VORTEX-SE Background

The Verification of the Origins of Rotation in Tornadoes EXperiment-Southeast (VORTEX-SE) is the first funded experiment that focuses on all processes related to the tornado "problem":

- Improved understanding of severe storms, tornadoes, and their environments, especially those characteristic of the southeastern U.S.
- Understand how NWS forecasters anticipate, detect, and warn for tornadoes
- Understand how the public receives and responds to that information

Primary physical science topics for year 1 included:
- CAPE/shear buildup in the SE environment
- Airmass-recovery evolution
- Land surface impacts
- Boundary layer heterogeneity
- Improving model forecasts of the SE environment

ULM participated in all but the first IOP as one of several mobile rawinsonde teams. Six ULM undergraduate students were afforded the opportunity to participate in the project.

Student Feedback

"Participating in this project allowed for me to gain insight into the planning, preparation, and execution of a large-scale field project. This project solidified my desire to pursue a research career." — Holly Mallinson

"I gained experience working as part of a team and learned a number of new skills. It was an honor to be involved with schools and organizations from across the country." — Alex Melancon

"I gained a better understanding of the rigor of field work and importance in working with others for the good of completing a massive group project." — Stephen Kreller

"One of my favorite parts of the project was getting to know the other participants. I had the opportunity to work with NOAA affiliates, learning more about their positions." — Elysa Murillo

ULM HAWCS: High Altitude Weather Collection with Soundings

Chevy Suburban outfitted with 4 tank helium tank and 2+3 seating, mobile hotspot, GPS

I Met-3150 & I Met-3050A sounding systems, I Met-1 radiosondes with pressure sensor, 403 MHz

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IOP 3: 31 March 2016

Left: SPC Tornado Outlook Verification for IOP 3. An EF2 tornado occurred within the VORTEX-SE domain beginning 0157 UTC 4/1/16. An EF1 and E0 tornado occurred just outside the domain in central TN near 2200 UTC.

Right: ULM balloon launch at 2200 UTC in Lawrenceburg, TN within the inflow of tornadic supercells to the northwest (below sounding on the left).

Above: ULM sounding series near the end of IOP 3. CAPE was slow to build during the afternoon, but increased to near 160 J kg⁻¹ by 00 UTC. Shear was in place for much of the IOP, however, it increased substantially near and after sunset. This appears to be related to the afternoon-to-evening transition (AET) period and subsequent development of A = 50 kJ/m² near 1.0 km AGL.

Below: Reflectivity from KHTX valid at the time of each above sounding. Launch locations noted by the star.

IOP 4c: 30 April 2016

Time (UTC) | Location | MLCAPE (CIN) | 0-1 km SRH (m² s⁻¹) | 0-3 km SRH (m² s⁻¹) | 4-km Shear (kt)
---|---|---|---|---|---
1640 | Double Springs, AL | 308 (154) | 123 | 88 | 38
1800 | Double Springs, AL | 738 (242) | 108 | 104 | 48
2000 | Double Springs, AL | 841 (250) | 96 | 104 | 47
2100 | Double Springs, AL | 311 (18) | 58 | 106 | 45
2140 | Jenkins, AL | 1425 (10) | 83 | 113 | 58
2220 | Jenkins, AL | 3971 (10) | 135 | 159 | 51

ML soundings indicate rapid destabilization and shear profiles that generally support rotating updrafts. However, low-level shear was far too low for sustained low-level mesocyclones and tornado genesis.