Unit 8:
Weather, Water & Climate

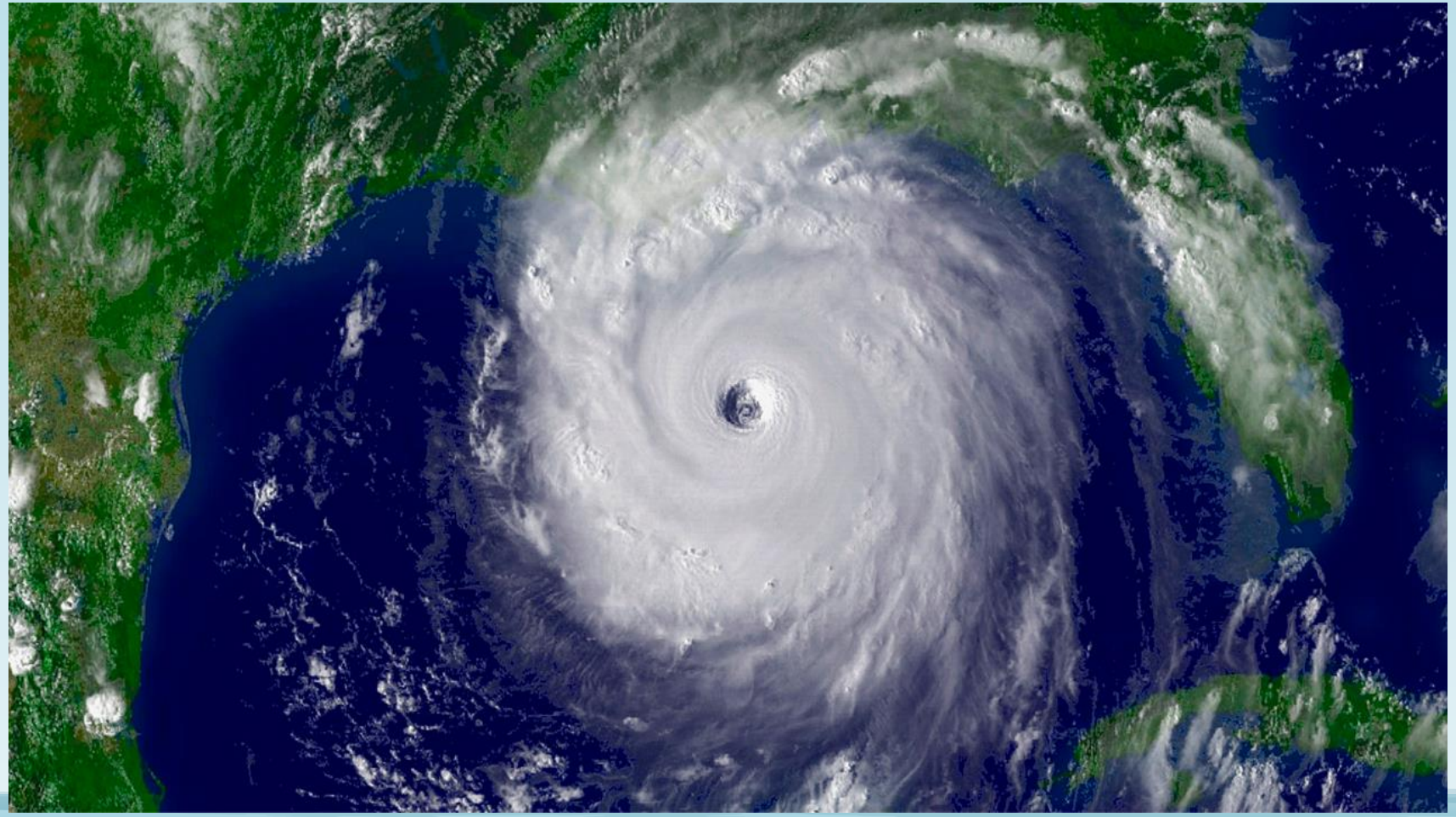
Part I: Weather

TOPIC 1: CYCLONIC WEATHER
TOPIC 2: WEATHER INSTRUMENTS
TOPIC 3: WEATHER VARIABLES
TOPIC 4: AIR MASSES & FRONTS

CYCLONIC WEATHER

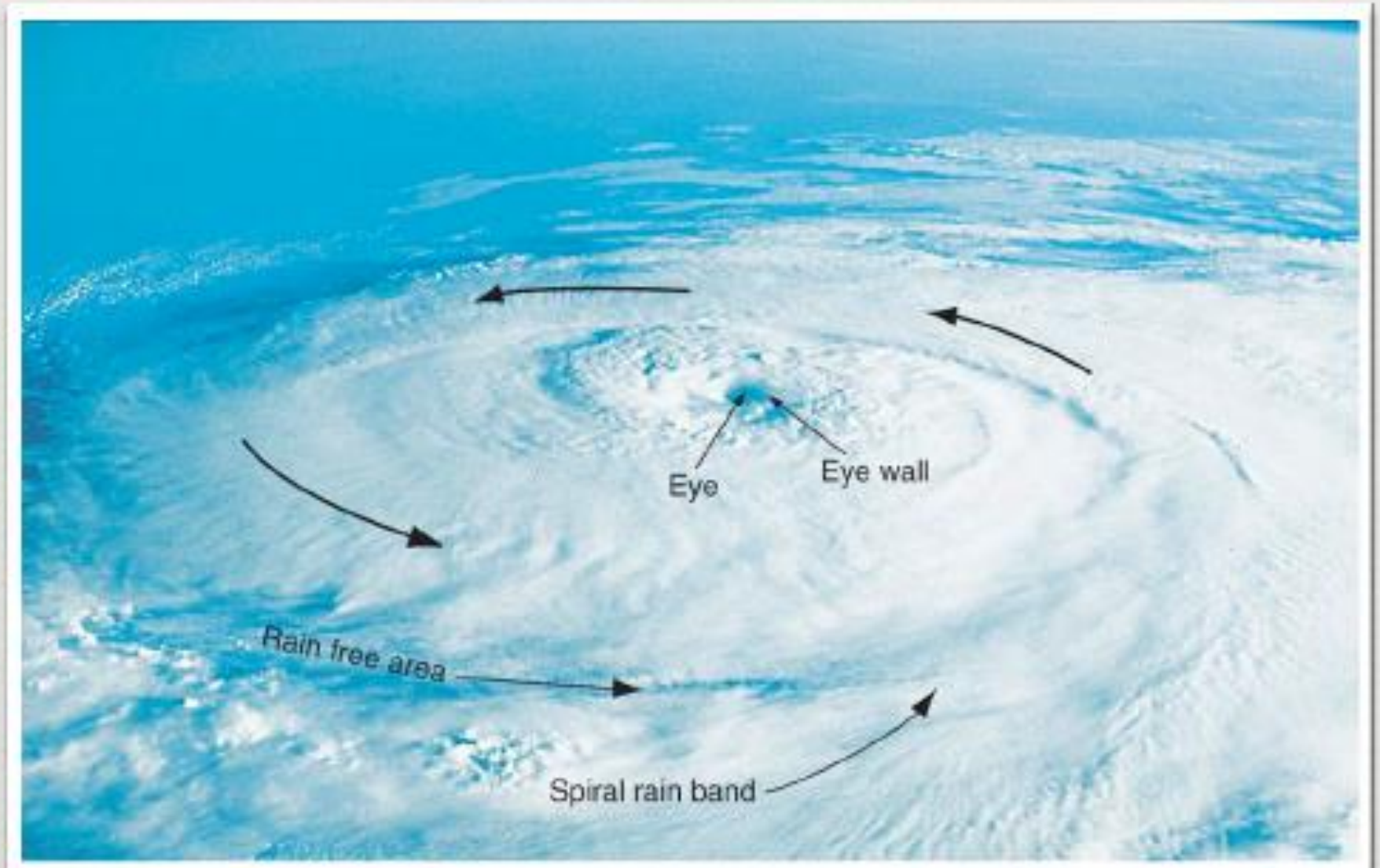
WHAT TYPES OF WEATHER ARE CYCLONIC?

Hurricanes 101



CYCLONIC WEATHER

- HURRICANE - LOW PRESSURE TROPICAL STORM THAT STARTS IN THE WESTERN ATLANTIC AND REACHES WINDS ABOVE 74 MPH

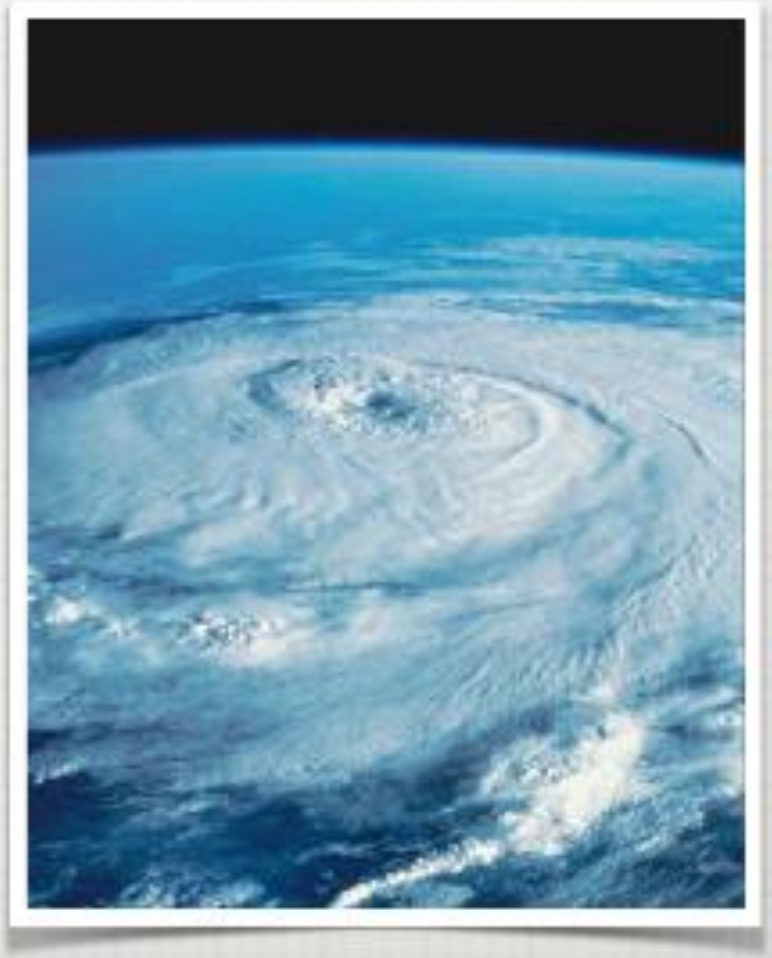


HURRICANE TERMINOLOGY

CYCLONIC WEATHER

HURRICANE STATISTICS

- LARGEST OF ALL THE STORMS
- APPROXIMATELY 10 PER YEAR
- NEARLY 400 DEATHS PER YEAR



CYCLONIC WEATHER

- SAFFIR-SIMPSON SCALE - SYSTEM FOR CLASSIFYING HURRICANES

Strength	Wind Speed	Storm Surge
Category 1	74 - 95	4 - 5
Category 2	96 - 110	6 - 8
Category 3	111 - 130	9 - 12
Category 4	131 - 155	13 - 18
Category 5	> 155	> 18

CYCLONIC WEATHER

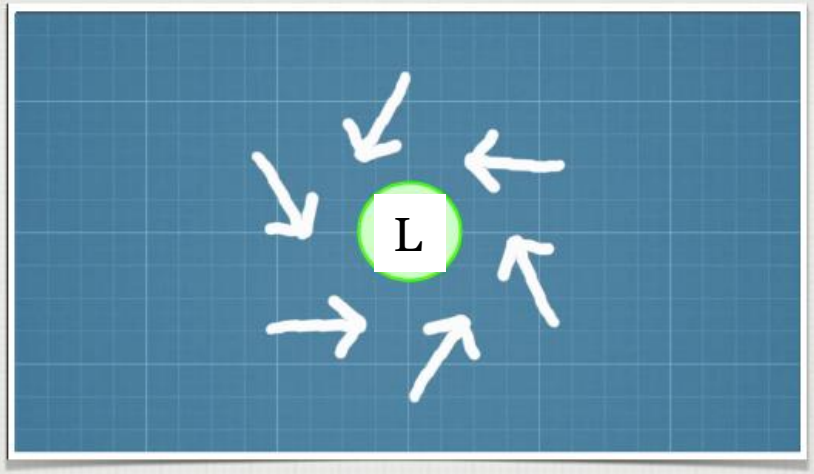
HURRICANE DANGERS

- SEVERE WINDS FROM 74 - 155 MPH

CYCLONIC WEATHER

HURRICANE DANGERS

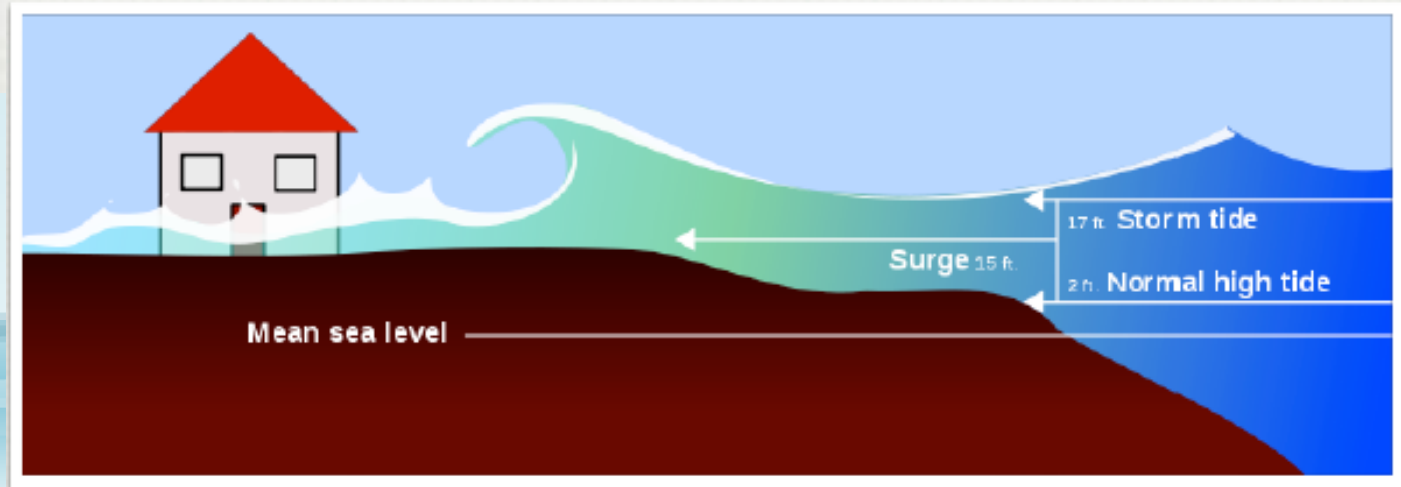
- WIND DIRECTION IS COUNTERCLOCKWISE AND INWARD



CYCLONIC WEATHER

HURRICANE DANGERS

- STORM SURGE - A DOME OF WATER 40 TO 60 MILES LONG THAT MOVES ONTO SHORE NEAR THE LANDFALL POINT OF THE HURRICANE



CYCLONIC WEATHER

HURRICANE FORMATION

1. THE SUN HEATS UP OCEAN WATER (ESPECIALLY NEAR THE EQUATOR)
2. BY THE END OF SUMMER, OCEAN TEMPERATURES REACH INTO THE 80'S

CYCLONIC WEATHER

HURRICANE FORMATION

3. A THUNDERSTORM MOVES WESTWARD OFF OF AFRICA AND INTO THE ATLANTIC OCEAN

4. WHEN UPPER WIND VELOCITIES ARE LOW, THUNDERSTORMS ARE GIVEN A CHANCE TO GAIN STRENGTH

CYCLONIC WEATHER

HURRICANE FORMATION

5. THE FAST RISING AIR (SUPPLIED BY THE WARM OCEAN) ALLOWS THE THUNDERSTORM TO GAIN STRENGTH

6. AS IT GROWS, EARTH'S ROTATION CAUSES IT TO SPIN COUNTERCLOCKWISE (CORIOLIS EFFECT)

CYCLONIC WEATHER

HURRICANE FORMATION

7. AS THEY BUILD A THUNDERSTORM CHANGES TO A TROPICAL DEPRESSION, THEN A TROPICAL STORM, AND FINALLY A HURRICANE

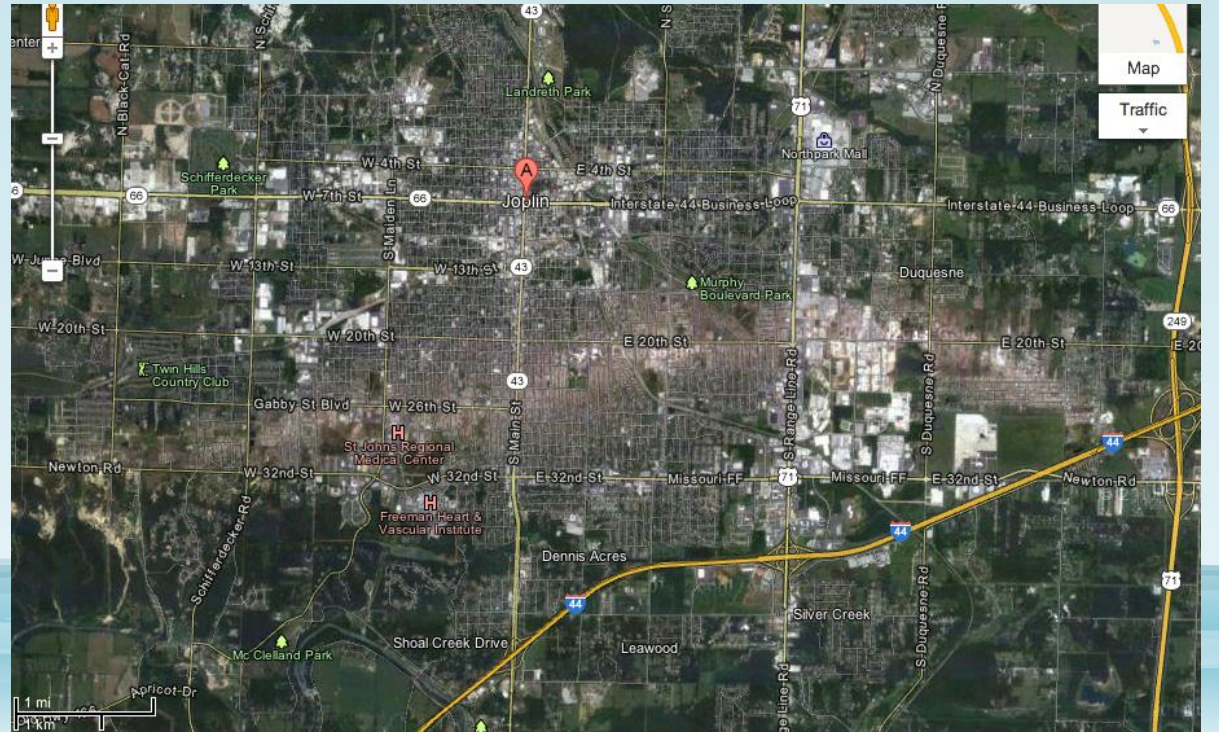
Hurricane Katrina Aftermath

Hurricane Katrina was the costliest natural disaster and one of the five deadliest hurricanes in the history of the United States.
Highest wind speed: 174 mph
Date: August 23, 2005 – August 31, 2005
Category: Category 5 Hurricane (SSHS)
Fatalities: 1,836
Affected areas: New Orleans, Cuba, Louisiana, Alabama, Georgia, & More
(Source: Wikipedia)

Questions?

Joplin, Missouri Tornado: May 2011

The 2011 **Joplin tornado** was a catastrophic EF5-rated multiple-vortex **tornado** that struck **Joplin**, **Missouri**, late in the afternoon of Sunday, May 22, 2011. It was part of a larger late-May **tornado** outbreak and reached a maximum width of nearly 1 mile (1.6 km) during its **path** through the southern part of the city.
(Source: Wikipedia)



CYCLONIC WEATHER

- TORNADO - A ROTATING COLUMN OF AIR RANGING IN WIDTH FROM A FEW YARDS TO MORE THAN A MILE AND WHIRLING AT DESTRUCTIVELY HIGH WINDS

CYCLONIC WEATHER

TORNADO STATISTICS

- MOST VIOLENT STORMS
- APPROXIMATELY 1000 PER YEAR
- NEARLY 50 DEATHS PER YEAR

CYCLONIC WEATHER

TORNADO DANGERS

- SEVERE WINDS FROM 250 MPH AND ABOVE

CYCLONIC WEATHER

TORNADO FORMATION

1. DEVELOP FROM AN INTENSE THUNDERSTORM
2. HEATING IS VERY INTENSE AND WARM AIR RISES IN STRONG CONVECTION CURRENTS

CYCLONIC WEATHER

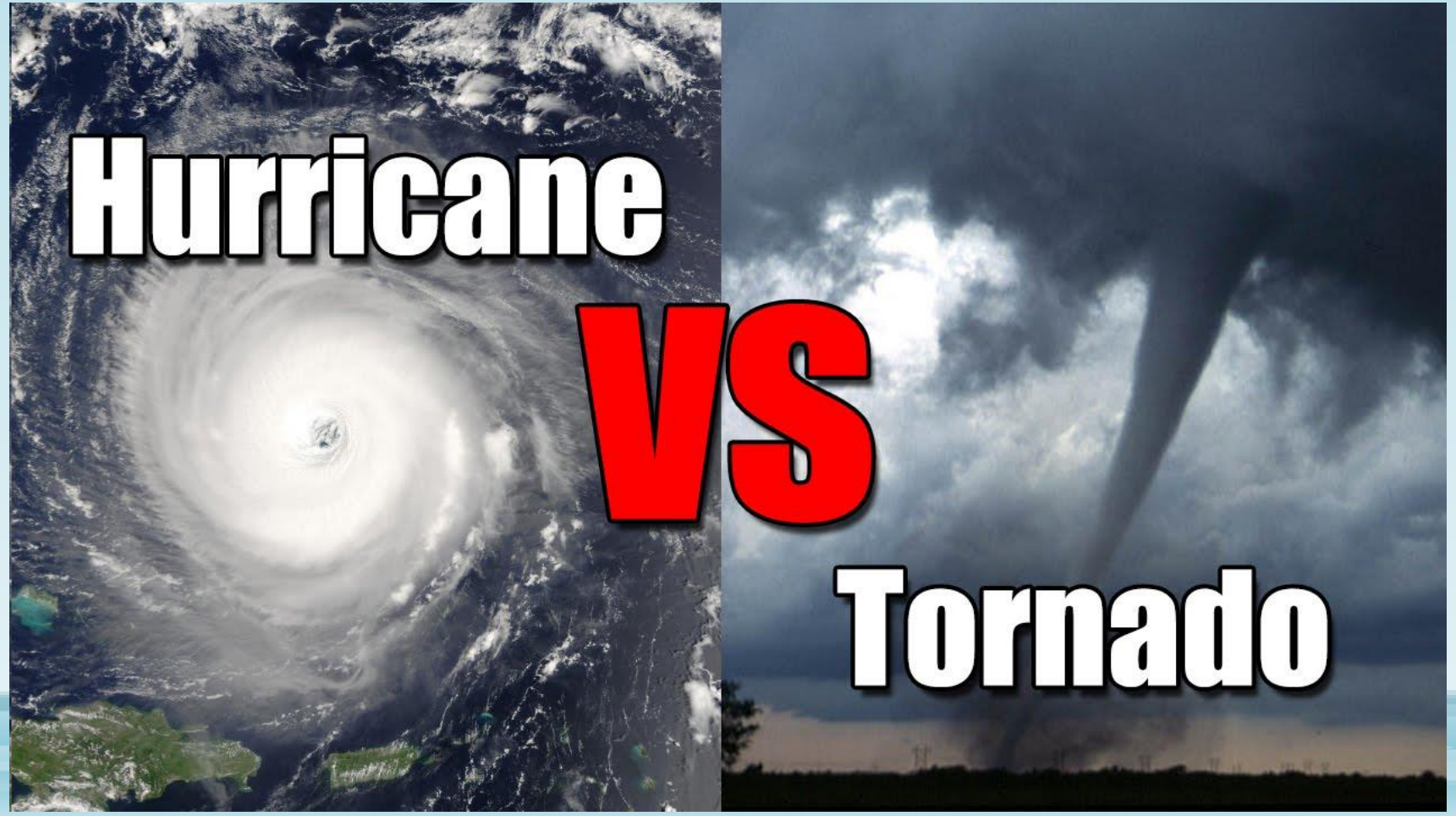
TORNADO FORMATION

3. THE RISING AIR CAUSES A LOW PRESSURE CENTER

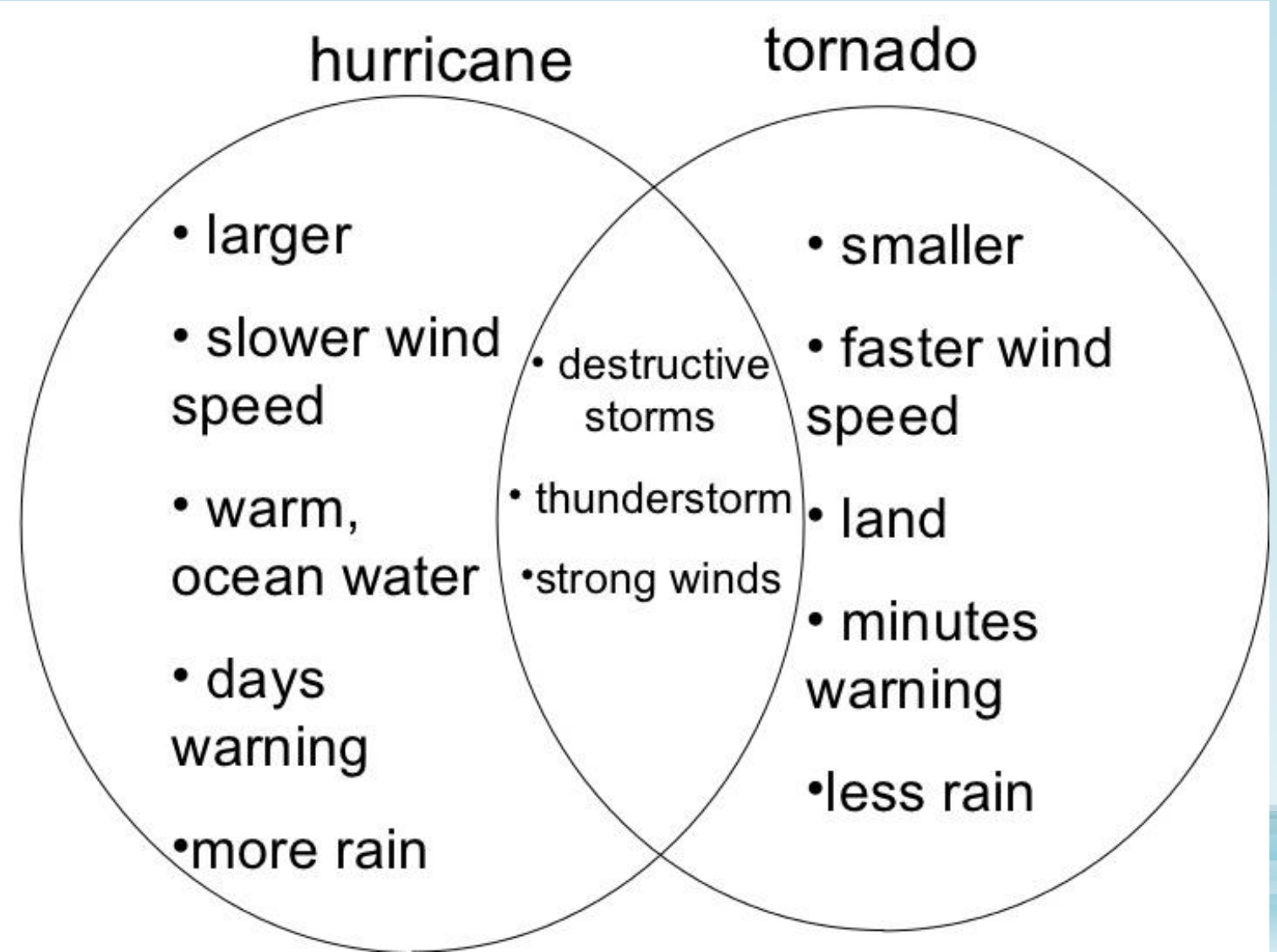
4. AS AIR RUSHES INTO THE CENTER IT STARTS TO SPIN UPWARD

“How Tornadoes Form”

Hurricanes vs. Tornadoes:
How Are They Similar?
How Are They Different?



Hurricanes vs. Tornadoes:
How Are They Similar?
How Are They Different?



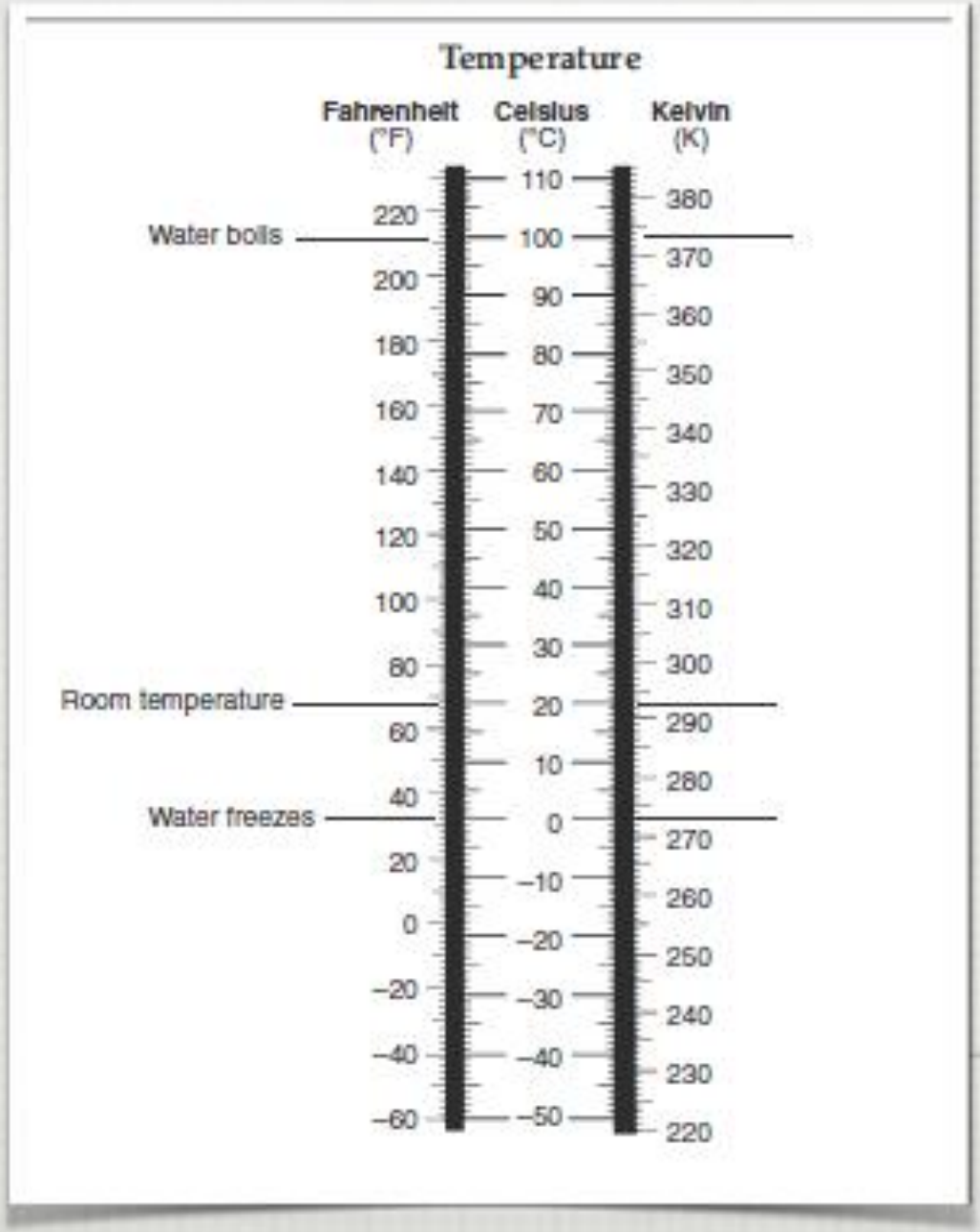
Questions?

WEATHER INSTRUMENTS

WHAT TOOLS DO WE USE TO HELP PREDICT THE WEATHER?

WEATHER INSTRUMENTS

- THERMOMETER - INSTRUMENT USED TO MEASURE TEMPERATURE
  - DIFFERENT SCALES INCLUDE:
    - CELSIUS
    - FAHRENHEIT
    - KELVIN

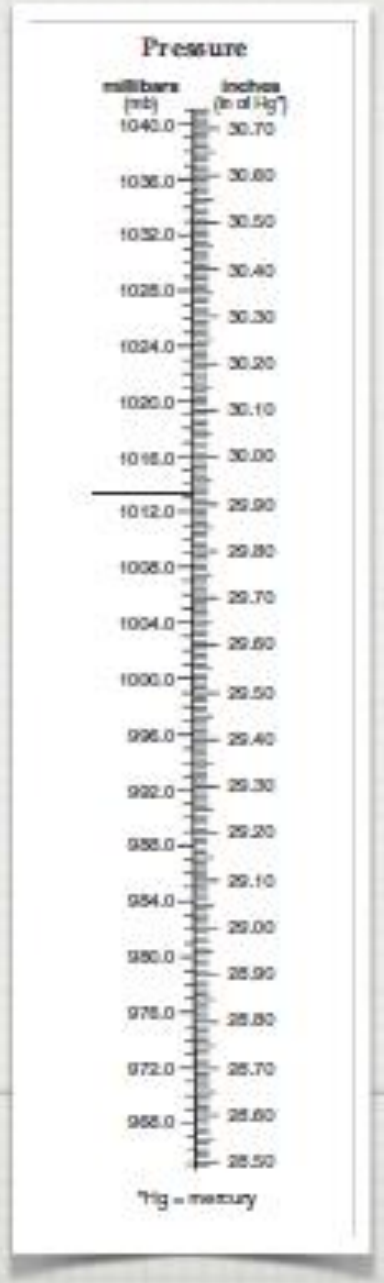


ESRT page 13

TEMPERATURE CONVERSION

WEATHER INSTRUMENTS

- BAROMETER - INSTRUMENT USED TO MEASURE AIR PRESSURE
  - DIFFERENT SCALES INCLUDE:
    - INCHES OF MERCURY
    - MILLIBARS



ESRT page 13

PRESSURE CONVERSION

WEATHER INSTRUMENTS

- ANEMOMETER - INSTRUMENT USED TO MEASURE WIND SPEED
  - DIFFERENT SCALES INCLUDE:
    - KNOTS
    - MILES PER HOUR

WEATHER INSTRUMENTS

- WEATHER VANE - INSTRUMENT USED TO MEASURE WIND DIRECTION
  - MEASURES DIRECTION USING COMPASS DIRECTIONS

WEATHER INSTRUMENTS

- SLING PSYCHROMETER - INSTRUMENT USED TO MEASURE DEW POINT AND RELATIVE HUMIDITY

WEATHER INSTRUMENTS

- RELATIVE HUMIDITY - THE AMOUNT OF WATER VAPOR IN THE AIR AT ANY GIVEN TIME
    - TO CALCULATE RELATIVE HUMIDITY YOU NEED A DRY BULB TEMPERATE, DIFFERENCE IN WET BULB AND DRY BULB TEMPERATURE, AND THE E.S.R.T.

ESRT page 12

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
−20	100	28														
−18	100	40														
−16	100	48														
−14	100	55	11													
−12	100	61	23													
−10	100	66	33													
−8	100	71	41	13												
−6	100	73	48	20												
−4	100	77	54	32	11											
−2	100	79	58	37	20	1										
0	100	81	63	45	28	11										
2	100	83	67	51	36	20	6									
4	100	85	70	56	42	27	14									
6	100	86	72	59	46	35	22	10								
8	100	87	74	62	51	39	28	17	6							
10	100	88	76	65	54	43	33	24	13	4						
12	100	88	78	67	57	48	38	28	19	10	2					
14	100	89	79	69	60	50	41	33	25	16	8	1				
16	100	90	80	71	62	54	45	37	29	21	14	7	1			
18	100	91	81	72	64	56	48	40	33	26	19	12	6			
20	100	91	82	74	66	58	51	44	36	30	23	17	11	5		
22	100	92	83	75	68	60	53	46	40	33	27	21	15	10	4	
24	100	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4
26	100	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9
28	100	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12
30	100	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16

ESRT page 12

RELATIVE HUMIDITY (%)

WEATHER INSTRUMENTS

- DEW POINT - THE TEMPERATURE AT WHICH AIR MUST BE COOLED FOR WATER VAPOR TO CONDENSE
  - TO CALCULATE DEWPOINT YOU NEED A DRY BULB TEMPERATE, DIFFERENCE IN WET BULB AND DRY BULB TEMPERATURE, AND THE E.S.R.T.

ESRT page 12

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
−20	−20	−33														
−18	−18	−28														
−16	−16	−24														
−14	−14	−21	−36													
−12	−12	−18	−28													
−10	−10	−14	−22													
−8	−8	−12	−18	−29												
−6	−6	−10	−14	−22												
−4	−4	−7	−12	−17	−29											
−2	−2	−5	−8	−13	−20											
0	0	−3	−6	−9	−15	−24										
2	2	−1	−3	−6	−11	−17										
4	4	1	−1	−4	−7	−11	−19									
6	6	4	1	−1	−4	−7	−13	−21								
8	8	6	3	1	−2	−5	−9	−14								
10	10	8	6	4	1	−2	−5	−9	−14	−28						
12	12	10	8	6	4	1	−2	−5	−9	−16						
14	14	12	11	9	6	4	1	−2	−5	−10	−17					
16	16	14	13	11	9	7	4	1	−1	−6	−10	−17				
18	18	16	15	13	11	9	7	4	2	−2	−5	−10	−19			
20	20	19	17	15	14	12	10	7	4	2	−2	−5	−10	−19		
22	22	21	19	17	16	14	12	10	8	5	3	−1	−5	−10	−19	
24	24	23	21	20	18	16	14	12	10	8	6	2	−1	−5	−10	−18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	−4	−9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	−3
30	30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1

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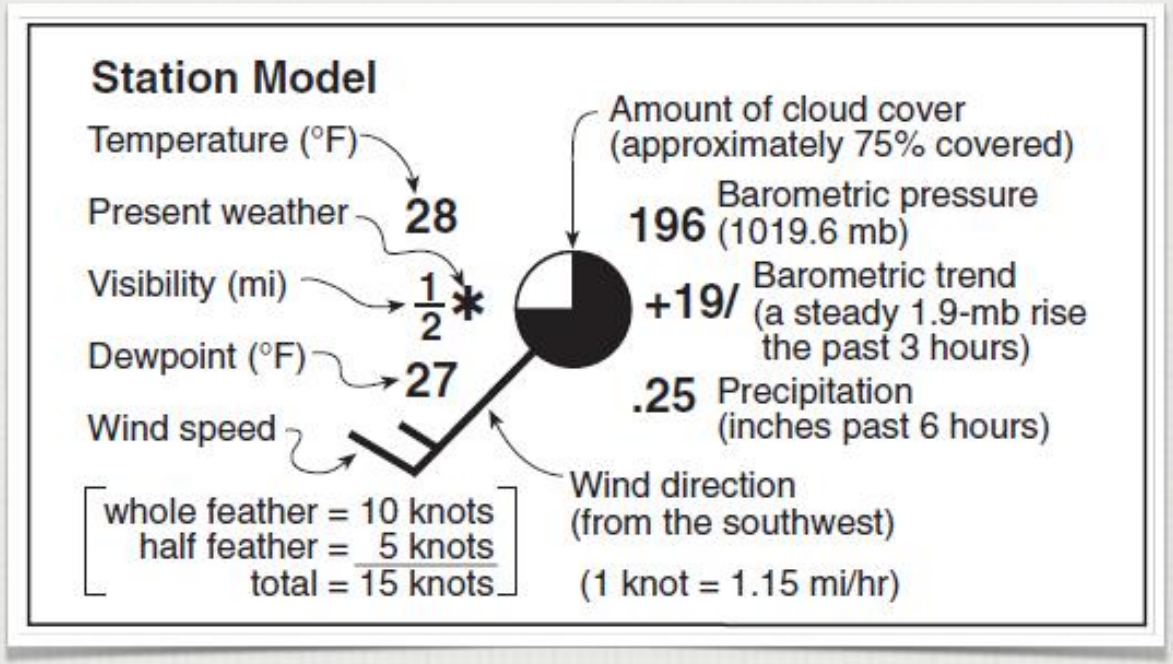
DEW POINT TEMPERATURES (°C)

Questions?

WEATHER INSTRUMENTS

- STATION MODEL - SYMBOL ON A WEATHER MAP THAT ILLUSTRATE ALL THE WEATHER CONDITIONS AT THAT LOCATION

ESRT page 13



“Station Models”

Questions?

Lab 15: Weather Instruments

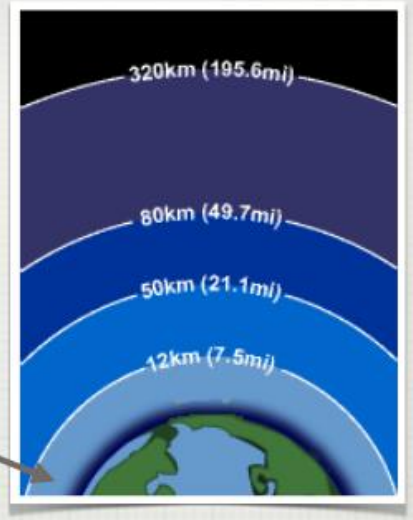
- You are now ready to complete Lab 15: Weather Instruments
- Worth: 90 Minutes
- Use your notes and your understanding of station models to complete all activities in your lab

WEATHER VARIABLES

WHAT WEATHER VARIABLES HELP PREDICT WEATHER?

WEATHER VARIABLES

- TROPOSPHERE - THE LOWEST PORTION OF THE ATMOSPHERE WHERE TEMPERATURE DECREASES
  - WEATHER OCCURS IN THIS LAYER ONLY

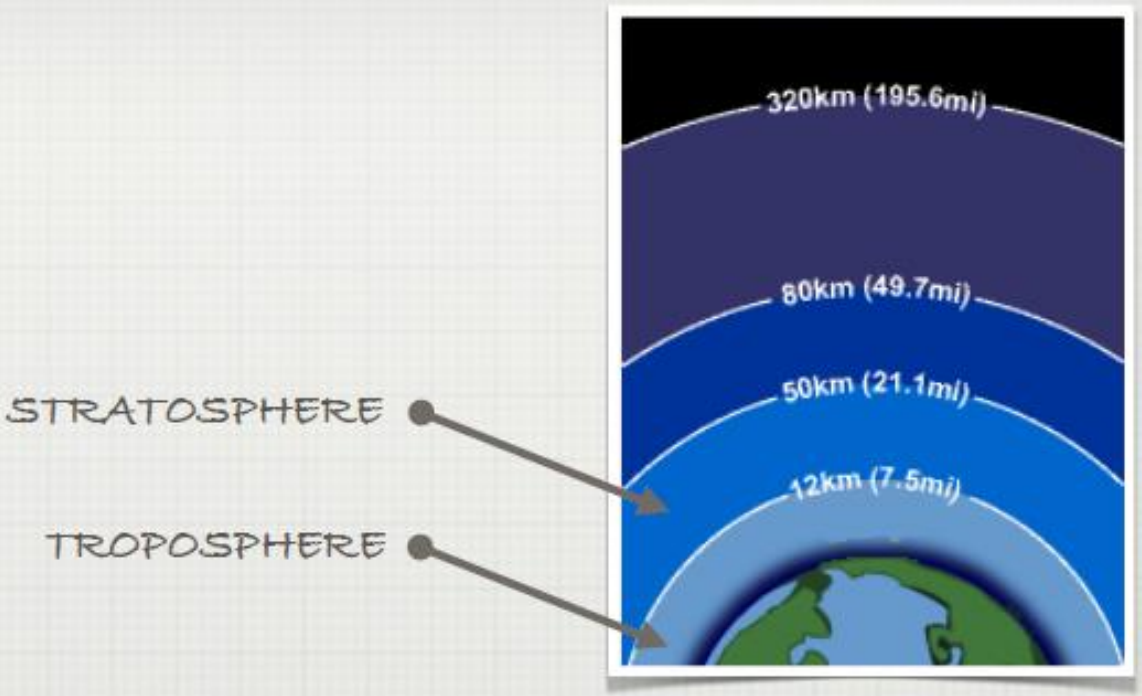


EARTH'S LAYERS

ESRT page 14

WEATHER VARIABLES

- STRATOSPHERE - A REGION OF THE ATMOSPHERE WHERE TEMPERATURE INCREASES

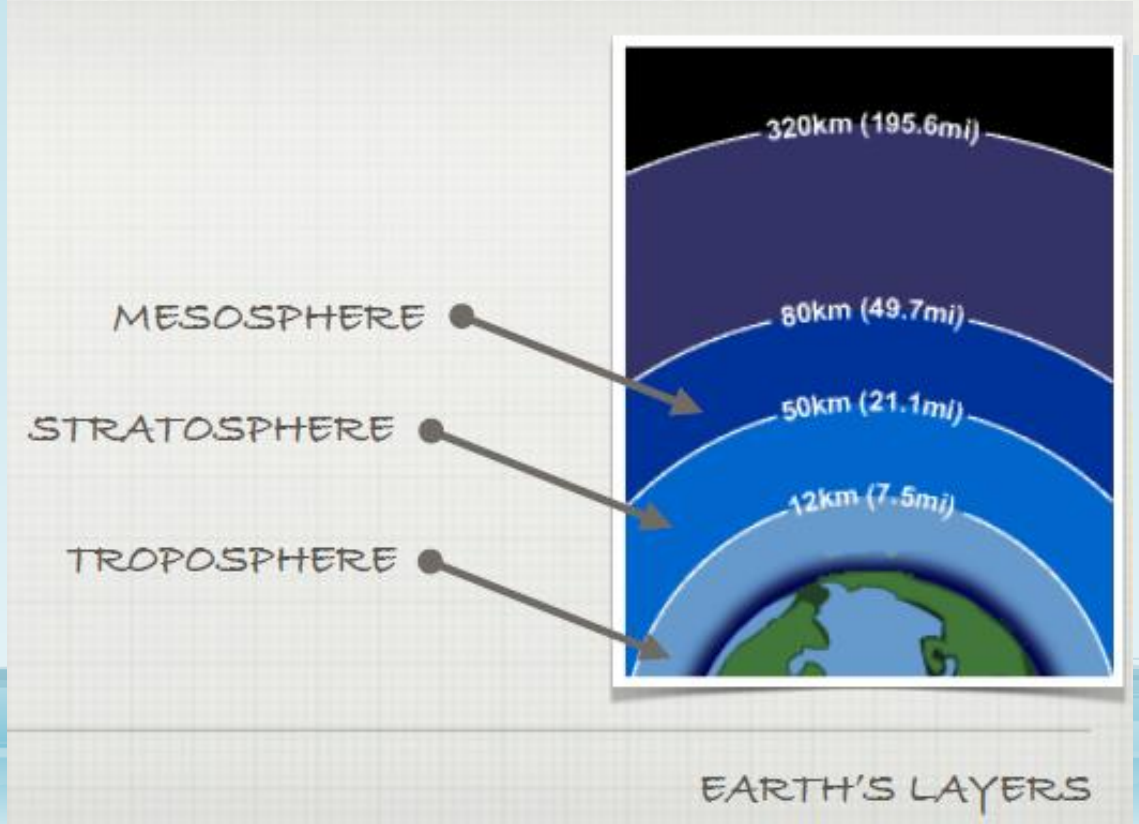


EARTH'S LAYERS

ESRT page 14

WEATHER VARIABLES

- MESOSPHERE - A REGION OF THE ATMOSPHERE WHERE TEMPERATURE DECREASES AGAIN



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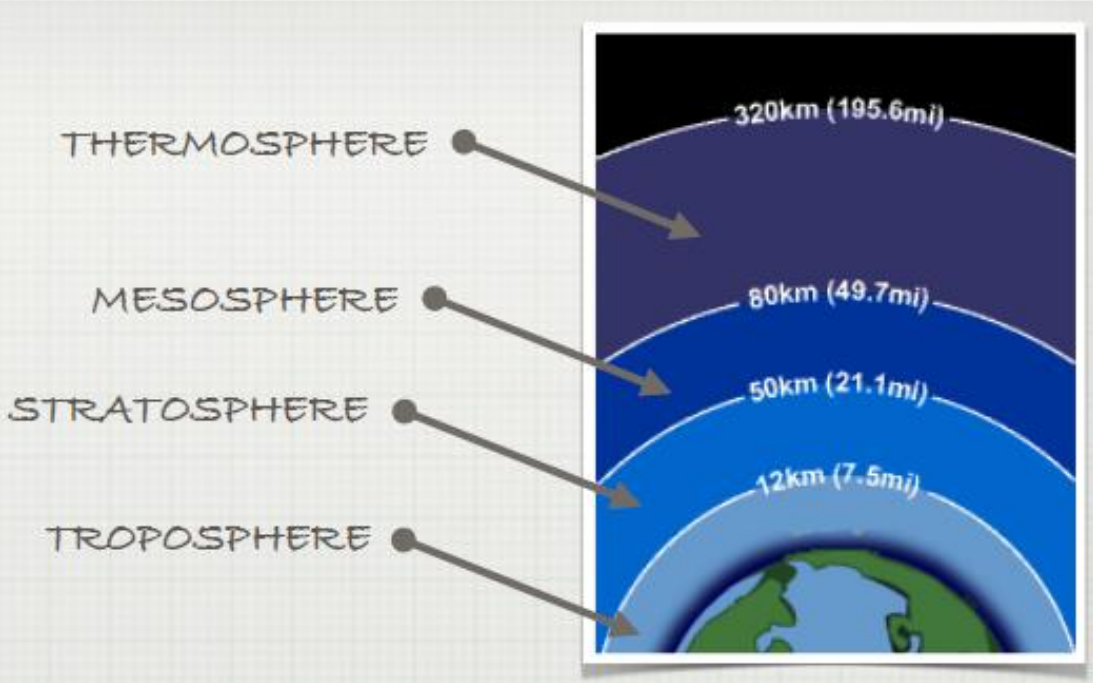
WEATHER VARIABLES

- THERMOSPHERE - THE OUTER MOST SHELL OF THE ATMOSPHERE WHERE TEMPERATURE INCREASES



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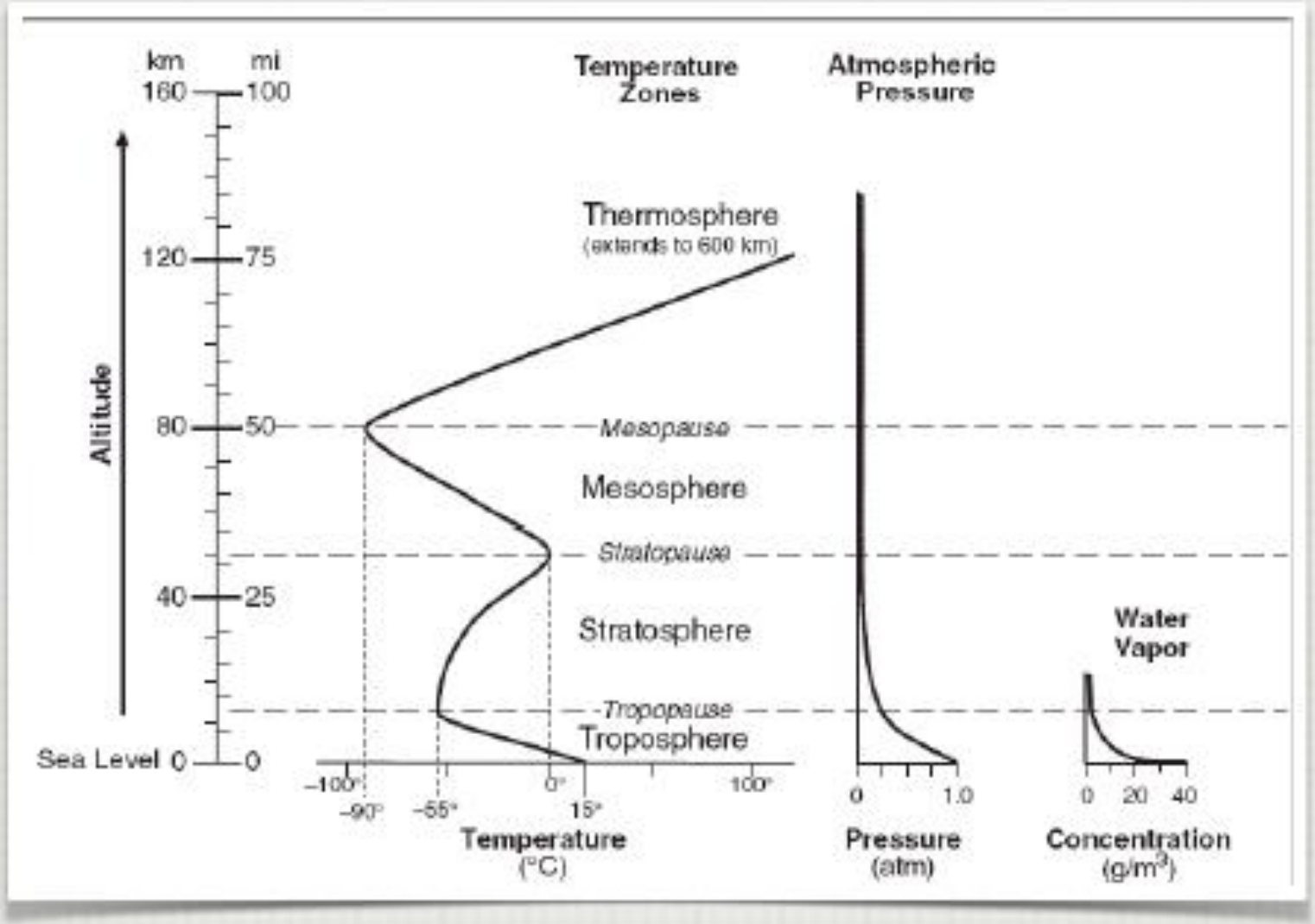


EARTH SCIENCE REFERENCE TABLES

ESRT page 14

WEATHER VARIABLES

- WEATHER - THE PRESENT CONDITION OF THE ATMOSPHERE --- INCLUDING TEMPERATURE, PRESSURE, WIND, HUMIDITY, AND MOVEMENT
    - CHANGES ARE DUE MAINLY TO UNEQUAL HEATING OF LAND MASSES, OCEANS, AND THE ATMOSPHERE

WEATHER VARIABLES

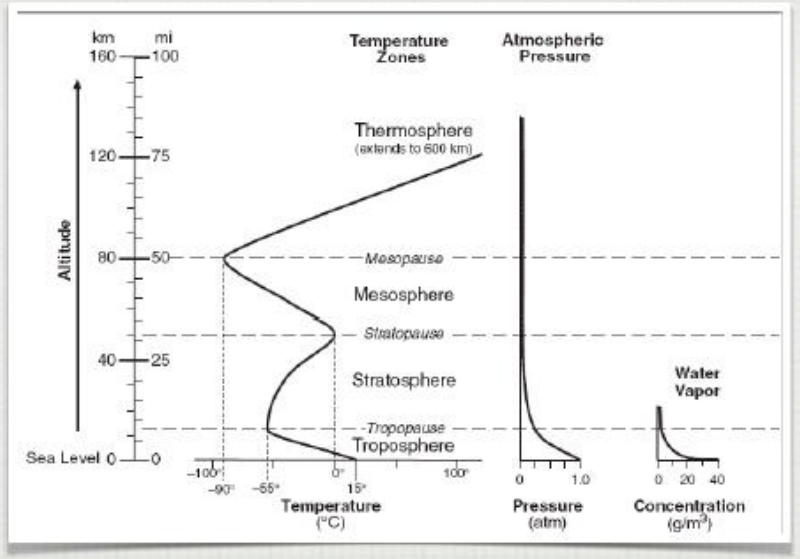
- TEMPERATURE - THE HEAT ENERGY PRESENT IN THE ATMOSPHERE AT THAT LOCATION
    - INFLUENCES AFFECTING TEMPERATURE ARE SOLAR RADIATION, ANGLE OF INSOLATION, HOURS OF DAYLIGHT, AND REFLECTION OFF THE ATMOSPHERE

WEATHER VARIABLES

- AIR PRESSURE - THE FORCE EXERTED ON A UNIT OF AREA BY THE AIR THAT IS EXERTED EQUALLY IN EVERY DIRECTION
    - AIR IS A MIXTURE OF GASES WITH MOLECULES THAT ARE FAST MOVING AND FAR APART

WEATHER VARIABLES

- AIR PRESSURE INCREASES AS YOU DECREASE YOUR ELEVATION
- AIR PRESSURE DECREASES AS YOU INCREASE YOUR ELEVATION



EARTH SCIENCE REFERENCE TABLES

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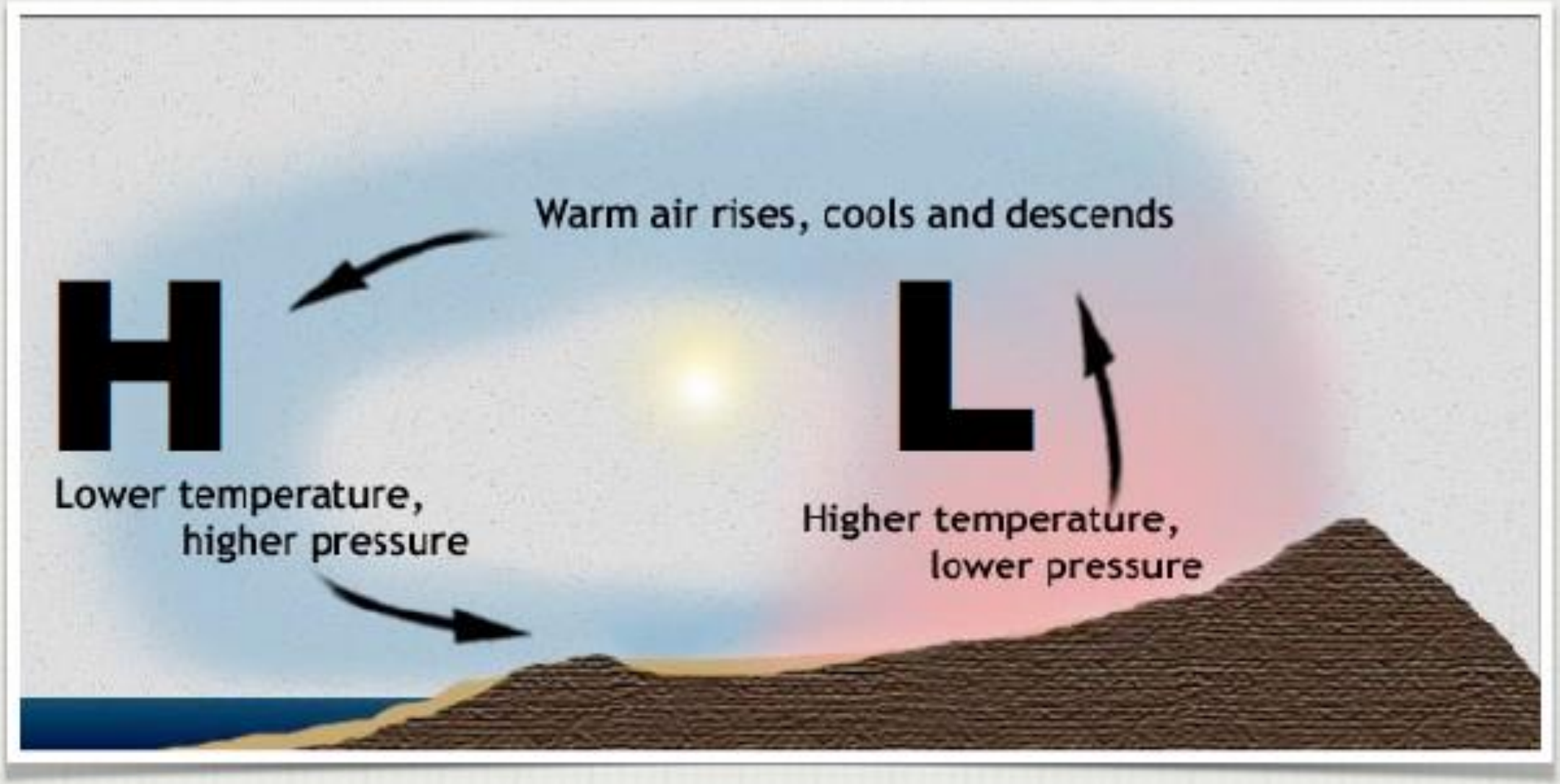
WEATHER VARIABLES

- AIR CURRENTS - RISING OR SINKING MOVEMENT OF AIR PERPENDICULAR TO THE GROUND
- WIND - THE HORIZONTAL MOVEMENT OF AIR PARALLEL TO THE EARTH'S SURFACE
    - WIND BLOWS FROM AREAS OF HIGH PRESSURE TO AREAS OF LOW PRESSURE

WEATHER VARIABLES

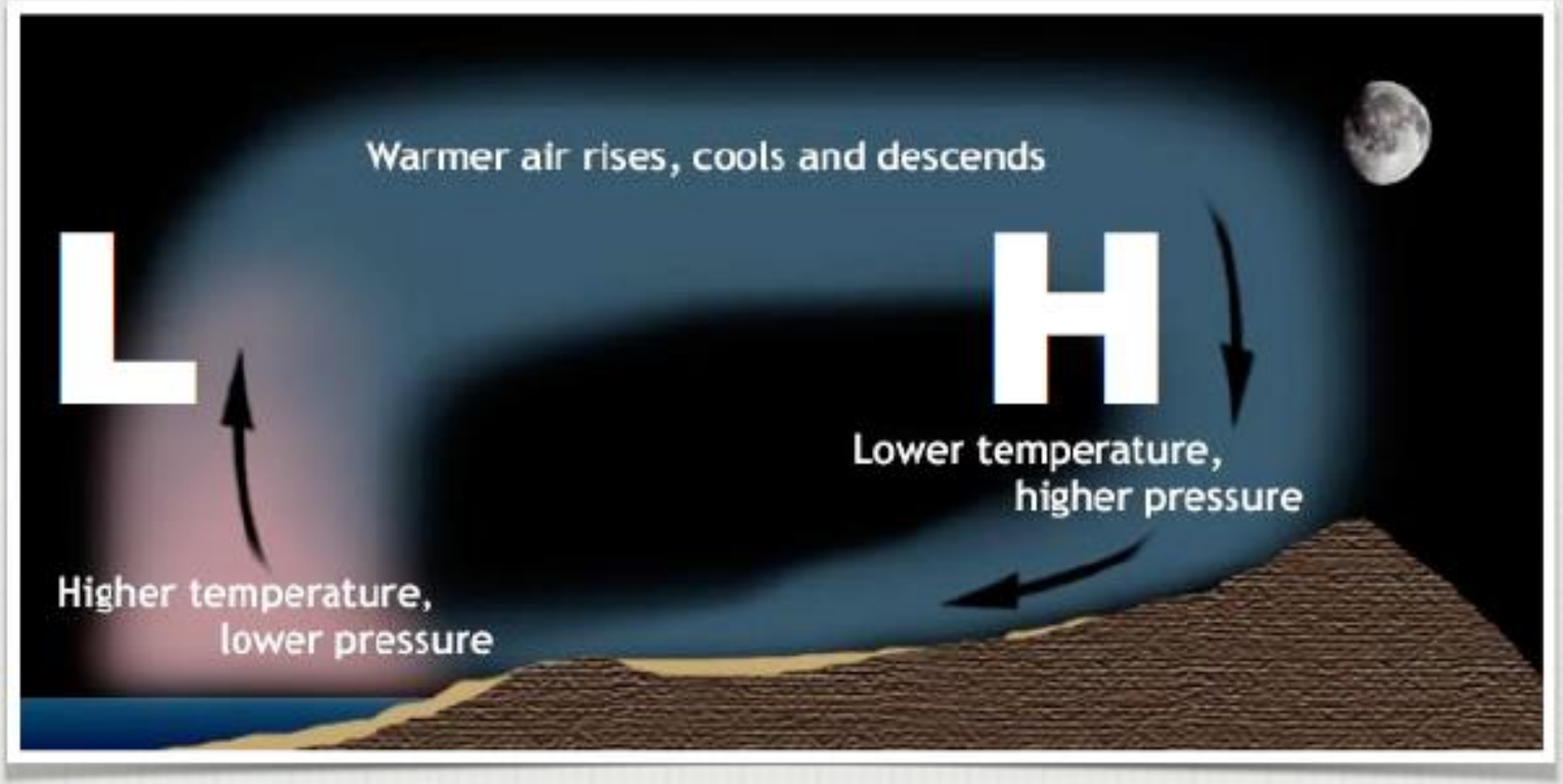
- SEA BREEZE - DURING THE DAY LAND HEATS UP FASTER THAN THE WATER, THUS CREATING A LOW PRESSURE ZONE OVER THE LAND
    - WIND BLOWS FROM AREAS OF HIGH PRESSURE TO AREAS OF LOW PRESSURE


Warm air rises, cools and descends
H
L
Lower temperature,
higher pressure
Higher temperature,
lower pressure

SEA BREEZE

WEATHER VARIABLES

- LAND BREEZE - DURING THE NIGHT LAND COOLS FASTER WHILE WATER HOLDS ITS HEAT, THUS CREATING A LOW PRESSURE ZONE OVER THE WATER
    - WIND BLOWS FROM AREAS OF HIGH PRESSURE TO AREAS OF LOW PRESSURE


Warmer air rises, cools and descends
L
H
Lower temperature,
higher pressure
Higher temperature,
lower pressure

LAND BREEZE

WEATHER VARIABLES

CLOUD FORMATION

- AIR IS WARMED FROM SUN HEATED SURFACES BECOMING LESS DENSE AND RISING
- AS IT RISES IT EXPANDS AND DECREASES IN TEMPERATURE AND PRESSURE

WEATHER VARIABLES

CLOUD FORMATION

- WATER VAPOR IN THE AIR THEN CONDENSES AS THE AIR IS COOLED TO THE DEWPOINT
    - CONDENSATION - THE PROCESS WHICH GAS TURNS TO A LIQUID
- REMEMBER: R.E.C.C.
    - RISES - EXPANDS - COOLS - CONDENSES

Questions?

Lab 16: Weather Variables

- You are now ready to complete Lab 16: Weather Variables
- Worth: 90 Minutes
- Use your notes and your understanding of drawing isolines, calculating gradient, and creating line graphs to complete all activities in your lab

AIR MASSES AND FRONT

HOW ARE AIR MASSES AND FRONTS RELATED TO WEATHER?

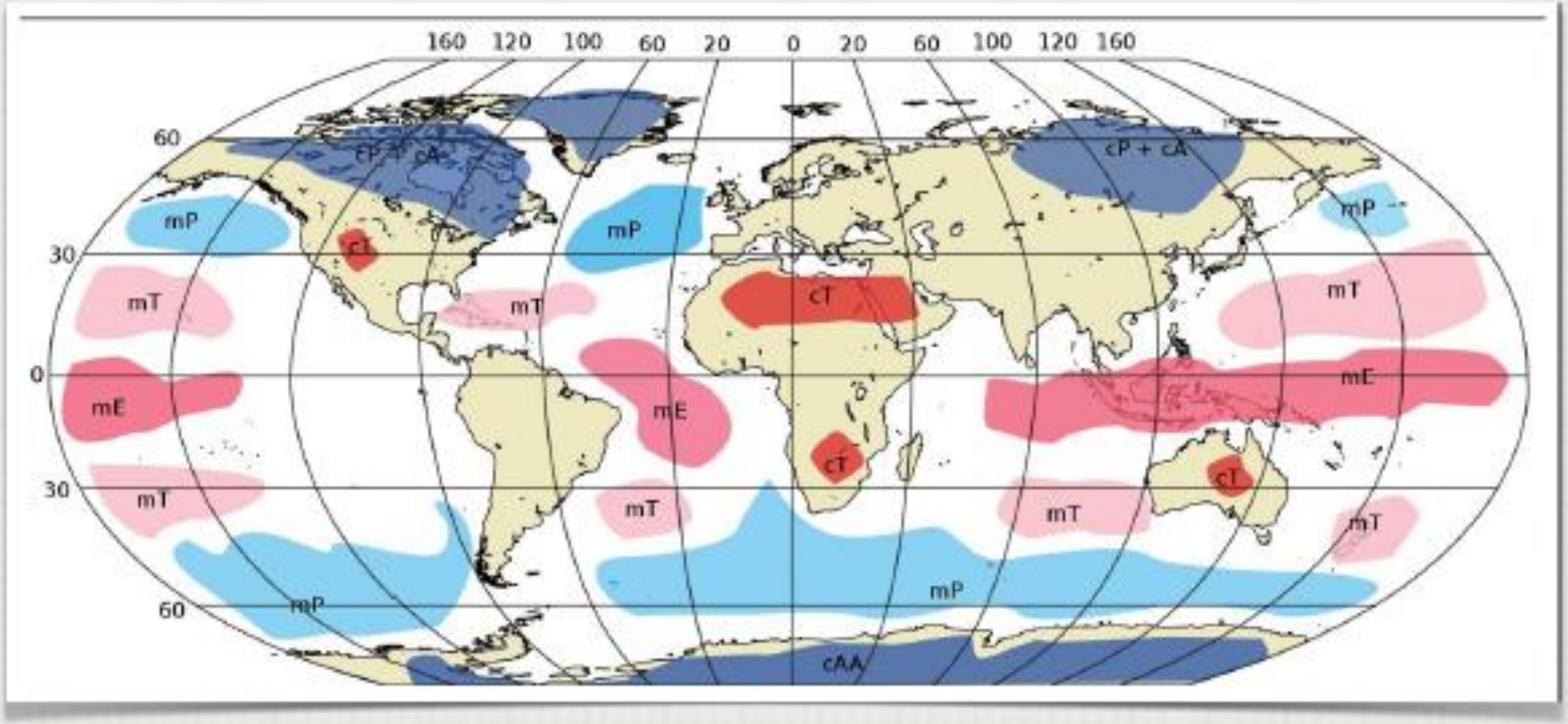
WEATHER PATTERNS

- AIR MASS - CHARACTERISTICS OF THE AIR IDENTIFIED BY TEMPERATURE AND MOISTURE
- SOURCE REGION - LOCATION OVER WHICH AN AIR MASS GETS ITS CHARACTERISTICS
    - AIR MASSES ARE NAMED AFTER THEIR SOURCE REGION AND ARE DESIGNATED BY LETTERS

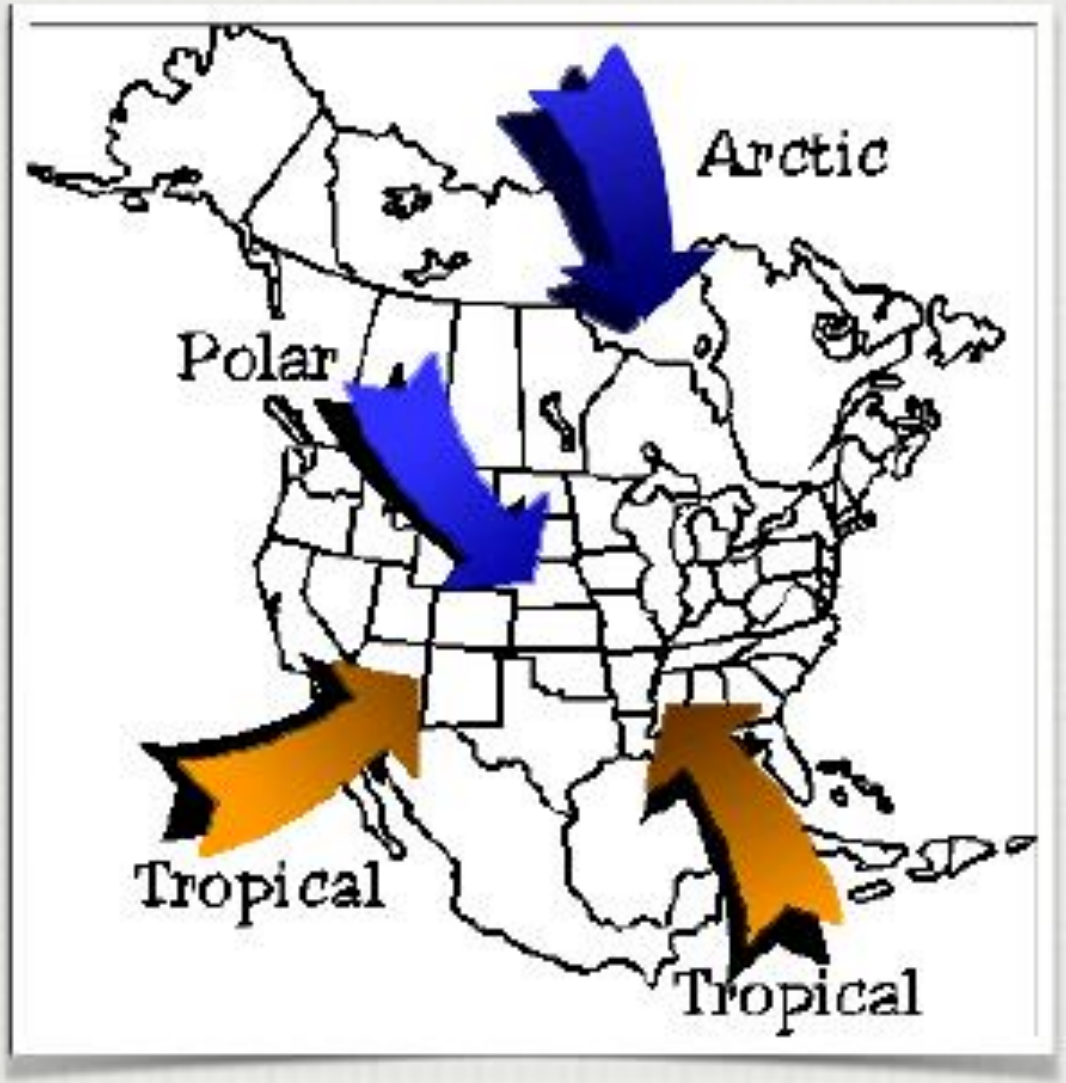
Air Masses

cA	continental arctic
cP	continental polar
cT	continental tropical
mT	maritime tropical
mP	maritime polar

ESRT page 13



AIR MASSES & SOURCE REGIONS



AIR MASSES & SOURCE REGIONS

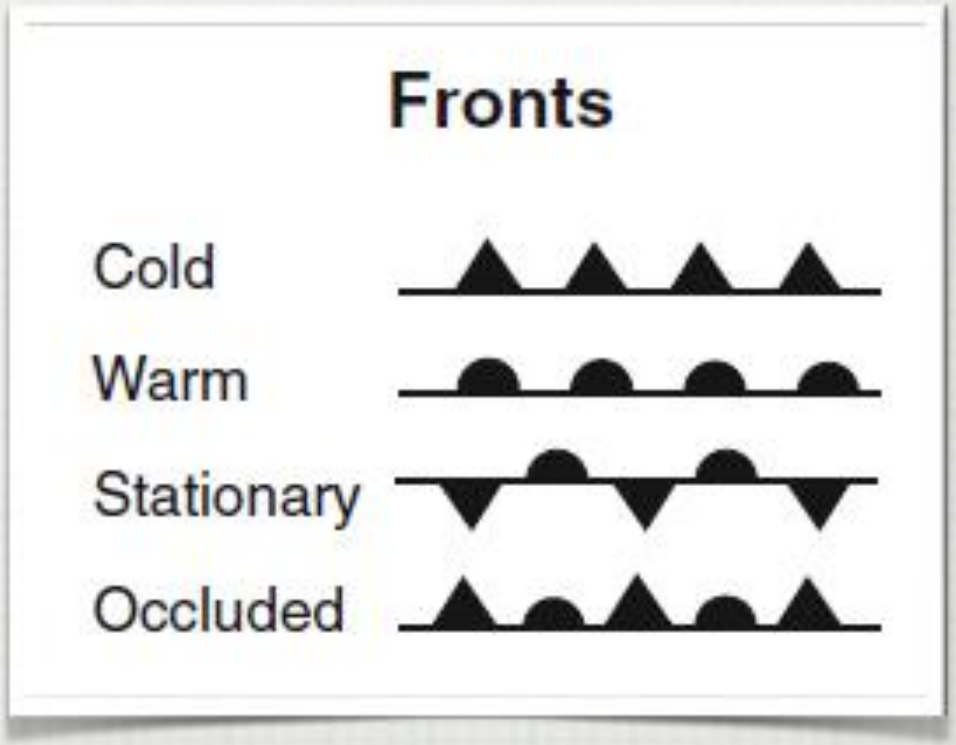
WEATHER PATTERNS

- WHEN TWO UNLIKE AIR MASSES COLLIDE A WEATHER FRONT IS CREATED

WEATHER PATTERNS

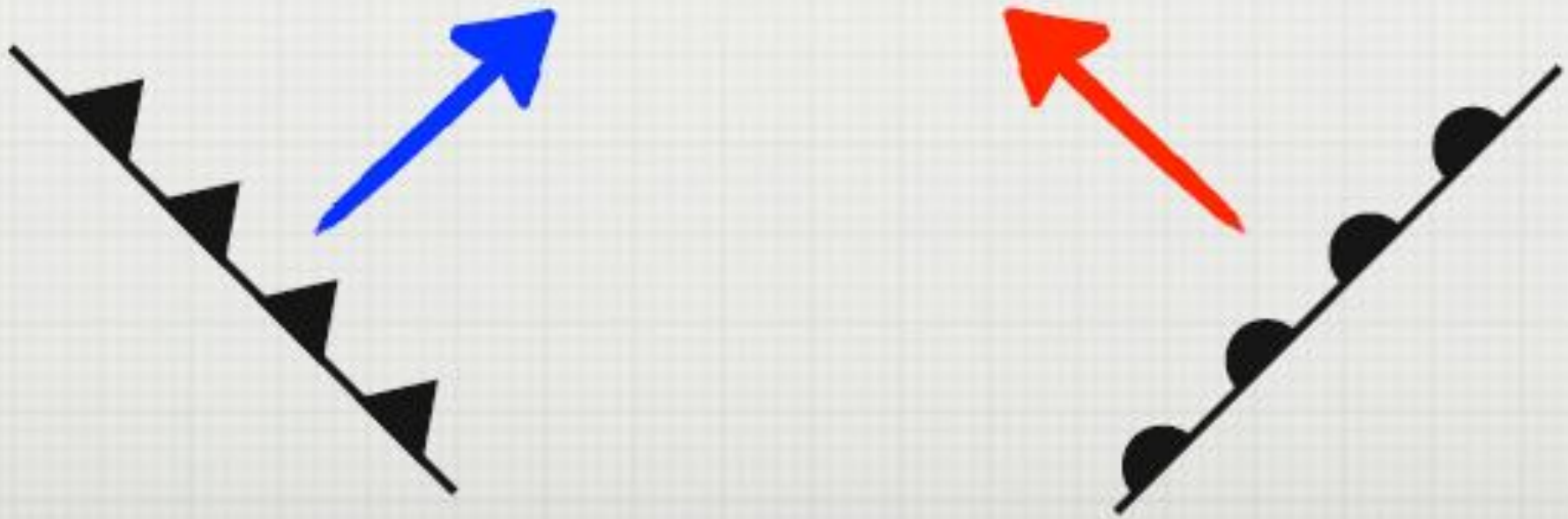
- THE BOUNDARY BETWEEN THE TWO DIFFERENT AIR MASSES IS REPRESENTED ON A MAP WITH A SYMBOL

ESRT page 13



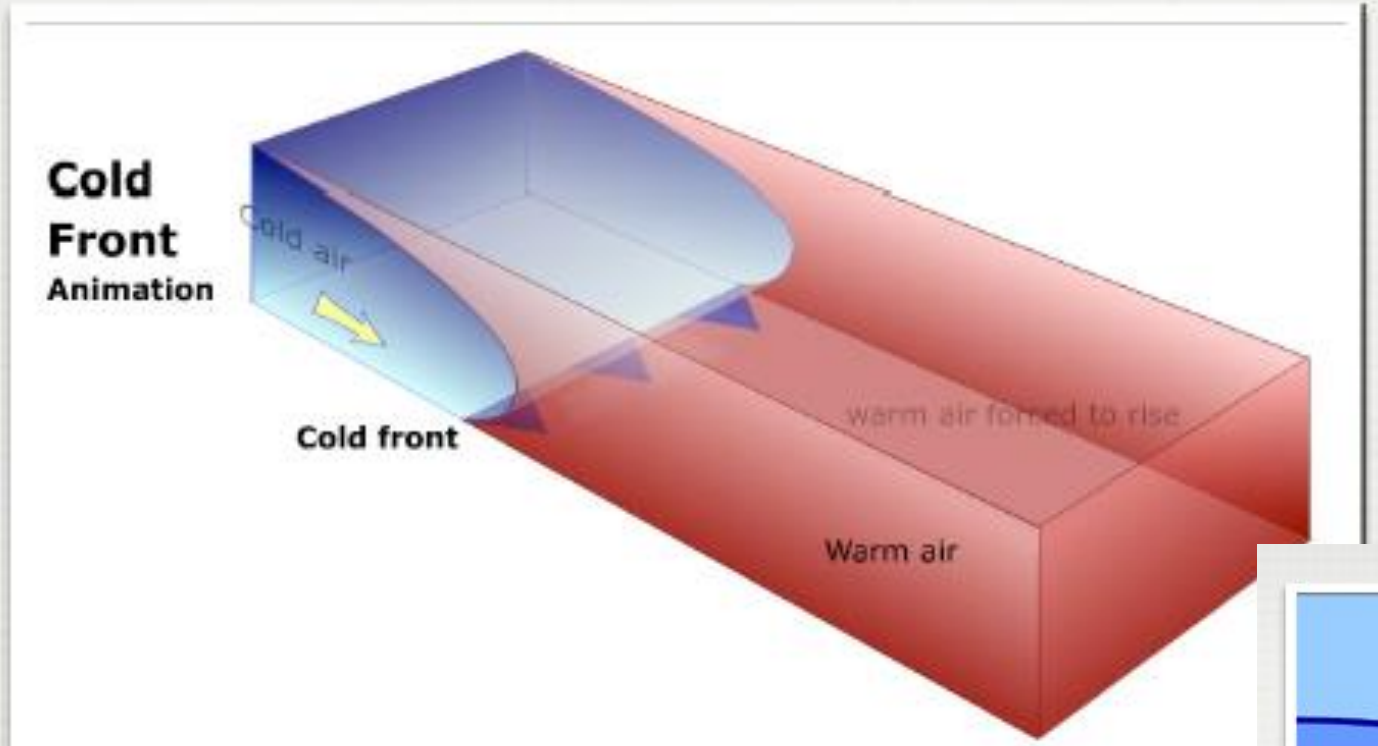
WEATHER PATTERNS

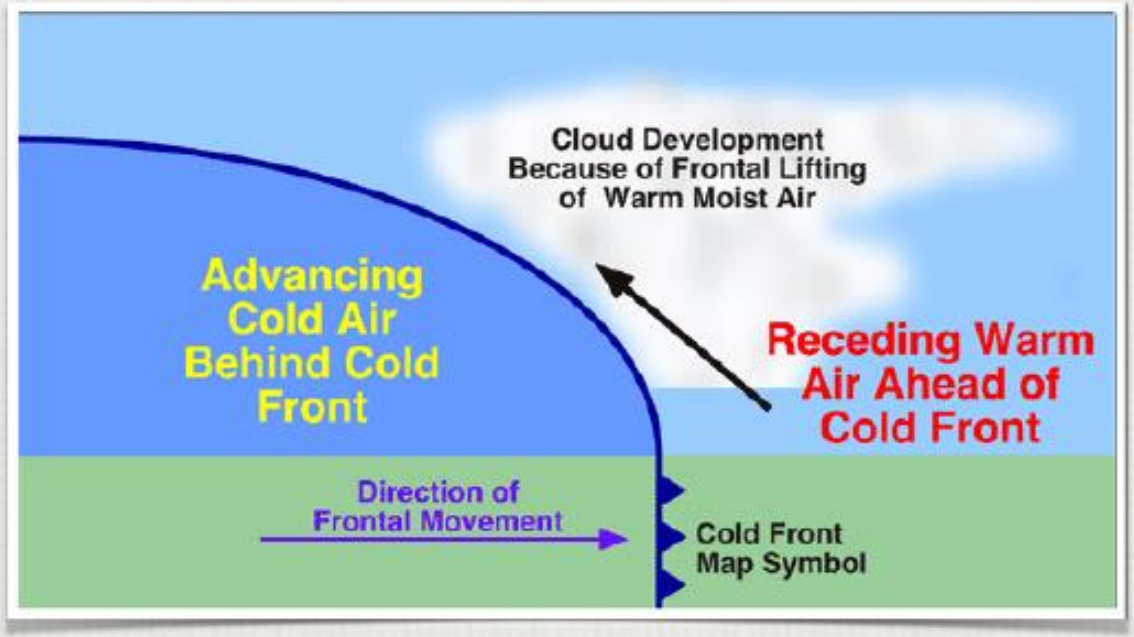
- THE SIDE THAT THE SHAPES ARE ON SHOWS THE DIRECTION THE FRONT IS MOVING TOWARDS



WEATHER PATTERNS

- COLD FRONT - A BOUNDARY WHERE MORE DENSE COLD AIR ADVANCES UNDER LESS DENSE WARM AIR PUSHING IT UPWARD
    - WEATHER: THUNDERSTORMS, HEAVY RAIN, AND A SHARP DECREASE IN TEMPERATURE

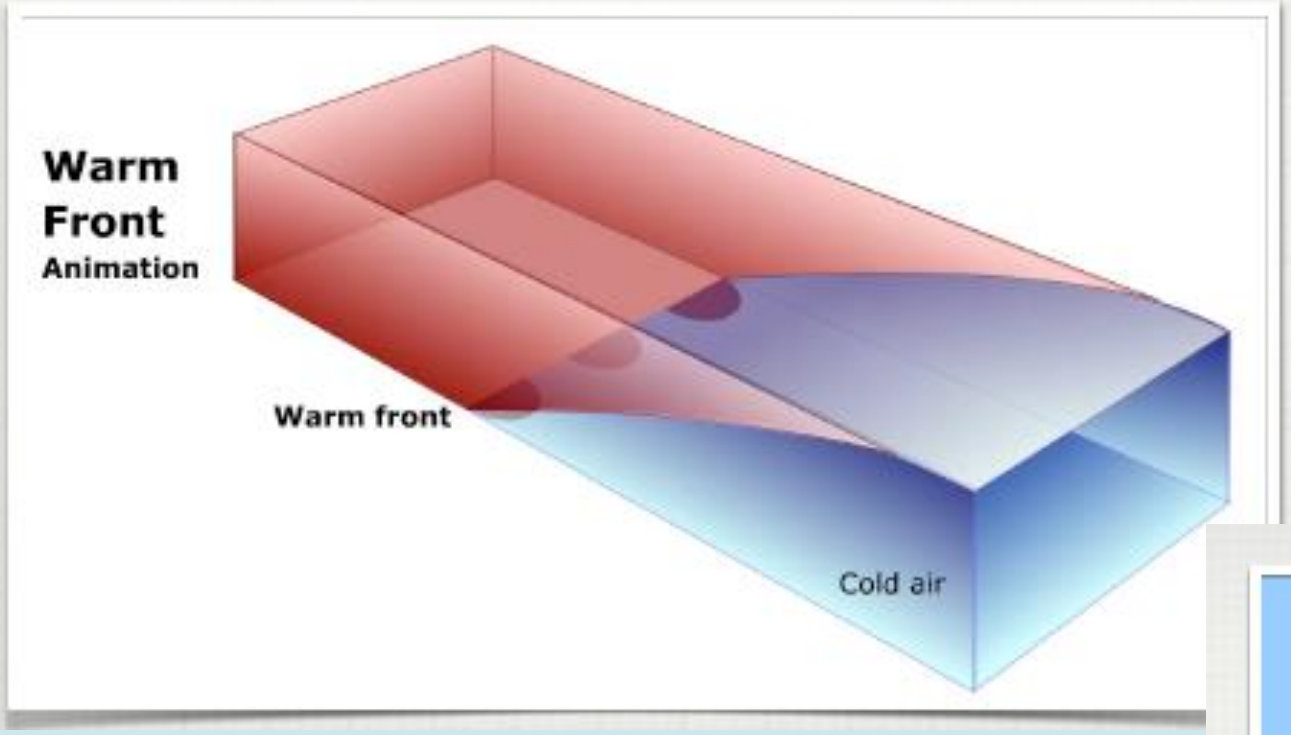

Cold
Front
Animation
Cold air
Cold front
warm air forced to rise
Warm air

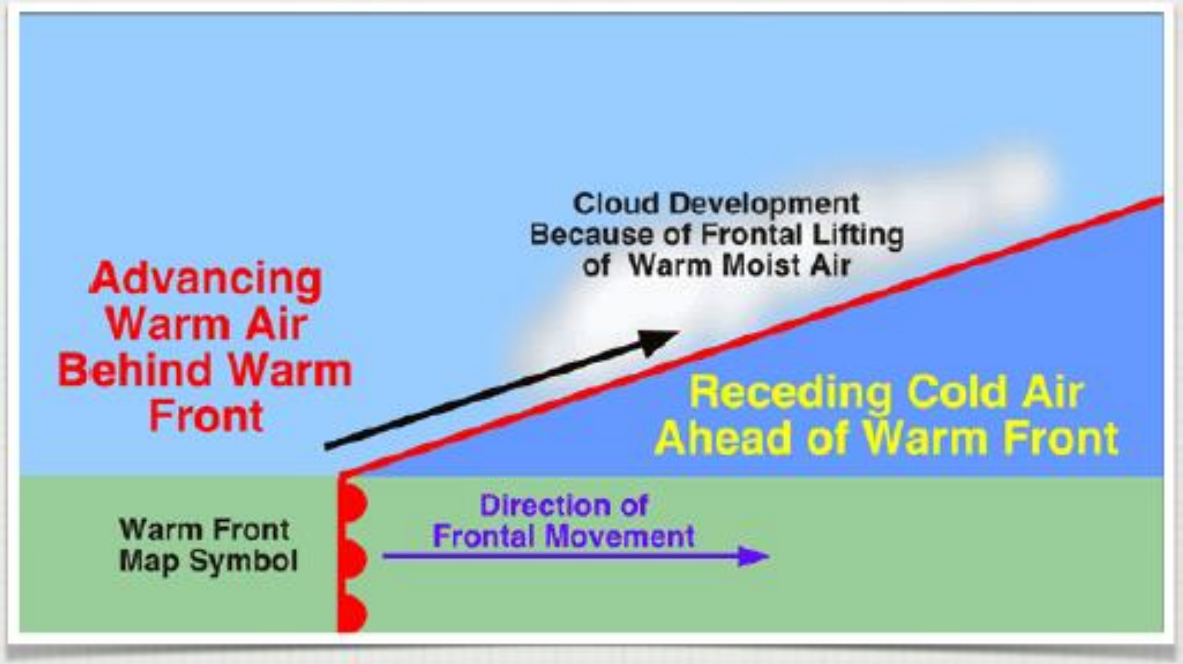

Cloud Development
Because of Frontal Lifting
of Warm Moist Air
Advancing
Cold Air
Behind Cold
Front
Receding Warm
Air Ahead of
Cold Front
Direction of
Frontal Movement
Cold Front
Map Symbol

COLD FRONT

WEATHER PATTERNS

- WARM FRONT - A BOUNDARY WHERE LESS DENSE WARM AIR ADVANCES OVER THE TOP OF MORE DENSE COLD AIR
    - WEATHER: LOW CLOUDS AND WIDESPREAD RAINFALL

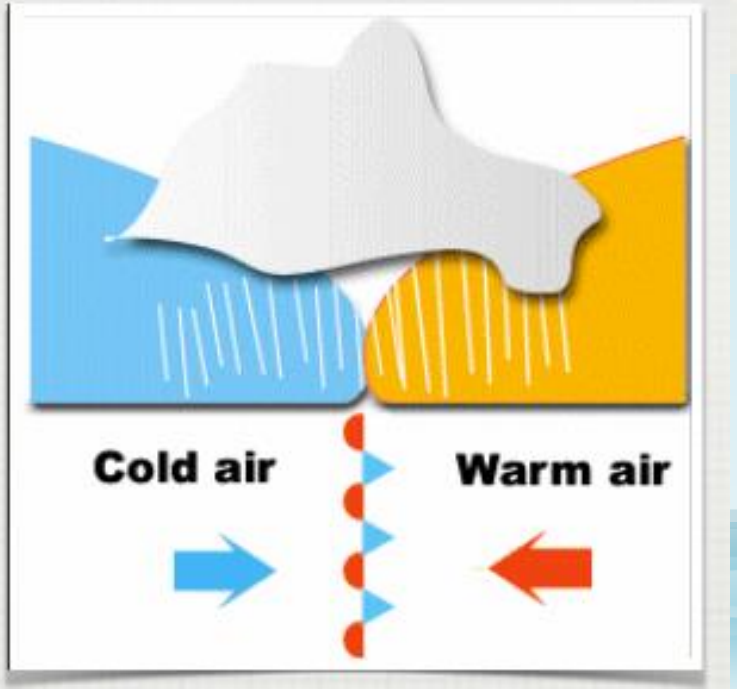

Warm
Front
Animation
Warm front
Cold air


Cloud Development
Because of Frontal Lifting
of Warm Moist Air
Advancing
Warm Air
Behind Warm
Front
Receding Cold Air
Ahead of Warm Front
Warm Front
Map Symbol
Direction of
Frontal Movement

WARM FRONT

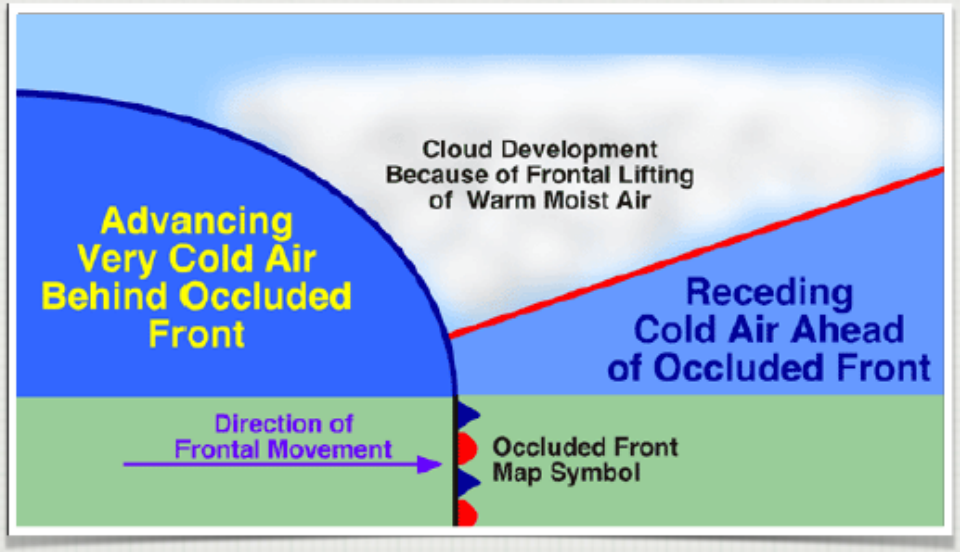
WEATHER PATTERNS

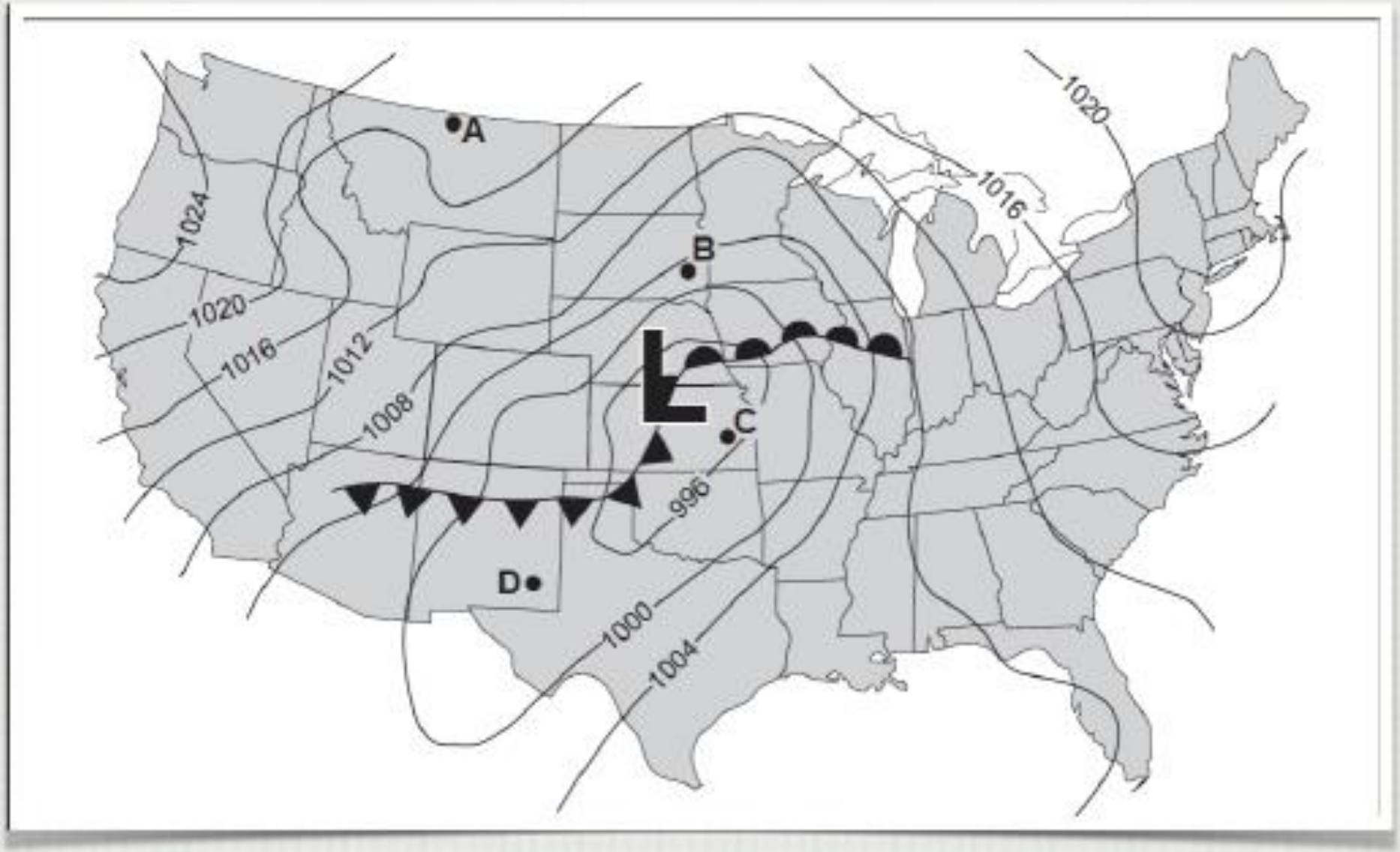
- STATIONARY FRONT - FORMS ALONG A BOUNDARY WHERE NEITHER AIR MASS IS MOVING
  - WEATHER: LONG WIDESPREAD RAIN



WEATHER PATTERNS

- OCCLUDED FRONT - A BOUNDARY WHERE A FAST MOVING COLD FRONT PUSHES WARM AIR ENTIRELY ALOFT
    - WEATHER: LONG WIDESPREAD RAIN AND THUNDERSTORMS





U.S. SYNOPTIC WEATHER MAP

Questions?

Unit 8
Part II: Water & Climate

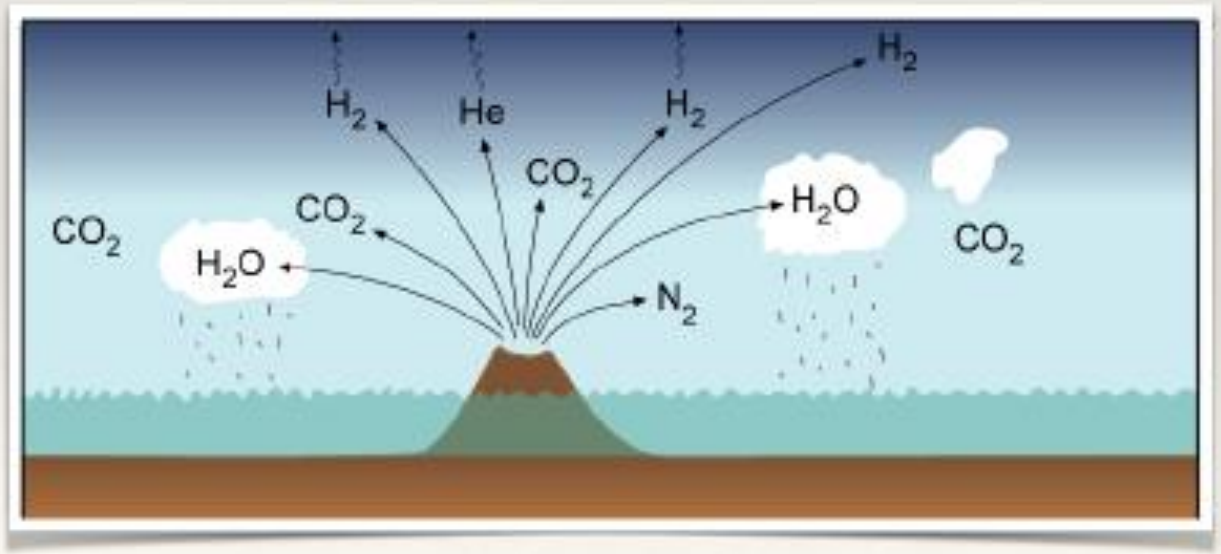
TOPIC 1: THE WATER CYCLE
TOPIC 2: CLIMATE VARIABLES
TOPIC 3: RAINFALL PATTERNS

The Water Cycle

How does water move and change phases in the atmosphere?

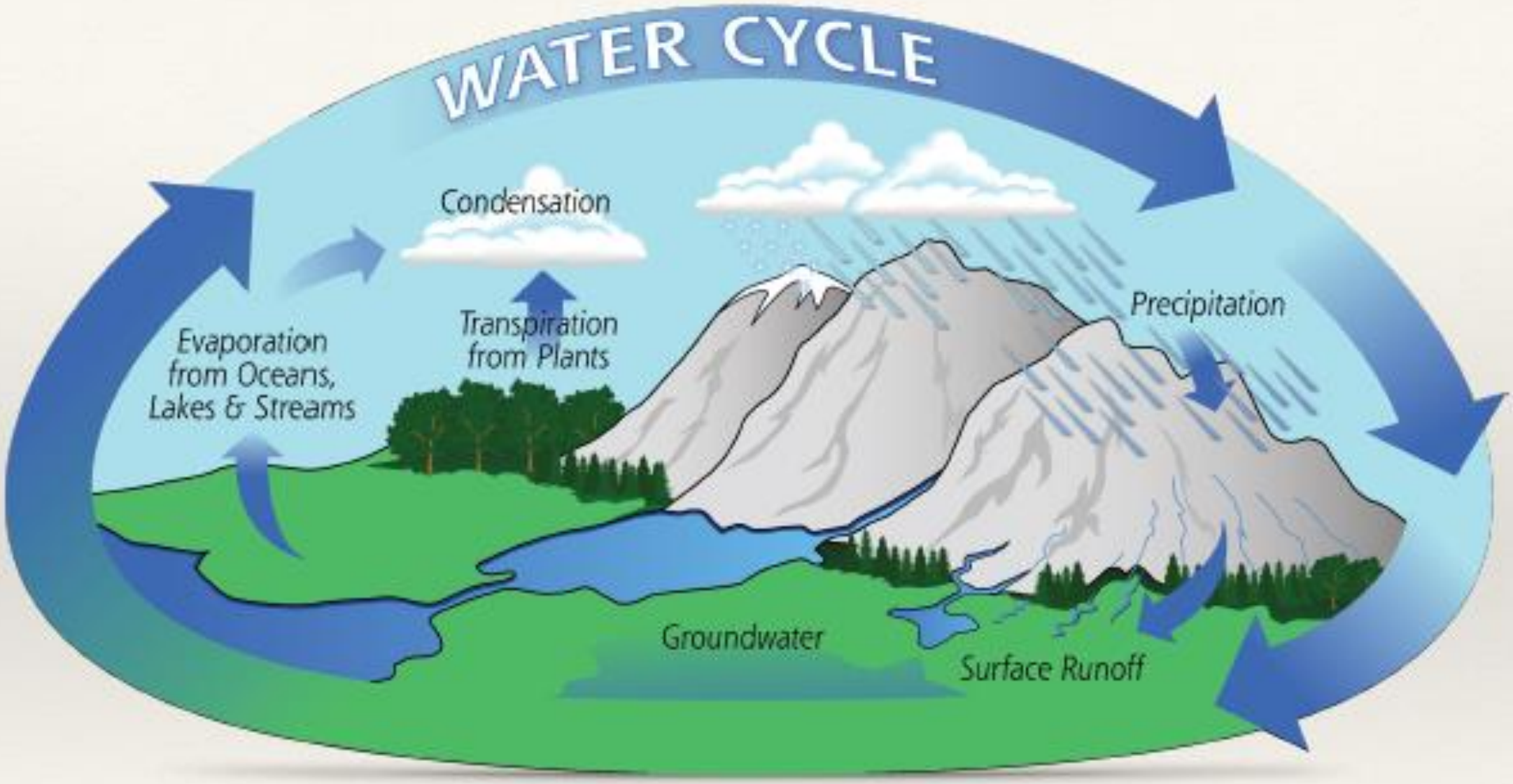
The Water Cycle

- Ever since the outgassing of water vapor 4 billion years ago, Earth has been recycling its water supply
  - Earth's has not gained or lost water since



The Water Cycle

- The Water Cycle - the model used to illustrate the movement and the phase changes of water at or near Earth's surface
  - The water cycle is fueled by solar energy (insolation) and gravity



The Water Cycle

The Water Cycle

- Evaporation - when the Sun warms up liquid water and turns it into water vapor
- Condensation - when water vapor turns into liquid water

The Water Cycle

- Transpiration - the process of water moving through plant and changing to vapor before being released into the atmosphere

The Water Cycle

- Precipitation - the product of the condensation that falls from the sky
  - Examples: rain, snow, sleet and hail

The Water Cycle

- When precipitation falls it can:
  - Be stored on land surfaces as ice and snow
  - Infiltrate into the upper parts of the lithosphere
  - Flow over Earth's surface as runoff
  - Be evaporated or undergo transpiration

The Water Cycle

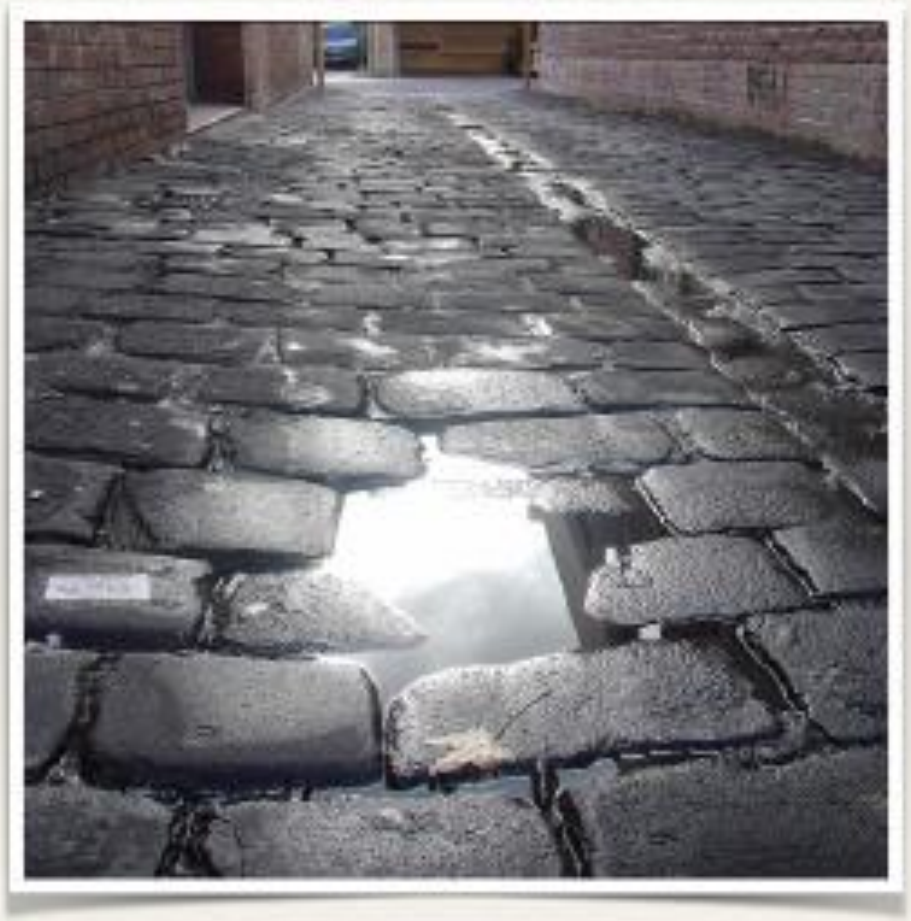
- Infiltration - the process by which water enters a substance

The Water Cycle

- Factors Affecting Infiltration:
    1. Slope of the Land - steeper slopes do not give time for water to infiltrate the ground

The Water Cycle

- Factors Affecting Infiltration:
    2. Degree of Saturation - the amount of water already in the ground

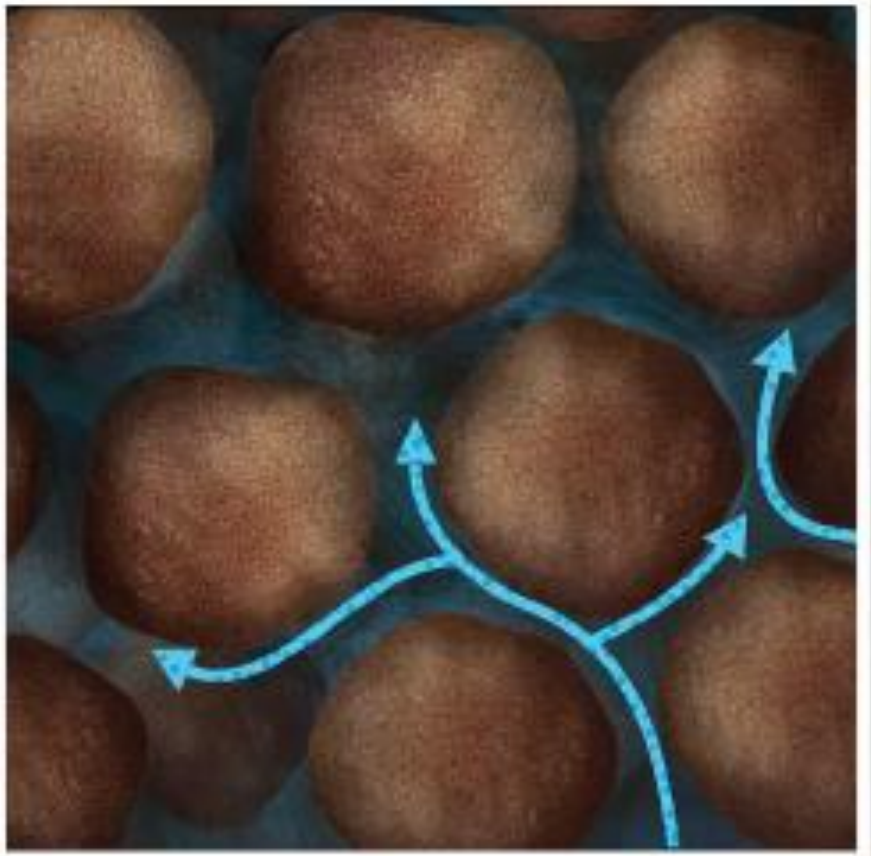


The Water Cycle

- Factors Affecting Infiltration:
    3. Porosity - the percentage of open space (pores and cracks) in the ground

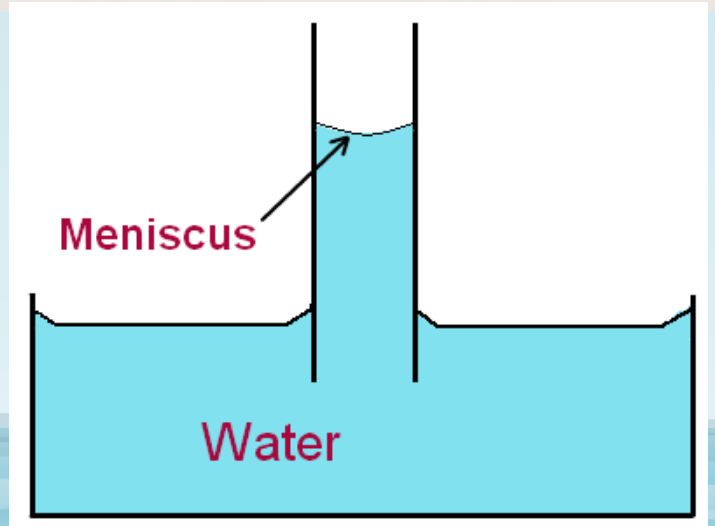
The Water Cycle

- Factors Affecting Infiltration:
    4. Permeability - a measure of how easily fluid flows through a porous solid



The Water Cycle

- Factors Affecting Infiltration:
  5. Capillarity - the action by which water moves against the downward pull of gravity



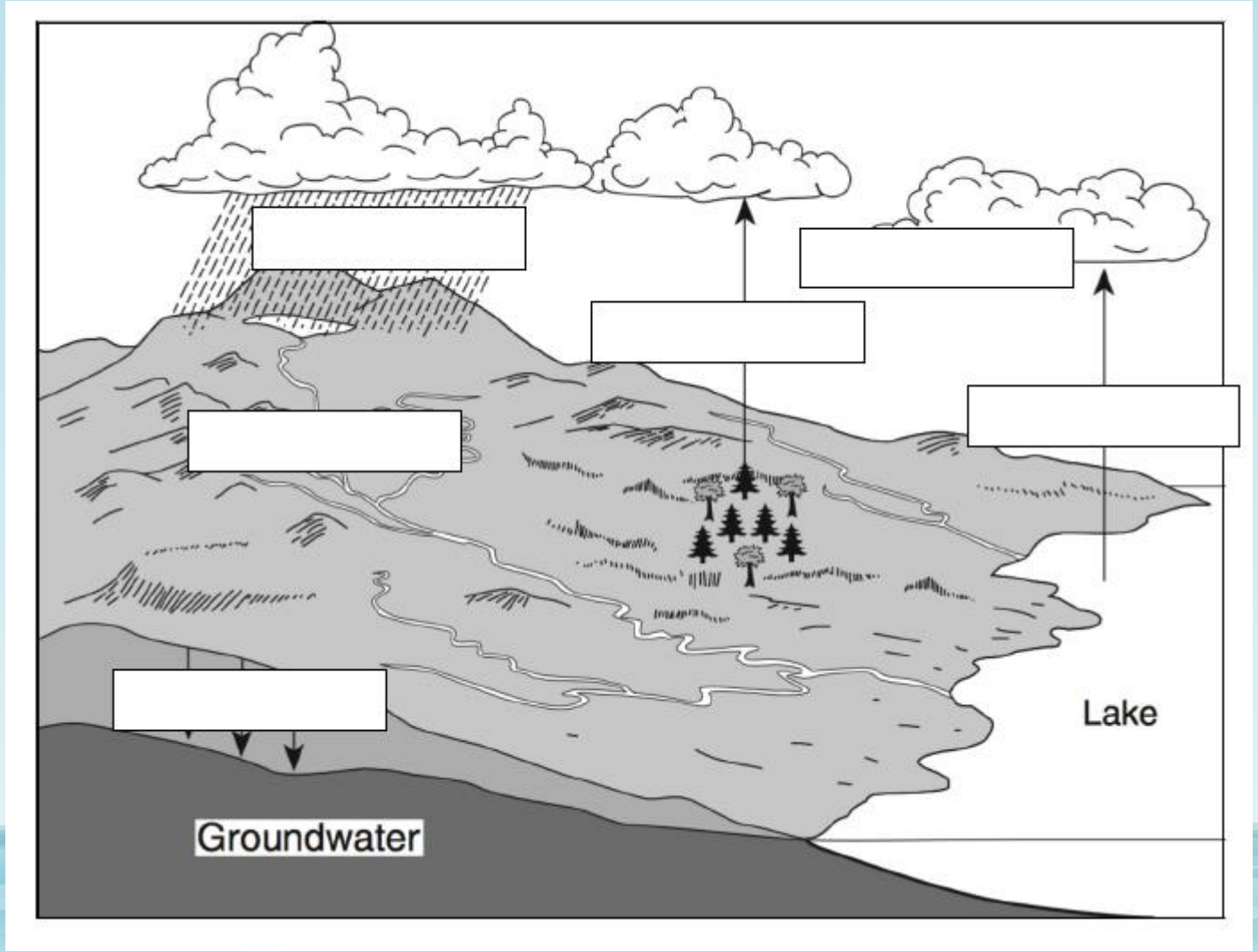
Capillary rise of water in a small tube

The Water Cycle

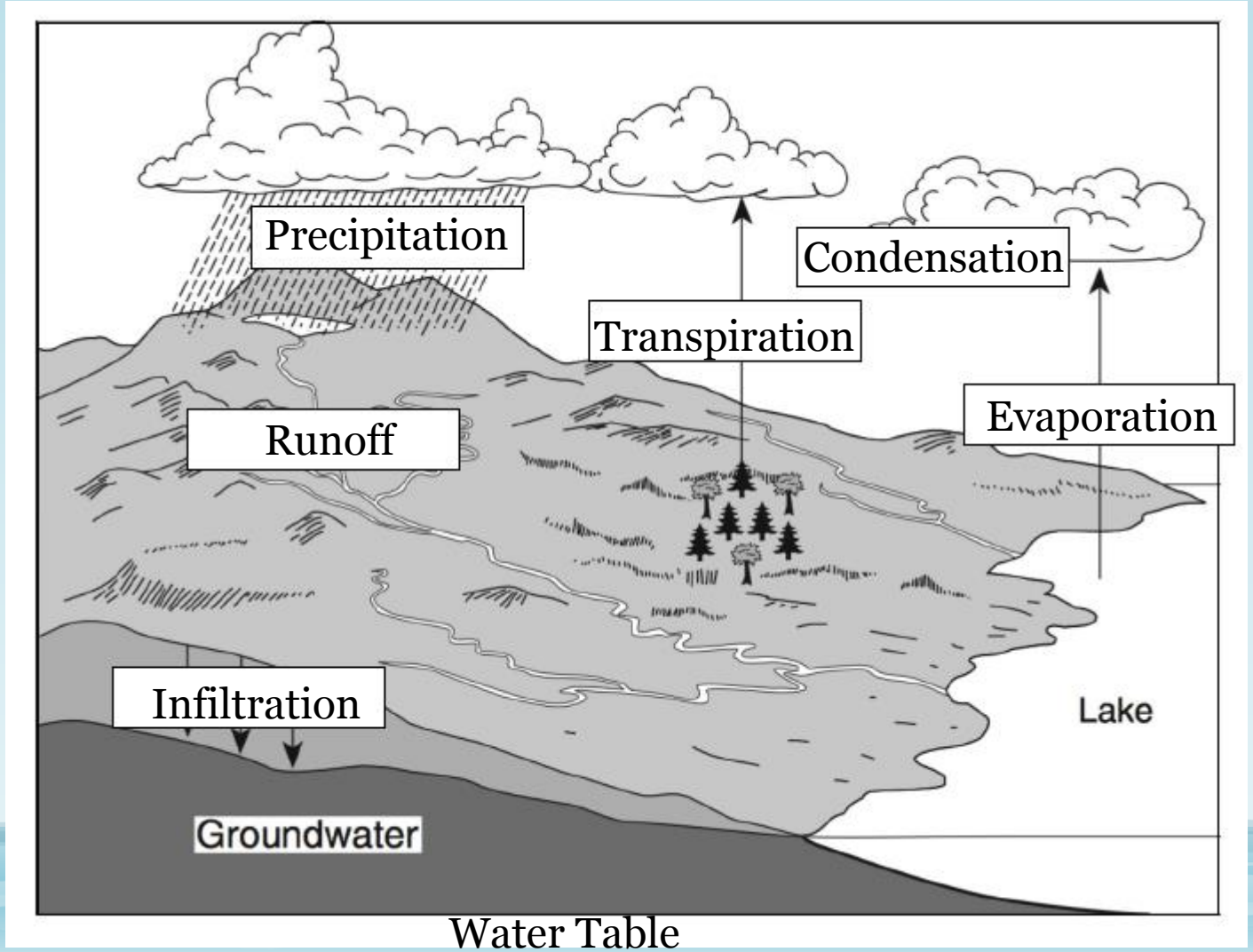
- Factors Affecting Infiltration:
    6. Vegetation - plants absorb water from the ground

“The Water Cycle”

Water Cycle Review: “Fill in the Blanks”



Water Cycle Review: “Fill in the Blanks”



Questions?

Climate Variables

What factors contribute to the different climate regions on Earth?

Before we look at “climate variables,” first we must ask… WHAT IS **CLIMATE**??

- CLIMATE IS…

Climate Variables

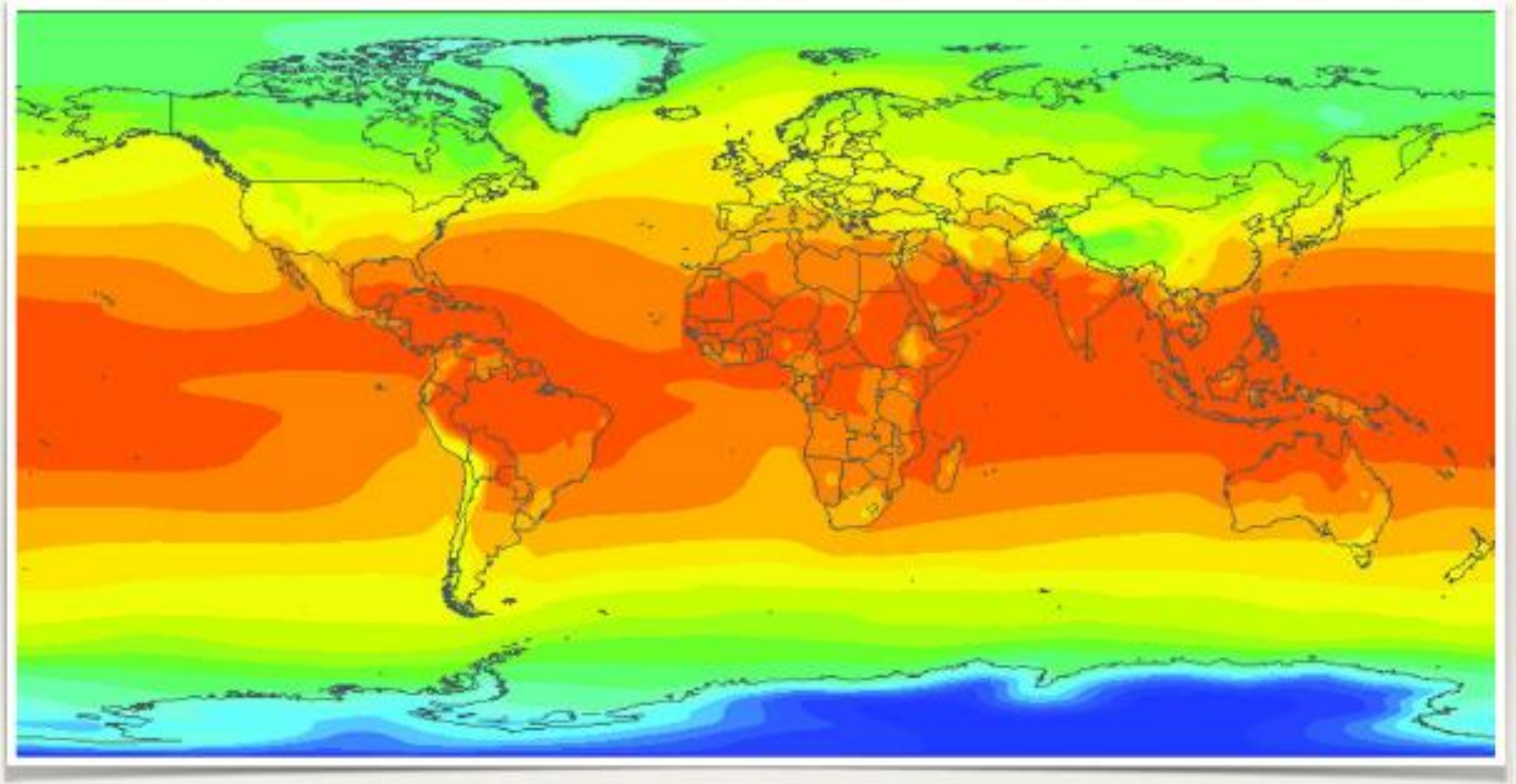
- Climate - the overall view of a regions weather conditions over a long time span




Climate Variables

Latitude and Temperature

- Temperature is affected by latitude, the angle of insolation, intensity, and duration of sunlight
  - Low Latitudes: high angle of insolation
  - High Latitudes: low angle of insolation



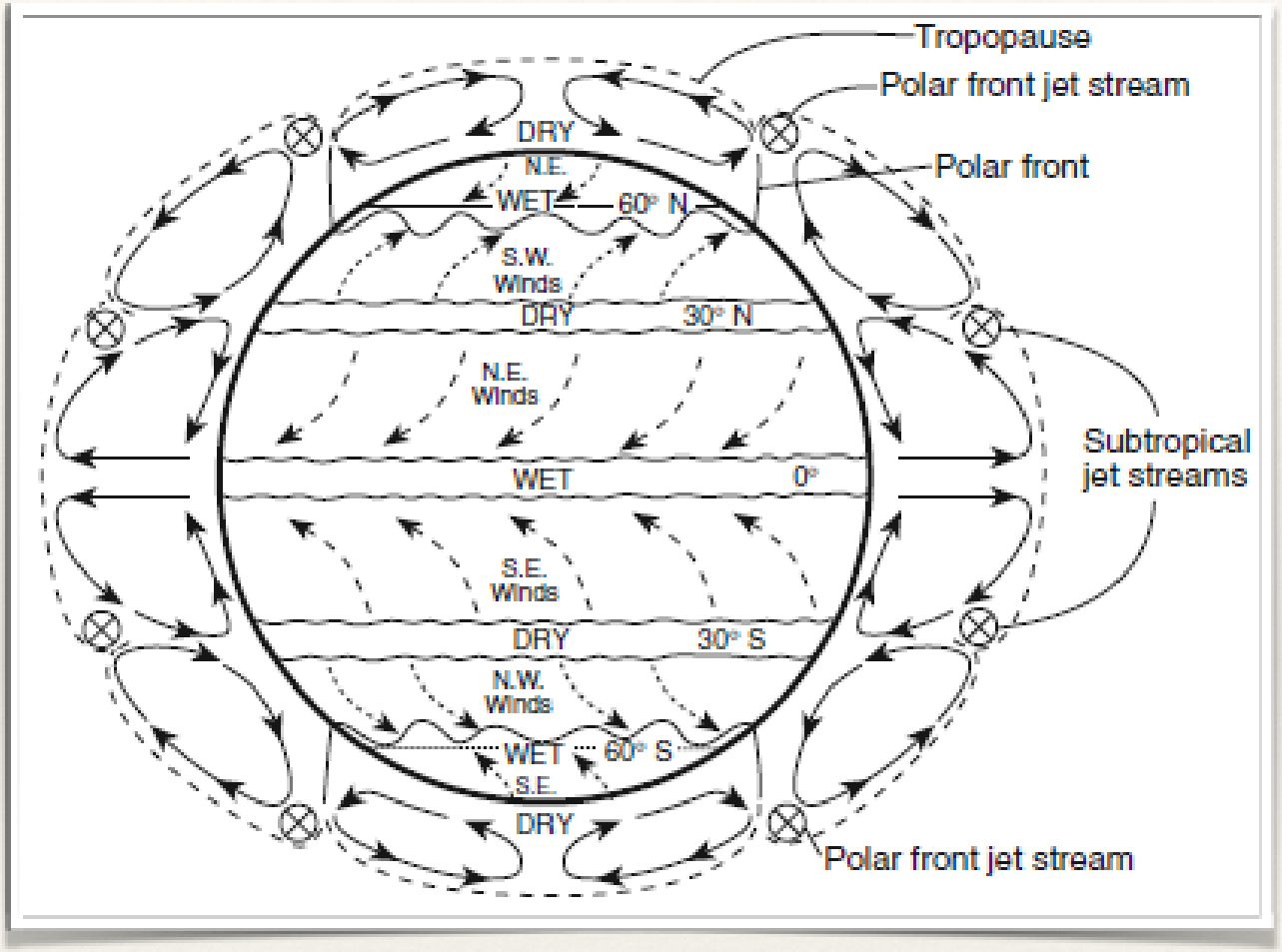
Latitude and Temperature

Climate Variables

Planetary Winds

- Prevailing Winds - movement of air over the Earth's surface that blows from the same direction
- Winds are caused by pressure differences
- United States has the prevailing southwesterly winds

ESRT pg. 14



Planetary Wind and Moisture Belts in the Troposphere

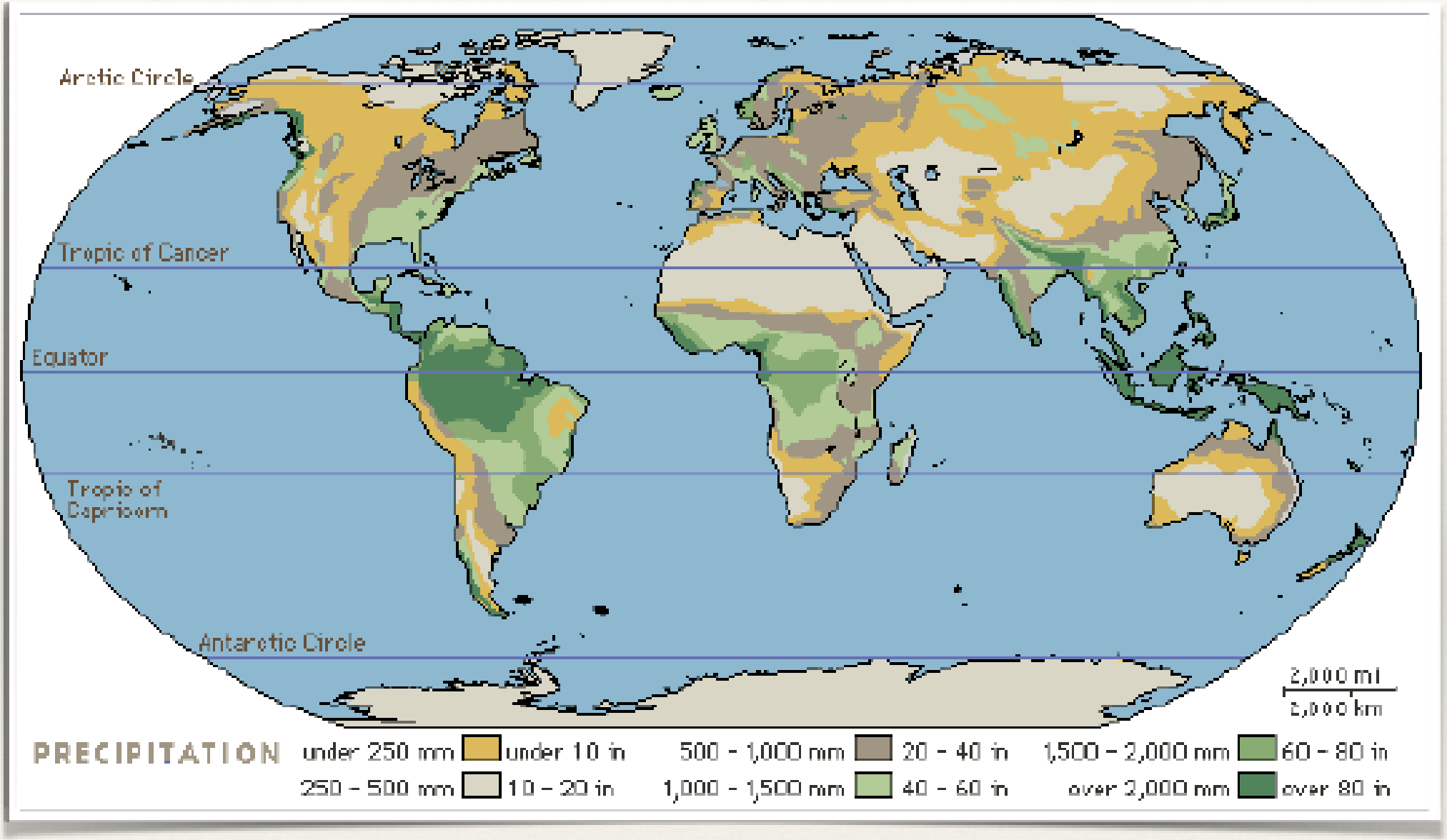
In Your Notes…

- Shade easterly winds GREEN
- Shade westerly winds ORANGE
- Color "wet" belts BLUE
- Color "dry" belts RED

Climate Variables

Latitude and Moisture

- Moisture content varies with latitude because of the planetary winds
  - Low Pressure at the equator causes air to rise, expand, cool, and condense to form clouds and rain
  - High pressure causes air to sink and form arid regions



Latitude and Moisture

Climate Variables

Large Bodies of Water

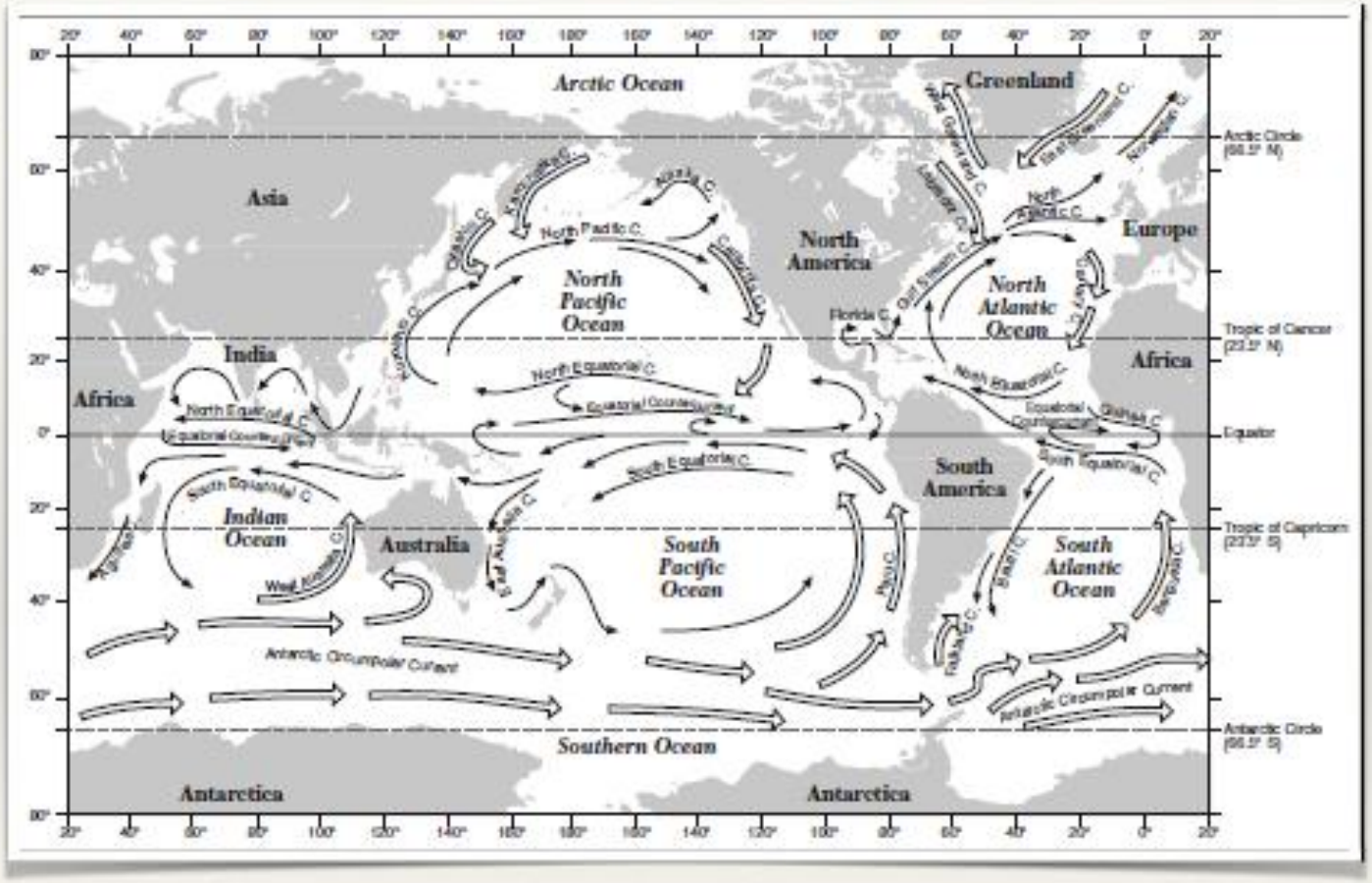
- Oceans, seas, lakes, and bays serve to modify climate regions
- Land masses close to a body of water will be regulated by the slow rate of heating and cooling of water
  - Example: Long Island , Lake Ontario Shore

Climate Variables

Ocean Currents

- Coastal climates are modified by ocean currents
  - Warm waters flow from the equator towards colder regions
  - Cold waters flow from the poles towards warmer region

ESRT pg. 4



Surface Ocean Currents

In Your Notes…

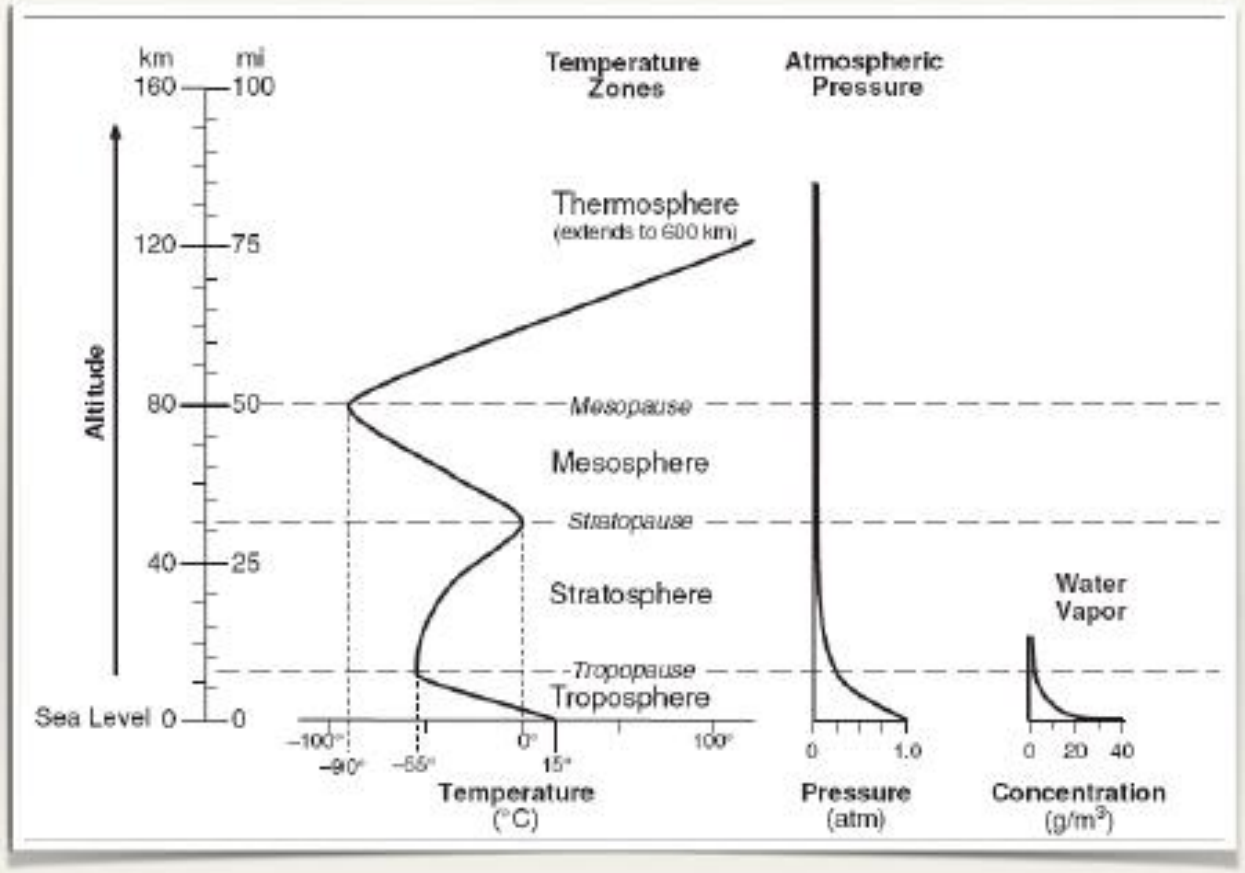
- Trace cold current lines/arrows (thick) BLUE
- Trace warm current lines/arrows (thin) RED

Climate Variables

Elevation

- Higher elevations are cooler due to temperatures decreasing in the troposphere

ESRT pg. 14



Selected Properties of Earth's Atmosphere

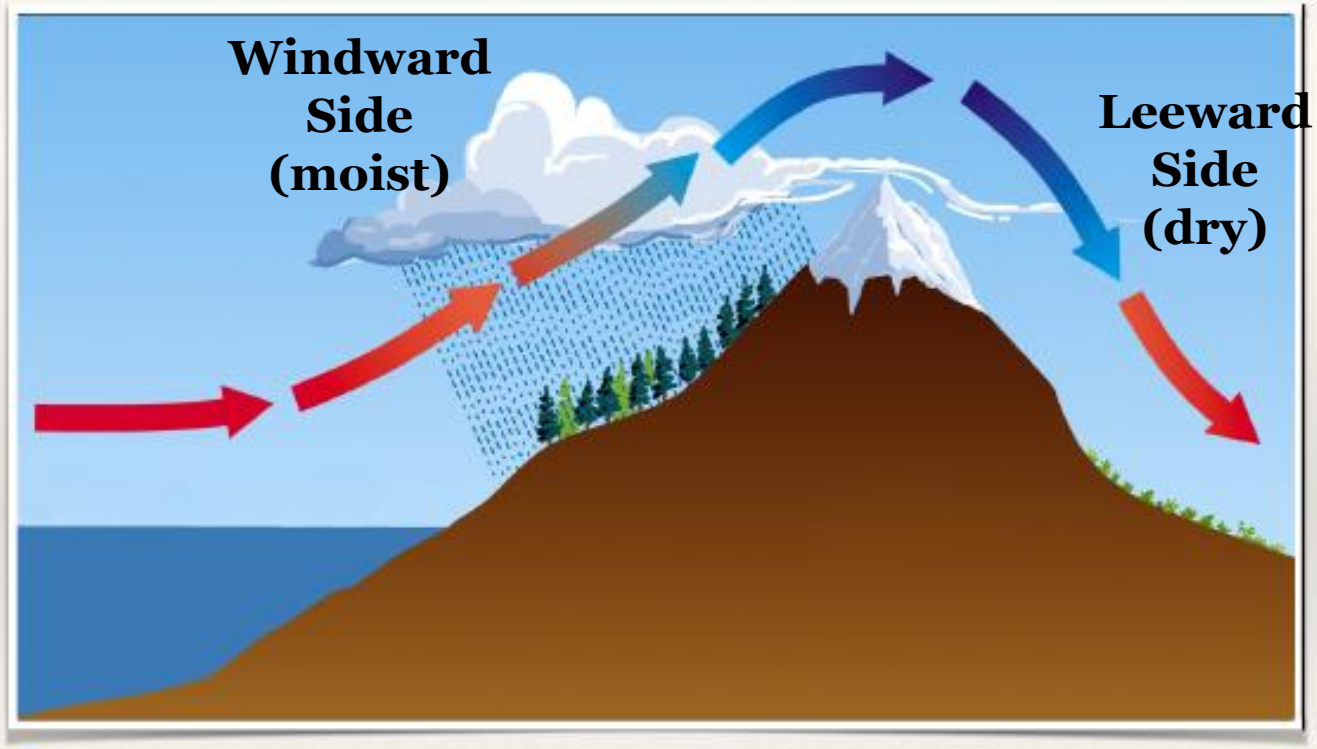
<u>In Your Notes…</u>

- Shade the temperature line RED as it increases
- Shade the temperature line BLUE as it decreases
- Shade the layers of the atmosphere as follows:
  - Troposphere = Green
  - Stratosphere = Yellow
  - Mesosphere = Purple
  - Thermosphere = Orange

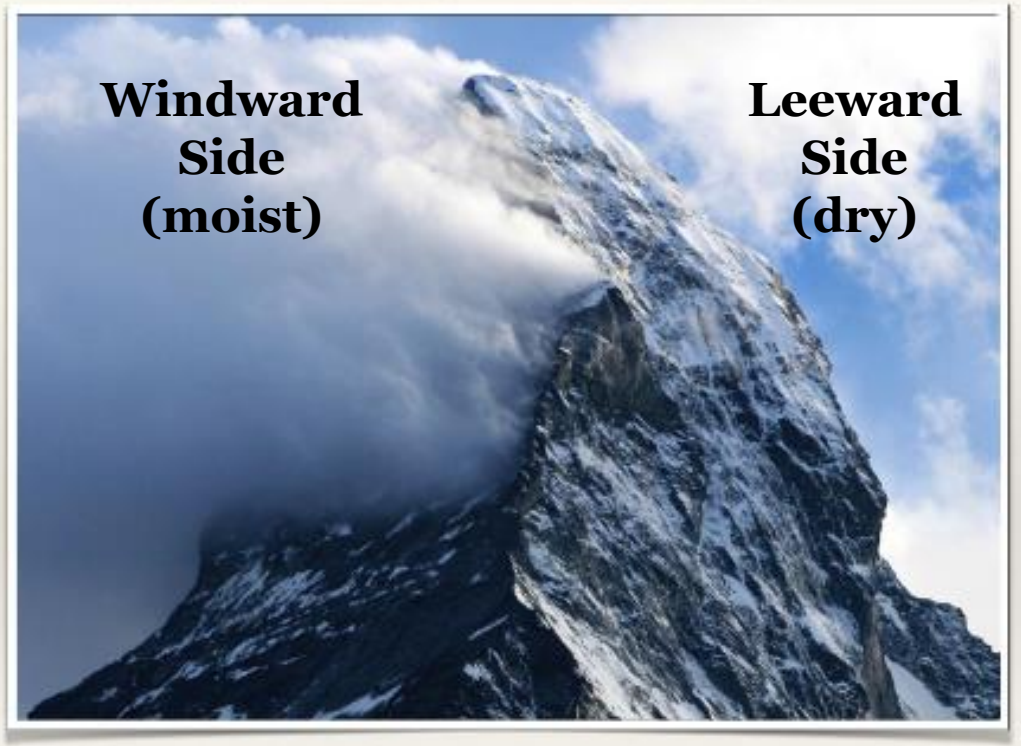
Climate Variables

Mountains

- Mountains intersect planetary winds and modify climate regions
- As the winds rise up the mountain, the air rises, expands, cools, and condenses, creating a cooler more moist region
- As the winds descend the mountain the moisture is lost creating a warm and dry region



Mountains Modifying Climate

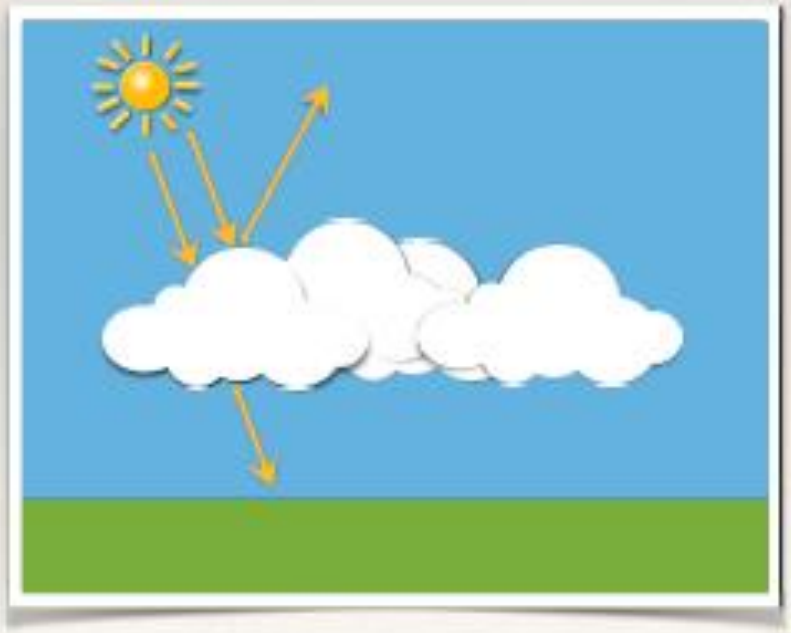


Mountains Modifying Climate

Climate Variables

Daytime Cloud Cover

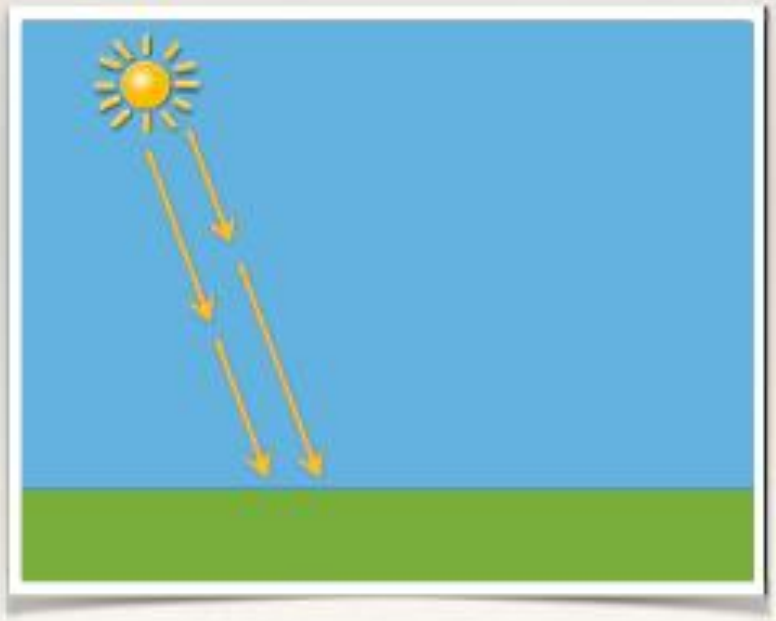
- Clouds: sunlight is blocked from warming up earth surface and heat energy is radiated back into space



Climate Variables

Daytime Cloud Cover

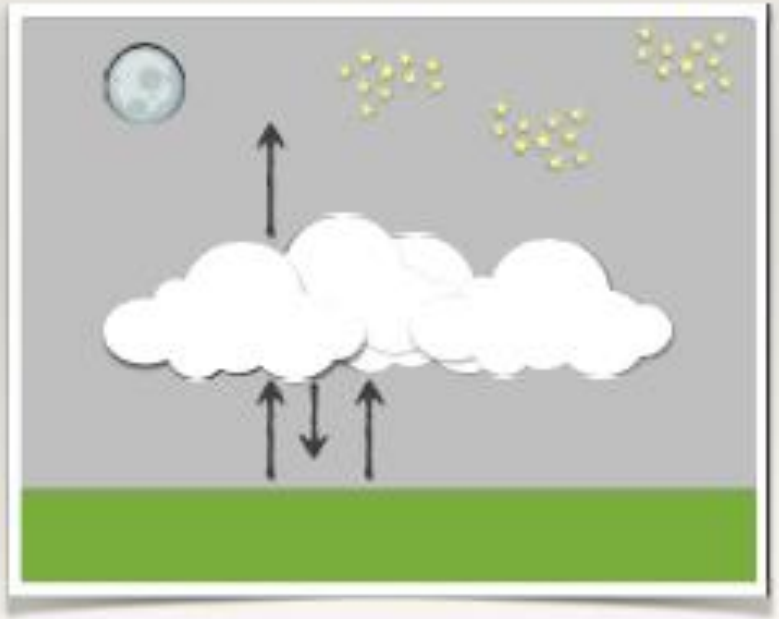
- No Clouds: sunlight reaches earths surface and heat energy warms the surface



Climate Variables

Nighttime Cloud Cover

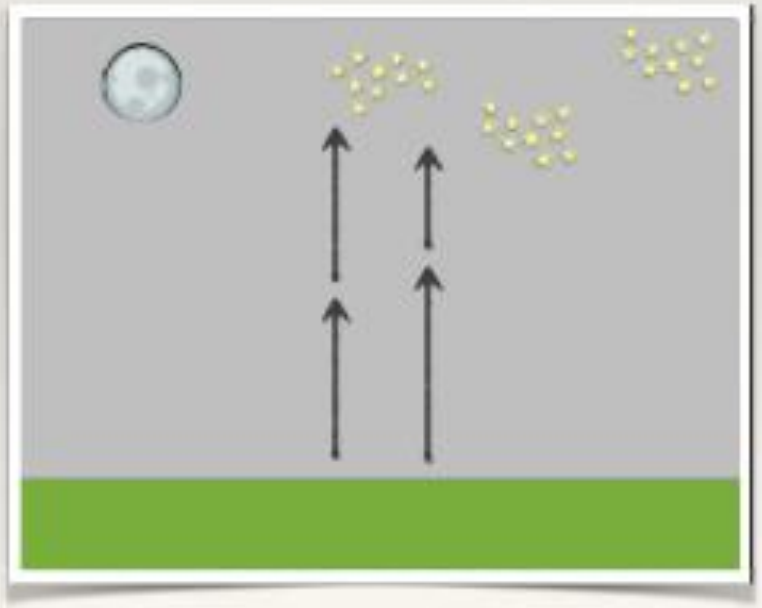
- Clouds: heat energy is trapped and not allowed to reradiate back into space



Climate Variables

Nighttime Cloud Cover

- No Clouds: heat energy is allowed to escape and reradiate back into space



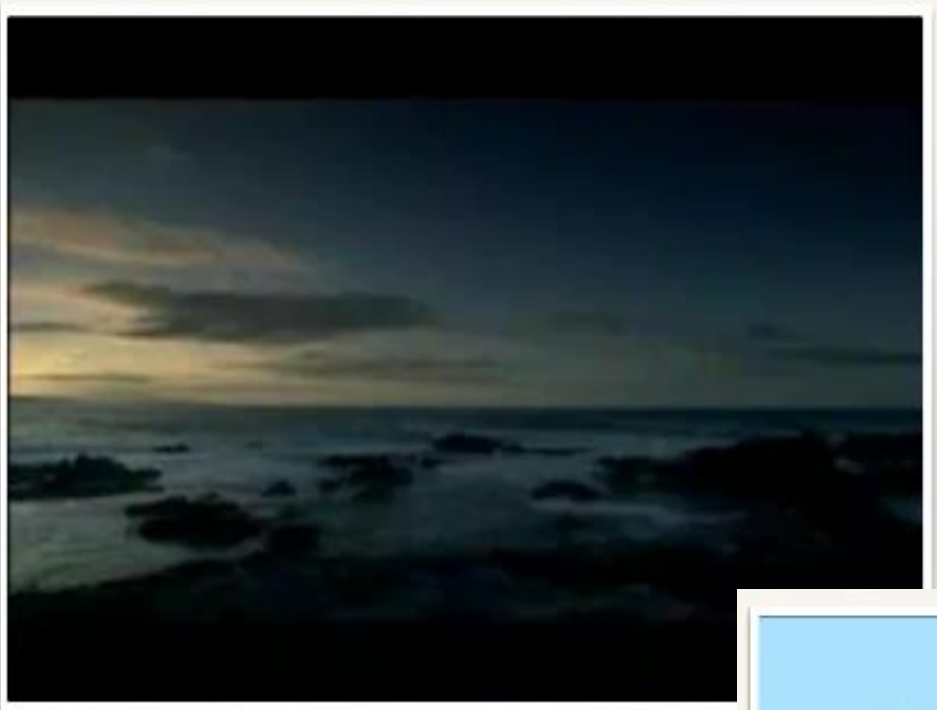
Questions?

Lab 17: Climate Variables

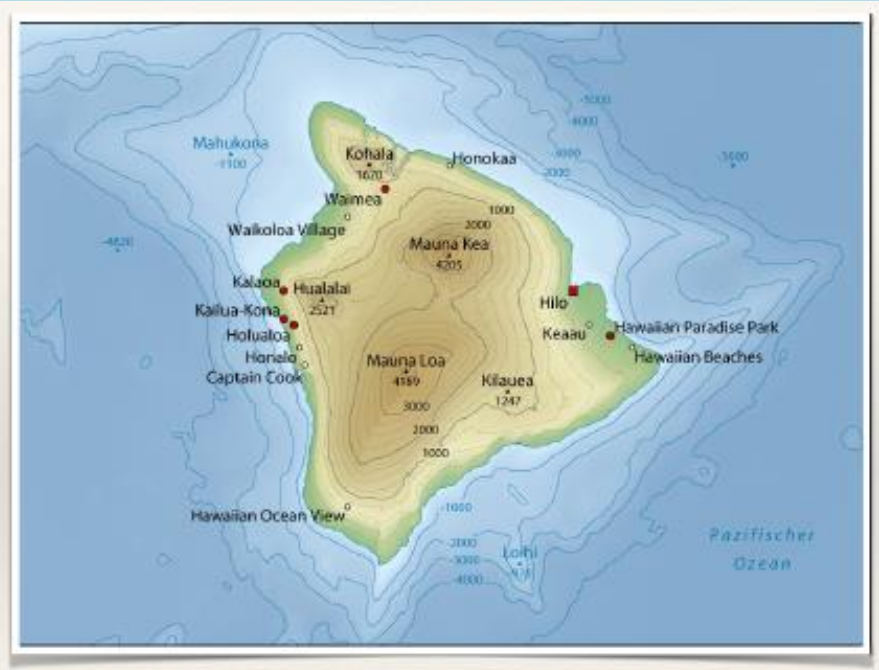
- You are now ready to complete Lab 17: Climate Variables
- Worth: 120 Minutes
- Use your notes and your understanding of the factors that influence the climate to complete all activities in your lab

Rainfall Patterns

How does geography effect rainfall patterns?



Hawaii



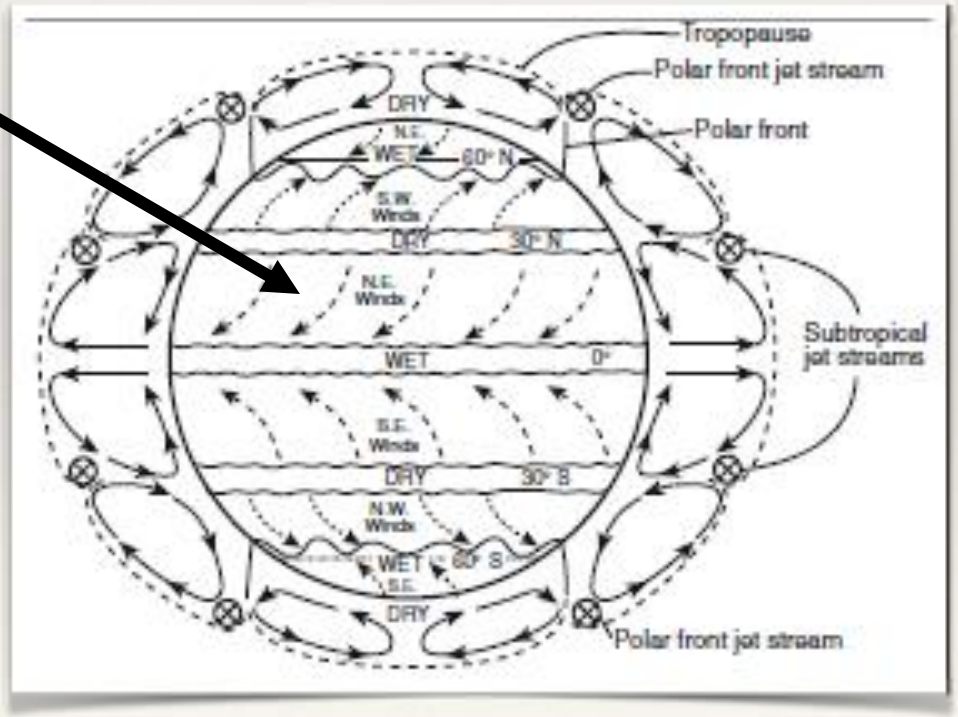
The Big Island's Topography

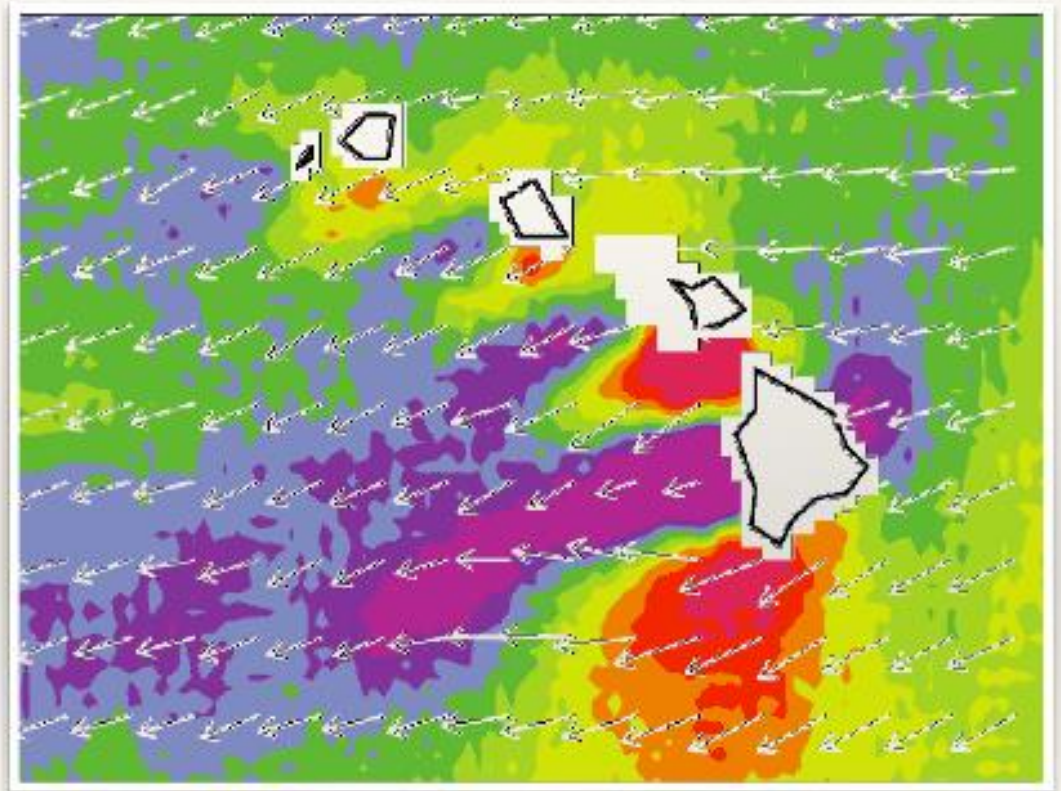
The Hawaiian Islands

Rainfall Patterns

- The big island is located between 0° and 30° N with the prevailing winds from the Northeast

HAWAII

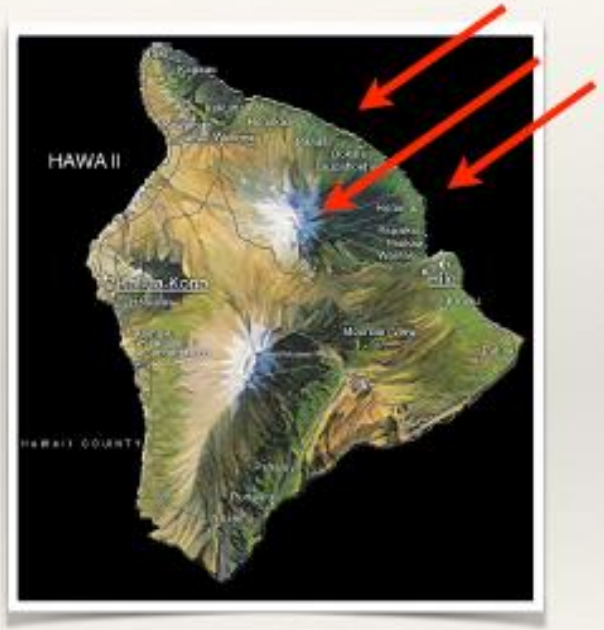




Prevailing Wind Direction

Rainfall Patterns

- Mountains that intersect prevailing winds can modify climate patterns



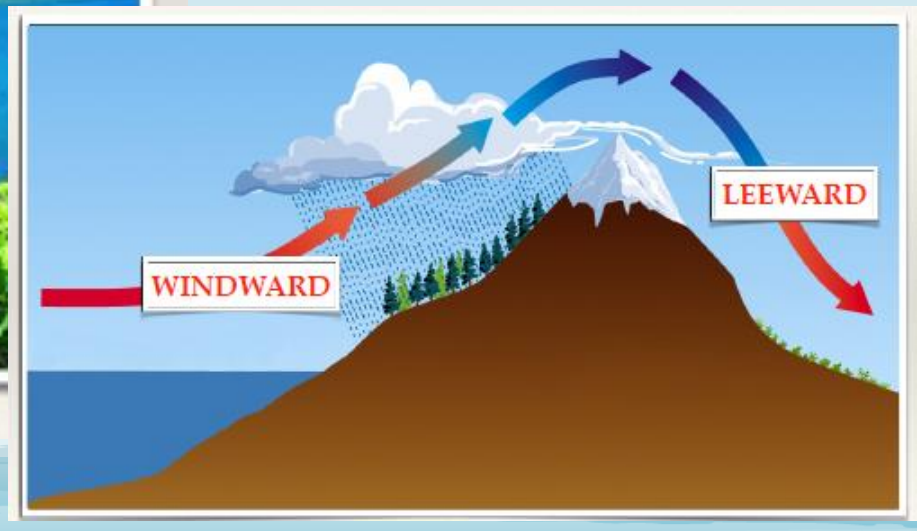
Rainfall Patterns

- Windward - the side the wind strikes first

Rainfall Patterns

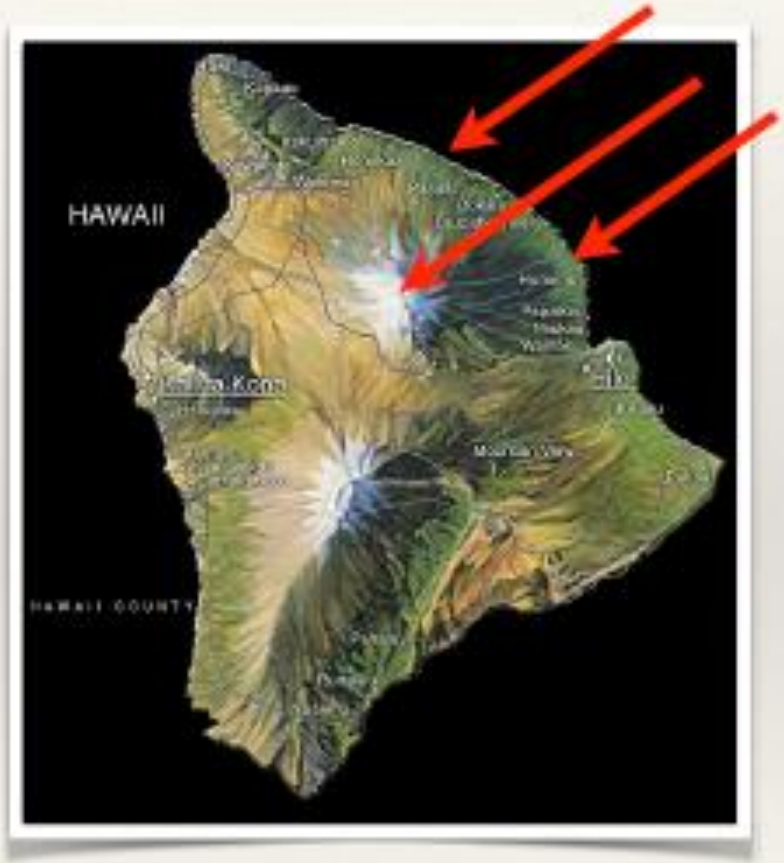
Windward Side

- Air rises
- Air expands and cools
- Air condenses and rains
- Lots of vegetation
- Plenty of rain



Rainfall Patterns

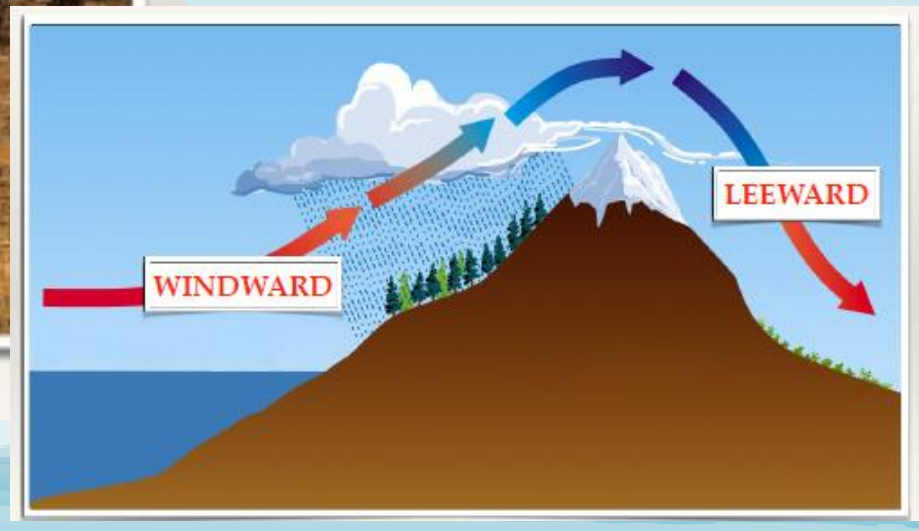
- Leeward - opposite the side the wind is blowing

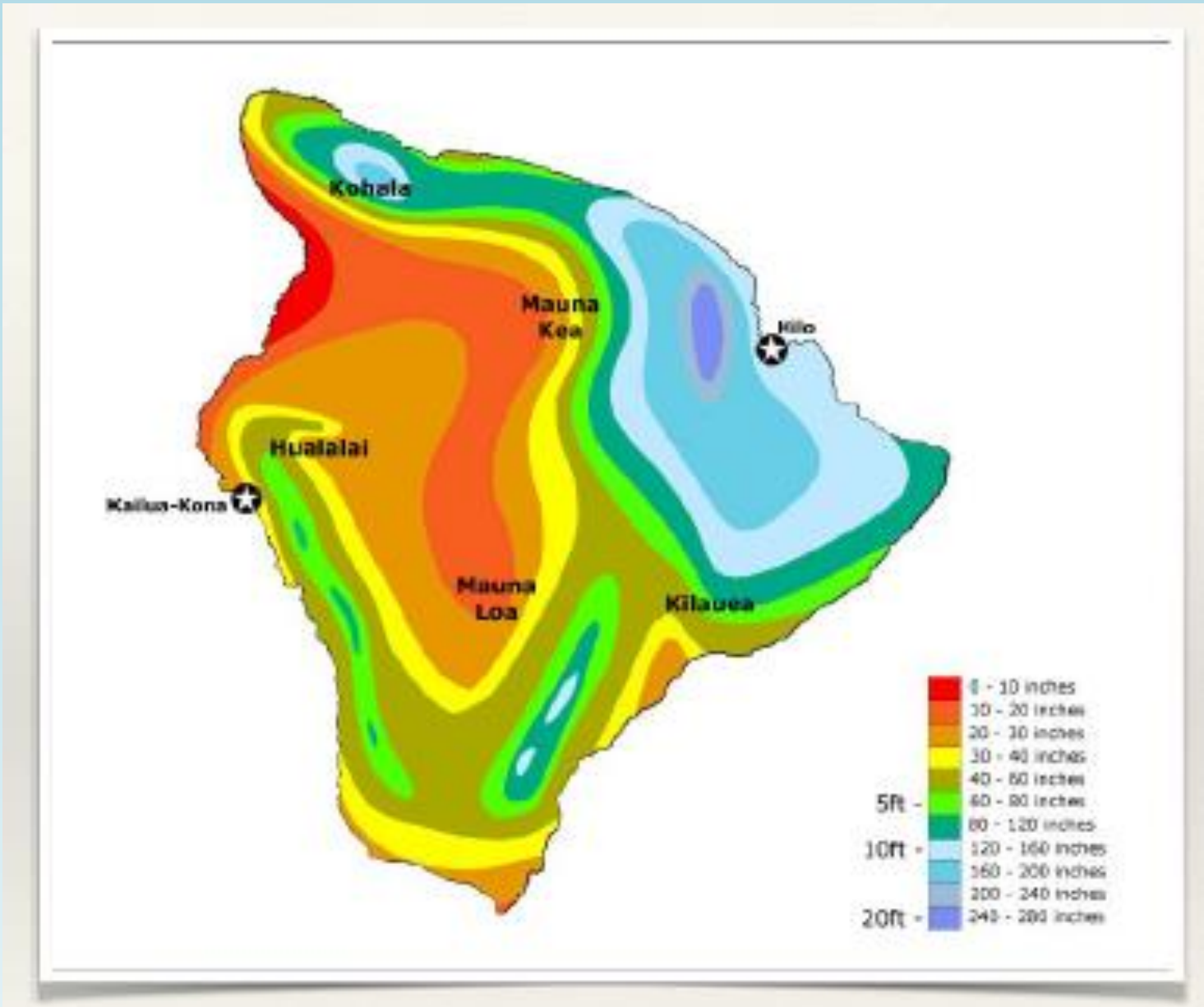


Rainfall Patterns

Leeward Side

- Air sinks
- Air contracts
- Air warms
- Minimal rain
- Minimal vegetation





The Big Island's Precipitation

Questions?