

ATS/CIRA Colloquium

Michael Bell

CSU ATS M.S. 2006

Visiting ATS from the Department of Atmospheric Sciences, University of Hawaii at Mānoa

Hosted by Sue van den Heever

**Observations of Tropical Cyclone Eyewall
Convective Structure and Forcing**

Friday, September 19, 2014

**ATS room 101; Discussion will begin at 11:15am
Refreshments will be served at 10:45am in the weather lab**

Tropical cyclone (TC) eyewall convection plays a critical role in intensity change. Recent studies have suggested that the radial location of eyewall convection relative to the radius of maximum wind is an important component of intensification efficiency. However, our understanding of the physical processes that determine the location and strength of eyewall convection is still incomplete. Axisymmetric conceptual and numerical models of the eyewall are characterized by moist neutral ascent forced by boundary layer convergence. In contrast, three-dimensional models suggest that a significant fraction of eyewall convective elements may contain positive buoyancy, and that asymmetric forcing by vertical shearing flow and mesoscale vorticity anomalies may play an important role. This talk will present an analysis of the structure and forcing of eyewall convection observed during Hurricane Rita (2005) from the RAINEX/IFEX field campaign and Typhoon Sinlaku (2008) from the TPARC/TCS08 campaign. A splinebased variational analysis is conducted to combine Doppler radar with aircraft and dropsonde observations. Improved retrievals of high-resolution winds and pressure gradients in the TC boundary layer are used to assess low-level forcing, and a novel thermodynamic retrieval is used to assess buoyancy and pressure perturbations in the free troposphere. These new mesoscale analysis techniques suggest that buoyancy, low-level supergradient winds, and vortex asymmetries all contribute to eyewall convective forcing, but the relative importance of different mechanisms evolves throughout the TC life-cycle due to the changing dynamic and thermodynamic environment.

Link to colloquium videos and announcement page: <http://www.atmos.colostate.edu/dept/colloquia.php>