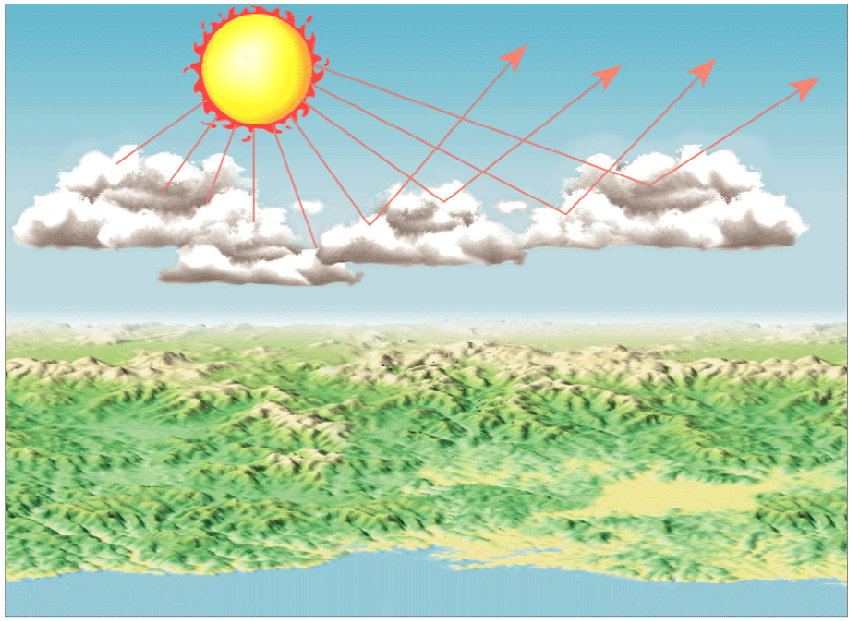
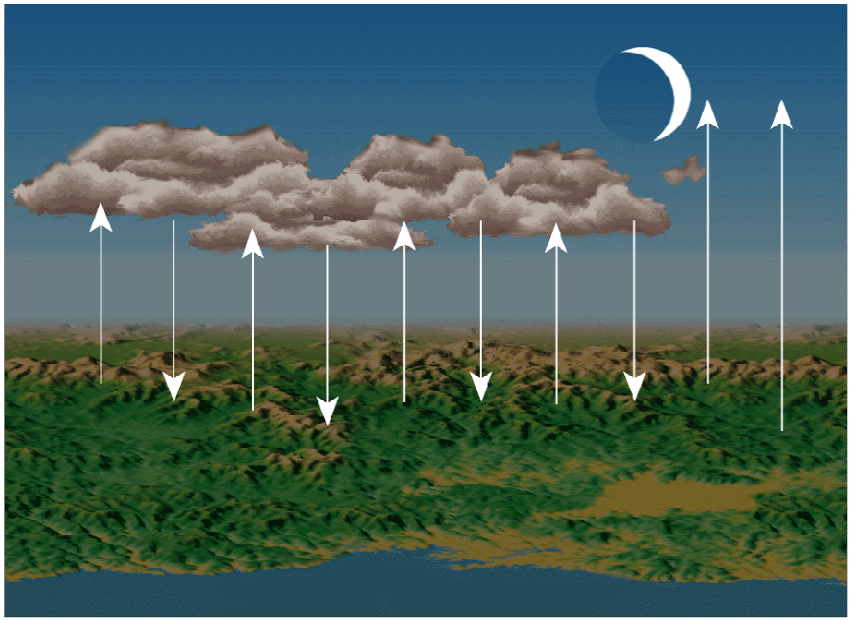
Temperatures vary because of how:

Clouds Reflect and Absorb Radiation



Reflect radiation from Sun



Absorb radiation that was absorbed by land

COMING UP NEXT:

WATER IN OUR ATMOSPHERE

Water in Our Atmosphere

- **Goals**
- Explain the importance of water vapor and its influence on:
    1. relative humidity
    2. dew point
    3. precipitation

What is Water?

- One water molecule consists of two hydrogen atoms that are covalently bonded to one oxygen atom. → H_20
- Water exists in three states of matter (S-L-G)

  State 1: **S**olid State = (Ice)

  State 2: **L**iquid State =(Fluid)

  State 3: **G**as State = (Vapor)

What is Water Vapor?

- Water vapor is the gas state of H_2O
- **It is the most important gas** in the atmosphere for understanding atmospheric processes

How Does Water Vapor Form?

- H_2O can change from one state to another through a process called: **phase change**

- **Important Note**: The process of changing states requires a transfer of thermal energy (heat)

Phase Changes as Energy Increases

- **<u>Phase Change 1</u>: *melting*= Solid to Liquid**

  Ex: Ice melting in a cup

- **<u>Phase Change 2</u>: *evaporation* =Liquid to Gas**
  - As thermal energy is absorbed by water, the molecules begin to move quickly enough to escape the surface of the liquid and become gas

- **<u>Phase Change 3</u>: *sublimation*= Solid to Gas**
  - Solids are **<u>quickly</u>** converted to gas without passing through the liquid state (Ex: = dry ice)

Phase Changes as Energy Decreases

- **Phase Change 4: *Condensation*= Gas to Liquid**

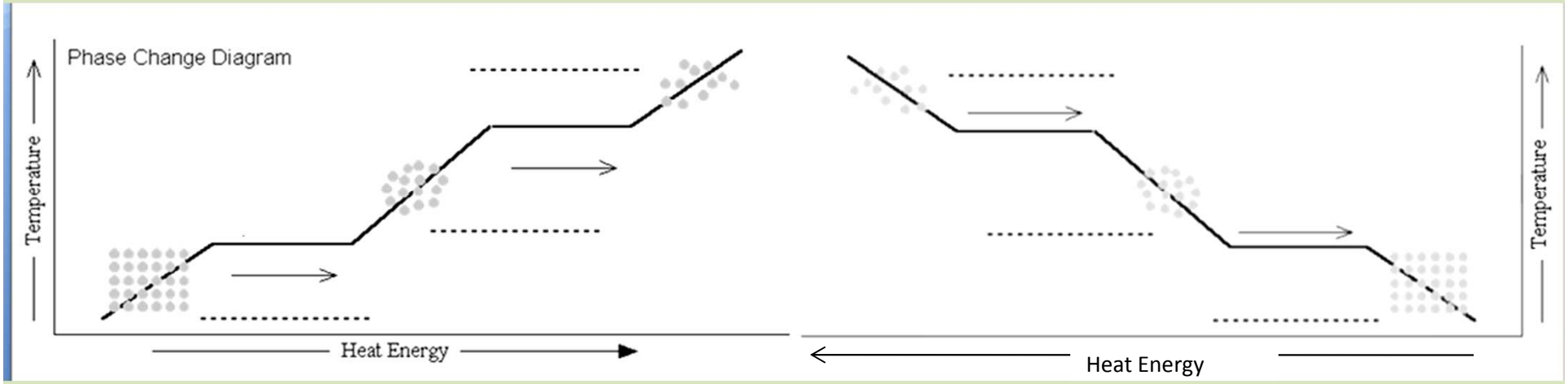
  Ex: Mirror fogging up during shower

- **Phase Change 5: *Freezing* =Liquid to Solid**

  Ex: Making Ice Cubes

- **Phase Change 6: *Deposition* = Gas to Solid**
  - **Fast** conversion from **gas** → **solid** without changing through the liquid state (Ex= frost on a car window)

Water Phase Change Diagram



In order for a phase change to occur ENERGY MUST BE TRANSFERRED!!!!!!!!!!!!!!!!!!!!

Phase Change Chart

Phase Change	States of Water	Final State of Water	Example
Solid to Liquid	Ice to Fluid	Fluid Water (liquid)	Ice melting in a cup
Liquid to Gas	Fluid to Vapor	Water Vapor (gas)	A puddle evaporating in the sun
Sublimation	Solid to Vapor	Water Vapor	Dry Ice
Deposition	Vapor to Solid	Ice	Frost deposited on a window

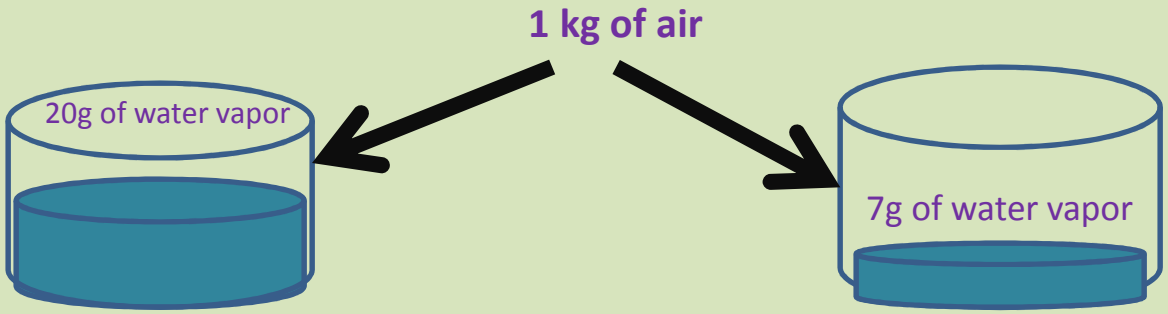
Humidity

- **Humidity** is a term used to describe **the amount** of water vapor in the air
  - Ex: The air in the room has 97% humidity
- **Saturation** is a term used to describe how much water vapor a kilogram of air needs in order to be considered full

  - Ex: **warm** air can hold **more** water vapor than **cold** air

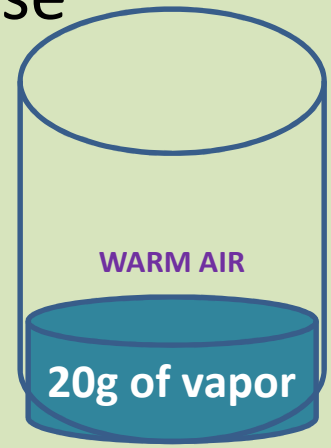
Relative Humidity

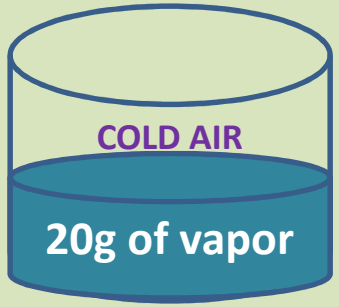
- **Relative humidity is a term used to describe how much water vapor the air will hold a certain temperature**
  - **Ex: When it is 77F degrees outside then 20 grams of water vapor is needed in every kilogram of air for the air to be fully saturated**
  - **Ex: When it is 50F degrees outside then only 7 grams of water vapor is needed in every kilogram of air for the air to be fully saturated**



Relative Humidity

- **If the amount of water vapor in the air does not change, then**
  - 1) as temperature decreases relative humidity will increase
  - 2) as temperature increases relative humidity will decrease





The cold air is now holding more water vapor per section of air than the warm air. Remember- the amount of water vapor is the same, but warm air can store more vapor than cold air

Dew Point

- The **dew point** is the temperature at which the water vapor in the air condenses into liquid water.
  - High dew point = moist air
  - Low dew point = dry air

– THAT’S ALL FOLKS

Water's Changes of State

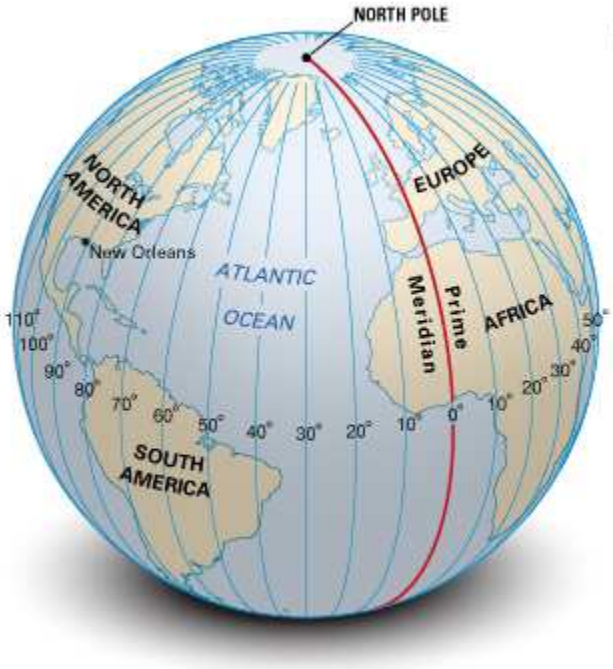
- Water can change from one state to another through a process called: **phase change**

  Phase Change 1: Solid to Liquid

  Phase Change 2: Liquid to Gas

  Phase Change 3: Solid to Gas

In order for a phase change to occur ENERGY MUST BE TRANSFERRED!!!!!!!!!!!!!!!!!!!!



FACTS ABOUT LINES OF LONGITUDE

- Are known as meridians.
- Run in a north-south direction.
- Measure distance east or west of the prime meridian.
- Are farthest apart at the Equator and meet at the poles.
- Cross the Equator at right angles.
- Lie in planes that pass through the Earth's axis.
- Are equal in length.
- Are halves of great circles.