AD-Net, a Lidar Network for Observation of Three Dimensional Distribution of Asian Dust Particles

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National Institute for Environmental Studies (NIES) is operating AD-Net (Asian dust and aerosol lidar observation network) in collaboration with many organizations in Japan, Korea, China, and Mongolia to observe continuously three-dimensional distribution of Asian dust and anthropogenic aerosols in the region. All lidars measure the backscatter profiles at 532 nm and 1064 nm, and also measure the depolarization ratio at 532 nm to obtain the information related to the sphericity of particles. The resolution is 6 m and 15 minutes in height and time, respectively. The extinction coefficient of non-spherical particles (mineral dust) and spherical particles (anthropogenic particles) are retrieved by combination of Fernald's method and external mixing assumption. Both extinction coefficients are uploaded to NIES www page every hour, and utilized in various field of atmospheric science. Extinction coefficient of mineral dust (ExtD) is proportional to the mass concentration of dust, and utilized in both of validation and data assimilation with chemical transport models. ExtD is also utilized as in index of exposure to dust particles in the epidemiological studies in which the environmental impact of Asian dust on human health is evaluated. AD-Net has a history of 20 years with similar equipment and data production method, thus the detection of long-term trend of Asian dust density in East Asia and Western Pacific region is an important task of AD-Net in next decade. Combination of lidar observation and global chemical transport model is indispensable for comprehensive understanding of emission, transportation and environmental impact of mineral dust in the region.