Plinius Conference Abstracts
Vol. 12, Plinius12-29
12th Plinius Conference on Mediterranean Storms
Corfu Island Greece, September 2010

On the use of different cloud resolving models to generate cloud-radiation databases for passive-microwave precipitation retrieval from space

I. Schipa (1), D. Casella (1), M. Formenton (1), M.M. Miglietta (1), A. Mugnai (1), P. Sanò (1), E.A. Smith (2), and G.J. Tripoli (3)

(1) Istituto di Scienze dell'Atmosfera e del Clima (ISAC), Consiglio Nazionale delle Ricerche (CNR), Lecce-Padova-Roma, Italy, (2) The Center for Research on the Changing Earth System (CRCES), Clarksville, Maryland, USA, (3) Department of Atmospheric and Oceanic Sciences, University of Wisconsin, Madison, Wisconsin, USA

Mesoscale cloud resolving models (CRMs) are often used to generate descriptions of the microphysical properties of precipitating clouds for the purpose of guiding precipitation retrieval algorithms designed for satellite-borne passive microwave radiometers. However, CRMs were not originally designed for that purpose. Notably, individual CRMs have adopted different bulk microphysical schemes to optimize the dynamical evolution of storms and accumulated rainfall, rather than optimizing for simulations of radiative properties – which are greatly affected by the microphysical details and vertical distributions of liquid and frozen hydrometeors. Thus, in principle, the simulated upwelling passive microwave (PMW) brightness temperatures (TBs) and associated precipitation retrievals generated by means of different CRMs with different microphysical parameterizations may be significantly different – even when the different CRMs prognostically adhere to the main dynamical and precipitation characteristics of the simulated storms.

We investigate this issue for two different mesoscale models – the University of Wisconsin Nonhydrostatic Modeling System (NMS) and the Weather Research and Forecasting (WRF) model which has been developed within a collaborative partnership among several research and operational U.S. institutions. Specifically, these two models have been used to simulate several heavy storms that occurred over Italy, and then the model outputs have been used to calculate the upwelling PMW TBs – and thus to generate the corresponding cloud-radiation databases (CRDs) that can be utilized for retrieving precipitation in conjunction with observations from satellite-borne microwave radiometers.

Here, we intercompare the NMS- and WRF-generated CRDs in order to provide an indication of the expected uncertainties in CRM-based precipitation retrievals due to differing microphysical parameterizations.