Characteristics of low-reflectivity ribbons in simulated supercells

Brice Coffer

Observations of low-reflectivity ribbons

- A low-reflectivity ribbon (LRR) is a narrow deficit in reflectivity bisecting the forward- and rear-flanks in some supercells.
- LRRs have been identified in seven supercells thus far (Snyder et al. 2012).
- Characteristics of LRRs studied thus far include cyclonically rearward movement, positive vertical vorticity, and an overlying updraft (Kosiba et al. 2013, Snyder et al. 2013, Griffin 2015).

Ensemble of supercells

- Initialized two ensembles (15 members each) based on the nontornadic and tornadic composite VORTEX2 profiles
- CM1, 125 m horizontal grid-spacing, NSSL microphysics
- All fifteen members in the tornadic VORTEX2 ensemble produced intense tornadoes
- Six members in the nontornadic VORTEX2 ensemble were tornadic, although all were weaker than the tornadic ensemble

Characteristics of low-reflectivity ribbons in the VORTEX2 ensembles

- No LRRs were present in the nontornadic VORTEX2 ensemble
- LRRs were seen in eight of the tornadic VORTEX ensemble members
- Presence of LRRs in simulations suggest they are not a radar artifact
- LRRs appeared near the time of tornadogenesis
- LRR were most clearly seen at 500 m but visible to up to 3+ km
- Across all eight cases, the LRR was present within a downdraft
- No consistent vertical vorticity signatures were observed
- Development of LRRs were related to growth of a new precipitation cell (PC) along the forward-flank of the supercell

Contact: becoffer@ncsu.edu