

Causes of Weather



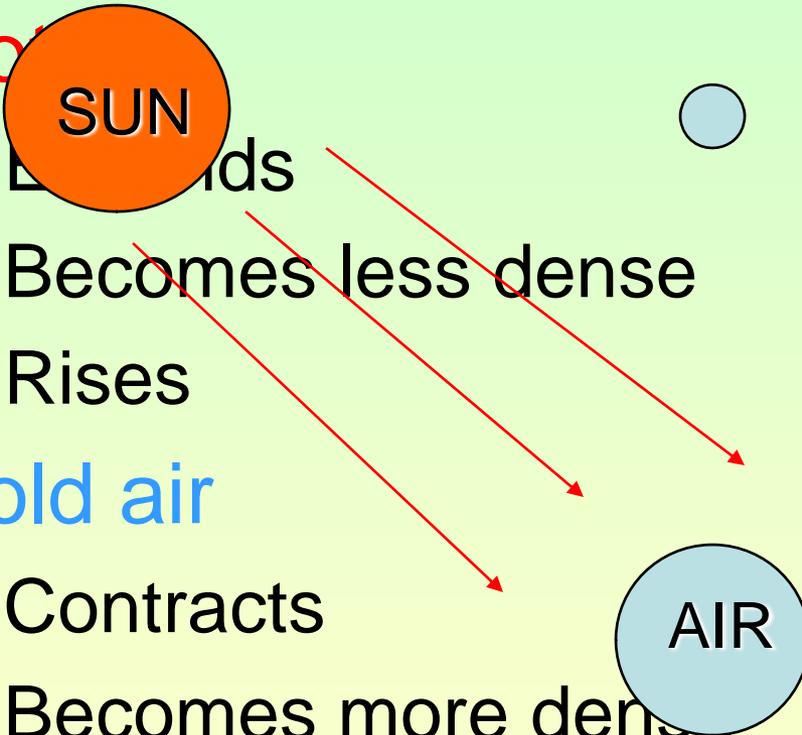
Meteorology

- ◇ A meteorologist studies the events and factors of weather
- ◇ A meteorologist knows that there are three ingredients of weather
 - Heat (from the sun)
 - Air
 - Moisture

Heat, Pressure and Wind Relationship

- We learned that the Earth is heated **unevenly** depending on
 - the location relative to the equator
 - type of surface

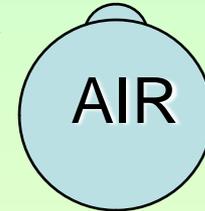
Heat influences air

- **Hot**
 - Expands
 - Becomes less dense
 - Rises
 - **Cold air**
 - Contracts
 - Becomes more dense
 - Sinks
- 

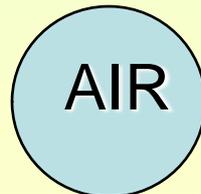
Air influences pressure

- Hot air

- Cold air



Less
Pressure

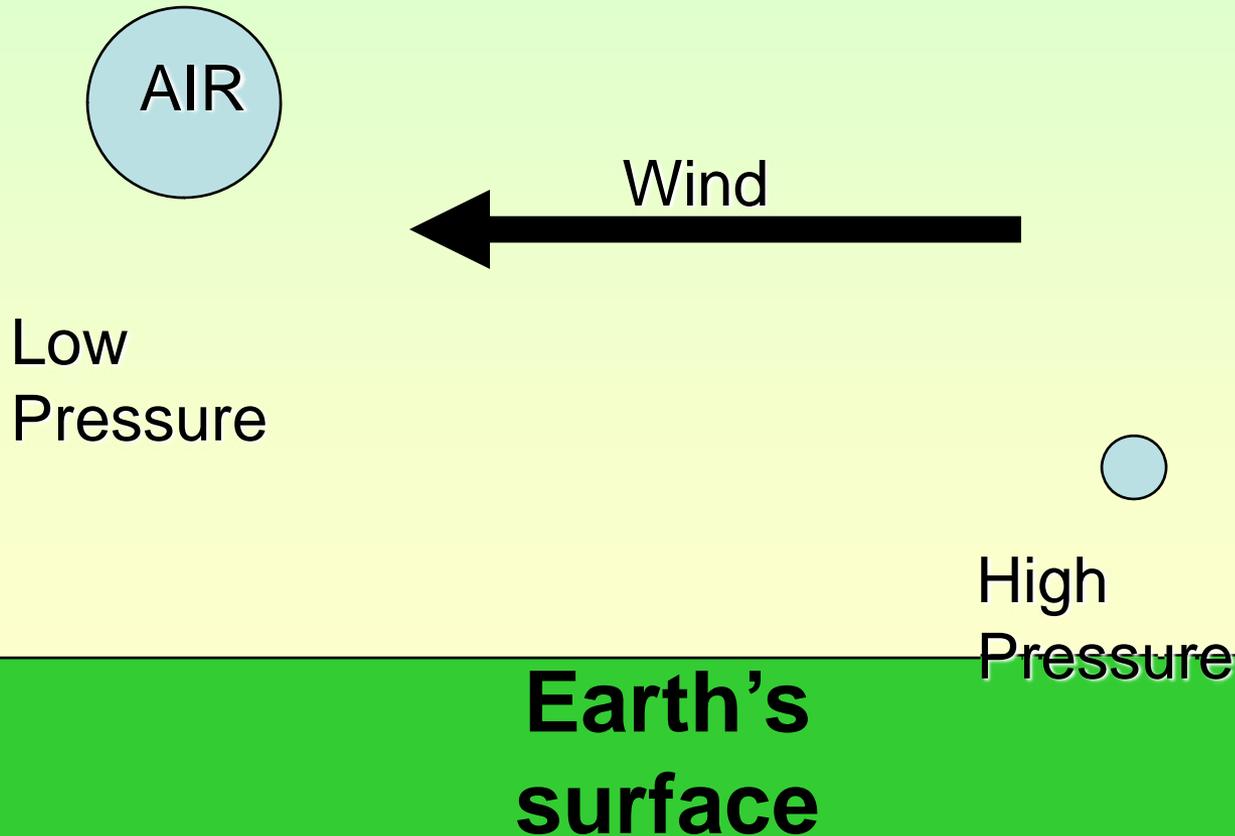


More Pressure

**Earth's
surface**

Wind relates to pressure

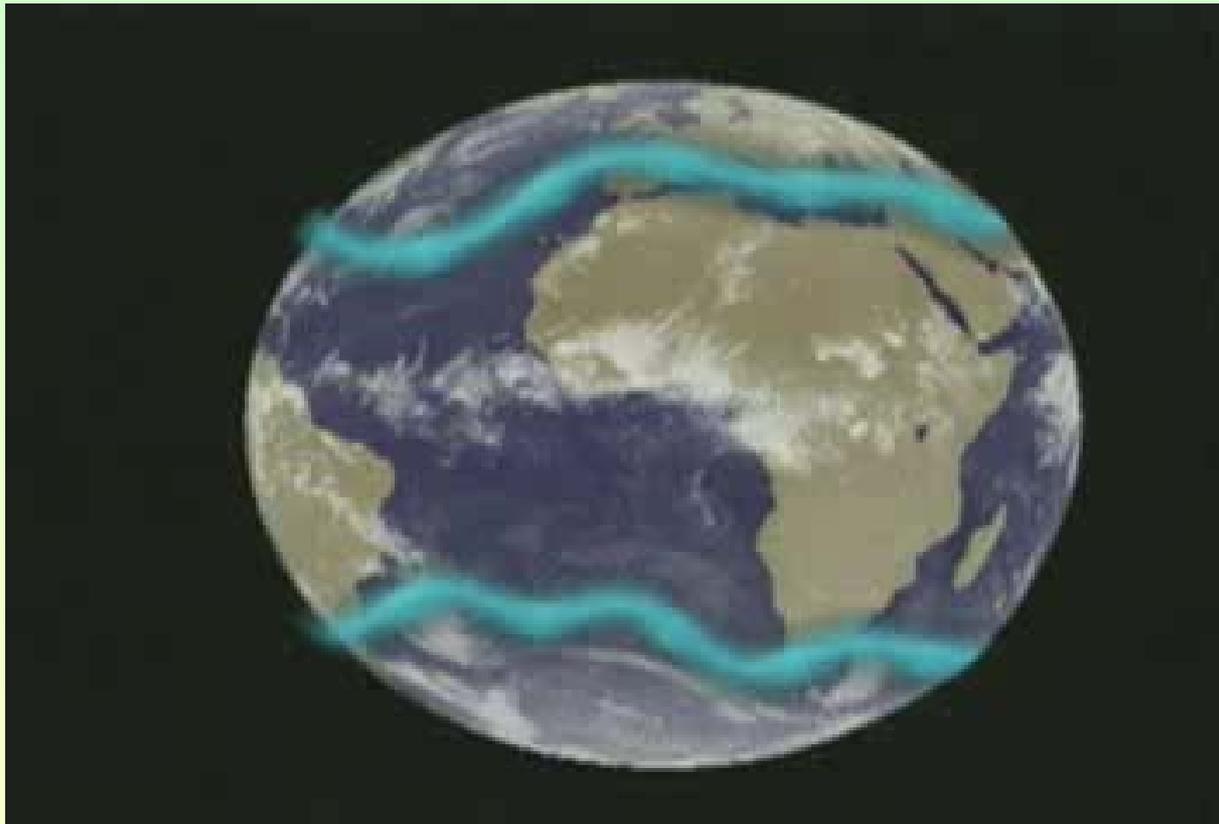
- Wind always moves from high to low pressure



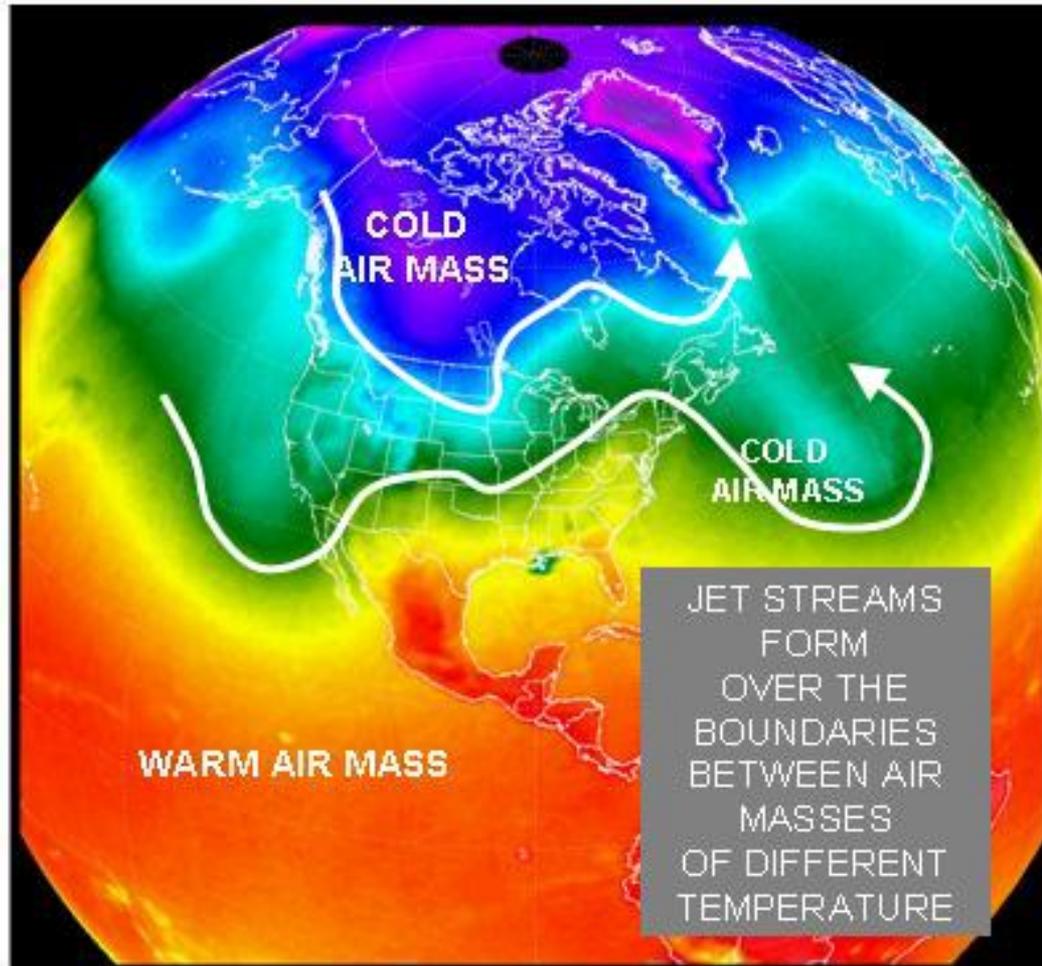
Jet Streams



- Narrow bands of fast, high-altitude westerly winds
- Constant presence due to high temps at equator and low temps at poles.
- Flow up to 185 km / hr
- Jet streams resemble jets of water, which is where they get their name
- Disturbances along jet streams give rise to large scale weather systems.



Jet Stream



Air, heat, and moisture

- Moisture is an ingredient of weather
 - We see it as precipitation
- Heat influences what the precipitation looks like
 - Snow, rain, hail, etc.
- Air moves moisture
- The density (influenced by heat) of the air affects how much moisture the air can hold
 - Warm air, expands, has more space to hold moisture
 - Cool air, contracts, has less space to hold moisture

Air Masses

- ◇ Air Mass – a large body of air that takes on characteristics of the area over which it forms
- ◇ Source region – the region where the air mass forms

Why are air masses which originate over land drier than those over water?

Duh....air masses are classified according to their source regions

Source Regions of Air Masses

<u>Abbr.</u>	<u>Name</u>	<u>Description</u>
(cT)	Continental Tropical	Warm and dry
(mT)	Maritime Tropical	Warm and humid
(cP)	Continental Polar	Cold and dry
(mP)	Maritime Polar	Cold and humid
(A)	Arctic	Very cold and dry

Air Mass Modification - the exchange of heat or moisture with the surface over which an air mass travels

Continental Arctic
Bitterly cold, dry

Maritime Polar
Cool, moist

Continental Polar
Cold, dry

Maritime Polar
Cool, moist

Continental Tropic
Hot, dry

Maritime Tropic
Warm, moist

Maritime Tropic
Warm, moist



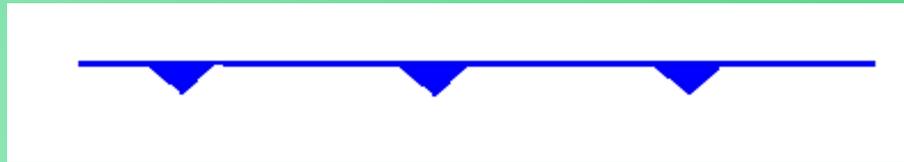
Fronts

- ◇ Definition – when 2 air masses with differing characteristics collide
- ◇ Colliding air masses can bring dramatic changes in the weather
- ◇ Types: cold, warm, stationary, and occluded

Types of Fronts

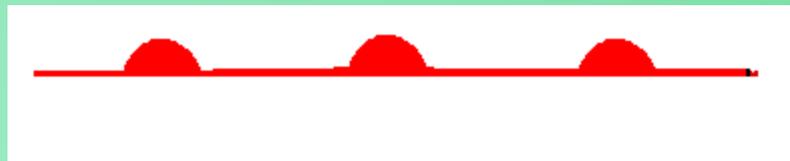
Cold Front -- cold, dense air displaces warm air

- As warm air rises, it cools and condenses
- Clouds, showers and thunderstorms are associated with cold fronts



Warm Front -- warm air displaces cold air

- Characterized by cloudiness and precipitation



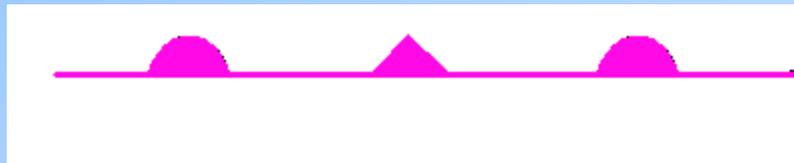
Stationary Front -- 2 air masses meet and neither one displaces the other

- the boundary between air masses stalls
- Rarely has extensive clouds and precipitation patterns, but the patterns that do occur are similar to a warm front

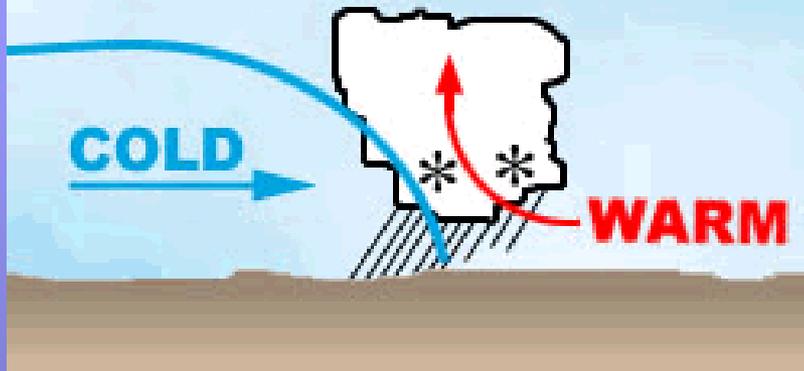


Occluded Front -- cold air mass overtakes a warm front

- warm air is lifted, which causes the cold air mass to collide with the advancing cold front
- The warm is squeezed upward between the 2 cold air masses
- Precipitation is common on both sides of the front



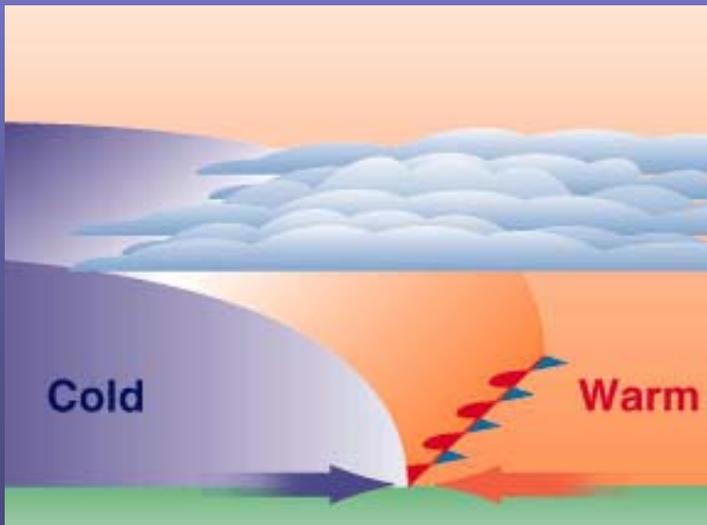
COLD FRONT



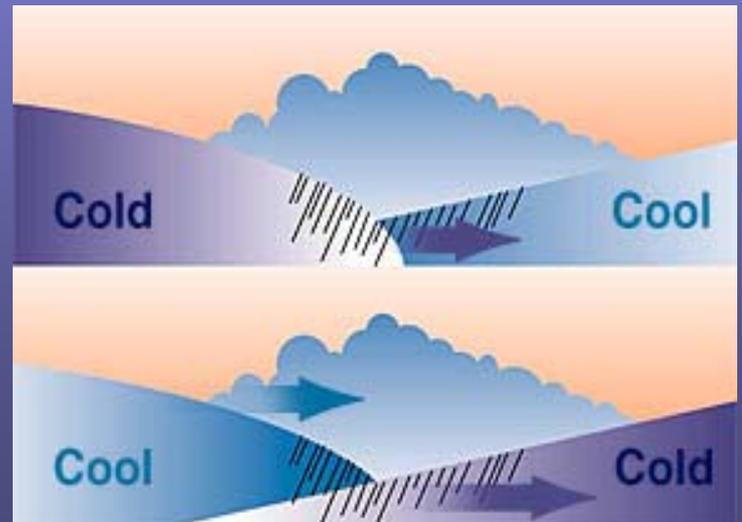
WARM FRONT



Stationary Front



Occluded Front



Global Wind Systems



- ◇ There are 3 basic wind systems
 - Trade Winds - occur at 30° N and S latitude
 - ◇ At this latitude, NE and SE trade winds occur
 - ◇ Once the air reaches the equator, it rises again and moves back toward 30° where it sinks and starts over again
 - Prevailing Westerlies - occur between 30° and 60° N and S latitude
 - ◇ Circular pattern is opposite of trade winds
 - ◇ They blow from the west to the east
 - Polar Easterlies - occur between 60° latitude and the poles
 - ◇ characterized by cold air

The End