High-Resolution Vertical Structure of Chantal and Interactions with Environmental Shear

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Objectives

• Document intense convective burst in Chantal
  – What sustains it?
  – What is its role in storm intensification?
  – Why supercell-like characteristics?

• Utilize high-resolution a/c measurements (EDOP…) into larger scale context provided by dropsondes, flight level and satellite.

Data Sets

• ER-2: EDOP, MAS, Flt. Lev
• DC-8: PR-2 (14 GHz), MMS, JLH, dropsondes
• P3: Flt. Level, dropsondes, radar
• Satellite: GOES, TRMM
Low pressure “meso-low” and precip. located NE of LLC.
Upper-level warm core due to high-$\theta_e$ air lifted from PBL. This warm core is significantly displaced from LLC.
Strong cell(s) forced at rain-cooled easterly flow boundary.
TS Chantal Flight 20 Aug 2001

• Coordinated QPE mission with ER-2, DC-8, & NOAA-42.
• Strong E-NE shear, convection formed downshear left.
• Convective burst episode: ER-2 overflew convective burst and DC-8 penetrated it.
• Dropsondes: DC-8 (7) and P3 (23) focused on eastern half of storm.
• Significant vertical motions at DC-8 altitude.
• TRMM pass at 2034 UTC.
Divergence

• Intense mesoscale outflow associated with convection.

• *Divergent region extends over low-level circulation.*

• Subsidence below western side of divergent outflow in radar and dropsondes.
TS Chantal GOES

20/1145

20/2115

20/1515

21/0048
Convection During Aircraft Flights
20 Aug 2002, 2000 - 2345 UTC

QuickTime™ and a Video decompressor are needed to see this picture.
Dropsonde Near Circulation Center

![Graph showing temperature and pressure data for an AVAPS measurement on 8/20/2001 at 21:25:15 UTC. The graph includes lines of constant pressure and temperature, as well as a profile of height versus potential temperature.]
TS Chantal
SE to NW
Section
Chantal Summary

- Low level circulation in Chantal appears to be decoupled from intense downshear convection.
- *Convective burst during aircraft flights resembles in some respects MCSs with rear inflow.*
- Strong subsidence observed over circulation center (upshear) not favorable for storm development and consistent with Ritchie and Elsberry (2001) results.
- *Future: complete observational study and to provide data for modeling comparison.*