

Monitoring the weather

by Alicia Evicks, Wilburton, Okla.

Highs in the 100s. Lows in the single digits and below. Humidity. Wind. Snow. Ice storms. Thunderstorms. Tornadoes. Oklahoma weather is uncontrollable, but it is not unpredictable. The Oklahoma Mesonet allows residents to plan around the weather.

When it all started

In the 1980s, Oklahoma State University and the University of Oklahoma saw the need for a comprehensive weather monitoring system to be introduced to the state. OSU wanted to know more about the weather and the environment to help agriculture and natural resources, and OU wanted to expand upon its reputation as a leading meteorology establishment.

In 1991, the universities and the Oklahoma Climatological Survey received funding to design and build the Oklahoma Mesonet. As of 1994, the network was fully operational and has been improving ever since.

"The two universities have worked together very closely, and it's been a very productive relationship," said Ronald Elliott, department head for OSU Department of Biosystems and Agricultural Engineering. "To the best of our knowledge, the Mesonet is the premier real-time weather monitoring network in the country."

The Mesonet is funded through the state legislature, external grants, local TV networks and federal sources, said J.D. Carlson, associate researcher for the OSU Department of Biosystems and Agricultural Engineering.

What is the Mesonet?

Mesonet is a combination of the meteorological term "mesoscale," which refers to a weather event, like a thunderstorm, that can range in size from one mile to 150 miles and can last several minutes to several hours and the word "network," said Carlson. This system measures the environment of Oklahoma in mesoscale weather patterns, giving residents accurate information.

"The Oklahoma Mesonet is an extremely valuable tool to determine current and past weather conditions and as an aid in day-to-day planning," said Joshua Morris, a master's student in the OSU Department of Plant and Soil Sciences.

The Oklahoma Mesonet system includes 116 automated stations covering Oklahoma's 77 counties. Each station monitors the environment with instruments located on or near a 10-meter-tall tower. The observations from these towers are then transmitted using the Oklahoma Law Enforcement Telecommunications System to a central facility every five minutes.

The Oklahoma Climatological Survey, located in Norman, Okla., verifies the quality of the observations and provides the data to the public. The whole process, from the time the measurements are taken to the time it reaches the public, typically takes no longer than 15 minutes.

Data collected from the stations include air temperature, relative humidity, wind speed and direction, barometric pressure, rainfall, solar radiation, soil temperature and soil moisture. The main way for Oklahoma residents to access Mesonet information is to connect to the Mesonet's Web site.

How the Mesonet helps agriculture

Data gathered from the Mesonet are packaged and placed on a Web site tailored for agriculture. This site, "Oklahoma Agweather," is easy to use and provides all of the latest and most recent weather information available, said Carlson.

"We average close to 5,000 unique users a month," said Al Sutherland, Mesonet extension specialist for the Oklahoma Cooperative Extension Service.

Weather is a key factor when making decisions dealing with agriculture and natural resources, said Elliott. For those using the Agweather Web site, these decisions can be made with greater ease and reassurance.

"We do use the Mesonet a lot," said Jeannie Hileman, manager of Farmers Cooperative Gin in Carnegie, Okla. "My farmers call constantly to check humidity levels. I think a majority of my progressive farmers in this area probably have the Agweather site bookmarked as one of their favorite sites."

Information about soil conditions, weather conditions, environmental conditions, management questions, links to commodity markets, OSU production publications and links to producer associations can be found on the Agweather Web site.

Sutherland said agricultural models found on the site can help producers reduce irrigation and pest control expenses. The Evapotranspiration Model can help monitor crop water use. Other models found on the site can help track disease infection hours and indicate the best time to apply a fungicide. The site also has pest control models to help in controlling such things as weevils.

The Agweather Web site helps track environmental concerns such as fire danger and pollutant dispersion. The Oklahoma Fire Danger Model is an internationally recognized model that helps in decisions related to wildfires and prescribed burns, according to the Agweather Web site.

"The thing I use the Mesonet most for is our prescribed burning business," said J. Grant Huggins of Resource Stewards in Ardmore, Okla. "We primarily use it for forecasting weather because weather conditions are extremely important on a burning day. We have to know the best forecast possible to predict wind speed and direction and humidity."

Carlson said the Oklahoma Mesonet provides other benefits to residents. Important weather information impacting emergency management, education in schools, energy savings plans such as wind and solar energy, weather forecasting and drought management are aided by the Mesonet.

"It's just a very useful tool," said Allen Terry, general manager of Central OK Services in Marshall, Okla. "You can get some real detail on what the clouds are doing around you or what the wind is doing around you and pinpoint your location."

Emergency management officials use the Mesonet in times when wind and precipitation could maximize an already dangerous situation. This system also is used if

there is a need for evacuation because of weather conditions. The Oklahoma Department of Agriculture, Food and Forestry uses the Mesonet data to declare "red flag fire alert" days, which are days that have a higher risk for spreading fires.

Carlson said the Mesonet provides more frequent and densely spaced data to forecasters, which result in better lead time for warnings issued by the National Weather Service. Rainfall totals are used to anticipate drought situations and to provide an overview of the state's condition.

The future of the Mesonet

"'The sky's the limit' for Mesonet," said Sutherland.

Elliot said the Oklahoma Mesonet is the world's most extensive and data-rich weather system; the challenge is to figure out ways to use all the data it provides. Research is being done every day to create new models and charts for producers and residents to use.

Residents of Oklahoma have a fantastic resource at their disposal, said Elliott. The Mesonet offers all the weather information one would need in making weather-related decisions.

"It is a tremendous resource," said Elliott. "Some are taking advantage of it, and many more could."

For more information, visit the Mesonet Web site at <http://www.mesonet.org> or visit the Oklahoma Agweather Web site at <http://agweather.mesonet.org>.

Oklahoma Weather Facts

- The state's record low of 27 below zero occurred Jan. 18, 1930, at Watts.
- On Feb. 4, 1996, Stillwater's Mesonet station reported a low of 18 below zero.
- In March, temperatures in the teens may warm to the 80s after only a few days.
- In April, rarely does a week pass when there are no severe thunderstorm or tornado watches blanketing part of the state.
- Seventy tornadoes were reported in the state May 3, 1999.
- On June 8, 1988, a temperature of 115 was recorded at the Altus Air Force Base, which was the highest temperature recorded for that day in the nation.
- In July, temperatures frequently exceed 100.
- The cities of Lahoma and Drummond were in the path of a devastating hail storm that featured baseball-sized hail stones and winds measuring as high as 113 mph Aug. 17, 1994.
- September presents a transition between hot summer days and cool winter nights.
- In Lawton, the wind chill factor plummeted to more than 20 below zero, just two days after an overnight low of 60 in October 1986.
- In 2002, Tulsa set a record high temperature of 84 for November.
- On Christmas Day 1987, an ice storm left more than 60,000 Oklahoma homes without electricity, as wires began to collapse under the weight of the ice.

Photos: Oklahoma's weather is best explained visually. Photos provided by (from left) Todd Johnson, Agricultural Communications Services; National Oceanic and

Atmospheric Administration; J.D. Carlson, OSU Department of Biosystems and Agricultural Engineering; Oklahoma Climatological Survey; Danny Cheresnich, Oklahoma Climatological Survey; and Oklahoma Mesonet.