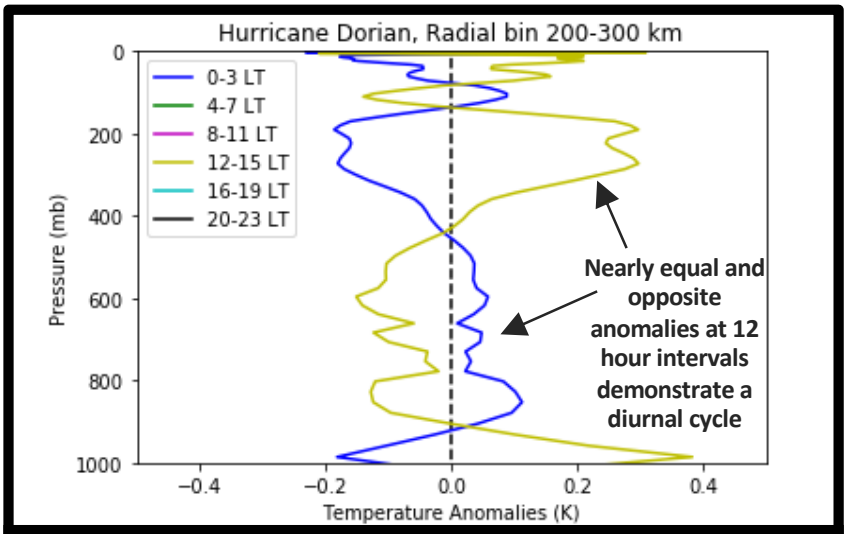
Tropical Cyclone Radial Anomalies

Quick Guide

Why are Tropical Cyclone Radial Anomalies Important?

Tropical cyclone radial anomalies show differences in thermodynamic fields in both the near-storm and the surrounding environment. Plan view imagery of radial anomalies demonstrate gradients in temperature and moisture, capturing important features such as dry air intrusions. Vertical anomaly profiles demonstrate patterns such as the tropical cyclone diurnal cycle (e.g., Dunion et al. 2014). Anomalies are calculated in a storm-relative framework, using a daily mean sounding to create azimuthal averages within 100km radial bins.



Composite temperature anomaly profiles in Hurricane Dorian using S-NPP and NOAA-20 CrIS/ATMS NUCAPS, valid from 0-3 and 12-15 local time (LT)

How are Tropical Cyclone Radial Anomalies Created?

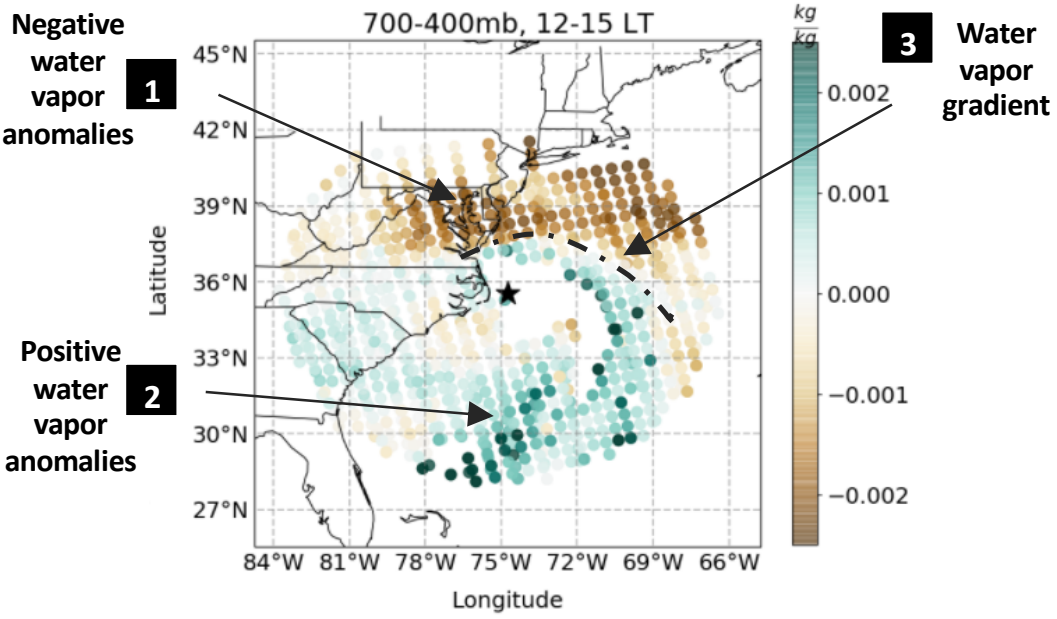
The NOAA Unique Combined Atmospheric Processing System (NUCAPS) is the algorithm used to process temperature and moisture soundings from hyperspectral infrared and microwave sounders such as CrIS and ATMS onboard S-NPP and NOAA-20 and IASI and AMSU onboard MetOp A and B. For each overpass, soundings are sorted into 100 km wide radial bins centered on the TC, extending to 800 km from the TC center. A daily mean sounding is calculated for each radial bin using available soundings in that bin for a given day. This daily mean profile is subtracted from each sounding within each radial bin to yield a temperature or moisture anomaly. Anomalies are then converted to local time (LT), and composited every 4 hours (e.g., 0-3 LT, 4-7 LT, etc.).

Tropical Cyclone Radial Anomalies Interpretation Example: Water Vapor

1 **Negative anomalies** in water vapor concentrations can help identify areas of relatively drier air

2 **Positive anomalies** can indicate areas of moistening, or show areas potentially conducive for further convective development.

3 **Gradients** in values can help identify boundaries or intrusions of dry/moist air



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