

4.149 Observed characteristics of precipitation timing during the hazes : Implication to aerosol-precipitation interactions.

Early Career Scientist

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Abstract:

Korea has suffered from largely domestic anthropogenic aerosols mixed with long-range transported pollutants from abroad. It is important to analyze general characteristics of different hazes in terms of time and space scales, and its relationship with precipitation. However, aerosol impact on weather has not much been investigated. First, we used ground aerosol observations at Seoul and Baengnyeongdo for 2011-2016 to classify severe haze episodes to Long-range transported haze (LH), Yellow sand (YS), Urban haze (UH) and Mixing haze (MH); after all, 40 LH cases, 23 YS cases, 29 UH cases and 35 MH cases classified. The ratios of the events accompanied with precipitation are 68%, 87% and 48% for LH, YS and UH respectively. Long-term analysis of the timing of aerosol and precipitation shows that precipitation tends to precede YS while it appears to coincide with LH event. We take statistics analysis to prove the reliability of these results. We also found out the differences between operational weather forecast and hourly observed precipitation in 41 cases among total 126 episodes examined. Interestingly light precipitation tends to last longer about within a day following enhanced aerosol loadings. Precipitation timing seems to be controlled by large scale synoptic forcing during the YS event. However, aerosols may be closely associated with precipitation through changes in

cloud microphysics during the severe long-range transported haze such that enhanced aerosols can increase smaller cloud droplets and further extend light precipitation at weaker rate. This result demonstrates active interactions between aerosols and meteorology such as probable modifications of cloud microphysics and precipitation, synoptic-induced dust transport, and precipitation-scavenging in Korea. In addition, we will demonstrate the precipitation characteristic on clear events for its comparison with the enhanced aerosol results mentioned above.