

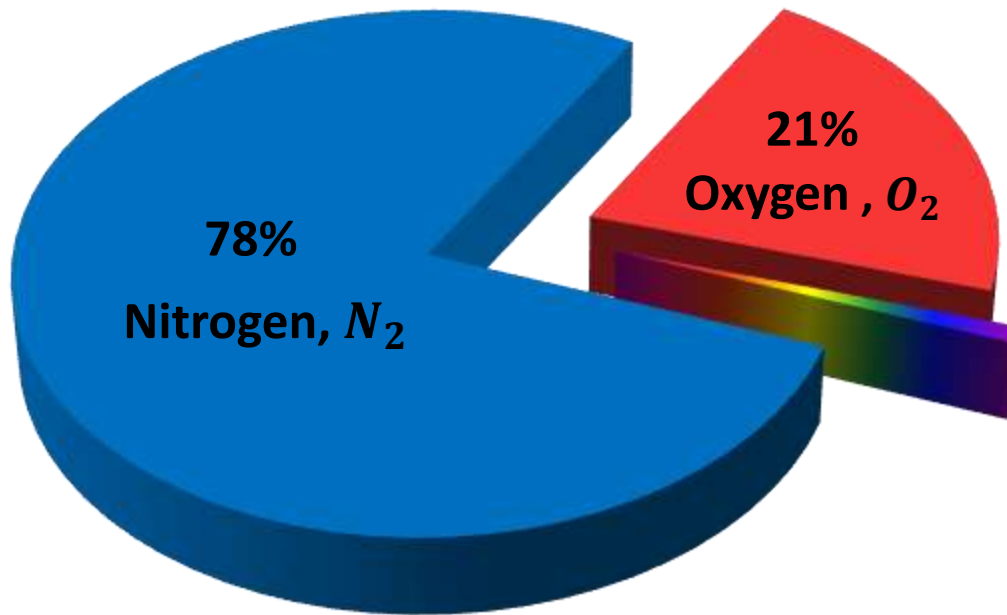
A view of Earth from space, showing the curvature of the planet and the atmosphere. The atmosphere is depicted as a bright blue glow along the horizon. The word "ATMOSPHERE" is overlaid in large, white, 3D-style capital letters, following the curve of the atmosphere. The background is a dark, starry space.

**ATMOSPHERE**

# ATMOSPHERE (VAPOUR SPHERE)

Layer of air surrounding the Earth

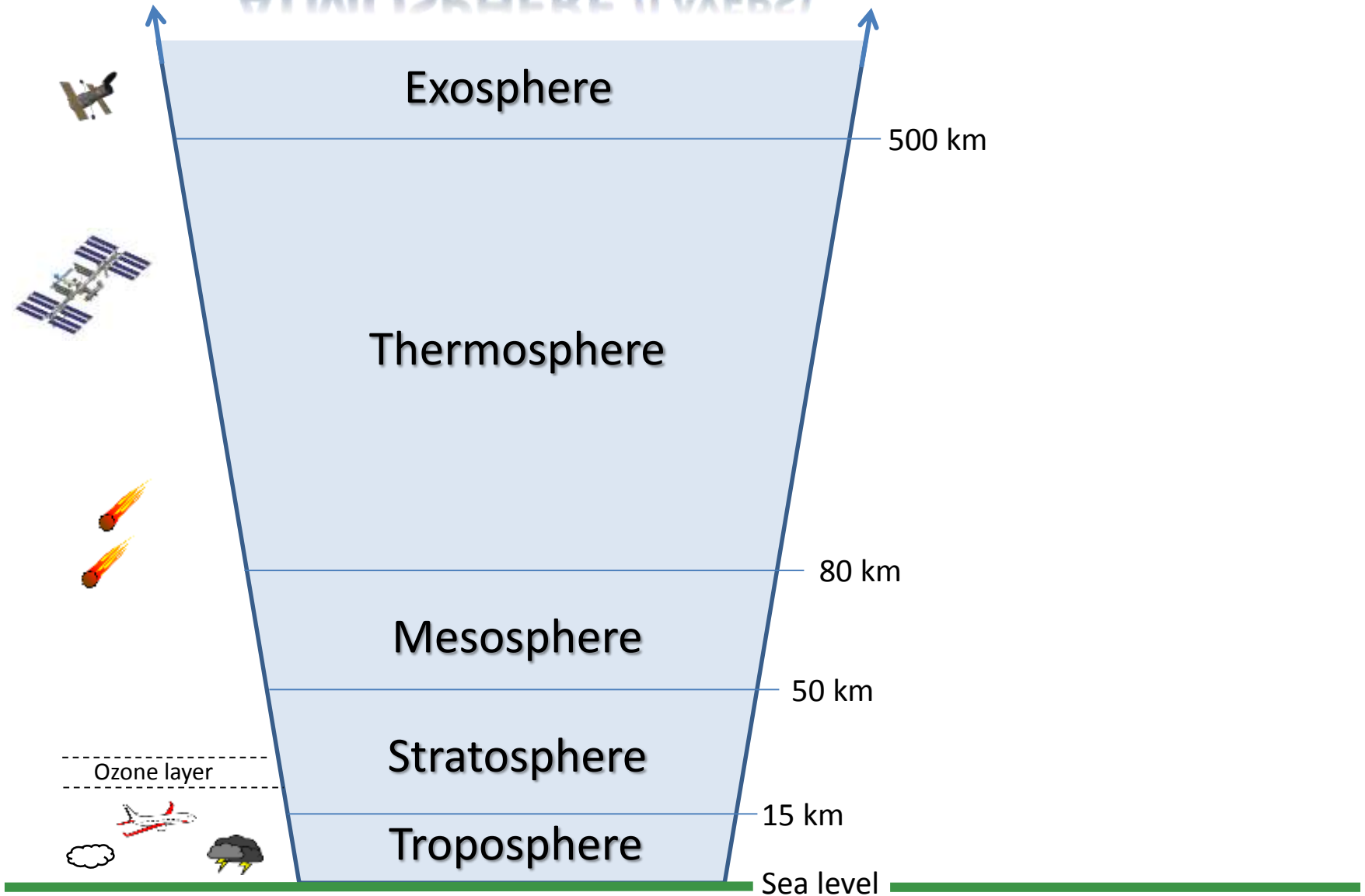
Composition of Air (low altitude)



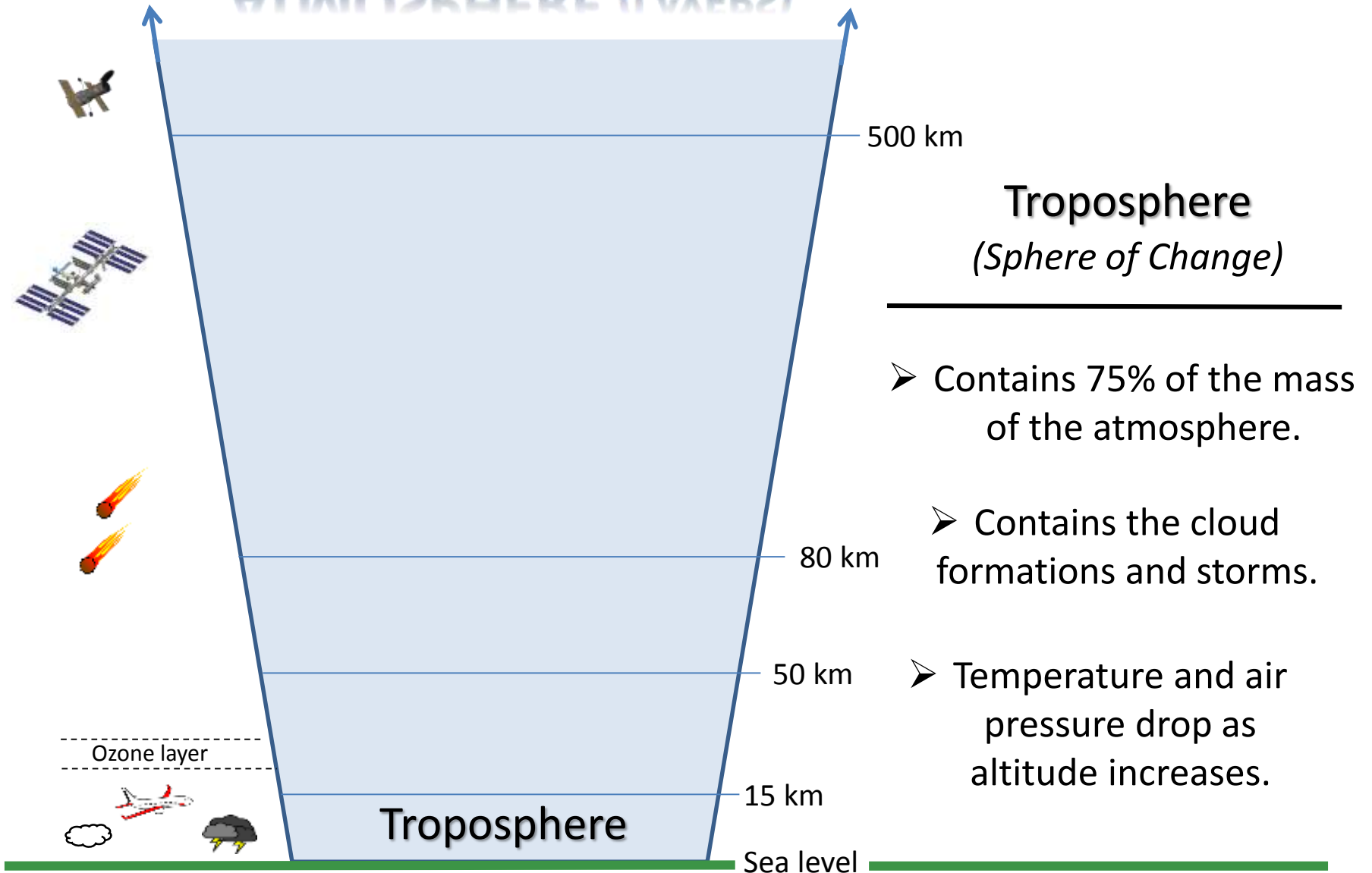
**Other:**

- Water vapour,  $H_2O$
- Argon,  $Ar$
- Carbon dioxide,  $CO_2$
- Neon,  $Ne$
- Helium,  $He$
- Methane,  $CH_4$
- Krypton,  $Kr$
- etc...

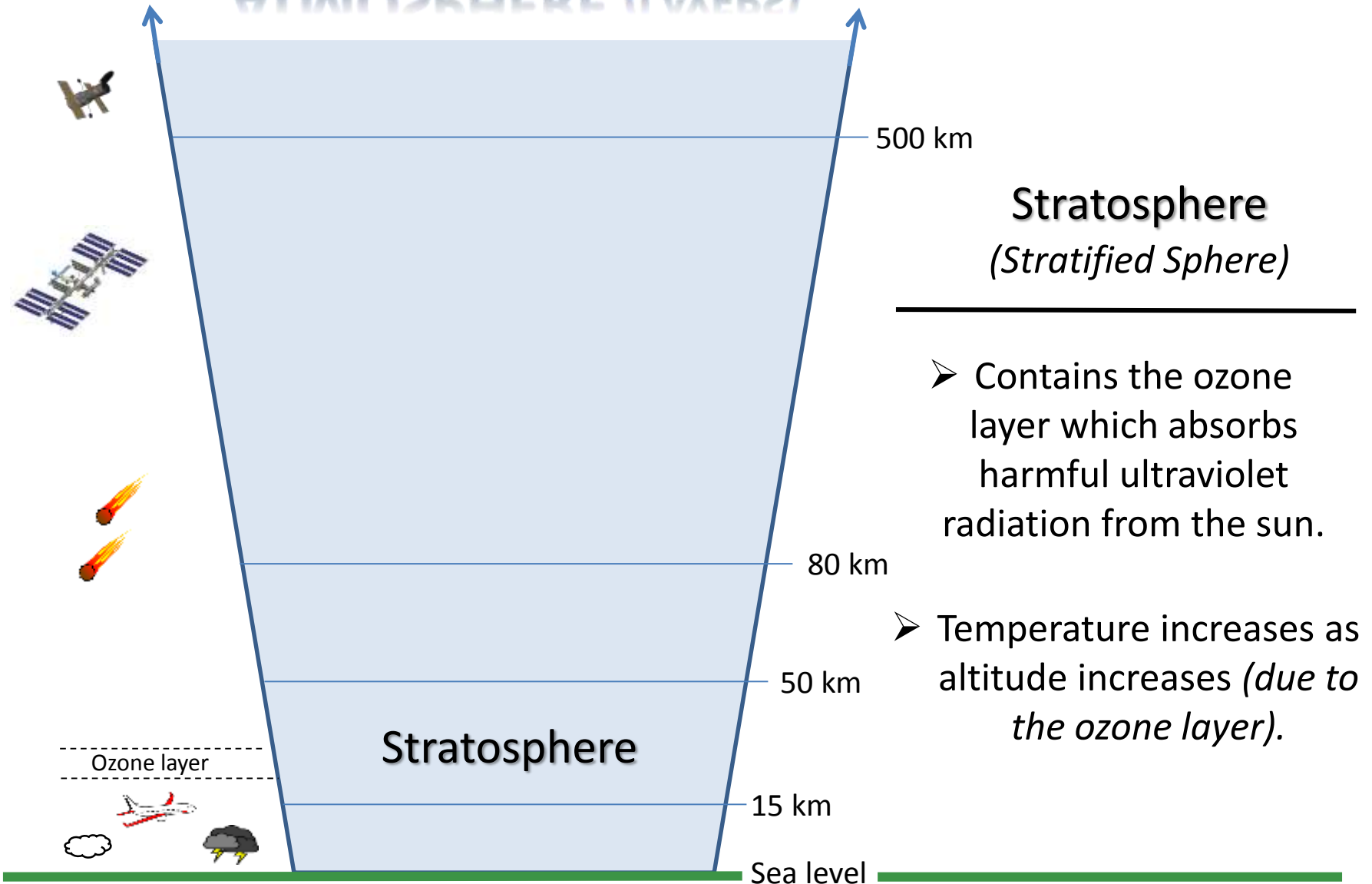
# ATMOSPHERE (LAYERS)



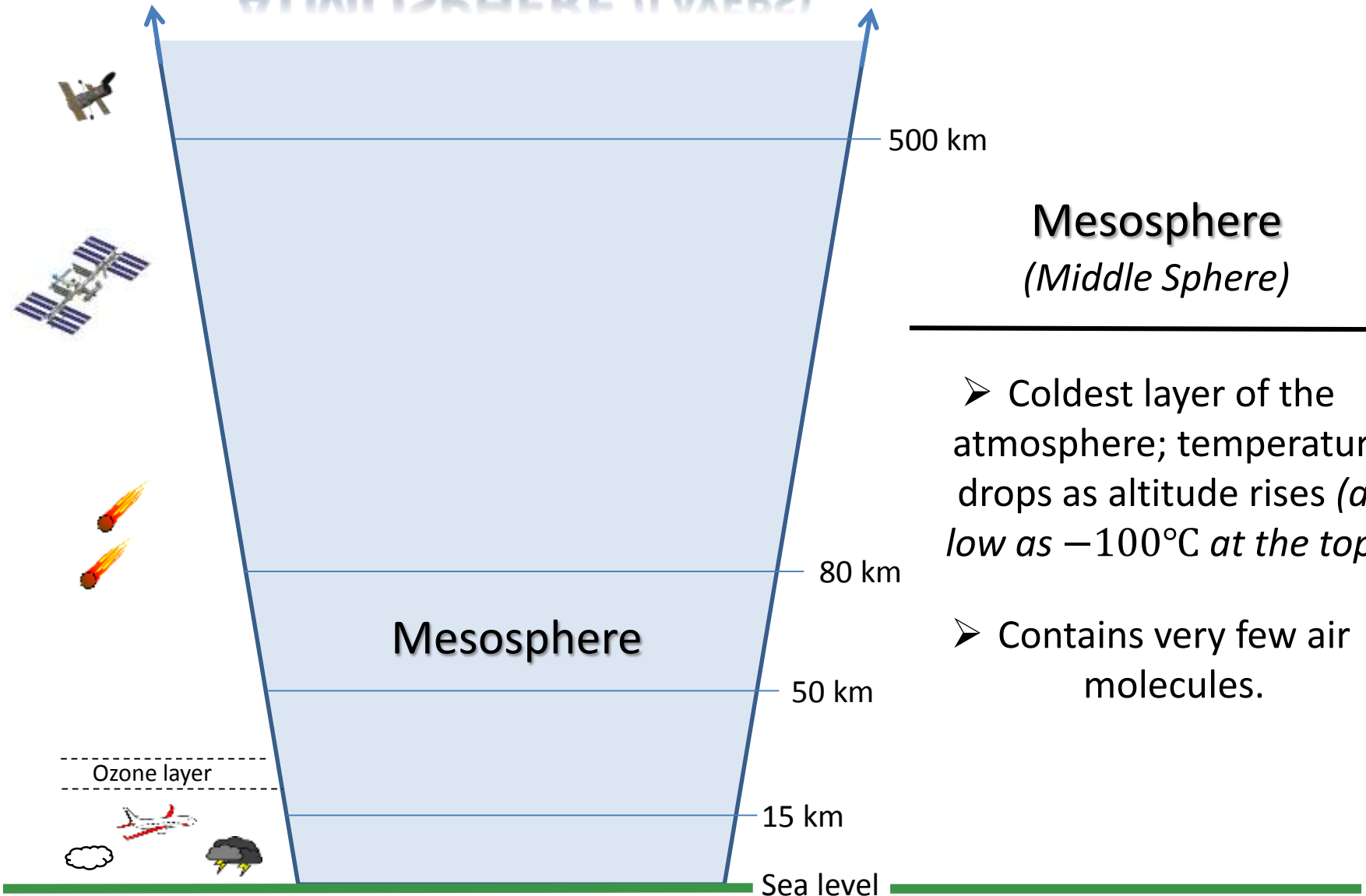
# ATMOSPHERE (LAYERS)



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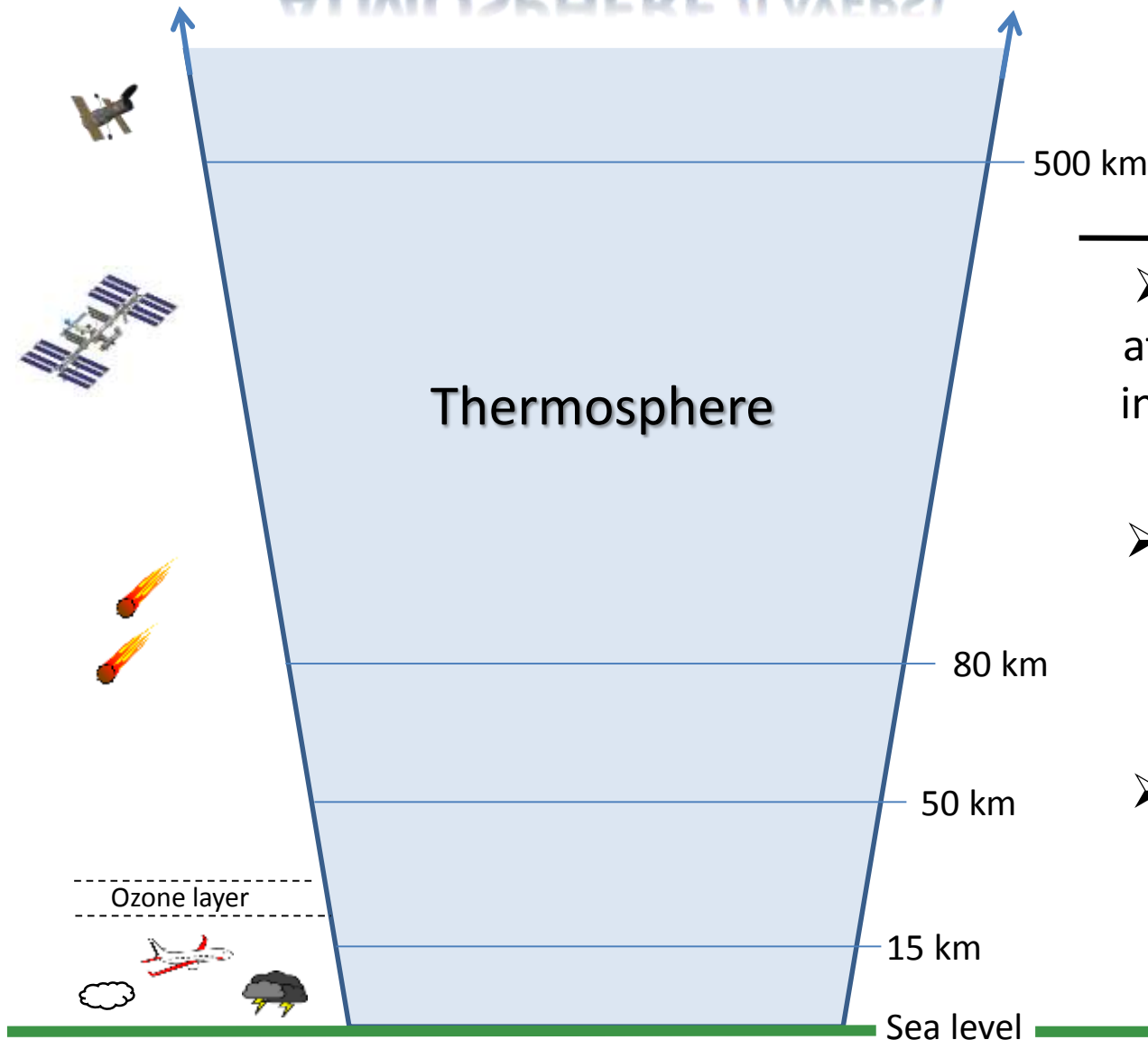
# ATMOSPHERE (LAYERS)



## Mesosphere (Middle Sphere)

- Coldest layer of the atmosphere; temperature drops as altitude rises (*as low as  $-100^{\circ}\text{C}$  at the top*).
- Contains very few air molecules.

# ATMOSPHERE (LAYERS)



## Thermosphere (Sphere of Heat)

- Hottest layer of the atmosphere; temperature increases with altitude (*as high as 2000°C*).
- Most of the sun's rays absorbed in this layer (polar auroras usually form in this layer).
- International Space Station orbits (altitude ~400 km).

# ATMOSPHERE (LAYERS)

Exosphere

500 km

**Exosphere**  
*(External Sphere)*

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- Extremely few air molecules (*almost a vacuum*).
- Most satellites orbit in this layer.

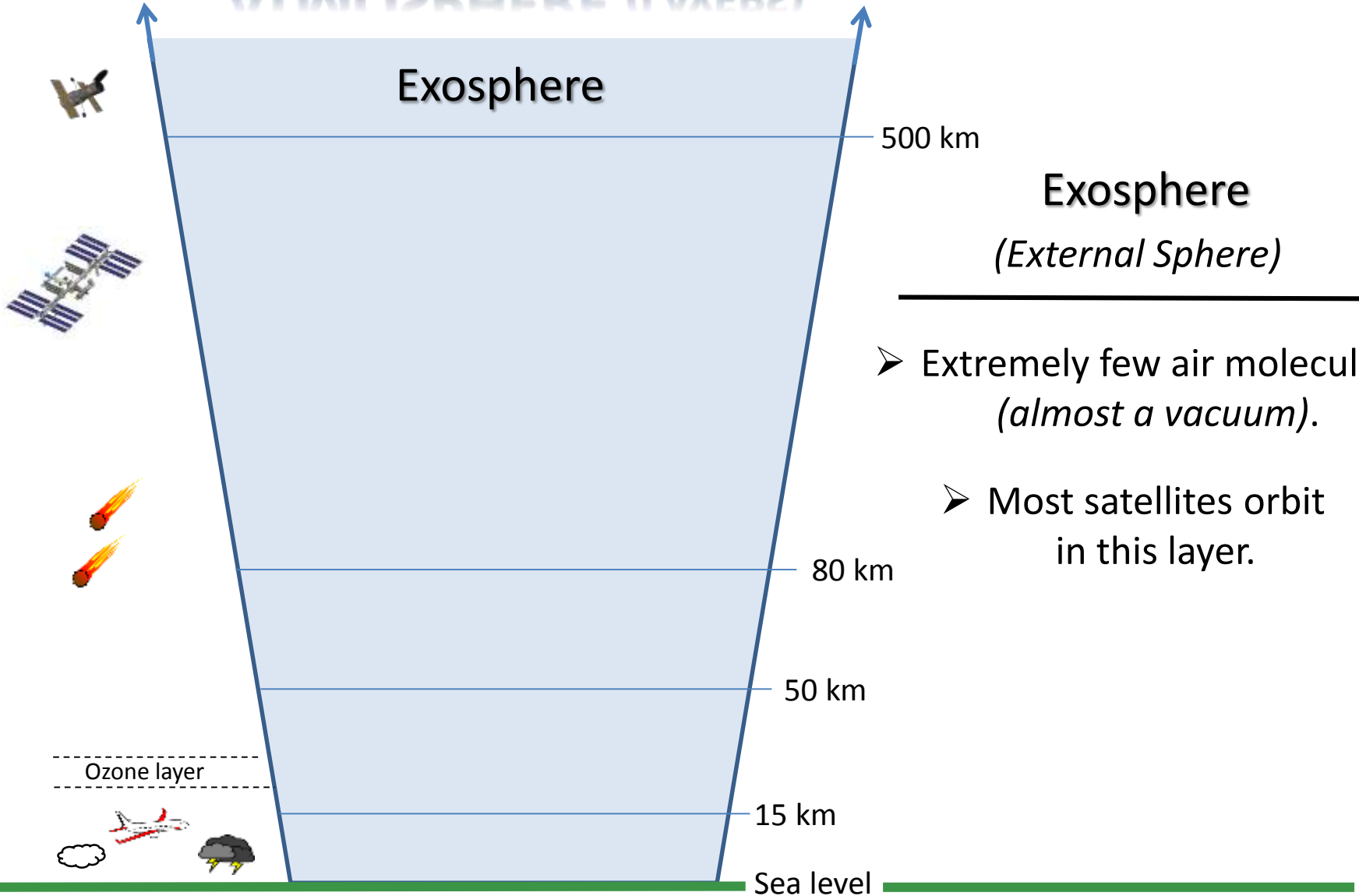
80 km

50 km

15 km

Sea level

Ozone layer



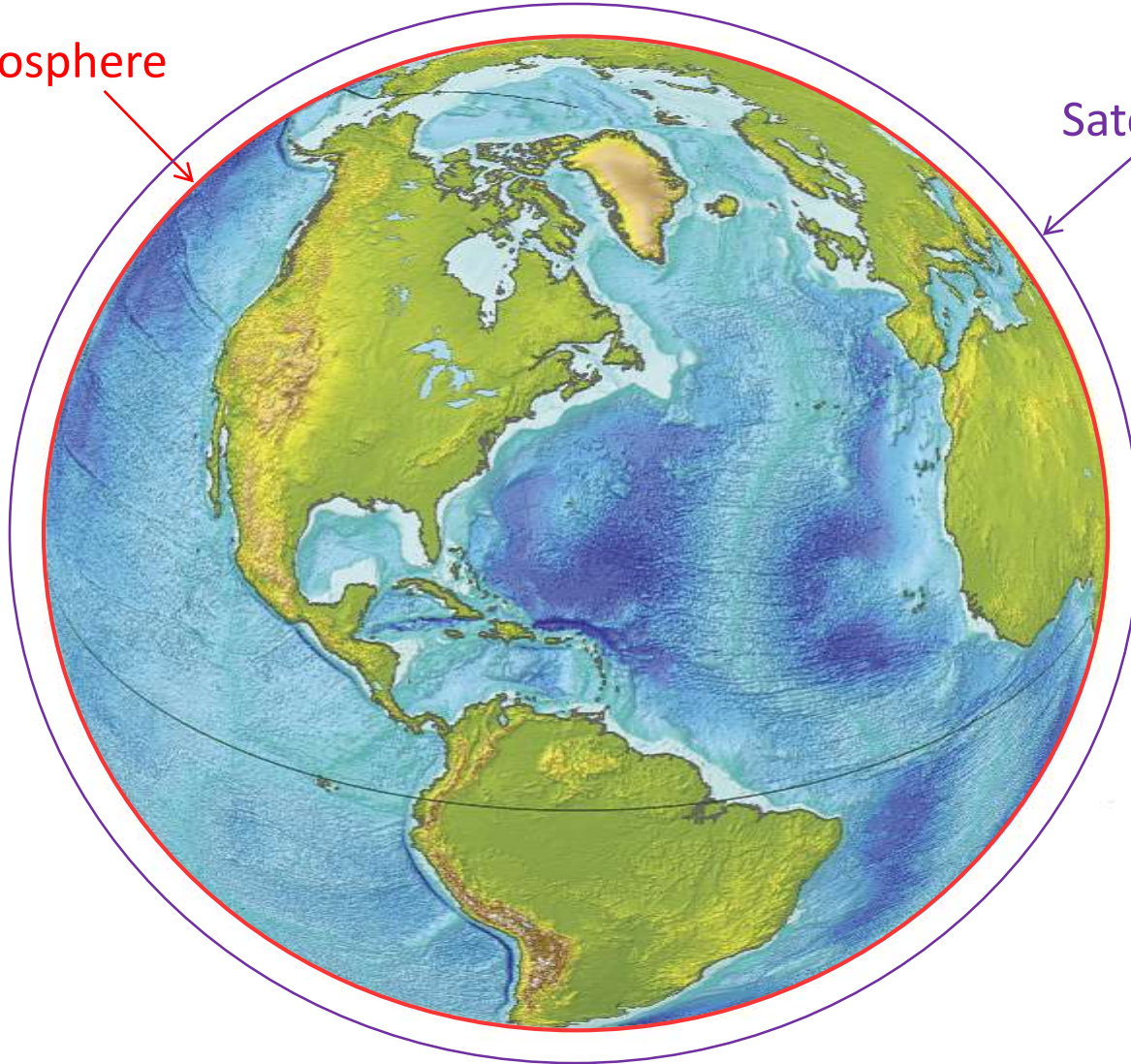


# Atmosphere (to scale)

Troposphere

*(75% of our atmosphere's mass; includes clouds, etc...)*

Satellites orbit



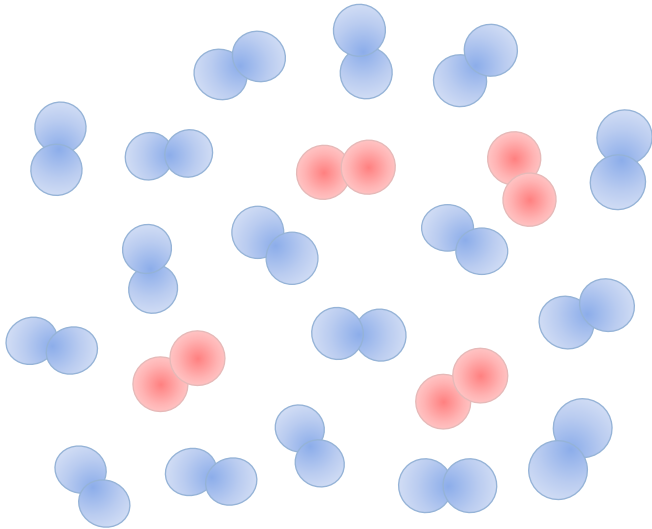
# Atmospheric Pressure

The pressure of the air in the atmosphere

- The more particles (molecules of air), the higher the pressure

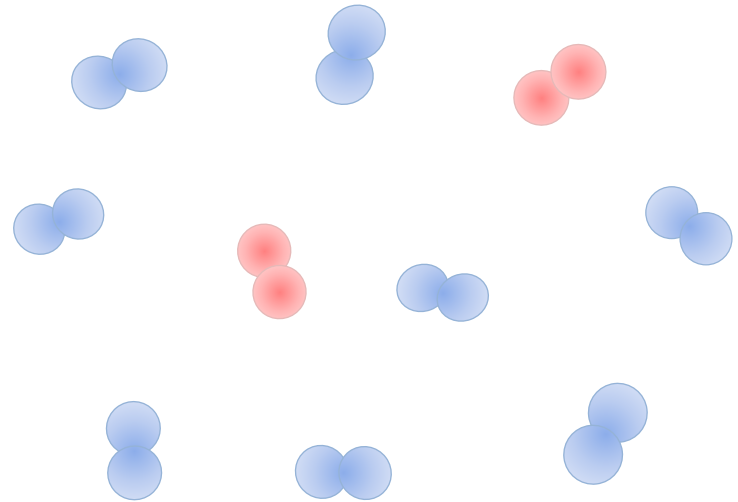
## High Pressure

*(Crowded; many molecular collisions)*



## Low Pressure

*(Molecules further apart; fewer collisions)*

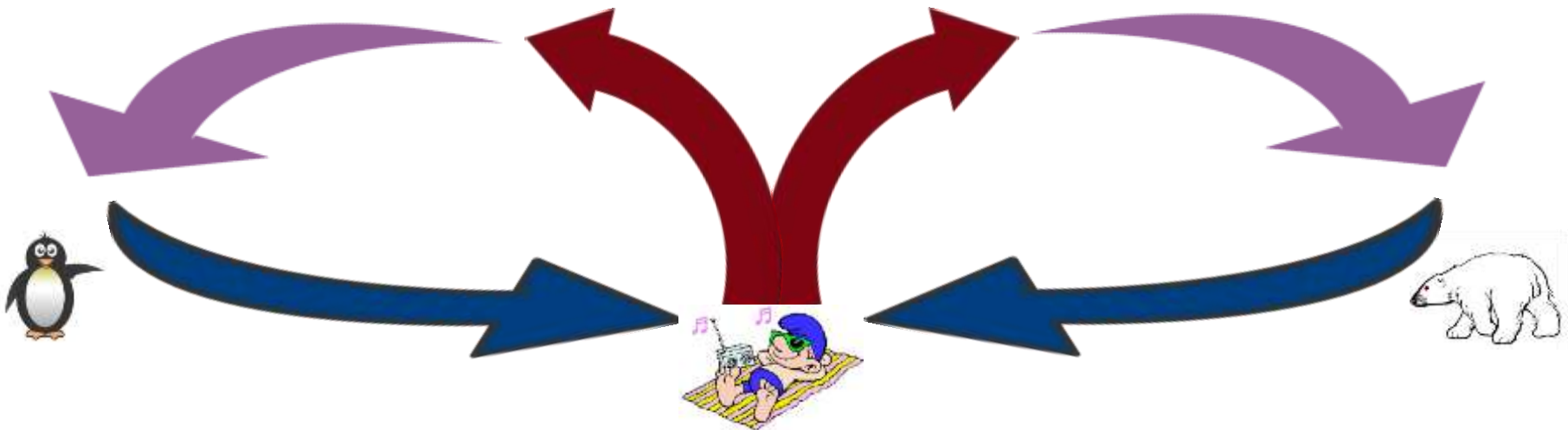


- Air particles tend to move from high-pressure to low-pressure areas.
  - This movement gives rise to **winds**.

# Atmospheric Circulation

Global movement of air surrounding the Earth

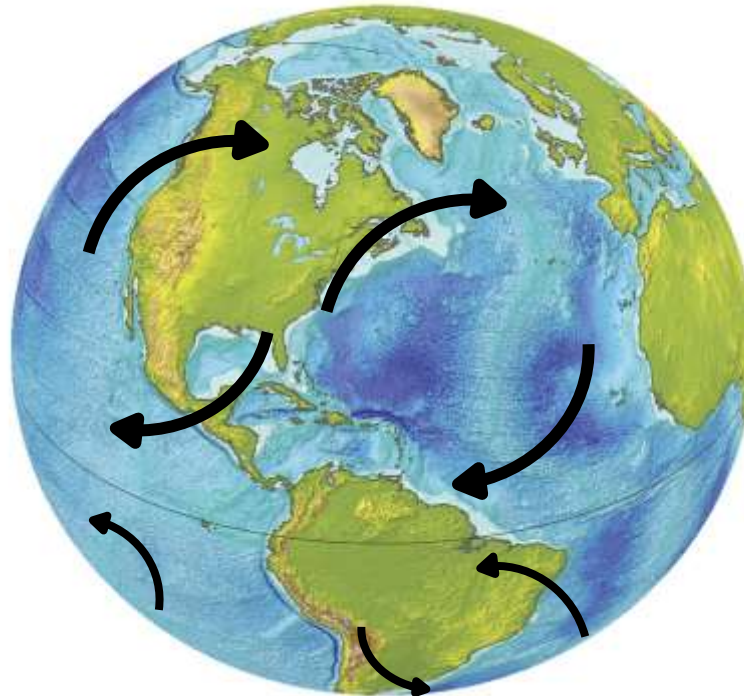
- Warmer air (*less dense*) rises above cooler air.
- Air tends to move from high pressure to low pressure.
  - Warmer air at the equator tends to rise, leaving behind a lower pressure zone near the surface.
  - Cooler air moves in from higher pressure areas (from the north and south; this helps balance the temperature on Earth).



# Atmospheric Circulation

Global movement of air surrounding the Earth

- Coriolis Effect: Air circulation is also affected by the fact that the Earth is spinning, causing air to take a curved path. (Circulation tends to be clockwise in the northern hemisphere, and counter-clockwise in the southern hemisphere)

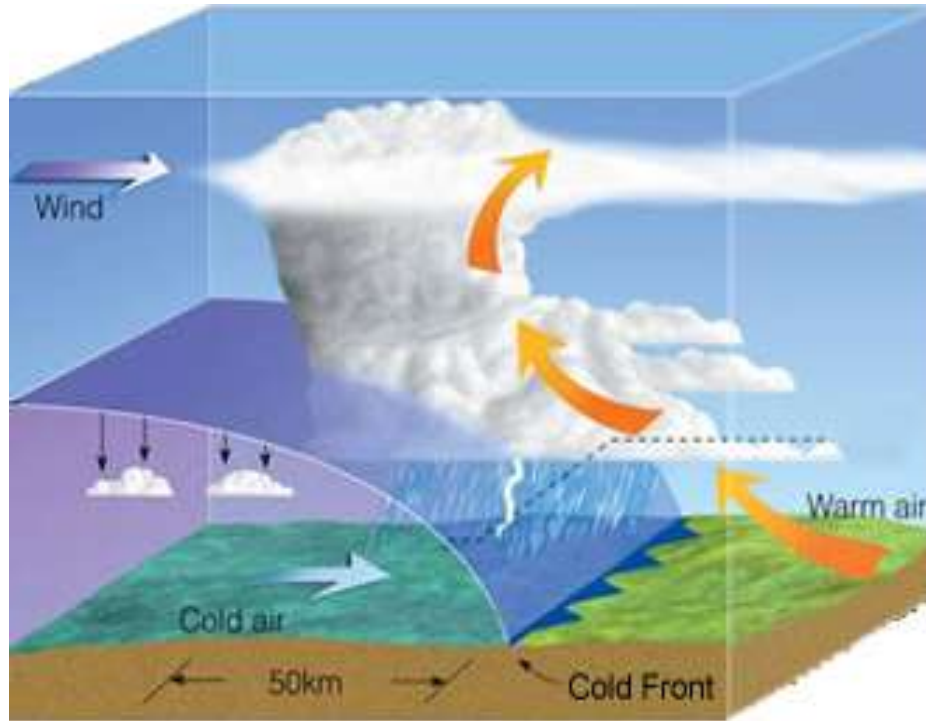


# Atmospheric Circulation

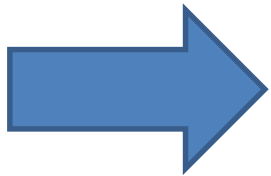
- Air Mass: A large portion of atmosphere that has a relatively uniform temperature and humidity.

# Atmospheric Circulation

## Cold Front



Cold air mass moves into a warm air mass.



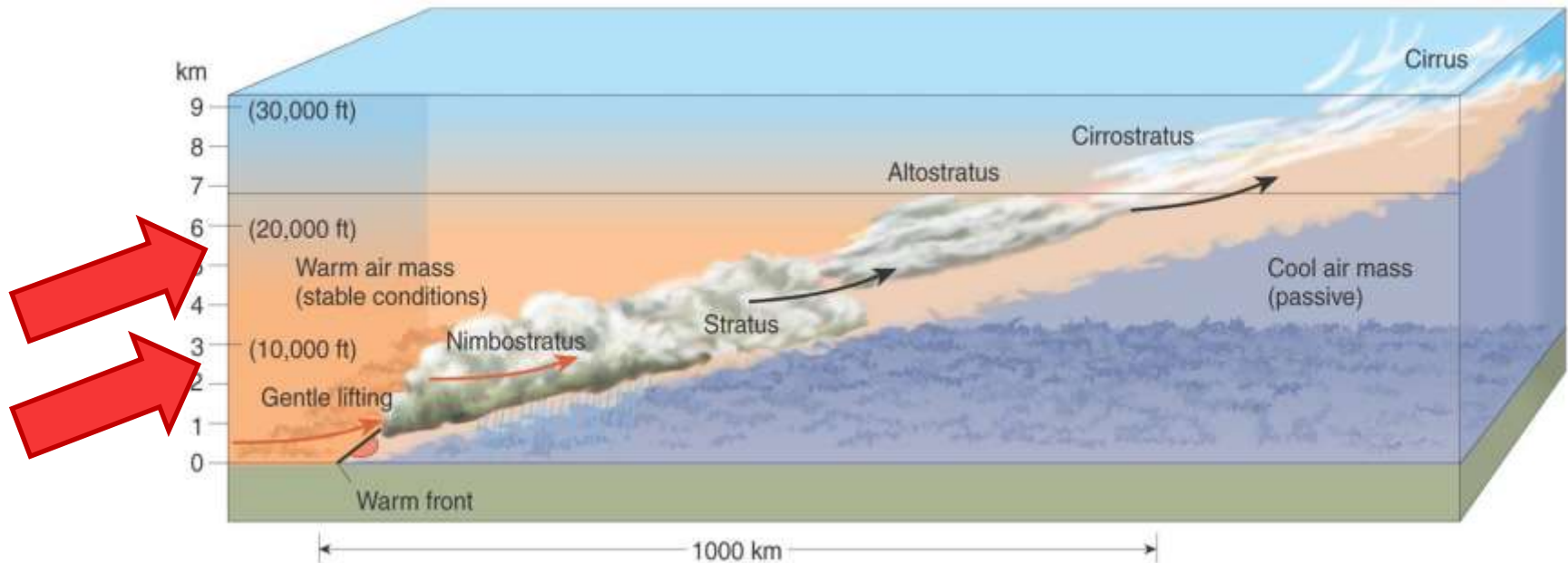
Warm air rises rapidly, cools, forms clouds, and often produces heavy rain.



# Atmospheric Circulation

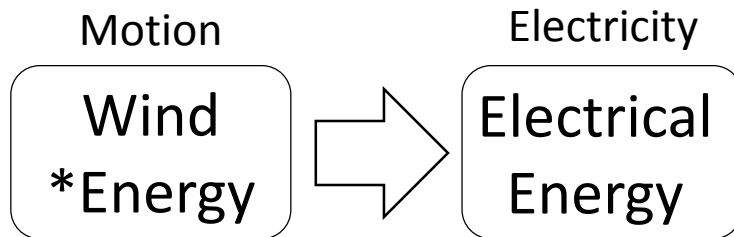
## Warm Front

Warm air mass moves into cold air, rises gradually over the cold air, forming light, stratified clouds. *(often results in long-lasting showers)*



# Energy Resources in the Atmosphere

## Wind Power



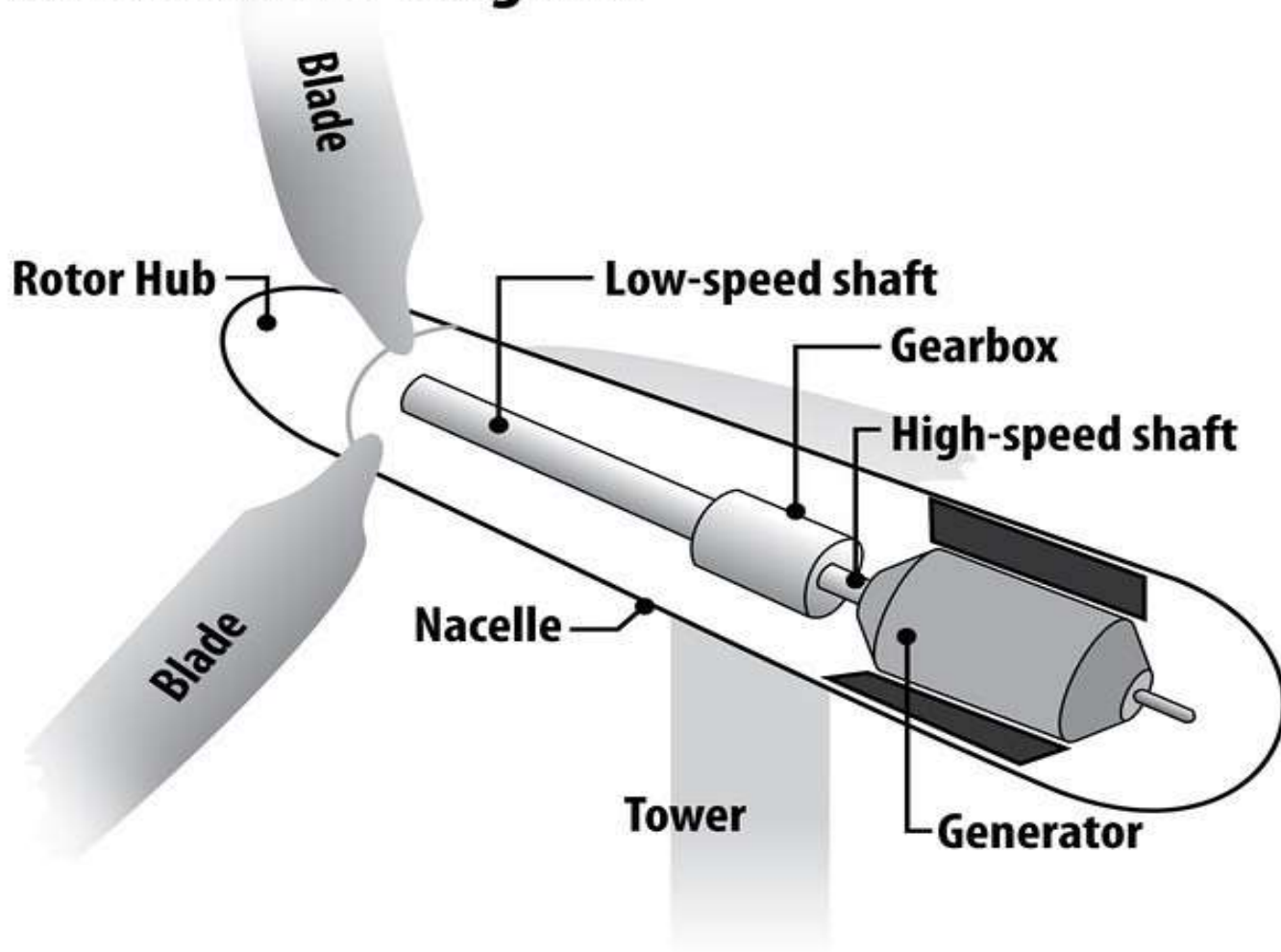
\* Wind energy (*moving air*)  
is a form of kinetic  
(*mechanical*) energy





# Energy Resources in the Atmosphere

## Wind Turbine Diagram



# Energy Resources from the Sun

## Solar Power

