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Observations of the vertical distributions of wintertime atmospheric pollutants in Northern China

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We present Mie lidars observations in north China and obtained the formation processes of a four-day pollution episode in the late winter in 2017.The evolution of particle extinction coefficients and boundary layer heights along the south-eastern transportation pathway are measured and then the particle transportation flux from/to Beijing, China during this period can be obtained. From December 27, three observing sites, Beijing Inner city(BJI), Beijing Huairou (BJH) and Tianjing (TJ) experienced this severe pollution nearly at the same time. The high average values of particle extinction coefficients indicates that the short-distance regional transport indeed exists in the southeast direction. The mean value of depolarized ratio in BJI was 0.14 ,which suggests that there existed predominant amounts of fine particles in this pollution. The boundary layer height sharply decreased and then maintained stable at the height of roughly 0.225 km . Furthermore,the typical weather conditions during this episode were stable high pressure system, sustained southwest wind, and shallow inversion layer near the surface. Therefore it was difficult for pollutants to diffuse.The back trajectories from a HYSPLIT model indicate that the air masses in the lower boundary layer were mostly advected from the densely populated south regions of China.