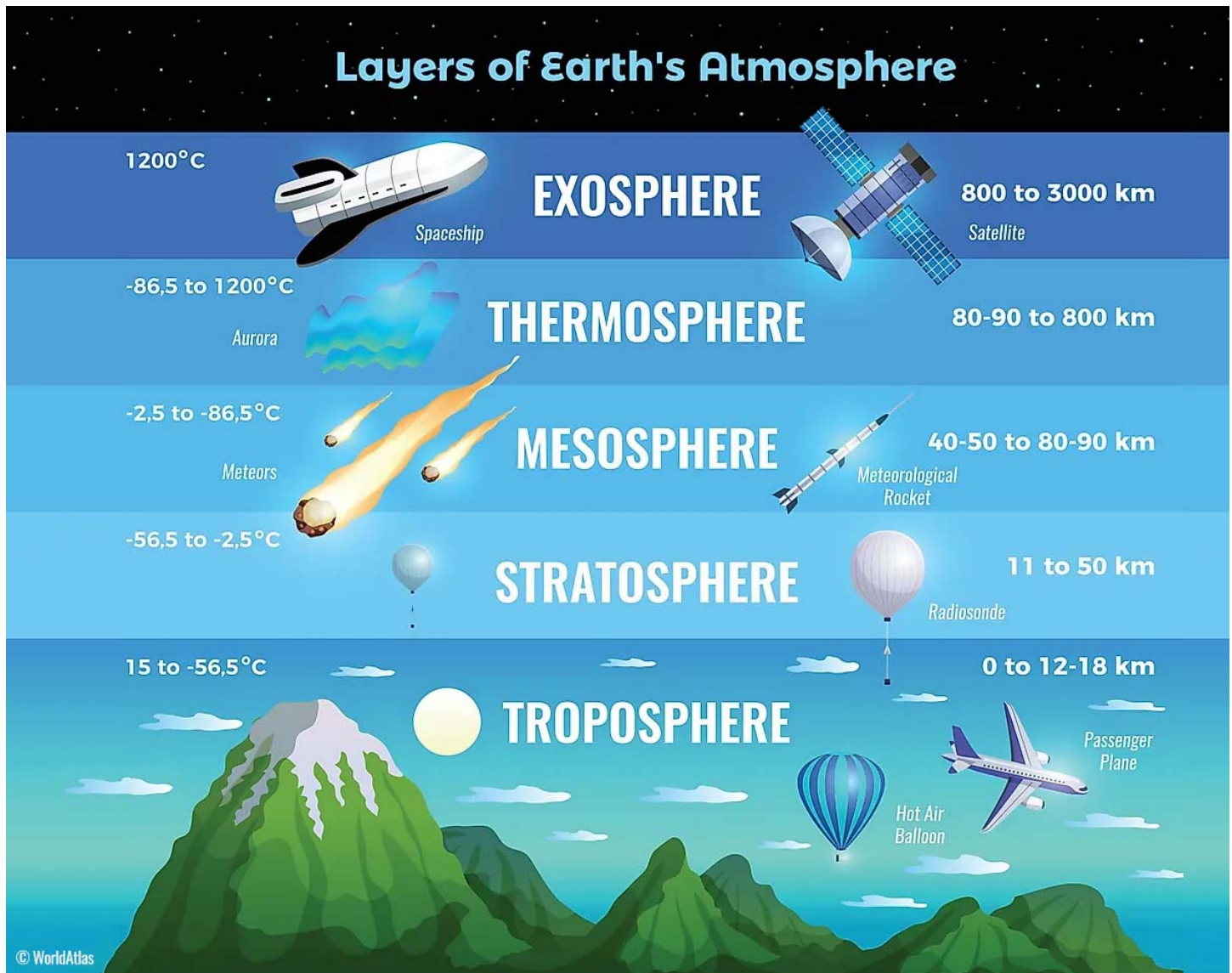


C5. Atmosphere & Ozone

The Layers of Earth's Atmosphere and Ozone Protection

The Earth's atmosphere is a vital component that surrounds our planet, providing us with the air we breathe and protecting us from the harsh environment of outer space. It is composed of several distinct layers, each with its own unique characteristics and functions. In this passage, we will explore the layers of Earth's atmosphere and how the ozone layer plays a crucial role in protecting us from harmful ultraviolet (UV) radiation.



Layers of the Atmosphere:

1. Troposphere

The troposphere is the closest layer to Earth's surface, extending up to about 7 miles (11 kilometers) at the poles and 12 miles (19 kilometers) at the equator. This layer is where all weather phenomena occur, including clouds, rain, and storms. It contains the majority of the atmosphere's water vapor and is where we find the air we breathe. As you ascend through the troposphere, the temperature generally decreases.

2. Stratosphere

Above the troposphere lies the stratosphere, which extends from about 12 miles (19 kilometers) to 31 miles (50 kilometers) above the Earth's surface. Unlike the troposphere, the stratosphere has a unique feature: the ozone layer. This layer contains a relatively high concentration of ozone (O₃) molecules, which absorb and block a significant portion of the sun's harmful UV radiation. The stratosphere is where commercial airliners typically cruise, as it is relatively stable and contains less turbulence than the troposphere.

3. Mesosphere

Beyond the stratosphere is the mesosphere, which stretches from approximately 31 miles (50 kilometers) to 53 miles (85 kilometers) above the Earth's surface. In the mesosphere, temperatures decrease with altitude, reaching incredibly low levels. This layer is where meteors burn up as they enter Earth's atmosphere due to friction with the air molecules.

4. Thermosphere

The thermosphere is the outermost layer of the Earth's atmosphere, starting around 53 miles (85 kilometers) and extending to hundreds of miles above the Earth's surface. In this layer, temperatures can rise to thousands of degrees Celsius, but it would not feel hot to us because the air density is extremely low. The thermosphere is where the International Space Station (ISS) orbits, and it plays a crucial role in protecting us from harmful space radiation.

Ozone & UV Radiation

The ozone layer, primarily found in the stratosphere, is crucial for our survival. It is composed of ozone (O₃) molecules, which absorb and block a significant portion of the sun's harmful ultraviolet (UV) radiation. UV radiation from the sun can cause various health problems, including skin cancer, cataracts, and sunburn, and it can also harm ecosystems.

Ozone molecules in the stratosphere act as a protective shield, absorbing most of the harmful UV radiation before it reaches the Earth's surface. Without this protective layer, life on Earth

would be much more challenging, as the increased UV radiation could have severe consequences for both humans and the environment.

However, human activities, such as the use of certain chemicals known as chlorofluorocarbons (CFCs), have led to the depletion of the ozone layer. CFCs were once widely used in refrigerants and aerosol propellants, but they were found to destroy ozone molecules when released into the atmosphere. This discovery led to international agreements, such as the Montreal Protocol, aimed at phasing out the production and use of CFCs to protect the ozone layer.

In conclusion, the Earth's atmosphere consists of several layers, each with its own distinct characteristics and functions. The troposphere is where weather occurs and where we find the air we breathe. The stratosphere contains the ozone layer, which protects us from harmful UV radiation. The mesosphere is where meteors burn up, and the thermosphere, while extremely hot, contains thin air and helps protect us from space radiation.

1. Which layer of the Earth's atmosphere contains the ozone layer?
 - a) Troposphere
 - b) Stratosphere
 - c) Mesosphere
 - d) Thermosphere
2. In which atmospheric layer does weather phenomena, such as clouds and storms, primarily occur?
 - a) Troposphere
 - b) Stratosphere
 - c) Mesosphere
 - d) Thermosphere
3. What is the main function of the ozone layer in the stratosphere?
 - a) Absorbing carbon dioxide
 - b) Blocking harmful UV radiation
 - c) Producing oxygen
 - d) Creating weather patterns
4. Where do meteors burn up as they enter Earth's atmosphere?
 - a) Troposphere
 - b) Stratosphere
 - c) Mesosphere
 - d) Thermosphere

5. Which layer of the atmosphere is characterized by extremely low temperatures?
 - a) Troposphere
 - b) Stratosphere
 - c) Mesosphere
 - d) Thermosphere

6. What is the primary reason for the depletion of the ozone layer?
 - a) Natural processes
 - b) Increased levels of oxygen
 - c) Release of chlorofluorocarbons (CFCs)
 - d) Changes in Earth's magnetic field

7. Which international agreement aimed to phase out the production and use of CFCs to protect the ozone layer?
 - a) Paris Agreement
 - b) Montreal Protocol
 - c) Kyoto Protocol
 - d) Copenhagen Accord

8. What consequences can increased UV radiation from the sun have on humans?
 - a) Increased vitamin D production
 - b) Skin cancer and cataracts
 - c) Stronger bones
 - d) Improved mood

9. Which layer of the atmosphere is where the International Space Station (ISS) orbits?
 - a) Troposphere
 - b) Stratosphere
 - c) Mesosphere
 - d) Thermosphere

10. Why does the thermosphere, despite extremely high temperatures, not feel hot to humans?
 - a) The air density is very low
 - b) It is too far from the Earth's surface.
 - c) Human skin is resistant to extreme temperatures.
 - d) The thermosphere is actually cold.

ANSWERS & EXPLANATIONS

1. b) Stratosphere
The ozone layer is primarily found in the stratosphere.
2. a) Troposphere
Weather phenomena like clouds and storms primarily occur in the troposphere.
3. b) Blocking harmful UV radiation
The main function of the ozone layer in the stratosphere is to block harmful UV radiation.
4. c) Mesosphere
Meteors burn up in the mesosphere as they enter Earth's atmosphere.
5. c) Mesosphere
The mesosphere is characterized by extremely low temperatures.
6. c) Release of chlorofluorocarbons (CFCs)
The primary reason for the depletion of the ozone layer is the release of CFCs into the atmosphere.
7. b) Montreal Protocol
The Montreal Protocol is an international agreement aimed at phasing out the production and use of CFCs to protect the ozone layer.
8. b) Skin cancer and cataracts
Increased UV radiation from the sun can lead to health problems such as skin cancer and cataracts.
9. d) Thermosphere
The International Space Station (ISS) orbits in the thermosphere.
10. a) The air density is very low
The thermosphere contains extremely low-density air, so despite high temperatures, it does not feel hot to humans.