Chapter 11.1 – Natural Causes of Climate Change (pg 464-475)

Describing Climate

Climate – average conditions of the atmosphere in a large region over 30 years or more

- Precipitation, temperature, humidity, atmospheric pressure, solar radiation, wind

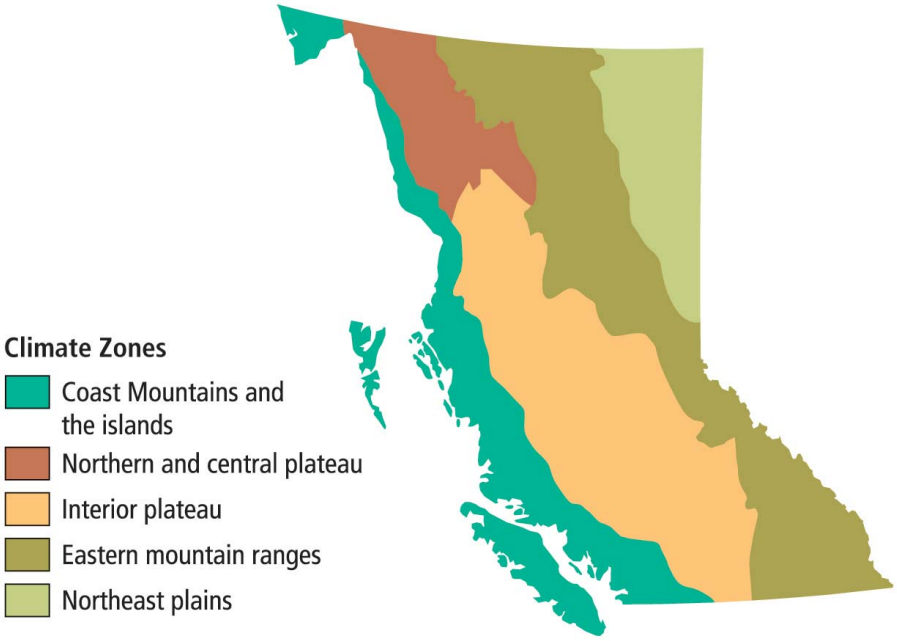

Figure 11.1 From the Cassiar Mountains in the north to the Interior Plateau, British Columbia has a range of climates. In this map, each type of climate is represented by a different colour.

Biogeoclimatic zone – region with a certain type of plant life, soil, geography, and climate

Activity 11-1A (pg 465)

The Past

- Paleoclimatologists have determined that Ice ages and periods of warming are natural processes on the planet
- CO2 levels in the atmosphere naturally fluctuate over time

Factors influencing climate change:

1. Composition of Earth's atmosphere
    - Natural Greenhouse Effect – absorption of thermal energy by the atmosphere (maintains Earth's temperature within a certain range)
    - Greenhouse gases absorb and emit radiation as thermal energy (keep Earth 34°C warmer)

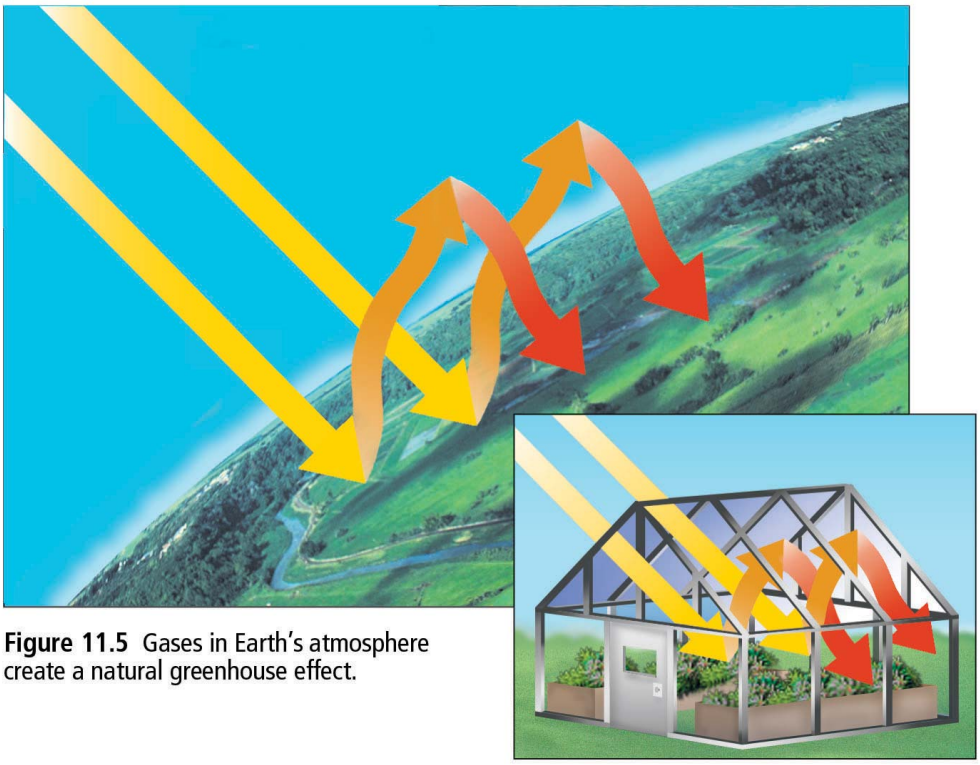

Figure 11.5 Gases in Earth's atmosphere create a natural greenhouse effect.

2. Earth's tilt, rotation, orbit around sun
    - causes seasons
    - tilt varies from 22.1° to 24.5° every 41000 years (currently 23.5°)
    - Earth's rotation has a wobble
    - Earth's orbit around the sun varies every 100 000 years (from circular to elliptical)

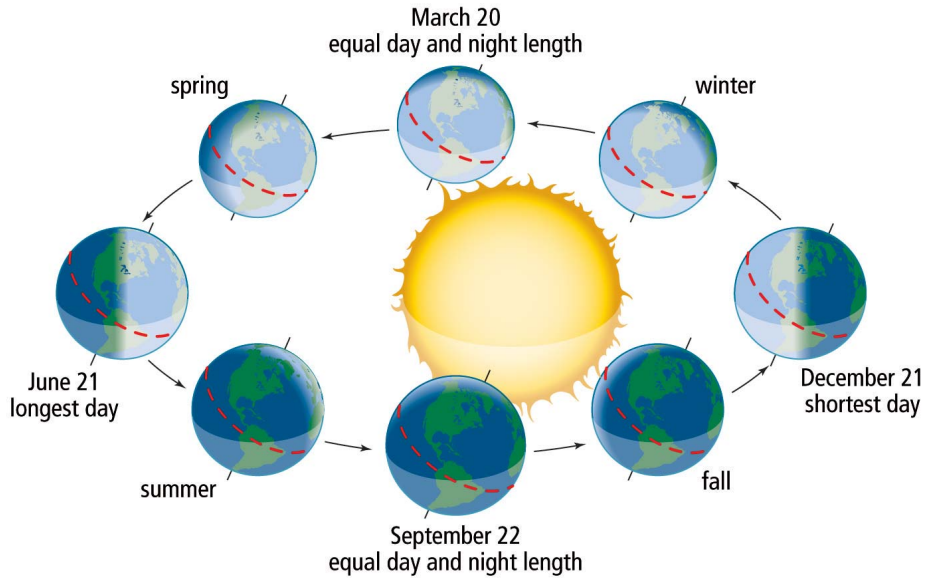

Figure 11.6 Earth takes a year to orbit the Sun. The seasons experienced in the northern hemisphere are indicated in this figure. The northern hemisphere's tilt away from the Sun is greatest at the winter solstice (December 21), and its tilt toward the Sun is greatest at the summer solstice (June 21). (Not drawn to scale.)

3. Water cycle (circulation of water on, above and below Earth's surface)
    - Water vapour is the most abundant greenhouse gas – as surface temperature rises so does the amount of water vapour in the atmosphere

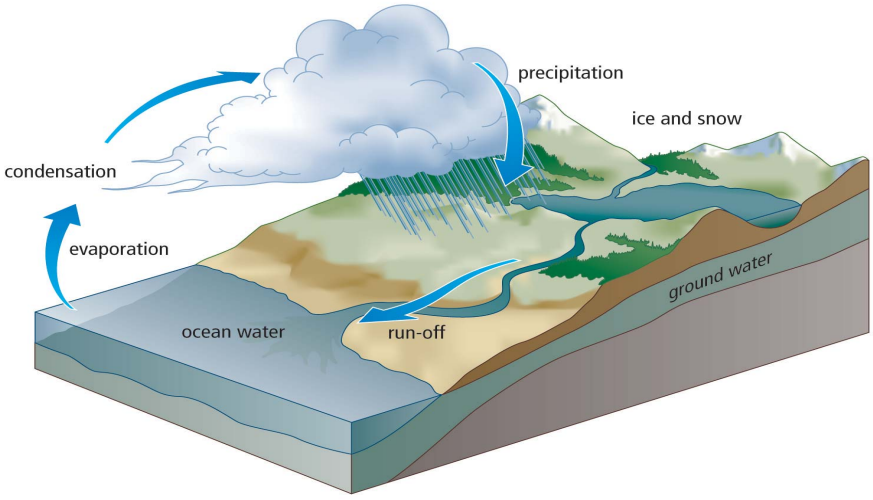

Figure 11.10 The water cycle. Precipitation brings water down to Earth's surface. Some of the water from precipitation runs off the land and into bodies of water. Evaporation from bodies of water and plant life (not shown) returns water to the atmosphere.

4. Ocean currents

- Giant convection currents in the oceans – transports water / thermal energy around Earth

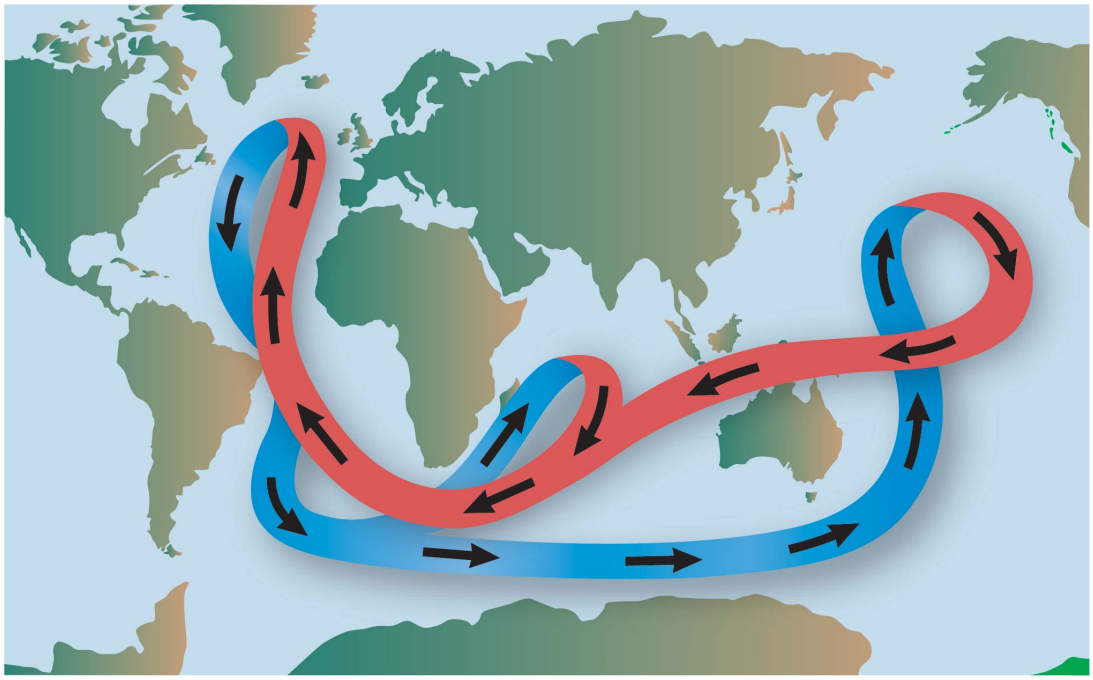

Figure 11.11 Deep-ocean currents form a global conveyer belt. Cold and salty water (blue lines) sinks below warmer, less salty water (red lines), resulting in convection currents.

5. Carbon cycle – maintains balance of CO_2 in the atmosphere
    - Carbon sinks – remove CO_2 from the atmosphere (deep oceans, photosynthetic organisms / forests)
    - Carbon source – release CO_2 into the atmosphere (weathering of rock, burning trees, decaying vegetation)

6. Catastrophic events (large-scale disasters)
    - Volcanic eruptions (ash blocks out sunlight, sulfuric acid in atmosphere reflects solar radiation causing Earth to cool)
    - Meteorites striking Earth's surface (dusty clouds form in the atmosphere – reflect and absorb solar radiation causing Earth to cool)
        - May cause a mass extinction