

Physical and chemical characteristics of aerosols measured in Anmyeondo, Korea

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We have observed and analyzed physical and chemical characteristics of aerosols obtained in Anmyeondo (36.53 ° N, 126.32 ° E, altitude 45.7m), located at downwind area from the Asian Continent. Therefore it is appropriate to monitor aerosols originating from the Continent. In order to analyze physical characteristics of the aerosols, we have measured aerosol mass concentrations with β -ray PM₁₀ (Thermo Anderson FH62C14), number concentrations with SMPS (Scanning Mobility Particle Sizer, TSI 3034), light absorption coefficient with Aethalometer (Magee Scientific AE31) and light scattering coefficient with Nephelometer(TSI 3563). For chemical characteristics, we collected PM₁₀ (APM 2000A) and PM_{2.5}(APM 2000A) samples using filters once a week with cyclone samplers, and analyzed 8 water soluble ion species such as sulfate, nitrate, ammonium, chloride, sodium, potassium, calcium, and magnesium with ion chromatography (ICS2000, DIONEX). The annual mean average mass concentration of PM₁₀ in 2014 was 38.7 $\mu\text{g}/\text{m}^3$, indicating that it was lower than the mean value (52.1 $\mu\text{g}/\text{m}^3$) from 1999 to 2013. Long-term trend of PM₁₀ has decreased gradually. The PM₁₀ was high in winter and spring due to Asian dust and smog events originating from Asian Continent. Daily means of PM₁₀ above 100.0 $\mu\text{g}/\text{m}^3$ were observed frequently in the spring and winter compared to another seasons.

During nine years from 2004 to 2014, the number concentrations of PM_{2.5} were considerably steady. It is because Asian dust phenomena were less observed in Korea compared to previous years. From 2008 to 2014, the ratio of each ion components to total ion components in PM_{2.5} was measured in order of nitrate (35%) > sulfate (27%) > ammonium (14%) > sodium (12%). In Asian dust, calcium concentration was increased 3~4 times than those of annual mean average, while especially nitrate (35%→45%) increased in smog cases.