

Inner Core Structure of Hurricane Patricia Observed During TCI-2015

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Hurricane Patricia (2015) rapidly intensified from a tropical storm to an estimated 185 kt intensity in 36 hours, making it the strongest tropical cyclone in the Western Hemisphere on record. Four high-altitude research flights with the NASA WB-57 aircraft were conducted into Patricia as part of the Office of Naval Research (ONR) sponsored Tropical Cyclone Intensity (TCI) field experiment from 20 to 23 October. The WB-57 was equipped with a new high-density sounding system (HDSS), enabling full-tropospheric profiling of temperature, humidity, and winds throughout Patricia's inner and outer core. A total of 257 dropsondes were released from the HDSS over the four day intensive observing period, spanning the development from a tropical depression to category 5 intensity. Doppler radar and dropsonde observations were obtained by the NOAA WP-3D aircraft reconnaissance from 21 to 23 October, allowing for complementary observations of the precipitation and kinematic structure during the rapid intensification period. Integrated kinematic and thermodynamic analyses of the full-tropospheric structure derived from dropsonde, radar, in situ, and satellite observations using a variational spline-based mesoscale analysis technique will be presented. The high-resolution observational analyses allow for calculation of axisymmetric potential vorticity (PV) during the extreme rapid intensification period. These new calculations reveal a compact inner core with an intensifying PV tower that breaks down just prior to landfall. The dynamics of Patricia's rapid intensification and weakening inferred from the observations will be discussed.

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