IRS2012-468
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Diagnosis and improvement of cloud simulations in the NCEP/GFS using A-Train satellite and ARM ground-based remote sensing data

Z. Li (1), H. Yoo (1), Y.-T, and Hou (2)

(1) University of Maryland, ESSIC, Atmos. & Oceanic Sci., United States (zli@atmos.umd.edu), (2) NCEP/NOAA, Camp Spring, MD, USA

Cloud properties and their vertical structure are important for meteorological studies due to their impact on both the Earth's radiation budget and adiabatic heating. Furthermore, persistent marine stratus clouds over the eastern tropical oceans have not yet been resolved well in most climate and weather forecast models. The objectives of this study are to diagnose the performance of National Centers for Environmental Prediction (NCEP) Global Forecast System (GFS) model in simulating cloud properties and to identify possible causes for the discrepancies in cloud fields using a suite of A-Train satellite sensors (CloudSat, MODIS, AMSR-E) and ARM ground-based measurements. We first compare cloud amounts in three atmospheric layers: low, mid and high using satellite retrievals from CloudSat, MODIS (two retrieval methods applied), followed by comparisons of other cloud variables such as cloud particle size, liquid and ice water amount, cloud heights from both space-borne and ground-based sensors. Discrepancies between model simulations and observations are investigated by resorting to atmospheric profiles of temperature and humidity from AIRS and extensive meteorological data from ARM. Cloud overlapping schemes are also evaluated using satellite and ground-based observations. Based on the findings, we modified a parameterization scheme for computing cloud amounts. Significant improvements are made with the modified scheme.