

# Chapter 15 Atmosphere

## Section 1: Earth's Atmosphere

- I. Atmosphere is the thin layer of air that forms a protective covering around the planet.
  - a. If not for the atmosphere days on Earth would be very hot and nights would be extremely cold.
  - b. The atmosphere maintains a balance between how much heat from the sun reaches the Earth and how much is allowed to escape back into space.
- II. The Earth's atmosphere is a mixture of gases, solids, and liquids.
  - a. The atmosphere extends from the Earth's surface to outer space.
  - b. The Earth's atmosphere is made of:
    1. 78% nitrogen, produced by volcanoes and decaying plants and animals.
    2. 21% oxygen.
    3. 1% is made of many other gases such as argon and carbon dioxide.
- III. Layers of the atmosphere.
  - a. The troposphere is the lowest layer in our atmosphere. It is next to Earth's surface.
    1. It contains 99% of water vapor and 75 % of the atmospheric gases.
    2. Contains rain, snow, and clouds.
    3. Extends up to about 10 km (about 6 miles).
  - b. The stratosphere is directly above the troposphere.
    1. Contains the ozone layer.
    2. Extends from 10 km above Earth's surface to about 50 km. About 24 miles thick.
  - c. The mesosphere is directly above the stratosphere.
    1. Where you would see a shooting star.

2. Contains wind storms.
  3. Very cold.
  4. Extends from about 50 km above Earth's surface to about 85 km. That is about 51 miles above Earth's surface and about 21 miles thick.
- d. The thermosphere is above the mesosphere.
1. Very high temperature because the gases absorb solar radiation. However it is not hot. Particles need to hit other particles in order to produce heat. The atmosphere is so thin that the particles are not making contact with one another.
  2. Thickest layer. From 85 km above Earth to 500 km thick (249 miles).
- e. The ionosphere is within the mesosphere and thermosphere. At night radio waves can travel great distances across the country because the sun's energy does not interfere.
- f. The exosphere is where the space shuttle and satellites orbit the Earth.
1. It has very few gas molecules.

#### IV. The ozone layer

- a. Found in the stratosphere 19 km to 48 km above the ground.
- b. Shields us from the sun's harmful ultraviolet radiation.

## Section 2: Energy Transfer in the Atmosphere

### I. Energy from the sun.

- a. The sun provides the Earth with most of its energy.
  1. It drives:
    - wind
    - ocean currents
    - allows plants to grow and produce food.
  2. The energy from the sun is either reflected back into space or absorbed by the atmosphere, land, or water.

### II. Heat

- a. Energy that flows from an object with higher temp. to an object with lower temp.
- b. Heat is conducted through the atmosphere in three ways:
  1. radiation – Energy that is transferred in the form of rays or waves. (the sun’s rays on your face)
  2. conduction – The transfer of energy that occurs when molecules bump into one another. The warmer the molecules the faster they move. Energy moves, by contact, from warmer objects to cooler ones.
  3. convection – The transfer of heat by the flow of material. Warm air is thin and the molecules are spread apart. Cool air molecules are closer together and dense. The heavier cool air sinks pushing the lighter warm air up.
    - Radiation from the sun heats sand, sand heats your feet through conduction, and convection occurs because the air rises to be replaced by cooler air.

**III. Water Cycle is the never ending process of evaporation, condensation, and precipitation.**

- a. Condensation occurs high in the atmosphere to form clouds.**
  - 1. Water vapor cools and changes to a liquid. This continues until enough water droplets have condensed to make the drop too heavy to stay in the air.**
- b. As the water falls to the ground, as a solid or liquid, it is called precipitation.**
- c. Evaporation takes place when water is heated. As it is heated it turns to a gas (water vapor).**
  - 1. Steam you see coming off the road after a summer rain.**
  - 2. Water in a pool must be replaced because it is being evaporated by the energy from the sun. Cannot be seen; happening so slowly.**
    - Steam from a boiling pot of water will condense on the microwave or oven hood and drop back down to the stove.**

## **Section 3: Air Movement**

### **I. The Coriolis Effect**

- a. Because of the rotation of the earth, air and water appear to turn right north of the equator and left south of the equator. (page 440, illustration)**