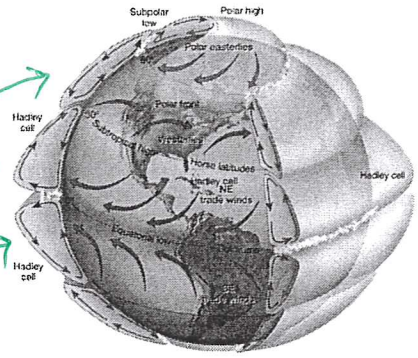
What causes wind?

- The SUN ! It heats the surface of the Earth unevenly
- Cold air is more dense than warmer air.
- Therefore, the colder air sinks and places pressure on the Earth's surface = areas of high pressure.
- Air moves from areas of higher pressure to lower pressure
- Wind : movement of air from an area of higher pressure to an area of lower pressure.
  - Greater difference in air pressure = faster the air moves
- Cold, dense air at the poles creates areas of high pressure at the poles.
- Warm, less-dense air at the equator forms areas of lower pressure.
- The air moves in small, circular patterns called convection cells

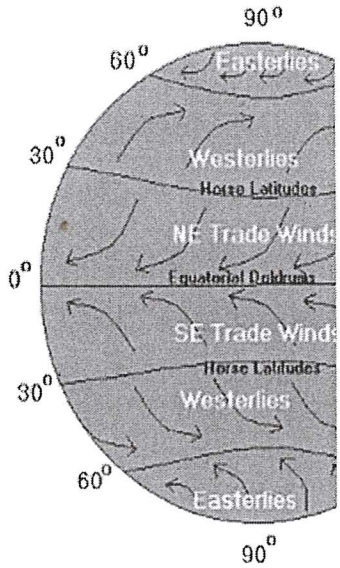


Wind Affected by Earth's Rotation

- Winds do NOT blow in a straight line. Due to the Earth's rotation, winds are deflected, or curved.
- The Coriolis Effect: the apparent curving of the path of a moving object from an otherwise straight path due to Earth's rotation.
  - Causes the air in the northern hemisphere of our earth to turn to the right and the air in the southern hemisphere to turn to the left.

Global Winds

- Wind systems that occur at or near Earth's surface.
- 3 Main Global Winds:
  1. Trade Winds – come from the east and blow to the west
     a. Blow between 30 degrees latitude and the equator N and S
  2. Westerlies – come from the west and blow toward the east
     a. Can carry moist air over the US producing rain and snow
     b. Blow between 30 and 60 degrees latitude
  3. Polar Easterlies – come from the cold, sinking air as it moves from the poles and curve to the west
     a. Can carry cold, Artic air over the US, producing snow and freezing weather
     b. Blow between the poles and 60 degrees latitude

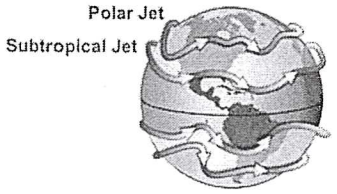


Calm Air

- Trade winds of both hemispheres meet in a calm area around the equator called doldrums.
  - Very little wind blows
  - Near the equator, the sun heats the air and causes it to rise, creating low pressure and little wind. The rising air eventually cools and it then rains.
  - "dull" or "sluggish"
- Horse Latitudes: calm areas at about 30 degrees latitude in both hemispheres.
  - Air stops moving in these areas and sinks

Jet Stream: Narrow belt of high-speed winds that blow from west to east between 7 km and 16 km above Earth's surface

  - Polar jet stream and subtropical jet stream
  - Why is this called the "Jet stream"?
    - Airplanes traveling "with" the jet stream will travel faster because the wind is helping the airplane move forward



Local Winds

- Movement of air over short distances
- Can blow from any direction, depending on features of an area
- Valley and Mountain Breezes
  - Valley breezes occur during the day because the sun heats the valley air quickly and the warm air rises and moves up the mountain
  - Mountain breezes occur at night when the mountain air cools faster than the valley
    - The cool air sinks down the mountain causing the wind to move in the opposite direction
- Sea and Land Breezes
  - Sea breeze occurs during the day because the land heats up faster than the water
    - Cool air from the water moves toward the rising warm air over land
  - Land breeze occurs during the night because the land cools faster than the water
    - Air above the ocean rises and pulls the cool air from the land creating the breeze