Geophysical Research Abstracts
Vol. 12, EGU2010-11560, 2010
EGU General Assembly 2010

Beyond Look Up Tables: Using MISR Radiances to Infer Aerosol Properties

Michael Garay (1), Olga Kalashnikova (2), and David Diner (2)

(1) Raytheon Company, Pasadena, California, USA (Michael.J.Garay@jpl.nasa.gov), (2) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA

The Multi-angle Imaging SpectroRadiometer (MISR) instrument on NASA's Terra satellite provides global cloud and aerosol information with a data record extending over 10 years. MISR's unique multi-angle and multi-spectral passive observing system allows aerosol retrievals to be performed over bright surfaces and yields particle information not previously available from space-borne platforms. The current aerosol retrieval algorithms rely on pre-generated look up tables to allow them to run in an operational setting with some trade-offs between algorithm speed and retrieval accuracy.

Here we will describe some initial steps toward moving beyond look up tables. First, we will consider the information content of the MISR observations themselves, with particular attention on the effects of changing viewing geometries, which vary with latitude range and season. Then, through radiative transfer simulations and carefully selected case studies performed in regions with appropriate suborbital measurements, we will show how the MISR radiances can be used to directly infer the optical properties of real aerosols. For instance, when the true characteristics of the aerosol are unknown, it is impossible for a look up table approach to find an appropriate match. However, the MISR radiances provide information on the particle phase function that can be exploited to infer certain characteristics of the unknown aerosol. Additionally, even lacking complete knowledge of climatological aerosol properties, precluding the use of look up tables, MISR observations can be used to study how aerosols change with changing conditions in regions that are traditionally challenging such as areas of high humidity or where the aerosol types and mixing are quite complex, such as southeast Asia.

These approaches may be usefully applied to upcoming instruments that provide polarization as well as intensity information, such as the Aerosol Polarimetry Sensor (APS) on NASA's Glory satellite, and the Multiangle Spectropolarimetric Imager (MSPI) being built by JPL.