atmosphere

Supplementary Materials:

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In this study, semi-continuous monitoring method was used for all real-time monitoring data of PM2.5 mass concentrations, ions, carbonaceous compounds, and elements and 1-hour averaging data was expressed in this paper.

Ions were analyzed by an Ambient Ion Monitor (URG Co., 9000D, AIM) which was ion chromatograph (IC) system and the experimental conditions of IC were described as shown in Table S1.

Table S1. Analytical conditions of ion chromatography used in this study.

Type	Anion	Cation
Eluent	KOH (10-45 mM)	MSA (20 mM)
Flowrate	0.25 mL/min	0.25 mL/min
Injection volume	50 µl	50 µl
Column	Dionex, IonPacAG18, AS18 2mm	Dionex, IonPacCGA12, CS12A 2mm
Suppressor	Dionex, AERS500-2mm	Dionex, CERS500-2mm
Detector	Dionex, Conductivity Detector	Dionex, Conductivity Detector
Viewer	Dionex, Chromeleon	Dionex, Chromeleon

Carbonaceous compounds (organic carbon (OC) and elemental carbon (EC)) was analyzed by an OCEC Aerosol Analyzer. In the first step, OC was measured with helium gas and then EC was measured with the mixed gas of oxygen and helium gases in the second step. Table S2 shows the experimental conditions of gases and temperature for the analyzer.

Table S2. Gas/temperature conditions of the OCEC Aerosol Analyzer.

Program Activity	Carrier Gas	Ramp Time (second)	Program Temperature
Oven Purge	Helium	10	1
1st Ramp	Helium	70	310
2ed Ramp	Helium	60	480
3rd Ramp	Helium	60	615
4th Ramp	Helium	90	840
-	Helium	30	0
1st Ramp	O_2/Helium	35	550
2nd Ramp	O_2/Helium	105	850
Internal Std. Calibration	CH_4/Helium	120	0
Cool down	Helium	1	0

Table S3 shows the measurement detection limit (MDL) of $PM_{2.5}$ chemical compounds. MDL of Ions were ranged from 0.001 to 0.040 µg/m^3, 0.297 µg/m^3 for OC, 0.0008 µg/m^3 for EC, and 0.0001 to 0.0008 µg/m^3 for elements, respectively.

Table S3. MDL of $PM_{2.5}$ components.

	Components	MDL		Components	MDL	Components	MDL
Ions	SO_4^{2-}	0.00595	Elements	Si	0.03690	Cu	0.00022
	NO_3^-	0.01018		S	0.00515	Zn	0.00019
	Cl^-	0.00966		K	0.00309	As	0.00016
	Na^+	0.00328		Ca	0.00069	Se	0.00021
	NH_4^+	0.00218		Ti	0.00036	Br	0.00025
	K^+	0.04444		V	0.00034	Ba	0.00088
	Mg^{2+}	0.00106		Cr	0.00025	Pb	0.00030
	Ca^{2+}	0.00286		Mn	0.00032		
Carbons	OC	0.29731		Fe	0.00042		
	EC	0.00084		Ni	0.00024		