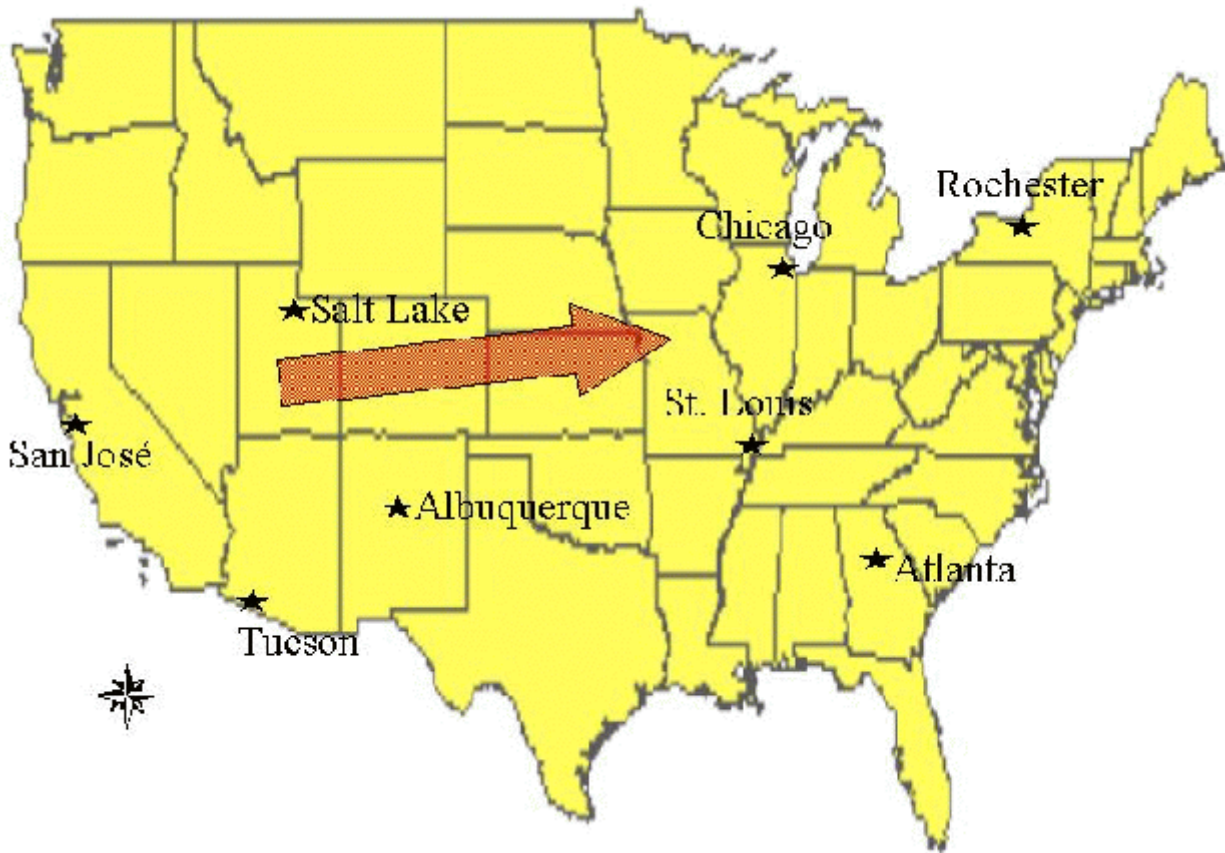


**Geology 103**  
**Air Pressure, Winds, Air Masses, Fronts**  
**Paula Messina**



**Figure 1:** A map showing cities in the U.S., and general weather pattern movement (indicated by the arrow) across the continent.

The graphic above (Figure 1) shows several cities in the United States. In this activity, you will be using your knowledge of air pressure and winds to determine the wind velocity in certain places.

Remember that wind velocity is a combination of the values describing wind direction and wind speed. It is also significant to recall that in the mid-latitudes of the Northern Hemisphere, weather patterns move generally from west to east. The arrow shown on the map above indicates where the center of a pressure system will migrate two days from the time that these data were recorded.

**Part I: Constructing Isobars**

On the page 4, you will use the air pressure data already recorded on the map to draw *isobars*, or lines that connect points of equal air pressure. It is important to note that isobars can never cross or touch each other. Isobars generally follow a pattern of a series of concentric circles or ovals around a

Low or a High Pressure Center.

A. Connect points of equal air pressure in the eastern part of the United States. Draw these isobars directly on the paper, preferably using pencil. You should ultimately construct three isobars at air pressures of 1008, 1012, and 1016 millibars.

B. Connect points of equal air pressure in the western part of the United States. Draw these isobars on the clear plastic sheet provided, using a wax marker or overhead projector felt-tipped pen. You should ultimately construct four isobars at air pressures of 1004, 1008, 1012, and 1016 millibars.

**Questions:**

1. What type of air pressure system is being experienced in the Eastern United States (High or Low)?
2. What type of air pressure system is being experienced in the Western United States (High or Low)?
3. What type of air mass most likely comprises the pressure system in the Eastern United States? [Remember that cool/dry air is associated with high pressure systems, and warm/moist air is associated with low pressure systems.]
4. What type of air mass most likely comprises the pressure system in the Western United States? [Remember that cool/dry air is associated with high pressure systems, and warm/moist air is associated with low pressure systems.]

Draw arrows indicating the direction of surface winds anticipated around the low pressure system, and around the high pressure system. Draw directly on the paper for the eastern United States (preferably using pencil), and on the clear plastic sheet for the western United States (use a wax or overhead projector marker).

5. What is the wind velocity for the following cities? Wind velocity is a combination of wind direction and wind speed. For each of the cities listed, determine the direction that the wind is coming *from*, and the inferred relative wind speed (i.e., either “fast,” “medium,” or “slow.”)

City	Wind direction (N, NE, E, SE, S, SW, W, NW)	Relative wind speed (fast, med., slow)
Albuquerque		
Atlanta		
Rochester		

Salt Lake		
San José		
Tucson		

Now, you are going to *predict* the future conditions based on the information you have. Since we learned that weather systems generally move across the country from west to east, position your clear plastic sheet so that the weather system that was positioned over the western United States (whose center was near the base of the large arrow) is centered near the tip of the arrow drawn on your map. Let's assume that the eastern weather system is stalled (in other words, is not moving, for some reason). These are conditions that happen with frequency.

6. What type of front would you expect to form between the two air masses? Why?
  
7. What type of clouds/precipitation would you predict for the cities of Chicago and St. Louis (as the Western air mass collides with the Eastern air mass)?

