Polarimetric Radar Characteristics of Warm Front-Crossing Storms on 9 April 2015

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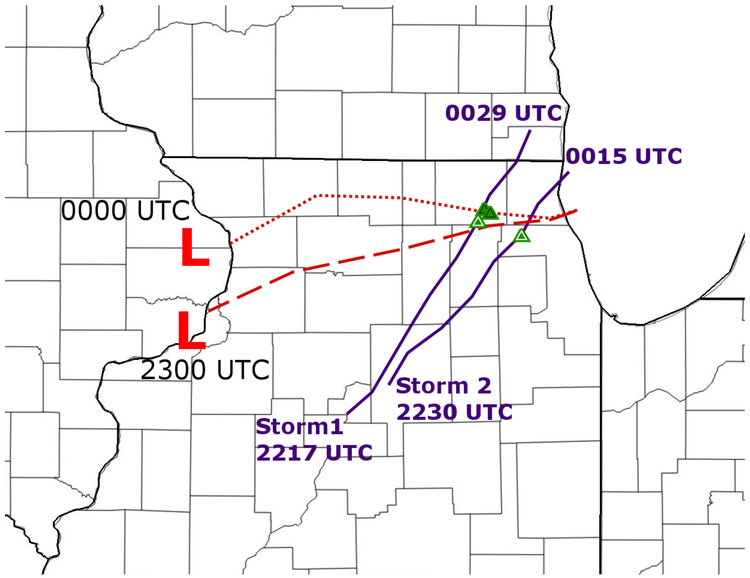
Storm Environment

- Warm front moved north across IL; became quasi-stationary by 1800 UTC
- SBCAPE ~2000 J kg^{-1} in central IL
- 0-6 km shear ~23 m s^{-1} (45 kt) over central IL
- Surface wind southerly south of front; backed to easterly to the north
- Two anticyclonic supercells developed from storm splits just after 2200 UTC



Tracks of two anticyclonically-rotating supercells on 9 April 2015 (purple). Green-and-white triangles are 1-inch hail reports and green-and-black triangles are 0.88-inch hail reports. 2300 UTC frontal position is the red dashed line and 0000 UTC frontal position is the red dotted line. Map courtesy Oklahoma Climatological Survey.

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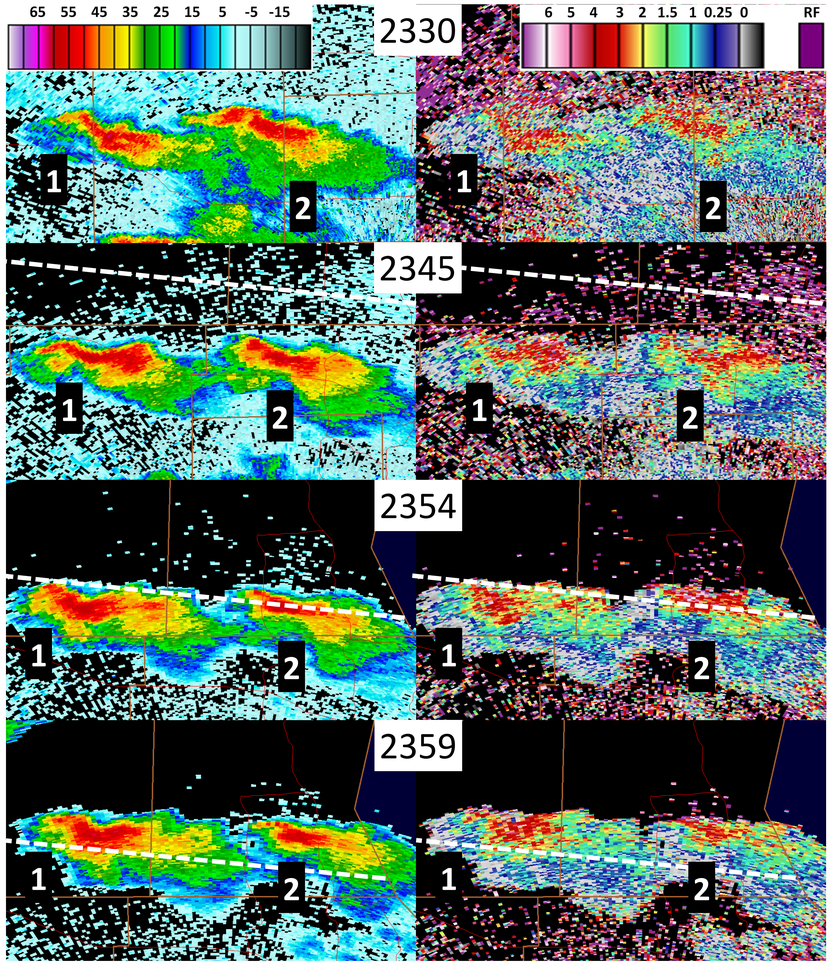
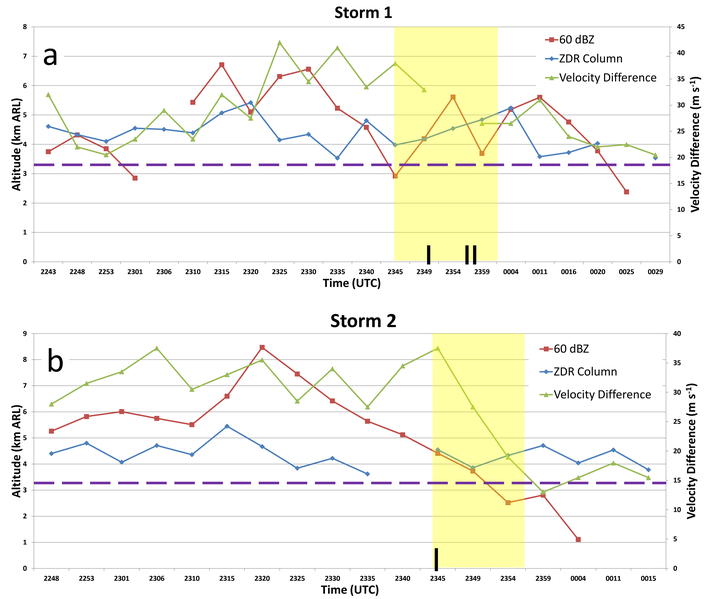
Low-level Z_{HH} and Z_{DR} Arc Evolution



Z_{HH} (left) and Z_{DR} (right) for storms 1 and 2 as they approach and cross the surface frontal boundary. Dashed line approximates location of front.

- Storm 1: Distinct inflow notch develops; Z_{HH} core and Z_{DR} arc broaden
- Storm 2: Z_{DR} arc values increase through 2354 UTC; Z_{HH} core slightly broadens

Updraft Metrics



Maximum height of 60-dBZ Z_{HH} and top of 1-dB Z_{DR} column, with maximum velocity difference for a) storm 1 and b) storm 2. Ambient 0°C height is purple dashed line. Period of boundary interaction highlighted in yellow; hail reports indicated by bold black lines.

Summary

- All hail reports near surface front
- Storm 1 shows signs of re-intensification after crossing boundary
  - Z_{DR} column top and 60-dBZ height increase
  - Velocity difference increases
- Storm 2 collapses just after encountering boundary
- Storm-relative wind responsible for change in low-level Z_{HH}, Z_{DR} structure?