



Estimation of source of high PM10 events in Seoul using wind back trajectory analysis

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This study examined the cause of High PM10 events in Seoul during recent few years(2001-2008). Seoul is the largest city of Korea with a population of fifty million inhabitants. The air quality of the city becomes more important as the gravitation of the population is intensified. According to the recent studies, the air quality of the Seoul has improved during recent years, but that the PM10 concentration of Seoul is much higher than the other big cities in countries of the world.

There are many local sources of PM10 in Seoul, such as heavy traffic, usage of fossil fuel, increase of building accompanied by decrease of forest and so forth. Besides, there are many external sources of PM10, such as incoming of air pollutants from China, because Seoul is located at the leeward side of China. In order to investigate the contribution of internal and external sources of PM10, wind back trajectory analysis is performed by using FLEXTTRA trajectory model. From back trajectory analysis, the air masses arriving Seoul are classified into four types; local source types, long range transport types from central and northern China, mixed types of both local source and long range transport, and very long range transport type from far China and Mongolia region. Using Hierarchical clustering method, the level of contribution of these four types is calculated. The local source type accounts for the largest percentage of total events, nevertheless, the long range transport type also accounts for considerable proportion, which suggests that the air pollutants crossing the border have a considerable impact on the occurrence of high PM10 events of Seoul.

In order to validate the back trajectory analysis, we analyzed the local wind direction of Seoul. From that analysis, it was found that westerly or northwesterly winds were dominated when the high PM10 events occurred, which results support the validity of wind trajectory analysis; in the case of high PM10 events, the western and northwestern directions of back trajectories are dominated. In contrast to high PM10 case, southern and eastern directions of back trajectories are dominated in the case of low PM10 events.

In order to investigate the characteristics of meteorological field of high PM10 events, we performed the composite analysis of meteorological factor such as pressure, wind, and temperature. In the case of local source type, high pressure is dominant over the Korean peninsula. Furthermore, the wind is very weak in the local source type, in contrast to the strong wind of long range transport type.