Characteristics and Major Sources Apportionment of Carbonaceous Aerosols in Ansan, Korea

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Carbonaceous aerosols have been identified as a significant component of $PM_{2.5}$, which have adverse effects on human health and air quality. However, they still have uncertainties in their physicochemical properties, transportation, and spatiotemporal distribution because ambient carbonaceous aerosols are composed of over a thousand different organic compounds. In this study, we investigated semi-continuous $PM_{2.5}$ sampled from Gyeonggi Air Quality Research Center (37.31˚N, 126.80˚E) located in Ansan, Korea, which can represent the characteristics of industrial and urban areas, to estimate the major sources of carbonaceous aerosols. Organic carbon (OC) and elemental carbon (EC) in each sample were determined using a Sunset OC/EC thermal optical transmittance (TOT) analyzer (Sunset Laboratory Inc., USA) based on NIOSH (National Institute for Occupational Safety and Health) protocol which can distinguish pyrolyzed and/or charred OC from EC. $PM_{2.5}$ samples on quartz filters are gradually heated to a specified temperature (310 ˚C to 870 ˚C) to determine the OC (from OC1 to OC4) and EC (from EC1 to EC6). In addition, measurements of heavy metal elements (Si, Ti, V, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Pb) in $PM_{2.5}$ samples were conducted using X-ray fluorescence spectrometer (XRF). We will use statistical approaches (such as Principal Component Analysis (PCA) and/or a receptor model) to determine the corresponding quantitative major sources apportionment of carbonaceous aerosols. Finally, we believe that this study will provide direction for effective reduction and regulation policies of major pollutants.

Keywords: Carbonaceous aerosols, Organic carbon, Elemental carbon, Source apportionment

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