

Aerosol Properties Over Dark Water from MISR Multi-angle Imaging

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In December 1999, the Terra satellite, carrying the Multi-Angle Imaging SpectroRadiometer (MISR) instrument, was launched into polar orbit. MISR images Earth with nine cameras pointed at angles varying from $+70^\circ$, through nadir, to -70° in the along-track direction, in each of four spectral bands (446, 558, 672, and 867 nm), a total of 36 channels. MISR's highest spatial sampling is 275 m at all angles; global coverage is obtained every eight days at low latitudes, every two days near the poles. The major scientific goals of MISR are to study the properties of clouds, Earth's surface, and aerosols [Diner et al., 1998].

MISR promises to contribute to our knowledge of the global aerosol budget, providing tight constraints on aerosol optical depth from well-calibrated spectral radiances measured at precisely known air-mass factors ranging from one to three. The multi-angle observations also sample a wide range of scattering angles (about 50° to 160° at mid-latitudes), offering additional constraints on particle shape, size distribution, and composition, particularly over dark, uniform surfaces such as ocean. The MISR Science Team performed extensive pre-launch studies to quantify the sensitivity of the new instrument to particle properties [Kahn et al., 1997; 1998; 2000a]. We also developed an automatic retrieval strategy that takes advantage of these sensitivities while keeping up with the high data rate of the instrument [Martonchik et al., 1998].

We are in the aerosol retrieval validation phase of the MISR experiment. We are performing both the MISR standard and research-level retrievals where corroborative data from other satellites, aircraft, and/or surface-based instruments are available. Our early experience comes from observations with AirMISR over Monterey Bay in 1999 [Kahn et al., 2000b], and MISR participation in the Puerto Rico Dust Experiment (PRIDE; July 2000). We also make frequent observations over Chesapeake Lighthouse, off the Virginia coast, and two sites in the Tropical West Pacific instrumented by the Atmospheric Radiation Measurement (ARM) program. In each case, a combination of surface and aircraft observations contributes to the analysis. This talk presents recent results from the MISR dark water validation effort.