

## ESCI 1010 Lab 5 Atmospheric Motion

**Before Lab:** Review pages 180-233 in your Weather and Climate textbook. Pay special attention to the sections entitled “Factors Affecting Wind”, “Winds Aloft”, “Surface Winds”, and “Jet Streams”.

**Summary:** This lab concentrates on understanding the motion of air around high and low pressure centers and identifying these systems and the jet stream on weather maps.

### LAB EXERCISE

1. Wind blows in specific directions around areas of high and low pressure. Draw the Northern Hemispheric airflow pattern around the high pressure (H) and low pressure (L) areas below.



2. Given the flow that you have drawn in question number 1 and the location of the cold and warm air masses below (denoted as “COLD AIR” and “WARM AIR,” respectively), draw arrows illustrating where the air masses should move relative to the high and the low (hint: air masses “go with the flow”).

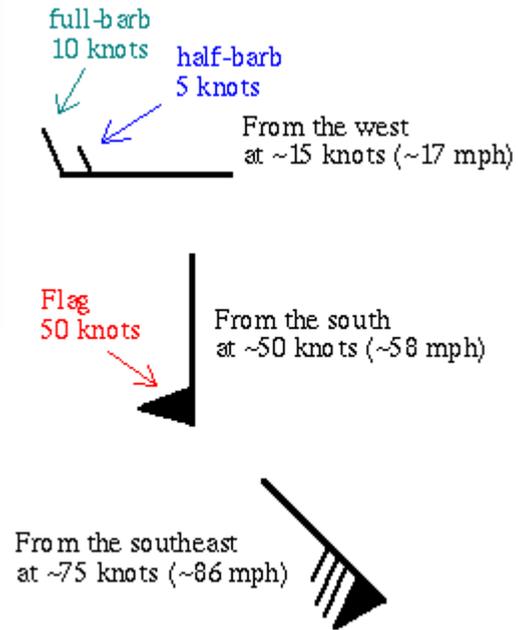
**COLD AIR**



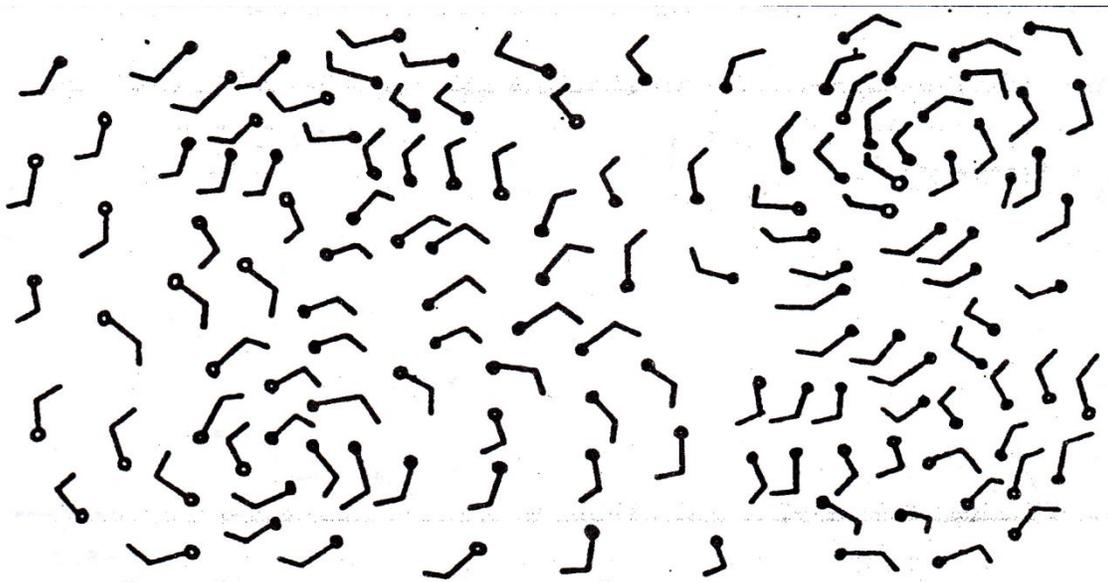
**WARM AIR**

Recall wind barbs from Lab 1:

Wind barbs are used to describe wind direction and speed on the station model. The wind barb is a line with tick marks (similar to an arrow with feathers on one end). In meteorology, the wind is always identified by the direction in which it is coming from (a south wind comes from the south and blows toward the north). The wind direction works just like a map (north at the top, east to the right, south at the bottom, and west to the left). Thus, the wind direction assigned to the top wind barb on the right is a west wind (two tick marks are at the tail). The wind directions assigned to the middle and bottom wind barbs on the right are south and southeast, respectively. Decoding information for wind speed is given in Figure 2-17a on page 50 of your textbook. In general, the more ticks, the faster the wind is blowing. Typically, meteorologists use knots to measure the wind speed. A full-barb is 10 knots and a half-barb is 5 knots as shown to the right. A flag is used to denote 50 knots.

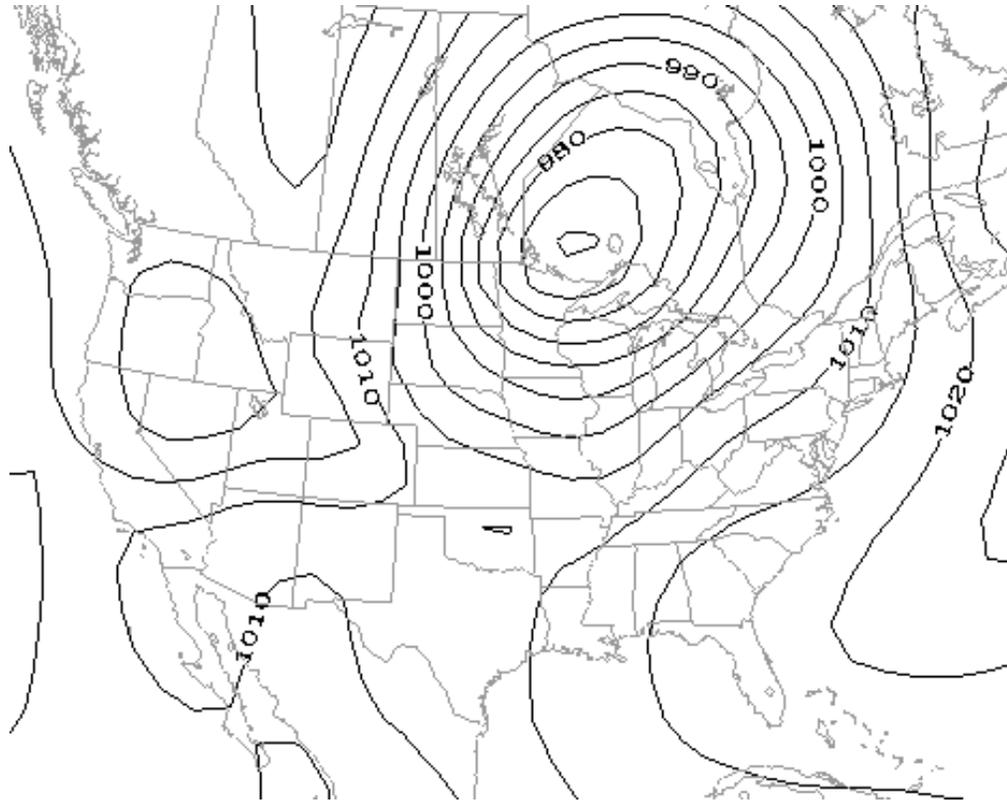


3. Given the flow around high and low pressure areas in the Northern Hemisphere, identify the low and high pressure areas below denoted only by wind barbs (there are four pressure centers—two low and two high). Place an "L" where the low pressure center is located and place an "H" where the high pressure center is located.



4. There is a force that initiates air motion from areas of high pressure toward areas of low pressure. What is this force called?

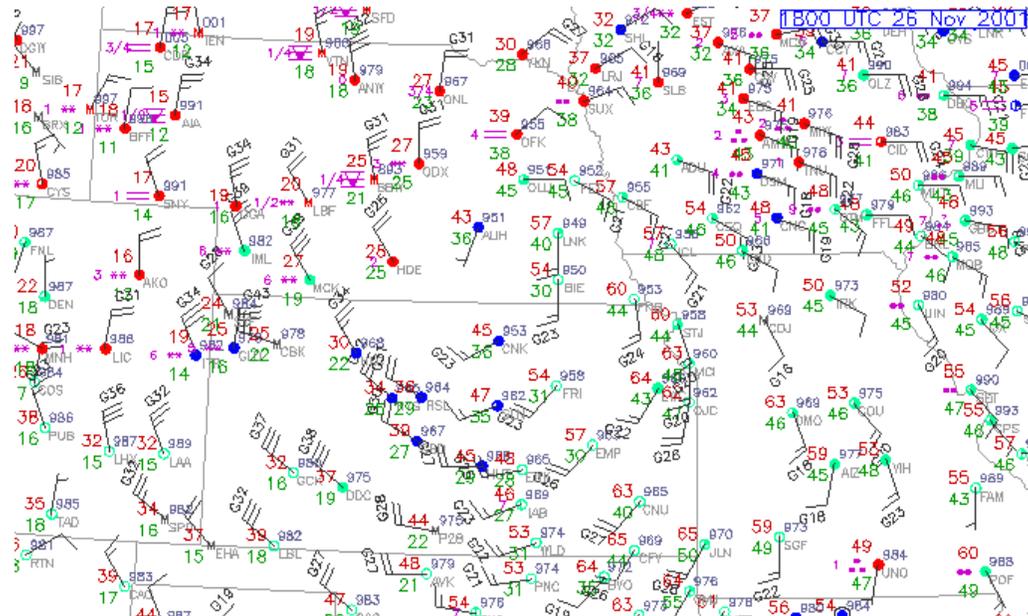
5. Isobars are lines of equal pressure and are plotted on the map below. Some of the isobars are labeled with the pressure in millibars. There is one low pressure area and one high pressure area on the map. Label the low pressure area with an "L" and the high pressure area with an "H" (hints: remember isobars make a ring around pressure centers; use the labeled isobars to guide you).



**Surface Mean Sea Level Pressure 12Z 27 October 2010**

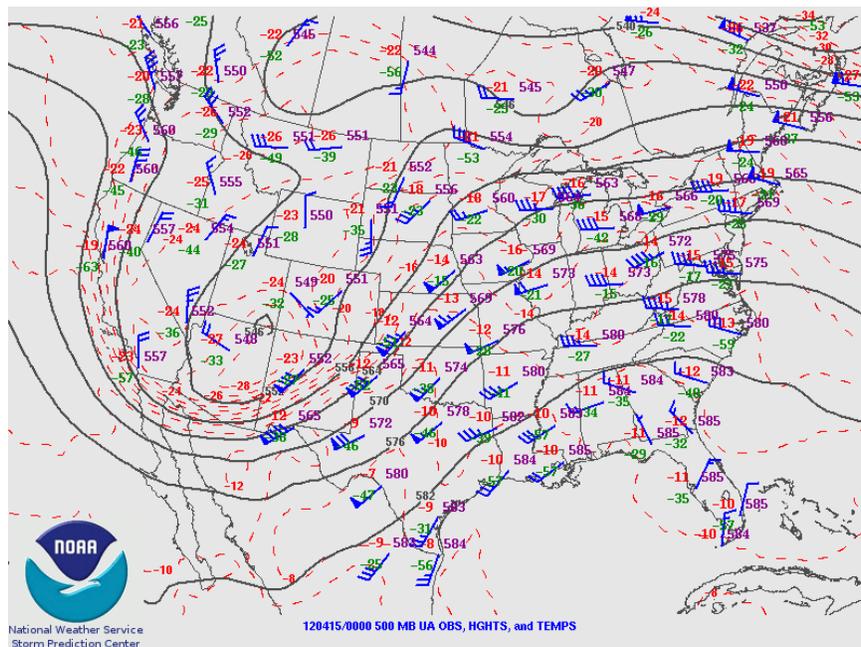
6. Note that the isobars on the map in question 5 above are spaced differently, how does their spacing relate to wind speed (i.e., if isobars are packed closely together, what does this say about wind)? Circle the area on the map with the strongest winds.

7. There is one surface pressure center on the map below. Label it as either a high or low pressure.



8. There are two weather variables on the map above that could be used to determine whether the pressure center was a high or a low pressure area. What are the two variables (hint: remember the station model from the first lab)?

9. The map below is a 500 mb (upper air) chart. Label the upper-level trough and the upper-level ridge.



10. Locate the jet stream in the 500 mb chart in question 9 above. Where is the area with highest winds in the United States?