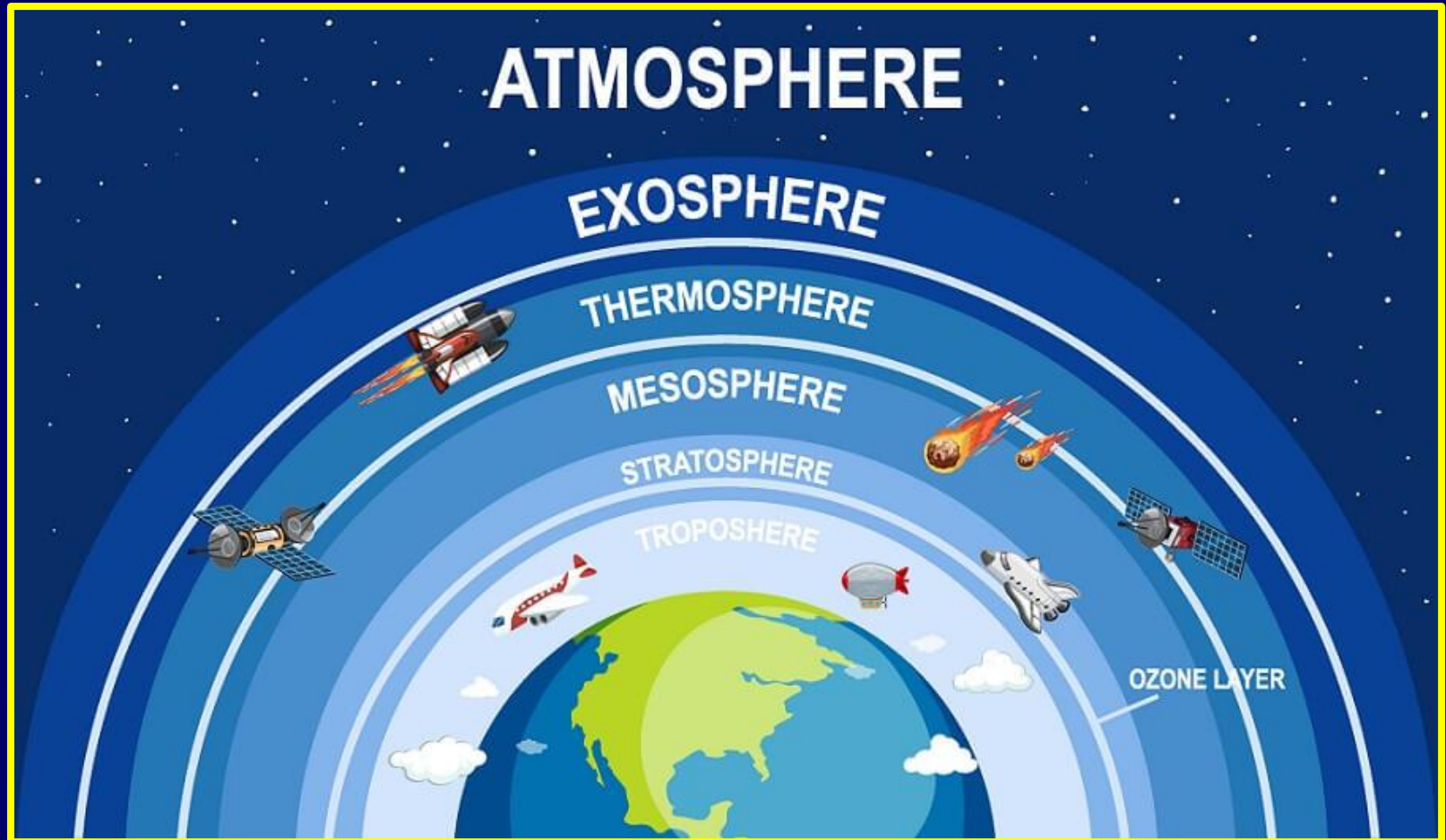


# Atmosphere



# Essential Standard 2.5

Understand the structure of and processes within our atmosphere.

## Learning Objective 2.5.1

Summarize the structure and composition of our atmosphere.

# I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can list the main gases found in the atmosphere.
- I can describe the various layers of atmosphere and describe their characteristic.

# Atmosphere

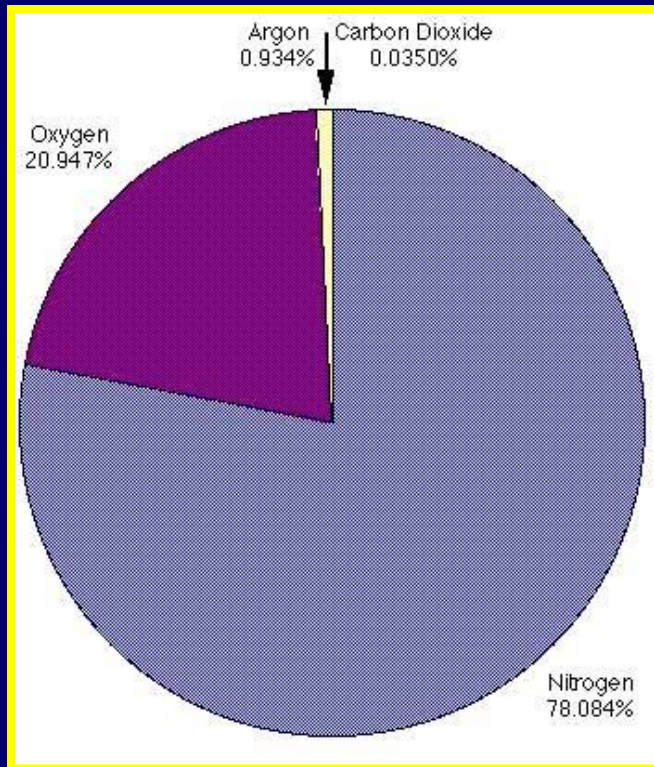
The atmosphere is a blanket of gases that surrounds Earth and is held here by Earth's gravity.



The atmosphere extends 800 miles out into space.

# Atmospheric Composition

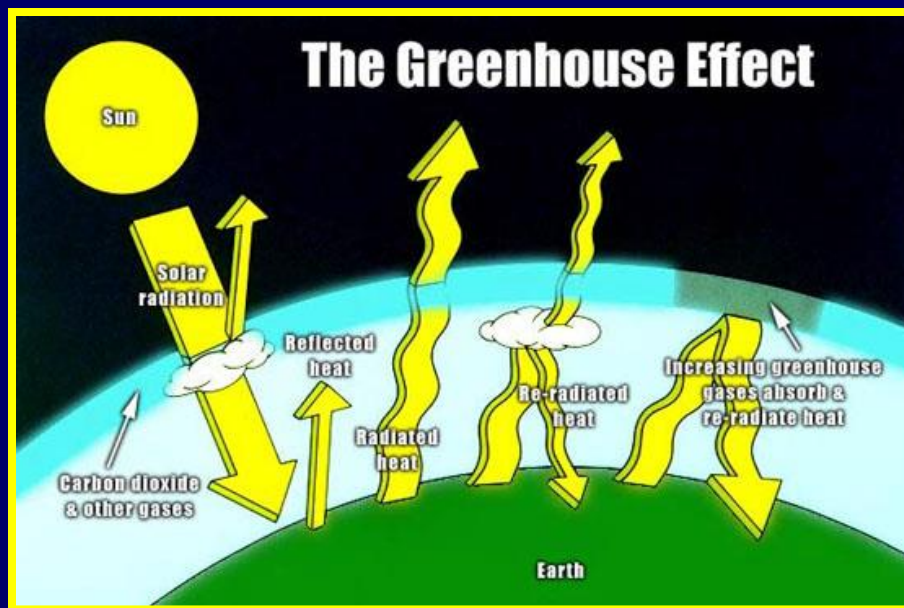
The majority of the atmosphere consist of nitrogen gas,  $N_2$ , that is very stable and non-combustible.



- 78% Nitrogen gas
- 21% Oxygen gas
- 1% - Other gases
  - Argon
  - Carbon Dioxide
  - Water Vapor
  - Methane
  - Ozone

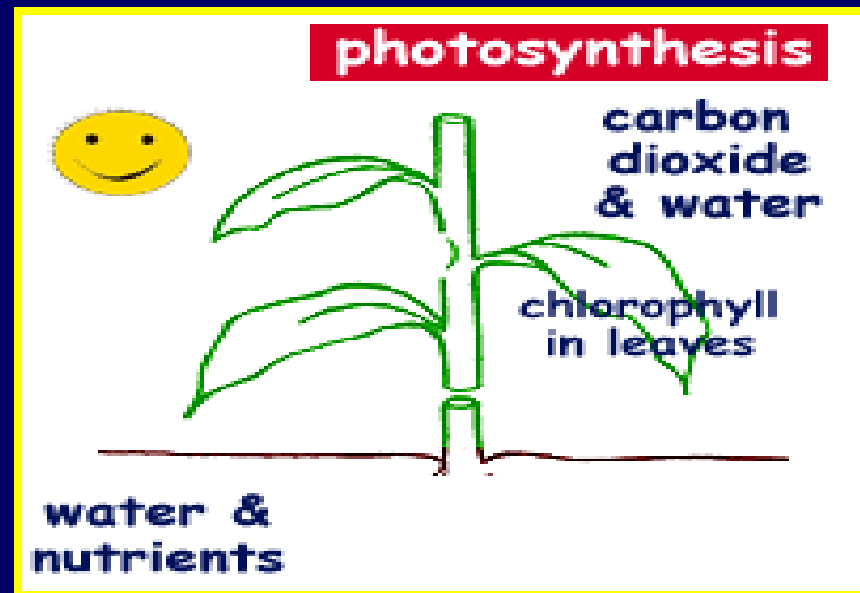
# Carbon Dioxide

Although carbon dioxide,  $\text{CO}_2$ , makes up a very small percentage, it plays an important role in regulating Earth's temperature.



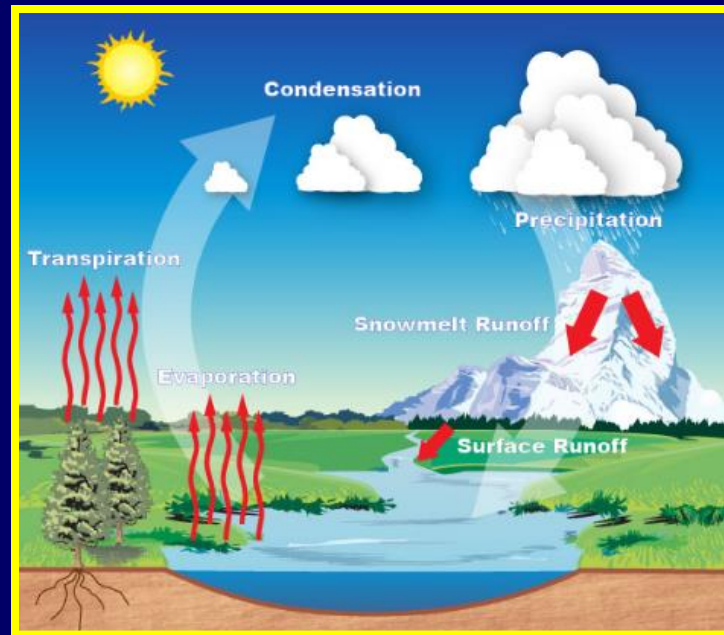
# Carbon Dioxide

Carbon dioxide is also crucial for the process of photosynthesis which provides energy and oxygen to most of life on Earth.



# Water Vapor

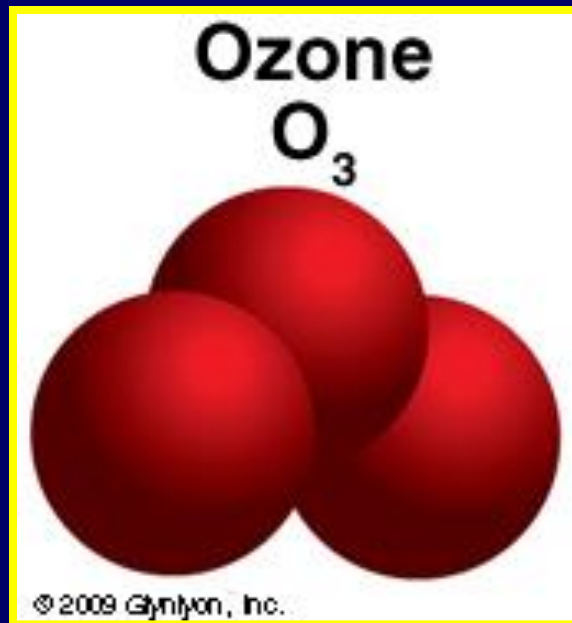
Water vapor also makes up a very small percentage but it too helps regulate Earth's temperature and is an important step in the water cycle.





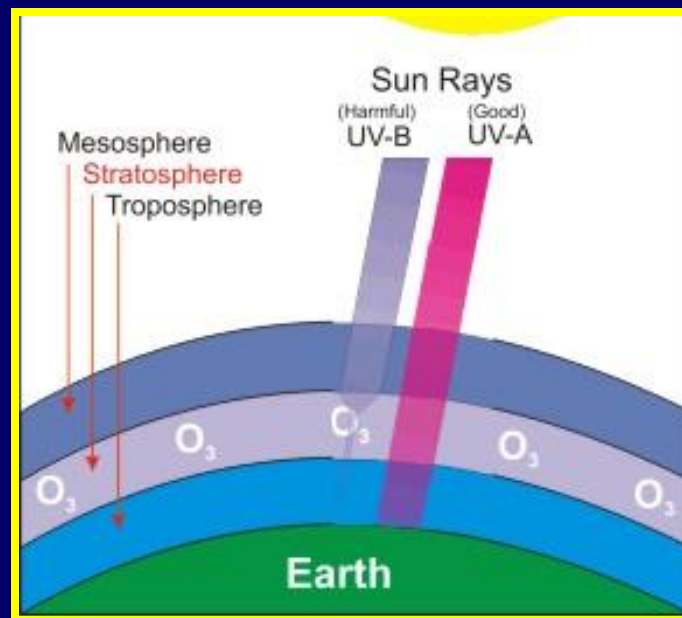
# Ozone

Ozone gas,  $O_3$ , is made up of three atoms of oxygen and also makes up a very small percentage of the atmosphere.



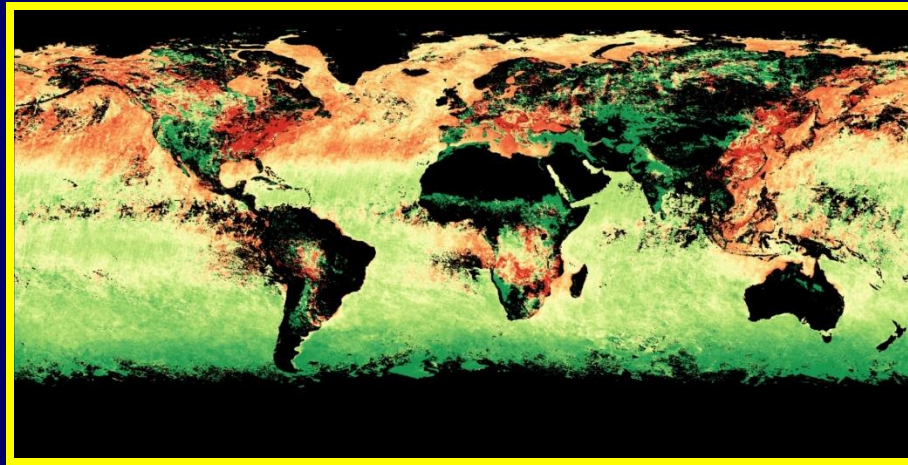
# Ozone

Ozone makes it possible for life to exist on land because it blocks harmful ultraviolet radiation, from the Sun, that causes skin cancer.



# Particulate Solids

Besides gases, the atmosphere also contains tiny particles of dust and salt that play an important role in cloud formation.



Red color represents concentrations of atmospheric dust particles.

# Atmosphere Structure

The atmosphere is made up of different layers that differ in composition and temperature.

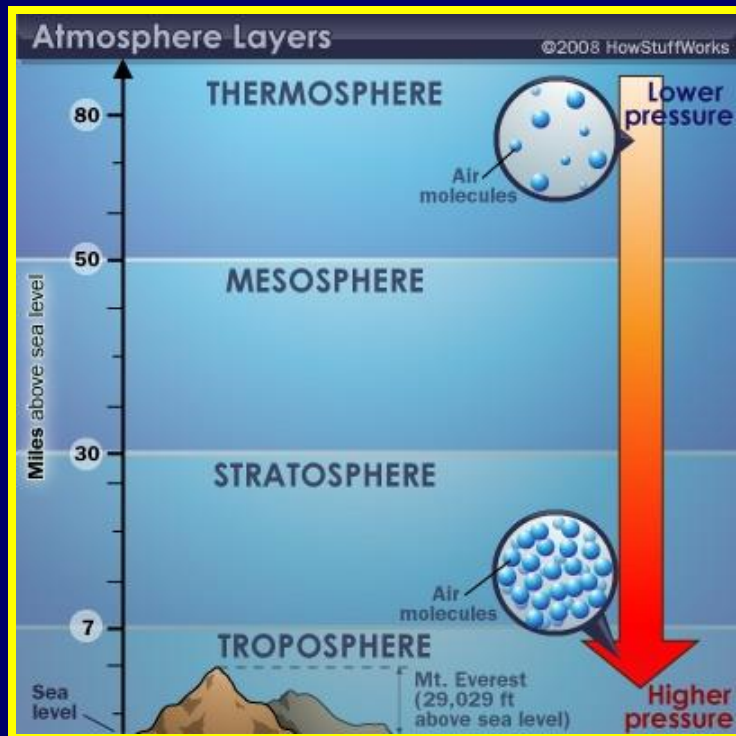
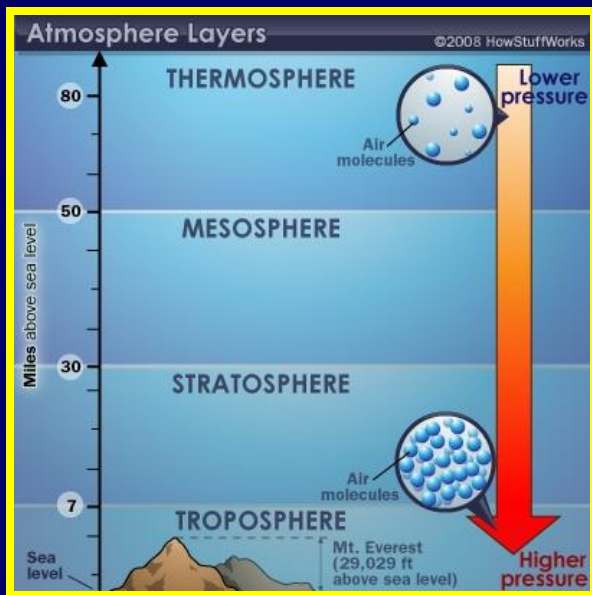


Photo taken by astronauts on the space shuttle

# Troposphere

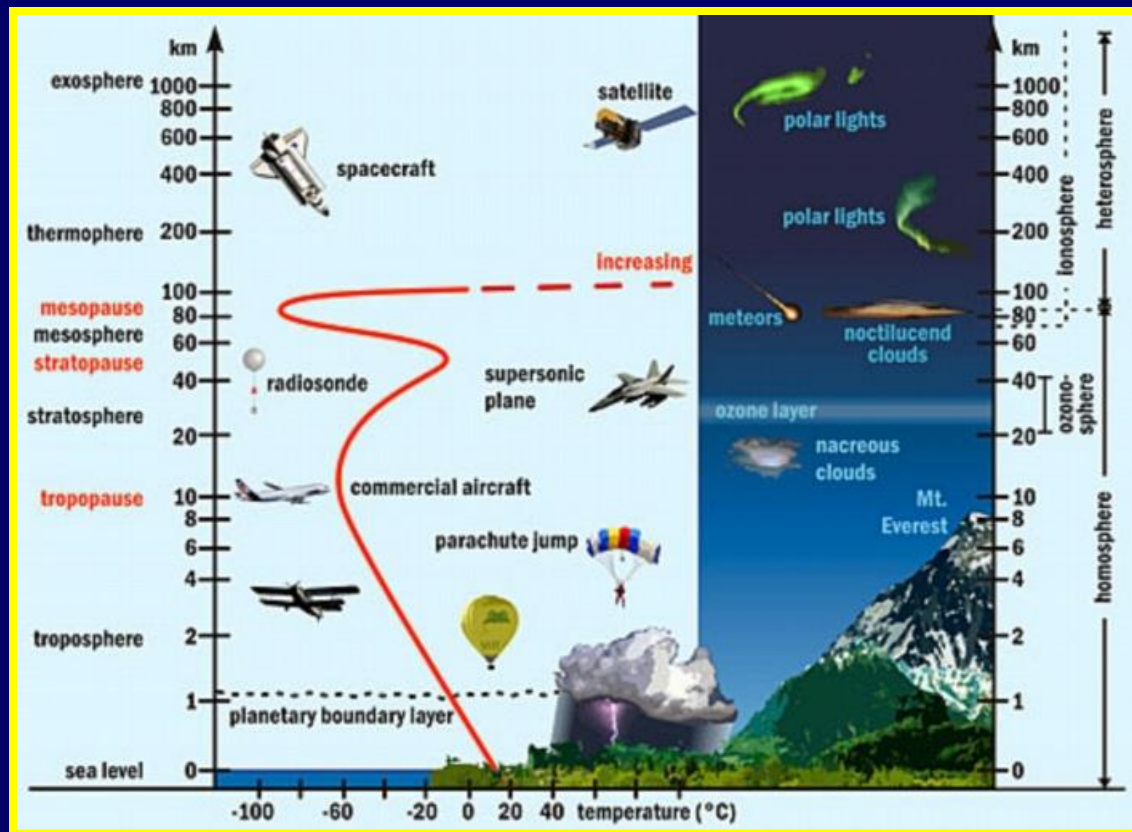
The troposphere is the layer closest to Earth's surface and contains most of the mass of the atmosphere as well as all of the water vapor.



The troposphere extends to about 7 miles into space. All storms occur in the troposphere.

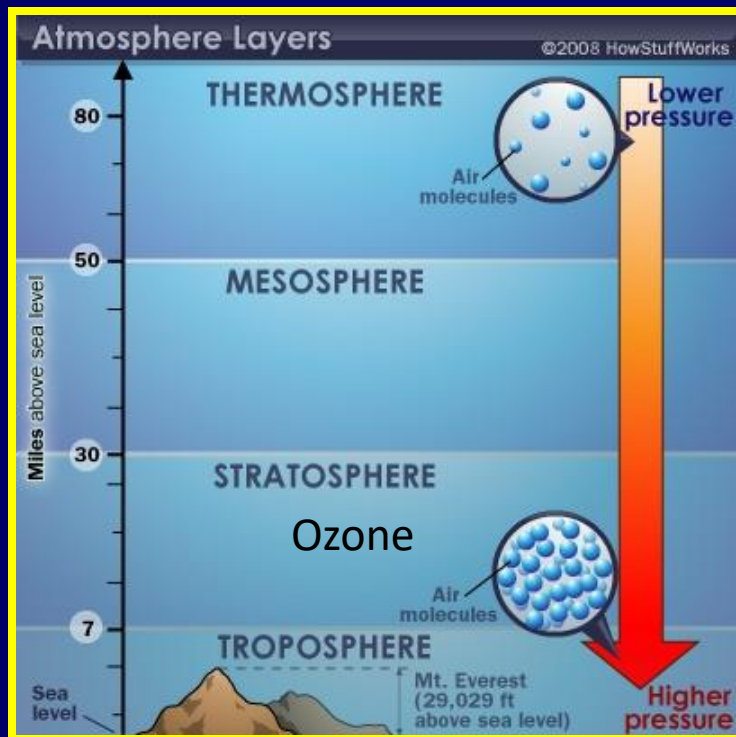
# Troposphere

In the troposphere, the temperature and pressure decrease with height.



# Stratosphere

The stratosphere lies right above the troposphere and is where ozone gas is found.

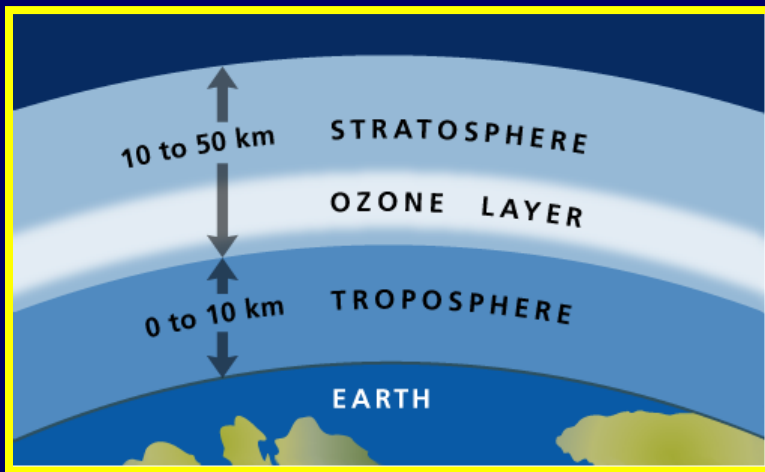


The stratosphere extends to about 30 miles into space.

Commercial planes often fly in this region to avoid bad weather.

# Stratosphere

Ozone gas, made up of three oxygen atoms, collects and forms a layer in the stratosphere.

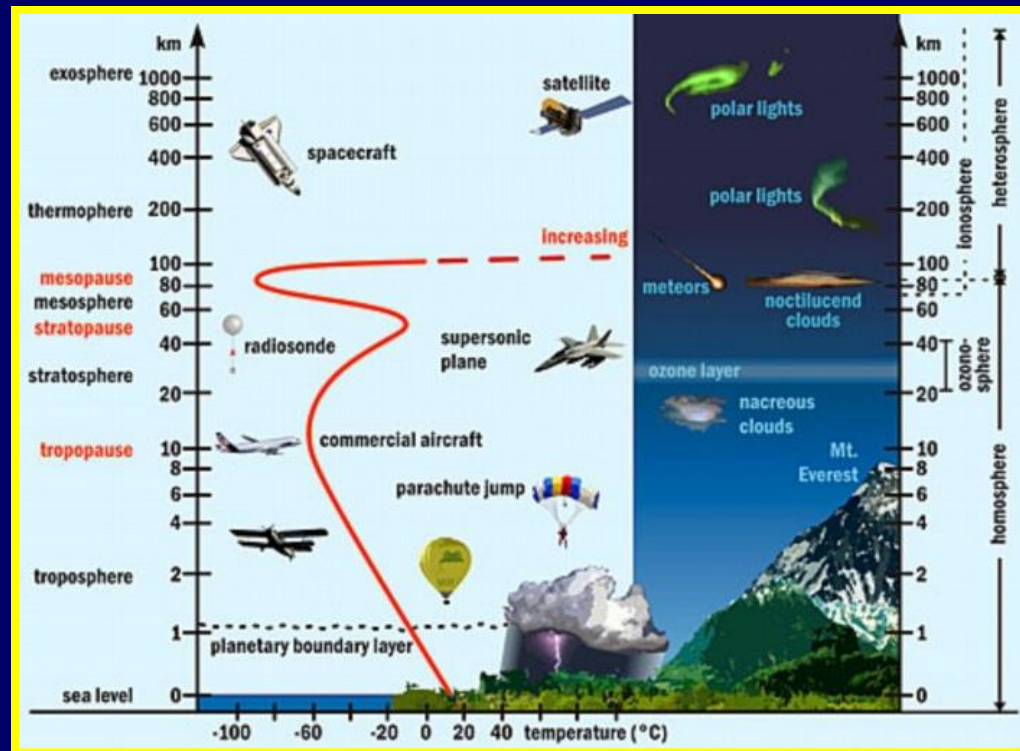


This layer of ozone blocks harmful ultraviolet radiation from reaching Earth.



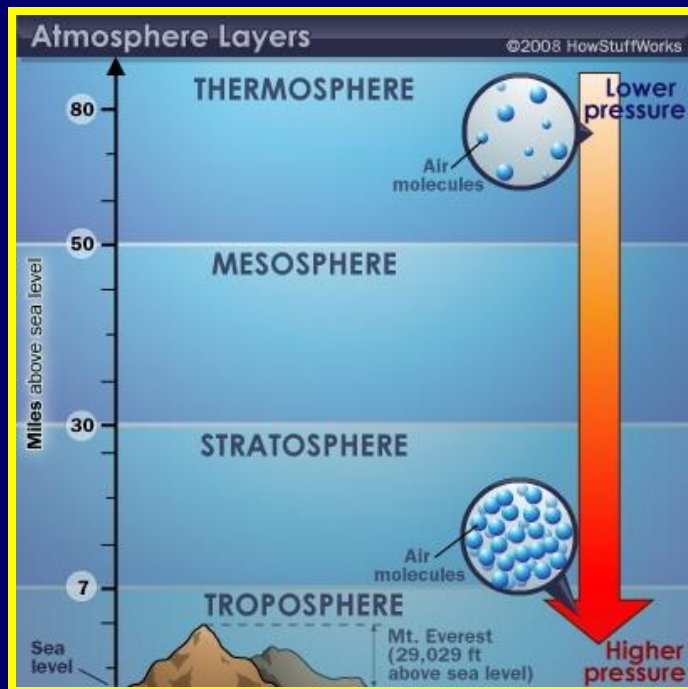
# Stratosphere

Due to the absorption of radiation, the temperature in the stratosphere actually increases with height.



# Mesosphere

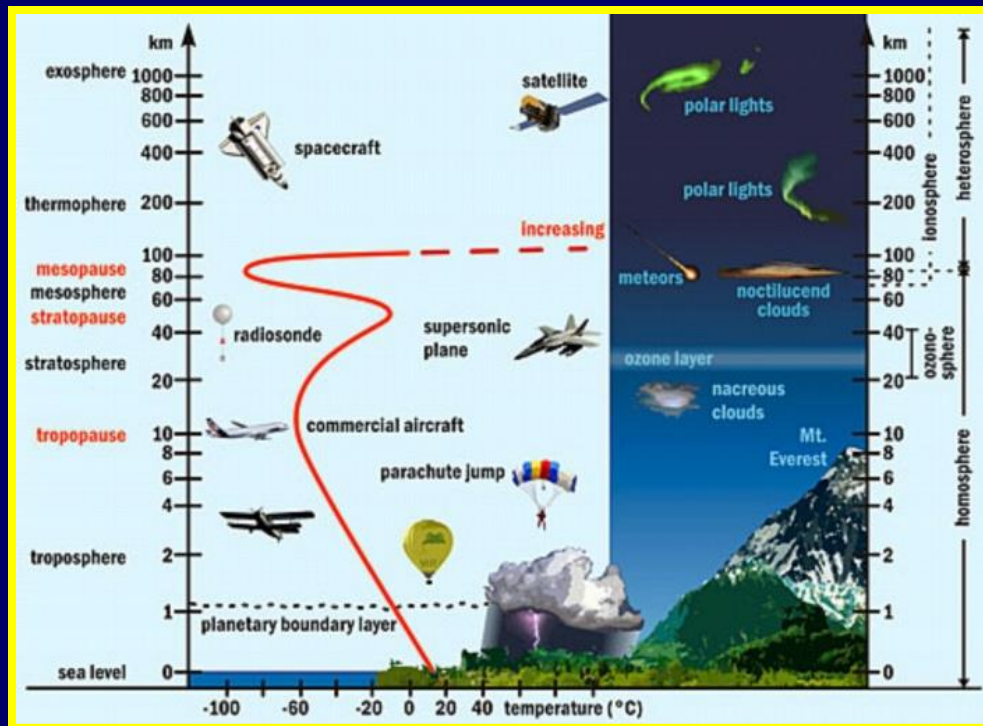
The mesosphere lies above the stratosphere and is the coldest layer with temperatures reaching  $-93^{\circ}\text{C}$ .



The mesosphere extends to about 50 miles into space.

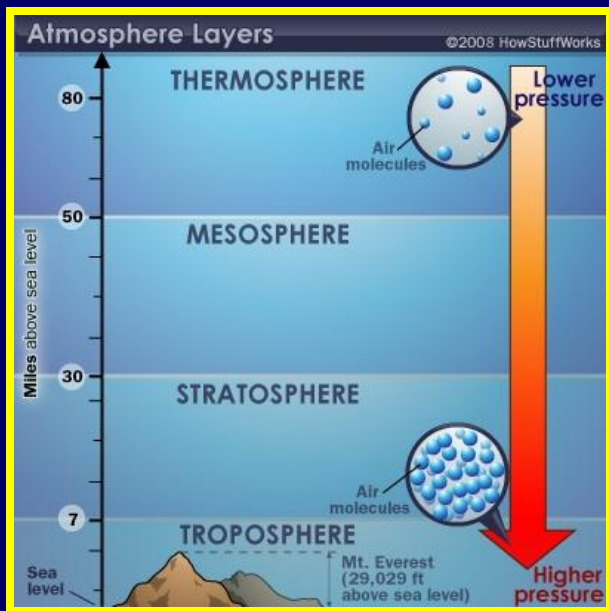
# Mesosphere

Most meteors collide with air particles here and burn up before they can reach Earth.



# Thermosphere

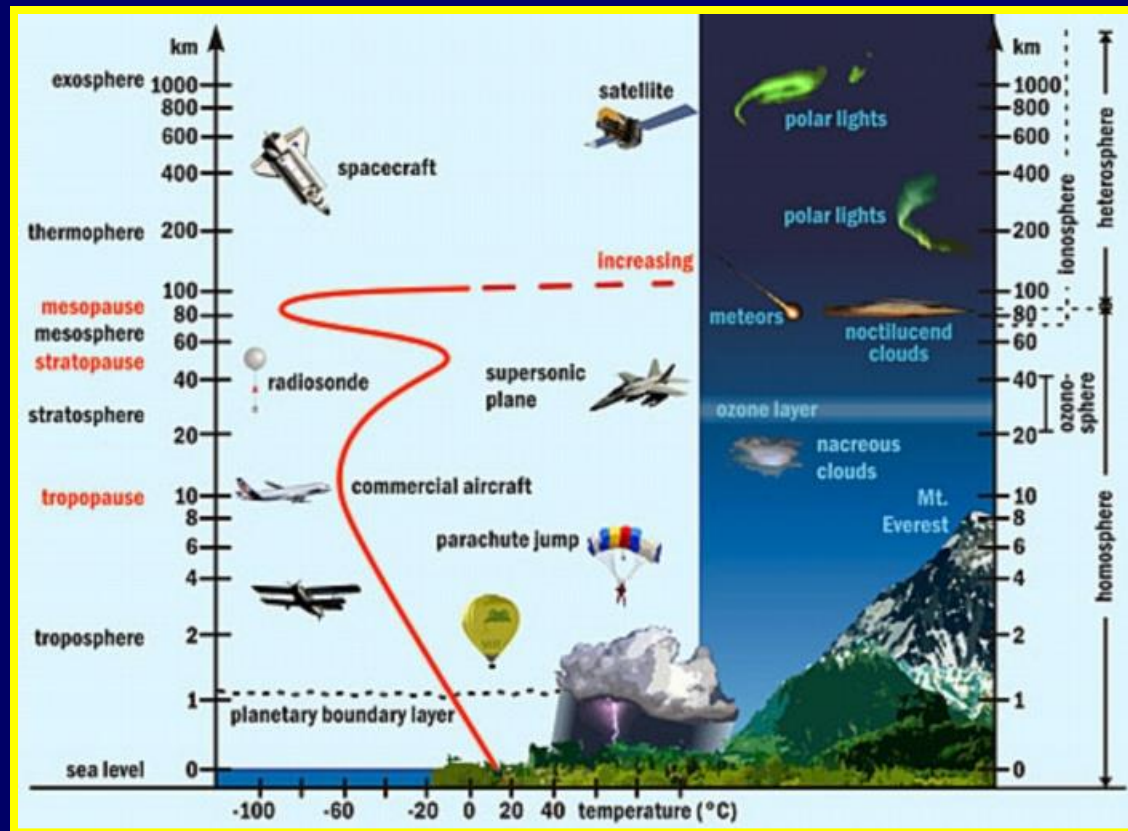
The thermosphere lies above the mesosphere and is the warmest layer with temperatures reaching over  $1000^{\circ}\text{C}$ , due to the radiation from the Sun.



The thermosphere extends to about 80 miles into space.

# Thermosphere

The thermosphere is where the auroras occur.



# Auroras

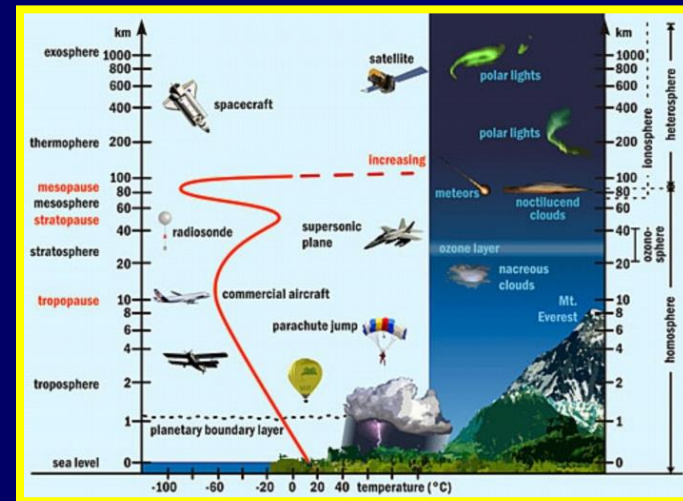
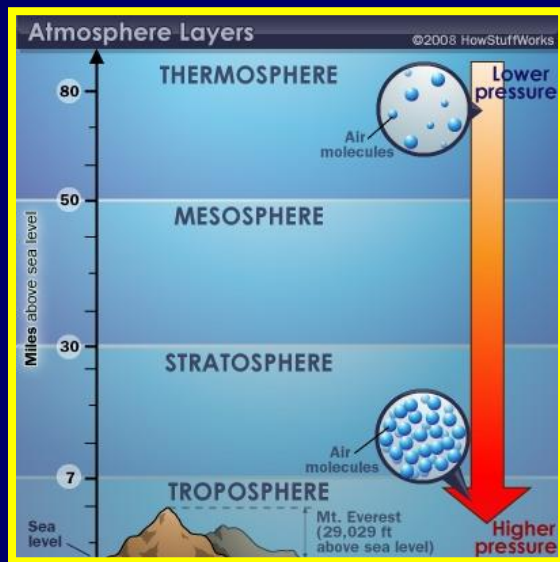
Auroras result when charged particles from the Sun collide with nitrogen and oxygen gases in Earth's thermosphere, giving off light.



They are most easily seen around Earth's poles.

# Exosphere

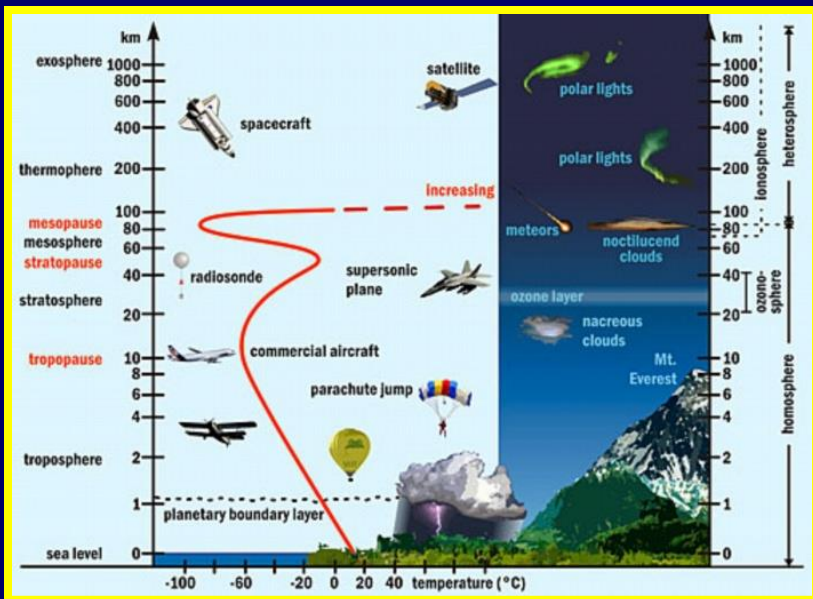
The exosphere is the outer-most layer of the atmosphere and contains a very small amount of atoms and molecules.



Satellites orbit here with little or no air resistance.

# Exosphere

Satellites orbit in the exosphere due to the small amount of air resistance.





# The End

