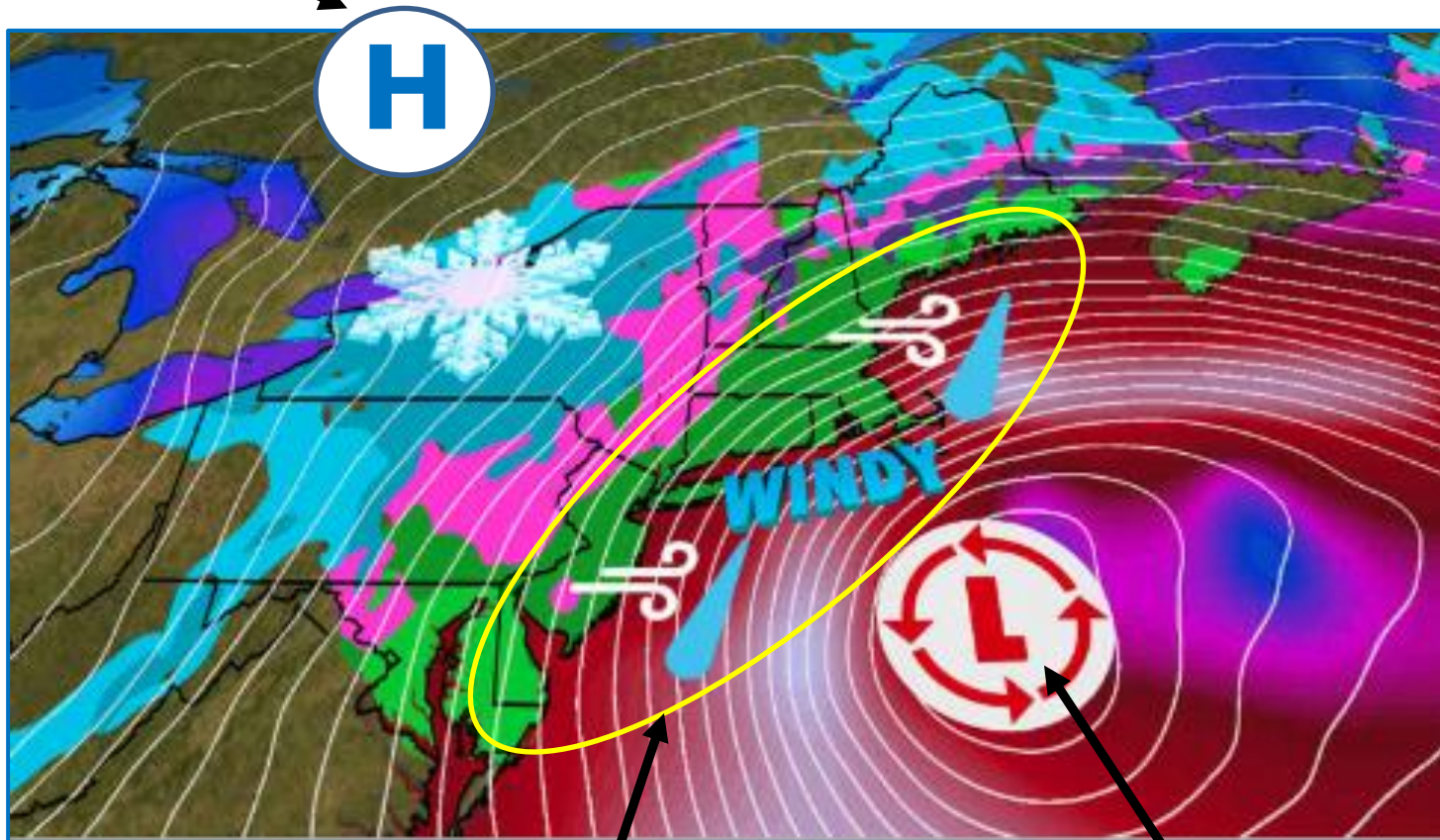


(Winter) Storm Anyone?

A Weather Map Example

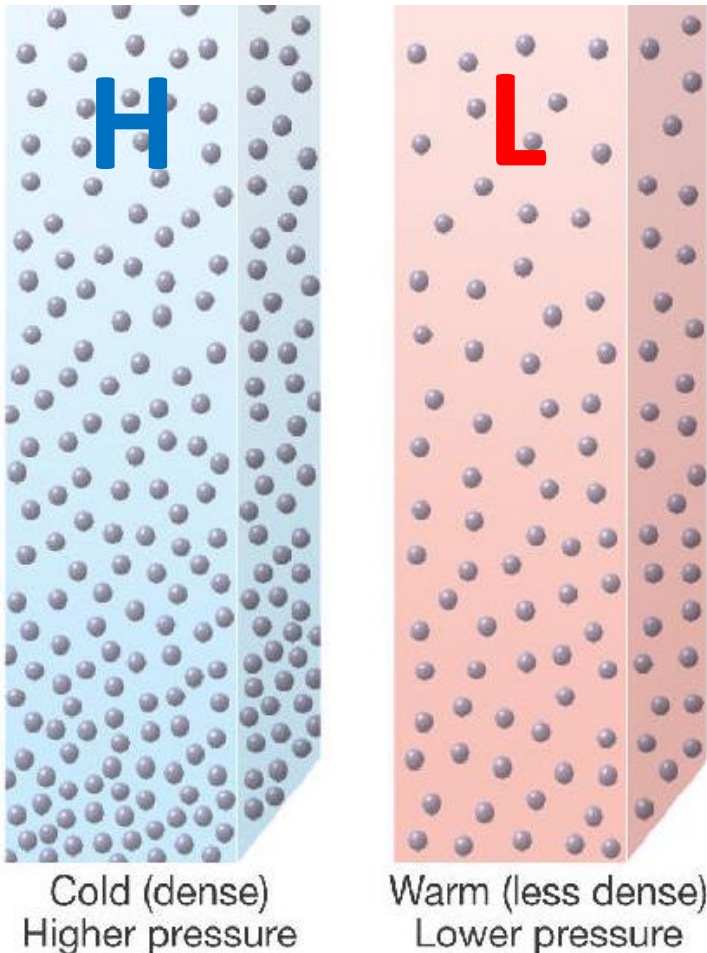
And this?



And why is it *windy* here?

What's this?

Air Pressure Differences

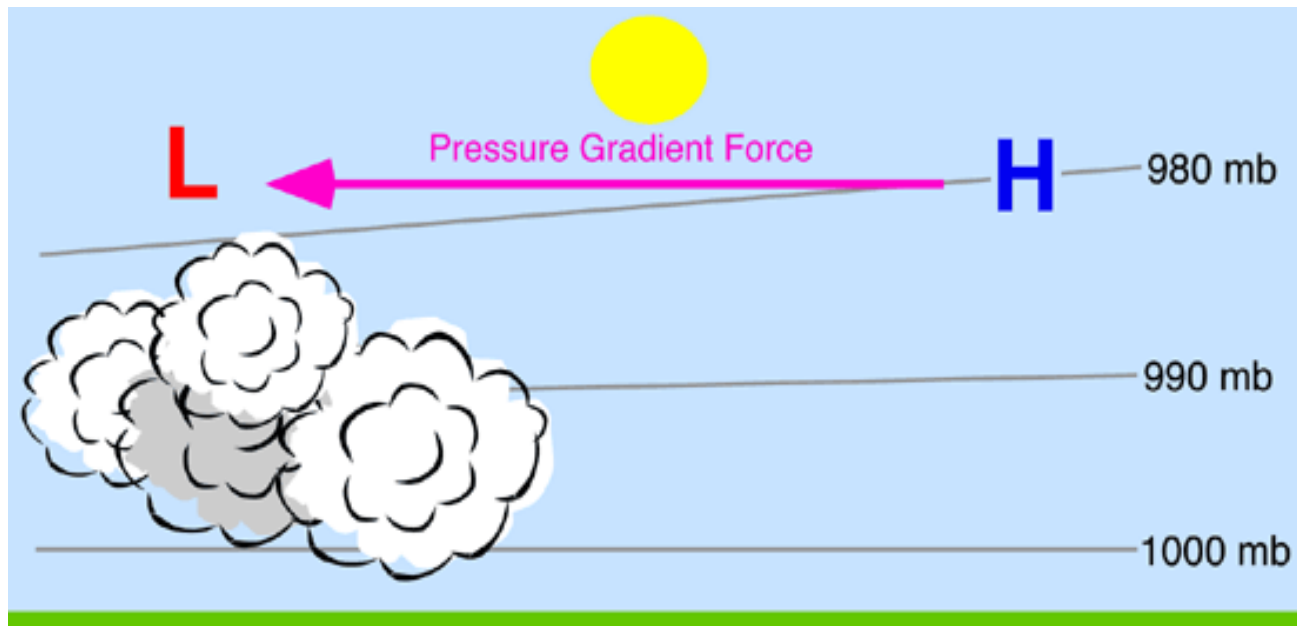


- In the troposphere, air pressure differences can occur due to:
 - the Sun angle at any particular spot
 - surface temperature differences (higher altitudes are cooler than lower altitudes)
- As air **warms**, it **expands** and becomes **less dense** creating **lower air pressure (L)**.
- **Cool**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

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

Wind Formation

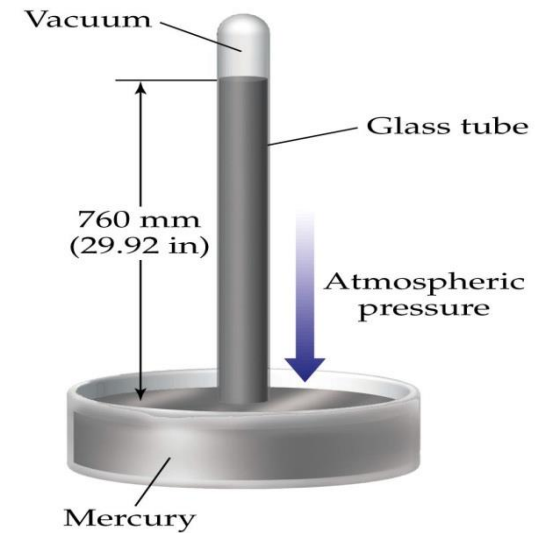
- Winds blow (that is *air moves*) from areas of high pressure to areas of low pressure.



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

How to Measure Wind?

- **Air pressure** is measured using a **barometer** (from Greek *baros* 'weight').



Winds are characterized by their **direction** and **speed**.



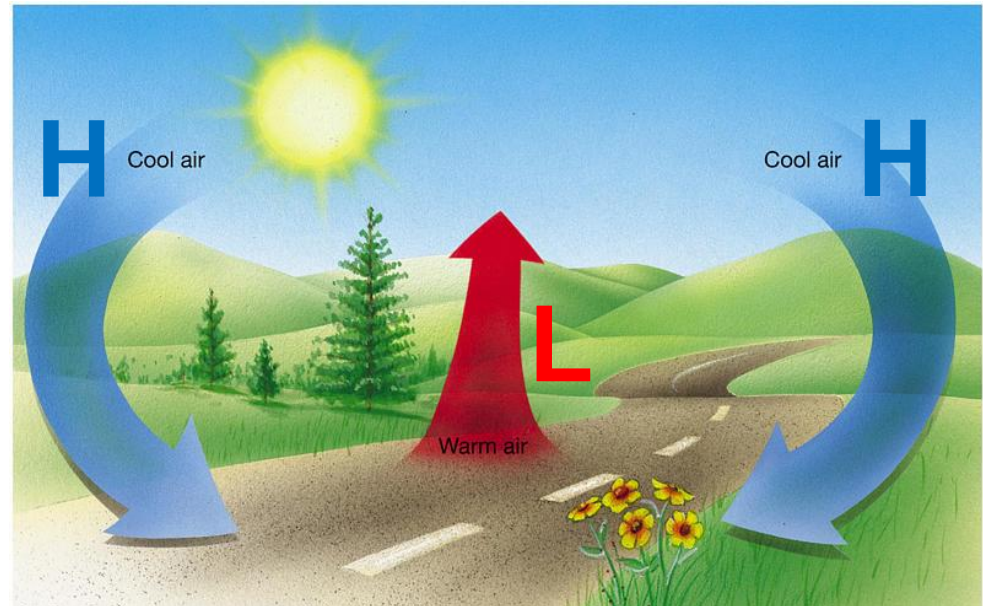
- **Winds are named** by the **direction from which they come**.

- **Wind speed** is measured by **anemometer** (from Greek *anemos* 'wind').

Local and Global Winds

Wind is the horizontal movement of air.

All wind is caused by air pressure differences due to the uneven heating of Earth's surface, which sets convection currents in motion: warm air rises and cool air falls.



- Convection currents on a **small scale** (over short distances) cause **local winds** - felt on the ground, often seasonal.
- Convection currents on a **large scale** (resulting from the difference in absorption of solar energy between the equatorial and polar zones on Earth) cause **global winds**.

Local Winds

- cover short distances

- blow from any direction

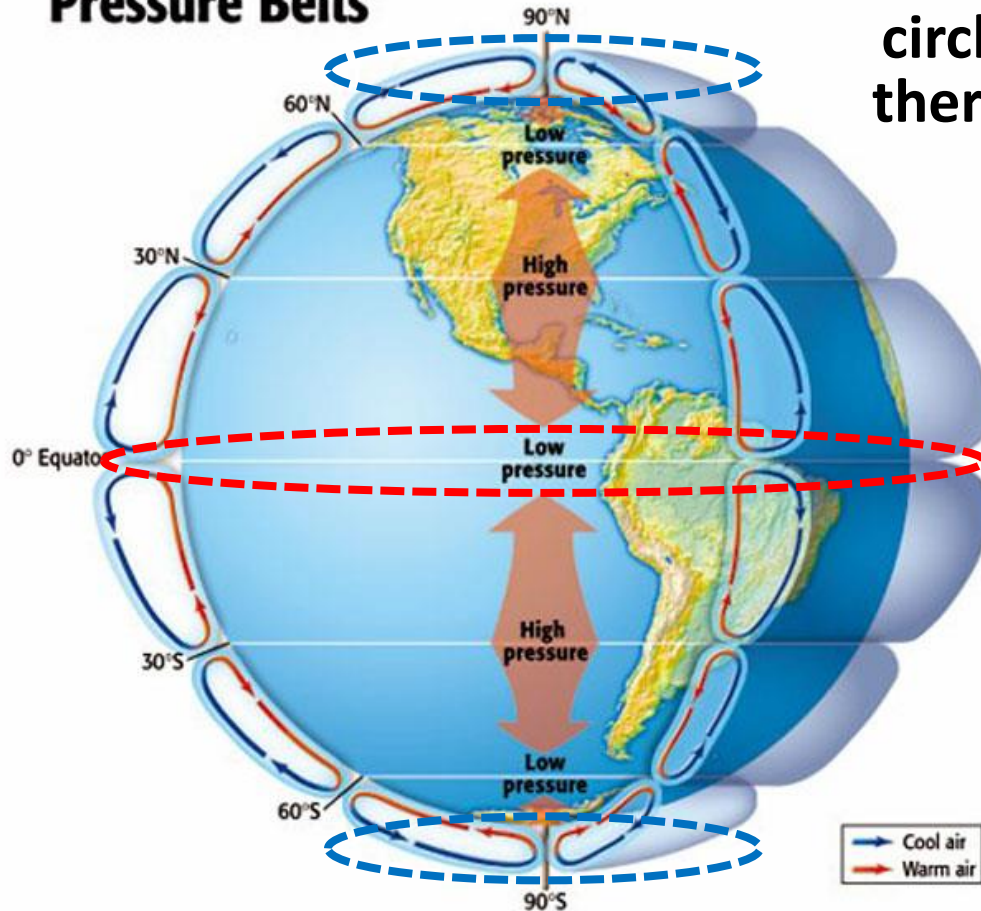


- often are seasonal

- created and influenced by local conditions, local temperature variations, and local topography.

Global Winds Formation

Pressure Belts



A series of **pressure/wind belts** circles the Earth; between them there are calm areas where air is rising or falling.

- **Example:**

- since the warm air **near the equator** is less dense, it rises forming areas of **low pressure**
- the cold air **near the poles** sinks because it is more dense, forming areas of **high pressure**

The air moves in large circular patterns called **convection cells**.

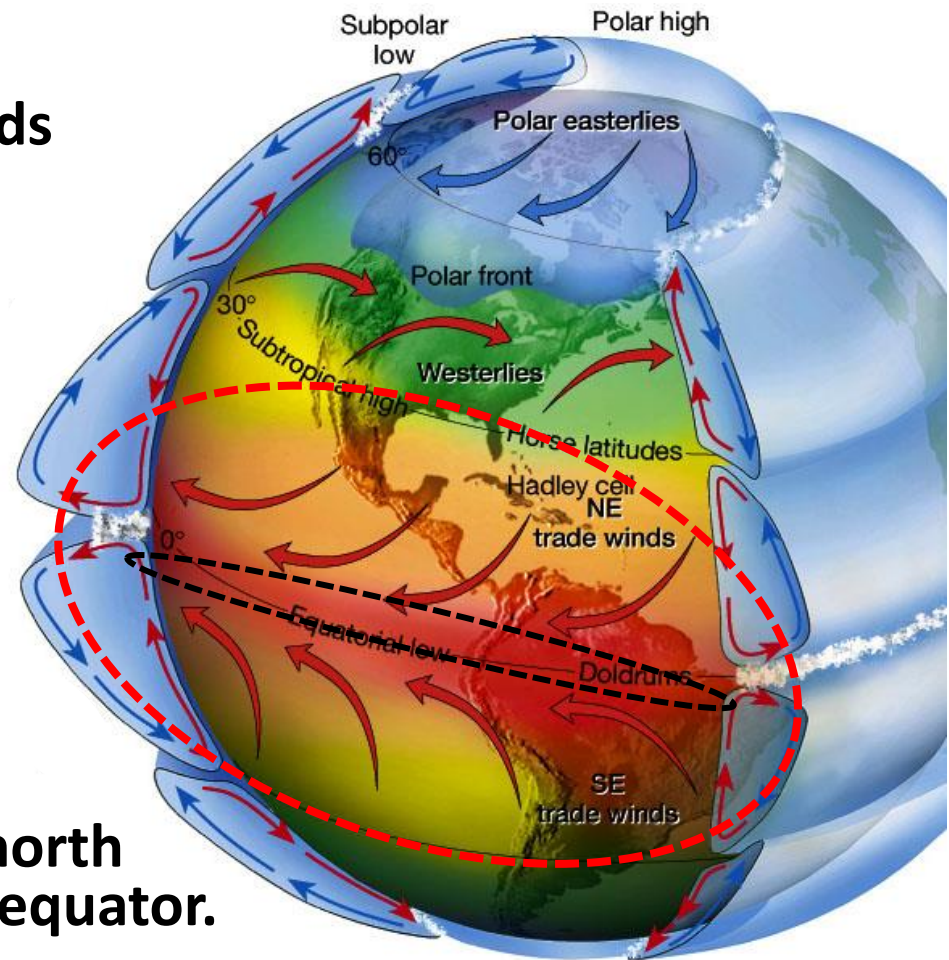
Types of Global Winds

Doldrums:

- **Calm** and **weak** surface winds located at the equator.
- **Name origin:** early sailors found that there were no winds near the equator for considerable periods of time (these *calm periods* were called *doldrums*) - the ships were essentially stuck in one place, not being able to move forward.

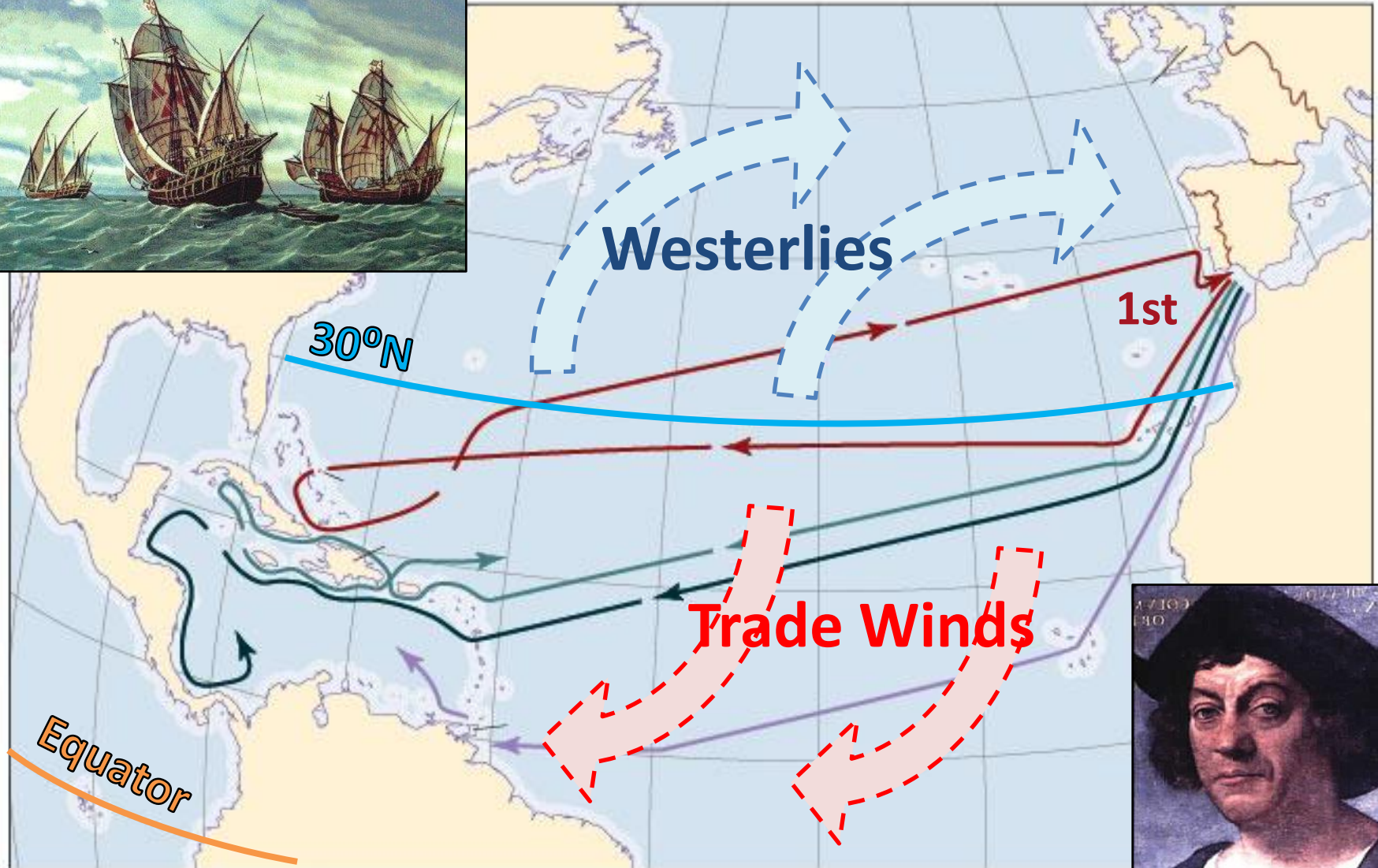
Trade Winds:

- Found between about 30° (north and south) latitude and the equator.
- **Steady** and **strong**, blow about **11 to 13 mph**.
- **Name origin:** from their ability to propel *trading ships* across the ocean.



Voyages of Christopher Columbus

1492-1504



Types of Global Winds

Horse latitudes: calm areas at 30°

Prevailing Westerlies:

- **Strong** winds located in the belt from 30-60° latitude in both hemispheres.
- Originate in horse latitudes.
- Blow *from west*, tend towards the poles.

Polar Easterlies:

- Cold, dry, **weak**, irregular.
- Found near the North and South Poles reaching to 60° latitude.

Both of these have a strong impact on the US weather.

