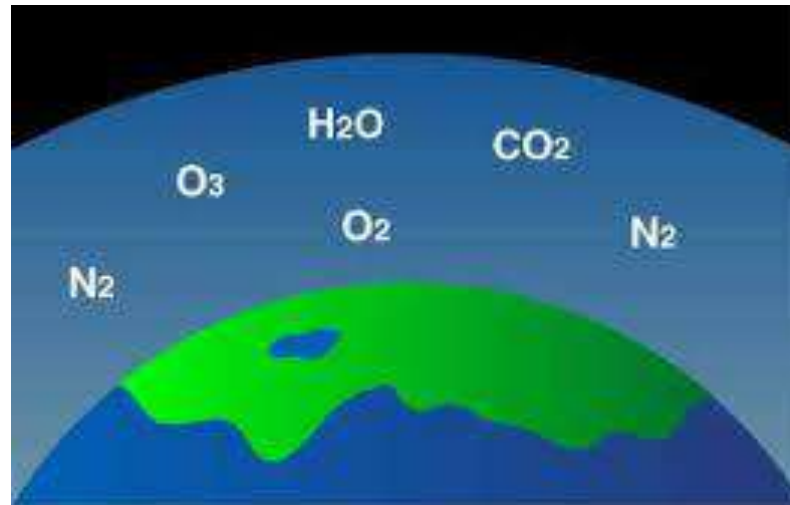


17.1 Atmosphere Characteristics

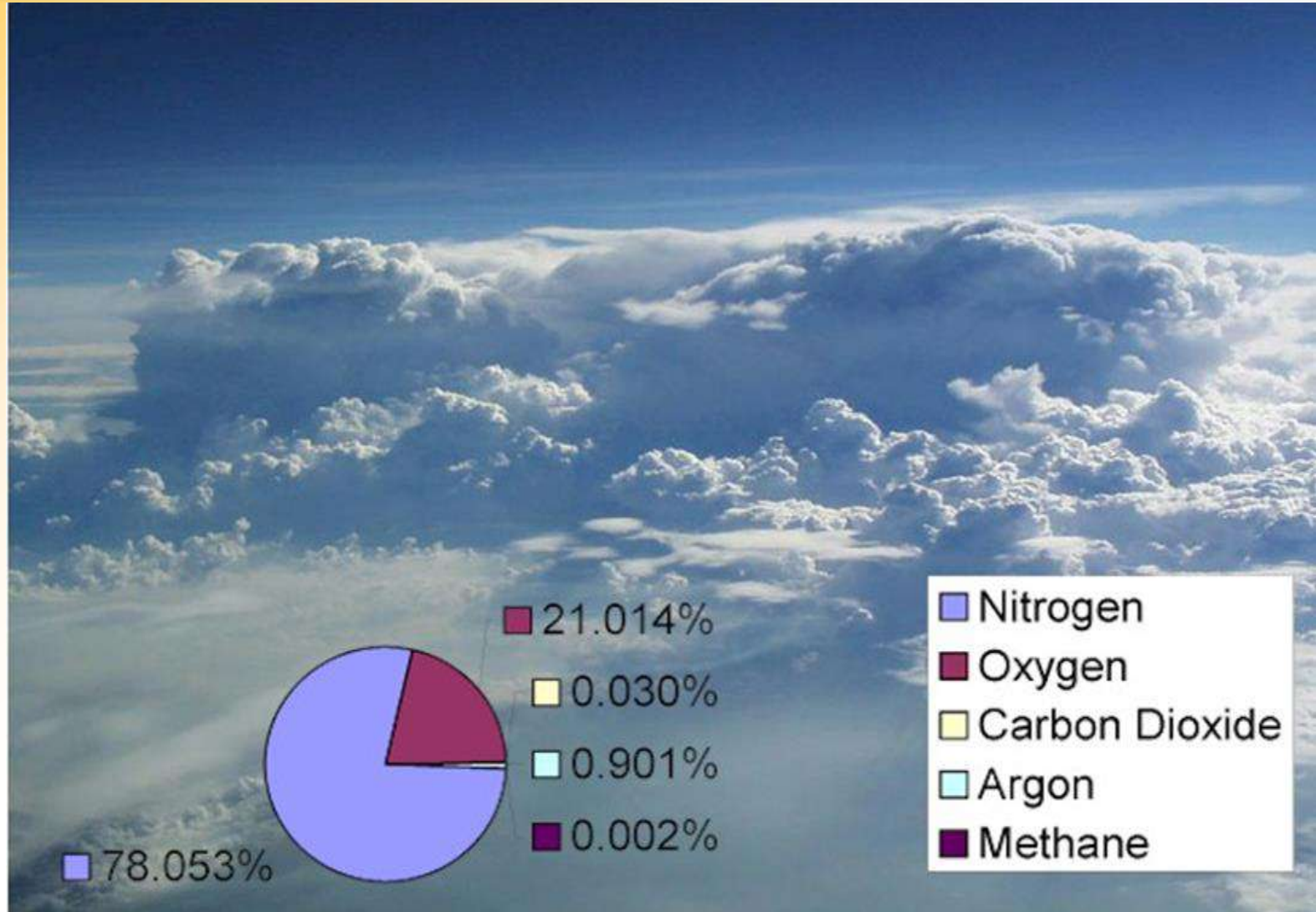
Composition of the Atmosphere

◆ Major Components

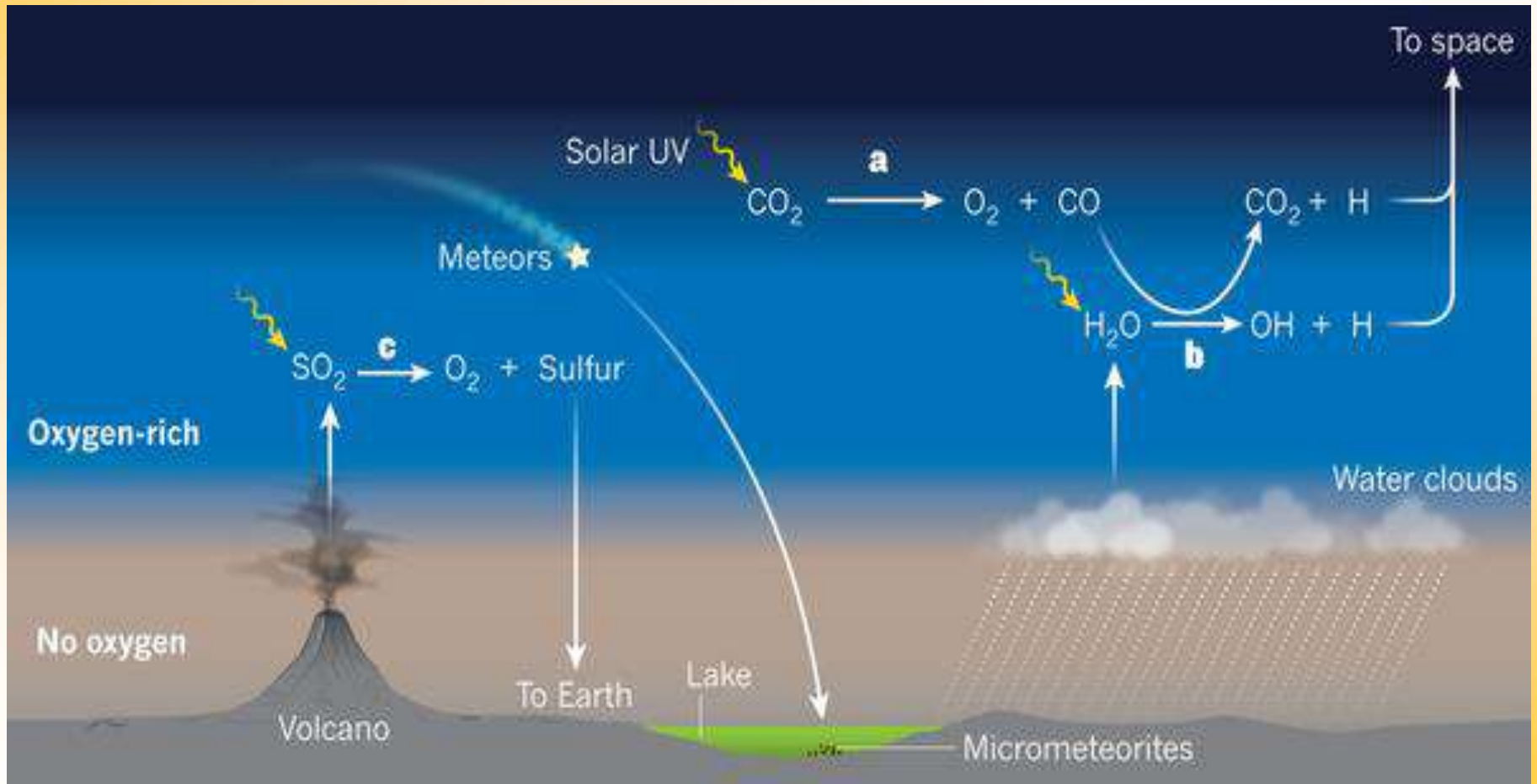
- Air is a mixture of different gases and particles, each with its own physical properties.



Volume of Clean, Dry Air



Primitive Atmosphere



17.1 Composition of the Atmosphere

◆ Variable Components

- **Water vapor** - source of all clouds and precipitation.
- Water vapor absorbs heat given off by Earth
 - * Carbon dioxide (CO₂) also absorbs heat
- Water Vapor also absorbs some solar energy.

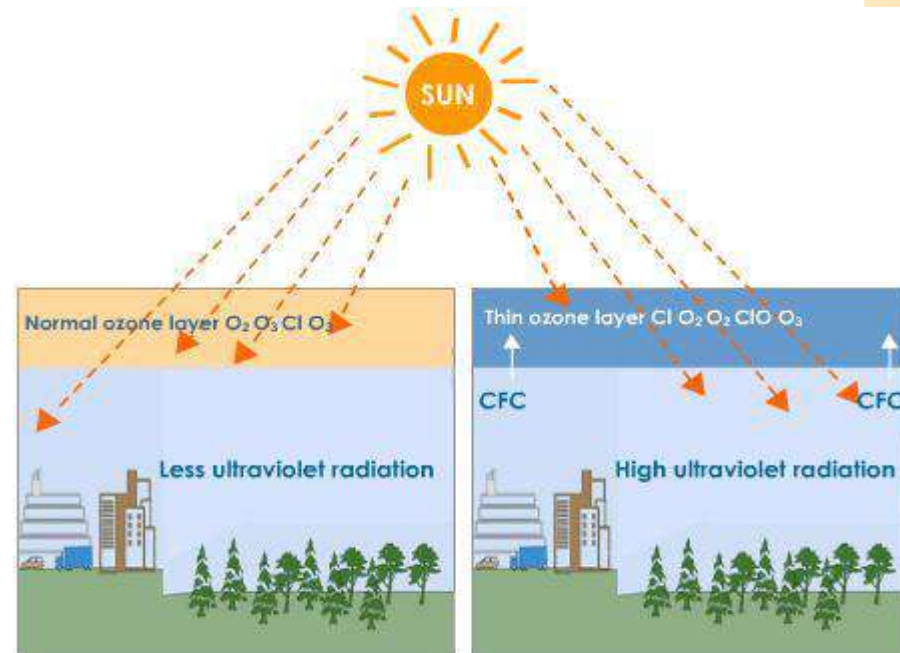


17.1 Composition of Atmosphere

◆ Ozone

- **Ozone** is a form of oxygen that combines three oxygen atoms into each molecule (O_3).
 - The ozone layer absorbs harmful UV radiation from the sun.

- If ozone did not filter most UV radiation and all of the sun's UV rays reached the surface of Earth, our planet would be uninhabitable for many living organisms.



17.1 Atmosphere Characteristics

Composition of the Atmosphere

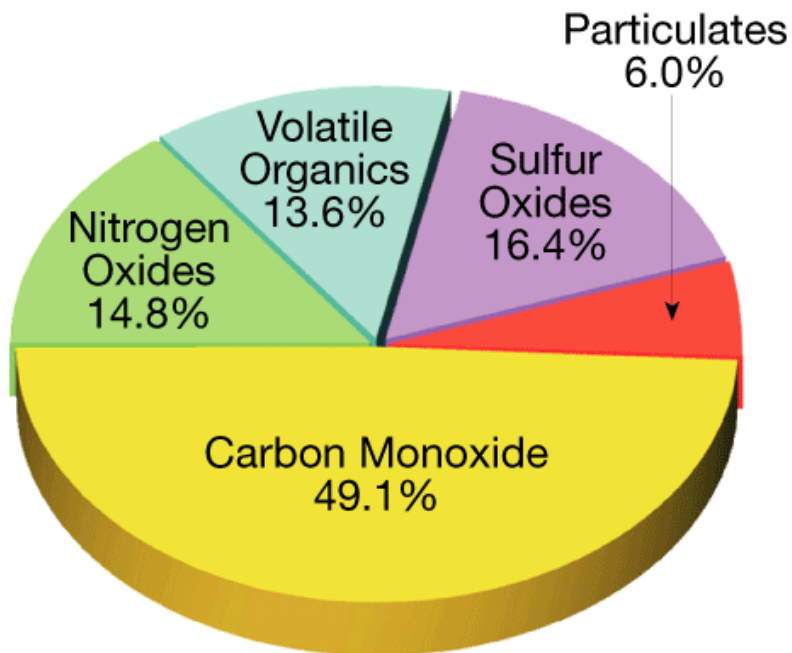
◆ Human Influence

- Emissions from transportation vehicles account for nearly half the primary pollutants by weight.

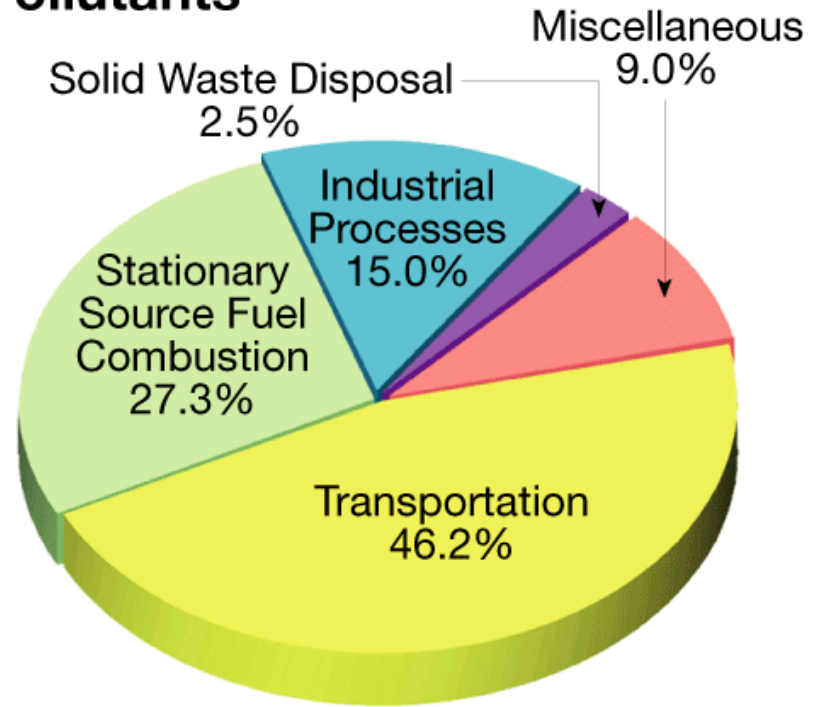


Primary Pollutants

Primary Pollutants



What They Are



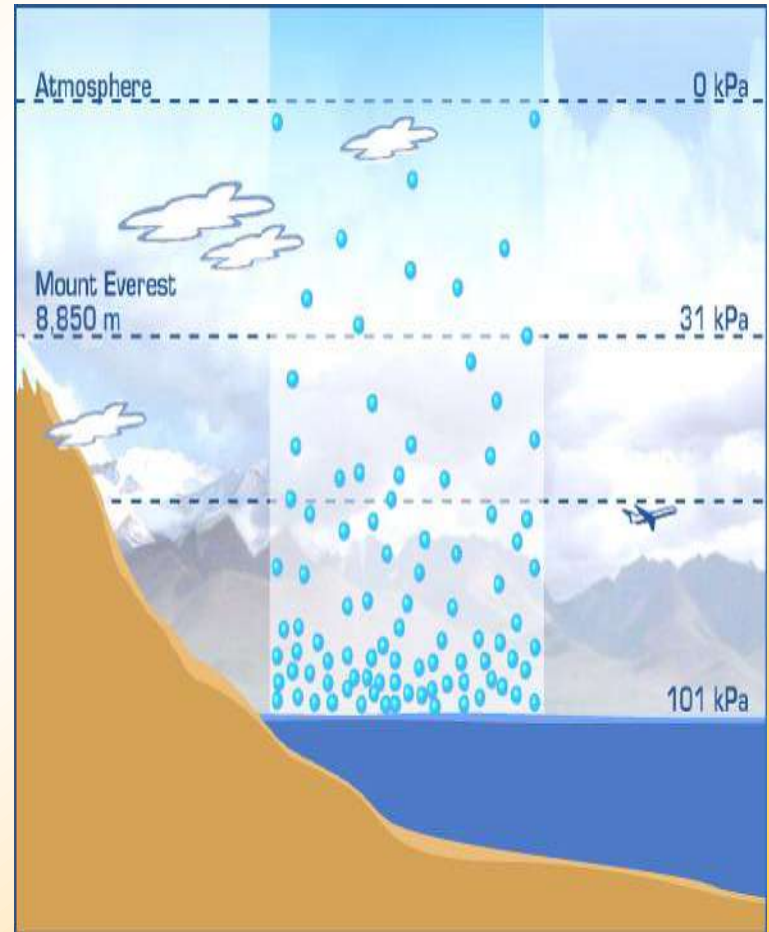
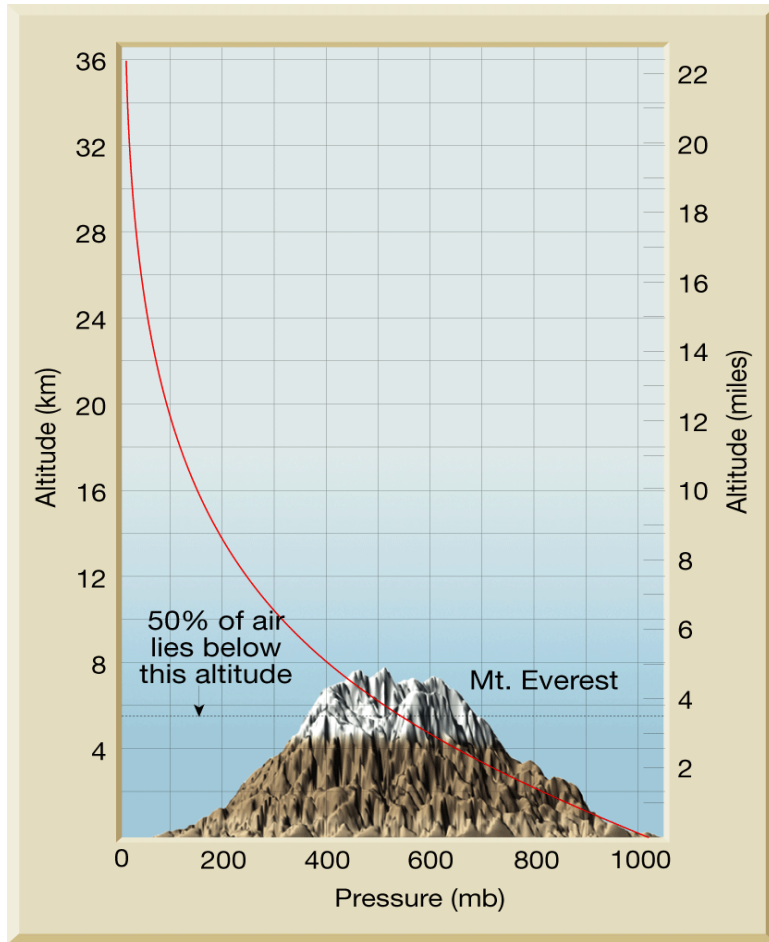
Where They Come From

17.1 Atmosphere Characteristics

Height and Structure of the Atmosphere

- ◆ The atmosphere rapidly thins as you travel away from Earth until there are too few gas molecules to detect.
- ◆ Pressure Changes – reduces as you go up
 - Atmospheric pressure is simply the weight of the air above.

Atmospheric Pressure vs. Altitude



Atmospheric Pressure decreases with altitude

17.1 Atmosphere Characteristics

Height and Structure of the Atmosphere

◆ Temperature Changes

- The atmosphere can be divided vertically into four layers based on temperature.
- The troposphere is the bottom layer of the atmosphere where temperature decreases with an increase in altitude.

1

Key
Points!

Closest layer to Earth, contains all weather, temperatures decrease as you go up.

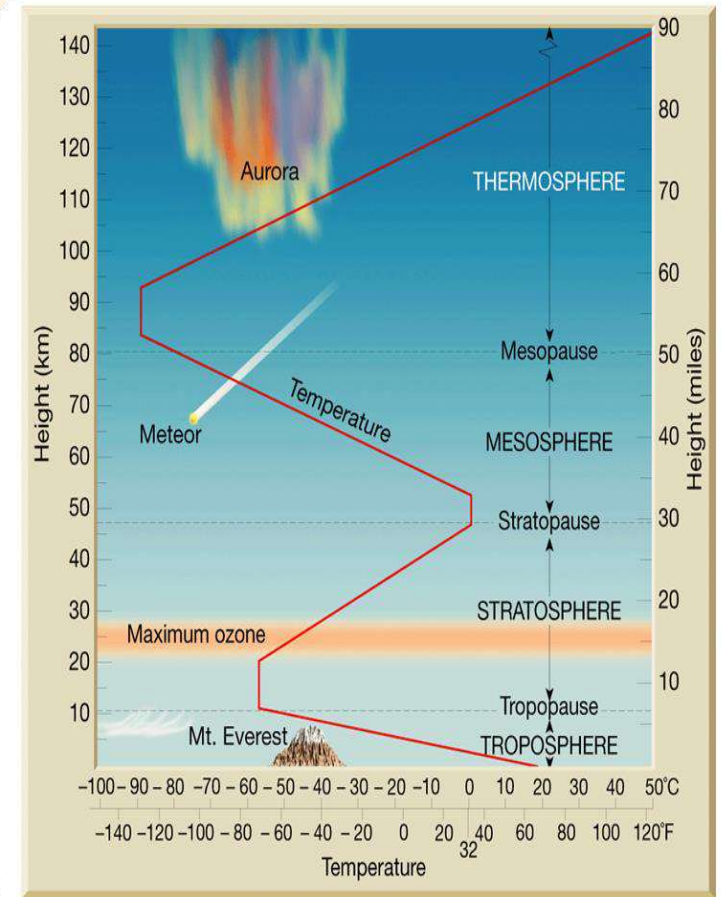
Snowy Mountaintops Contrast with Warmer Snow-Free Lowlands



Height and Structure of the Atmosphere

2 Stratosphere

layer of the atmosphere where temperature remains constant to a height of about 20 kilometers. Temperature gradually increases until the stratopause.

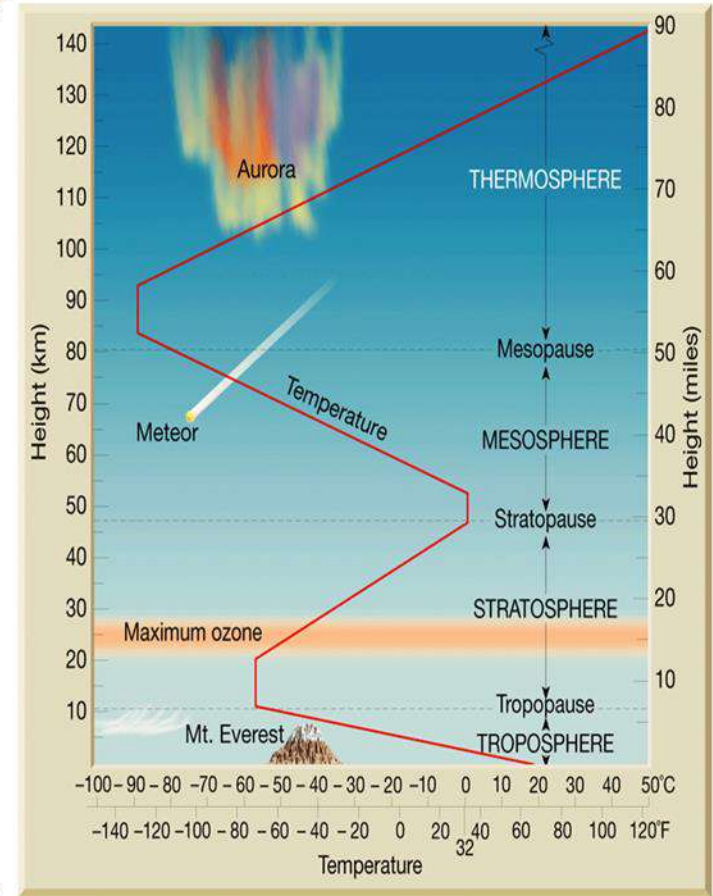


Key
Points

Contains ozone layer,
temperatures increase as you go up

3 Mesosphere

layer of the atmosphere immediately above the stratosphere and is characterized by decreasing temperatures with height.



Key
Points

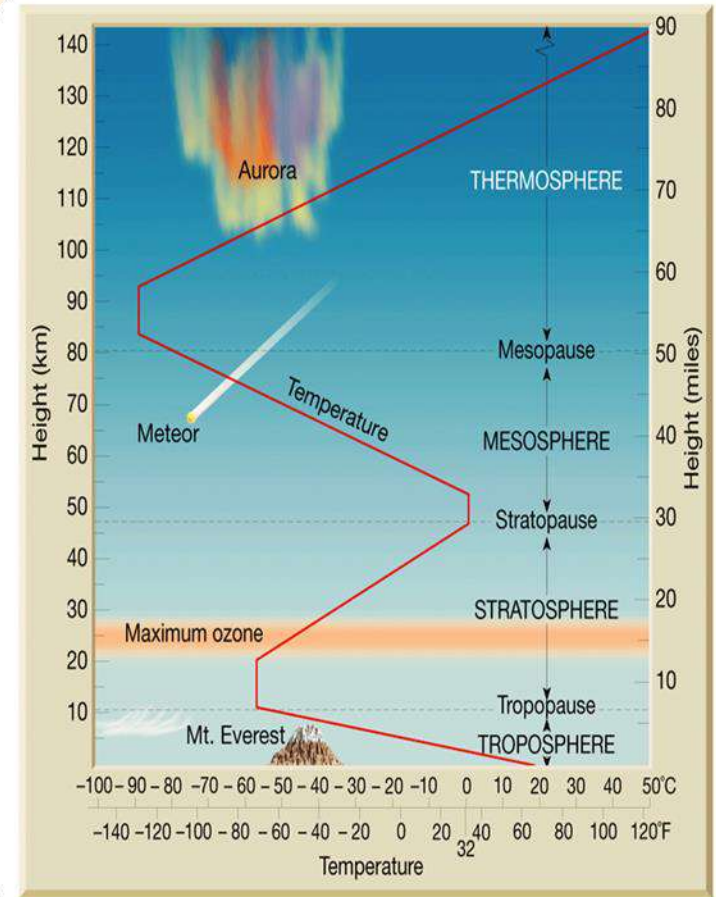
meteors hopefully “burn up” here, coldest layer, temperatures get colder as you go up

4 Thermosphere

region of the atmosphere immediately above the mesosphere and is characterized by increasing temperatures due to the absorption of very short-wave solar energy by oxygen.

Key
Points

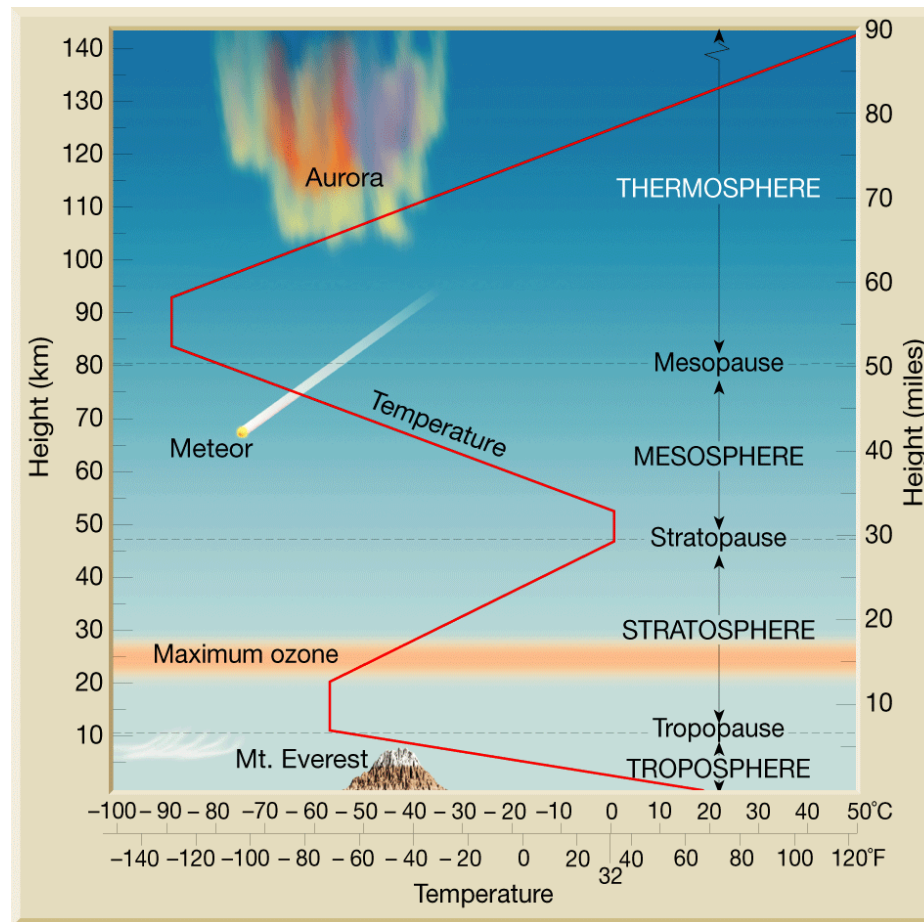
top layer, auroras, boundary to space, very thin amount of gases, temps. increase as you go up



Thermal Structure of the Atmosphere

What is the lowest level of the atmosphere, and what happens there?

Troposphere;
weather
phenomenon



What is the 2nd lowest of the atmosphere, and what important gas is found there?

Stratosphere;
ozone

Draw a quick sketch in notes!

17.1 Atmosphere Characteristics

Earth-Sun Relationships

◆ Earth's Motions

- Earth has two principal motions—rotation and revolution.
- Rotation – spinning about axis; 24hr daily cycle
- Revolution – orbit around sun; 365 day cycle

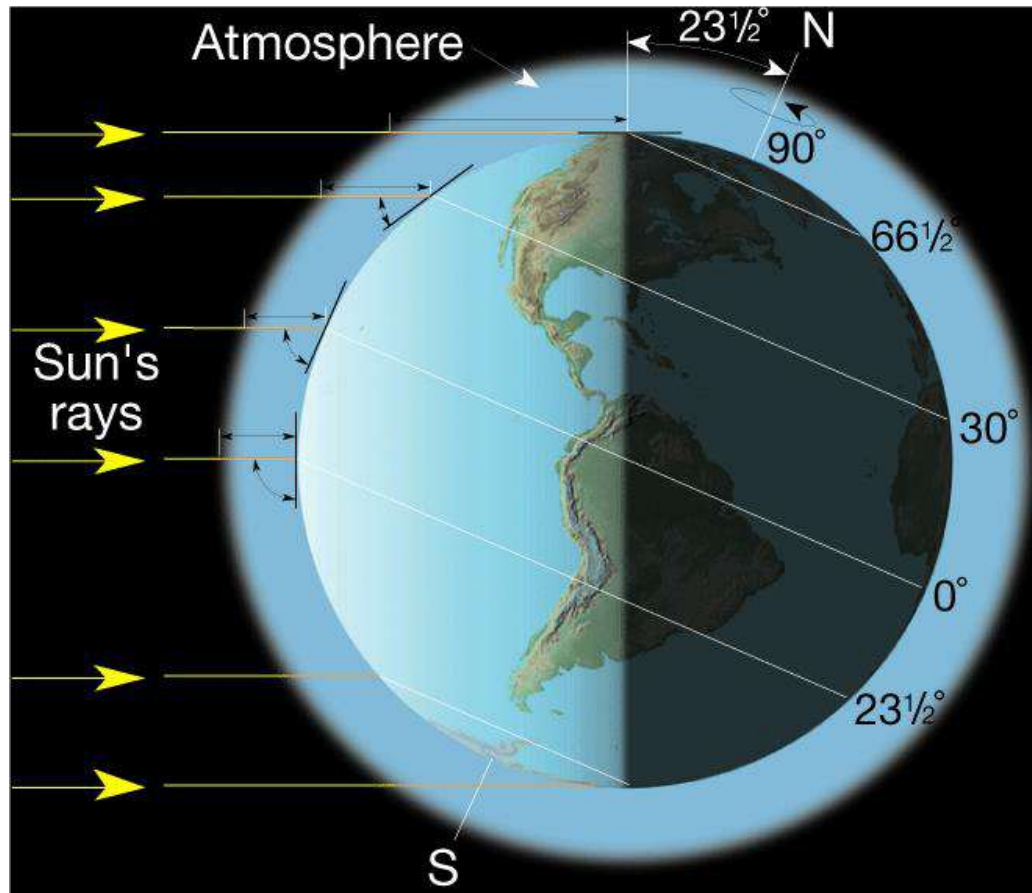
◆ Earth's Orientation

- Seasonal changes occur because Earth's position relative to the sun continually changes as it travels along its orbit.

Tilt of Earth's Axis

Earth is tilted 23.5 degrees from the perpendicular.

Earth axis always points to the North Star



If the axis was not tilted, we would not have seasonal changes.

17.1 Atmosphere Characteristics

Earth-Sun Relationships

◆ Solstices and Equinoxes

- The **summer solstice** is the solstice that occurs on June 21 or 22 in the Northern Hemisphere and is the “official” first day of summer.

Leans towards Sun = Hot

- The **winter solstice** is the solstice that occurs on December 21 or 22 in the Northern Hemisphere and is the “official” first day of winter.

Leans away from Sun = Cold

17.1 Atmosphere Characteristics

Earth-Sun Relationships

◆ Solstices and Equinoxes

- The **autumnal equinox** is the equinox that occurs on September 22 or 23 in the Northern Hemisphere.
- The **spring equinox** is the equinox that occurs on March 21 or 22 in the Northern Hemisphere.

Vertical rays of the sun strike the equator (0° latitude)
Earth position is neither tilted toward/away from Sun

17.1 Atmosphere Characteristics

Length of Daylight

- ◆ The length of daylight compared to the length of darkness also is determined by Earth's position in orbit.
- ◆ All latitudes receive 12 hours of daylight during vernal and autumnal equinoxes
- ◆ The farther north of the equator on the summer solstice – the longer the period of daylight. (Arctic Circle – 24 hrs daylight)

Solstices and Equinoxes

