table S1. Ambient concentration (μg m^{-3}) of carbonaceous aerosols measured in Shanghai, China.

Site name	type	Latitude	Longitude	a.g.l (m)	Sampling period	OC	EC	Reference
Tongji University campus	Urban	37°11'13''N	121°29'58''E	16	20/3/1999-27/3/2000	14.34	6.21	1
Hainan Road	Urban	31°15'13''N	121°29'11''E	18	5/5/1999-20/3/2000	15.43	6.77	1
Tongji University campus	Urban	37°11'13''N	121°29'58''E	16	3/1999-3/2000	14.6	6.1	2
Hainan Road	Urban	31°15'13''N	121°29'11''E	18	3/1999-3/2000	14.6	6.1	2
Yanchang campus of Shanghai University	Urban	31°16'43''N	121°27'11''E	25	10/2005-1,4,7/2006	14.7	2.8	3
Jiading Environmental Monitoring Station	Suburban	31°23'02''N	121°15'09''E	10	10/2005-1,4,7/2006	17.5	3	3
Pudong Environmental Monitoring Station	Urban	31°13'34''N	121°32'19''E	18	19/4/2007-31/12/2008		3.9	4

Reference 1: Ye, B., Ji, X., Yang, H., Yao, X., Chan, C. K., Cadle, S. H., Chan, T., and Mulawa, P. A.: Concentration and chemical composition of $PM_{2.5}$ in Shanghai for a 1-year period, Atmospheric Environment, 37, 499-510, 2003.

Reference 2: Yang, F., He, K., Ye, B., Chen, X., Cha, L., Cadle, S. H., Chan, T., and Mulawa, P. A.: One-year record of organic and elemental carbon in fine particles in downtown Beijing and Shanghai, Atmospheric Chemistry and Physics, 5, 1449-1457, 2005.

Reference 3: Feng, Y. L., Chen, Y. J., Guo, H., Zhi, G. R., Xiong, S. C., Li, J., Sheng, G. Y., and Fu, J. M.: Characteristics of organic and elemental carbon in $PM_{2.5}$ samples in Shanghai, China, Atmospheric Research, 92, 434-442, 2009.

Reference 4: Wang, X., Chen, R., Meng, X., Geng, F., Wang, C., and Kan, H.: Associations between fine particle, coarse particle, black carbon and hospital visits in a Chinese city, The Science of the Total Environment, 458-460, 1-6, 2013.