



Supplement of

Source apportionment and dynamic changes of carbonaceous aerosols during the haze bloom–decay process in China based on radiocarbon and organic molecular tracers

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Table S1 Source apportionment results for the PM_{2.5} (μg/m³).

Location	Date	Primary matters						Secondary matters					PM _{2.5}
		PI	EC _f	EC _{bb}	POM _f	POM _{bb}	others	SO ₄ ²⁻	NO ₃ ⁻	NH ₄ ⁺	SOM _f	SOM _{nf}	
Beijing (North China)	Mar.16	13.4	2.79	1.42	4.21	10.9	38.1	36.7	81.2	29.5	16.4	15.7	250
	Mar.22	12.9	1.23	0.61	1.07	6.01	83.9	11.2	14.5	7.25	8.27	8.50	155
	Mar.25	25.5	3.55	1.13	7.91	14.0	134	18.7	38.4	15.7	15.1	16.5	290
	Apr.10	5.58	0.39	0.29	0.83	2.73	63.5	4.25	1.36	0.90	4.83	2.30	87
Guangzhou (South China)	Apr.11	2.48	1.30	0.51	2.15	1.86	31.8	10.1	4.18	4.54	1.76	4.20	65
	Apr.12	4.88	2.77	0.74	5.72	3.25	38.8	11.6	9.56	5.57	2.70	6.60	92
	Apr.13	6.12	4.27	0.97	7.56	4.90	43.3	15.9	20.9	9.45	5.56	13.1	132
	Apr.15	2.60	2.50	0.56	3.27	0.94	56.0	22.4	22.7	12.8	11.7	9.53	145
	Apr.17	2.70	2.43	0.32	2.70	1.25	31.1	13.9	7.96	5.51	2.01	5.84	76

PI: primary inorganic ions including K⁺, Mg²⁺, Ca²⁺, Cl⁻ and Na⁺. EC_f: fossil fuel combustion-derived EC; EC_{bb}: biomass burning-derived EC; POM_f: primary fossil organic matter; POM_{bb}: biomass burning organic matter; others: primary matters that did not identified; SOM_f: secondary fossil organic matter; SOM_{nf}: secondary non-fossil organic matter. The conversion factors for WSOC to WSOM and WIOC to WIOM are 2.1 and 1.3, respectively (Yttri et al., 2007). Thus, POM_f and SOM_f are estimated by POC_f × 1.3 and SOC_f × 2.1, respectively, according to their definitions in the manuscript. Since fresh particles emitted by biomass burning is a mixture of WSOC and WIOC, the average conversion factor of 1.7 is used to calculate POM_{bb}. Therefore, SOM_f is estimated through this equation: SOM_f = non-fossil WIOC × 1.3 + non-fossil WSOC × 2.1 - OM_{bb}. Estimation methods for these carbons have been thoroughly described in “Methodology for Source Apportionment” of the manuscript. For the calculation of OC_{bb}, different (POC/Lev)_{bb} values were used for Beijing (13.52) and Guangzhou (7.76) due to their obviously distinct biomass burning types (Fig. S3), of which also has been discussed in the manuscript.

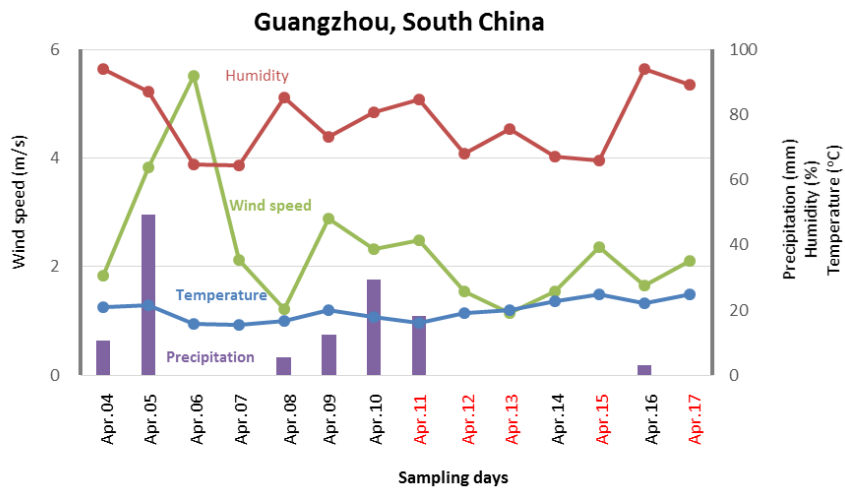
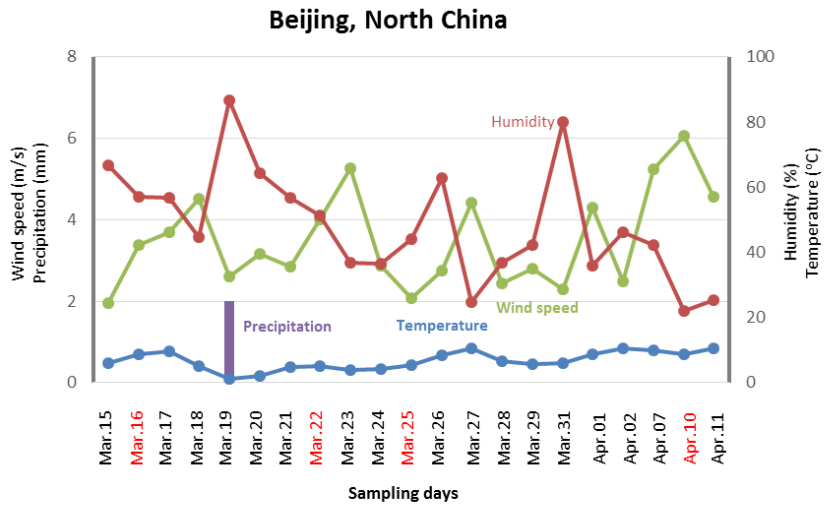


Figure S1 Meteorological data for Beijing and Guangzhou during the sampling campaign. Sampling days marked by the red color are the days selected for the ^{14}C measurements.

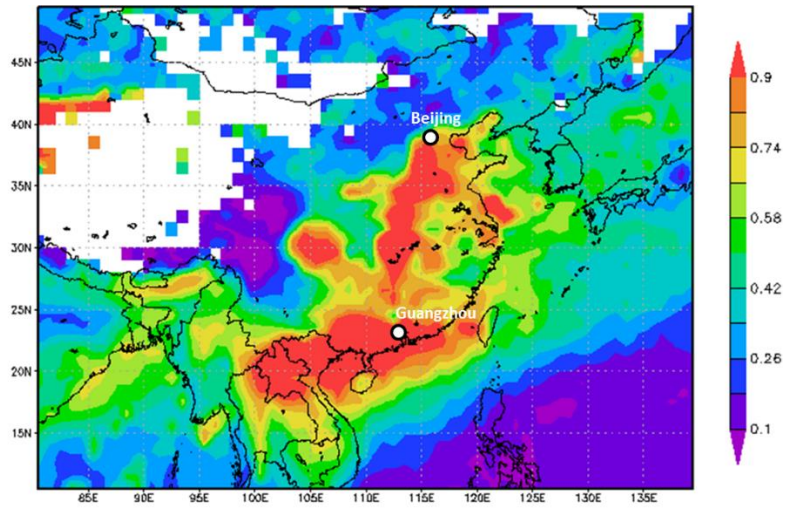


Figure S2 Satellite-derived aerosol optical depths at 550 nm from March 15 to April 18, 2013 in East Asia (1×1 degree, MODIS, National Aeronautics and Space Administration, U.S.). The two marked circles are represent Beijing and Guangzhou, respectively.

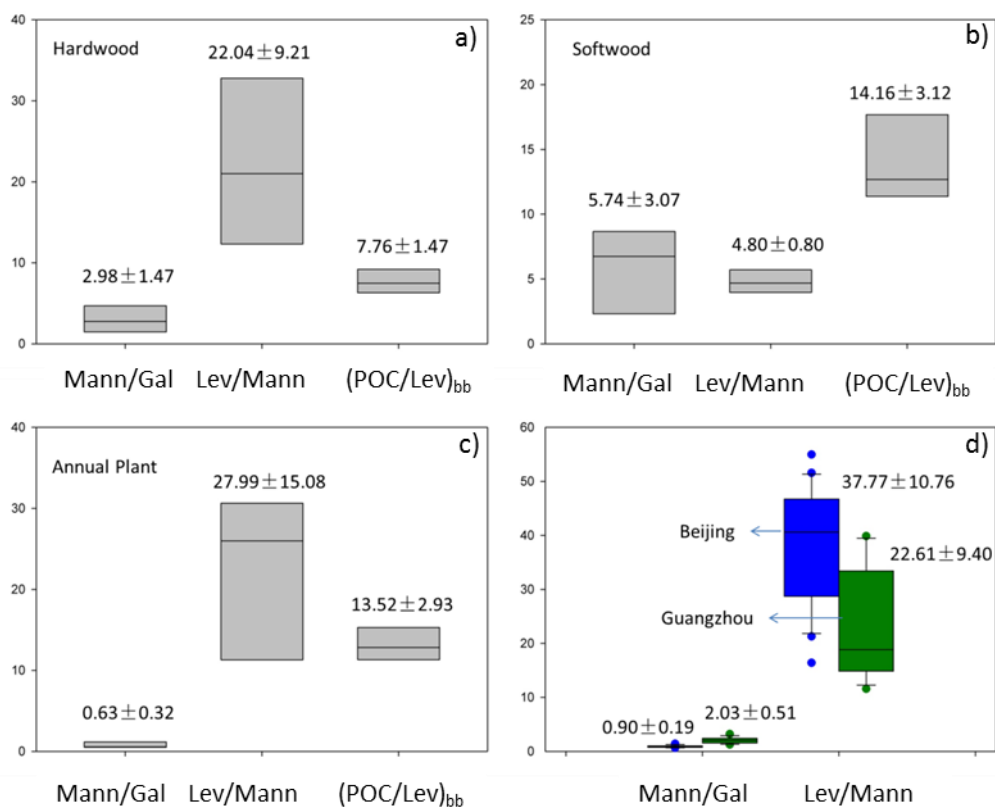


Figure S3 Values for Man/Gal, Lev/Man and (POC/Lev)_{bb} in particles derived from the various biomass burning types. a): hardwood; b): softwood; c): annual plant; d) real particles in Beijing and Guangzhou collected in this study. Data for hardwood, softwood and annual plant are obtained from the literatures in (Liu, et al. 2014).

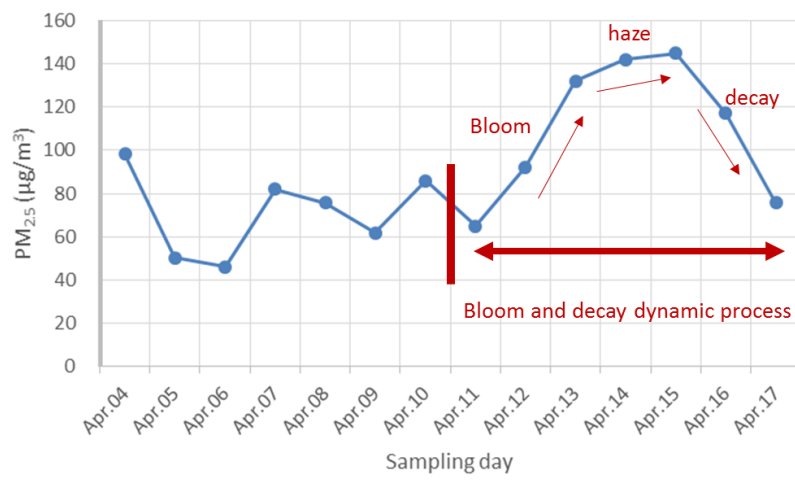


Figure S4 A bloom and decay dynamic process of haze in Guangzhou.

References

Liu, J., Li, J., Zhang, Y., Liu, D., Ding, P., Shen, C., Shen, K., He, Q., Ding, X., Wang, X.: Source Apportionment Using Radiocarbon and Organic Tracers for PM_{2.5} Carbonaceous Aerosols in Guangzhou, South China: Contrasting Local-and Regional-Scale Haze Events, *Environ. Sci. Technol.*, 48, 12002-12011, doi:10.1021/es503102w, 2014.

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