



Friday, Oct 26, 2018

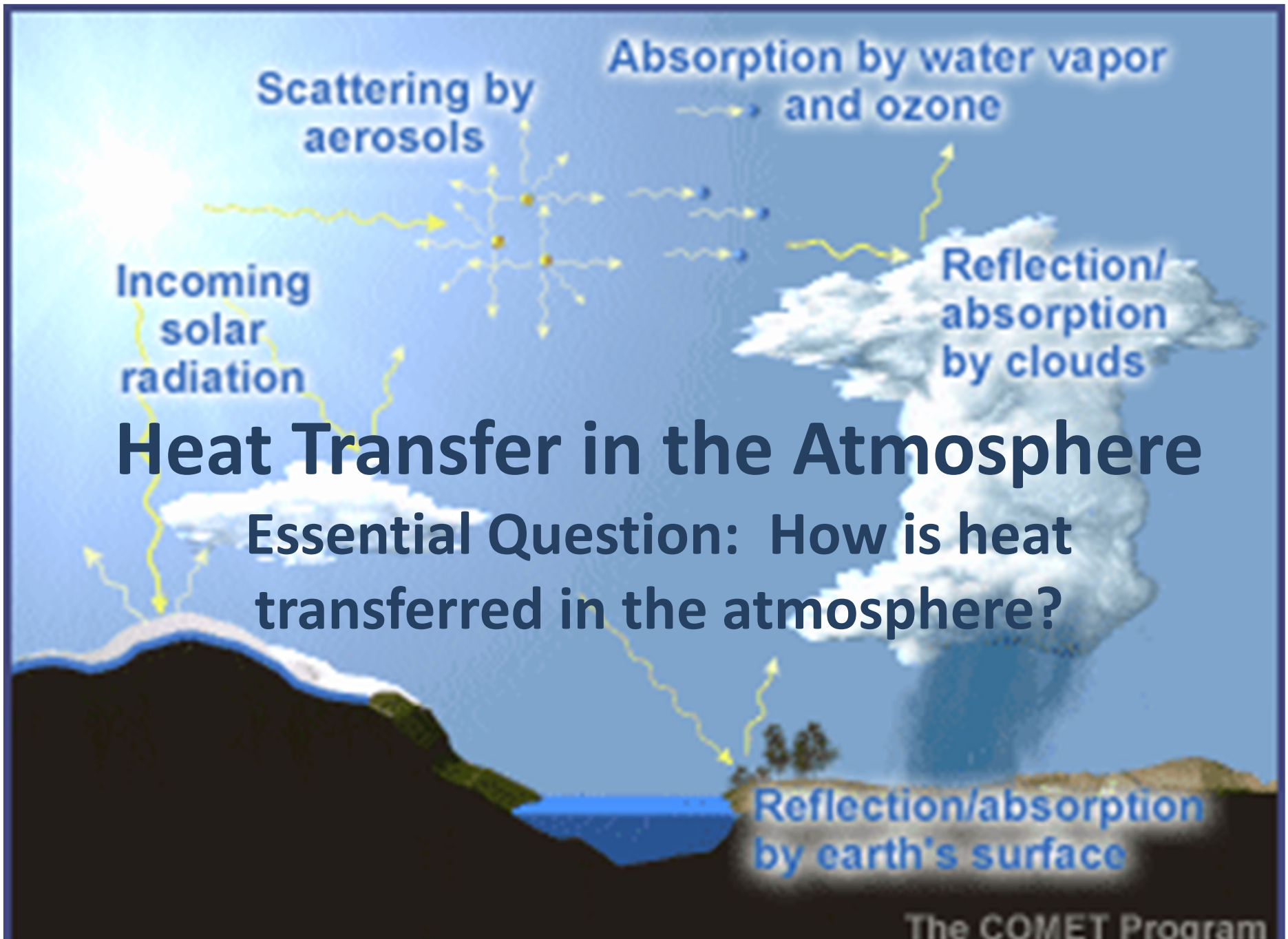
Pick up: Radiation WS ISN pg 60 at top/Weather CN pg 65

Today you will:

- Take notes on Heat Transfer/Solar Radiation pg 61
- Take notes on Weather pg 65
- Readworks.org → The Run Series #1, #2, #3, #4

HOMework:

WB Ch. 19, 21 Interactive reading due Wed

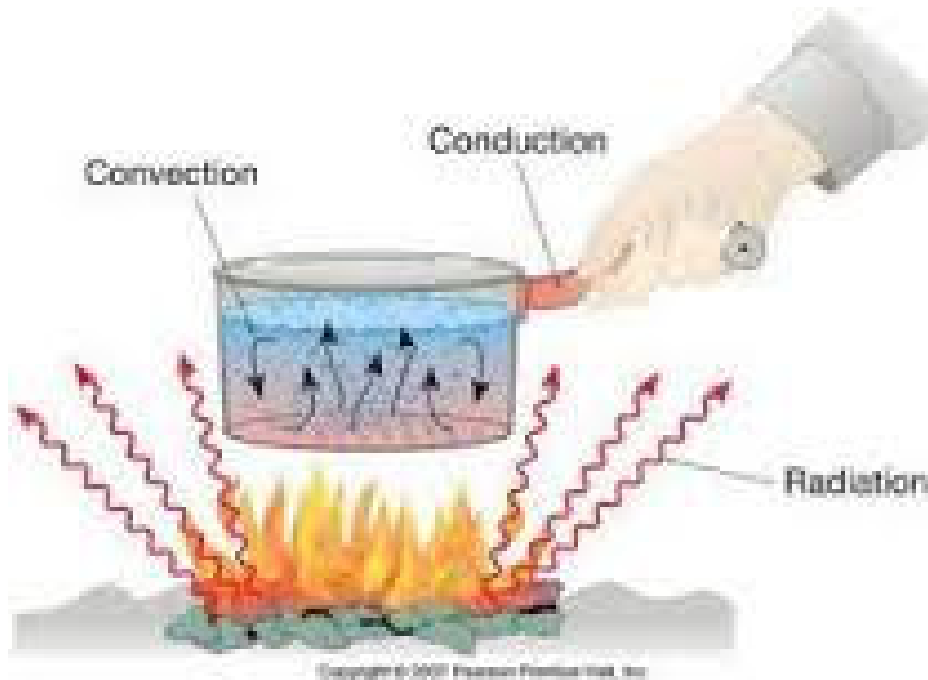


Heat Transfer in the Atmosphere

Essential Question: How is heat transferred in the atmosphere?

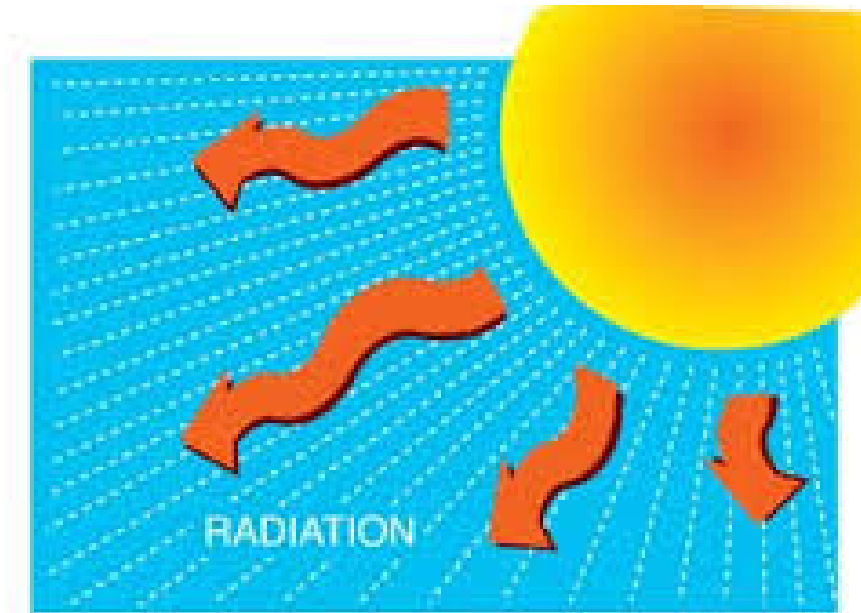
How is our atmosphere heated?

- There are three ways heat is transferred in Earth's atmosphere.
- Radiation, conduction, and convection



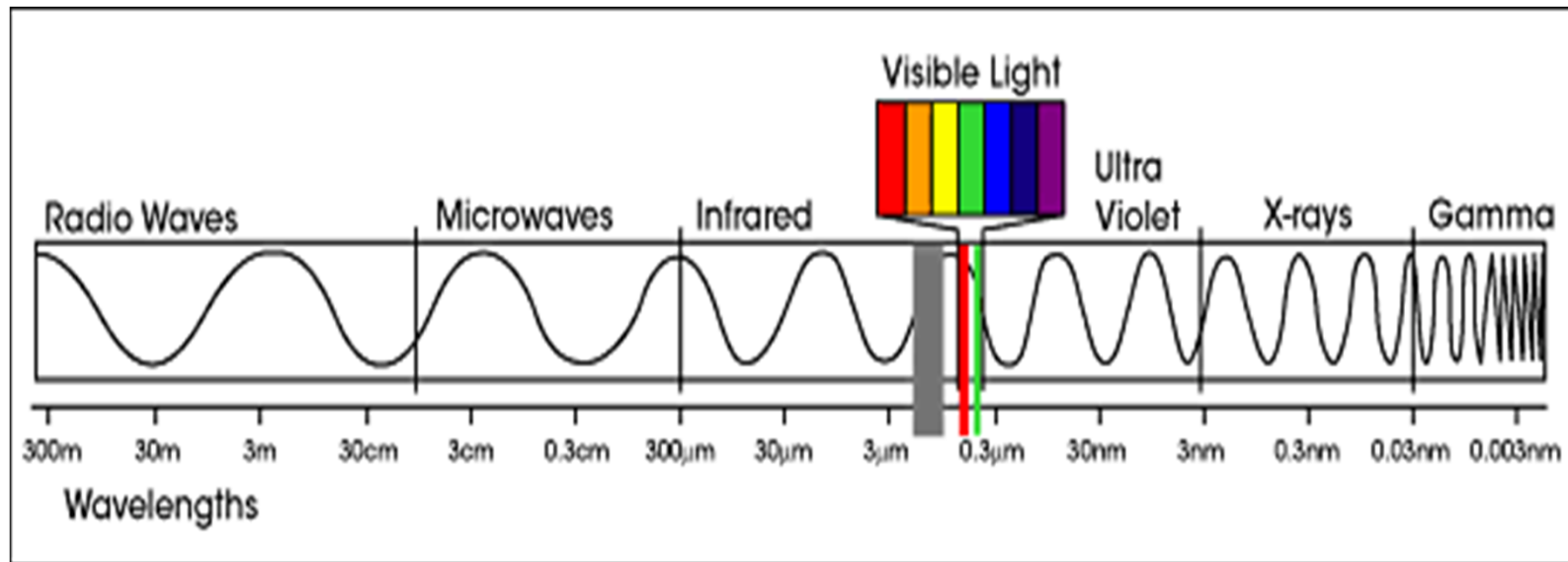
Where does most of Earth's heat come from?

- Almost all of Earth's energy comes from the sun.
- Energy from the sun travels to the Earth as radiation.

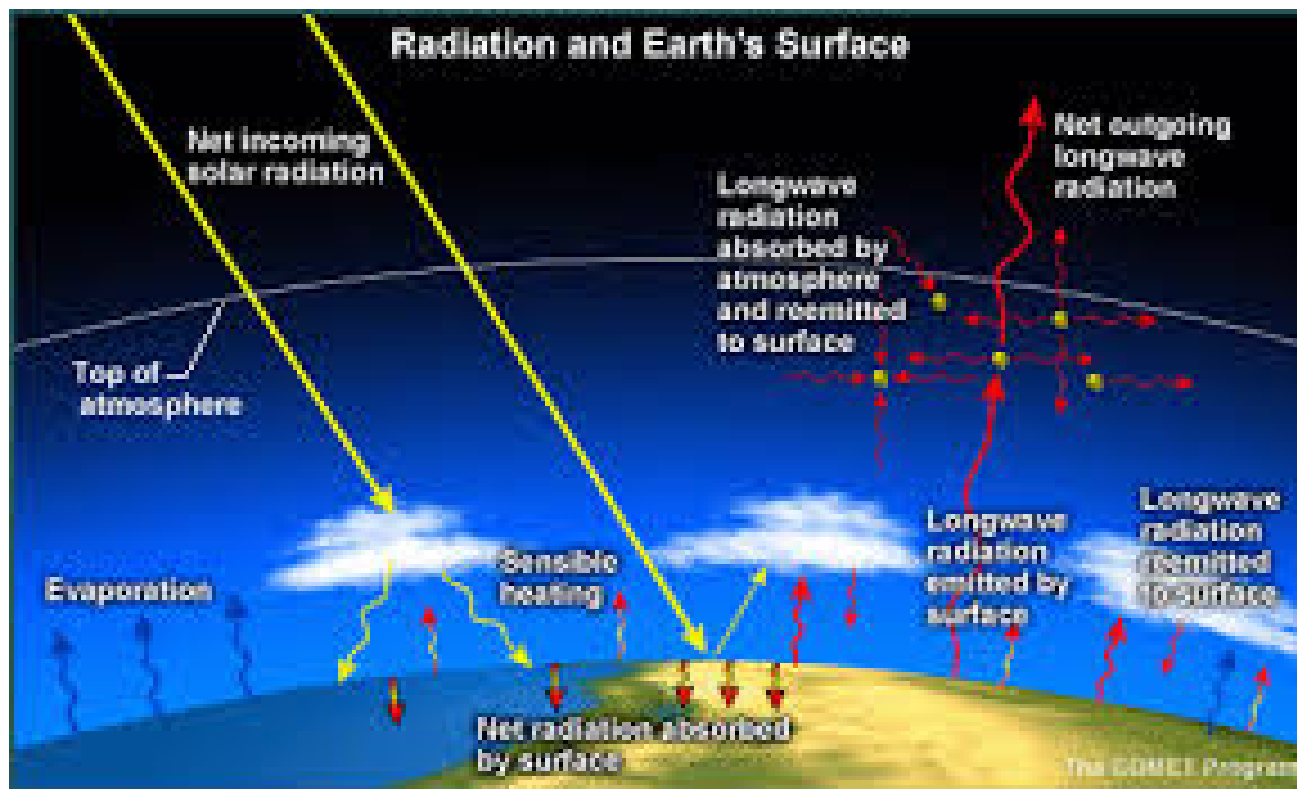


Radiation

- Heat transfer by electromagnetic waves.



- Wavelengths shorter than visible light are absorbed in the upper atmosphere.
- Solar radiation is absorbed by Earth's surface or reflected back into the atmosphere (albedo).



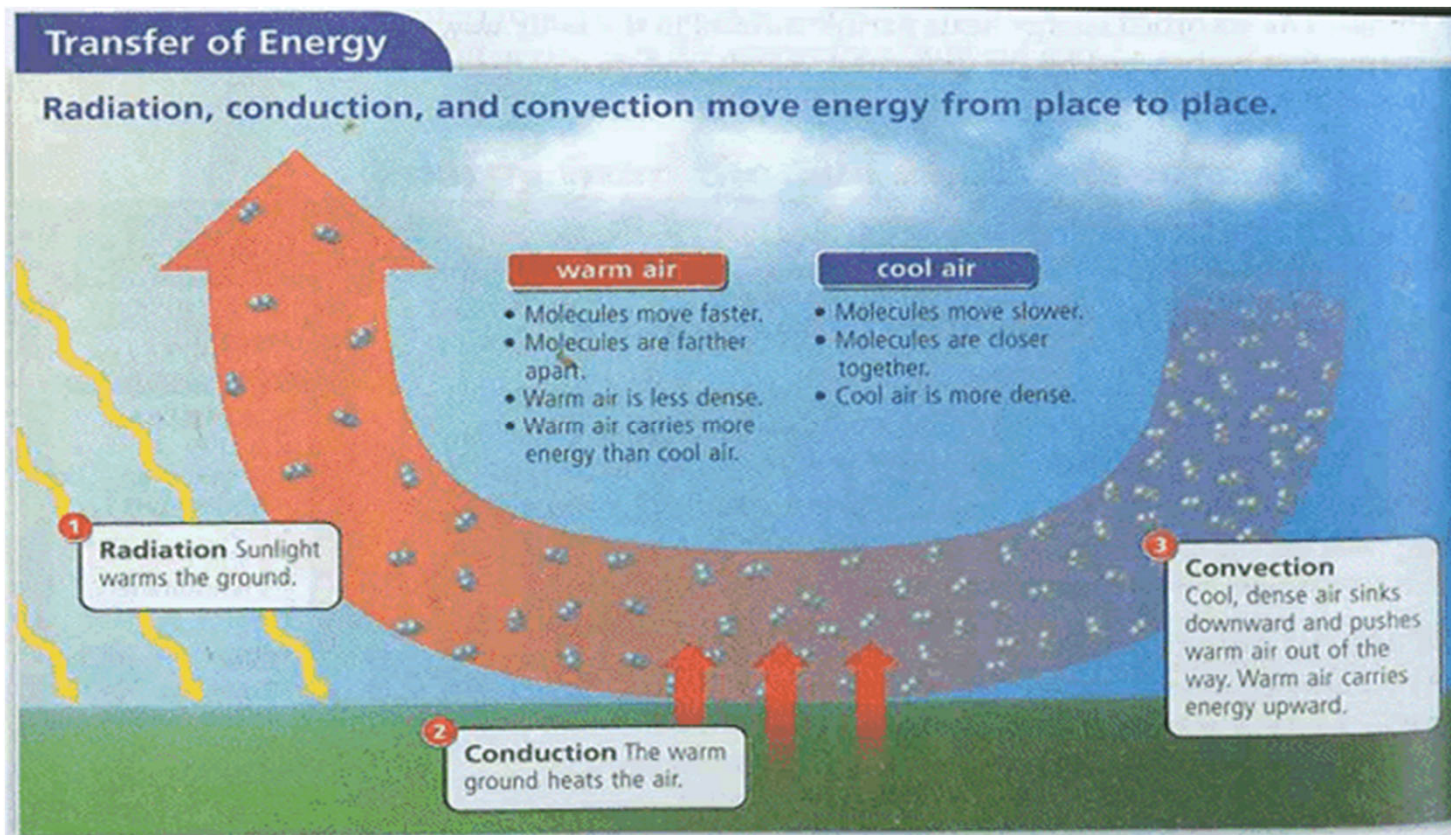
What is conduction?

- Conduction is heat transfer through a material.
- The layer of air on Earth's surface is heated by contact with earth.

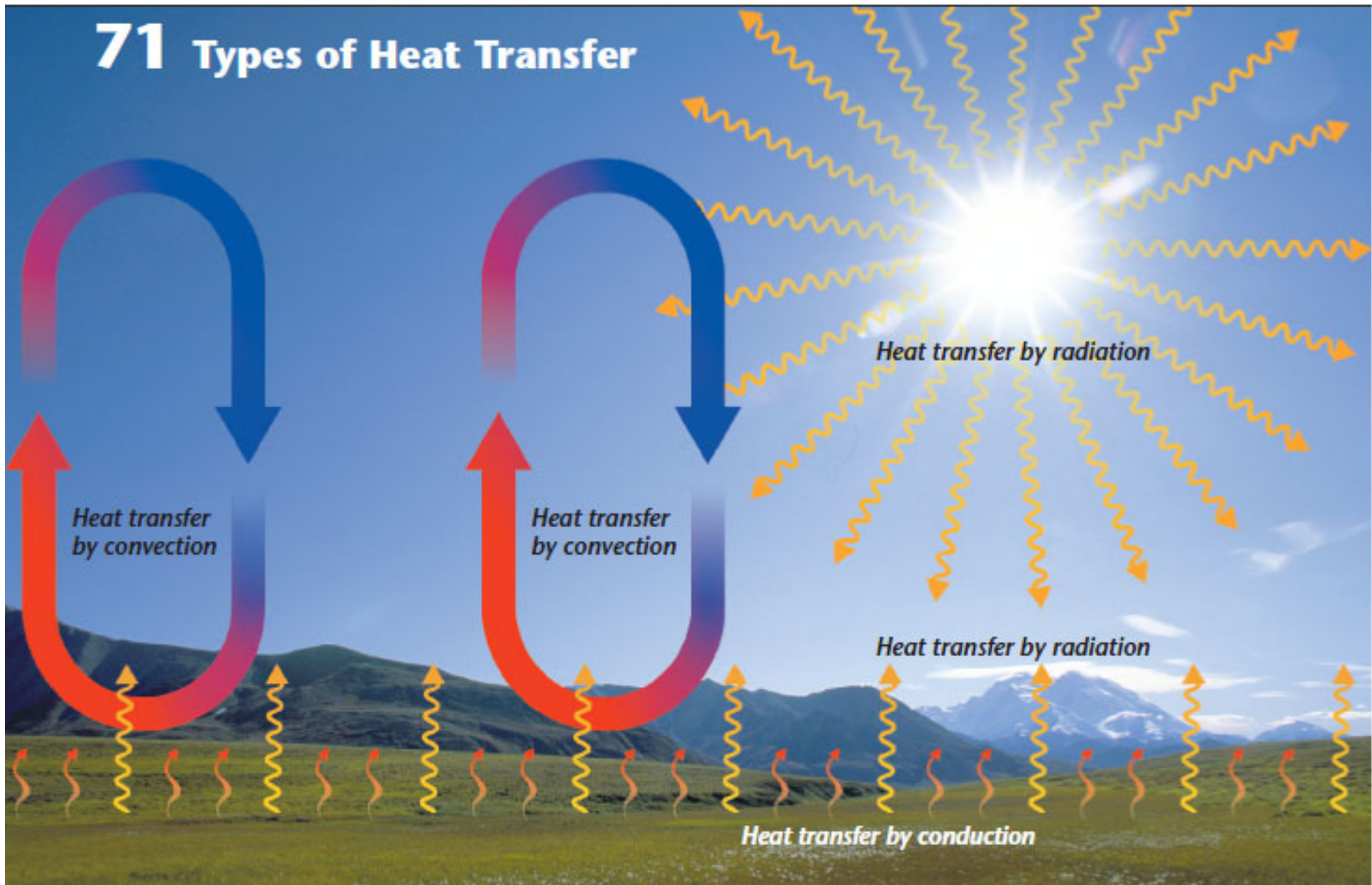


What is convection?

- Convection is the movement of matter due to differences in density caused by temperature differences. Warm fluids rise, cool fluids sink.

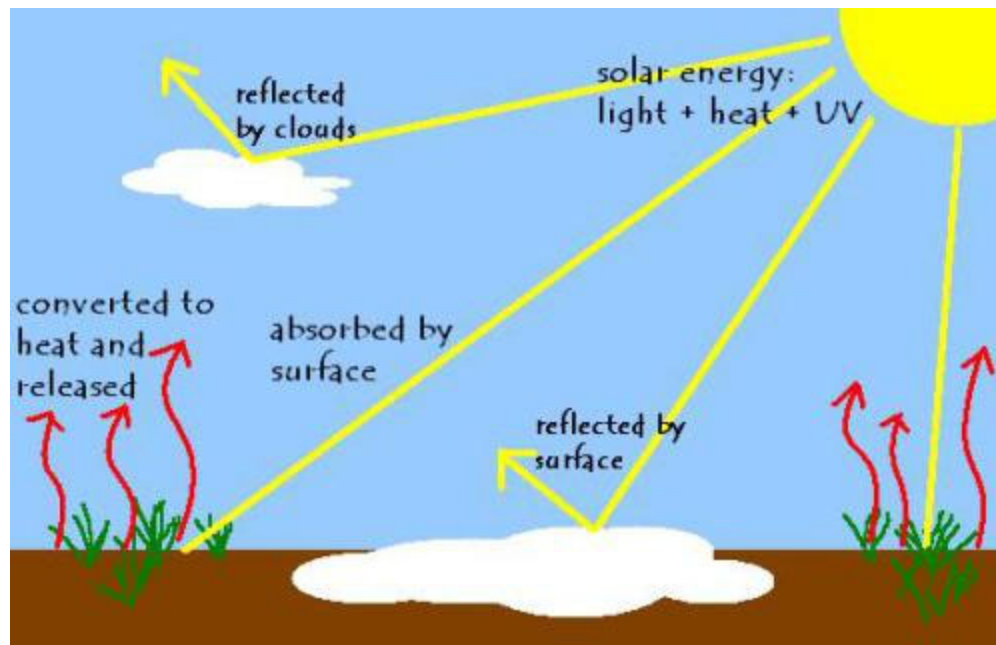


71 Types of Heat Transfer

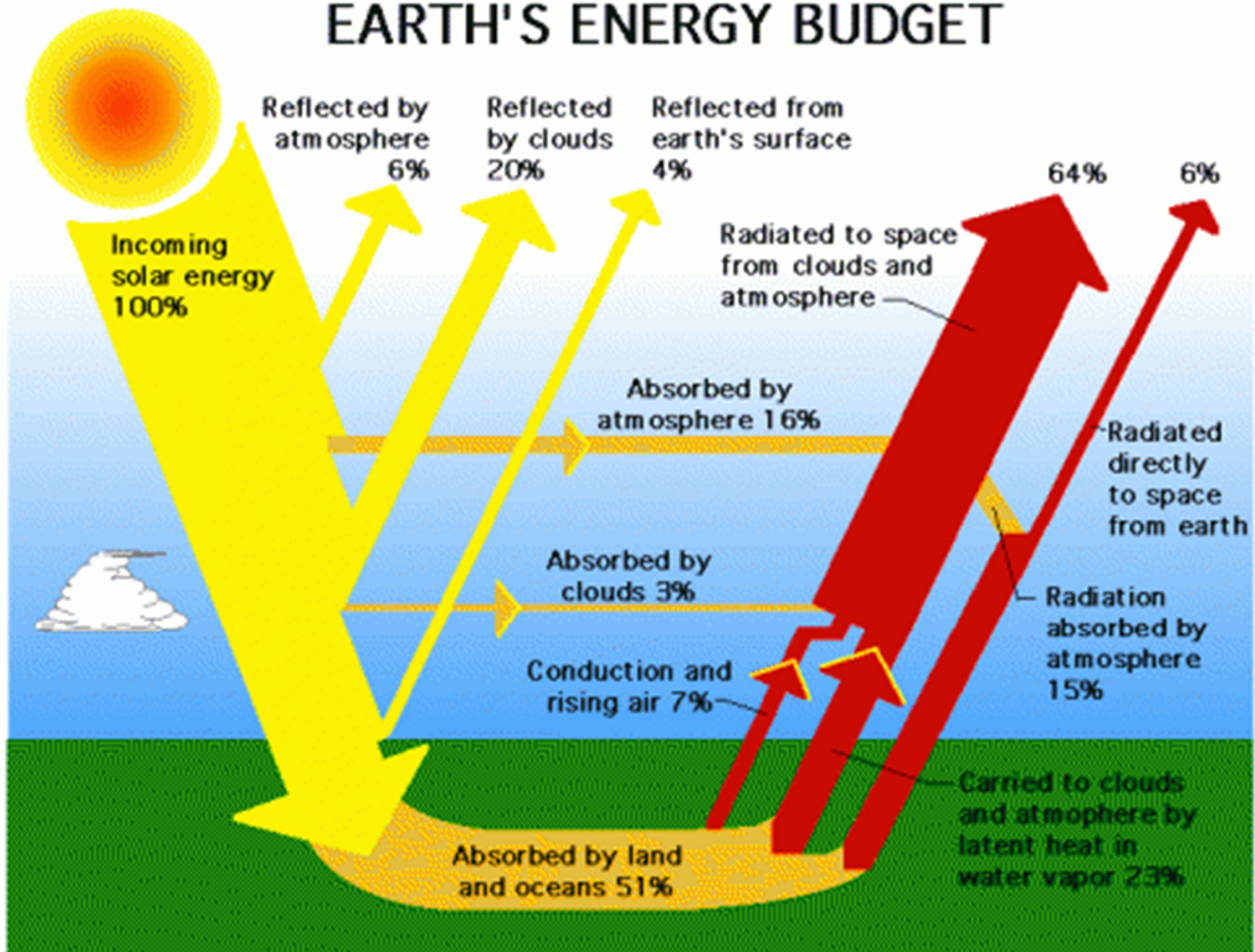


What is Earth's heat budget?

- The amount of energy entering the Earth via the sun is approximately the same as the amount of energy exiting the Earth.

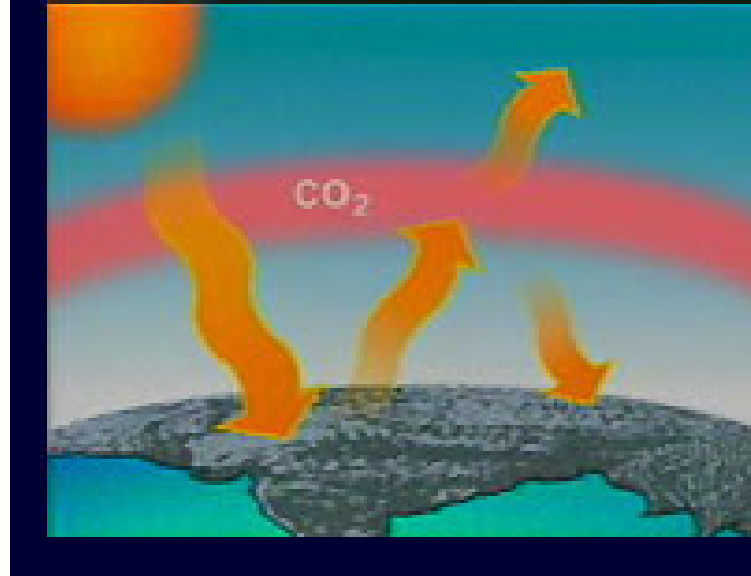


EARTH'S ENERGY BUDGET



What is the Greenhouse Effect?

- The greenhouse effect is the warming of Earth that occurs when carbon dioxide and water vapor in the air absorb radiation.



What happens to our heat budget if...

- We increase carbon dioxide in the atmosphere?

WEATHER INSTRUMENTS

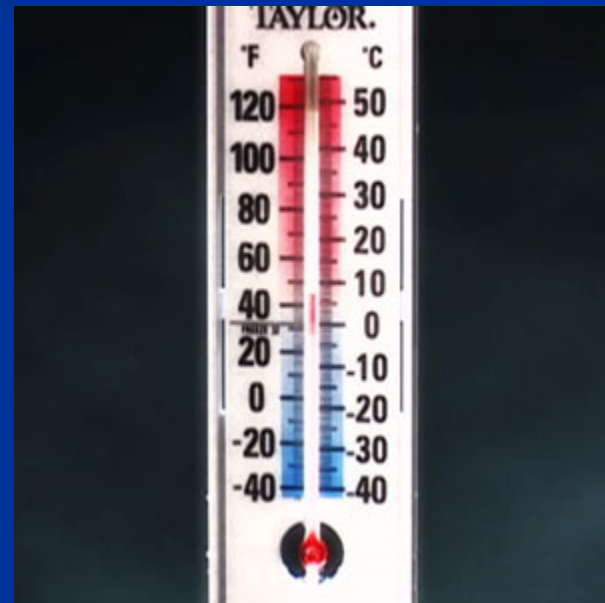
Rain Gauge

- Type of instrument used by meteorologists
- Used to gather and measure the amount of liquid precipitation over a set period of time
- Most rain gauges generally measure the precipitation in millimeters



Thermometer

- A device that measures temperature
- Measures in either Fahrenheit or Celsius



Barometer

- an instrument used to measure atmospheric pressure
- Atmospheric pressure is the force per unit area in the Earth's atmosphere.



Wind Vane or Weather Vane

- A wind vane is also called a weather vane
- It is one of the oldest weather tools
- It is a tool for measuring wind direction
- It spins on a rod and points in the direction from which the wind comes.



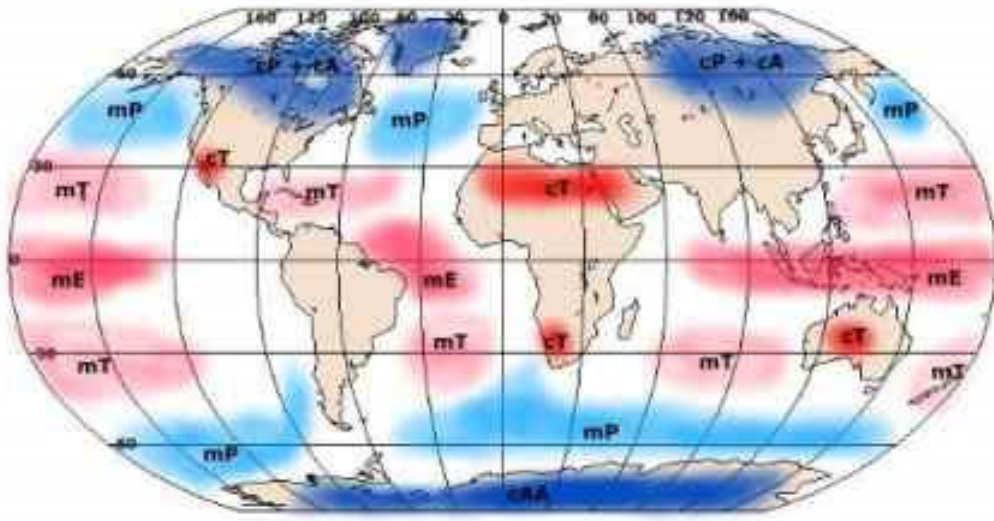
Anemometer

- It is a device for measuring wind speed
- It is one instrument used in a weather station

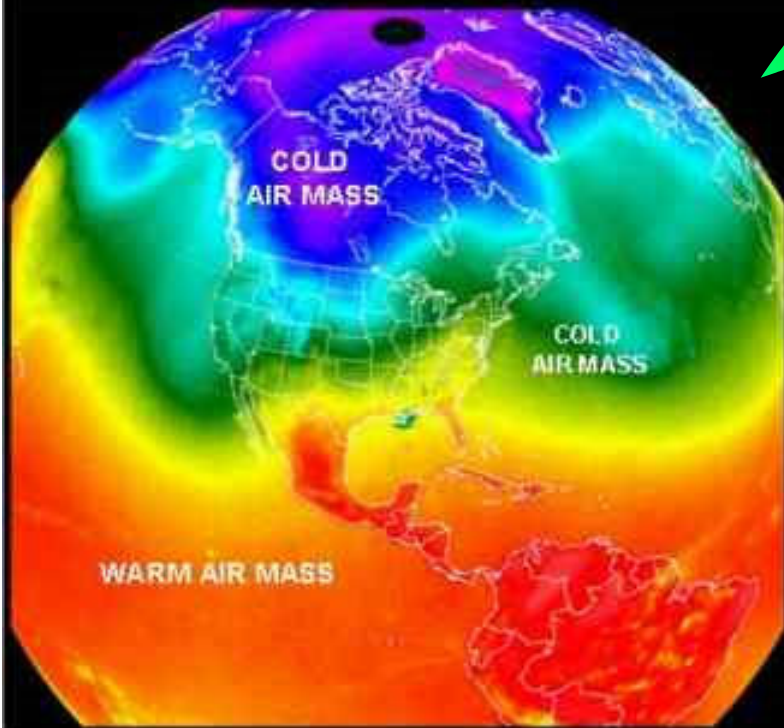


Psychrometer

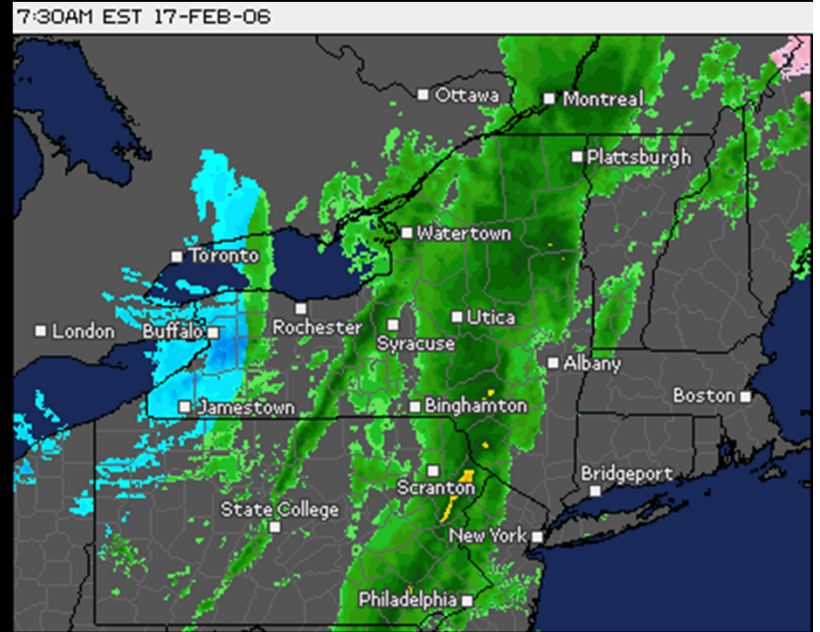
- Measures humidity in the air
- Humidity is the amount of moisture in the air.



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Air
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AIR MASSES

What's the definition?

**A large body of
air with similar
characteristics
throughout**

AIR MASSES

MOVE

From areas of high pressure

TO

**Areas of low
pressure**

Air pressure differences are caused by unequal heating of Earth's surface. Air over the poles is high pressure. Air over the equator is low pressure.

Most air moves from poles to the equator

Coriolis effect (curving because of Earth's rotation) causes wind belts and storms

Air masses are classified based on their

temperature

and amount of

moisture

**Air masses get their characteristics based
on**

**where
they
form**

When air moves slowly

- It takes on the temperature and humidity (amount of moisture) of its region, becoming an air mass
- Air mass – large body of air with similar temperature and humidity

Continental

Air mass

Forms over land

Continental Air Mass

- Low humidity
- Brings dry weather when it moves to another region.

Maritime

Air mass

Forms over water

Maritime Air Mass

- High humidity
- Brings moist weather when it moves to another region.

The abbreviations used to classify air masses use the following letters: c, m, T, P, and A. For each letter, describe its property:

	Word	Means
c	continental	dry
m	maritime	moist
T	Tropical	warm
P	Polar	cold
A	Arctic	very cold

Air Mass	Air condition
Continental tropical	
Continental polar	
Maritime tropical	
Maritime polar	

What would their characteristics be?

mT

cP

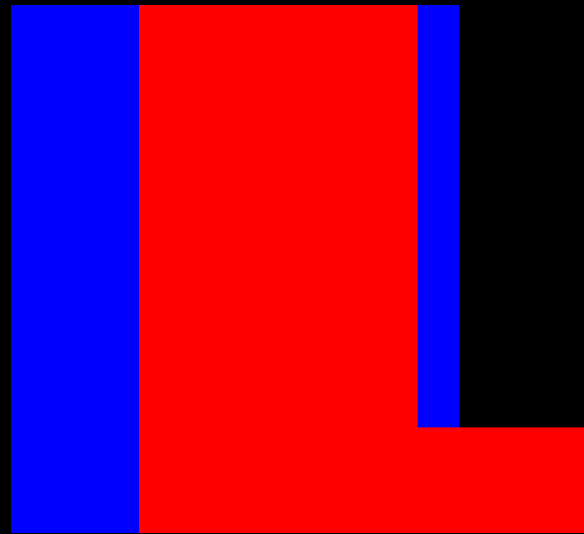
warm and moist

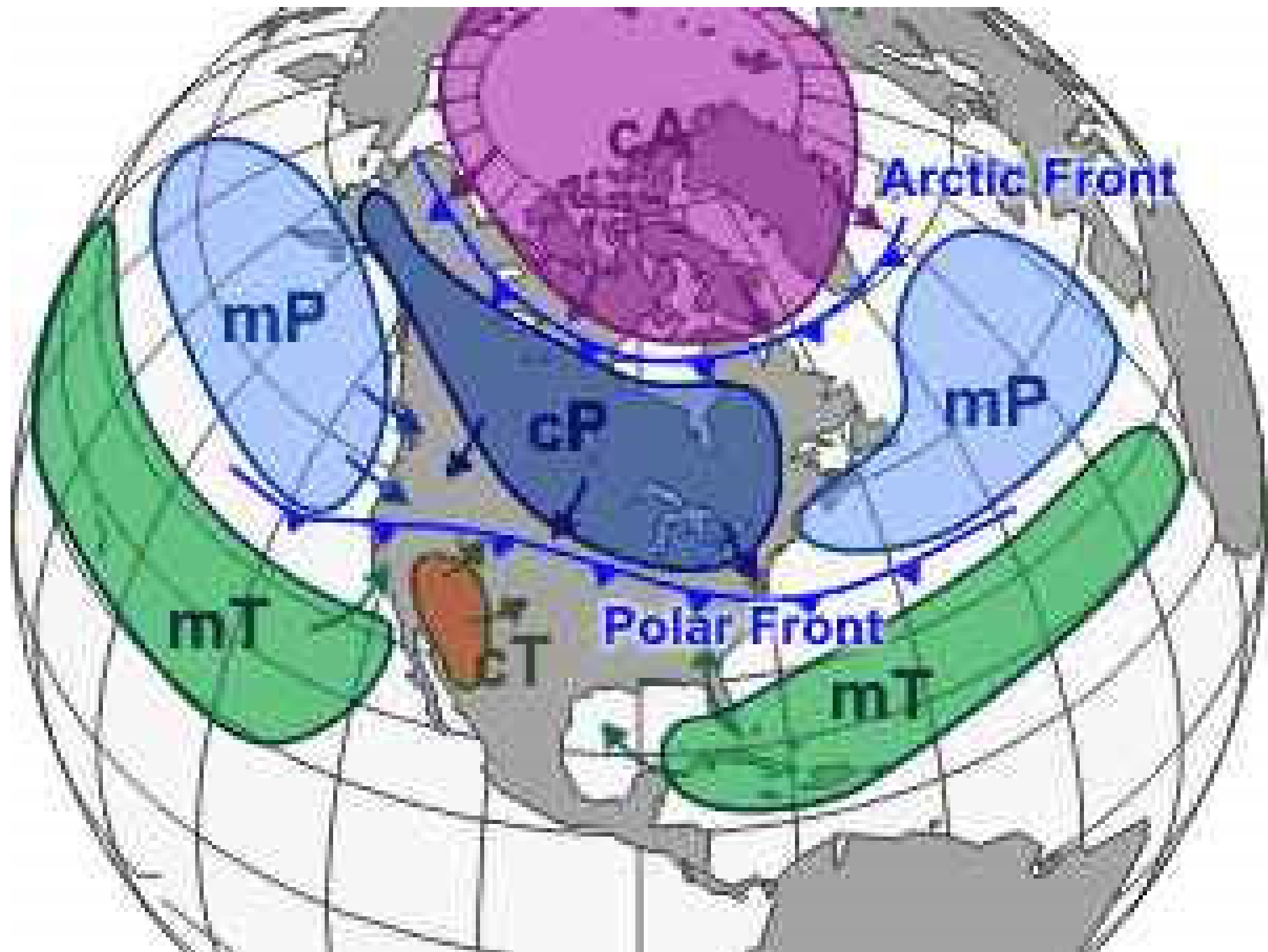
cold and dry

High or Low Pressure?

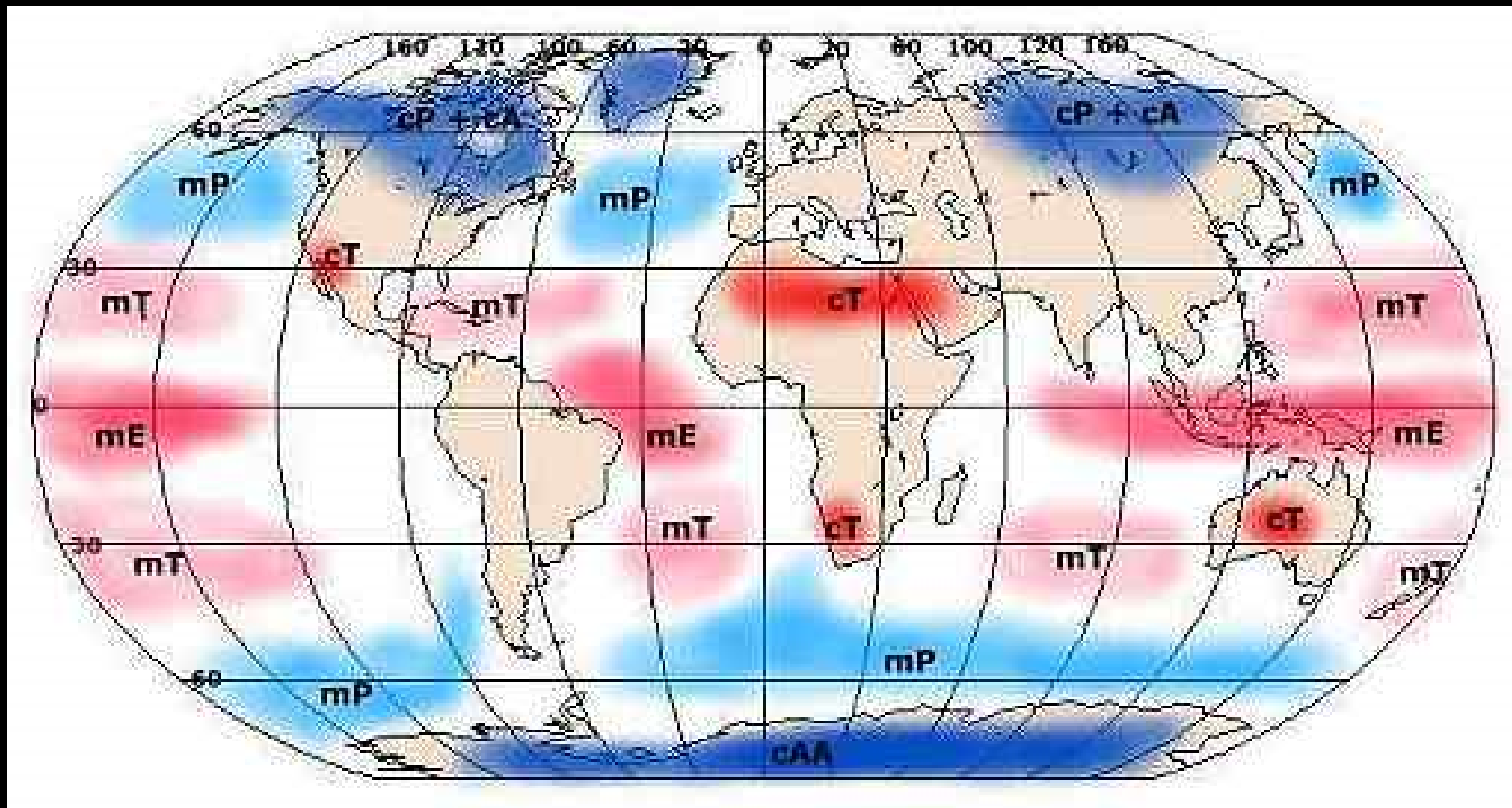
mT

cP





World Air Mass Source Regions







Fronts

4 different types:

1. Cold front
2. Warm front
3. Stationary
4. Occluded



Fronts are the basic building blocks of weather systems.

Fronts occur where two large air masses collide at the earth's surface.

Each air mass has a different temperature associated with it.

Fronts are caused by winds moving one air mass away from its birthplace.

Cold Front



Warm Front



Stationary Front



Occluded Front



Air Masses and Fronts

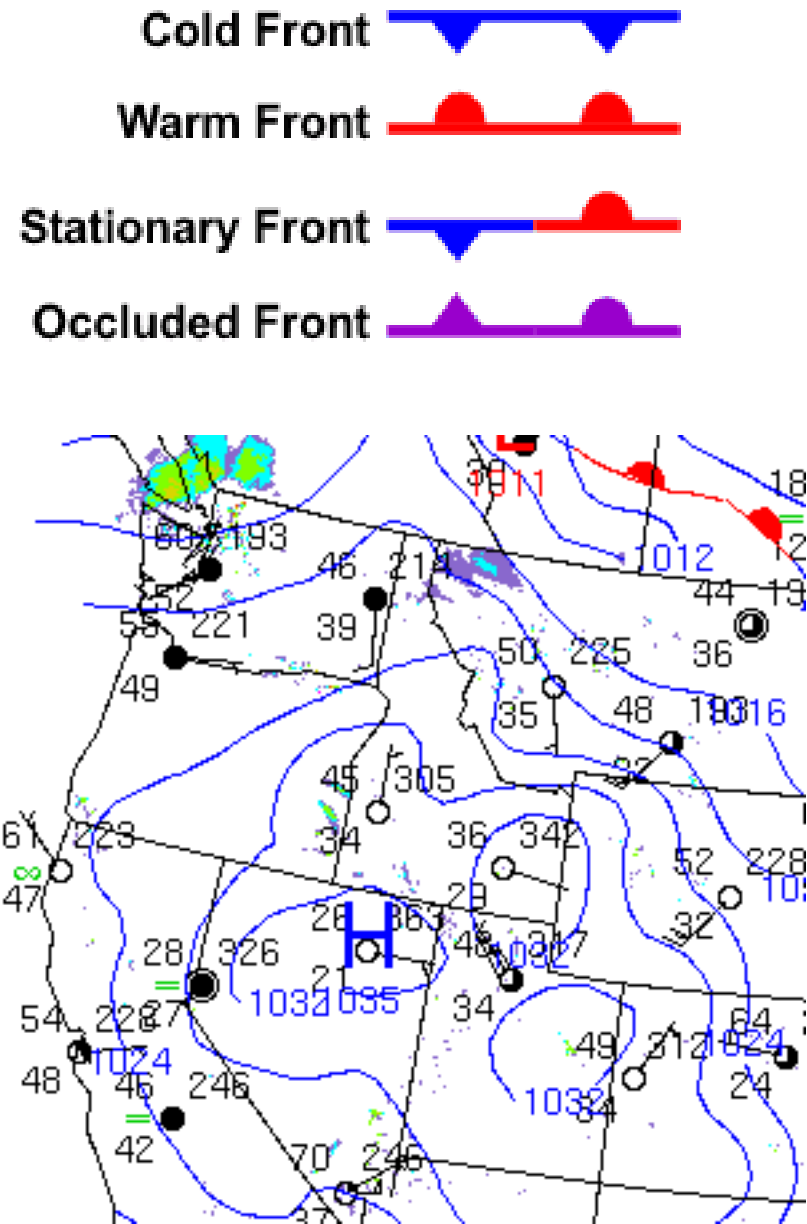
Fronts are the boundaries between two air masses.

Fronts are classified as to which type of air mass (cold or warm) is replacing the other.

A **cold front** separates the leading edge of a cold air mass displacing a warmer air mass.

A **warm front** is the leading edge of a warmer air mass replacing a colder air mass.

If the front is essentially not moving (i.e. the air masses are not moving) it is called a **stationary front**.



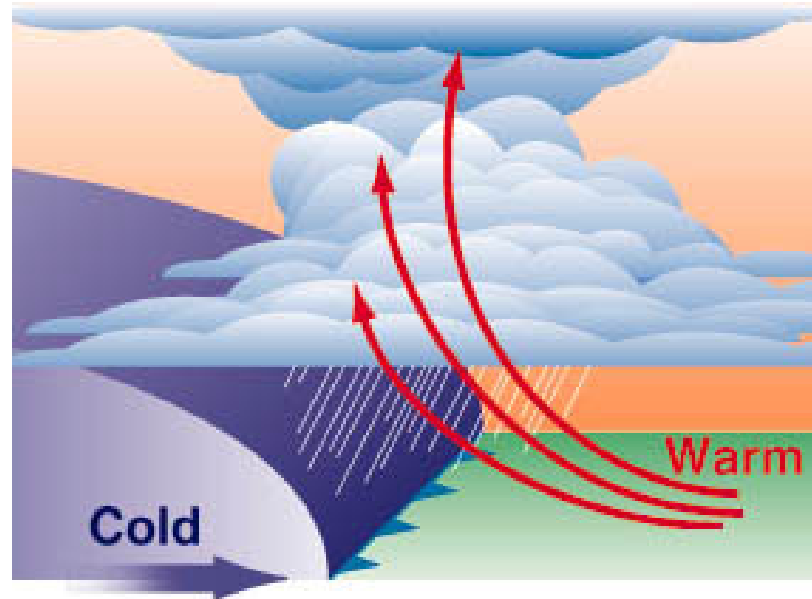
Cold Fronts



Cold fronts – cold air mass over takes a warm air mass. Remember, warm air rises.
Storms – short-lived and sometimes violent
Squall line – line of heavy thunderstorms at a cold front

Fronts

1. Cold front



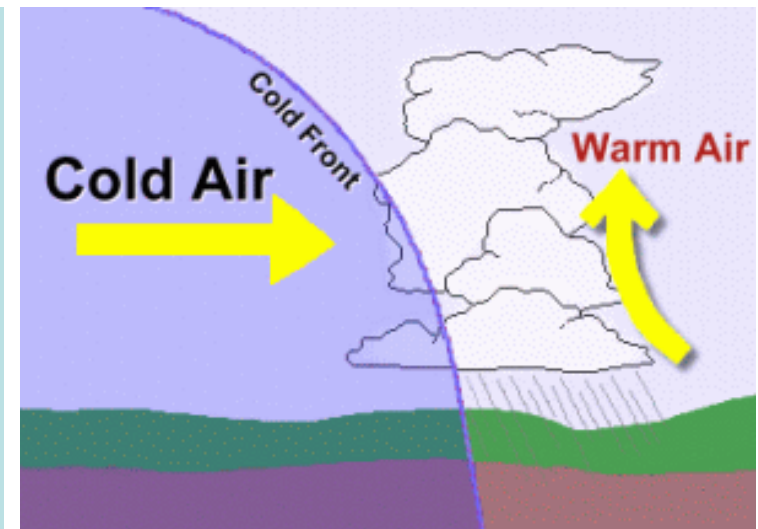
Cold fronts occur when heavy cold air displaces lighter warm air, pushing it upward.

Cumulus clouds form and usually grow into snow storms.

Temperatures drop anywhere from 5° to 15°.

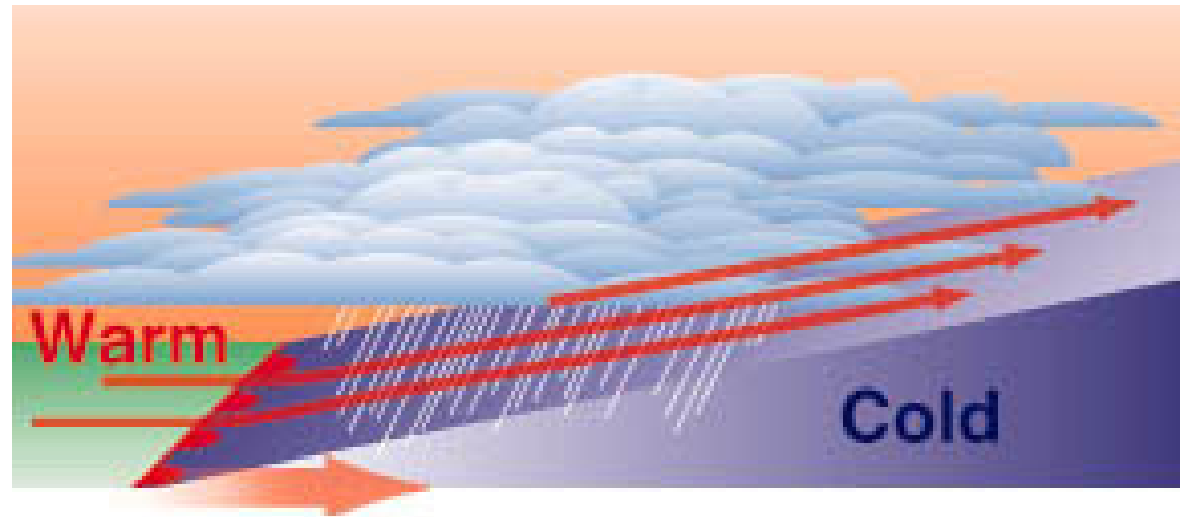
Winds become gusty and erratic.

Rain, snow, sleet, and hail can occur with a cold front.



Fronts

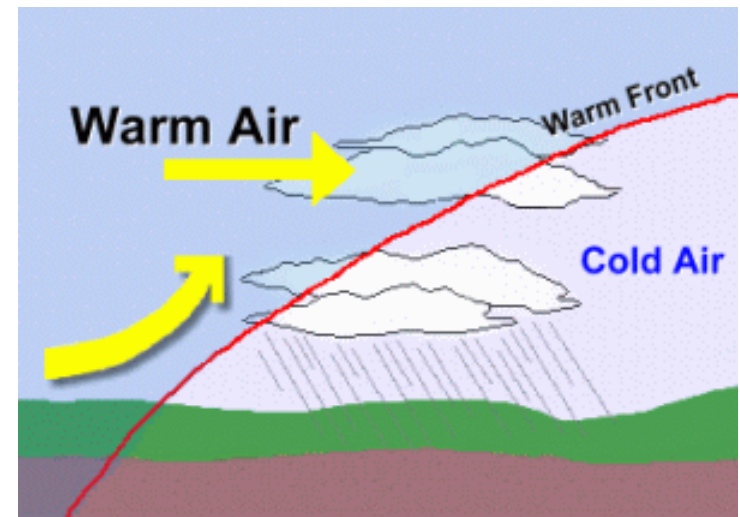
Warm front – a warm air mass takes over a cold air mass
Produce precipitation over a large area
Occasionally violent



Altostratus clouds form and may be associated with rain, snow, or sleet.

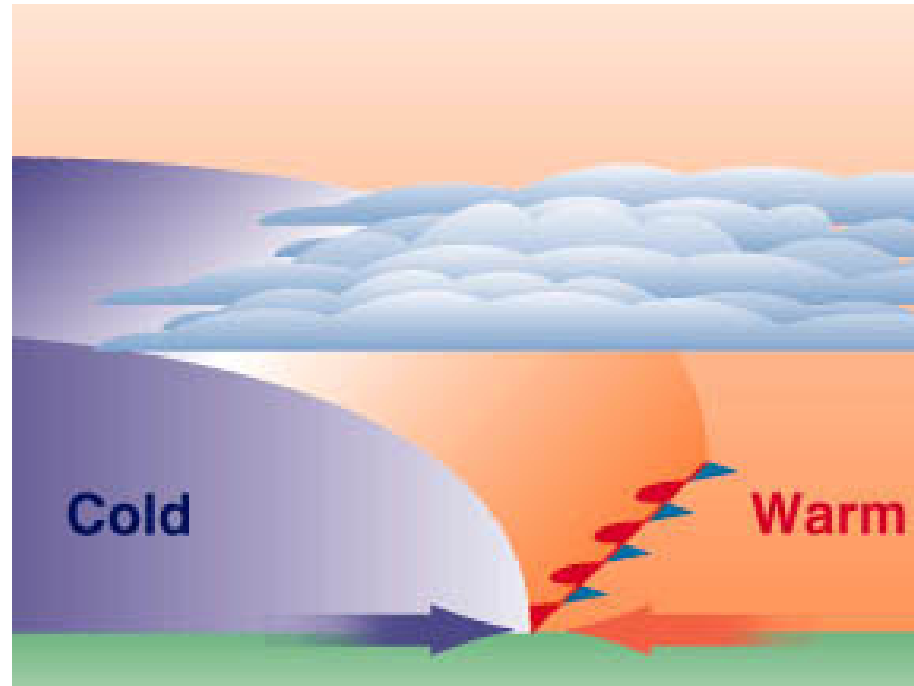
Temperatures may warm slightly.

Winds are usually gentle with this kind of front.



Fronts

3. Stationary front –
air masses move
slowly or not at all



Stationary fronts occur when neither warm nor cold air advances.

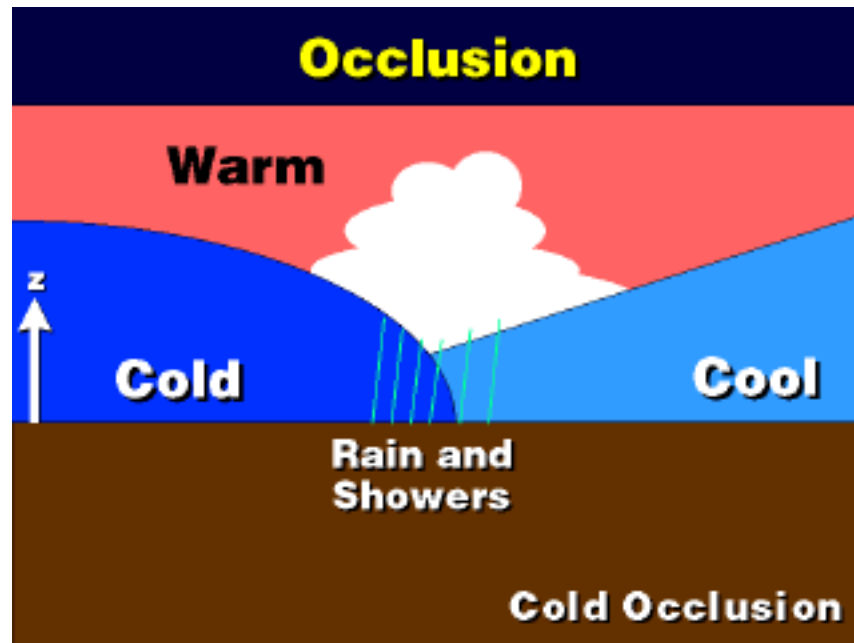
The two air masses reach a stalemate.

These type of conditions can last for days, producing nothing but Altocumulus clouds.

Temperatures remain stagnant and winds are gentle to nil.

Fronts

4. Occluded front – cold air mass lifts warm air mass completely



Cold occlusion: When a cold air mass follows a warm air mass, the cold air mass, which moves faster, eventually catches up the warm front.

This then lifts the warm air (behind the warm front) off the ground, creating an occluded front, where the two fronts are joined.

Usually associated with rain or snow and cumulus clouds.

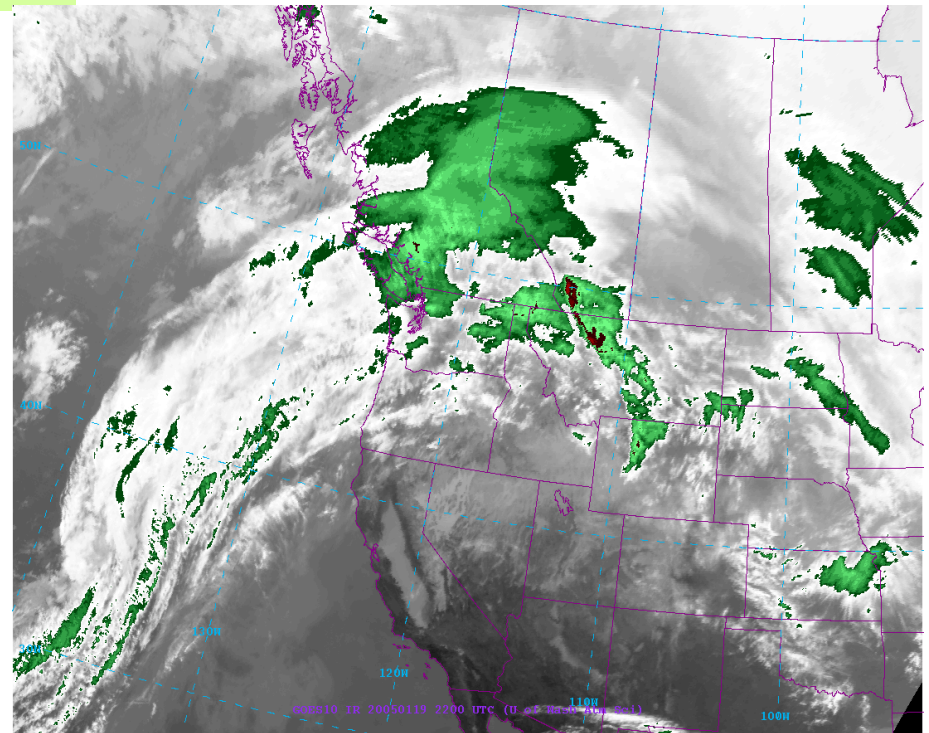
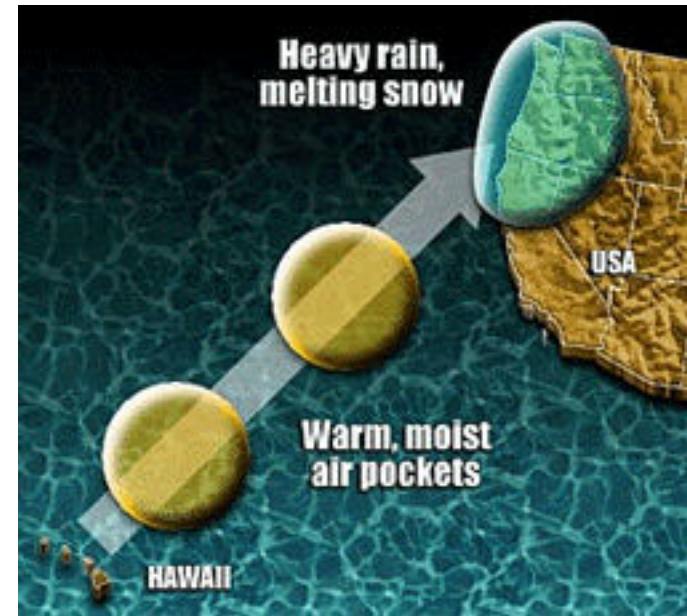
Temperature fluctuations are small and winds are gentle.

May indicate the end of a storm cycle

Storm Tracks

Pineapple Express

- SW Storm Track
- These storms can leave over 7" of water
- High snow accumulation at the highest of elevations in the mountains
- High elevation freezing levels



Storm Tracks

Polar front – polar air mass meets tropical air mass.

Mid latitude cyclone - storm with a low pressure center that forms when a bend in a cold front causes low pressure center to start having rotating winds moving toward the central region.

Anti-cyclone – high pressure center