Community support and Testing of Advanced Physics with Hurricane WRF model

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The Hurricane Weather Research and Forecasting (HWRF) model is a fully coupled atmosphere-ocean model run operationally for all global basins. Innovations are contributed by the NOAA NCEP Environmental Modeling Center (EMC), by other NOAA research laboratories (such as the Atlantic Oceanographic and Meteorological Laboratory and the Geophysical Fluid Dynamics Laboratory), and by scientists from universities and other academic institutions. HWRF is a complex multicomponent system, consisting of the Weather Research and Forecasting (WRF) atmospheric model coupled to the Princeton Ocean Model for Tropical Cyclones (POM-TC), a sophisticated initialization package including a data assimilation system and a set of postprocessing and vortex tracking tools.

The HWRF model has a large worldwide community of registered users (1200 users in over 100 countries). The inputs from users are critical for model development. The presentation will highlight how the Developmental Testbed Center (DTC) facilitates the use of HWRF by the community. The HWRF model is upgraded every year keeping in pace with the recent research and innovations.

In recent years, the hurricane community has invested a substantial amount of effort to investigate and improve the representation of physical processes in the HWRF model. The Developmental Testbed Center (DTC) has partnered with the NOAA/NCEP Environmental Modeling Center (EMC) Hurricane Team and physics developers to evaluate HWRF physical parameterizations directed at improving HWRF forecast skill.

For this evaluation, retrospective HWRF forecasts for several storms in the Atlantic and Eastern Pacific basins will be produced using variations of the 2016 operational configuration; results compared against the operational baseline. Specifically, we will discuss results related to recommended enhancements from developers to partial cloudiness, cumulus, and radiation parameterizations. Assessment will be done through a combination of physical process diagnostics as well as traditional track and intensity verification, including statistical significance. Additionally, verification of large-scale fields and storm scale evaluation will be explored to further investigate sensitivities to physical parameterizations in HWRF.