Geophysical Research Abstracts
Vol. 13, EGU2011-9644, 2011
EGU General Assembly 2011

Characteristic of water-soluble organic carbon in PM10 measured in Seoul, Korea

Sun Young Lee (1), Ji Yi Lee (2), Seung Muk Yi (1), and Yong Pyo Kim (2)

(1) Department of Environmental Health, Graduate School of Public Health, Seoul National University, (2) Department of Environmental Science and Engineering, Ewha Womans University

WSOC is one of the most important components of atmospheric aerosols, which constitutes a significant fraction of organic carbonaceous aerosol. WSOC changes hygroscopic property of aerosol and, thus, affects climate change acting as cloud condensation nuclei (CCN). WSOC can be emitted directly from primary sources and/or formed by atmospheric oxidation (secondary sources). Biomass burning is a major primary source of WSOC and oxidation of volatile organic compounds (VOCs) and their partition to the aerosol (e.g., SOA formation) are a secondary source for WSOC.

To understand the effect of atmospheric aerosol on the climate change and aerosol oxidation (e.g., aerosol aging), characterizations of WSOC in the atmosphere is essential. However, despite of their significance in the atmosphere, characteristics of WSOC are still not sufficiently understood, especially in Northeast Asia region, including Korea.

In this study, to understand characteristics of WSOC, atmospheric particulate matter and WSOC were collected during 24h-period with organic carbon (OC), elemental carbon (EC) and other chemical species (i.e. nitrate, sulfate etc.) from August 2006 to August 2007. OC, EC, and other chemical species were measured using three different PM10 inlet cyclone samplers (URG), operating at a flow rate of 16.7 L min-1. For the measurement of WSOC, PM10 high volume air sampler (Kimoto, model 121 series) was used. The average concentration of WSOC was 4.18$\pm$2.85 μgC m-3, (ranged from 0.42 μgC m-3 to 11.5 μgC m-3) which was comprised of 40$\pm$16 % of OC (ranged from 7 % to 92 %). From this result, it is thought that OC at Seoul, Korea has high hydrophilic property. The average fraction of WSOC concentration to PM10 mass concentration was 8.0$\pm$4.0 % (range: 1%-31%), indicating WSOC is one of major components in PM10 although the WSOC fractions were variable. The seasonal variation of WSOC concentration was observed with the highest in winter (6.65$\pm$3.18 μgC m-3) and the lowest in summer (2.67$\pm$2.10 μgC m-3). The concentrations of WSOC measured in this study were comparable to those measured at other urban site in Korea (Park and Cho, 2011, Atmos. Environ., 45, 60-72). Compared to other countries, WSOC concentration at Seoul, Korea was about two times higher than those of Hong Kong (Ho et al., 2006, Atmos. Chem. Phys., 6, 4569-4576) and Japan (Aggarwal and Kawamura (2009), Atmos. Environ., 43, 2532-2540).

The characteristics of WSOC and aerosol aging process in the Northeast Asia region will be further discussed by comparison with other chemical composition in the aerosol and back-trajectory analysis using NOAA HYSPLIT model.