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Development of the Asian Dust Databank to support studies of interactions between atmospheric dust aerosol, land-use and climate in Central and East Asia

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In support of the Northern Eurasia Earth Science Partnership Initiative (NEESPI) we have been working on the development of the Asian Dust Databank by integrating diverse satellite and ground-based data on land-use and land-cover changes, atmospheric mineral dust, and climatic variables in Central and East Asia. The ultimate goal of this effort is to gain a better understanding of interactions between land-cover and land-use changes and varying atmospheric dust burden and their roles in and linkages to climate changes occurred in Northern Eurasia over the past 50 years.

This paper will present our work towards establishing an observation-based climatology of dust storm events, which is one of the key components of the Asian Dust Databank. An integrated analysis of satellite and ground-based visibility observations will be presented with the goal to reconstruct the timing and duration of dust outbreaks on a case-by-case basis. Satellite multi-sensor observations used in this study include TOMS (Total Ozone Mapping Spectrometer), and MODIS (Moderate-Resolution Imaging Spectroradiometer) aboard NASA Terra and Aqua satellites. In addition, a detailed analysis of dust events occurred in springs of 2007 and 2008 will be presented. This analysis is performed by using the CALIPSO space lidar data in conjunction with A-Train satellite constellation observations to investigate the dynamics and spatiotemporal distributions of dust plumes, considering dust sources and mid- and long-range transport. Given various intrinsic limitations of individual data sets, an integrated analysis methodology is being developed to provide a reliable dust climatology.