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Editorial

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The Asian dust and agricultural biomass burning aerosol from the ground-based Lidar and satellite measurements in China: Transport, optical properties and impacts on regional air quality

Editorial

The optical properties, time-height distribution and impact on the local air quality from a heavy Asian dust transport episode are investigated with a synergistic ground-based, satellite sensors and model on May 2011 in Nanjing city (32.05°N,118.78°E, 94m ASL), China. Two dust layers located in the planetary-boundary-layer (PBL, <2.5km) and free troposphere (3–6km) are observed by a Polarization Raman-Mie Lidar. Diff erent transport paths originating from the Gobi deserts and Taklimakan deserts are demonstrated by the NOAA HYSPLIT, NAAPS models and NASA satellites (MODIS and CALIPSO) imageries. Th e dust aerosol layer shows the depolarization ratios at 0.1–0.2 and strong extinction coeffi cients attaining 1.0km-1 at 532nm and the Lidar ratios of dust are 47.3–55sr below 2.5km altitude. During this dust intrusion period, the aerosol optical depths (AOD) dramatically increase from 0.7 to 1.6 at 500nm whereas the Angstrom exponents decrease from 1.2 to 0.2 according to the Cimel-sun photometer measurement. Meanwhile, both surface PM10 and PM2.5 concentrations show similar temporal variation and a signifi can't increase with the peak value attaining 767 g/m3 and 222 g/m3 respectively. Regional influences of the transported dust are further illustrated by the AERONET-sun photometer observations at Taihu and Xianghe sites (downwind and upwind from Nanjing), satellites MODIS, CALIPSO and model products in east China. In addition, we also discussed the agricultural biomass burning (ABB), which has been of particular concern due to its influence on air quality and atmospheric radiation, as it produces large amounts of gaseous and aerosol emissions. This study presents an integrated observation of a signify can't ABB episode in Nanjing, China during early June 2011, using combined ground-based and satellite sensors. The time-height distribution, optical properties, sources and transport of smoke, as well as its impacts on air quality are investigated. Lidar profiles indicate that the smoke aerosols are confi ned to the planetary-boundary-layer (PBL) and have a depolarization ratio of less than 0.08. Th e aerosol optical depth (AOD) increases from 0.6 to 3.0 at a wavelength of 500nm, while the Angstrom exponent varies from 1.0 to 1.6. The aerosol single scattering albedo becomes smaller (0.87-0.8) at 675-1020nm and shows a decreasing trend from the wavelength of 440nm to 1020nm, indicating more absorbing aerosols. The absorption Angstrom exponent (0.7) is smaller than 1.0, which may indicate the aged smoke particles mixed or coated with the urban aerosols. By combining MODIS fire, AOD, CO from AIRS and NO2 from OMI products, the ABB sources are identified in mid-eastern China. Surface PM10 and PM2.5 show a dramatic increase, reaching 800 g/m3 and 485 g/m3, respectively.

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