

Supporting Information - Source apportionment using radiocarbon and organic tracers for PM_{2.5} carbonaceous aerosols in Guangzhou, South China: Contrasting local and regional scale haze events

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1 **WIOC and EC measurement**

2 The filter was dried in a desiccator and a punch (1.5 cm × 1.0 cm) of this filter was taken for the
3 measurements of WIOC and EC using the thermal-optical transmittance (TOT) method (NIOSH
4 870) by an OC/EC analyzer (Sunset Laboratory Inc., Tigard, OR, U.S.).

5 **Water-soluble ion, anhydrosugars and SOA tracer measurement**

6 In brief, a round punch (1 inch in diameter) was extracted in ultra-pure water (10 mL), sonicated
7 in an ice-water bath, filtered through a 0.22 μm size filter and then analyzed with an Ion
8 Chromatography (Metrohm 883 Basic IC plus, Switzerland) for the measurement of water-soluble
9 ions. For the analysis of Lev (C₆H₁₀O₅), Gal (C₆H₁₀O₅), Man (C₆H₁₀O₅) and SOA tracers, another
10 round punch of filter (1 cm of diameter) was taken out. Then internal recovery standards
11 (methyl-β-L-xylanopyranoside, m-XP and C24D50) were added to the filter and extracted with
12 methanol 3 times for 10 min using ice-water ultrasonic agitation. Afterwards, the extract was
13 reduced to 1 mL with a rotary evaporator, filtered and dried completely by a gentle nitrogen
14 stream, added with a mixture of 40 μL of N,O-Bis(trimethylsilyl)trifluoroacetamide (BSTFA) plus
15 1% trimethylsilyl chloride and pyridine in an oven at 70°C for 1 h. Finally, the solution was run on
16 a gas chromatography–mass spectrometry (GC-MS) (Agilent 7890 GC and Agilent 5975 MS) with
17 a capillary column (DB-5MS, 30 m, 0.25 mm, 0.25 μm). SOA tracers include
18 cis-2-methyl-1,3,4-trihydroxy-1-butene (C₅H₁₀O₃), 3-methyl-2,3,4-trihydroxy-1-butene (C₅H₁₀O₃),
19 trans-2-methyl-1,3,4-trihydroxy-1-butene (C₅H₁₀O₃), 2-methylglyceric acid (C₄H₈O₄),
20 2-methylthreitol (C₅H₁₂O₄), 2-methylerythritol (C₅H₁₂O₄), 3-hydroxyglutaric acid (C₅H₈O₅),
21 pinonic acid (C₁₀H₁₆O₃), β-caryophyllene acid (C₁₄H₂₂O₄), 2,3-dihydroxy-4-oxopentanoic acid
22 (C₅H₈O₅).

23 **Isolation systems for WIOC and EC with regard to ¹⁴C measurement**

24 Briefly, WIOC and EC are combusted in a stream of oxygen at 340 °C for 15 min and 650 °C for
25 10 min, respectively. Prior to combustion at 650 °C, EC is placed in a tube furnace at 375 °C for 4
26 hours.

Table SI Investigation of dynamics of WSOC desorption^a

Water Volume (ml)	WSOC ($\mu\text{g C}$)		
	Sample A	Sample B	Sample C
20	66.2	222.4	507.8
50	71.8	228.8	519.0
80	72.2	232.1	527.0
100	72.8	243.8	527.3
120	73.8	245.0	527.2
12 h soaking	84.4	242.8	517.6

^aPM_{2.5} concentrations are 38.0 $\mu\text{g}/\text{m}^3$, 72.4 $\mu\text{g}/\text{m}^3$ and 157 $\mu\text{g}/\text{m}^3$ for sample A, B and C, respectively.

Table S2 Emission inventory of Man/Gal, Lev/Man and (OC/Lev)_{bb} for different types of biomass burning

		Man/Gal	Lev/Man	OC/Lev	References
Hardwood	Yellow Poplar	5.01	10.67	6.40	1
	Mockernut Hickory	1.82	24.73	6.28	1
	White Ash	---	---	10.10	1
	Sweet-gum	---	---	7.81	1
	Northern Red oak	1.35	35.46	5.94	2
	Red Maple	---	---	9.22	2
	Paper Birch	---	---	9.13	2
	Forest Fire	3.72	17.28	7.16	3
	Average	2.98±1.47	22.04±9.21	7.76±1.47	
Softwood	White pine	6.98	5.81	19.23	2
	Hemlock	10.34	3.73	10.48	2
	Balsam fir	6.74	4.68	12.28	2
	Black Spruce	2.40	4.20	12.69	4
	Wild fire	2.23	5.60	16.13	5
		Average	5.74±3.07	4.80±0.80	14.16±3.12
Annual Plant	7 rice straws	0.57(0.17-1.07)	30.65(12.31-55.03)	13.77(10.03-19.15)	4
	Agricultural waste (United States)	0.50	26.00	12.82	6
	Sawgrass savanna	1.17	11.29	12.66	6
	Wheat	--	--	10.00	7
	Agricultural waste (East Asia)	--	--	16.82	8
		Average	0.63±0.32	27.99±15.08	13.52±2.93
Guangzhou	Ambient aerosols	2.19±0.33	17.85±4.25		This study

Dashed line denotes no data reported

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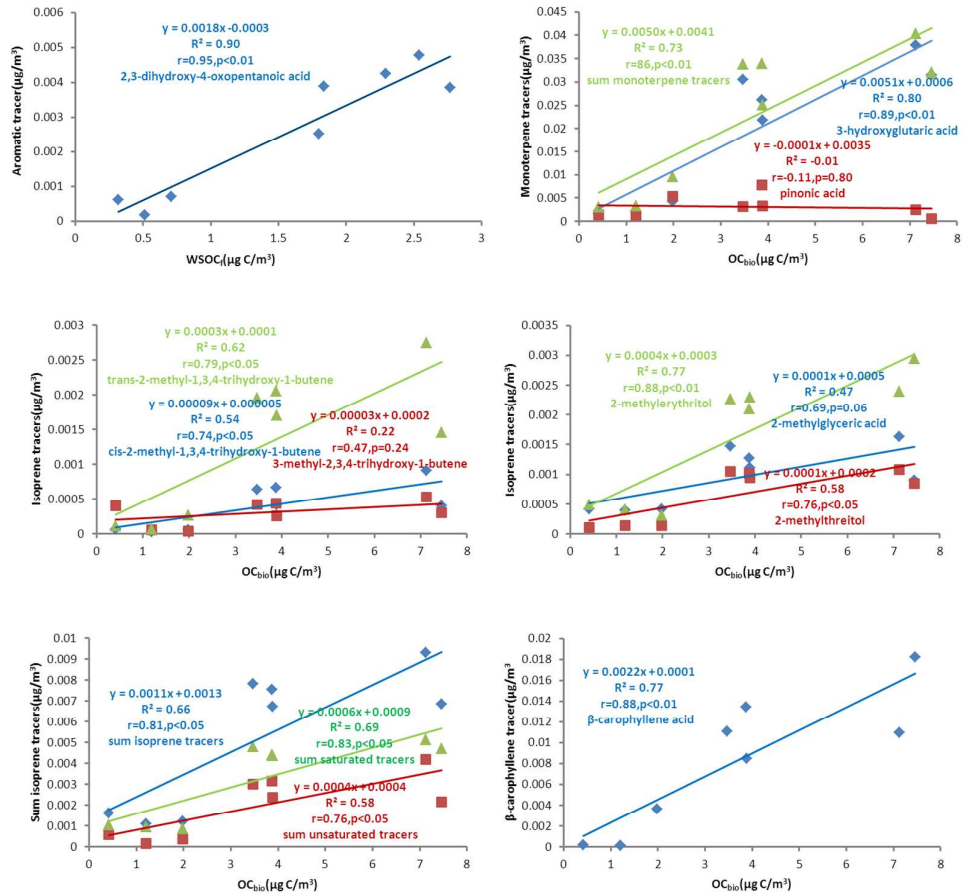


Figure S1 Correlations between SOA tracers and WSOC_f and OC_{bio}

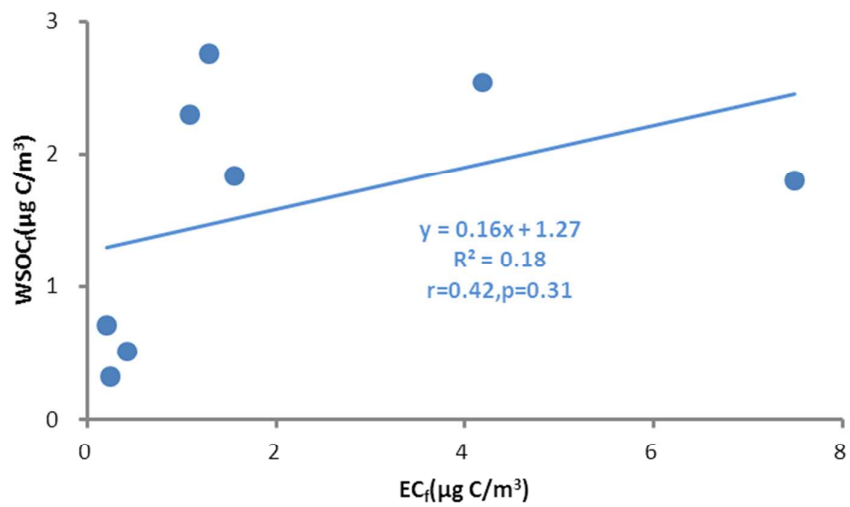


Figure S2 Correlation between $WSOC_f$ and EC_f