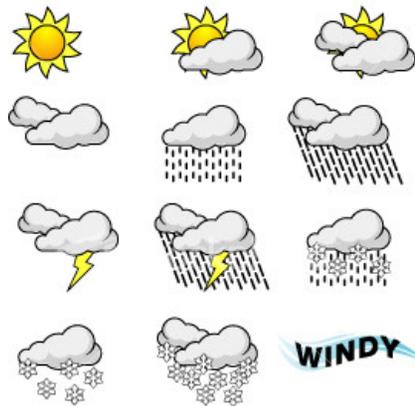


Weather!

Mr. P's Class
Meigs Magnet School
Room 213

What is Weather?

- **Weather** is the condition of the Earth's Atmosphere at a given time.
- It can change drastically in a 24 hour period.



What causes Weather?

- All elements of weather are the direct result of energy from the sun.
- The sun's rays hit earth and the land absorbs the heat unevenly.
- This uneven heating causes changes in weather.

What does weather include?

- Air temperature
- Cloud cover
- Amount of sunlight
- Relative humidity
- Precipitation
- Wind speed
- Wind direction

Temperature

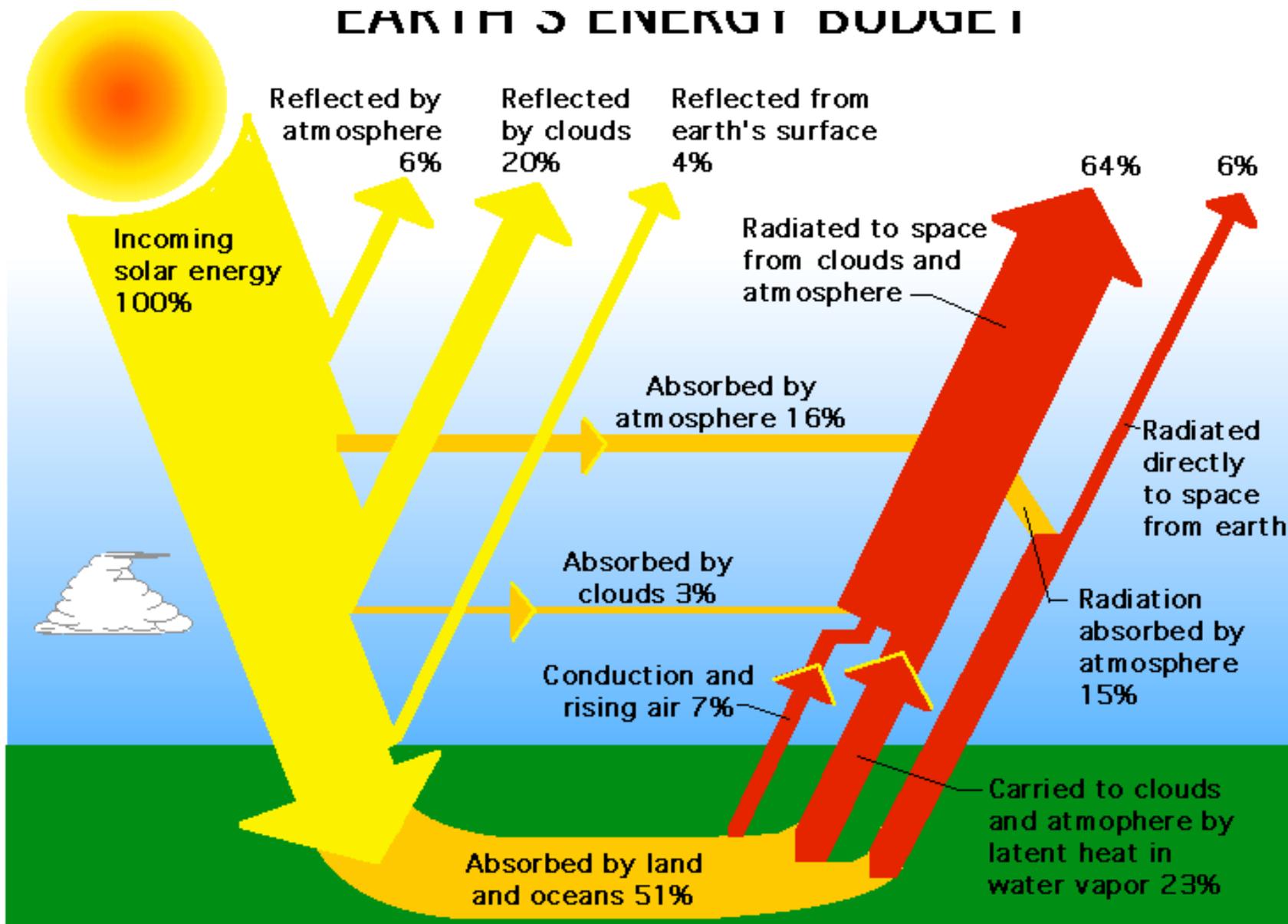
- **Temperature** is amount of heat in a substance. Expressed in degrees Fahrenheit or Centigrade (Celsius)
- Temperature is measure by an instrument called a **thermometer**.

The Earth's Atmosphere

- It is a layer of air that surrounds the earth.
- It is made up of many gases. Mostly Nitrogen, Carbon Dioxide and Oxygen.



EARTH'S ENERGY BUDGET

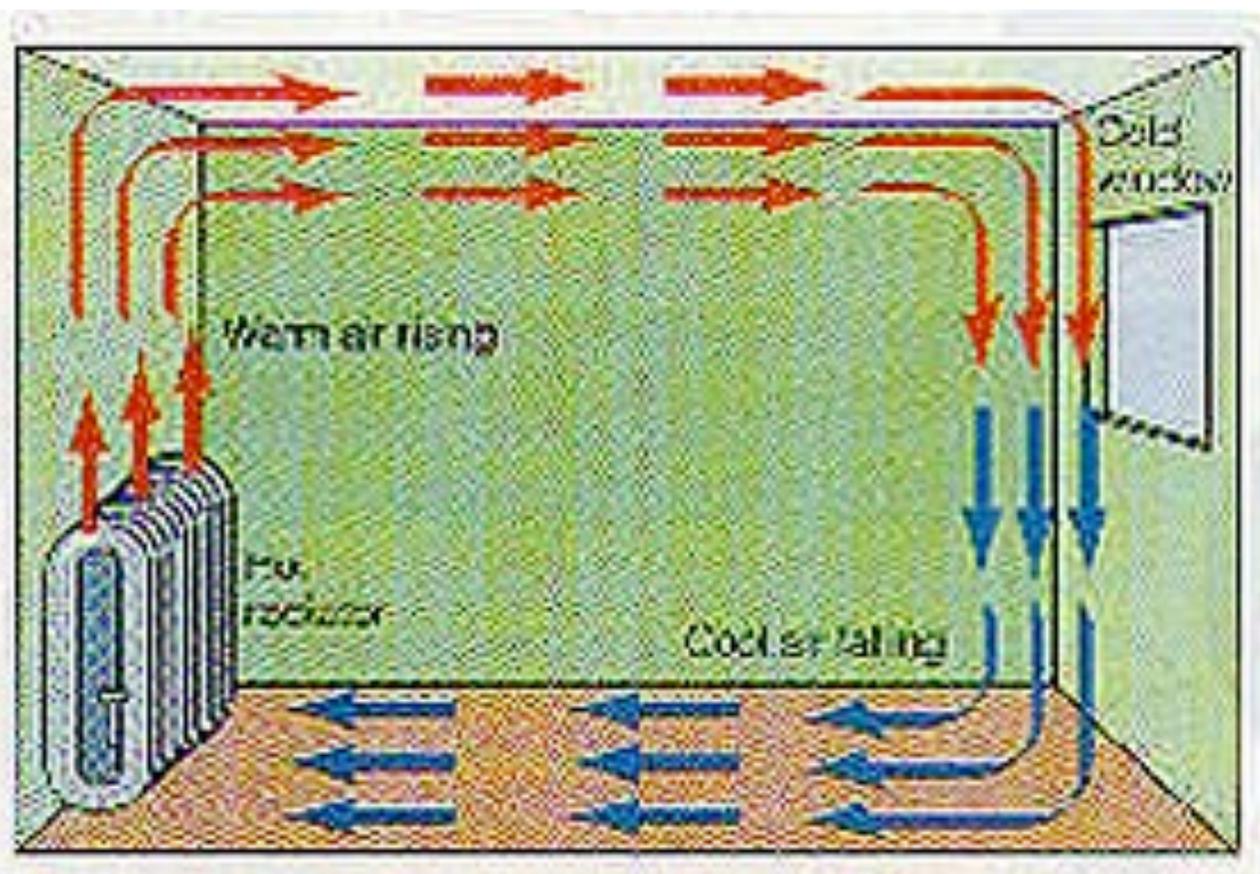


A Bunch of Hot Air.

- Cold air contracts or sinks.
- The air molecules get closer together, which makes the air heavier or more dense.
- Hot air expands or rises. The molecules get further apart, become less dense and they get lighter.

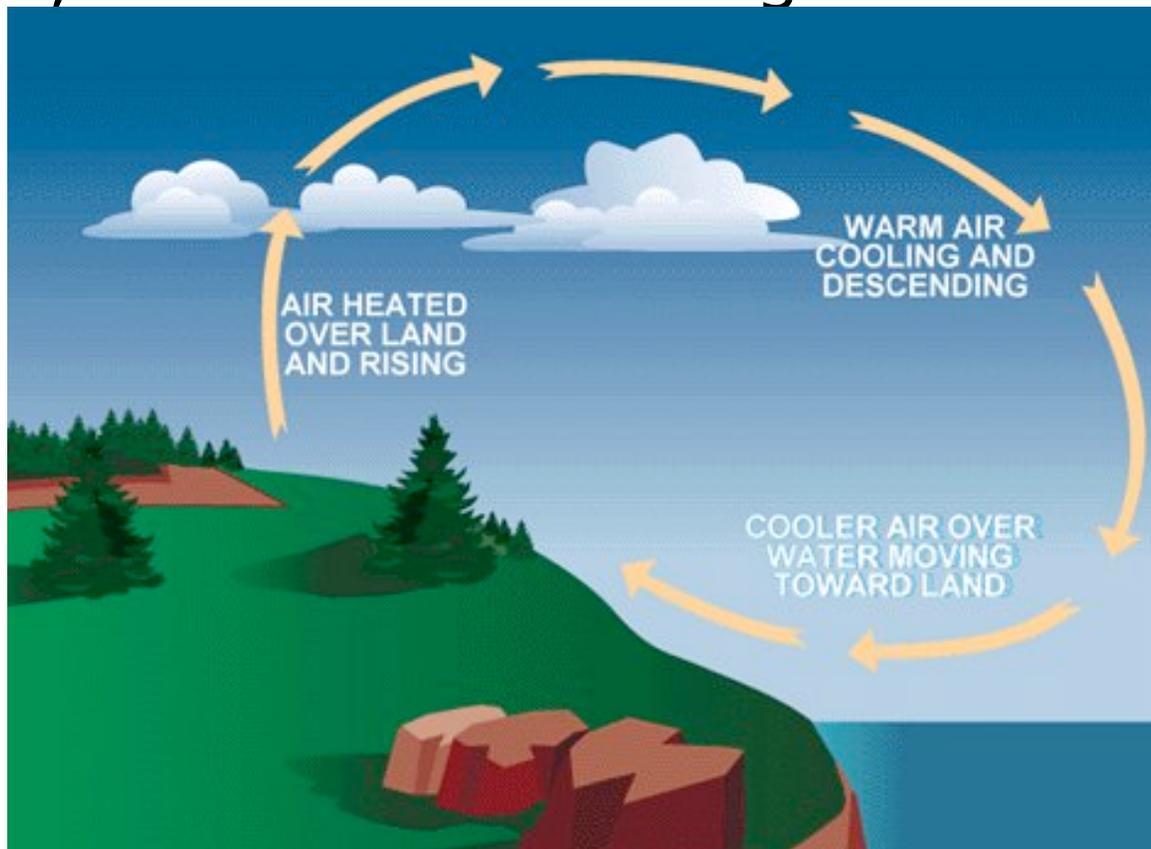
Air Circulation

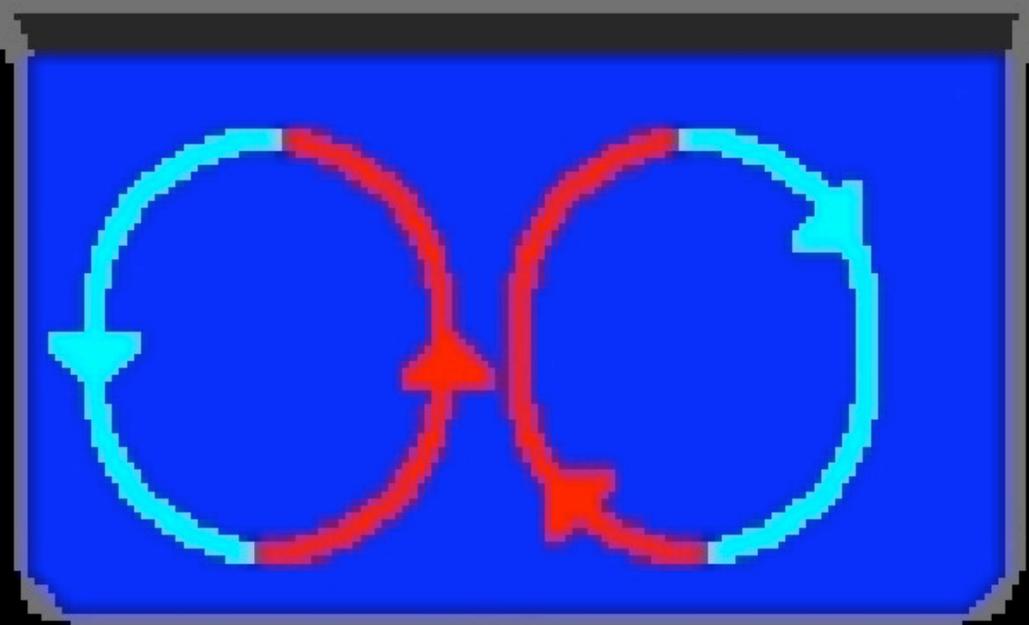
- Since warm air rises, the upper part of the room is the warmest. The coolest part of the room would be closer to the floor.



Convection Currents

- Is the act of a cold fluid or gas pushing a warmer, more dense fluid or gas out of the way.





Convection

Other examples of convection

- A fridge door
- The door to your house
- Ovens

Wind Spiral

- Why is the spiral able to turn?
- The hot air “rising” is turning the spiral.

Wind

- Wind is moving air in the atmosphere.
- Air is always moving from high pressure to low pressure.
- The strongest winds are tornadoes, the air pressure is extremely low.

How to measure wind speed

- Wind speed is measured in kilometres per hour (kph). We use a device called an **anemometer**.
- **Wind Direction is always stated in terms of where the wind is coming from.**



Measuring Wind Direction

- Wind Sock



- Weathervane



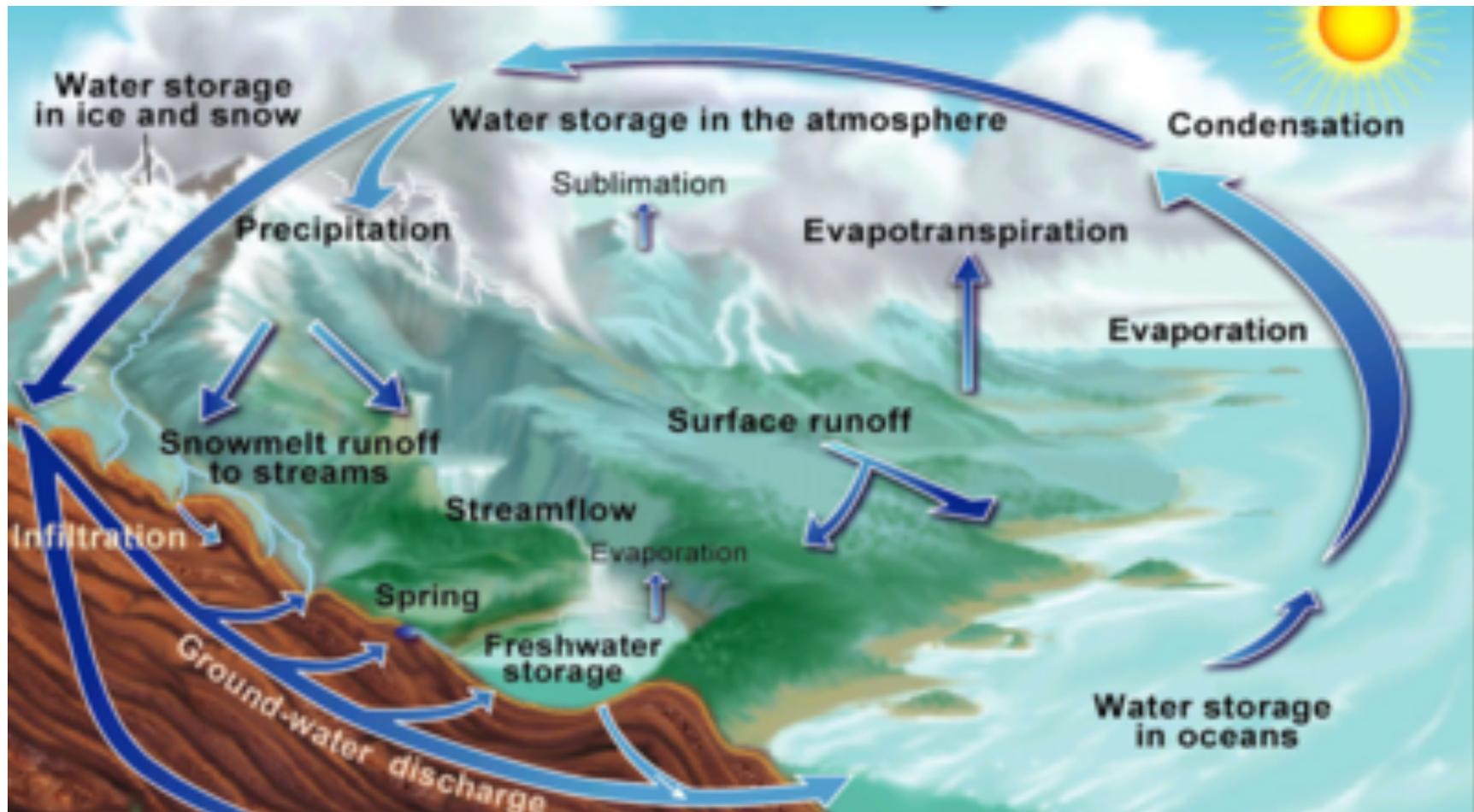
Beaufort Scale

- The **Beaufort scale** is an empirical measure for describing [wind intensity](#) based mainly on observed sea conditions. Its full name is the **Beaufort wind force scale**.

Humidity- Moisture in the Air

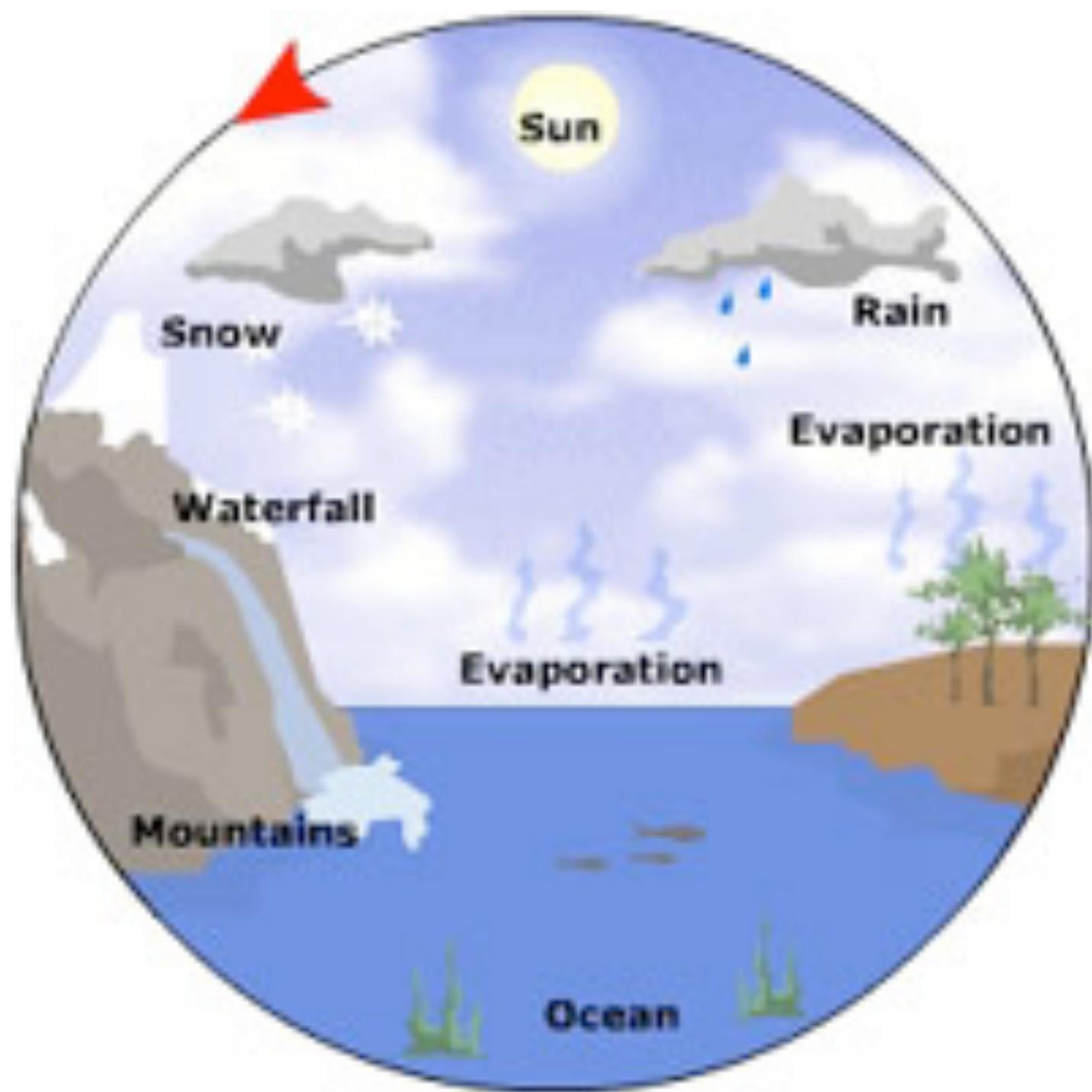
- The sun heats up the water on land and causes evaporation.
- The moisture that is in the air is called humidity.
- Saturated is when the air has too much moisture and cannot hold anymore.

The Water Cycle



The Water Cycle

- The sun heats up the water- **evaporation**
- The water vapor (gas) **condenses** into clouds
- The clouds become saturated and **precipitation** is the result.
- The precipitation pools in lakes, oceans and rivers. Waiting to evaporate again.



Relative Humidity

- It is the ratio of how much moisture is in the air and how much the air can hold.
- 50% humidity means the air is holding 50% moisture

Precipitation

- When there is too much moisture, the water will fall as precipitation.
- Precipitation will fall in two main forms: rain or snow depending on the temperature of the air through which the moisture will fall.
- Other forms of precipitation are sleet and hail.

Forms of Precipitation



Snow

- If the air is cooled below the freezing point of water, the condensing moisture is quickly freeze into ice crystals.
- The ice crystals join to make snowflakes
- Snowflakes are always six sided.



Rain

- When droplets of moisture join together becoming heavy enough to fall to the ground.



Hail

- Formed in cumulonimbus (storm) clouds. They are frozen droplets of moisture.



Sleet

- When falling rain starts off in warmer air, but passes through air below freezing, the rain drops cool and freeze onto surfaces when they hit the ground.



Facts on Precipitation

- It takes 10 centimetres of snow to make one centimetre of rain.
- Dew is moisture in the air cools off at night. In the morning it is found on everything. In colder temperatures, dew is frost.

Air Pressure

- The force that is applied on everything on the Earth caused by the weight of the air.
- Air particles are mobile, they exert pressure on objects.
- High air pressure brings warm, dry air.
Low air pressure brings rain or moisture

Air Pressure

- Air pressure can change quickly, ie- when a storm comes in.
- There are three factors that affect air pressure: altitude, air mass temperature and the amount of moisture in the air.
- A Barometer is used to measure air pressure.

Clouds

- Clouds come in many shapes and forms.
- Some are high in the sky, while others are so low they touch the ground.
- No matter what shape or elevation, clouds form the same way, by having water vapor condense onto small solid particles like dust, sea salt, and pollution

Clouds

- Clouds serve several important functions.
- They provide rain and snow.
- They also help retain heat, so it doesn't escape quickly back into space.
- On hot days, clouds provide shade

Types of Clouds

- There are **Four** main types of clouds
- **Cirrus**- found high in the atmosphere
- **Cumulus**- found in mid-atmosphere
- **Stratus**- found in the low atmosphere
- **Nimbus**- storm clouds.

Cirrus

- They are thin, wispy clouds blown by high winds into long streamers.
- They usually mean fair to pleasant weather.



Cumulus

- They are puffy clouds that sometimes look like pieces of floating cotton
- They can develop into a giant cumulonimbus, which is a thunderstorm cloud



Stratus

- are uniform grayish clouds that often cover the entire sky.
- They resemble fog that does not reach the ground.
- Usually no precipitation falls from stratus clouds, but sometimes they may drizzle.

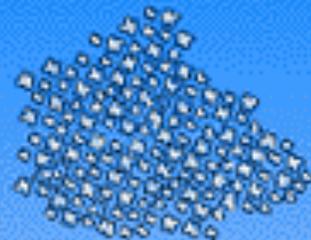


Nimbus (Cumulonimbus)

- They are thunderstorm clouds that form if cumulus clouds continue to grow vertically.
- Lightning, thunder, and even violent tornadoes are associated with the cumulonimbus.



Common types of clouds in the troposphere



Cirrocumulus
(mackerel sky)
above 18,000 feet



Cirrus
above 18,000 feet



Cumulonimbus
from near the ground
to above 50,000 feet



Altostratus
6,000 to 20,000 feet



Altostratus
6,000-20,000 feet



Stratocumulus
below 6,000 feet



Stratus
below 6,000 feet



Cumulus
below 6,000 feet



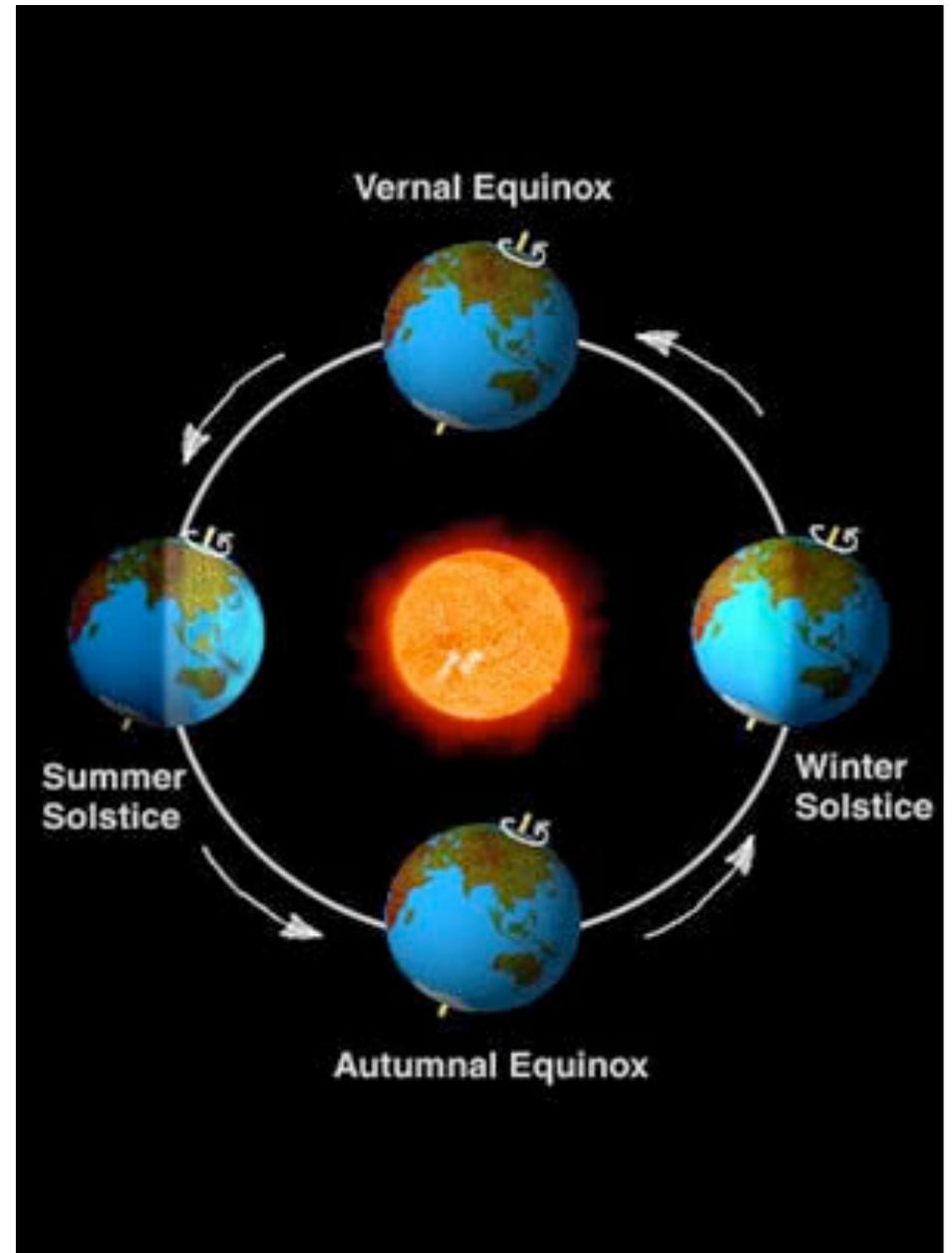
Can you identify these clouds?



-- Photograph by Kevin Knupp --
-- U. of Illinois Cloud Catalog --

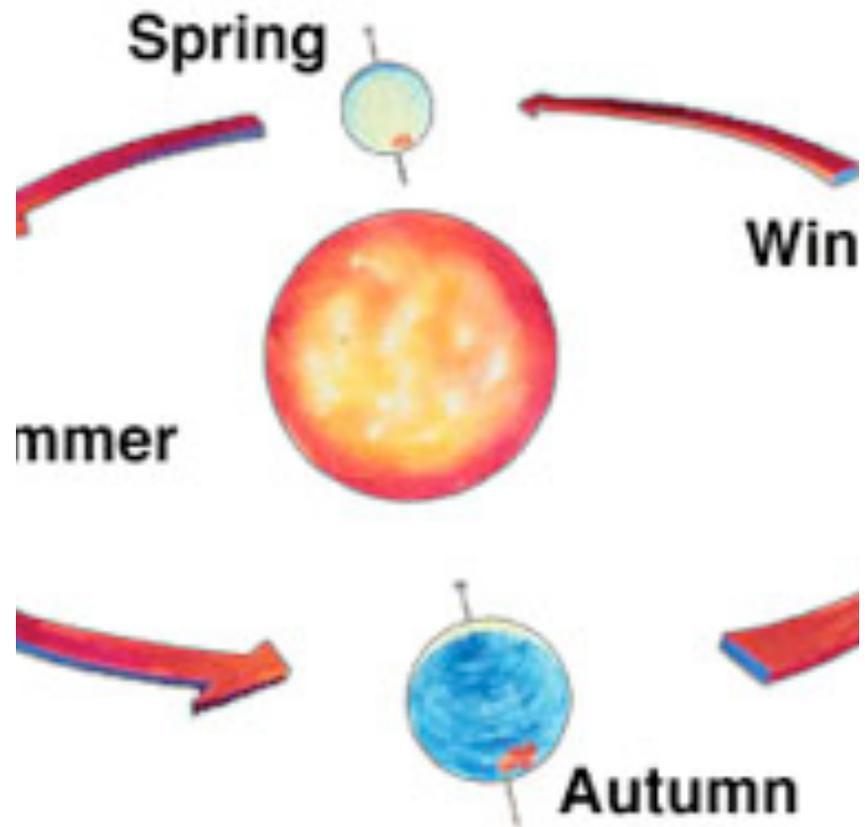
Seasons

- The Earth orbits around the sun.
- The Earth tilts on its axis 23.5 degrees.
- The area of the Earth, that heats up more, is closer to the sun.



Seasons

- When Canada is tilted away from the sun, it is winter.
- When Canada is tilted towards the sun, it is summer.
- Spring and Autumn are the in between orbits.



Daylight

- The Earth turns on its axis, one complete rotation in one day. (24 hours)
- The Sun rises in the east and sets in the west
- The amount of daylight is related to the Earth's orbit around the sun.
- Spring and summer have more daylight hours, because we are tilted towards the sun.

Daylight

- The sun give off sunlight, that heats the Earth.
- Direct Sunlight is hotter than indirect sunlight.
- What time of the day is the hottest?

Noon

- The sun is directly over our heads at lunch time.
- At noon you do not have hardly any shadow.
- In the morning and evening, sunlight is spread out more.
- You have more of a shadow, because the sunlight has to travel a greater distance.

Hot Sun, Cool Sun

- Measure the heat of the sun, at different times of the day.
- When are the sun's rays most spread out?
- When is it the warmest?

Predicting the Weather

- <http://weather.msn.com/local.aspx?wealocations=wc:CAXX0126>
- Monitor the weather for a week.
- Use www.theweathernetwork.com

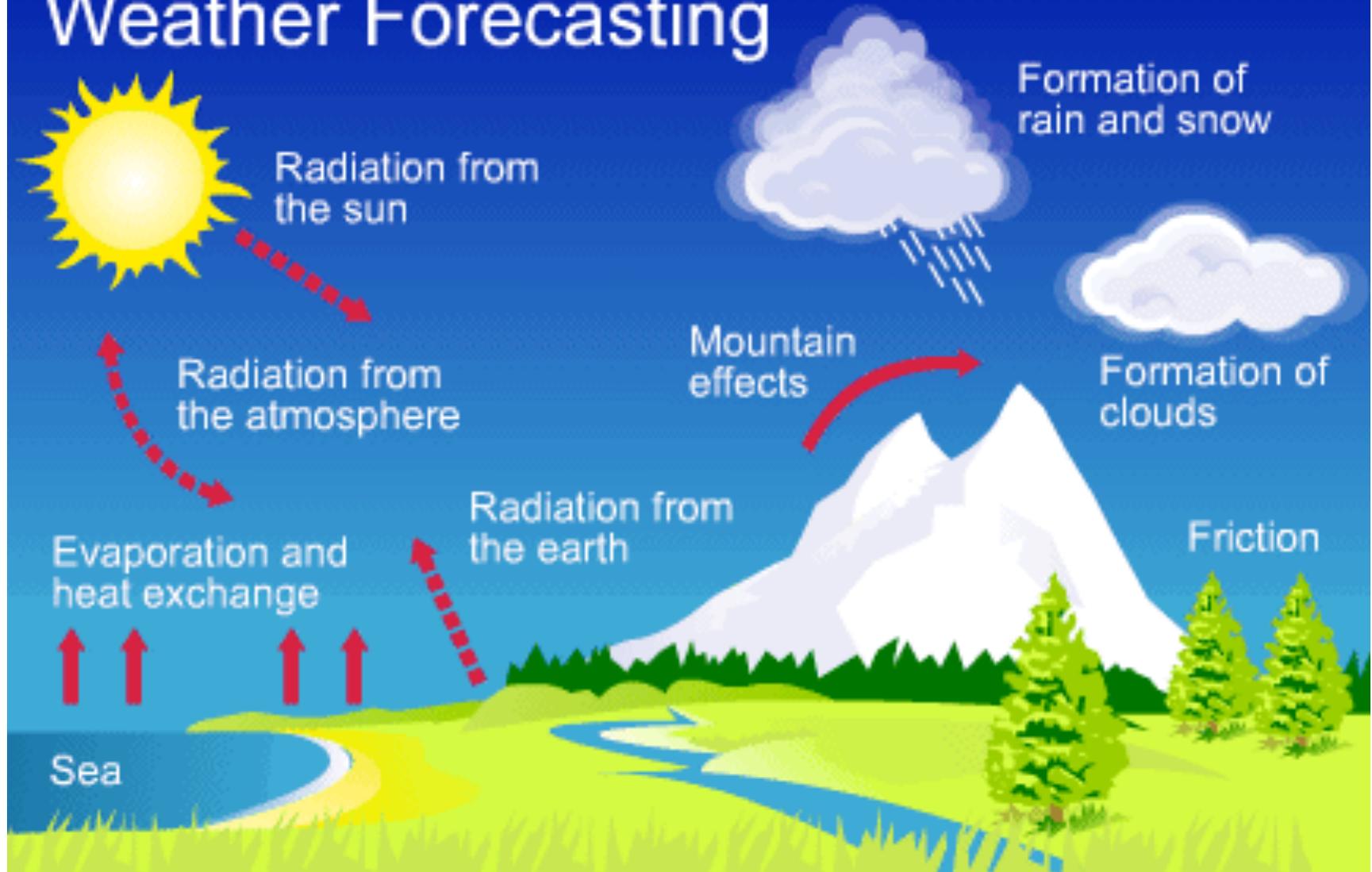
Examples of Weather Forecasts

- What do all the numbers mean?

Forecasting the Weather

- You have keep track of the weather for ten days.
- Was the weather forecast accurate?
- Why is it so difficult to predict the weather?

Weather Forecasting



Factors that influence weather in different areas.

- Land Elevation
- Location- latitude and longitude
- The sun
- Cloud cover
- Air pressure
- Earth's orbit (seasons)



Part Two

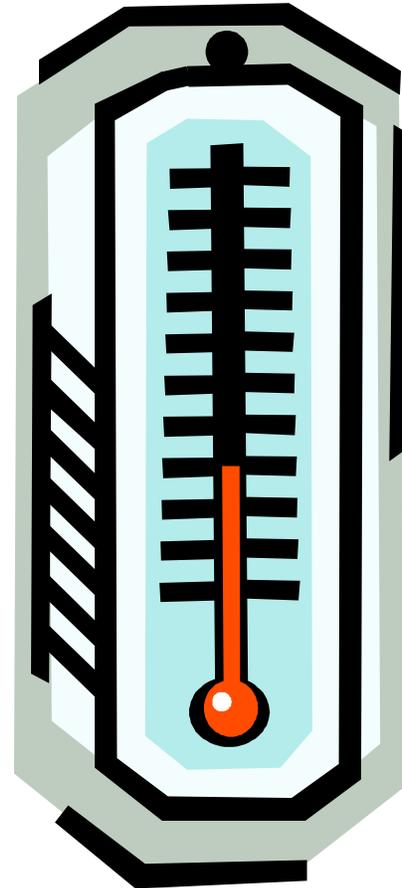
Weather

What is weather?

- ☀ Refers to the state of the atmosphere at a specific time and place.
- ☀ The one thing that you can talk to anybody about
- ☀ If you don't like the weather just wait around it will change in Tennessee
- ☀ What are some of the factors that affect the weather?

Air Temperature

☀️ Temperature is the measure of the average amount of motion in particles.



Wind

a natural movement of air of any velocity; *especially* : the earth's air or the gas surrounding a planet in natural motion horizontally



Humidity

- ✚ The amount of water vapor present in the air
- ✚ Relative Humidity -is a measure of the amount of water vapor present in the air compared to the amount needed for saturation at a specific temperature

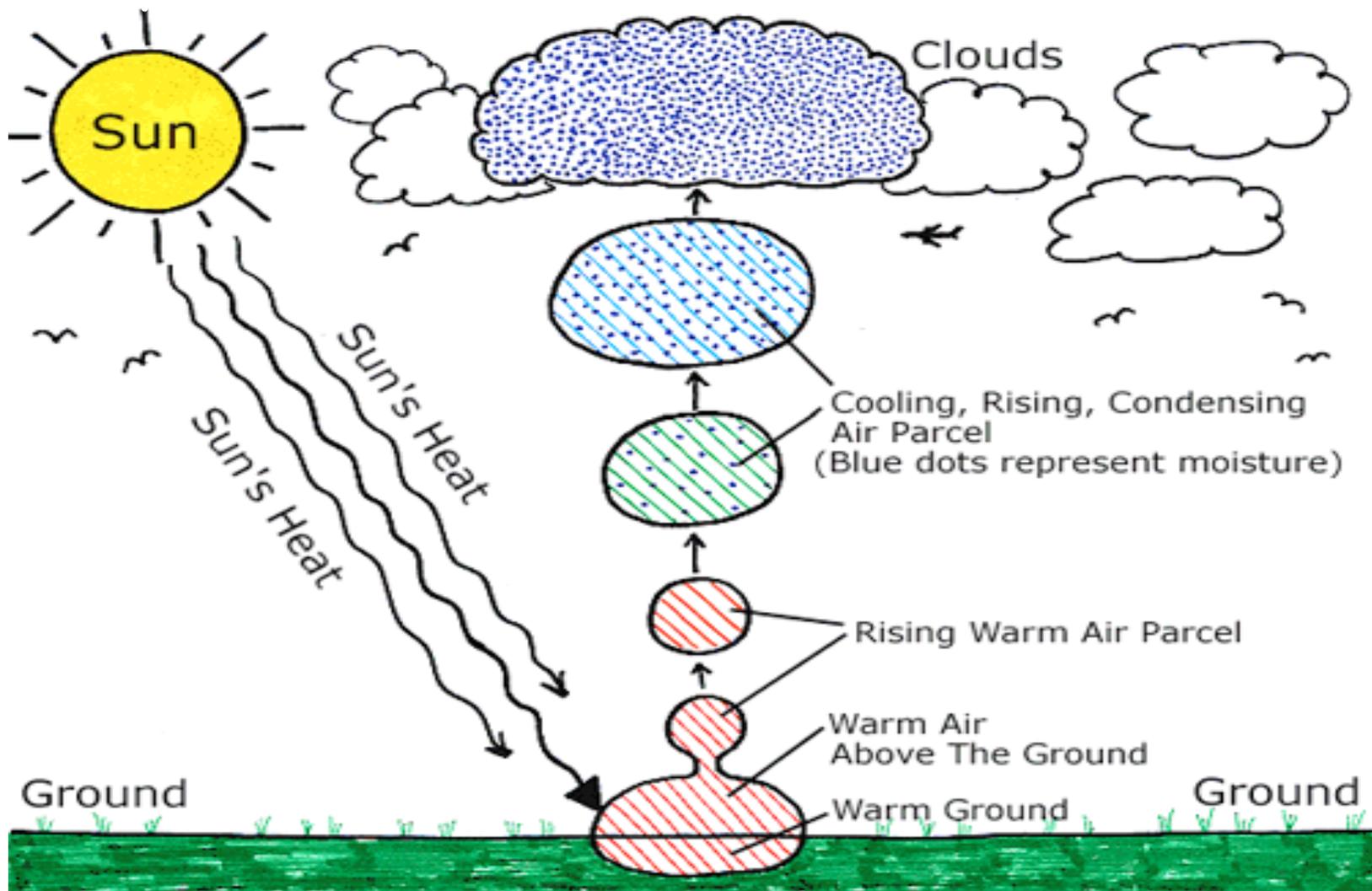
Clouds

- Masses of small water droplets or tiny ice crystals that float in the air.
- Three main types are cirrus, cumulus, and stratus.
- Other clouds are a mixture of these three main types.

Precipitation

Any form of water that fall to the ground from clouds...

- Rain
- Snow
- Hail
- Sleet



Cirrus

- Cirro- means “curled” or “feathery”
- Form highest in the sky; are made up of ice crystals; and appear as curls, tufts, or wisps.
- Usually signal the end of clear weather.

Cumulus

- Cumulo- means “heaped” or “piled”
- Cottony clouds with flat, usually gray bases, and puffy, bright tops.
- Usually signal good weather, but if atmosphere is unstable, can build into towering clouds that produce showers and thunderstorms.

Stratus

- Strato- means “layer-like” or “sheet-like.”
- Low-lying, dull-colored clouds that form in layers or sheets.
- Usually bring drizzling rain or light-falling snow.

Alto

- A prefix meaning “middle range of clouds” and used to describe clouds that lie from 6,500-18,500 ft. (1,980-5,640m).

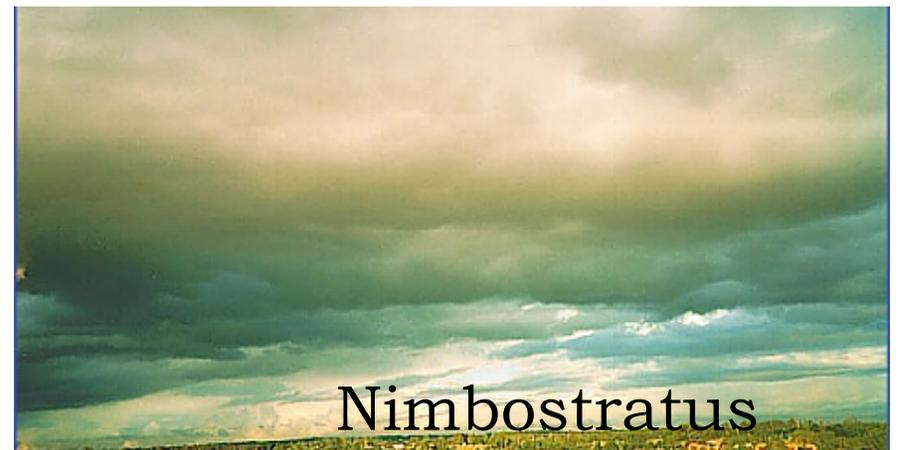
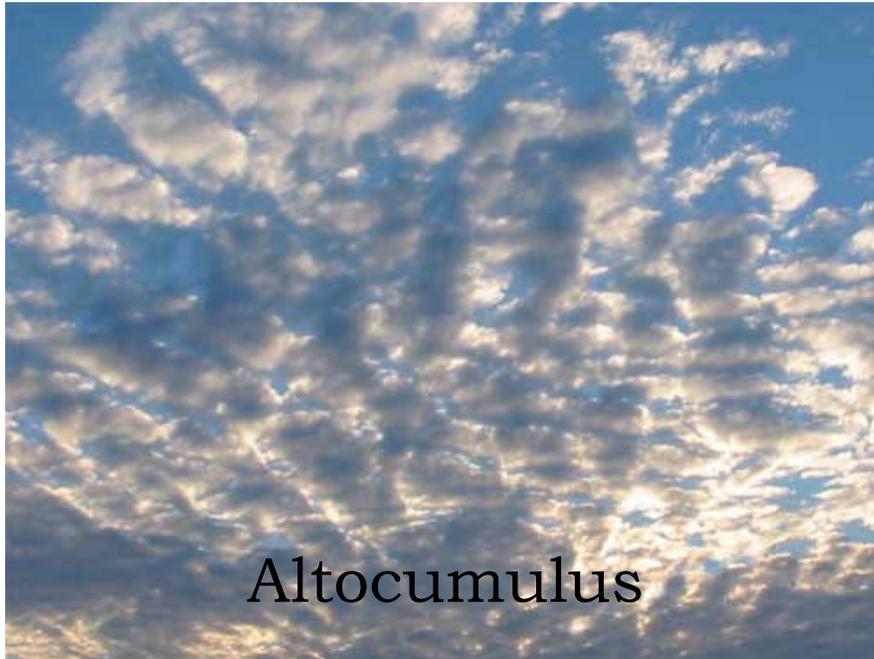
Nimbus

- A rain cloud

Other Cloud Types



More Cloud Types



Precipitation

- Water that falls from the clouds
- Air temperature determines the form of precipitation that falls
- 4 main types of Precipitation: Rain, Sleet, Snow and Hail

Types of Precipitation



Rain



Sleet



Snow



Hail

Air Masses

- *A large body of air that has properties similar to the part of the Earth's surface over which it develops.*

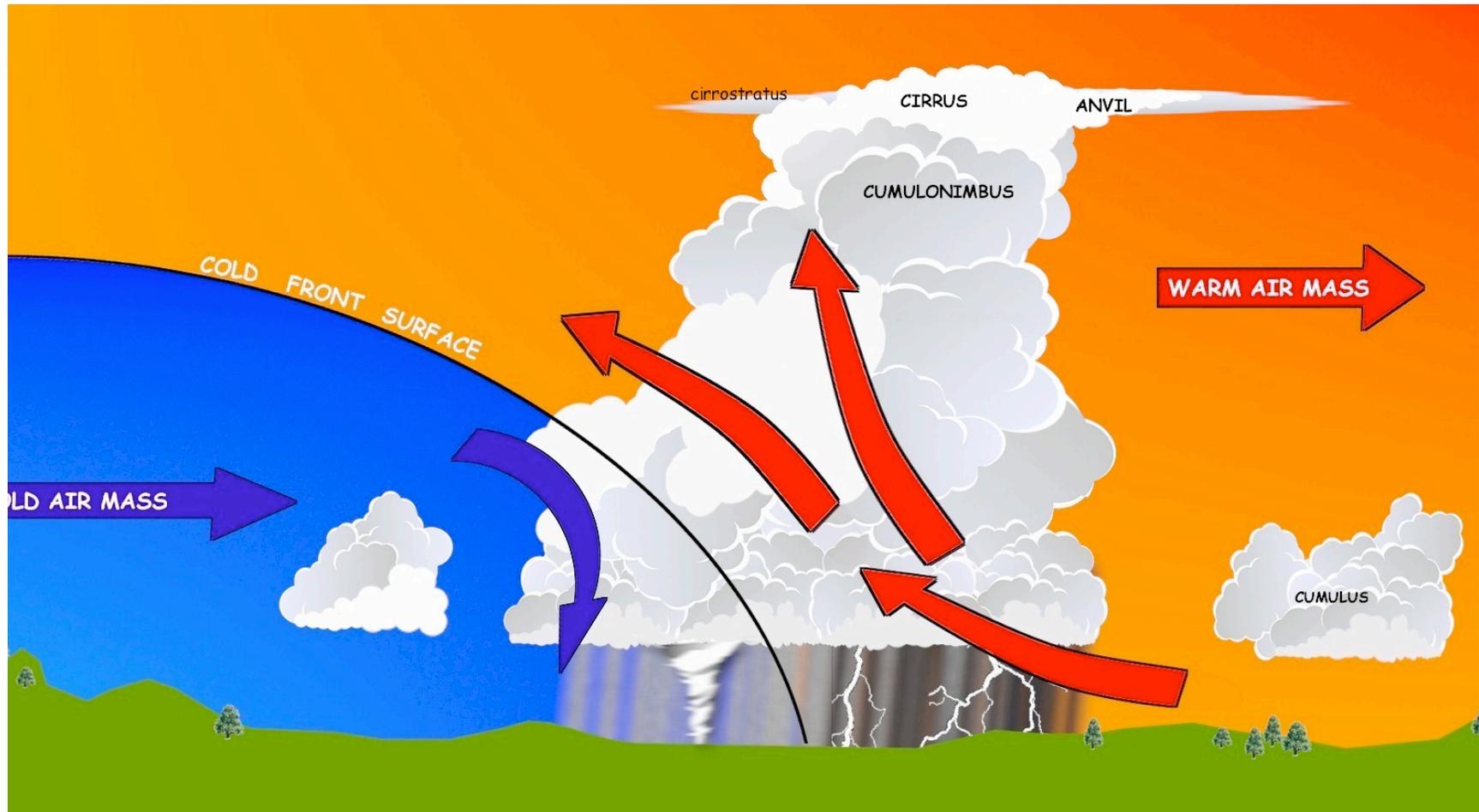
Air Mass Map



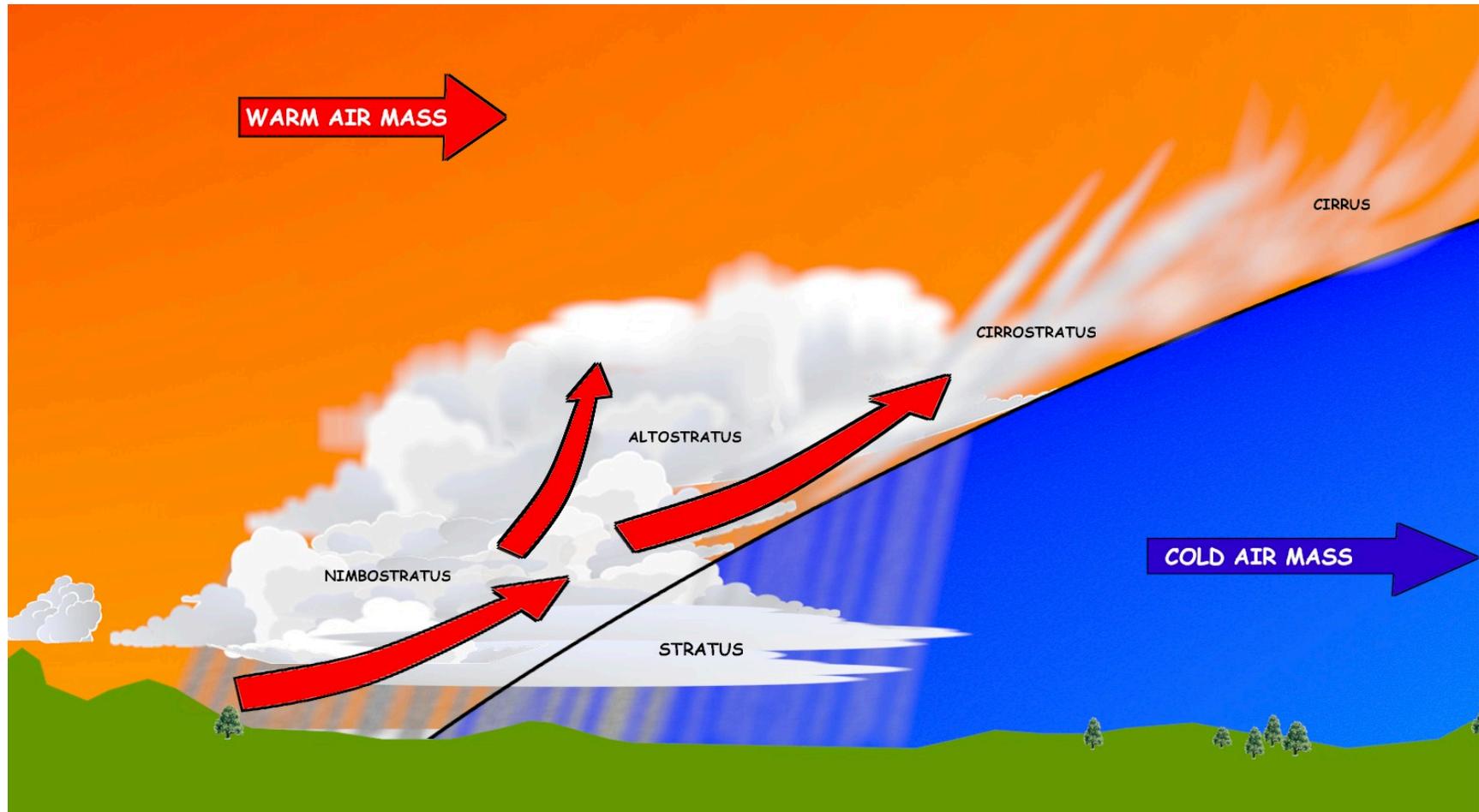
Fronts

- A boundary between two air masses of different density, moisture, or temperature.

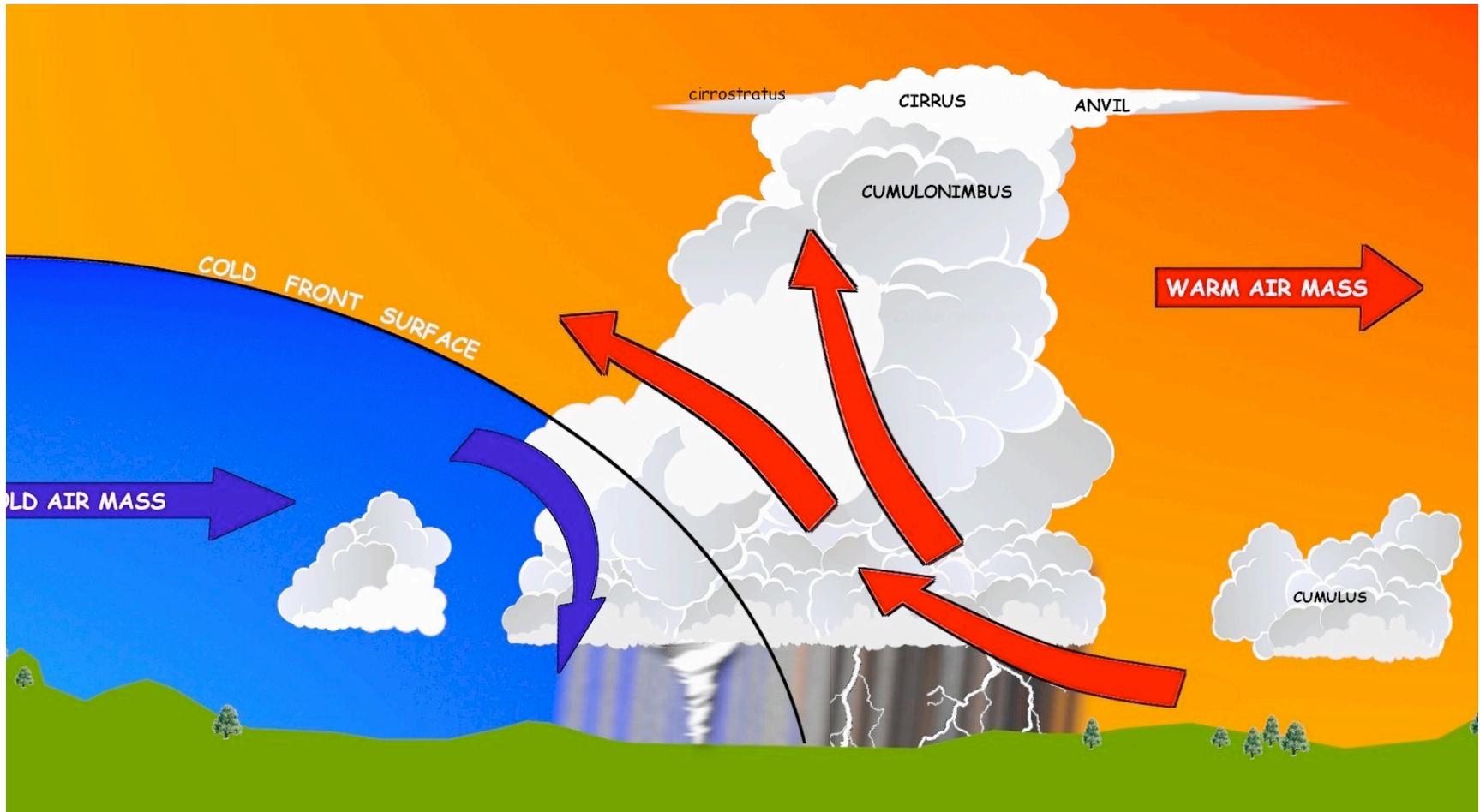
Cold Front



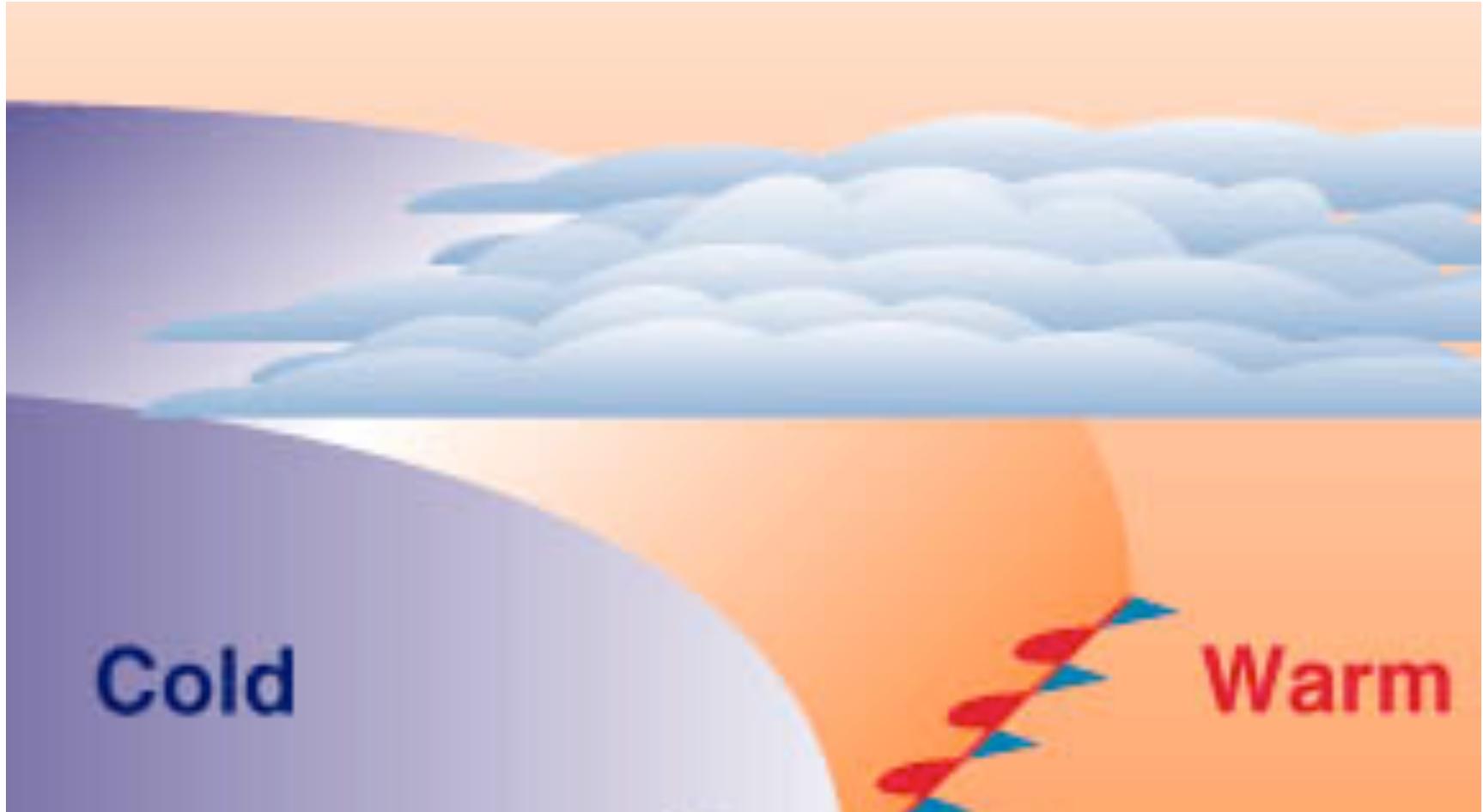
Warm Front



Occluded Front



Stationary Front



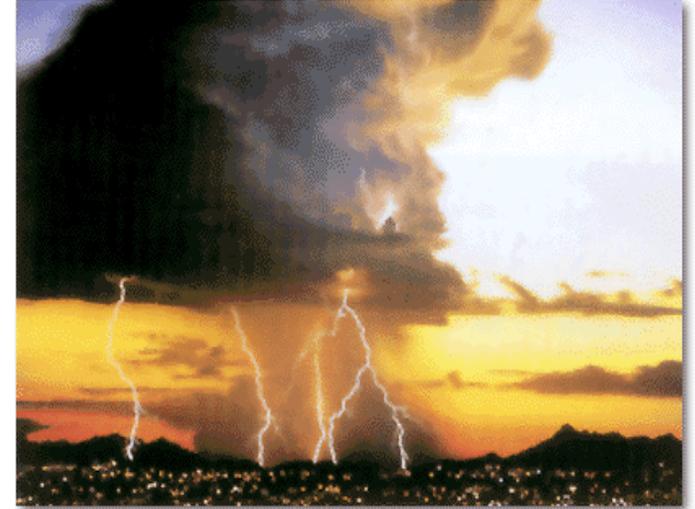


Severe Weather

Thunderstorms



Lightning



Tornadoes



More Severe Weather



Hurricanes

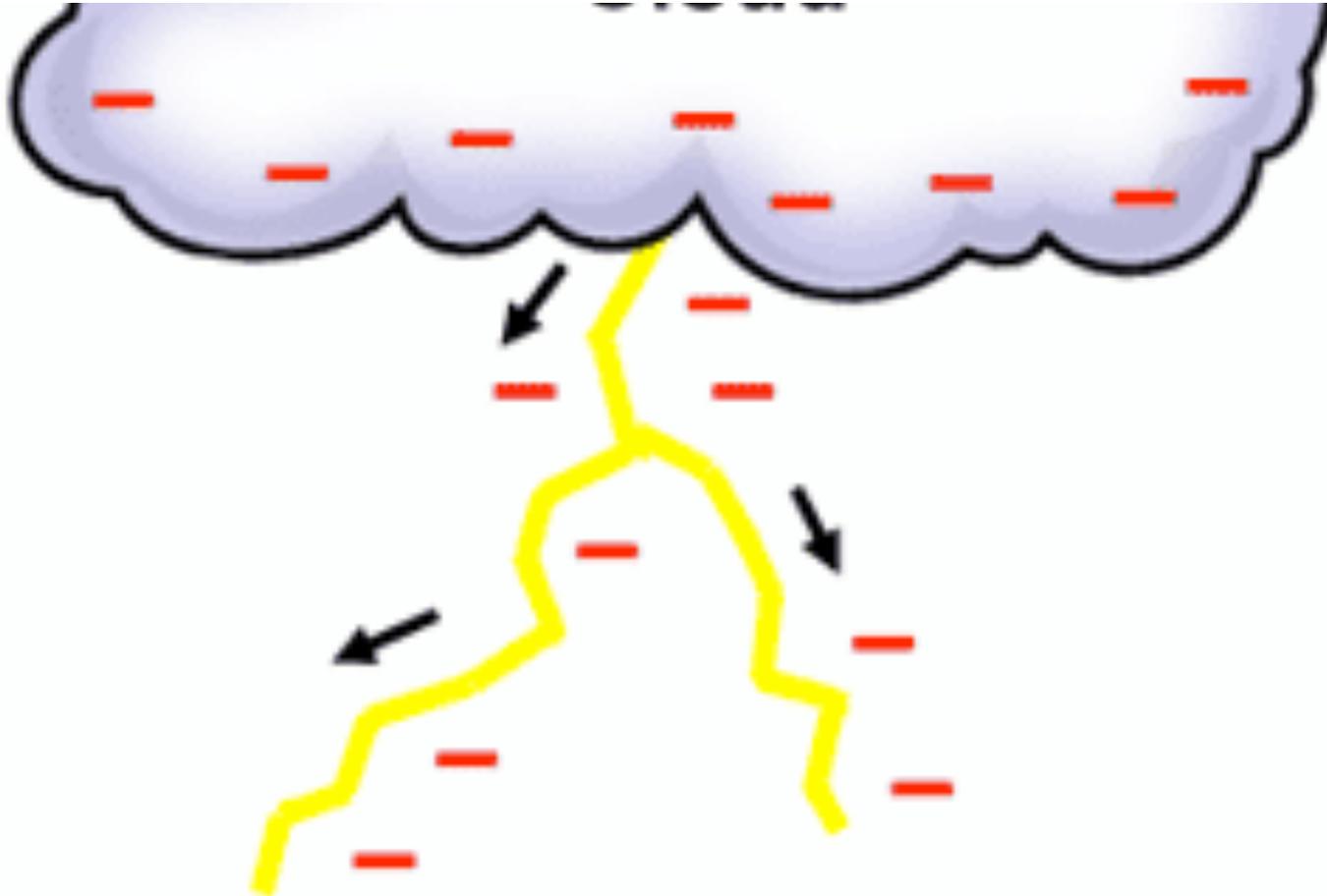


Blizzards

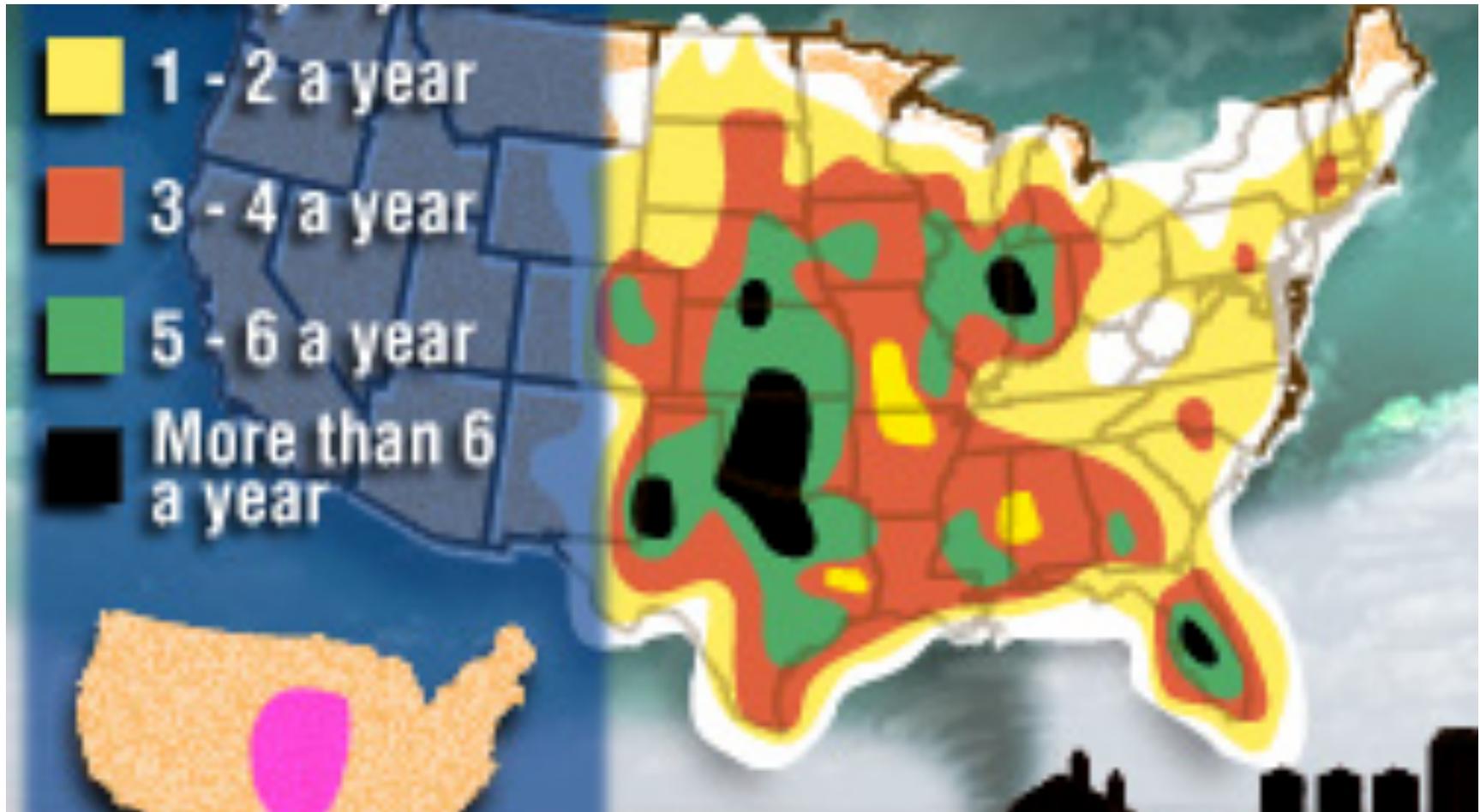
Severe Weather Safety

- Watches- conditions are favorable
- Warnings- conditions already exist
- Examples- Tornadoes, Flooding, Thunderstorms, Blizzards, Winter Mixes and Hurricanes

Lightning



Tornado Alley



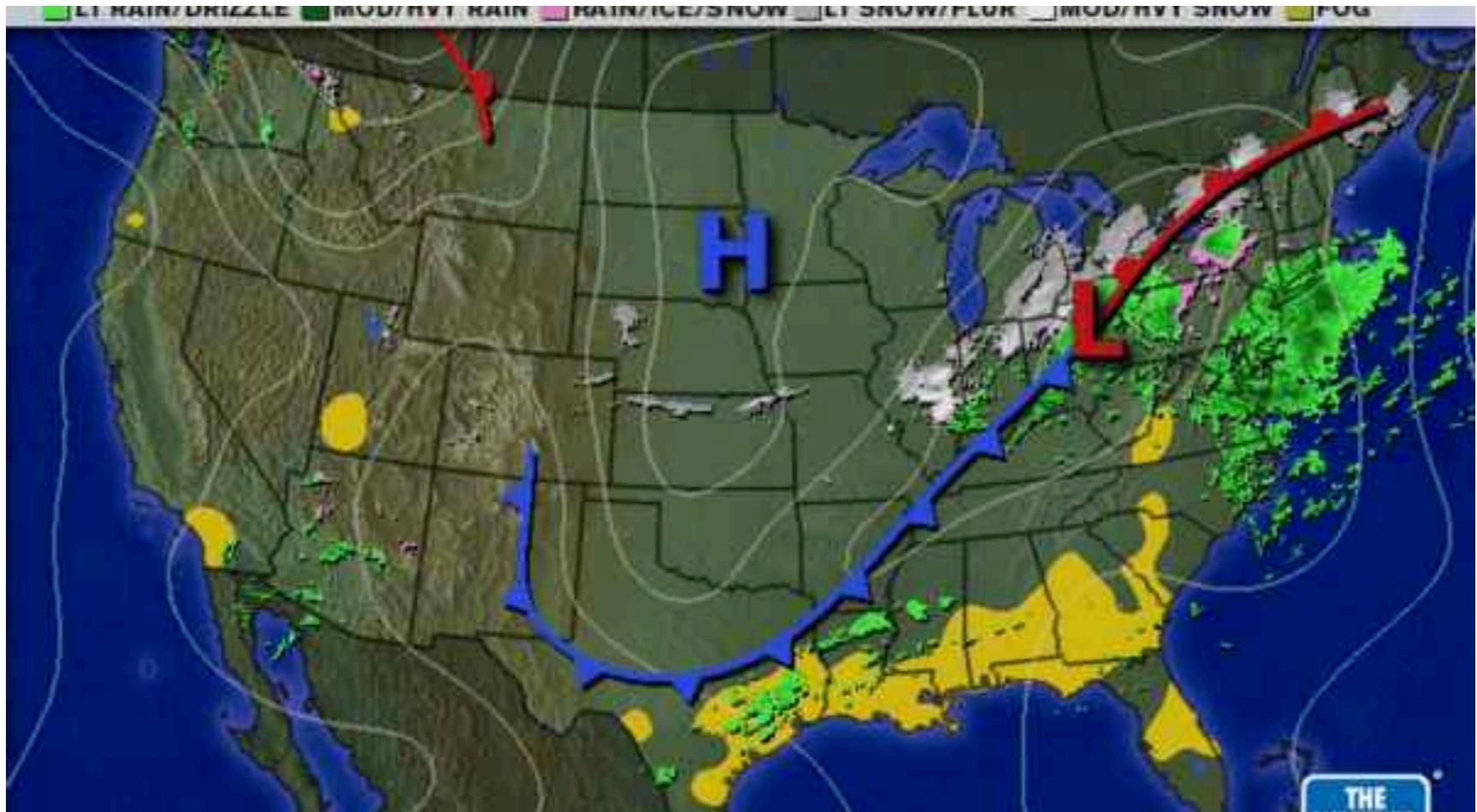
Fujiti Scale

SCALE	CATEGORY	FORCE	DAMAGE
F0	WEAK	0-72MPH	LIGHT
F1	WEAK	73-112	MODERATE
F2	STRONG	113-157	CONSIDERABLE
F3	STRONG	158-206	SEVERE
F4	VIOLENT	207-260	DEVASTATING

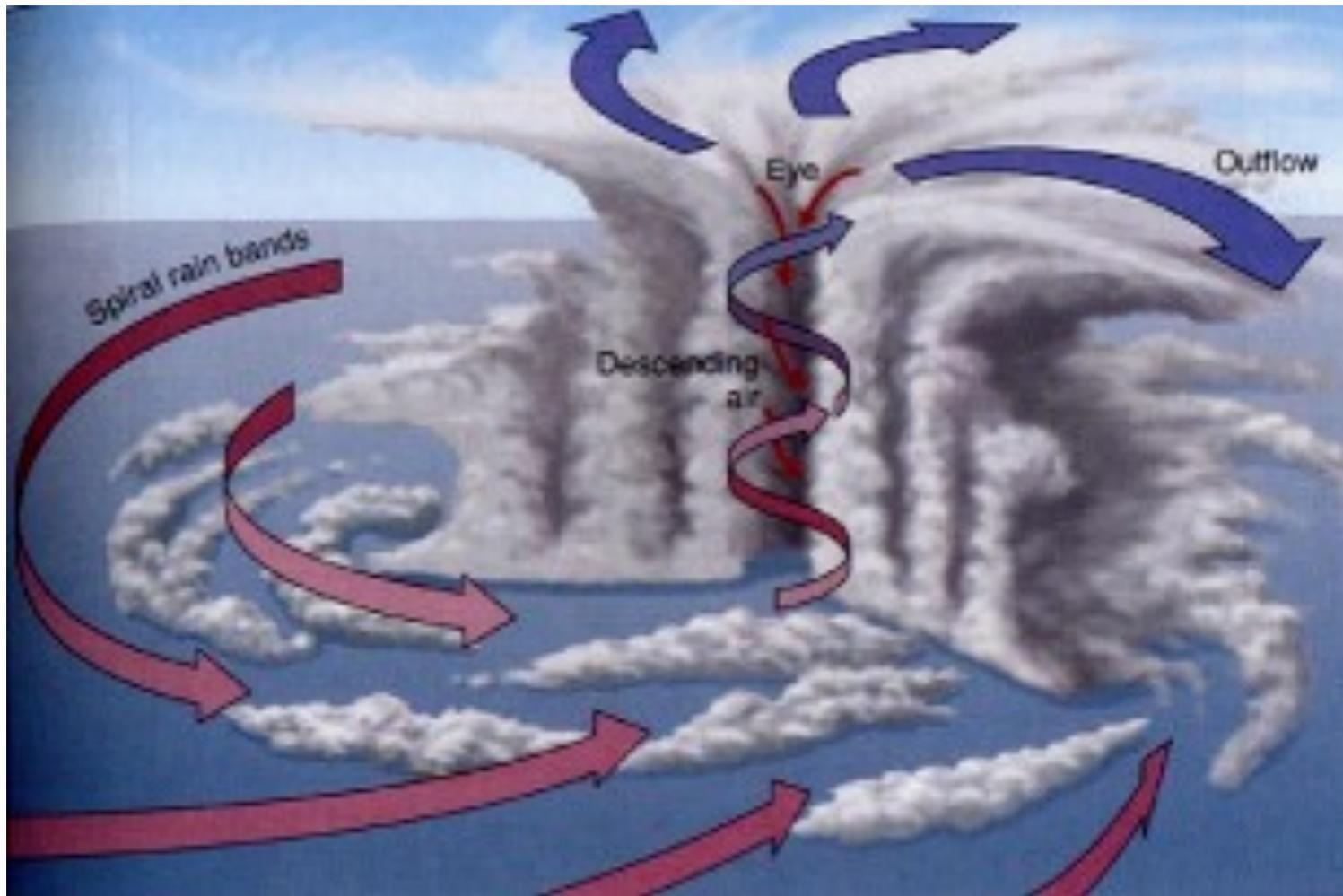
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Weather Map



Hurricane



Hurricane Scale



JUNE 1st - NOVEMBER 30th (ATLANTIC/GULF)

	Winds	Storm Surge	Barometric Pressure
CATEGORY 5	Over 155 mph.	Over 18 ft.	27.17" or less
CATEGORY 4	131 to 155 mph.	13 ft. to 18 ft.	27.17 to 27.90"
CATEGORY 3	111 to 130 mph.	9 ft. to 12 ft.	27.91 to 28.49"
CATEGORY 2	96 to 110 mph.	6 ft. to 8 ft.	28.50 to 28.93"
CATEGORY 1	75 to 95 mph.	4 ft. to 5 ft.	28.94" or more

TROPICAL STORM: Sustained winds: 39 to 73 mph.
(Follow your local emergency instructions)

Hurricane Charley



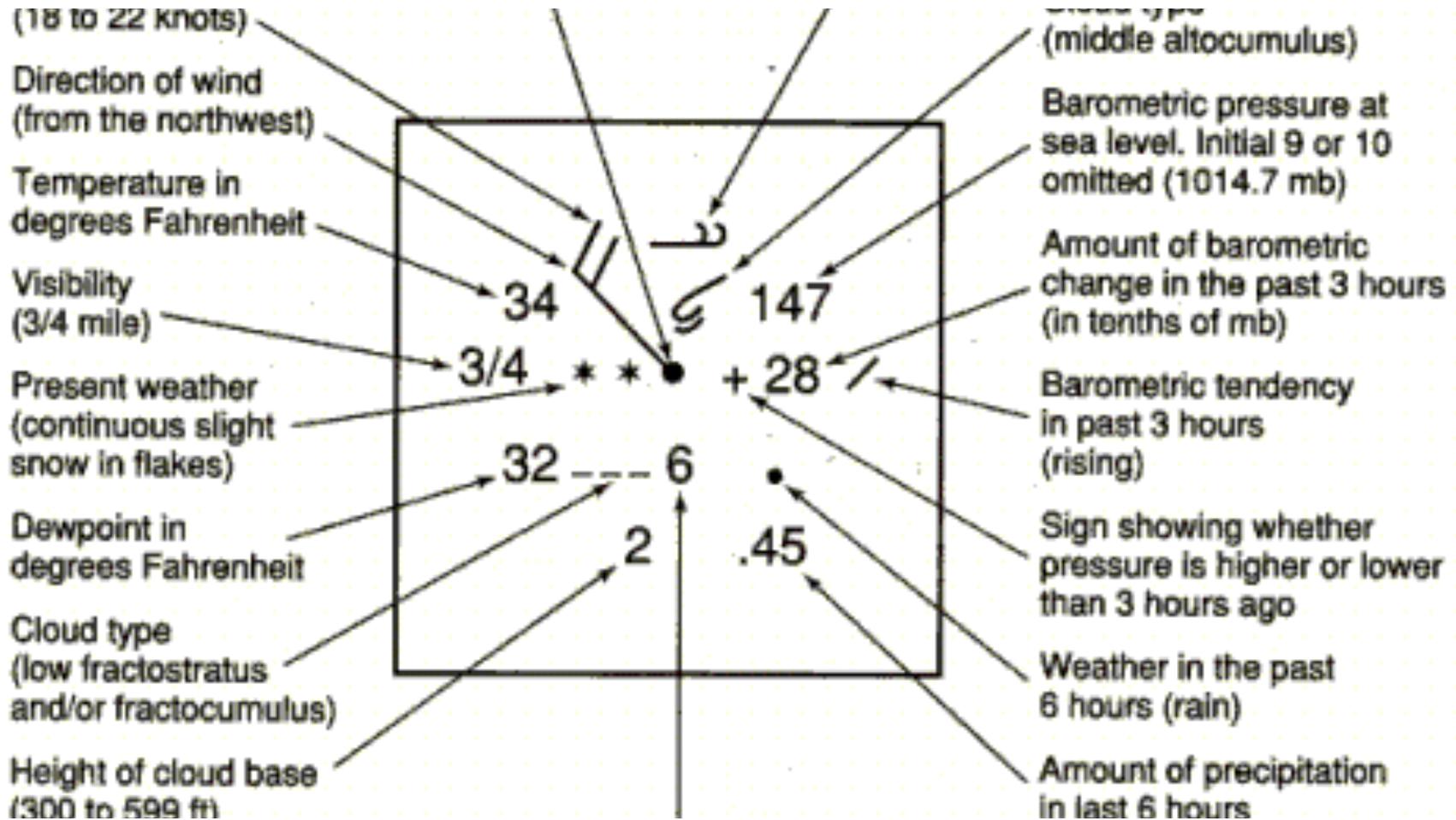
NWS



- Two sources of forecasting weather
 - Data collected from upper atmosphere
 - Data collected on the Earth's surface



Weather Station Model



Isobars

- Isobars-connect points of the “same”
- Examples:
temperature and wind speed
- The further away the lines the lower the wind speed



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