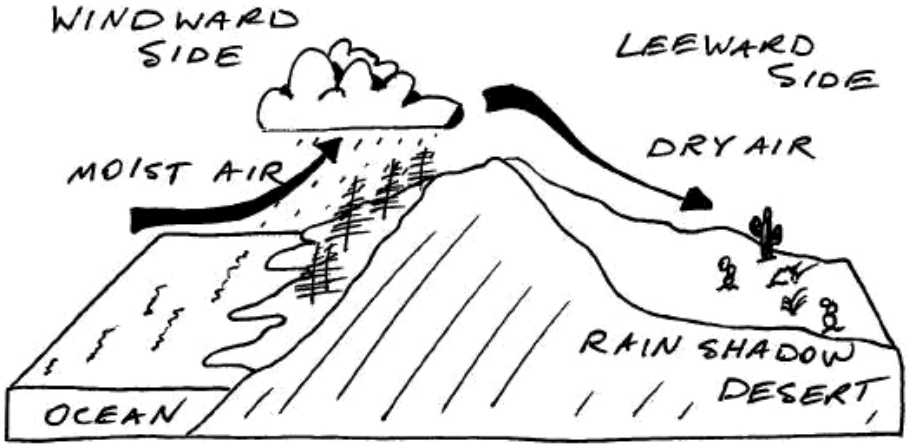
Weather and Climate

Weather is a short term and local phenomenon. It is what is happening in your town at the particular moment. The characteristics of weather include temperature, precipitation, wind direction, barometric pressure, and humidity. The key is to remember that weather is a highly variable local occurrence. An abnormally warm summer or cold winter does not imply a climate shift.

Climate on the other hand, is a pattern of weather that has occurred over a long period of time. The uneven heating of the surface of the earth, ocean currents, and patterns of air circulation will determine the normal temperature and precipitation for a particular area. Precipitation and temperature are the two main determinants of climate. **Microclimates** are small areas that differ from the surrounding climate and can occur in the form of rain shadows and heat islands.

A **heat island** occurs when a city containing large amounts of concrete and pavement storea large amounts of heat. The result is an average temperature that is slightly higher than the surrounding area.

The **rain shadow effect** is described in the diagram below.



A **warm front** occurs when an incoming warm air mass meets a cooler one that is in place. The warm front rises above the cool air below it and condenses to form precipitation. This type of front can create long periods of clouds and precipitation.

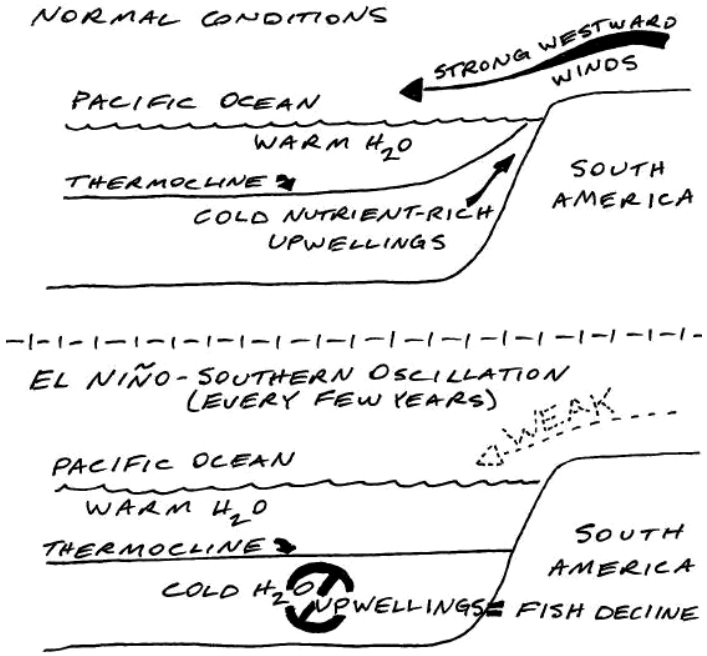
A **cold front** occurs when an incoming cold air mass meets a warm air mass that it is replacing. The cold front stays near the ground, effectively forcing the warm air upwards. As the warm air is forced upward, it creates tall clouds that can generate heavy rainfall, high winds, and thunderstorms.

Ocean currents play a large role in climate patterns as they redistribute heat to different regions.

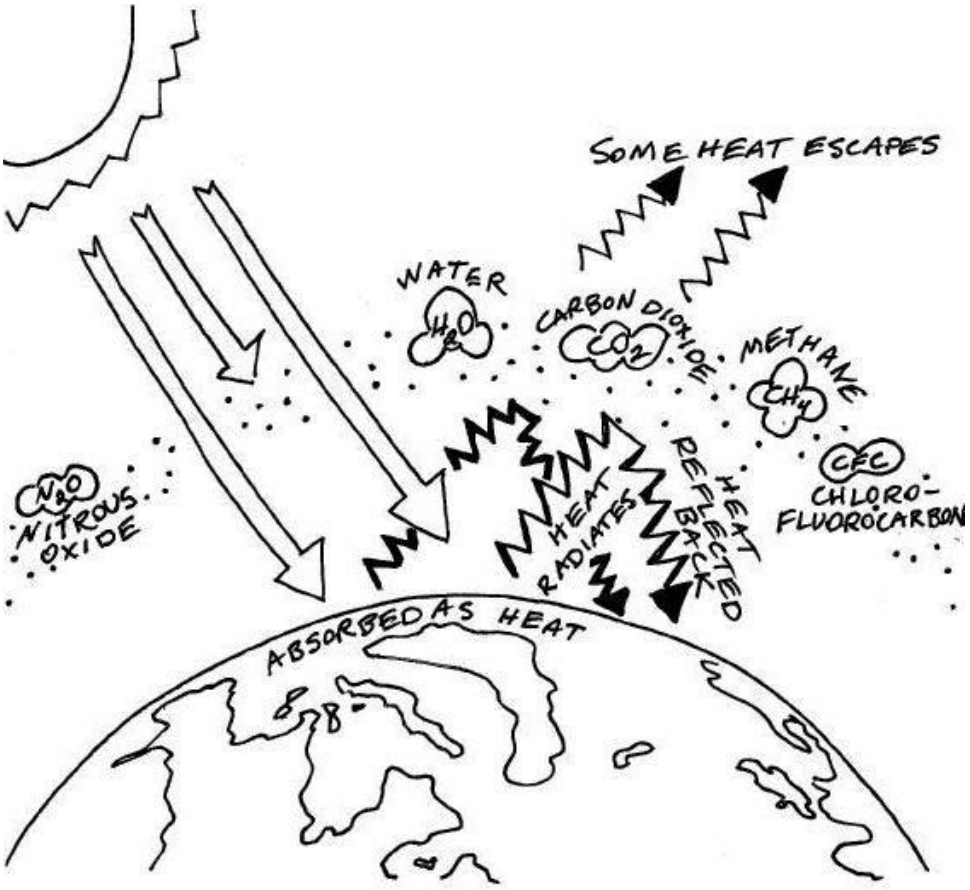
Extreme Weather

In some circumstances weather, such as tornadoes and hurricanes, can be quite destructive. **Tornadoes** can form when a cool downdraft and a warm updraft meet to create a spiraling funnel cloud. **Hurricanes** (typhoons in the pacific) form in a similar fashion to tornadoes, and are sustained by the energy and moisture from warm ocean water. The shallow Gulf of Mexico is the perfect environment for hurricanes to gain size and strength.

Aside from normal weather variances there are weather cycles that occur infrequently, and have far reaching effects on many regions of the earth. **El Nino-Southern Oscillation** (see diagram on the following page) is an interesting weather pattern that occurs every few years in the equatorial and South Pacific Ocean. The changes in the weather shown in the diagram below can lead to droughts, heavy rainfall, mudslides, and increased incidence of disease in many countries around the globe. The suppression of nutrient upwellings results in decreased biological productivity as nutrient rich water does not make it to the surface waters.



The **Greenhouse effect** occurs when sunlight penetrates the Earth's atmosphere. Some of the energy is released as longer wave radiation from the surface of the earth. This radiation is "trapped" by atmospheric gases such as water vapor, CO_2, methane, and nitrous oxides. This "trapped" energy has a warming effect on the troposphere. The greenhouse effect is necessary for maintaining life as we know it. THIS IS GOOD.



Weather and Climate Review Questions

Use the following answer choices to answer questions 2-6.

A) Weather

B) Climate

C) Microclimate

D) Rain Shadow Effect

E) Heat Island

1. A pattern of weather that has occurred over a long period of time.

2. Small areas that differ from the surrounding climate.

3. Greater precipitation occurs on the windward side of a mountain range due to this.

4. This describes the increased temperature in urban areas due to concrete, asphalt, and less vegetation than surrounding areas.

5. Short-term local occurrences in temperature, precipitation, humidity, etc…

6. Which of the following events leads to a suppression of cold nutrient rich upwellings along the west coast of South America?

A) El-nino

B) Greenhouse effect

C) Ozone Loss

D) Hurricanes

E) Cold Fronts

7. Which of the following are considered "greenhouse" gasses?

I. Nitrogen

II. CO_2

III. Water vapor

IV. Methane

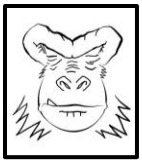
A) I only

B) I, II, and III only

C) I, II, and IV only

D) II, III, and IV only

E) I, II, III, and IV



APES in a BOX: The Review Sessions

Multiple Choice Scoring Guidelines

1. B	3. D	5. A	7. D
2. C	4. E	6. A	

Multiple choice points earned/7 * 100 = Quiz average

(_____)/ 7 * 100 = _____ Quiz Grade