

Wacky Water

Freezing Precipitation and Instrumentation

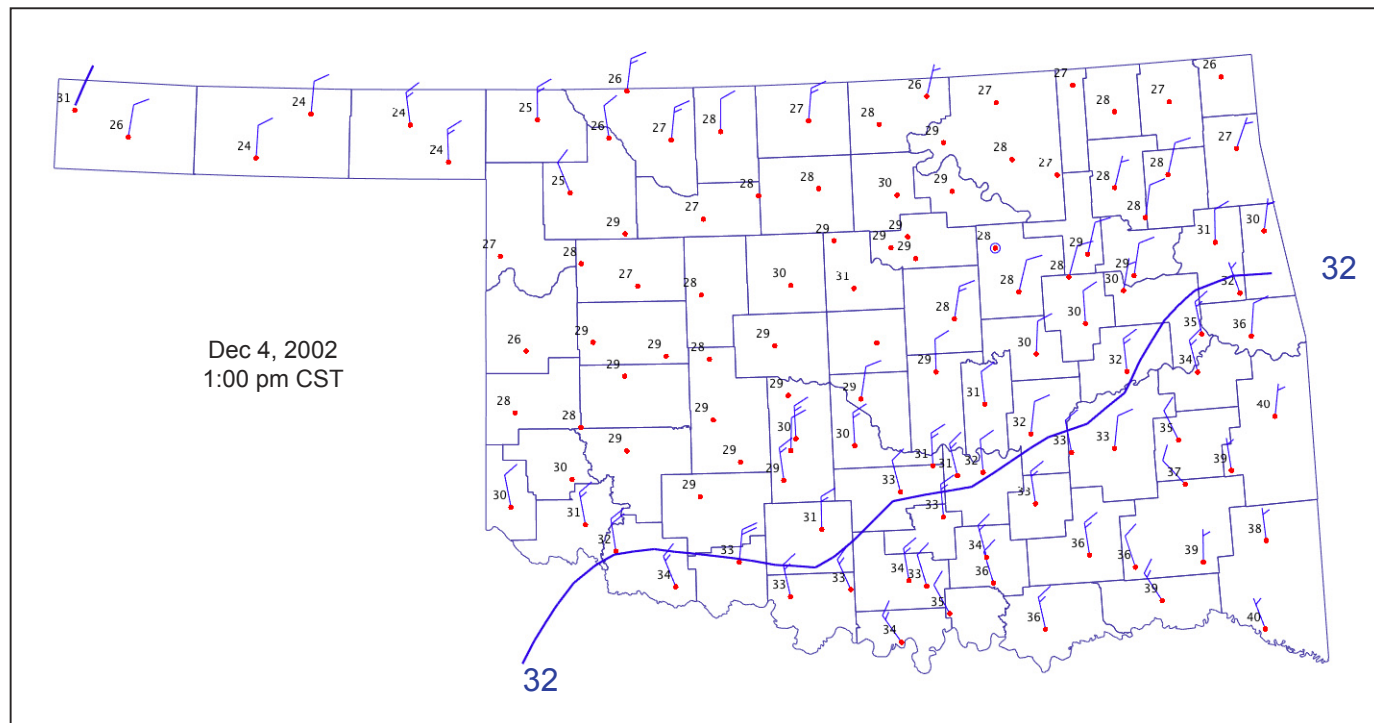
The sensors on Oklahoma Mesonet towers are not immune to the harsh winter conditions that sometimes plague our state. When freezing rain or snow occurs, radiation sensors can be covered and the rain gauge may freeze over. One set of sensors that are particularly susceptible to freezing rain is the set that measures wind speed and direction. The cup anemometer, in particular, can be completely incased in ice and report “calm” wind conditions even in wind speeds of 20 miles per hour or more. The effect is similar to having your vehicle door frozen shut in freezing rain. Although the ability to retrieve accurate wind data is compromised in freezing rain events, a meteorologist can still use the calm wind reports to identify the areas that are receiving the frozen precipitation. It is a good bet that if the Mesonet towers are accumulating ice, the bridges, roads, and power lines in the vicinity of the site are as well. This information is very helpful to the State Department of Transportation, the electric utility companies, and National Weather Service.

In our previous seasonal summary, you learned how to interpret plotted winds. On the map below (December 4, 2002 at 1pm CST), notice that there is a large portion of northwestern and north central Oklahoma where the wind barbs are absent. In the panhandle, and in the south central and southeastern portions of the state, winds are from the north or northwest at ten to fifteen miles per hour. A meteorologist would look at the entire map

and deduce that the winds are out of the north and northwest at ten to fifteen miles per hour over the entire state, but something is preventing winds from being reported in the swath extending from the southwest corner to the northeast corner of the state.

Notice that the temperatures in the region where the winds are missing are all below 32 F, the freezing point of water. But, also notice that there are many stations that are observing temperatures below freezing and are still reporting winds. Therefore, the freezing temperatures by themselves are not causing the wind data to be reported as “calm”. Something else is occurring in conjunction with the freezing temperatures. That ‘something else’ is rainfall. When liquid water falls and freezes on contact with power lines, roads, and Mesonet instruments, it is called “freezing rain”. The region where the winds are not being reported is evidence that the towers are incased in ice!

Oklahoma Mesonet Winds and Air Temperature



CLASSROOM ACTIVITY

Below are two maps of temperature and winds. The first map shows data recorded at 1 pm CST on January 29, 2002. The second map is from 24 hours later – 1 pm CST on January 30, 2002.

1. On the January 29, 2002 map, shade the areas of Oklahoma that are experiencing temperatures below freezing (32°F).
2. Are the areas that you identified in Question 1 experiencing freezing rain? (Remember that you can use the reporting of winds to help answer this question – See Interpretation Section.)
3. On the January 30, 2002 map, shade the areas of Oklahoma that are experiencing temperatures below freezing (32°F).
4. Are any areas that you identified in Question 3 experiencing freezing rain? (Again, you may use the wind reports to help you.) If the answer to this question is yes, identify where the freezing rain is falling.
5. If freezing rain is falling over parts of Oklahoma, what is happening to the roads, bridges, power lines, trees, and Mesonet instruments in the region where the freezing rain is falling?

Oklahoma Mesonet Winds and Air Temperature

