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**Motivation**

- All tornadoes occurred without severe thunderstorm or tornado warnings
- Tornadoes occurred in excess of 65 km to over 100 km from the nearest NEXRAD radar sites; extremely difficult to detect
- Tornadoes occurred 50-75 km from VU radar

### SYNOPTIC AND MESOSCALE BACKGROUND

- Vertically-stacked low located over central Plains
- WAA regime across Illinois and Indiana ahead of 850 hPa low
- Remnant QLCS from devastating 24 May tornado outbreak progressed northeast across Missouri and Illinois during overnight and early morning hours, reaching NE Illinois mid-morning
- QLCS became tornadic across E Illinois and NW Indiana
- 8 total tornadoes were produced, with 6 tornadoes in NE Illinois and NW Indiana
- Four tornadoes were studied, 1 EF0 (Morocco, IN), 2 EF1s (NW of Rensselaer, IN), and 1 EF2 (near Mt. Ayr, IN), with path lengths up to 10 km and path widths up to 275 m

### REFLECTIVITY (Z) OBSERVATIONS

- Reflectivity “notches” occurred along the leading edge of the QLCS
- Notches maintained appearance well after tornado dissipation
- Reflectivity “bulges” occurred behind QLCS
  - Bulges associated with past QLCS tornado events (Barker 2006)

### STORM-RELATIVE VELOCITY (SRV) OBSERVATIONS

- Circulations were detected on storm relative velocity PPI plots
- Strongest circulation with EF1 tornado NW of Rensselaer, IN
- Numerous east-west oriented bands appear on Z, SRV, and ρhv plots, moving from S to N nearly perpendicular to QLCS motion
  - Bands may be associated with ducted gravity waves, with evidence of potential ducting layer on 1200 UTC DTX sounding and favorable location with respect to low (Koch and O’Handley, 1997)

### CROSS-CORRELATION COEFFICIENT (ρHV) OBSERVATIONS

- Minimum in ρHV associated with reflectivity notch of EF2 tornado near Mt. Ayr, IN, on 1423 UTC plot
- Marginally low ρHV values, other noise, and rather significant distance from radar preclude reaching conclusion of the source of the minimum in notch
- Additional coherent minimum in ρHV appears behind QLCS leading edge at 1423 UTC and 1430 UTC
  - Minimum ρHV associated with reflectivity weakness
  - Given no circulation or tornado associated with feature, cause of ρHV minimum is unclear

**Damage survey map for 5 of the tornadoes on 25 May 2011.** Map created on Google Earth, with survey conducted by lead author.