

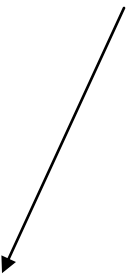
WEATHER & CLIMATE

Ch. 1 Sect. 1 – “The Atmosphere”

Characteristics of the Atmosphere (Intro.)

- Earth – surrounded by a mixture of gases.
 - Contains oxygen we need
 - Protects us from Sun
 - Atmosphere is always changing
 - Everything WE do, affects the make-up of the atmosphere

The Composition of the Atmosphere



- 78% Nitrogen
 - 21% Oxygen [made by phytoplankton and other plants]
 - 1% Other Gases [Argon, CO₂, tiny particles, & water *]
 - Water is in atmosphere in different states:
 - LIQUID – droplets
 - SOLID – snow & ice crystals
 - * GAS – invisible gas called “water vapor” (most H₂O in atmosphere)
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Atmospheric Pressure and Temperature

- We carry a load equivalent to a column of air 700 km high every day
- Even though air is light, a square inch at sea level is under 15 POUNDS of air
 - (similar to carrying large bowling ball in tip of finger)

As Altitude Increases, Air Pressure Decreases

- Gravity pulls the atmosphere (air molecules) toward Earth
- Air pressure = measure of force that air molecules push on a surface
- When you're on Earth, more molecules are above you so air pressure is stronger than if you're in space. (e.g. people on bottom of human pyramid have more pressure)

○ As altitude  air pressure 

(altitude & air pressure are inversely related)

Atmospheric Composition Affects Air Temperature

- Some parts of atmosphere have more gases that absorb solar energy = warmer temp.
- Some parts of atmosphere have less gases that absorb solar energy = cooler temp.

Layers of the Atmosphere

- Because of temperature differences, there are 4 separate layers of atmosphere
 - Sphere = ball
 - Tropo = turning / change
 - Strato = layer
 - Meso = middle
 - Thermo = heat

The Troposphere: The Layer in Which We Live

- Layer next to Earth's surface
- Densest – contains almost 90% of atmosphere's TOTAL MASS
- Almost all CO₂, water vapor, clouds, air pollution, weather, & life are here
 - Temperature varies *(altitude & temperature are inversely related)*
- Gases in this layer mix continuously



The Stratosphere: Home of the Ozone Layer

- Gases are layered and don't mix like they do in the troposphere
- Air is thin and has little moisture
- OZONE LAYER in stratosphere (near top) = protects us from sun's harmful UV radiation
 - Because ozone is at top of layer & absorbs UV radiation ...





temperature as altitude

The Mesosphere: The Middle Layer

- Coldest layer
- Altitude and temperature are inversely related (like in troposphere)



The Thermosphere: The Edge of the Atmosphere

- Top atmospheric layer
- Temperature  as altitude  (like in stratosphere)



- **Temperature** = measure of average energy of particles in motion
- **Heat** = TRANSFER of thermal energy between objects of different temps.

Even though there are extreme temperatures (1,000°C +) in the thermosphere because the particles there are moving very fast, you cannot **feel** heat because there are so few particles (low density) to collide with or touch each other. **(See definitions above)**

The Ionosphere: Home of the Auroras

- Gas particles in upper mesosphere and lower thermosphere absorb harmful solar energy and become electrically charged = **IONS**.
- The ions in the thermosphere (*layer is called "IONOSPHERE"*) radiate energy as shimmering lights = **AURORAS** (known as northern or southern lights)
- Ionosphere also reflects AM radio waves causing them to bounce off this layer and go back to Earth.

