



Performance of Satellite Dust Retrievals over the West African Sahara during Fennec in June 2011

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Satellite retrievals of atmospheric desert dust have the ability to capture the spatial and temporal distribution of dust on regional and global scales, although it is known that retrievals may be sensitive to variations in the atmospheric state and the background surface. Observations of dust from satellite instruments played an important role in understanding the Saharan climate system during the first Fennec intensive measurement campaign in June 2011. We compare dust retrievals over the Sahara Desert during June 2011 from the IASI, MISR, MODIS, and SEVIRI satellite instruments against each other in order to understand the strengths and weaknesses of each retrieval. Particular attention is paid to the effects of meteorological conditions, land surface properties, and the magnitude of the dust loading. Validation using ground-based AERONET data indicate that of the satellite instruments, SEVIRI is most able to retrieve dust during optically thick dust events, whereas IASI and MODIS perform better at low dust loadings. MISR and MODIS are least sensitive to variations in meteorological conditions, while SEVIRI tends to overestimate the aerosol optical depth (AOD) under moist conditions, especially at low dust loadings. The effect of surface properties on the retrievals is also investigated, with respect to the albedo, the emissivity, and the elevation of the land surface. Further comparisons between the dust retrievals and airborne LIDAR measurements taken during the Fennec campaign help to corroborate the inter-satellite and AERONET findings.