Characteristics of wintertime carbonaceous aerosols in Seoul, Korea

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Keywords: carbonaceous aerosol, Organic carbon, elemental carbon
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Hourly PM2.5 organic carbon (OC) and elemental carbon (EC) were measured continuously in Seoul Hwangsa Monitoring Center, National Institute of Meteorological Science, Seoul, Korea since November, 2015. It employs Thermal-optical transmittance method with NIOSH 5040 protocol. Average concentrations were 4.9±2.3 μg/m^3 and 1.6±0.85 μg/m^3 for OC and EC, respectively. EC accounted 24±7.7% of total carbon (OC+EC). From the 4-month measurement, both OC and EC concentration were highest in December, and lowest in February. Monthly variation of OC and EC mass concentration was shown in Table 1.

Collocated PM2.5 sampler was also operated to investigate 24-hr integrated mass concentration and other chemical components (water-soluble ions and trace elements). Contributions of OC and EC to PM2.5 total mass concentration were 0.16±0.038 and 0.046±0.013%, respectively, during December 2015 to February 2016 (Fig. 1).

Diurnal and weekly variations were analysed for OC and EC. The EC showed a more significant diurnal pattern with the highest concentration on 8 a.m. (LST) while OC had two smoother peaks on 9 a.m. and 8 p.m. Diurnal variation of EC during the weekend was not distinct compared to that of weekdays. Weekly patterns of OC and EC showed that the concentrations were highest during middle weekdays and minimized on Sunday. And this weekly variation of OC was more significant than that of EC. Night time high OC concentration was observed in many studies (). Minimum in the middle of the day and maximum at night time can be explained by the diurnal changes in mixing height even though there might be other contributions such as emission changes (Bae et al., 2004). The reason that variation of EC is less significant than that of OC might be due to EC is less sensitive to meteorological parameters such as temperature and RH (Duan et al., 2005).

Table 1. Monthly mean of OC and EC (in (μg/m^3)) mass concentration measured in Seoul, Korea.

Month	OC	EC	No. of data
Nov. '15	4.7±2.5	1.7±1.0	466
Dec '15	6.3±2.8	2.2±1.1	166
Jan. '16	5.4±2.0	1.5±0.62	606
Feb. '16	4.2±2.0	1.4±0.68	492

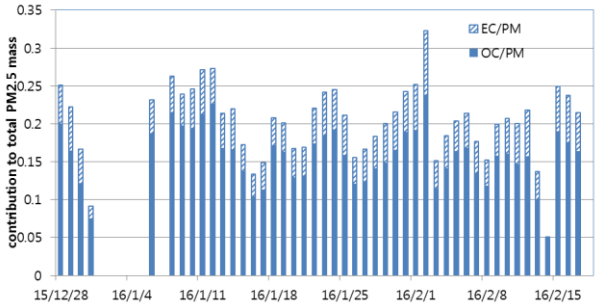

Figure 1. Contribution of OC and EC to total PM2.5 mass concentration in Seoul, Korea during December 2015 to February 2016.

Acknowledgements

This work was supported by **Research and Development for KMA Weather, Climate, and Earth system Services(NIMS-2016-3100).**

References

Bae, M., J.J. Schauer , J.T. DeMinter and J.R. Turner (2004), Hourly and Daily Patterns of Particle-Phase Organic and Elemental Carbon Concentrations in the Urban Atmosphere, *J.Air & Waste Manag Assoc.*, 54:7, 823-833

Duan F., K. He, Y. Ma, Y. Jia, F. Yang, Y. Lei, S. Tanaka, and T. Okuta (2005), Characteristics of carbonaceous aerosols in Beijing, China, *Chemosphere*, 50, 355-364.