Weather Forecasting
Learning Activity 3

Objective:

This exercise will allow the students determine the location of cold fronts and warm fronts on a map plotted with temperature observations.

Overview:

Through a series of steps, the student will learn to analyze weather maps using temperature as a variable. In the process, the student will discover the different types of weather associated with weather systems based upon the information provided by temperature observations.

Total Time:

30 minutes

Supplies:

Colored pencils, copies of the unplotted temperature maps

Bacground:

Analyzing maps with the current weather conditions is an essential part of the entire forecast process. Basically, if we do not know what is currently occurring, it is near impossible to predict what will happen in the future.

Computers have been able to analyze maps for over 20 years. However, computers cannot interpret what they analyze. There is no substitute for the hand analysis. Analyzing maps by hand causes the forecaster to study every detail in the weather and enables him/her to discern the continuity or "flow" of the weather.

Map analysis is not too unlike drawing in a dot-to-dot coloring book. Just as one would draw a line from one dot to the next, analyzing maps is similar in that we will draw lines of equal values between dots representing various elements of the atmosphere.

Procedure:

You will draw lines connecting the temperatures, much like you did with the **sea-level pressure map.** However, you will also need to *interpolate* between values. Interpolation

involves estimating values between stations which will enable you to properly analyze a map.

We will begin drawing from the 40°F temperature in Seattle, Washington (top left value). Since we want to connect all the 40°F temperatures together, the nearest 40°F value is located in Reno, Nevada, (southeast of Seattle). However, in order to get there you must draw a line **between** a 50°F temperature along the Oregon coast and a 30°F temperature in Idaho. Since 40°F is halfway between the two locations, your line from Seattle should pass halfway between the 50°F and 30°F temperatures.

Place a light dot halfway between the 50°F and 30°F temperatures. This is your interpolated 40°F location.

Next connect the Seattle 40°F temperature with the Reno 40°F temperature ensuring your line moves through your interpolated 40°F temperature. Continue connecting the 40°F temperatures until you get to Texas.

Now your line will pass between two values, 60°F and 30°F. Like the last time, you should make a mark between the 60°F and 30°F but this time a 50°F is also to be interpolated in addition to the 40°F. Between the 60°F and 30°F temperatures, place a small dot about 1/3 the distance from the 30°F and another small dot about 2/3 the distance from the 30°F. These dots become your interpolated 40°F and 50°F temperatures. Finish drawing your 40°F isotherm passing through your interpolated 40°F value. Repeat the above procedures with the other isotherms drawn at 10°F intervals. Label your isotherms.

Discussion:

Isotherms are used to identify warm and cold air masses.

- Shade, in blue, the region with the lowest temperatures.
- Shade, in red, the region with the warmest air.

Note: Temperatures themselves are neither "cold" nor "hot". The air temperature is the *measure of energy in the atmosphere*. Often, television meteorologists will erroneously say "cold temperatures are moving in" or "we have hot temperatures in such and such place". What they should say is "cold air is moving in" or "the weather is hot" in describing the air mass as indicated by the temperatures.

Lastly, draw the cold and warm frontal systems after analyzing the temperature chart. Here is a hint: Find the area where your isotherms (lines of constant temperature) are bunched up together. Also remember the source region of air, as well as how the low and high pressure systems rotate, as this analysis was taken at the same time as the pressure chart you plotted/analyzed earlier.