Atmospheric Motion: The Basics

First some **basics** of atmospheric motion. Differences in temperature create differences in pressure. Differences in pressure are manifest as high pressure and low pressure cells and the air moves (**winds**) in an attempt to equalize these differences. This is called the **pressure gradient force.** A **low pressure** cell is a partial vacuum and air will flow into it. This movement is called **convergence.** Air also rises in a low. If it rises high enough, the air will cool and the water vapor will condense. Thus low pressure is associated with clouds and precipitation. A low pressure cell is a surface feature. Low pressure higher up in the atmosphere is called a trough (**Trof**).

A **high pressure** occurs when and where the atmosphere is "piled up." So winds move (are pushed) outward from a high. This movement is called **divergence.** Since the air is "piled up" already, air descends within a high; i.e., it moved downward closer to the earth's surface. This is called **subsidence.** As it subsides or descends, the temperature increases. Thus clouds do not form and precipitation will not usually occur in a high. A high is really high pressure measured at the earth's surface. High pressure in the upper atmosphere is called a **ridge**.

Winds very seldom blow directly from high to low pressure. For large scale wind systems, the **Coriolis force** modifies their direction. The fact that the earth is spinning means that the winds are deflected when viewed from a point on the surface. In the northern hemisphere the deflection is to the right of the path of motion. Thus a south wind (moving north) is deflected to the right or east becoming a westerly wind. In the southern hemisphere the deflection is to the left of the path of motion. Thus a south wind (moving north) is deflected to the left or west becoming an easterly wind.

One of the more important results of this deflection is that air develops a circulation or rotary motion around highs and lows. In the **northern** hemisphere the circulation around a **high** is **clockwise** or **anticyclonic**, while in the **northern** hemisphere the circulation around a **low** is **counterclockwise** or **cyclonic**. In the southern hemisphere air still diverges from a high but its circulation is reversed; i.e., it rotates counterclockwise. In the southern hemisphere air still converges into a low but the rotation is reversed to it is clockwise.