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# The Warm Core Structure of Hurricane Earl (2010): Observations and Simulations

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In a series of recent studies, we have examined the warm core structure of tropical cyclones in the context of idealized numerical simulations. In those studies, we found that the maximum in perturbation temperature was consistently at mid-levels (4-8 km height), in contrast to the conventional wisdom that the warm core is a maximum at upper-levels. We argued that due to the scarcity of observations, the "true" characteristic warm core structure of tropical cyclones remains unknown. In this study, we aim to further our understanding of the thermal structure of the eye, using a combination of observations and numerical simulations for Hurricane Earl (2010).

We use dropsondes released at 11-12 km height by the NASA DC-8 aircraft into the inner-core of Hurricane Earl to determine the temperature profile in and near the eye. In order to calculate the perturbation temperature, we composite NOAA-GIV sondes that were dropped in the environment (> 200 km from the storm center) of Earl, and subtract this environmental profile from the inner-core sondes. As Earl was sampled by the DC-8 on four different days, we are able to characterize the warm core structure during different parts of the TC lifecycle.

We further investigate the warm core structure of Hurricane Earl with 3-km WRF simulations produced using the 2013 version of the PSU EnKF system. Both the inner-core and environmental temperature structures are compared between the analyses/forecasts and the dropsonde observations.