Geophysical Research Abstracts,
Vol. 11, EGU2009-9767, 2009
EGU General Assembly 2009

Quantification of broken and inhomogeneous cloud impact on satellite cloud-phase retrievals

E.L.A. Wolters (1), H.M. Deneke (1,2), B.J.J.M. van den Hurk (1,3), J.F. Meirink (1), and R.A. Roebeling (1)

(1) Royal Netherlands Meteorological Institute, Climate Research and Seismology Department, De Bilt, Netherlands (wolterse@knmi.nl), (2) Meteorological Institute University of Bonn, Bonn, Germany , (3) Institute for Marine and Atmospheric Research Utrecht, Utrecht University, Utrecht, Netherlands

One of the basic variables necessary for the development of accurate climate model cloud parameterizations is the global distribution of cloud thermodynamic phase, i.e., whether clouds are composed of either ice or water particles or a combination of both. Within EUMETSAT's Climate Monitoring Satellite Application Facility (CM-SAF), a technique was developed to discriminate water from ice clouds, using visible (0.6 μm), near-infrared (1.6 μm), and thermal infrared (10.8 μm) spectral channel radiances.

This presentation addresses the question to what extent broken cloudiness and cloud horizonal inhomogeneity influence satellite cloud-phase retrievals at different spatial resolutions and for two climate regions (subtropical ocean and mid-latitude land) when using the operational cloud-phase retrieval technique of the CM-SAF. This technique is applied to measured radiances from the Moderate-Resolution Imaging Spectroradiometer (MODIS) onboard NASA's Earth Observing System (EOS) *Terra* and *Aqua* satellites. The cloud-phase retrievals are made for 1x1 km and 3x3 km^2 nominal resolution, the latter simulating those for the Spinning Enhanced Visible and Infrared Radiometer Instrument (SEVIRI) onboard the Meteosat-8 and -9 satellites.

The research is broken up into two components. First, the impact of broken cloudiness and cloud inhomogeneity on the cloud-phase retrieval is scrutinized using synthetic datasets. Second, for May and August of 2007 1x1- and 3x3-km^2 retrievals from Terra and Aqua radiances are compared with these synthetic retrievals and the effect on cloud-phase determination is quantified for the two aforementioned areas.

The MODIS observations reveal that for broken clouds over Central Europe the retrieved water cloud occurrence frequency is up to 21% higher at low resolution than at high resolution. Over the Atlantic Ocean, the difference is up to 12%. For overcast inhomogeneous clouds, over both areas gradually less water clouds are retrieved at low resolution and increasing cloud inhomogeneity, although the changes are generally within 5%.