

HyARC Seminar (HyARC Seminar#169)

Date: March 28 (Friday) 15:00-

Room: The meeting space (#617) of Research Institutes Building.

Speaker: Dr. Wen-Chau Lee (National Center for Atmospheric Research, USA)

Title: A Squall-Line-Like Principal Rainband in Typhoon Hagupit (2008)
Observed by Airborne Doppler Radar

Abstract:

This study examines the structure and dynamics of Typhoon Hagupit's (2008) principal rainband using airborne radar (ELDORA) and dropsonde observations during The Observing System Research and Predictability Experiment (THORPEX) Pacific Asian Regional Campaign (T-PARC). The convection in Hagupit's principal rainband was organized into a well-defined line with trailing stratiform precipitation on the inner side. Individual convective cells had intense updrafts and downdrafts, and were aligned in a wave-like pattern along the line.

The line-averaged vertical cross section possessed a slightly inward tilting convective core and two branches of low-level inflow feeding the convection. The result of a thermodynamic retrieval showed a pronounced cold pool behind the convective line. The horizontal and vertical structures of this principal rainband show characteristics that are different than the existing conceptual model, and are more similar to squall lines and outer rainbands.

The unique convective structure of Hagupit's principal rainband was associated with veering low-level vertical wind shear and large convective instability in the environment. A quantitative assessment of the cold pool strength showed that it was quasi-balanced with that of the low-level vertical wind shear. The balanced state and the structural characteristics of convection in Hagupit's principal rainband were dynamically consistent with the theory of cold pool dynamics widely applied to strong and long-lived squall lines. The analyses suggest that cold pool dynamics played a role in determining the principal rainband structure in addition to storm-scale vortex dynamics.

(given in English)