

# VORTEX Southeast: Verification of the Origins of Rotation in Tornadoes EXperiment-Southeast

**Tornadoes are some of the most violent storms on the planet and kill more people in the South-east United States than anywhere else in the country.**

The Verification of the Origins of Rotation in Tornadoes EXperiment-Southeast, or VORTEX-SE, is a collaborative effort aimed at researching storms and conditions producing tornadoes in the U.S. Southeast, along with how people learn of severe weather threats and how they respond to protect their lives and property.

## Gathering Data

Funded by Congress, VORTEX-SE is preparing for its fifth operating year. Through the end of fiscal year 2019, VORTEX-SE provided 77 grants to universities and research laboratories to explore issues related to enhanced tornado threats found in the Southeast U.S.

## Current Research

During November 2018 - April 2019, VORTEX-SE conducted more than 1,600 weather balloon launches. Data obtained from soundings across the Southeast in nine different weather systems were used by National Weather Service forecasters in real time, and were ingested into experimental runs of the Experimental High-Resolution Rapid Refresh Ensemble (HRRR-E) forecast model.

Additionally, VORTEX-SE supported social and behavioral scientists working in the region in

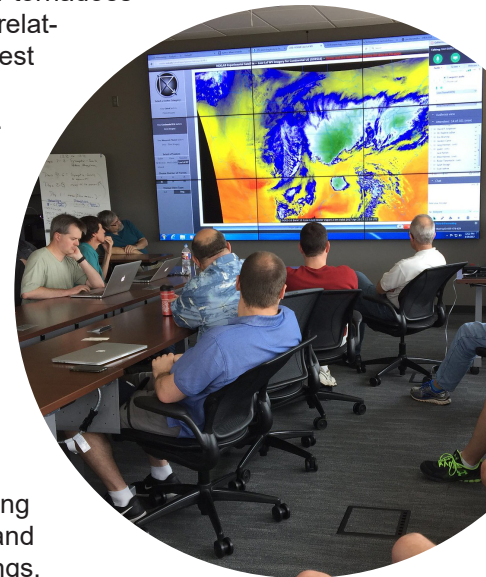


**VORTEX-SE Societal Impacts**  
Researcher Kim Klockow-McClain is studying how current practices by agencies affect severe weather safety messages the public receives in the United States.

the aftermath of the deadly Lee County, Alabama, tornado in early March 2019. These scientists conducted on-the-ground research to learn more about the vulnerability and decision making of residents in the area to help guide future efforts to reduce tornado mortality nationwide.

## Understanding the Southeast

VORTEX-SE has led to an increased understanding of the large scale conditions that support tornadic storms in the Southeast, which are quite different from Tornado Alley in the Great Plains. It has also shown conditions in the Southeast that favor tornadoes may be local in nature — related to terrain, land use, forest coverage, water bodies, and other similar features. Plans are being developed to greatly improve our understanding of these local variations, the observing requirements, and the forecast model changes that will be needed to use this information. Perhaps of most importance, VORTEX-SE gained a new understanding of how residents receive and respond to tornado warnings.



Research is underway to explore how sheltering decisions are made and how better information can lead to better decisions. The VORTEX-SE research emphasis is moving toward improving understanding and forecasts in the time period between warnings—minutes of lead time—and watches—hours of lead time. Social science research is showing key societal and personal decisions are being made in that timeframe.

VORTEX-SE researchers in a weather briefing deciding where and when they want to deploy weather instruments.



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On March 3, 2019, the “Meso 18-19” VORTEX-SE project researchers launched several weather balloons prior to the tornado event that killed 23 people in Lee County, Alabama.

Researchers kept a watchful eye on state-of-the-art and experimental forecasting tools, which allowed them to mobilize quickly when ominous signs of possible severe weather and supercell tracks appeared on the models throughout Alabama, Mississippi, and parts of Georgia. Researchers launched special soundings for the event. Partners included universities, NOAA research labs and 13 NOAA National Weather Service sites. Such launches were used by NOAA forecasters at the Storm Prediction Center and the NWS forecast offices to help anticipate the severity of the tornado threat.

VORTEX-SE is creating a more cohesive image of how additional observations like those launched during that day in 2019 can improve numerical forecast models. The vast quantities of data collected that day will be analyzed over the next several years.

NOAA's National Severe Storms Laboratory is also participating in a National Science Foundation and NOAA supported project TORUS, or Targeted Observations using Radar and UAS in Supercells, which is complimentary with activities in VORTEX-SE. Both TORUS and VORTEX-SE seek new knowledge about how the storms interact with their environments, favoring or disfavoring tornado formation. This is one key to improving tornado forecasts on the time scales between 15 minutes and several hours.

Some storm observation methods are suitable for the Great Plains, but not the Southeast. What is learned in the Great Plains will help inform strategies for upcoming observing campaigns in the Southeast.

VORTEX-SE can implement similar observations in upcoming observing campaigns based on identification of key observations in the Plains. The main difference between the two projects are that scientists go to the storms in TORUS while in the Southeast, the storms come to the scientists. Using this concept, more will be learned about how the Southeast differs from the Plains, and how better to forecast and warn in the Southeast United States.

