PA62) Characteristics of $PM_{2.5}$ Primary and Secondary Organic Carbon Aerosol Measured in Urban and Background Sites of Korea in 2008

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1. Introduction

A major fraction of the atmospheric fine particulate matter consists of carbonaceous material, which plays an important role in the atmosphere with regard to earth radiative transfer, human health effects, atmospheric chemistry, and global climate changes. They are also important in understanding emission and transport/transformation of air pollutants in context with long-range transport of air pollutants. The Korean Peninsula is located at the downstream area of the Asian continent. Due to its location, the Korean peninsula is often affected by long-range transported aerosols such as Asian dust, biomass burning smoke pollution, and anthropogenic particle pollution. Objective of this study is to better understand characteristic of carbonaceous aerosol in atmospheric particles for different types of air mass, and different seasons.

2. Methods

The sampling measurements were conducted at Yonsei University site (37°34′N, 126°56′E) located in the north-west part of Seoul where urban, commercial activities are possible sources of air pollutants, at Deokjeok Island (37°13′N, 126°9′E) situated off the west coast of the Korean peninsula lying on the upwind region of prevailing westerly, and at Gosan (33°17′N, 126°10′E) placed on the west coast of Jeju Island off the southern tip of the Peninsula in spring (May 20~June 1), summer (August 11~23) and fall (October 09~20) of 2008. The samples were collected on pre-baked quartz fiber filters a 12-hour sampling interval, using low volume cyclone samplers with $PM_{2.5}$ size cut inlet. OC and EC in $PM_{2.5}$ sample were analyzed by the thermal.optical transmittance (TOT) method based on NIOSH temperature protocol.

3. Results and Discussion

The highest OC and EC concentrations were observed in Seoul while lowest were measured at Gosan in spring, summer, and fall of 2008. The average seasonal concentrations of carbonaceous aerosol were at minimum during the summer at the three sampling sites (Fig. 1).

Total carbonaceous aerosol contributed less to $PM_{2.5}$ at Deogjeok and Gosan background sites (18%~35%) than in urban Seoul site (24%~40%) indicating that impact of urban and vehicle pollution sources in Seoul.

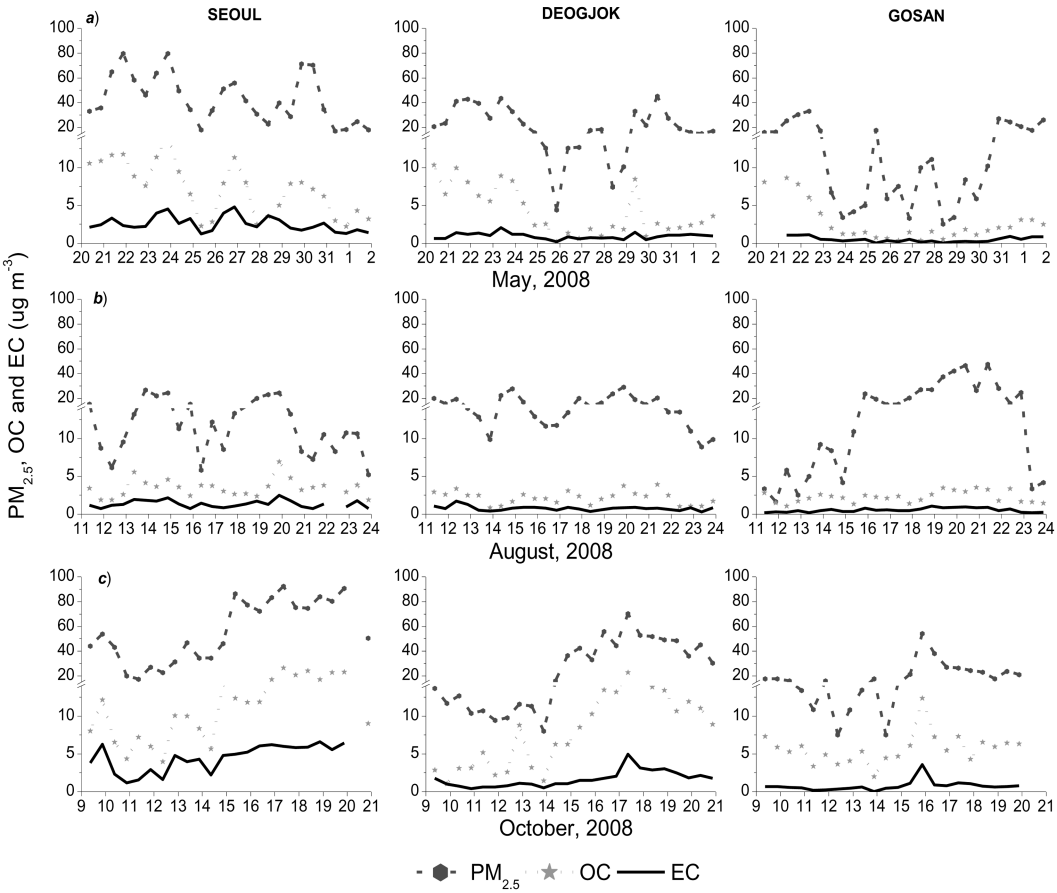

Fig. 1. Temporal variations of $PM_{2.5}$ mass and carbonaceous aerosol concentrations in Seoul, Deogjeok Island and Gosan for spring (a), summer (b) and fall (c) seasons in 2008.

Primary OC (POM) and secondary OC (SOC) were calculated using minimum OC/EC ratio method (Turpin and Huntzicker, 1995). On average secondary OC accounted 35%~72% in Seoul, 24%~68% in Deogjeok, and in Gosan 51%~62% of the total OC during spring, summer and fall seasons. The average contribution of SOC to OC was high though SOC concentration was small in Seoul during summer due to photo-oxidation processes. Characteristics of $PM_{2.5}$ carbonaceous aerosol during long range transported pollutants events will be discussed.

Acknowledgements

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References

Turpin, B.J. and J.J. Huntzicker (1995) Identification of secondary aerosol episodes and quantification of primary and secondary organic aerosol concentrations during SCAQS, Atmos. Environ., 29, 3527-3544.