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Retrieved thermodynamic structure of Hurricane Rita (2005) from airborne multi–Doppler radar data

Abstract

The newly developed Spline Analysis at Mesoscale Utilizing Radar and Aircraft Instrumentation–Thermodynamic Retrieval (SAMURAI-TR) is used to estimate three-dimensional temperature and pressure perturbations in Hurricane Rita on 23 September 2005 from multi–Doppler radar data during the RAINEX experiment. These are believed to be the first fully three-dimensional gridded thermodynamic observations from a TC. Analysis of the contributions of the kinematic and retrieved thermodynamic fields to different azimuthal wavenumbers suggests the interpretation of eyewall convective forcing within a three-level framework of balanced, quasi-balanced, and unbalanced motions. The observed wavenumber-1 thermodynamic asymmetries verified results of previous studies on the response of a vortex tilted by shear, and the vertical motion is nearly hydrostatic on the wavenumber-1 scale. Higher-order wavenumbers were associated with unbalanced motions and convective cells within the eyewall.

Keyword

Thermodynamic retrieval

Reference

Boehm, A. M., and M. M. Bell, 2021: Retrieved Thermodynamic Structure of Hurricane Rita (2005) from Airborne Multi–Doppler Radar Data. *J. Atmos. Sci.*, **78**, 1583–1605. https://doi.org/10.1175/JAS-D-20-0195.1