What Causes Different Climates?

Map of World Climates
I. The Significance of Climate

A. What is the difference between Climate and Weather?

1. **Climate**: the average, long-term pattern of weather in a region
2. **Weather**: the state of the atmosphere at a certain time and place

Both climate and weather are measured in terms of temperature, wind speed, humidity, cloudiness, precipitation and other variables.

II. Global Climate Controls

- Latitude
- Altitude
- Proximity to H₂O
- Topography
- Ocean Currents
- Prevailing winds
A. Latitude

1. Because the Earth tilts on its axis, and because the earth is spherical the Sun’s rays strike the Earth at different angles.
   a. as a result, different parts of Earth receive different amounts of solar radiation.

3. The tropics receive the most solar radiation because the sun’s rays strike almost directly. Temperatures in the tropics are warm year-round.

4. The temperate zones have moderate conditions.

5. The polar zones receive the least radiation because the sun’s rays strike at a very low angle. Temperatures in polar regions are usually cold.
B. Altitude
1. Altitude is the height above sea level.

2. On average, temperatures drop about 1°C for every 160 m of altitude.

3. The higher the altitude, the lower the average yearly temperature.

C. Proximity to H₂O
1. Land gains and loses heat much faster than water.

2. Based on other factors certain areas closer to large bodies of water may have a relatively small yearly temperature range.
   a. example: the California coast vs. the north-eastern seaboard of the U.S.A.

3. Continental interiors have large yearly temperature ranges.
D. Topography

1. Climates often differ on either side of a mountain.

2. As air rises over a mountain, it cools. As it cools, it condenses, and releases moisture (rain). This is called the windward side.

3. As the dry air flows over the mountain, it descends and warms, usually producing deserts. This is called the leeward side.

Deserts such as the Atacama in Chile are common on leeward sides of mountains.
E. Ocean Currents

1. Ocean currents can warm or cool the air above.

2. Ocean currents may be considerably warmer or colder than the normal air temperature for that latitude.

F. Prevailing Winds

1. There are three basic wind systems in each hemisphere: Polar Easterlies, Northeast or Southeast Tradewinds and Prevailing Westerlies.

2. These winds blow air masses with distinct regions of origin (ie. formed over land or water, formed at certain latitudes).

3. The interaction and movement of air masses affect climate.
The End