The Spectral Characteristics of Climatological Variables over the Asian Dust Source Regions and its Association with Particle Concentrations in Busan

Hye-Young Son and Cheol-Hee Kim*
Division of Earth Environment System, College of Natural Sciences
Atmospheric Science Major, Pusan National University, Busan, Korea, 609-735
**E-mail: chkim2@pusan.ac.kr*

In order to examine how climatological condition can influence on urban scale particulate air pollutants, single and cross spectrum analysis have been performed to daily mean concentrations of particulate matters (PM_{10}) in Busan together with the climatological variables over the Asian dust source regions. Single power spectrum analysis of PM_{10} concentrations in Busan shows that, aside from the typical and well-known periodicities, 3-4 year of peak periodicity of power spectrum density was identified. In cross spectrum analysis, this 3-4 year periodicity is found to have a strong positive correlation with the wind speed and pressure, and negative with the temperature and relative humidity, which is rather consistent with both characteristics of air mass during the Asian dust event whose periodicities have been recorded inter-annually over the Korean urban cities. Over the Asian dust source regions, PM_{10} vs. precipitation shows no significant periodicity from the time series of precipitation data, but the periodicity of EDI (Effective Drought Index) shows some interannual variabilities ranging form 2 to 4 years over the various source regions, suggesting that, rather than precipitation itself, the EDI could be more closely associated with the occurrence frequency of Asian dust and interannual variability of urban particle concentrations in Korean cities.

Key words: aerosol, single spectrum, cross spectrum, Asian dust, Effective Drought Index(EDI)