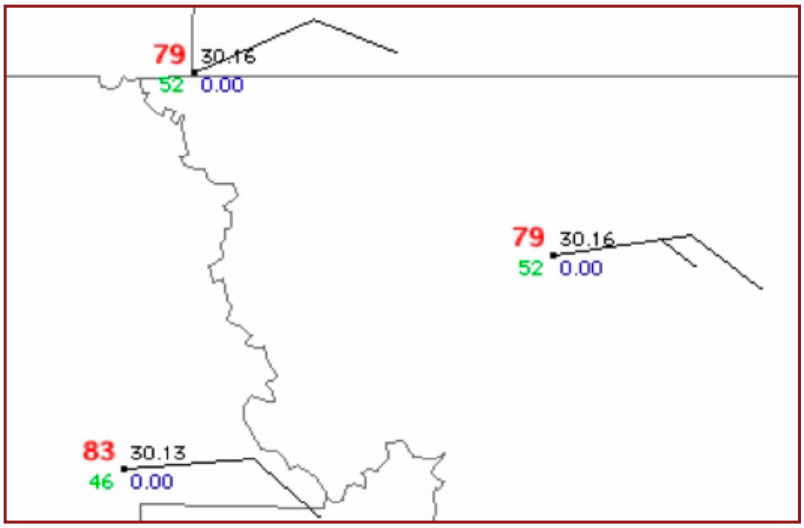
INTERPRETATION ARTICLE

When meteorologists plot surface weather conditions on a weather map, a standard plotting convention is used. This type of map is called a “station model plot”. An example of an Oklahoma Mesonet station model plot is shown in the figure below. The Oklahoma Mesonet station model depicts current temperature (upper left in red), dew point temperature (lower left in green), wind speed and wind direction (the black “wind barb”), altimeter setting (upper right in black), and total precipitation since midnight (lower right in blue).



The black dot is centered on the latitude and longitude of the Mesonet site where the weather observations are made. In the U.S., surface temperature and dew point temperature are expressed in degrees Fahrenheit, the altimeter setting is plotted in inches of mercury, and the precipitation is recorded in inches.

Wind direction is represented on the station model plot by the position of the “wind barb”. The barb enters the dot at the location that the wind is coming from. In the example above, Hobart (the easternmost station) is experiencing winds from the east. Retrop (the northernmost station) is recording northeast winds (winds from the northeast) and Mangum is reporting winds from the east. Imagine driving along the line that enters the station dot. You will be traveling with the wind.

The wind speed is coded on the tail of the wind barb. Long tails are worth 10 miles per hour each, while short tails denote 5 miles per hour. At Hobart, the combination of a long tail and a short tail indicates a wind of 15 miles per hour. Retrop and Mangum are both experiencing winds of 10 miles per hour.

CLASSROOM ACTIVITY

ACTIVITY: ANALYZING OBSERVATIONS

After plotting observations on a map, meteorologists analyze their field of choice (e.g., temperature, dewpoint, pressure). The analysis is accomplished by drawing lines of constant value, known as **isopleths** ("iso" means equal and "pleth" means value). The isopleths *connect* points of equal value and *separate* larger values of a field from smaller values.

Isopleths can be drawn for any scalar field. Particular types of isopleths are indicated below:

Temperature → Isotherms
Dew Point → Isodrosotherm
Pressure → Isobar
Rainfall → Isohyet

Contour Intervals

The process of contouring a weather map aids in the visual interpretation because the process reveals the spatial pattern. For example, a contoured field of air temperature depicts locations of features such as cold fronts and dry lines. However, to create the best possible contour analysis, it should be performed carefully, with a consistent set of contour intervals.

The exact contour interval for a specific analysis depends upon the field to be analyzed and the spatial scale of the analysis. For example, an analysis of temperature might be performed using a 5 °F contour interval. Contour values should be evenly divisible by the interval. For example, a series of contour values for a 5°F temperature analysis would be 35 °F, 40 °F, 45 °F, 50 °F, etc., rather than 32 °F, 37 °F, 42 °F, 47 °F, 52 °F. Typical contour intervals are shown below:

Field	Contour Interval	Suggested Contour Values
Sea-Level Pressure	4 mb	992, 996, 1000, 1004, 1008, 1012
Temperature	5 °F	50, 55, 60, 65, 70, 75, 80
Dew Point Temperature	5 °F	40, 45, 50, 55, 60, 65, 70

Performing the Analysys

It is often advisable to begin an analysis in the center of the map, rather than at the edge. Be careful to interpolate between observation points in the placement of a contour line to produce a smooth representation of the pattern. Isopleths also should not extend outside the field of data. For example, an analysis of the data from the Oklahoma Mesonet should not extend into neighboring states because no Mesonet observing sites are located there. Closed contours should identify maximum and minimum values. On pressure charts, the maximum value should be labeled with an uppercase "H" and the minimum value with an uppercase "L". Maxima and minima in temperature fields are sometimes marked with "W" and "C" (warm vs. cold), and moisture plots might be labeled with "M" and "D" (moist vs. dry).

Guide to Isoplething

- Isopleths NEVER branch or cross. They should either be closed lines or end at the edge of the data field.
- Isopleths should be drawn smoothly and labeled clearly. Each contour line should be labeled at the beginning and end of the line. Long contour lines may also be labeled at a small number of places along the line.
- Lightly sketch isopleths at first and then go back and darken them after you are sure they are correct.
- Isopleths should be drawn at equal intervals. Typically, isobars (lines of constant pressure) are drawn at intervals of 4 mb and isotherms (lines of constant temperature) are drawn every 5°F.

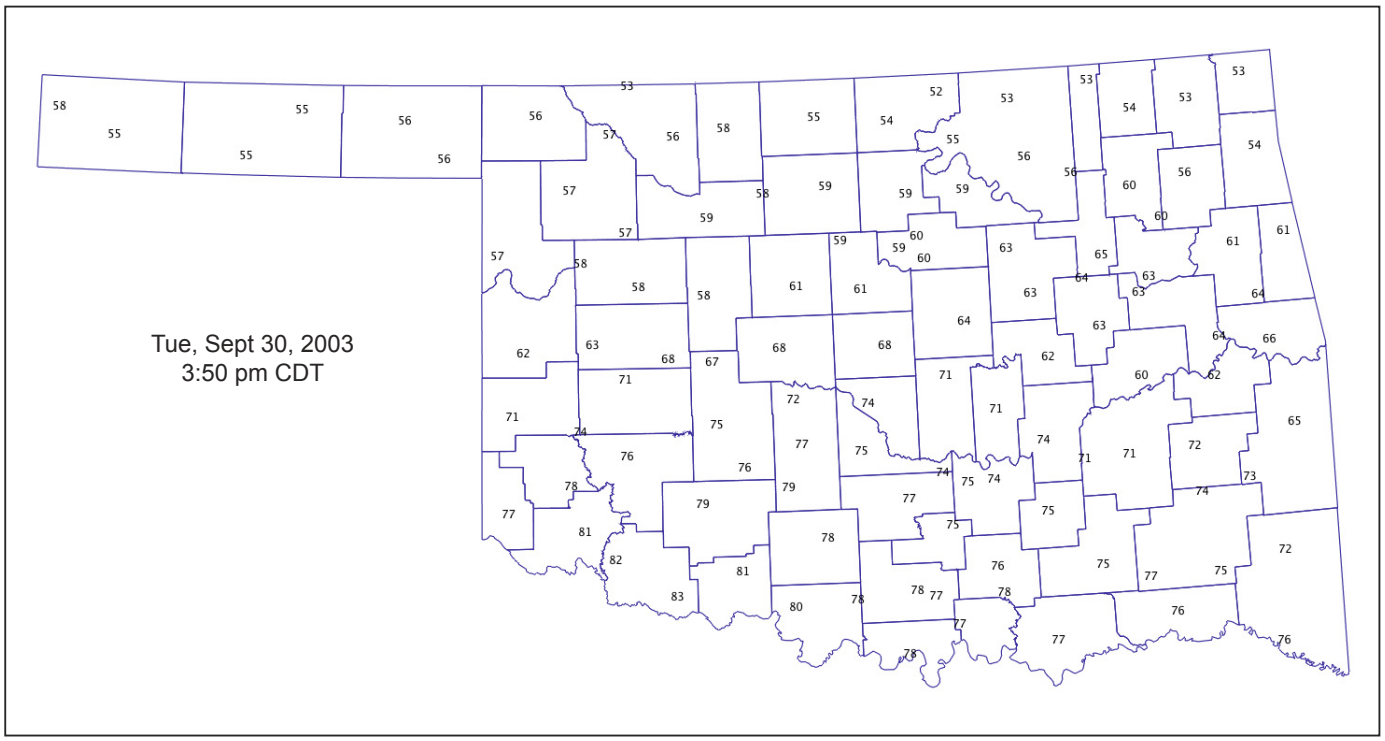
Exercise

1. Draw isotherms at intervals of 5 °F on the enclosed map.

2. Where is the strongest temperature gradient located (the rapid change from low temperature to high temperature?

CLASSROOM ACTIVITY

Oklahoma Mesonet Air Temperature



Oklahoma Mesonet Air Temperature Key