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Sources and processes of iron aerosols in a megacity in Eastern China

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Table S1. Sampling periods and sample numbers.

	Sampling periods	Sample number
Haze	December 2018-January 2019, December 2019-January 2020	34
Fog	November 2018-April 2019, December 2019-January 2020	17
Dust	October 2019-November 2019	12
Clear	September 2019, December 2019-January 2020	37
Rain	December 2019-January 2020	9

Table S2. Definitions of haze, fog, dust, clear, and rain weather conditions.

	Definition
Haze	The meteorological definition of haze is a kind of weather phenomenon in which a large number of tiny dust particles, smoke particles or salt particles suspended in the atmosphere, the relative humidity is less than 80%, and the horizontal visibility drops below 10 km.
Fog	The meteorological definition of fog is tiny water droplets suspended in the air, and horizontal visibility is less than 1 km, the relative humidity is higher than 90%.
Dust	Dust is a kind of natural meteorological phenomenon associated with strong cold front from Northwest China. The FLEXible PARTicle (FLEXPART) Lagrangian particle dispersion model shows that air mass backward trajectories of typical dust events crossed East Asia (Fig. S1).
Clear	Clear weather samples were collected when $PM_{2.5}$ concentration was less than 75 μg m^{-3}, and visibility was greater than 10 km.
Rain	Rain refers to the liquid droplets falling to the ground from the above cloud. We collected $PM_{2.5}$ samples as rain samples when precipitation intensity < 10 mm d^{-1}.

Table S3. Results obtained from the analysis of NIST standard reference sample and field blanks using EDXRF (in µg cm^{-2}).

Elements	Certified values	EDXRF values	Field blanks
Na	0.074	0.081	0.009 ± 0.002
Mg	1.412	1.417	0.004 ± 0.000
Al	2.519	2.321	0.139 ± 0.002
K	0.644	0.615	0.033 ± 0.005
Ca	1.426	1.417	0.015 ± 0.003
Ti	0.163	0.151	0.008 ± 0.002
V	0.003	0.003	BDL
Cr	0.023	0.021	0
Mn	0.037	0.036	0.001 ± 0.000
Fe	2.772	2.743	0.029 ± 0.004
Co	0.008	0.008	0
Ni	0.024	0.022	0
Cu	0.052	0.048	0.002 ± 0.000
Zn	0.177	0.174	0.003 ± 0.000
Ga	0	0	BDL
Sr	0.007	0.006	0
Ba	0.068	0.062	0.003 ± 0.000
Pb	0.041	0.038	0.002 ± 0.000
P	0.061	0.061	0.003 ± 0.000
S	0.165	0.151	0.011 ± 0.001
Cl	0.135	0.122	0.008 ± 0.000
As	0	0	BDL
Se	0	0	0

BDL: below detection limit.

Table S4. Significance T test matrix of $PM_{2.5}$, total Fe, dissolved Fe and Fe solubility levels between different weather conditions.

		Haze	Fog	Dust	Clear	Rain
$PM_{2.5}$	Haze		0.000**	0.000**	0.000**	0.000**
	Fog	0.000**		0.000**	0.000**	0.000**
	Dust	0.000**	0.000**		0.000**	0.000**
	Clear	0.000**	0.000**	0.000**		0.000**
	Rain	0.000**	0.000**	0.000**	0.000**	
Total Fe	Haze		0.040*	0.002**	0.113	0.031*
	Fog	0.040*		0.001**	0.581	0.045*
	Dust	0.002**	0.001**		0.000**	0.001**
	Clear	0.113	0.581	0.000**		0.036*
	Rain	0.031*	0.045*	0.001**	0.036*	
Dissolved Fe	Haze		0.007**	0.003**	0.000**	0.000**
	Fog	0.007**		0.025*	0.000**	0.010*
	Dust	0.003**	0.025*		0.000**	0.000**
	Clear	0.000**	0.000**	0.000**		0.008**
	Rain	0.000**	0.010*	0.000**	0.008**	
Fe solubility	Haze		0.004**	0.007**	0.000**	0.001**
	Fog	0.004**		0.000**	0.000**	0.000**
	Dust	0.007**	0.000**		0.008**	0.022*
	Clear	0.000**	0.000**	0.008**		0.026*
	Rain	0.001**	0.000**	0.022*	0.026*	

* represents a significant difference between the two groups at the 0.05 level (2-tailed).

** represents a significant difference between the two groups at the 0.01 level (2-tailed).

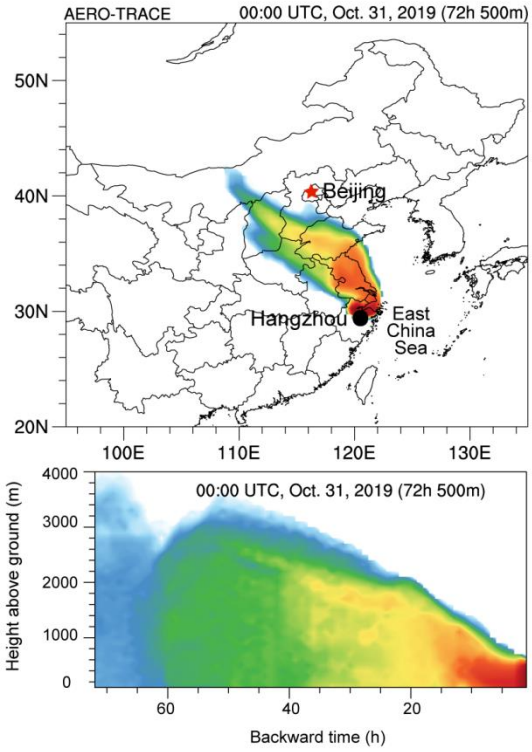

Figure S1. Backward trajectories of air masses in dust weather condition (duration: 72 h; height: 500 m above ground level).

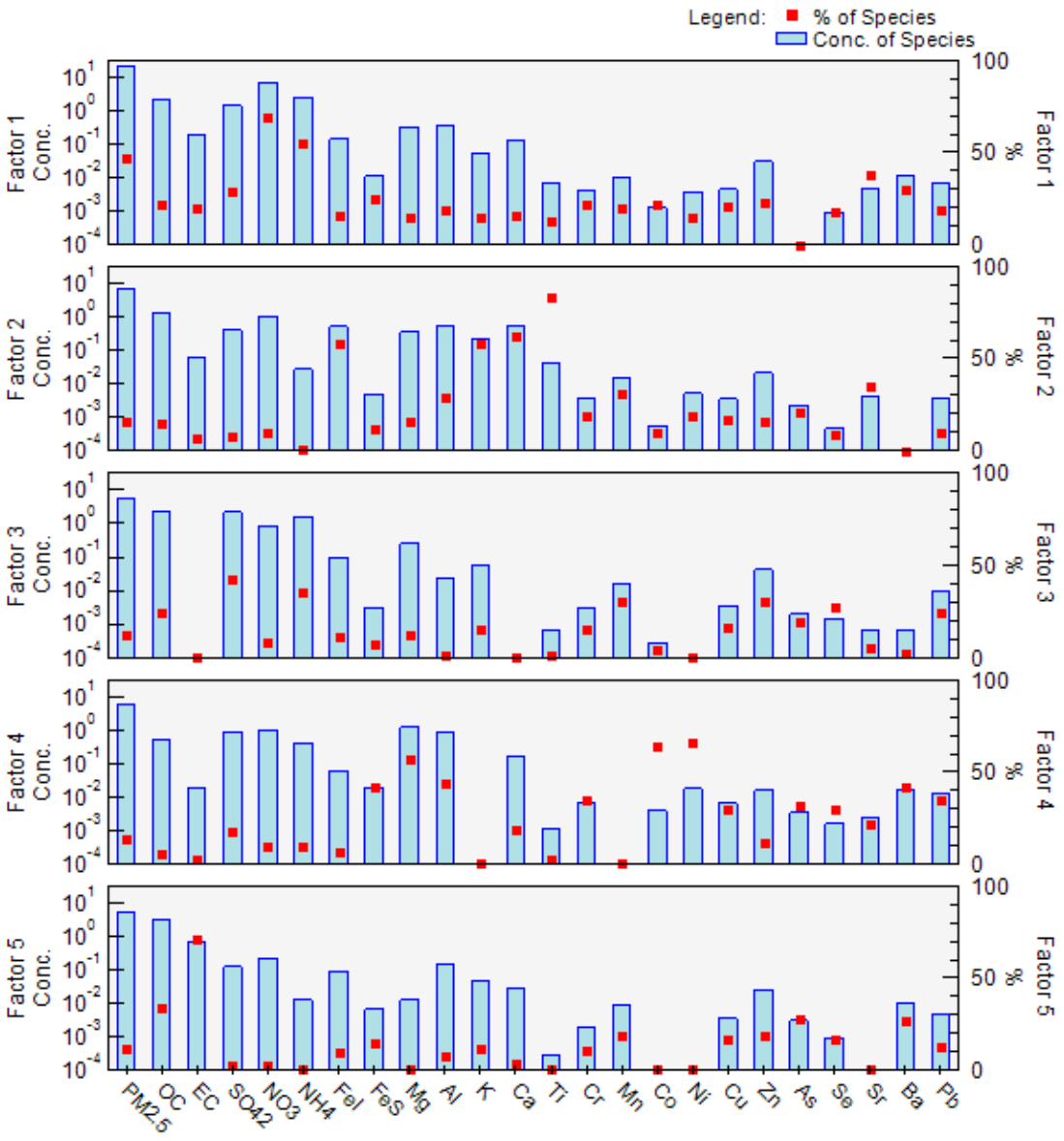

Figure S2. Source profiles deduced from PMF analysis (5 factors).

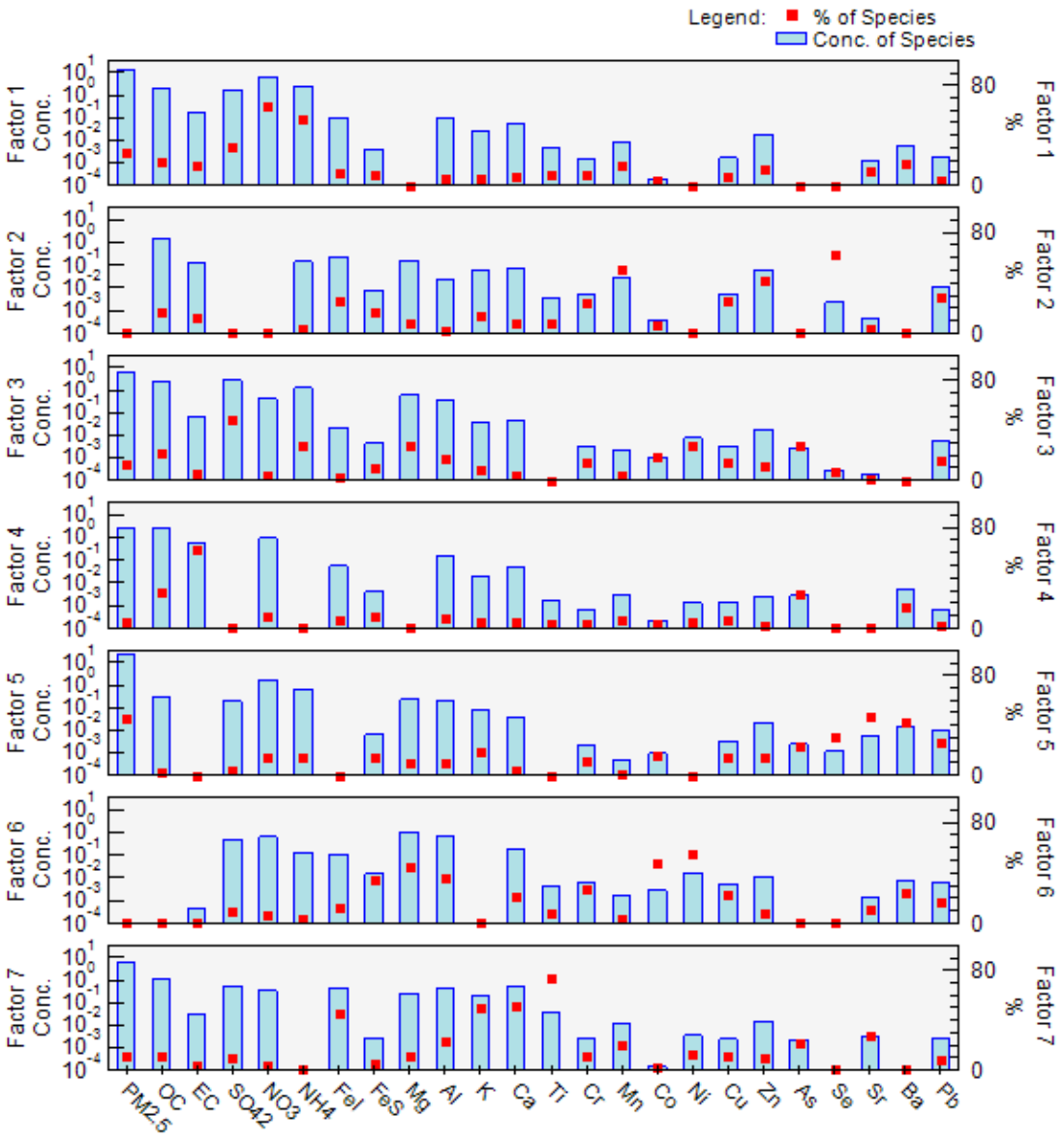

Figure S3. Source profiles deduced from PMF analysis (7 factors).

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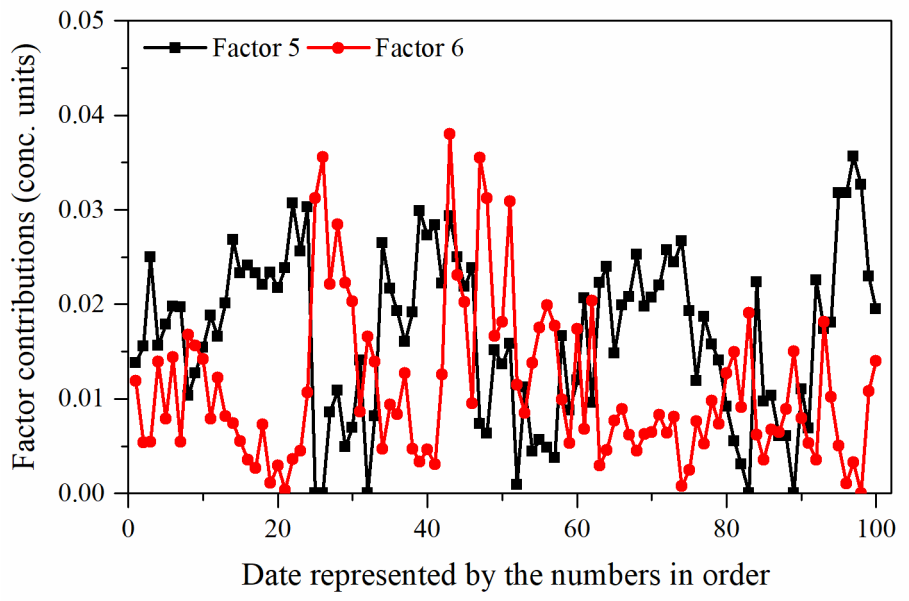

Figure S4. Time series of factor 5 and 6 contributions (conc.units). Since the sampling time of different weathers is intermittent, the date is replaced by sequential numbers.

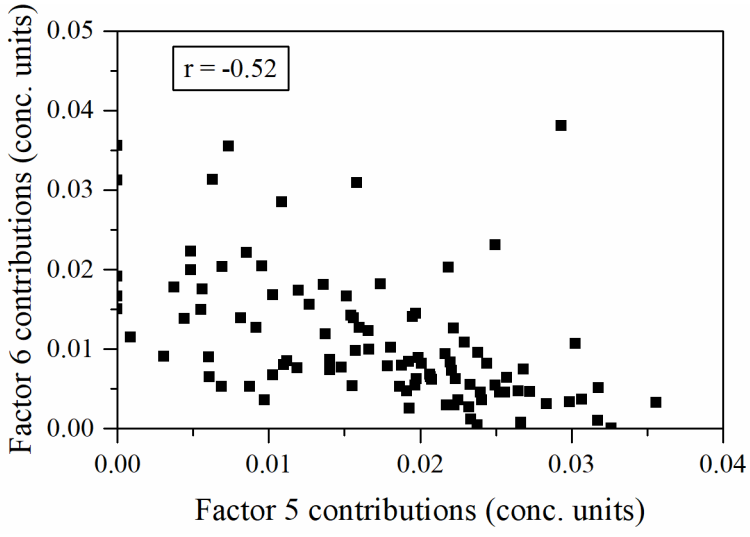

Figure S5. The correlation between factor 5 and 6 contributions (conc.units).