Plinius Conference Abstracts,
Vol. 11, Plinius11-147, 2009
11th Plinius Conference on Mediterranean Storms

Understanding Discrepancies between Simulated and Measured Upwelling Microwave Brightness Temperatures: A Sensitivity Study on the Impact of Cloud Ice Microphysical and Scattering Parameterizations

D. Casella (1), T. Hashino (2), A. Mugnai (1), P. Sanò (1), E.A. Smith (3), and G.J. Tripoli (2)

(1) Istituto di Scienze dell'Atmosfera e del Clima (ISAC), Consiglio Nazionale delle Ricerche (CNR), Roma, Italy (daniele.casella@artov.isac.cnr.it, +39-06-49934337), (2) Department of Atmospheric and Oceanic Sciences, University of Wisconsin, Madison, WI 53706, USA, (3) NASA/Goddard Space Flight Center, Laboratory for Atmospheres, Greenbelt, MD 20771, USA

Most physically-based Bayesian algorithms for precipitation retrieval from satellite-borne microwave (MW) radiometers use cloud-radiation databases (CRD's) that are composed of numerous detailed microphysical cloud profiles obtained from cloud resolving model (CRM) simulations, coupled with the simulated upwelling brightness temperatures (TB's) at several MW frequencies. These TB's are computed by applying radiative transfer (RT) schemes to the CRM profiles for the same frequencies and polarizations of the satellite MW radiometer measurements in use. Then, the ensemble of simulations is compared with the measurements to estimate the precipitation rate. A good agreement between simulations and measurements is obviously needed. Nevertheless, depending on frequency, there are several sources of discrepancy between simulated and measured TB's.
Here, we show the results of a sensitivity study on the impact of several different parameterizations that are used to compute the radiative properties of ice particles, as well as on the CRM skill in providing realistic descriptions of the microphysical structures of precipitating clouds. To this end, we use 2D-simulations of a case study of the KWAJEX campaign (that took place from 23 July to 14 September 1999), that were performed by the University of Wisconsin – Nonhydrostatic Modeling System (UW-NMS) using both a bulk microphysics scheme, as well as a new microphysical scheme called Advanced Microphysical Prediction System (AMPS) that explicitly predicts ice particle properties (such as size, particle density, and crystal habits).