Use NU-WRF and GCE Model to Simulate the Precipitation Processes during MC3E Campaign

Wei-Kuo Tao, Di Wu, Toshi Matsui, Xiaowen Li, Xiping Zeng, Christa Peters-Lidard,

and Arthur Hou,

One of major CRM approaches to studying precipitation processes is sometimes referred to as *"cloud ensemble modeling"* (Soong and Tao 1980; Tao and Soong 1986; Krueger 1988; Moncrieff *et al.* 1997; and many others). This approach allows many clouds of various sizes and stages of their lifecycles to be present at any given simulation time. Large-scale effects derived from observations are imposed into CRMs as forcing, and cyclic lateral boundaries are used. The advantage of this approach is that model results in terms of rainfall and Q_1 and Q_2 usually are in good agreement with observations (Tao 2003; Randall *et al.* 2003; and many others). In addition, the model results provide cloud statistics that represent different types of clouds/cloud systems during their lifetime (life cycle). The large-scale forcing derived from MC^3E^1 will be used to drive GCE model simulations. The model-simulated results will be compared with observations from MC^3E. These GCE model-simulated datasets are especially valuable for LH algorithm developers (please see the previous work by Tao *et al.* 2006; Shige *et al.* 2004, 2007, 2009; and Grecu and Olson 2006).

In addition, the regional scale model with very high- resolution, NASA Unified WRF is also used to real time forecast during the MC3E campaign to ensure that the precipitation and other meteorological forecasts are available to the flight planning team and to interpret the forecast results in terms of proposed flight scenarios. Post Mission simulations are conducted to examine the sensitivity of initial and lateral boundary conditions to cloud and precipitation processes and rainfall. We will compare model results in terms of precipitation and surface rainfall using GCE model and NU-WRF.

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[1] The PI is a member of the ARM Science team and will have access to data collected in different ARM field campaigns [i.e., the Tropical Western Pacific (TWP) and TWP-ICE (Tropical Warm Pool - International Cloud Experiment] for model forcing and validation.