Determine the Relationship of Lightning with Intensity Forecast of Tropical Cyclones Using the HWRF Model

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The National Oceanic and Atmospheric Administration (NOAA) created the Hurricane Forecast Improvement Project (HFIP) in 2010 with the ten-year goal of improving tropical cyclone intensity and track forecasts by 50% for days one through five. Part of this goal is to improve forecasts of the tropical cyclone intensification. In order to contribute to this goal, I investigated the role of lightning during the life cycle of a tropical cyclone using the Hurricane Weather Research and Forecast (HWRF) 2015 operational model. In this study, I tested a scheme that I implemented into the HWRF operational model under the NOAA EPP GRTSP award in 2015. A 126 hours cycle simulation of Atlantic hurricane Earl 2010, Atlantic tropical storm Fiona 2010, was conducted to evaluate the evolution of the spatial distribution of lightning location and density. HWRF model output with lightning parameterization model was analyzed and compared observations. The observations were retrieved from The National Hurricane Center (NHC) and the lightning data was acquired from the World Wide Lightning Location Network (WWLLN). Preliminary results from these experiments shown that the relationship between lightning and intensity changes exist. Furthermore results shown that a peak in lighting occurred hours before intensity peak.