

Introductory Definitions

- The atmosphere is defined as a mixture of gas molecules, suspended particles, and falling precipitation.
- Meteorology is defined as the study of the atmosphere and what causes 'weather'.

Composition of the Atmosphere

- 'Permanent gases' are those that make up a constant proportion of the atmosphere.
 - The region within 80 km of Earth's surface is known as the 'homosphere' because its composition remains the same with altitude.
- 'Variable gases' are those whose atmospheric distribution varies in time and space.
 - The 'heterosphere' is located above the 'homosphere'. In the 'heterosphere', the composition of gases varies with altitude.

The Permanent Gases

- The homosphere contains mainly nitrogen and oxygen.
- Nitrogen (N_2) is a stable gas that composes 78% of all of the permanent gases.
 - It is relatively meaningless in terms of meteorological and climatological processes.
- Oxygen (O_2) makes up 21% of the atmosphere.
 - It is vital to all forms of life.
- Argon makes up most of the rest of the atmosphere.

Variable Gases

- Water Vapor (H_2O) makes up most of the variable gases.
 - Found mostly in the lower 5 km of the atmosphere.
 - Needed to form clouds.
 - Absorbs energy emitted by the Earth's surface.
 - A 'greenhouse gas'.
- Carbon dioxide (CO_2)
 - Added to the atmosphere by plant and animal respiration, volcanic eruptions, and natural and anthropogenic (human-produced) combustion.
 - Removed from the atmosphere by 'photosynthesis', where plants convert light to chemical energy.
 - Its content has increased world-wide in the last half-century due to anthropogenic activities.
 - Absorbs energy emitted by the Earth's surface.

- Highest amounts in the early spring due to lower amounts of vegetation.
- Lowest amounts in the late summer.
- Ozone (O₃) is vital to life in the upper atmosphere (absorbs ultraviolet radiation) and is a pollutant near the surface.
- Methane (CH₄) is a more effective greenhouse gas than carbon dioxide.

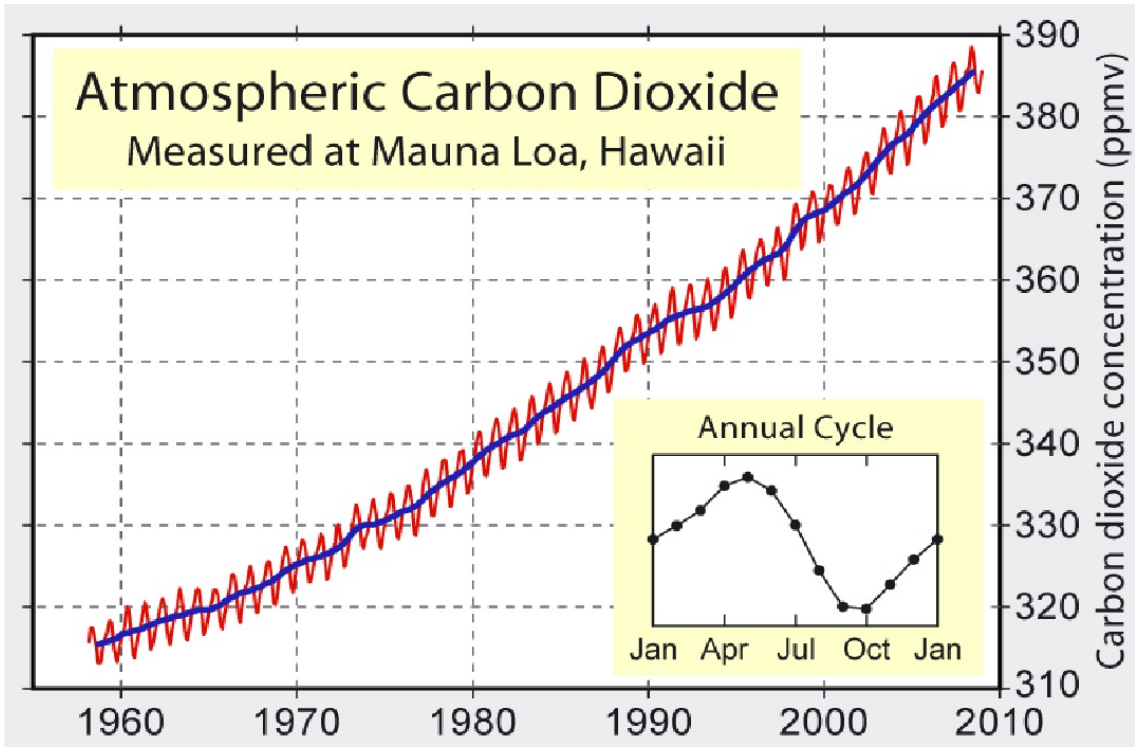
Vertical Structure of the Atmosphere

- Earth's atmosphere is divided into four layers based on temperature changes versus altitude: Troposphere, Stratosphere, Mesosphere, and Thermosphere.
- Troposphere
 - Lowest of the four layers where humans live.
 - Temperature decreases with increasing height.
 - Virtually all weather occurs here.
 - Top of the troposphere is known as the tropopause.
- Stratosphere
 - Above the troposphere.
 - Virtually no weather occurs in this region.
 - Temperature increases with increasing height because of ultraviolet radiation absorbed by ozone.
- Mesosphere
 - Above the Stratosphere.
 - Temperature decreases with increasing altitude.
- Thermosphere
 - Above the Mesosphere.
 - Temperature increases with increasing altitude.

Helpful Links:

<http://www.physicalgeography.net/fundamentals/7a.html>

<http://www.physicalgeography.net/fundamentals/7b.html>



Credit: http://upload.wikimedia.org/wikipedia/commons/8/88/Mauna_Loa_Carbon_Dioxide.png

