

## Hand-Twist Model Demonstration

To accompany <http://serc.carleton.edu/eslabs/weather/3b.html>

Goal: Demonstrate the general circulation pattern around high- and low-pressure systems.

Gather these materials:

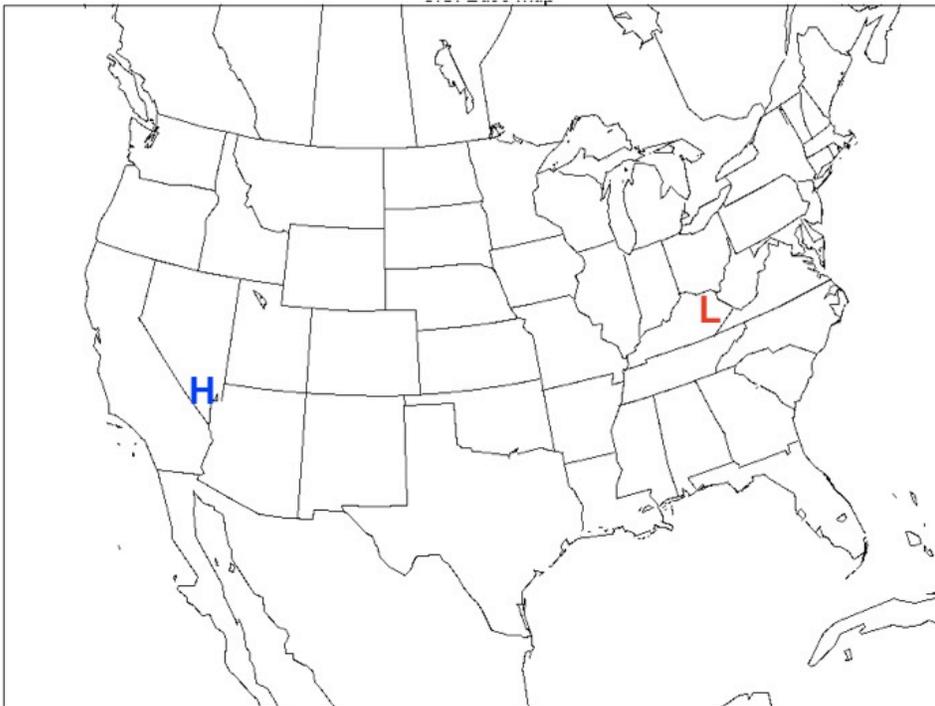
- map of United States with marked with a High and Low symbol.
- pencil or pen
- *optional*: complete this activity using an overhead transparency of the map and use projector to demonstrate to the class.

1. Read the information about regional air circulation below, or on the Earthlabs website. As you read, relate the information on the card to the steps in your demonstration.

2. Assemble and practice your demonstration.

Diagram a High Pressure System

- a. Begin with the High-pressure system. Lightly draw a circle an inch or so in diameter around the large “H” appearing on your base map. Sample map pictured below.



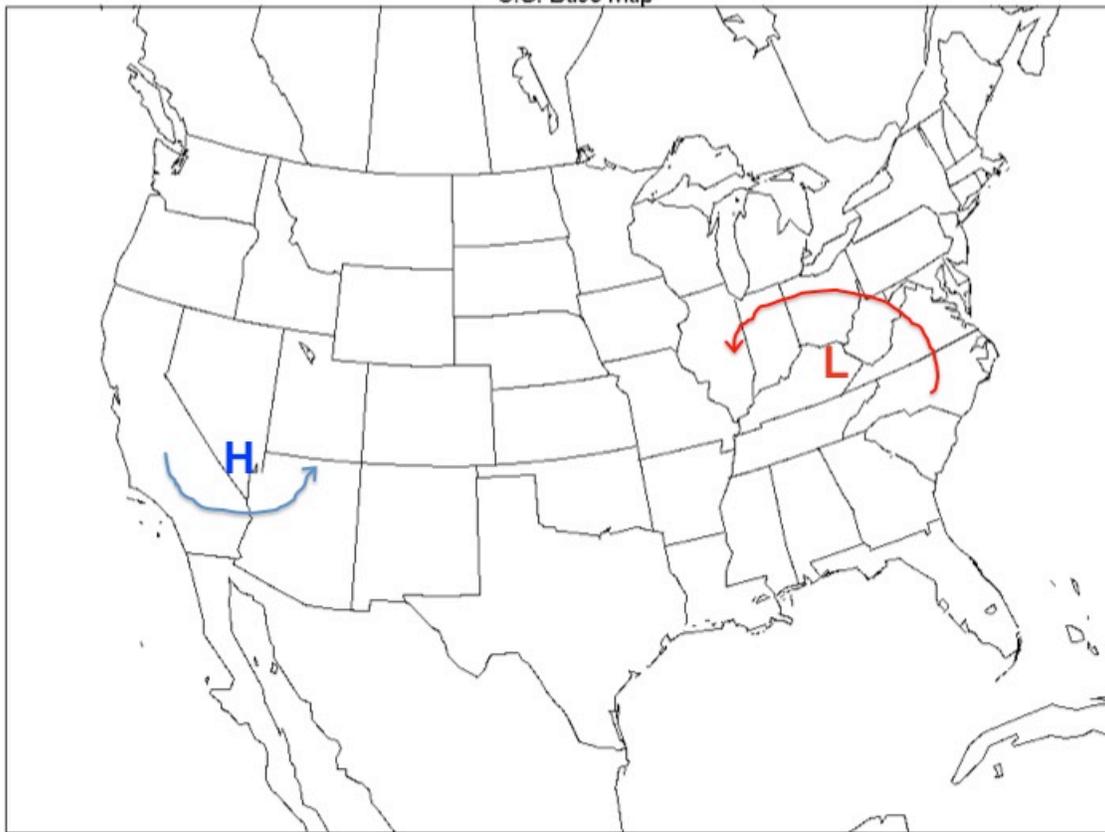
- b. Place the map flat on your desk. Stand up and place your palm and fingers directly over the H. Bring the thumb and fingertips of your left hand (if you are right-handed) or your right hand (if you are left-handed) close together and place them on the circle you drew around the high-pressure symbol.
- c. Rotate your hand slowly clockwise, as seen from above, and gradually spread out your thumb and fingertips as your hand turns. Do not rotate the map. Practice this until you achieve as full a twist of your hand (or about 270 degrees).
- d. Place your thumb and fingertips back in your starting position on the circle. Mark and label the positions of your thumb and fingertips a, b, c, d, and e, respectively.
- e. Slowly rotate your hand *clockwise* while gradually spreading your thumb and fingertips. Go through about a quarter of your twisting motion. Stop, mark, and label the positions of your thumb and fingertips on the map. Follow the same procedure in quarter steps until you complete your full twist.
- f. Connect the successive dots for each finger and your thumb using a smooth curved line. Place arrowheads on the lines to show the direction that your thumb and fingertips moved.
- g. The spiral lines represent the general flow of surface air that occurs in a typical High-pressure system.

#### Diagram a Low Pressure System

- a. Diagram a Low-pressure system. Lightly draw a circle an inch or so in diameter around the large "L" shown on the map.
- b. Again, if possible, stand up. Place your non-writing hand flat on the map with your palm, centered over the low and covering the circle.
- c. Practice rotating your hand counter-clockwise as seen from above while gradually pulling in your thumb and fingertips as your hand turns until they touch the circle. Do not rotate the map. Practice until you achieve a maximum twist with ease.
- d. Place your hand back in the spread position on the map. Mark and label the positions of your thumb and fingertips a, b, c, d, and e, respectively.
- e. Slowly rotate your hand counter-clockwise while gradually drawing in your thumb and fingertips. Stopping after quarter turns, mark and label the position

of your thumb and fingertips. Continue the twist until your thumb and fingertips are on the circle.

- f. Connect the successive dots for each finger and your thumb using a smooth curved line. Place arrowheads on the lines to show the direction your thumb and fingertips moved. Sample shown below.
- g. The spirals represent the general flow of surface air that occurs in a typical Low-pressure system.



General direction of airflow around high and low pressure centers

- 3. Review the information about regional air patterns, below. Discuss the similarities and differences between the hand –twist demonstration and the patterns of air movement in the diagram below.
- 4. Prepare the demonstration for the class. Make sure that everyone on your group has a role in the demonstration.

## Regional wind patterns

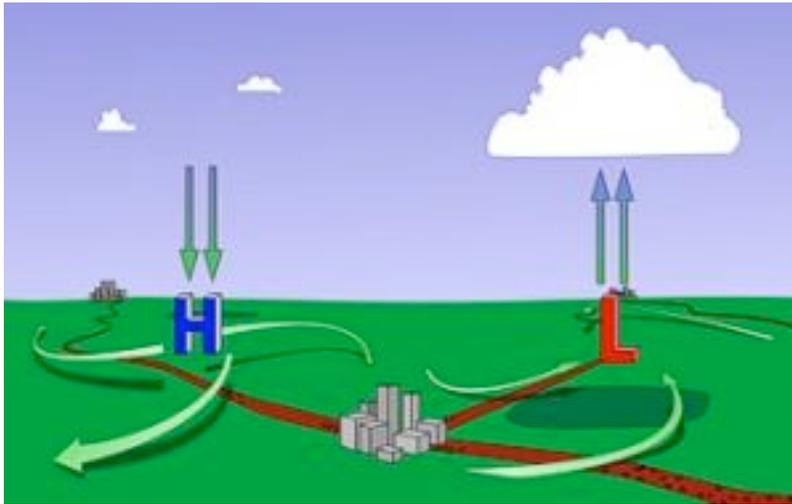


Image Source: NWS Jetstream

The atmosphere, like any fluid, is in constant motion. We sense this atmospheric motion as wind. Wind moves from areas of high pressure to areas of low pressure. At any given time, the centers of high and low pressure initiate the local and regional wind patterns. Except for the semi-permanent pressure systems, these centers of high and low pressure systems are constantly migrating around the Earth, giving us a never-ending variety of wind and weather patterns.

In the Northern hemisphere, wind rotates counter-clockwise and into low pressure centers, and clockwise and out of high pressure areas. These patterns of rotation are called **cyclones** (into low pressure) and **anti-cyclones** (away from high pressure).

*Optional:*

Click the link to view an amazing wind map for the entire conterminous (lower 48 states). <http://hint.fm/wind/>

While watching the animated map, compare it with the High- and Low-pressure locations on the fronts map.

<http://www.wunderground.com/US/Region/US/2xFronts.html>

Adjust the windows so you can see both maps side-by-side, and then investigate how winds move from areas of high pressure to areas of low pressure, along the isobars of pressure (white lines on the fronts map). Also take note of the clockwise and counter-clockwise patterns around the highs and lows. Note: Be sure to compare maps from the same day and time.