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Sources of non-fossil-fuel emissions in carbonaceous aerosols during early winter in Chinese cities

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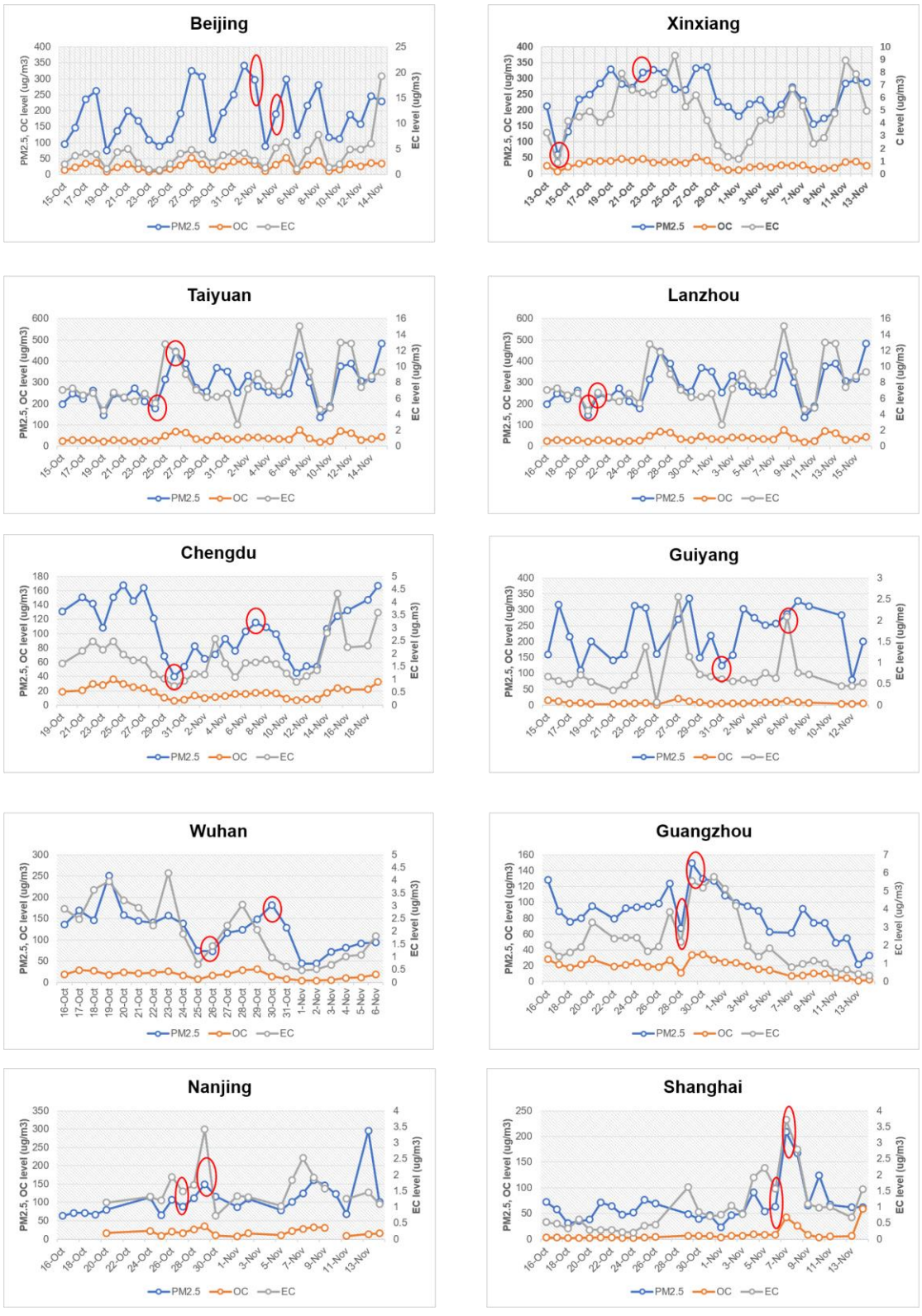
Details of sampling information

city	Abbreviation	location site	Coordinates	
Beijing	BG	National research center for geoanalysis	116.34E, 39.93N	2013/11/3(Low) 201311/5(high)
Shanghai	SH	Handan Campus of Fudan University	31.29N, 121.5E	2013/11/6(low) 2013/11/7（high）
Guangzhou	GZ	Institute of Geochemistry, CAS	23.15N,113.36E	2013/10/28(low) 2013/10/29(high)
Nanjing	NJ	Institute of Soil Science, CAS	32.06N, 118.8E	2013/10/27(Low) 2013/10/29(high)
Chengdu	CD	Institute of mountain hazards and environment, CAS	30.64N, 104.08E	2013/10/31(low) 2013/11/8(h)
Taiyuan	TY	China institute for radiation	37.80N, 112.57E	2013/10/25(low)

		protection		2013/10/26(high)
Wuhan	WH	Wuhan University	30.53N,114.37E	2013/10/26(low) 2013/10/30(high)
Xinxiang	XX	Henan normal university	35.33N, 113.91E	2013/10/15 2013/10/22
Lanzhou	LZ	Lanzhou university	36.05N, 103.86E	2013/10/20 2013/10/21
Guiyang	GY	Institute of Geochemistry, CAS	26.57N, 106.73E	2013/10/31 2013/11/6

Figure S1. Filter selection



WINSOC and EC measurement

One punch (area: 1.5 cm2) cut from each filter for analysis of WINSOC and EC mass concentration using the thermal-optical transmittance (TOT) method (NIOSH 870) by an OC/EC analyzer (Sunset Laboratory Inc., Tigard, OR, U.S.). For quality control, the analyzer was calibrated routinely using prebaked filter blank and standard sucrose solutions every day. The replicate analysis was performed with 10% of total samples and differences were within 10% for WINSOC and EC. Ten field blanks for each site were collected as the same way as other samples except with small exposure time of 15 min. The average concentrations of WINSOC on the field blanks at each site were less than 1% of the sample batches, and EC blank was undetectable. All reported WINSOC concentrations were not subtracted from the samples.

Water-soluble ion and anhydrosugars analysis

In brief, one punch (1 inch in diameter) was extracted in ultrapure water, sonicated in an ice-water bath, filtered through a 0.22 μm size filter and then main water-soluble cations (Na+, K+, NH4+, Ca2+, Mg2+) and anions (Cl-, SO24- and NO3-) were determined simultaneously by using ion chromatograph (Shimadzu TOC_VCPH, Japan). All ions were quantified against a standard calibration curve. Based on daily test samples, the uncertainty of the ion compound analyses of the filters is within 10% for all the analyzed ions. For the analysis of anhydrosugars (levoglucosan, Galactosan and Mannosan isomers), one punch of filter (1cm in diameter) was used. Internal recovery standards (methyl-β-L-xylanopyranoside, m-XP) were added to the filter and extracted with methanol three times for 15 min using ice-water ultrasonic agitation. Afterwards the extract was reduced to 1 mL with a rotary evaporator, filtered and dried completely by a gentile nitrogen stream, and then added with a mixture of 40 μL of N,O-Bis(trimethylsilyl)trifluoroacetamide (BSTFA) plus 1% trimethylsilyl chloride and pyridine in an oven of 70°C for 1 h before running on gas chromatography (GC)-MSD (Agilent 7890 GC and Agilent 5975 MS) with a capillary column (DB-5MS, 30 m, 0.25 mm, 0.25 μm).