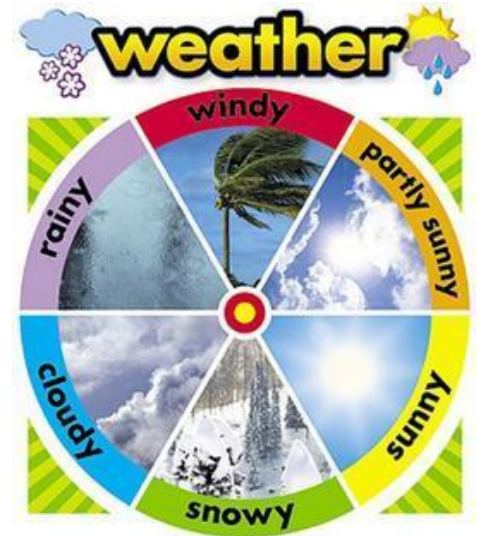


What is Weather?

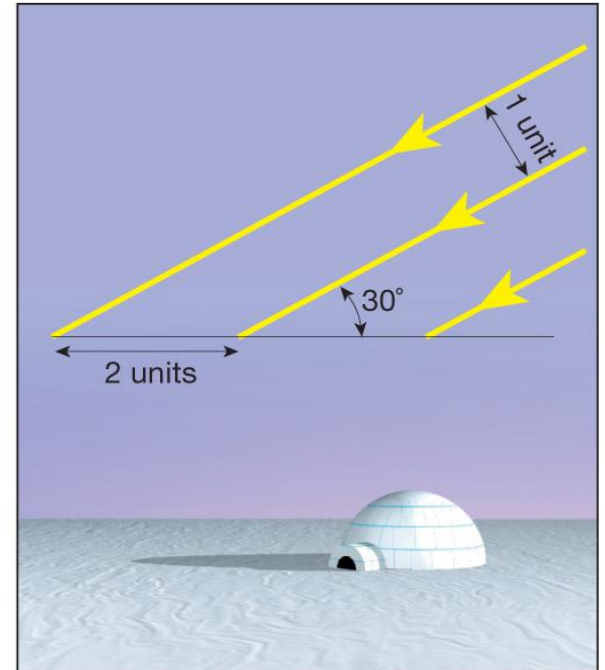
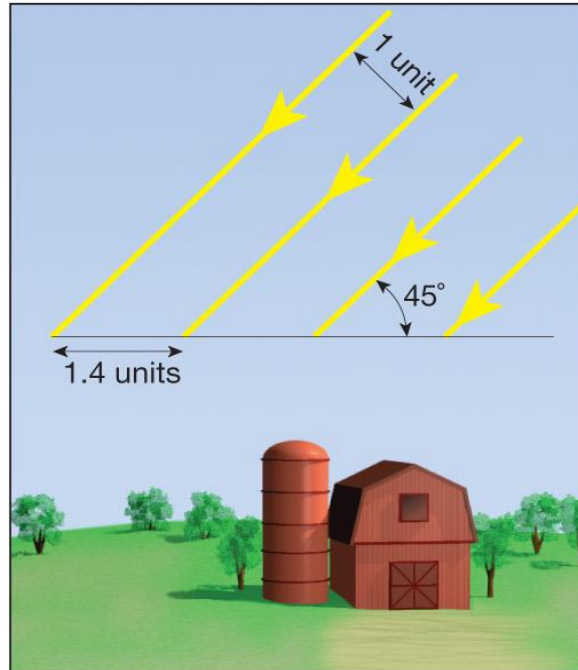
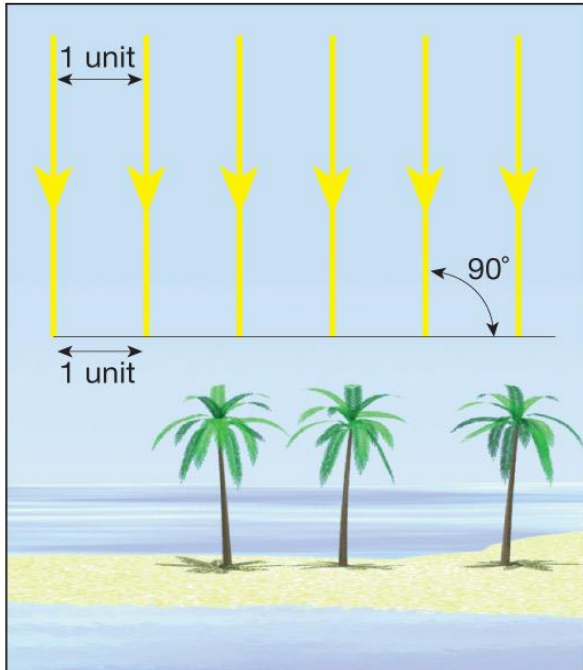
Weather is the **state of the atmosphere**: hot or cold, wet or dry, calm or stormy, clear or cloudy.



- Most weather phenomena occur in the **troposphere**:
 - On Earth, the *common weather phenomena* include wind, clouds, rain, snow, fog and dust storms.
 - *Less common* events include *natural disasters* such as tornadoes, hurricanes, typhoons and ice storms.
- Weather is one of the fundamental processes that shape the Earth through *weathering* and *erosion*.
- Weather is **driven by air pressure differences between one place and another**; in turn, air pressure itself is defined by **temperature and moisture**.

Heating of the Atmosphere

The Sun shines more directly **near the equator** bringing these areas **more energy**; the **polar regions** are at shallow angles of sunlight and receive **less energy** (plus they get little or no sunlight at all during the winter!).

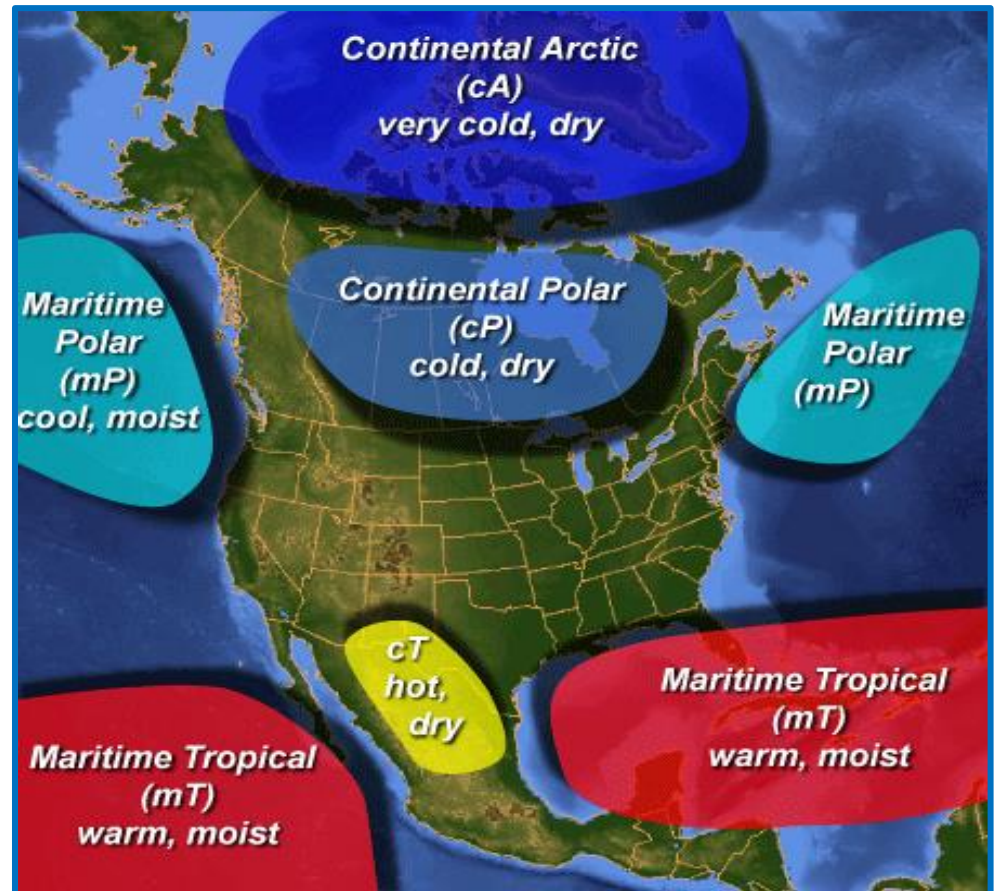


Unequal heating creates a restless movement of air to distribute heat energy from the Sun across the planet.

Air Masses

Air mass is defined as a *large body of air that has similar temperature and moisture within.*

- Originate in flat, uniform areas with light winds.
- *Examples:* snow covered Arctic plains, tropic-subtropic oceans, forests, mountains, large bodies of water.
- Classified by their origin:
 - Land (continental)
 - Water (maritime)
 - Latitude (Equatorial, Tropical - within 25° of equator, Polar - poleward of 60° north and south, Arctic/Antarctic)

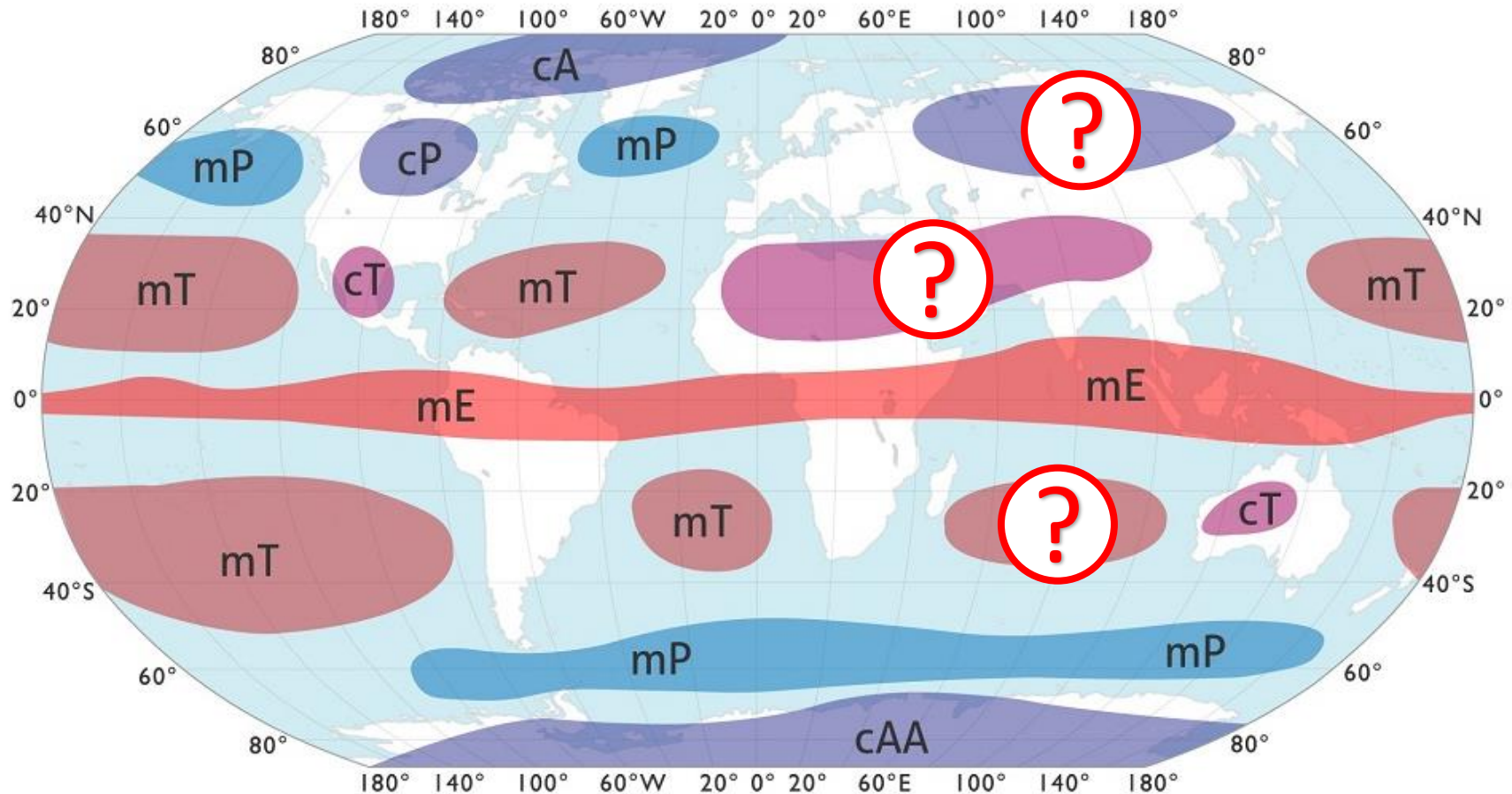


Air masses affecting the U.S. weather during the course of a typical year.

Air Masses of the World

c = continental

m = maritime



P = Polar

T = Tropical

A/AA = Arctic/Antarctic

E = Equatorial

Air Masses and Fronts

Air masses cover many thousands of square kilometers.

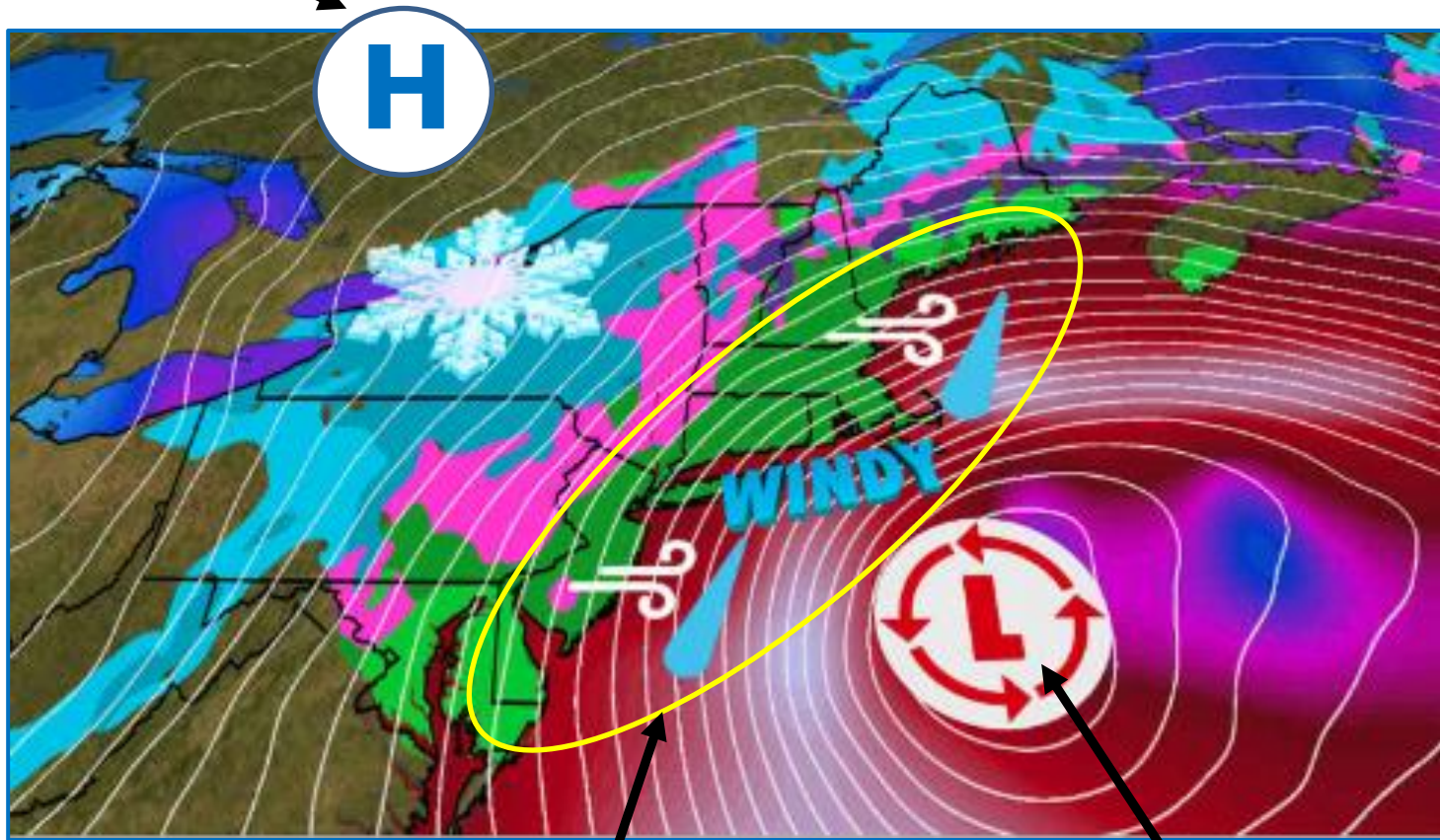


A boundary that separates two different air masses is called a weather (*atmospheric*) front.

Winter Storm Anyone?

A Weather Map Example

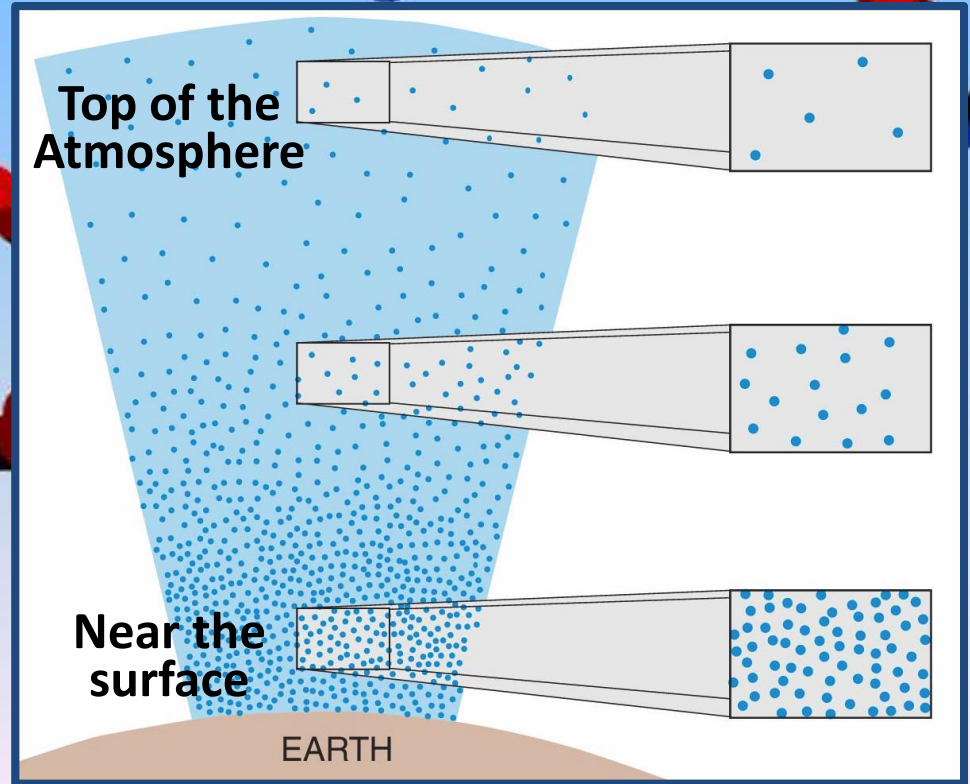
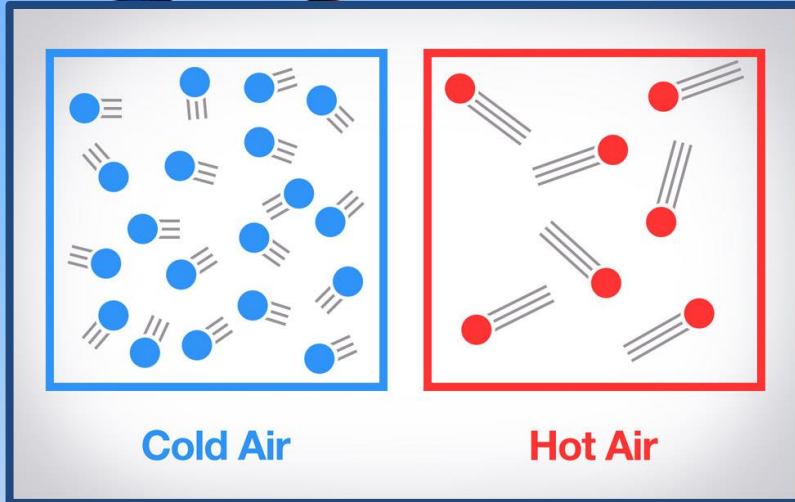
And this?



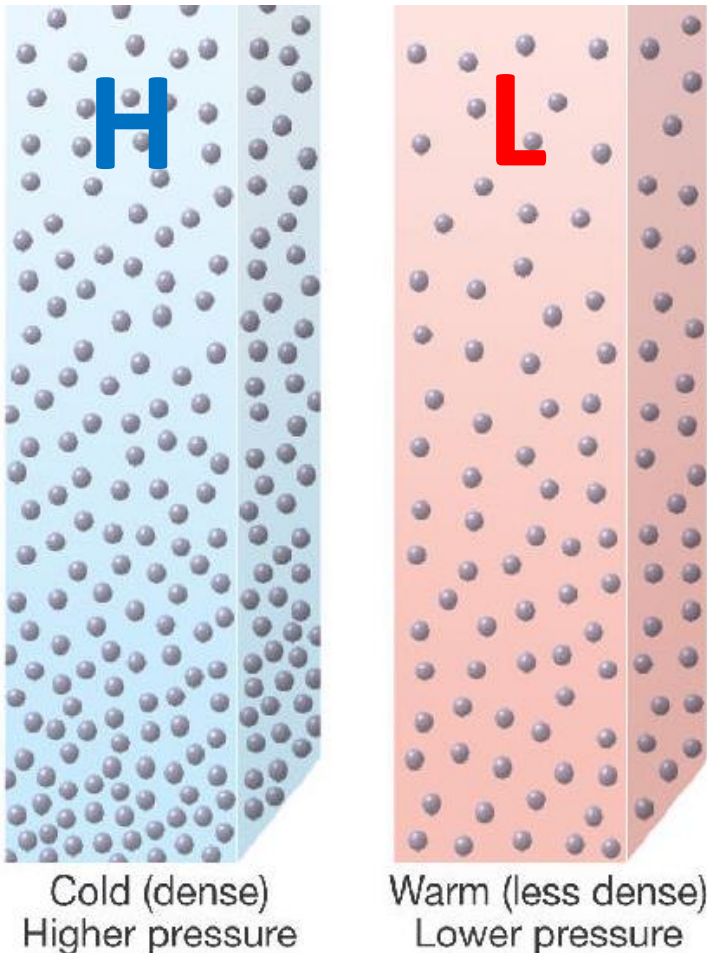
And why is it *windy* here?

What's this?

The air is made up of *molecules*: particles that are in constant motion.



Air Pressure Differences

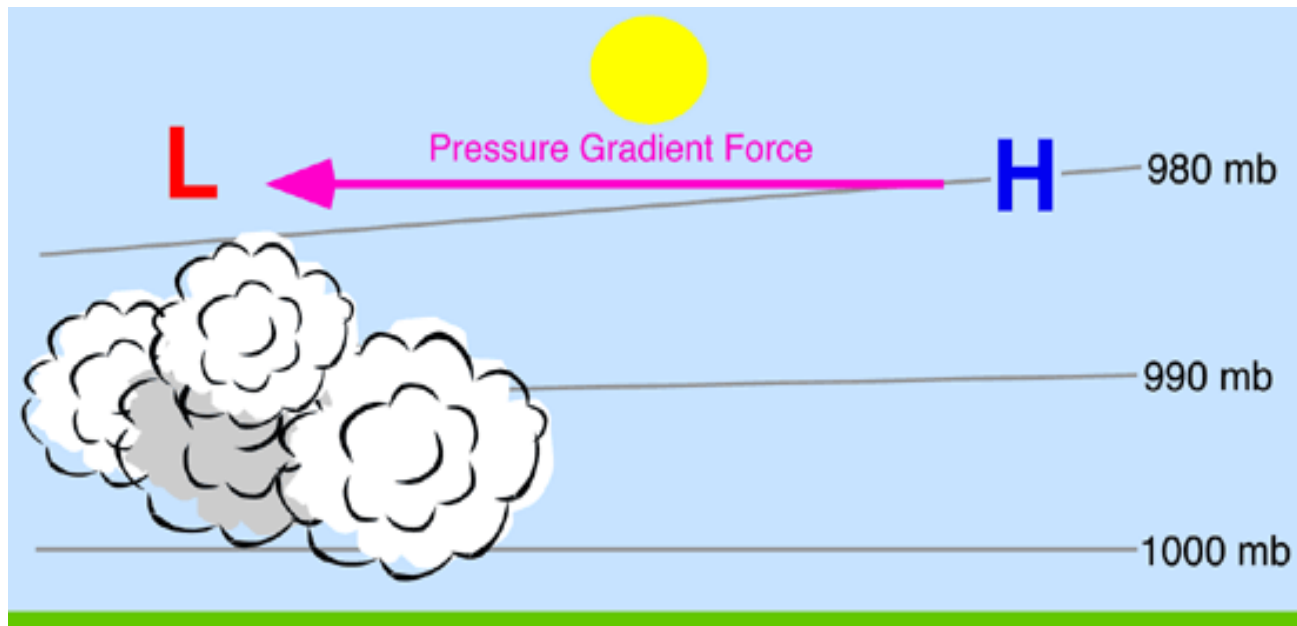


- Air pressure differences can occur due to:
 - the Sun angle at any particular spot
 - surface temperature differences (higher altitudes are cooler than lower altitudes)
- As air **warms**, it **expands** and becomes **less dense** creating **lower air pressure (L)**.
- **Cool** air **sinks** and becomes **denser** creating **higher air pressure (H)**.

Differences in air pressure cause **wind**:
flow of air on a large scale.

Wind

- Winds blow (that is *air moves*) from areas of high pressure to areas of low pressure.



- Wind speed is often a way of classifying storms.
Meteorologists distinguish two types of winds:
Local Winds and **Global Winds**.