# Utilize polarimetric radar to assess the performance of WRF-SBM Simulations of Deep Convective Systems

*Wei-Kuo Tao[1], Takamichi Iguchi[1], Toshihisa Matsui[1]

1. NASA Goddard Space Flight Center

We developed a framework of dynamical downscaling of aerosol variables from the NASA Modern Era Retrospective analysis for Research and Applications Aerosol Reanalysis (MERRA Aerosol) into cloud condensation nuclei (CCN) input of the Weather Research and Forecasting Model coupled with spectral bin microphysics (WRF–SBM). The performance of the downscaling framework as well as the applied WRF-SBM model was tested in cloud-resolving simulations of maritime and continental conditions observed in Tropical Warm Pool-International Cloud Experiment (TWP-ICE) and Midlatitude Continental Convective Clouds Experiment (MC3E) field measurement campaigns. Deep convective storms on January 23, 2006 for TWP-ICE and May 23, 2011 for MC3E were simulated specifically in this study. Roughly, calculated representative CCN number concentrations (at 1 % super saturation for liquid water) at the surface were 100 $cm^{-3}$for the TWP-ICE case and 1500 $cm^{-3}$for the MC3E case. The surface concentration and the calculated aerosol vertical profile for the MC3E case were in broadly agreement with those observed at the Atmospheric Radiation Measurement Program Southern Great Plains (ARM-SGP) ground site and airborne condensation particle counter (CPC) measurements.

The WRF-SBM simulation results of the deep convective systems are evaluated by comparison with ground-based radar measurements, particularly polarimetric radar components calculated using a synthetic polarimetric radar simulator. Sensitivity experiments simply interchanging the maritime and continental CCN loadings are conducted and the results are presented/discussed too.

Keywords: WRF Simulations, polarimetric radar , Spectral bin microphysics