

Short-term variability of air pollutants related to Meteorological characteristics in Seoul, South Korea

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Temporal patterns of a time series of observed air pollutants can be described in terms of three basic classes of components: short-term, seasonal, and long-term components. The short-term variability in the time series usually occupies the largest portion of the total variability. Meteorological factors can play an important role in the short-term variability since the air pollution at a given place is largely affected by accumulation or ventilation of air pollutants and precursors, atmospheric chemistry on the secondary formation, and transport of regional pollutants. In this study, inter-relationships between the short-term components of air pollutants (PM_{10} , SO_2 , NO_2 , CO , and O_3) and meteorological variables in Seoul, the capital city of South Korea, were investigated. Short-term components of each variable for 1999–2016 were obtained by the Kolmogorov-Zurbenko filter that leaves the short-term variability with period shorter than 33 days. We found that the inter-correlations among the short-term variabilities of primary pollutants (PM_{10} , SO_2 , NO_2 , and CO) are significantly high, and those pollutants show high concentrations in warm, humid, and low winds conditions. Synoptic weather patterns related to this meteorological condition exhibits an eastward-moving high-pressure system that can induce both slow regional transport of air pollutant from China and accumulation of local pollutants. O_3 was strongly related to the high irradiance, winds, and daily maximum temperature, but dry conditions.