

THE OKLAHOMA MESONET

Operational since 1994, the Oklahoma Mesonet is a statewide automated weather station network operated jointly by the University of Oklahoma and Oklahoma State University. It provides the “infrastructure” for OK-FIRE and allows us to have timely and spatially dense weather data to assess the current conditions for fire weather, fire danger, and smoke dispersion. Currently 120 remote weather monitoring stations exist.

Each Mesonet station consists of an automated instrumented tower (10-m height) along with other sensors within a 10-m by 10-m plot of land. A typical Mesonet tower (Marena, OK) is shown below.



A wide array of weather and soil variables are measured. The table below lists the variables measured. All Mesonet stations measure the “core” variables and about 90% of the stations also measure the “supplemental” variables.

Core Variables	Supplemental Variables
<ul style="list-style-type: none">■ Solar Radiation	<ul style="list-style-type: none">■ Air Temperature (9 m)
<ul style="list-style-type: none">■ Air Temperature (1.5 m)	<ul style="list-style-type: none">■ Soil Moisture (5, 25, 60 cm)
<ul style="list-style-type: none">■ Relative Humidity (1.5 m)	<ul style="list-style-type: none">■ Soil Temperature (5 cm bare)
<ul style="list-style-type: none">■ Wind Speed (10 m and 2 m)	<ul style="list-style-type: none">■ Soil Temperature (5 cm grass)
<ul style="list-style-type: none">■ Wind Direction (10 m)	<ul style="list-style-type: none">■ Soil Temperature (30 cm grass)
<ul style="list-style-type: none">■ Rainfall	
<ul style="list-style-type: none">■ Barometric Pressure	
<ul style="list-style-type: none">■ Soil Temperature (10 cm bare)	
<ul style="list-style-type: none">■ Soil Temperature (10 cm grass)	

The Oklahoma Mesonet is a *mesoscale* network with respect to both space and time. With respect to space, the network currently consists of 120 sites with an average spacing of 30 km (19 miles). The tower locations are shown in the figure below. Note that there is at least one station in every county; some counties have 3 or 4 stations.



With respect to time, the reporting of weather and soil observations by the Mesonet also falls in the mesoscale range. For this purpose, the Oklahoma Mesonet utilizes an already existing statewide telecommunications network, the Oklahoma Law Enforcement Telecommunications Network (OLETS). Observations are sent by radio signal to a nearby OLETS tower (or by a repeater to an OLETS tower). Weather observations are sent every 5 minutes, while soil temperatures are sent every 15 minutes and soil moisture measurements, every 30 minutes.

For wildland fire managers, one of the major benefits of the Oklahoma Mesonet is the spatial density of the network. With the average station spacing of 30 km, fire managers are typically within 15 km (9 miles) of a Mesonet tower and are able to utilize essentially local weather information for wildfire suppression or prescribed fire activities. Prior to Mesonet, all that was available in near-real-time was information from synoptic scale networks (e.g., airport stations).

The other major benefit is the real-time availability of the data. Not only are weather and soil observations made and sent in time intervals ranging from 5 to 30 minutes, but these observations are made available on the Internet within minutes after being received at the Oklahoma Climatological Survey in Norman, Oklahoma. At the OK-FIRE web site, weather observations and smoke dispersal conditions are updated every 5 minutes and fire danger model information every hour.