

Finding Fronts on the Mesonet

What is a Front?

Fronts are zones of transition between two different air masses that can be 20 to 100 miles across. An observer can usually tell when the front has moved through based on changes in the weather, such as differences in temperature, dewpoint, wind direction, and cloud cover. The frontal zone represents the leading edge of a wedge of cold or cool air. If the wedge is moving into an area of warmer air, the front is called a cold front. If the wedge is retreating and warmer air is moving into an area previously occupied by cool air, the front is called a warm front. The type of front depends on both the direction in which the air mass is moving and the characteristics of the air mass. There are three types of fronts discussed below: cold, warm, and stationary.

To locate a front on a Mesonet map, look for the following: sharp temperature changes over relatively short distances, changes in the moisture content of the air, shifts in wind direction, low pressure troughs and pressure changes, and clouds and precipitation patterns.

Not all of these patterns may be obvious or even occur, but these are some signs.

Cold Fronts

Since the Mesonet is a dense network of weather stations, it is easier to locate fronts on the Mesonet than with other weather station systems. The Mesonet is a resourceful tool to locate and track cold fronts. A cold front is a front in which cold air is replacing warmer air at the surface.



Some of the characteristics of cold fronts are as follows. Cold fronts tend to move faster than all other types of fronts. They tend to be associated with the most violent weather among all types of fronts. Cold fronts tend to be associated with cirrus clouds well ahead of the front, strong thunderstorms along and ahead of the front, and a broad area of clouds immediately behind the front (although fast moving fronts may be mostly clear behind the front). They can be associated with squall lines (a line of strong thunderstorms parallel to and ahead of the front). In winter, cold fronts move into Oklahoma mainly from the Canadian prairies but sometimes from the Arctic Circle or the eastern Pacific. Cold fronts usually bring cooler weather, clearing skies, and a sharp change in wind direction.

Warm Fronts

A warm front is a front in which warm air replaces cooler air at the surface.

Some of the characteristics of warm fronts are as follows. Warm fronts tend to move slowly. Warm fronts are typically less violent than cold fronts. Although they can trigger thunderstorms, warm fronts are more likely to be associated with large regions of gentle ascent (stratiform clouds and light to moderate continuous rain). Warm fronts are usually preceded by cirrus clouds first (~600 miles ahead), then altostratus or altocumulus (~300 miles ahead), then stratus and possibly fog. Behind the warm front, skies are relatively clear (but change gradually) and humid conditions often prevail. Warm fronts are associated with warm air overrunning cooler air. If a warm front exists on a weather map it will be to the east of a surface low pressure area. Clouds and precipitation are quite prevalent to the north of the warm front.



Stationary Fronts



A stationary front is a front that does not move or barely moves. Stationary fronts behave like warm fronts, but are more calm. Many times the winds on both sides of a stationary front are parallel to the front. Typically stationary fronts form when polar air masses are modified significantly so as to lose their character (e.g., cold fronts which stall).

How to Locate the Fronts

To locate a front, one of the first products to look at is air temperature. Go to <http://agweather.mesonet.org>, choose Weather, Current Weather, Air Temperature, Contour Air Temperature. Sharp temperature changes over relatively short distances can indicate a front. In the example below, Figure 1, the front is located just passed Tulsa, Oklahoma City and Lawton.

A second way to identify a front is wind direction. Choose Weather, Current Weather, Wind, Wind Vectors. Winds at the front are very calm. One can judge how fast the front is moving based on wind speed. In the example below, Figure 2, the winds moving to the southeast are much stronger than the winds where the front has not yet passed.

An excellent way to see a front move through the state is to animate the winds or the air temperature. To animate air temperature, choose Weather, Current Weather, Air Temperature, Air Temperature 2-hr Anim. This shows the air temperature changing as the front moves through over the previous two hours. To animate winds, choose Weather, Current Weather, Wind, Wind Vectors 2-hr Anim. This shows the animation of the winds shifting as the front moves across the state.

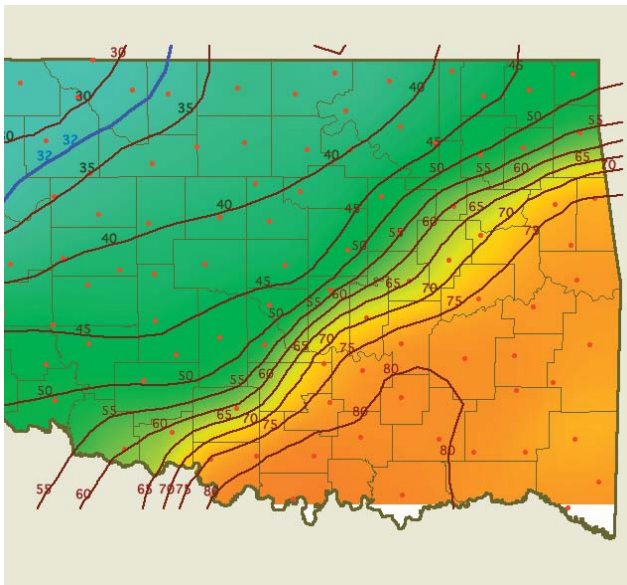


Figure 1

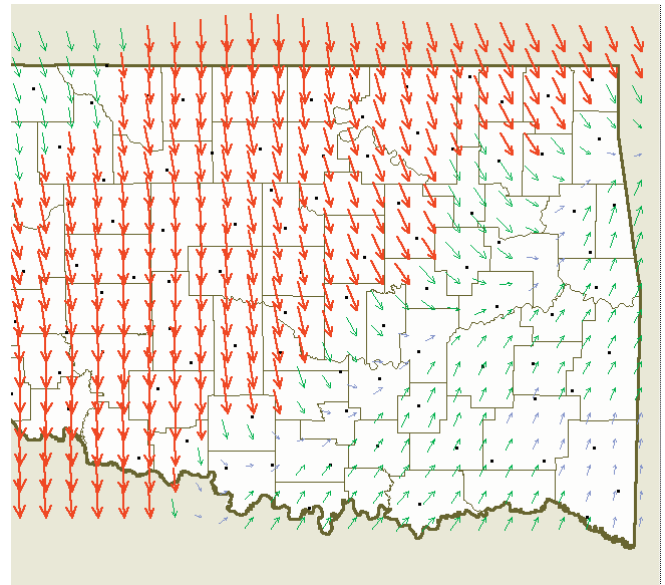


Figure 2