Advances and Challenges in Tropical Cyclone Structure and Intensity Predictions

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In the mid-1980s, the Hurricane Dynamics Group at GFDL began a 10-yr effort to transform their research hurricane model into an operational hurricane forecasting tool for the National Weather Services. In 2017 GFDL model is part of NOAA's legacy for Tropical Cyclone (TC) Predictions, filled with innovative research that transitioned to operations. Key to the success of that effort were the moving nest for providing higher resolution, improved initial representation of the hurricane inner core, Kurihara's convection scheme and an improved representation of the evolving ocean in the coupled system. The next-generation HWRF system inherited some of the fundamental scientific developments from GFDL and became the second regional operational modeling system for TC predictions in 2007. During the past 5 years, with support from NOAA's Hurricane Forecast Improvement Project, significant progress has been made in structure and intensity forecasts with NOAA HWRF system (HFIP; Gopalakrishnan et al., 2016). This talk will provide a brief history of regional hurricane models, GFDL and the evolutionary HWRF system. We will provide a report on advancements especially related to structure predictions with the high-resolution HWRF system and its evolution into a unique regional-to-vortex scale and eventually Global-to-vortex scale Tropical Cyclone prediction system. Due credits to the GFDL team for sowing the early seeds for Tropical Cyclone research in NOAA!

Gopalakrishnan, S, and co-authors, 2016: 2015 HFIP R&D Activities Summary: Recent Results and Operational Implementation
(http://www.hfip.org/documents/HFIP_AnnualReport_FY2015.pdf)