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Vertical Vortex Development in Hurricane Michael (2018) during Rapid Intensification

Abstract

The landfall of Hurricane Michael (2018) at category-5 intensity occurred after rapid intensification (RI) spanning much of the storm's lifetime. Four missions observed the RI period with tail Doppler radar (TDR). TDR data from each aircraft's pass were using the Spline Analysis at Mesoscale Utilizing Radar and Aircraft Instrumentation (SAMURAI) variational wind retrieval technique and SAMURAI-TR that retrieved thermodynamics to yield three dimensional kinematic and thermodynamic fields of the storm during RI. Vorticity and angular momentum increased and concentrated in the eyewall region. A vorticity budget analysis indicates that the tendencies became more axisymmetric over time. In this study, they focus on how the eyewall vorticity tower builds vertically into the upper levels. Horizontal vorticity associated with the vertical gradient of tangential wind was tilted into the vertical by the eyewall updraft to yield a positive vertical vorticity tendency to the vorticity tower. Observed maintenance of thermal wind balance from a thermodynamic retrieval shows evidence of a strengthening warm core and further contributed to the efficient intensification in this RI event.

Keyword

Rapid intensification (RI)

Reference

DesRosiers, A. J., Bell, M. M., & Cha, T. Y. (2022). Vertical vortex development in Hurricane Michael (2018) during rapid intensification. *Monthly Weather Review*, **150**(1), 99-114, https://doi.org/10.1175/MWR-D-21-0098.1