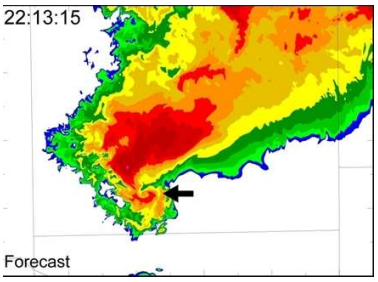
Center for Analysis and Prediction of Storms

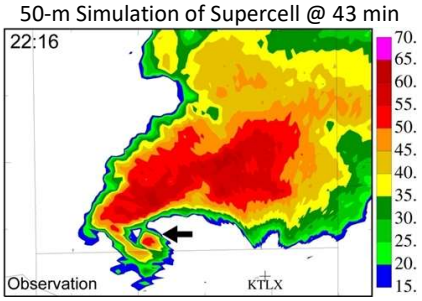
University of Oklahoma

Overview

CAPS was established in 1989 as one of the first National Science Foundation (NSF) Science and Technology Centers. Currently it is one of OU's six University Strategic Organizations. Its primary mission is to develop techniques for high-resolution analysis and prediction of high-impact local weather and environmental conditions. Its research also includes mesoscale and convective-scale dynamics and predictability, interdisciplinary research on radar meteorology and information technology, and applied research to advance operational high-resolution numerical weather prediction (NWP) capabilities in the United States and the World. It developed and supports an advanced end-to-end NWP system, known as the ARPS model system, as well as utilizing community NWP models such as WRF and FV3. CAPS research is supported by grants and contracts from the NSF, NOAA, NASA, DoD, private sector and foreign governments.



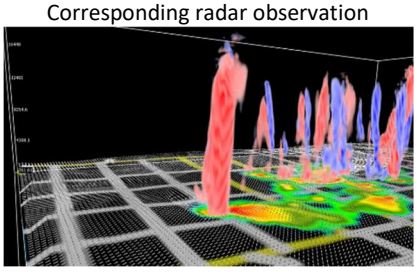
50-m Simulation of Supercell @ 43 min

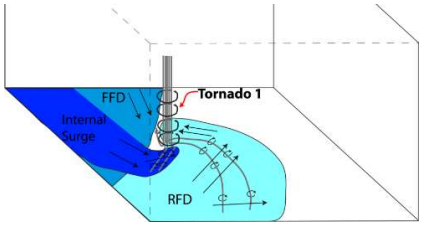


Corresponding radar observation

Core Competencies

- High resolution Numerical Weather Prediction (NWP)
- Data assimilation at storm scale using Cycled 3DVAR, IAU-VDT, Ensemble Kalman Filter
- Real-time analysis, nowcasting and short-term Forecasting
- NWP ensemble design, real-time execution and ensemble consensus post-processing
- Machine Learning applied to NWP and ensemble forecast output
- Dual-Pol & Doppler radar quality-control and remapping
- Utilization of X-Band gap-filling radars
- Observation System Simulation Experiments (OSSEs) and Observation Sensitivity Experiments
- Mesoscale and storm-scale process studies, including Tornadogenesis, Tropical Storm Dynamics, Urban Flows & Air Quality
- 3-D visualization of high-resolution NWP output
- Downscaling of climate models to determine local impacts
- Data analysis and modeling for renewable energy
- Training of operational meteorologists in mesoscale meteorology, radar and satellite data.
- Mentoring the next generation of storm-scale researchers


3D Visualization of Updraft Helicity



Schematic of tornadogenesis processes from CAPS numerical study


FV3 "Cubed Sphere" Domains

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