

A multi-isotope approach to tracing the sources and migration of air pollutants in East Asia

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Nitrogen isotope ($\delta^{15}\text{N}_{\text{nitrate}}$), multiple sulfur isotopes ($\Delta^{33}\text{S}_{\text{sulfate}}$ and $\delta^{34}\text{S}_{\text{sulfate}}$) and strontium isotope ($^{87}\text{Sr}/^{86}\text{Sr}$) composition with the concentration of major cations (Na^+ , Ca^{2+} , Mg^{2+} , K^+ , NH_4^+ , Sr^{2+} and Al^{3+}) and anions (SO_4^{2-} , NO_3^- and Cl^-) of precipitation samples collected in Seoul, Korea were measured over a period of 1 year covering whole four seasons. Multi-isotopic compositions indicate that the anthropogenic activities such as emissions from power plant and car exhaust are predominant sources for air pollutant in the study area. Regional and/or remote soil dust from silicate weathering would affect the isotopic composition of precipitation while sea salt spray is not a significant source, which could be estimated by sodium ion (Na^+) concentration as an indicator of marine origin. These results give a hint for tracing the origin and migration of air pollutant in East Asia region. Considering that precipitation is one of the potential controlling factors on isotopic compositions of meteoric water and plant, the measured isotopic compositions could be applied to researching the spatial variation of isotope ratios (i.e., isoscape) in Korea.