

Characteristics of PM_{2.5} Carbonaceous Aerosol using PILS-TOC and GC/MS-TD in two megacities, Rep. of Korea

Da-Jeong Park¹, Seung Shik Park², Joon-Young Ahn³, Hye-Jung Shin³, Yeong-Jae Lee³, and Min-Suk Bae¹

¹Department of Environmental Engineering, Mokpo National University, Jeollanamdo, 534-729, Rep. of Korea

²Department of Environment and Energy Engineering, Chonnam National University, Gwangju, 500-757, Rep. of Korea

³National Institute of Environmental Research, Air Quality Research Division, Incheon, 404-708, Rep. of Korea

Keywords: WSOC, PILS, GCMS

Presenting author email: minsbae@hotmail.com

Carbonaceous aerosols are classified as either organic carbon (OC) or as elemental carbon (EC) and are the main components of aerosols in the atmosphere (Rattigan et al., 2010). Generally, OC can be classified as water soluble for secondary and insoluble for primary. Continuous Water-Soluble Organic Carbons (WSOC) by the Particle Into Liquid Sampler - Total Organic Carbon (PILS-TOC) analyzer were measured at the Seoul intensive monitoring site from June 17 through July 5 and at the Gwangju intensive monitoring site from Nov. 4 through Nov. 22 in Rep. of Korea, 2014. In addition, the 24 hour integrated PM_{2.5} collected by Teflon and Quartz filters were analyzed for water soluble ions by Ion chromatography (IC), WSOC by TOC from water extracts, organic carbon (OC), elemental carbon (EC) by carbon analyzer using the thermal optical transmittance (TOT) method, and mass fragment ions (m/z) related to alkanes and PAHs (Poly Aromatic Hydrocarbons) by Gas Chromatography-Mass Spectrometer-Thermal Desorption (GC/MS-TD).

The Carbonaceous Thermal Distributions (CTD) have been motivated by the fact that the thermal evolution of carbonaceous aerosols is different than during an instrumental analysis (Bae et al., 2014). Based on the statistical analysis, four different CTDs from OCEC thermal-gram were identified at the Seoul intensive monitoring site.

fragments, and diurnal patterns of WSOC. The results provide knowledge regarding the origins of WSOC and their behaviors.

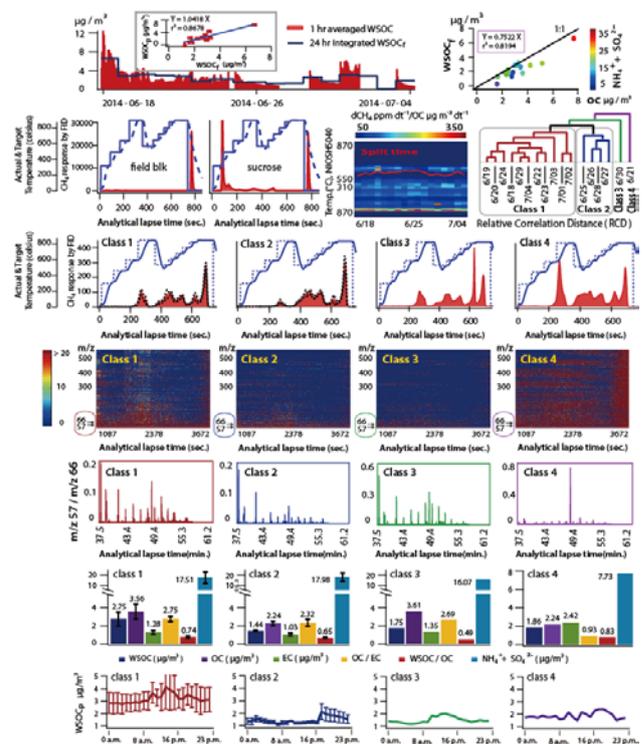


Figure 2. Time series of 1 hour averaged WSOC_p and daily WSOC_f with pairwise correlation scatterplots between daily WSOC_p and WSOC_f, pairwise correlation scatterplots between WSOC_f and OC colored by sum of NH₄⁺ & SO₄²⁻, thermal distribution (CTD), CTD -Class 1, CTD -Class 2, CTD -Class 3, CTD -Class 4 for the sampling periods.

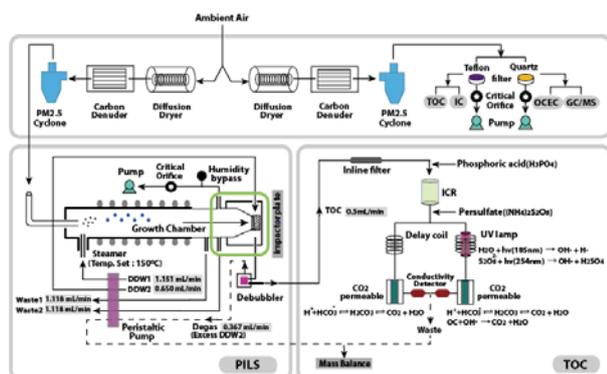


Fig. 1. Schematic diagram of measurement system for integrated samplers and continuous water soluble organic carbon (WSOC) by PILS-TOC.

This study discusses the primary and secondary sources of WSOC based on the Classified CTD, organic mass

This work was supported by the National Institute of Environmental Research (NIER) and National Research Foundation of Korea (NRF-2013R1A1A2065686).

Bae, M. et al. (2014) *Sci. Total Environ.* **466**, 56-66.

Rattigan O. et al. (2010) *Atmos. Environ.* **44**, 2043-2053.