

## **6. Testing and evaluation of physical parameterization innovations for NOAA's Next-Generation Global Prediction System**

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The National Oceanic and Atmospheric Administration (NOAA) is developing a Next-Generation Global Prediction System (NGGPS) with the goal of supporting the National Centers for Environmental Prediction (NCEP) in producing operational forecast guidance for various scales (from weather prediction to seasonal) involving modeling components (atmosphere, chemistry/aerosols, land, ocean, waves, sea ice, and space weather) that exchange information through the NOAA Environmental Modeling System (NEMS) mediator (often called the coupler). NGGPS development is expected to be a distributed effort, in which testing of physical parameterizations contributed by the general community is facilitated through a Global Model Test Bed (GMTB) within the Developmental Testbed Center (DTC).

GMTB has established a hierarchical testing framework for evaluating innovations in atmospheric physics. This framework contains a variety of tools, ranging from a single-column model for controlled experimentation, to an automated workflow for running, postprocessing, and evaluating physics for global models. The DTC's Model Evaluation Tools (MET) software, is used to compare the experimental forecasts against a variety of observations as well as against precipitation analyses derived from a variety of sources, such as satellite data (microwave and infrared bands), radar reflectivity, and rain gauges. The use of this state-of-the-art forecast verification system allows NOAA to use an evidence-driven approach towards decision-making and end-to-end modeling system development, a step toward meeting the recommendation of the University Corporation for Atmospheric Research (UCAR) Community Advisory Committee for NCEP (UCACN).

This system was used to assess an advanced cumulus parameterization option for the NCEP Global Forecast System, the Grell-Freitas scale-aware scheme. In this presentation, we will discuss the test plan (created jointly by GMTB, the physics developer, the NGGPS Program Office, and the NOAA Environmental Modeling Center), along with comprehensive results and impact of the test. Additionally, we will present the outcome of the November 2016 GMTB-sponsored NGGPS Physics Workshop, along with recommendations to foster community involvement in the development and testing of advanced physics for future operational implementations of the Global Forecast System at NCEP.