

6a.1 Evaluation of quantitative precipitation forecasts by the Hurricane Weather Research and Forecast (HWRF) model

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Tropical cyclones (TCs) pose a substantial threat to human lives and property. Hurricanes, and even weak tropical storms, can produce copious amount of rainfall and cause extensive inland flooding, a leading cause of death associated with tropical cyclones, surpassed only by storm surge (Rappaport 2014).

The Hurricane Weather Research and Forecasting (HWRF) model is a state-of-the-art operational NWP suite targeted for tropical cyclones. HWRF forecasts are primarily used by the NOAA National Hurricane Center and the Joint Typhoon and Warning Center as guidance for forecasting TC track, intensity, and structure. While the HWRF Quantitative Precipitation Forecast (QPF) could be useful as additional guidance for disaster management and planning, it is not systematically employed today by the National Weather Service National Centers and Weather Forecast Offices. One of the reasons for this omission is that rigorous verification of the HWRF QPF has not been performed.

In this presentation we will show extensive evaluation of the HWRF QPF against CMORPH and Stage IV analyses, along with a comparison of HWRF's skill against the Global Forecast System (GFS). In addition to assessing the quality of HWRF QPF for potential use in operations, this evaluation aims at providing input to the developers for possible model improvement.

One of the challenges of forecasting rainfall associated with TCs is that a relatively small error in track can lead to a vastly different QPF field. Therefore, when verifying QPF by tropical cyclone models, it is valuable to single out the contribution to QPF error from the incorrect forecast of storm location. This study uses a methodology similar to the one pioneered by Marchok et al. (2007), which involves shifting the QPF field based on track error.

Initial results indicate that both HWRF and GFS overforecast precipitation but HWRF has a higher bias. Additionally, both the HWRF and GFS QPF are affected by track error, with the GFS generally having higher equitable threat scores.