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Monitoring the Haze Using Multi-sensor Aerosol Optical Depth Data

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Aerosols play a significant role in earth-atmospheric radiant balance and global climate changes, and can directly affect air quality. So accurate aerosol monitoring is very significant. Satellite remote sensing can get the earth's atmospheric and underlying information macroscopically and dynamically. It is an effective method to detect the areosol' spatial and temporal distribution. Aerosol optical depth (AOD) retrieval is an important parameter which describe the aerosol' extinction and can be retrieved from satellite data relatively easily. Many satellites have been launched into space in the past decades, so there are many sensors that can be used to retrieved AOD and following many aerosol retrieval algorithms for different satellites and sensors such as dark dense vegetation (DDV), deep blue and structure function method, etc.

On June 25, 2009, a thick haze was blown eastward off the coast of China, over Bohai Sea and Yellow Sea. The haze appears as a dingy blue-gray veil extending over land and water. Haze frequently builds up in eastern China during the winter when weather conditions trap pollutants over the plain. To monitor the thick haze effectively and real-timely and know its geographic distribution quantitatively, we use the Synergetic Retrieval of Aerosol Properties (SRAP) method to retrieve AOD over the Northeast China On June 25, 2009 from the multispectral Moderate Resolution Imaging Spectroradiometer (MODIS). The retrieval results were compared to the ground-based aerosol measurements by CE318 automatic sun tracking photometer at the AErosol RObotic NETwork (AERONET) sites and show that the AOD retrieved by SRAP have good precision. The correlation coefficient is about 0.95. The results are also validated quantitatively with multi-sensor measurements, such as the Multi-angle Imaging SpectroRadiometer (MISR), Polarization and Directionality of the Earth's Reflectances (POLDER) and Advanced Very-High Resolution Radiometer (AVHRR). On the other hand, detection of haze with multi-sensor measurements is also executed in this paper. Using different data sets from multiple satellite sensors is a powerful method for studying Earth–atmosphere problems. We can utilize the strengths of the individual sensors that may not be otherwise possible. In this paper, we compare the AODs retrieved from multi-sensor, find the advantages in haze monitoring respectively, especially the AOD retrieved by the SRAP method.