

# **Classification and its scale analysis of Severe Haze recently observed in Korea**

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Cloud-aerosol-precipitation interactions mechanism is heavily dependent upon scale problems, and thus the first thing to understand its mechanism is to quantify the time (or spatial) scale of forcing driver, aerosols. This study is focused on recently occurring dense haze episodes accompanied with severe visibility impairment from 2011 to 2013 at two adjacent monitoring stations (Baengnyeongdo and Seoul) in Korea. Baengnyeongdo is an island being located 200 km west from Seoul.

First of all, we have tested various flow charts to classify the various categories of heavy haze events by making use of aerosol scattering coefficient, PM<sub>2.5</sub>, and time lag difference of PM<sub>2.5</sub> increase time at both stations, backward trajectories, and the ratio of PM<sub>2.5</sub> to PM<sub>10</sub> specifically in the quantitative perspective. One of them is selected for this study.

Long-range transported haze (LH) and Yellow Sand (YS) show very distinctive time lags of both PM<sub>2.5</sub> and PM<sub>10</sub> between both stations, but much higher ratio of PM<sub>2.5</sub> to PM<sub>10</sub> for LH in comparison with YS. Meanwhile urban haze (UH) has a significant increase in PM<sub>2.5</sub> only at Seoul as easily expected. Time scales (e-folding time) of aerosol light scattering coefficients for LH and UH are 6-12 hours and 7-16 hours, respectively calculated for several episodes according to the criteria developed, which eventually corresponds to spatial scale of 120-240 km, 140-320 km, respectively by assuming average boundary wind speed, 5.6 m/s (Anderson et al., 2003). In general, long-range transported hazes have larger temporal and spatial dimension (about meso- $\alpha$  scale) than domestic hazes, after carefully designed classification of haze episodes. These results can be a useful basis for the estimation of regional aerosol radiative forcings in East Asia.

**Key words:** haze classification, long-range transported hazes, temporal•spatial scale