Into the storm: Using drones to track twisters

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Amelia Wilson, Nathan Woody and Alyssa Avery prepare their aircraft for flight at Oklahoma State University. Researchers at OSU are designing and building Kevlar-reinforced drones to fly into the worst storms and send back real-time data to forecasters about how fierce they might become. Photo: AP Photo/ Oklahoma State University, Gary Lawson

With tornadoes, advance warning comes down to minutes. In Moore, Okla., on May 20, it was 16 minutes.

The deadly, mile-wide tornado that killed 24 people first formed in the town of Newcastle. People there got all of five minutes' warning.

Tornadoes used to strike without any warning at all. Since the 1970s, meteorologists have worked to raise the average warning time to 13 minutes. A combination of weather balloons, radar and on-the-ground observations form the core of today's forecasting technology.

Now scientists have a new goal: extending the warning time from minutes to hours by sending unmanned aircraft — drones (https://www.newsela.com/?tag=drone) — into a brewing storm. Pulling that off would require not only technological expertise. It would also need the government to be more flexible about rules that block most unmanned flights over the United States.

Most of the work on unmanned aircraft vehicles has been for military strikes or spying. But researchers are increasingly exploring their use in science, including severe weather research.

From Battlefield To Cornfield

Oklahoma is one of the states leading the charge, and for good reason: 19 twisters touched down in the state in the last two weeks of May alone. Engineering teachers and students at Oklahoma State University are building and designing Kevlar-reinforced aircraft to survive high winds. Kevlar is a super-strong, man-made fiber. Weather researchers at the University of Oklahoma are building sensors and advising OSU researchers on data collection.

“We have the (unmanned aircraft) expertise, we have the weather expertise and, by golly, we have the weather,” said Stephen McKeever, an Oklahoma government and university official. “In many senses, we’re the perfect laboratory to do this kind of thing.”

The small aircraft weigh up to 55 pounds and can cost from $10,000 to $100,000, depending on the types of technology involved. They are remotely controlled by a pilot. Sensors would collect data on temperature, humidity and pressure while intercepting a storm. This is crucial information in tornado prediction.

Researchers also aim to improve forecasting by monitoring the atmosphere before and after storms form.

Oklahoma State professor Jamey Jacob first started working on drones for Mars exploration in the 1980s. Since then, his focus has shifted to twisters and the questions still confounding scientists: how, why and when tornadoes form.

“If you live in Oklahoma, you have an interest in tornadoes,” he said.

Jacob guides teams of students on the aircrafts’ design and assembly. One team had scheduled a test flight for an aircraft built for a government public safety drone program May 20. That was the day the tornado hit Moore. They delayed the flight two days and successfully launched the plane into clear skies.

Quietly Seeking Survivors

The aircraft also can be used to help fight wildfires, dust agricultural crops and inspect pipes. Quiet ones can help locate survivors in the aftermath of a disaster. After the Moore tornado, officials had to stop helicopters from flying over elementary schools where people were searching for survivors. The noisy choppers were drowning out calls for help from the wreckage.

“We’re really excited actually about how our technology can be re-deployed from border patrol into flying into storms to gather and collect data that can really save a lot of people’s lives,” said Jacob Stockton, a graduate student at Oklahoma State.

The technology is also safer than storm chasing when it comes to visually confirming a tornado. That is a big deal to a weather-research community reeling from the deaths of three experienced storm chasers caught in a tornado that struck the Oklahoma City suburb of El Reno.

Oklahoma Governor Mary Fallin signed an executive order two years ago to create an advisory council on unmanned aerial systems, to be headed by McKeever.

The committee met May 31, hours before the El Reno storm hit the Oklahoma City area. Committee members discussed the severe weather predicted for that night with a twinge.

“We were all knowing that, if we could get airplanes up into the air ...” said committee member Phillip Chilson, a professor at the School of Meteorology and Advanced Radar Research Center at the University of Oklahoma.

A Big "If" For Now

The key word is “if.” Under current Federal Aviation Administration rules, it is illegal to operate unmanned aircraft in the national airspace.

Public agencies, including universities, can apply for a special certificate to fly the aircraft. But from there, the FAA requires 48-hour advance notice before the aircraft actually goes up. The government also insists that the pilot keep the aircraft in his or her line of sight at all times. This is impossible when it comes to rain-shrouded tornadoes that form within hours.

Researchers are careful not to criticize the FAA, noting its emphasis on safety. But they say they are frustrated about the slow pace of changes to rules that have limited the use of a technology that is ready and can be a big help.

But changes are coming. In a 2012 law, Congress laid out the start of a framework for letting unmanned aircraft into national airspace by September 2015.

For the first step, the FAA is preparing to set up six test sites around the U.S. for the research and development of unmanned aircraft. Officials have received 50 applications from 37 states, including Oklahoma. Decisions are due in December.

Quiz

1 Select the paragraph from the article that provides the MOST evidence that Oklahoma has a high occurrence of tornadoes.

2 What are Oklahoma State University engineering teachers and students doing to help with tornado research?

(A) building sensors to collect weather data.

(B) creating Kevlar, a strong man-made fiber.

(C) building aircraft that will survive high winds.

(D) advising OU researchers on data collection.

3 According to the article, the data collection sensors gather information on all the following EXCEPT?

(A) humidity

(B) mass

(C) pressure

(D) temperature

4 After the tornado in Moore, why did officials stop helicopters from flying over elementary schools where people were looking for survivors?

(A) Helicopters were interfering with the scientists unmanned aircraft drones.

(B) The loud noise from the helicopter was preventing survivors from being heard.

(C) The helicopters were reducing visibility by blowing debris around the wreckage.

(D) The Federal Aviation Agency said that it was not safe in the aftermath of the storm.

Answer Key

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Paragraph 5:
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