Characteristics of low-reflectivity ribbons in simulated supercells

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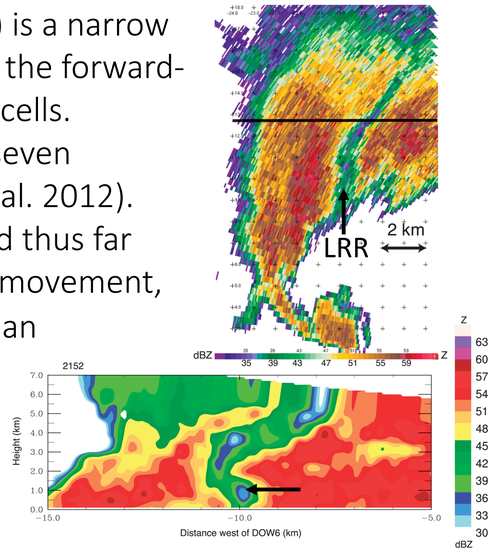
Observations of low-reflectivity ribbons

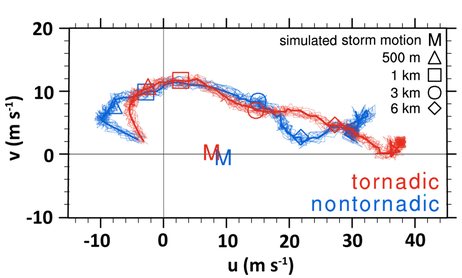
- A low-reflectivity ribbon (LRR) is a narrow deficit in reflectivity bisecting the forward- and rear-flanks in some supercells.
- LRRs have been identified in seven supercells thus far (Snyder et al. 2012).
- Characteristics of LRRs studied thus far include cyclonically rearward movement, positive vertical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

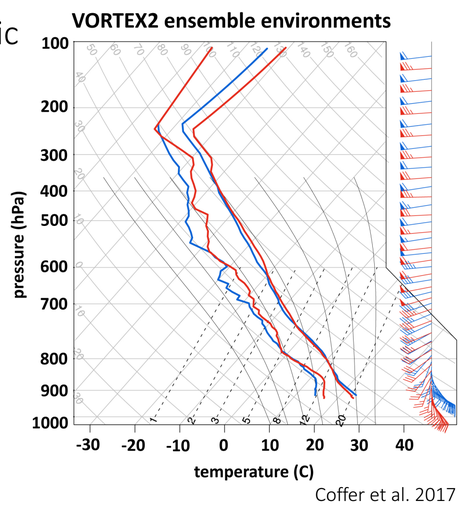


Kosiba et al. 2013

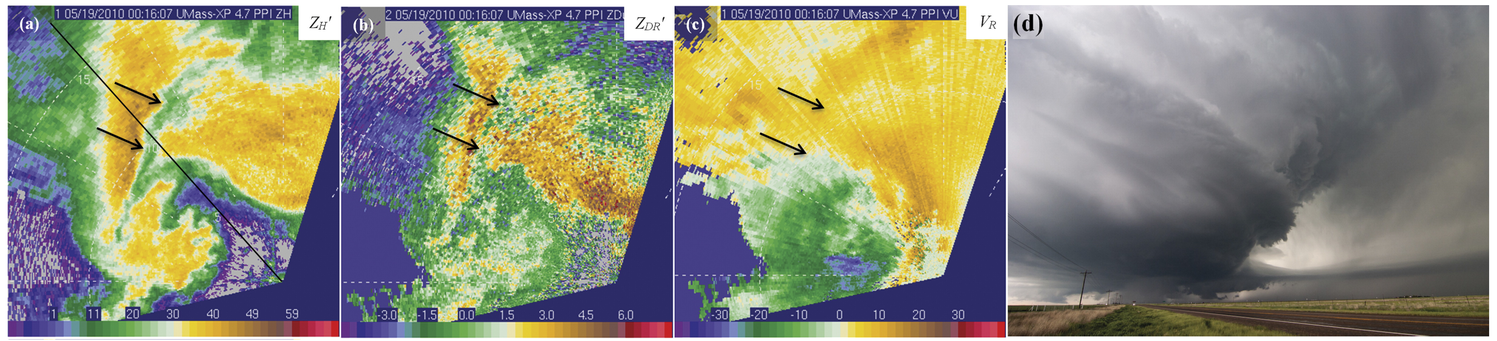
Ensemble of supercells

- 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





Coffer et al. 2017



Snyder et al. 2012

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