Geophysical Research Abstracts
Vol. 12, EGU2010-1459, 2010
EGU General Assembly 2010

New spectral methods in cloud and aerosol remote sensing applications

K. Sebastian Schmidt (1), Patrick McBride (1), Peter Pilewskie (1), Graham Feingold (2), and Hongli Jiang (2)

(1) University of Colorado, Boulder, Colorado, United States (sebastian.schmidt@lasp.colorado.edu), (2) NOAA Earth System Research Laboratory, Chemical Sciences Division, Boulder, Colorado, United States

We present new remote sensing techniques that rely on spectral observations of clouds and aerosols in the solar wavelength range. As a first example, we show how the effects of heterogeneous clouds, aerosols of changing optical properties, and the surface within one pixel can be distinguished by means of their spectral signatures. This example is based on data from the Gulf of Mexico Atmospheric Composition and Climate Study (GoMACCS, Houston, Texas, 2006), Large Eddy Simulations (LES) of polluted boundary layer clouds, and 3-dimensional radiative transfer calculations. In a second example, we show that the uncertainty of cloud retrievals can be improved considerably by exploiting the spectral information around liquid water absorption features in the near-infrared wavelength range. This is illustrated with spectral transmittance data from the NOAA International Chemistry Experiment in the Arctic LOwer Troposphere (ICEALOT, 2008). In contrast to reflected radiance, transmitted radiance is only weakly sensitive to cloud effective drop radius, and only cloud optical thickness can be obtained from the standard dual-channel technique. We show that effective radius and liquid water path can also be retrieved with the new spectral approach, and validate our results with microwave liquid water path measurements.