PERiLS: Researchers seek out and study tornadoes and severe weather

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Storm season is upon us. And the National Weather Service is in the process of coming to a town near us with a SKYWARN training. They offer those online as well.

But how do they come up with studying the storms and giving us warnings? What's behind those messages we receive in stormy season?

Let's give it a look together. The following training is a quick summary of an article published last year by the National Severe Storms laboratory, referred to as NSSL. On our LeeCARES.org website, you will be able to read this training and get to the link of the original article. Fascinating stuff.

Imagine you are studying is a massive thunderstorm or perhaps even a violent tornado. It's three o'clock in the afternoon but the sky is dark. The wind is howling and swirling in all directions and huge hail is starting to fall.

You're standing outside in these elements, face-to-face with the power of nature.

And did we mention the storm is moving? Moving fast. Maybe even… right at you? By the way, are you getting all that data recorded?

Sounds a little overwhelming right? For the scientists and researchers at the NOAA National Severe Storms Laboratory (NSSL), it might be just another Wednesday.

According to DaNa Carlis, Director of NOAA National Severe Storms laboratory, their mission is, and I quote, "to be the world leader in observing, understanding and modeling severe thunderstorms. We want to be able to equip forecasters and society as a whole with the tools necessary to minimize the impact of tornadoes and severe thunderstorms on lives and property. To accomplish this mission, our scientists have to get out into the field and face these storms up close and personal."

NOAA was officially founded in 1964 to study tornadoes and Severe storms. It deployed for the first time the Doppler radar in 1970 and was able to detect rotation in thunderstorms, verifying the data with actual storm observation by people driving in a car with a map, a pencil and paper, and armed with a camera.

The only way to know what is going on in the atmosphere, believe it or not, us just being out there observing the skies and what the weather does, opines Alan Gerard, Chief of NSSL's Warning Research and Development Division. And I quote "Whether it's tornadoes, lightning, hail, wind, flash floods— we really have to have ground truth and the observations from the phenomena to be able to figure out what's going on and how to better forecast and warn for it."

For us ARES is very important as we can now fully appreciate our service to the National Weather Service, our County, and fellow citizens when we observe and report.

NSSL research scientist Anthony Lyza adds, "Field work is essential to the work we do at NSSL because it allows us to go out and test the hypotheses. It lets us ask the questions that we have from what we learn and research in the lab and go and examine actual storms and see how accurate or inaccurate some of our ideas might be."

The NSSL advance its research by working with many people in the field, capturing different aspects of a storm and employing different talents and strengths. They formulate hypothesis and then they test them in the film. The ones that are proven correct will be use for the advancement of technology and forecasting.

Most of the work, like in all sciences, results in being incorrect or incomplete. But the dedication of these individuals through the failed hypothesis is what has brought knowledge about the nature and the dynamics of complex storms, which, in turns, allows them to serve the public, save lives, and protect properties.

Today, meteorologists have become accurate enough to look at the radar and say that a tornado is about to form and, of course, to say when a tornado has formed (unless for the EF0 or EF1, those are mostly spotted by ground observation).

Their goal is to be able to look at the radar and advise the public that a tornado will be forming for sure in 20-30 minutes to give people better chance to look for cover.

One of the most significant field campaign is PERiLS (Propagation, Evolution, and Rotation in Linear Storm), one of the most comprehensive research projects of severe storms to date that took place across the Southeast United States in the winter periods of 2022 and 2023.

PERiLS involved hundreds of researchers, scientists and other support personnel, all coordinating to deploy numerous different instruments safely and efficiently to observe, document and analyze these storms up close and in real time.

Such personnel gather information about temperature, humidity, wind speed and direction and how that changes during the course of the storm. This helped characterize things like instability and wind shear, that are important to the organization and formation of severe thunderstorms.

The project utilized dozens of different instruments and tools from several entities to observe the environment around and in the storms, especially focused on the internal storm processes associated with tornado-producing squall lines that are common in the region. Scientists were able to collect information on over 20 EF3 to EF4 tornadoes.

The Southeast region was chosen for two reasons.

1. This kind of tornadoes are difficult to predict because they develop and evolve rapidly.
2. This kind of tornadoes and storms tend to be at nighttime in this region that has higher a density of populations living in mobile or prefabricated homes, adding to the risk.

These storms in the Southeast are completely different from the central United States because they are long lines and don’t have as much intensity to the updrafts. The tornadoes form rapidly with very few forewarnings, so it is really hard to apply the knowledge researchers have gained elsewhere to the Southeast tornadoes.

Probably, the most significant operation of the PERiLS campaign came in March of 2023, when a violent EF4 tornado hit the town of Rolling Fork, Mississippi, with NSSL researchers in place to capture data during the storm.

As we can see, they were able to collect data on some very significant tornado events and they came back with the satisfaction to have learned much knowledge on the environment and a few things that occur in the individual tornado-producing thunderstorm that are now used by the NOAA National Weather Service in issuing warnings.

This is training for tonight, this is KD5BJ, back to net.