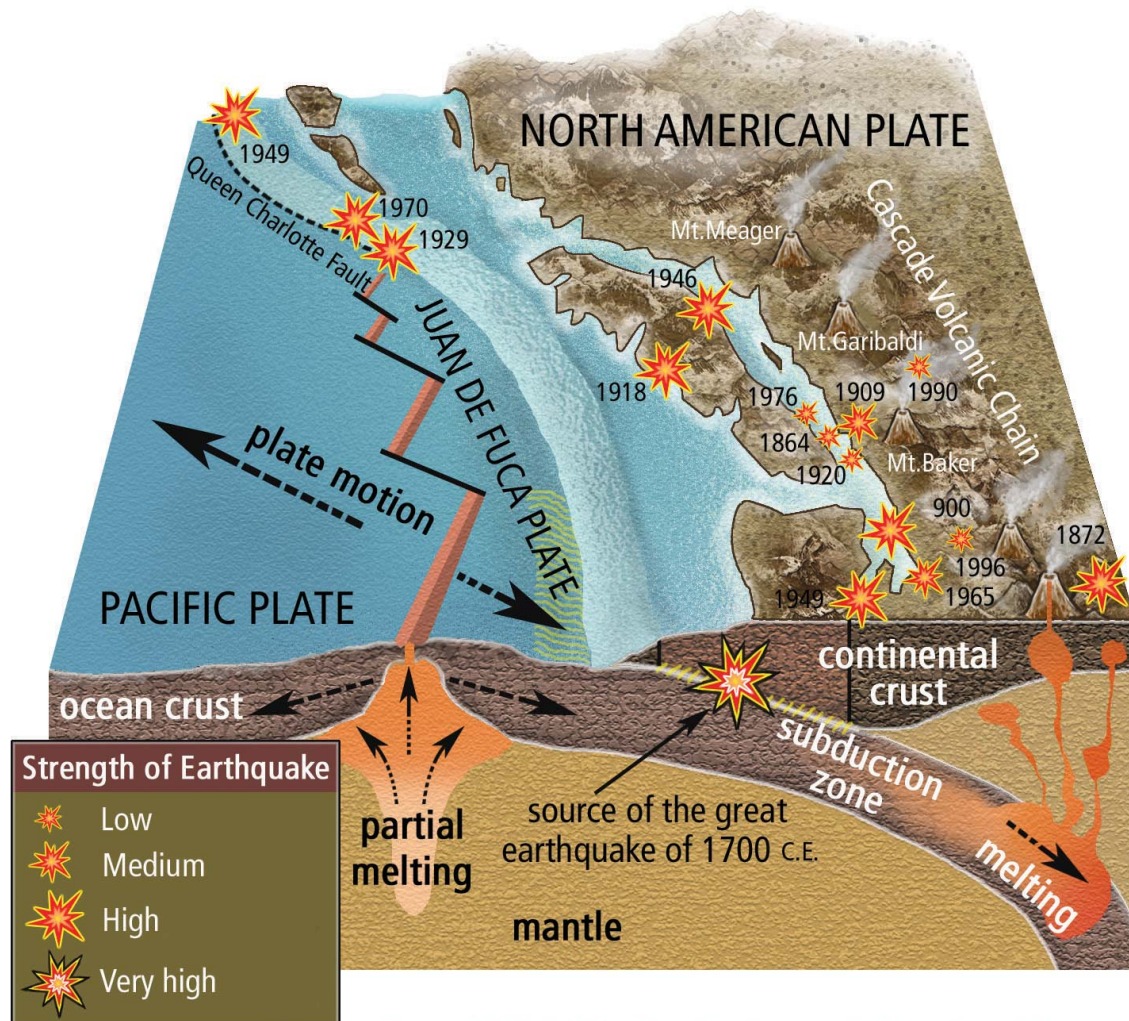


## Chapter 12.2 Earthquakes and Volcanoes (pg. 526-534)

**Earthquakes** – a massive release of energy that shakes the crust

- Caused by friction between two moving tectonic plates
- 95% occur along plate boundaries

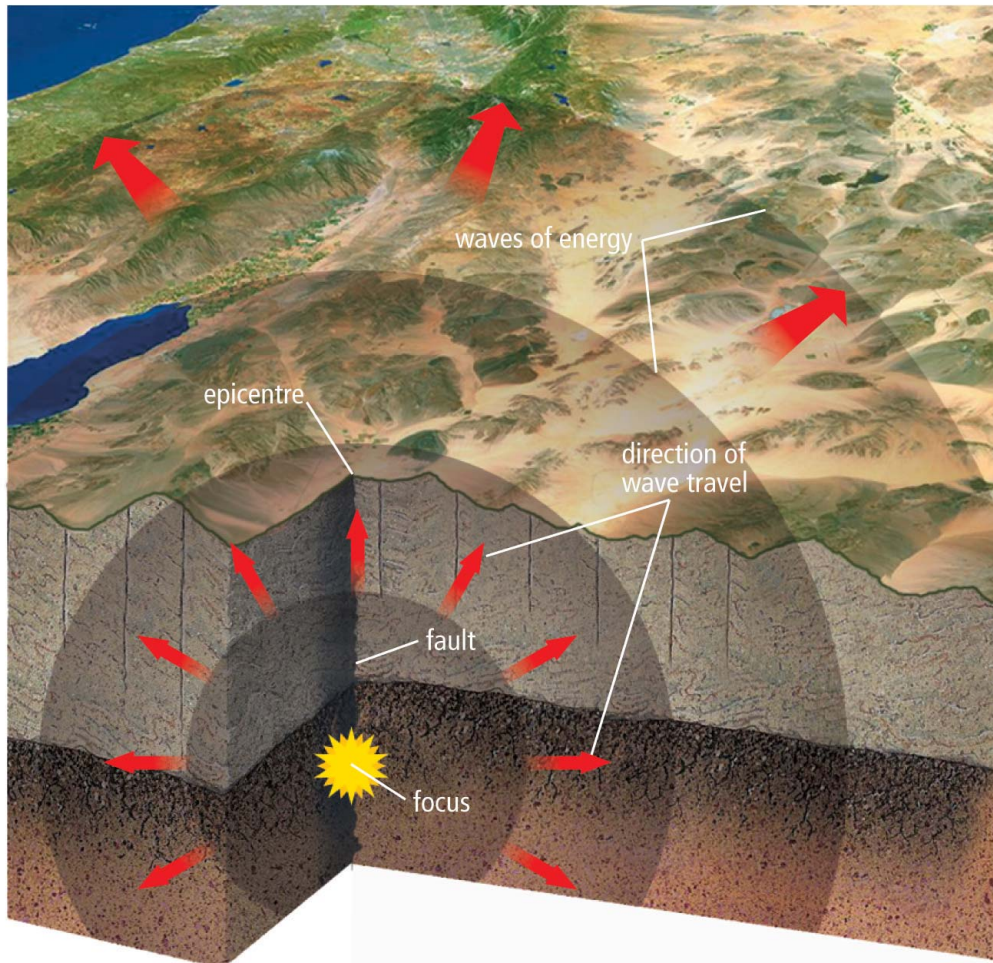
### BC Plate Boundaries



**Figure 12.21** British Columbia sits near the boundary of the North American and Juan de Fuca Plates, an area where large earthquakes can occur.

- **Focus** – location inside the Earth where an earthquake starts. Energy release begins here.

- **Epicenter** – point on Earth’s surface directly above the focus
  - Earthquakes classified according to depth of foci (shallow, intermediate, deep)
  - Amount of surface damage depends on depth of foci (most damage with a shallow focus)

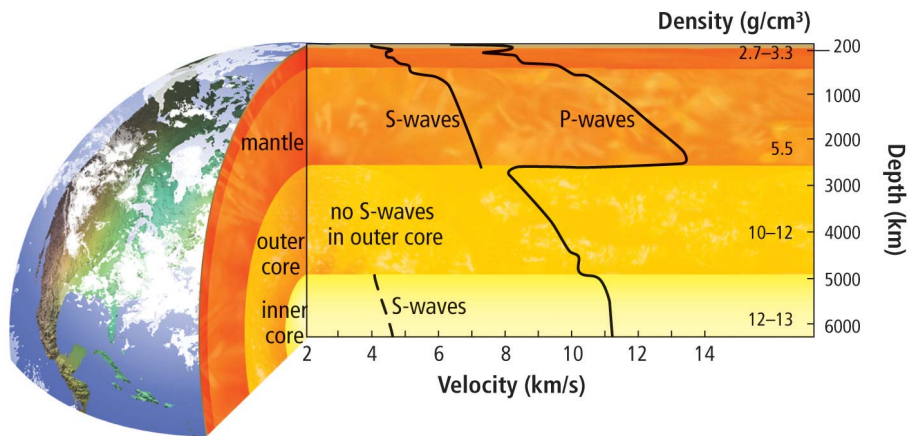


**Figure 12.12** Waves of energy travel outwards from the focus of an earthquake. The epicentre of an earthquake is the point on Earth’s surface directly above the focus.

- **Seismic waves** – vibrations produced by energy released from an earthquake
  - **Seismology** – study of earthquakes and seismic waves
  - Tells scientists about Earth’s layers



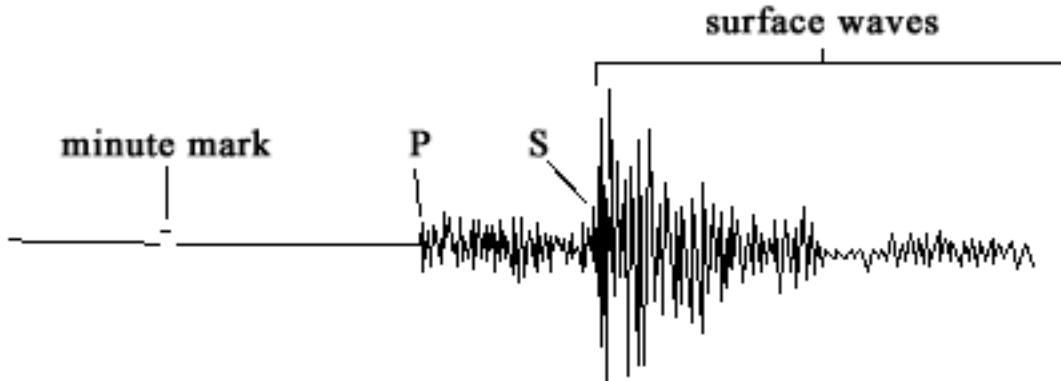
- Two types of seismic waves:
  - 1. Surface waves (L-waves)**
    - Roll along Earth's surface like ripples in a pond
  - 2. Body Waves (underground)**
    - a. Primary waves (P-waves)**
      - i. Travel through solids, liquids and gases
      - ii. Arrive first (fast)
      - iii. Ground squeezes and stretches
    - b. Secondary waves (S-waves)**
      - i. Only travel through solids
      - ii. Second to arrive (slower)
      - iii. Ground motion is perpendicular to wave



**Figure 12.23** The path of seismic waves. P-waves and S-waves travel underground and are affected by the density of the material they travel through. Because L-waves travel along Earth's surface, they move more slowly than P-waves and S-waves.

## Measuring Earthquakes

- Seismometers (Seismographs) measure ground motion caused by an earthquake – produces a seismogram



- Can be used to determine the epicenter of the earthquake

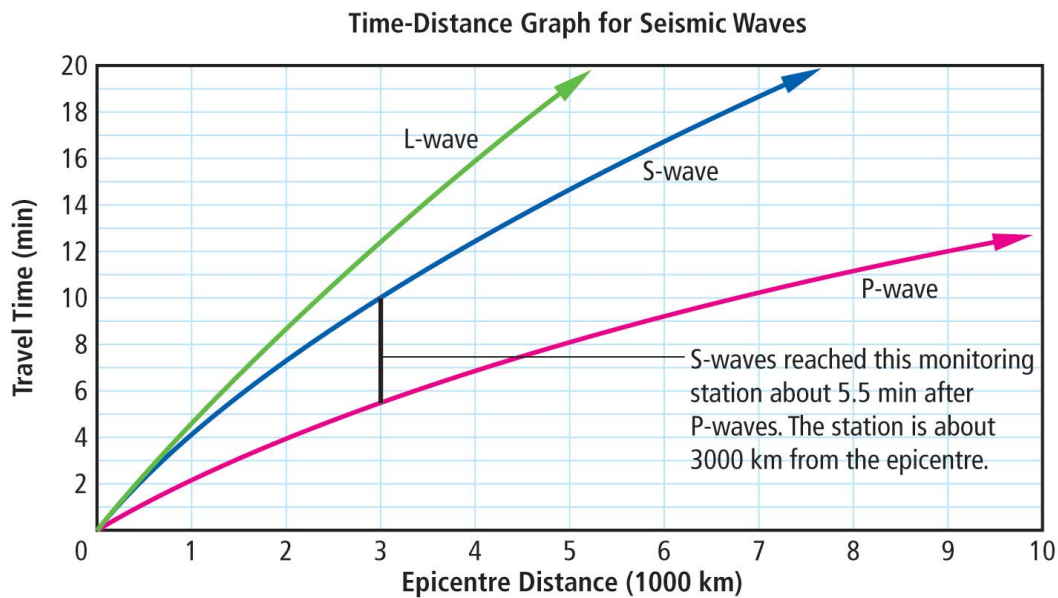


Figure 12.25 A time-distance graph shows how long it takes for different seismic waves to travel a certain distance.

- Magnitude rates the strength of an earthquake
  - Each 1-step on the scale = 10x larger seismic waves

## Volcanoes

- Type of volcano depends on type of tectonic plate boundary

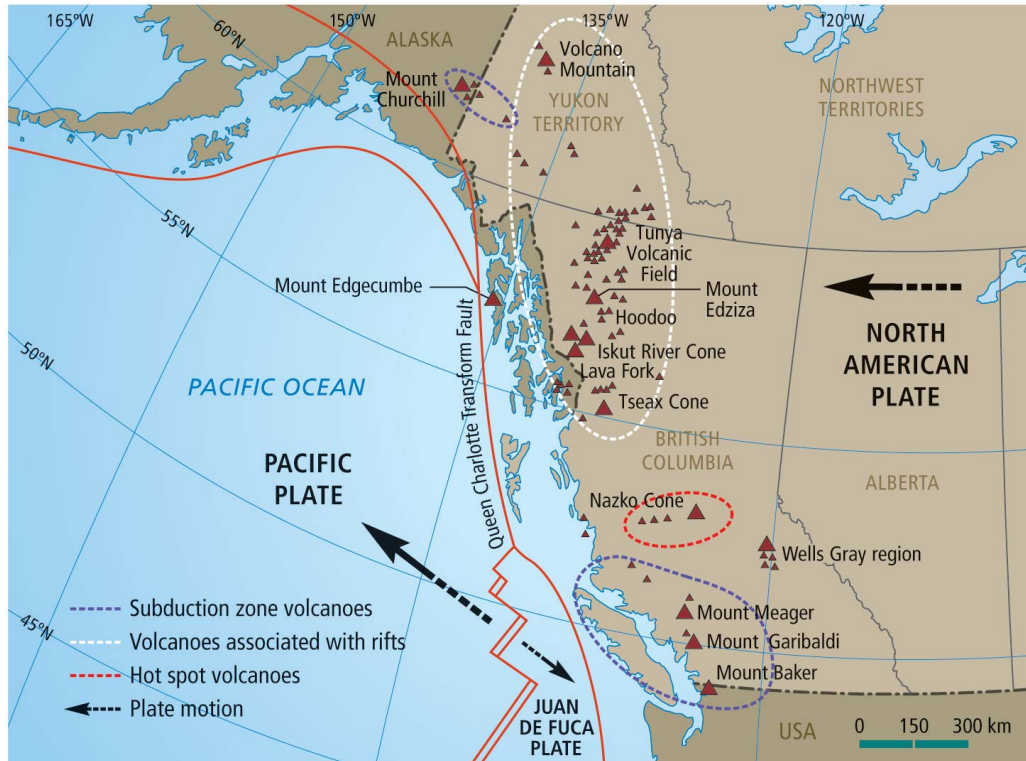
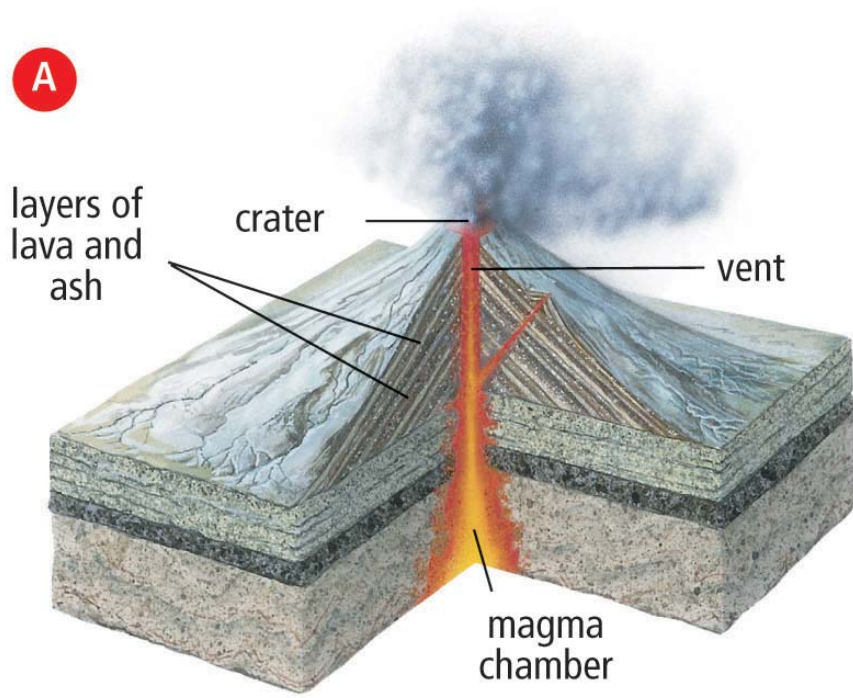


Figure 12.26 Volcanoes in and near British Columbia

### 1. Composite Volcanoes

- Cone shape from repeated eruptions of ash and lava
- Explosive, thick magma
- Found near subduction zones – volcanic belts
- Ex Mt. St. Helens



**Figure 12.27** A composite volcano (A).  
Mount St. Helens, Washington (B).



## 2. Shield Volcanoes

- Largest on Earth
- Form over hot spots
- Thinner magma – flows more easily (less explosive)
- More common in the ocean (Hawaiian Islands)

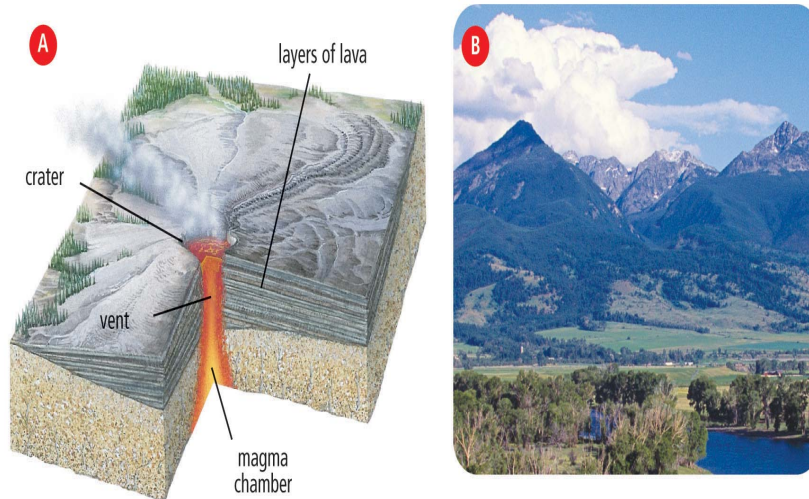


Figure 12.28 A shield volcano (A). Yellowstone National Park lies over a hot spot. The most recent volcanic eruption in the area occurred about 70 000 years ago (B).

## 3. Rift Eruptions

- Magma erupts through long cracks in lithosphere (spreading ridges)
- Not very explosive
- Release enormous amounts of lava

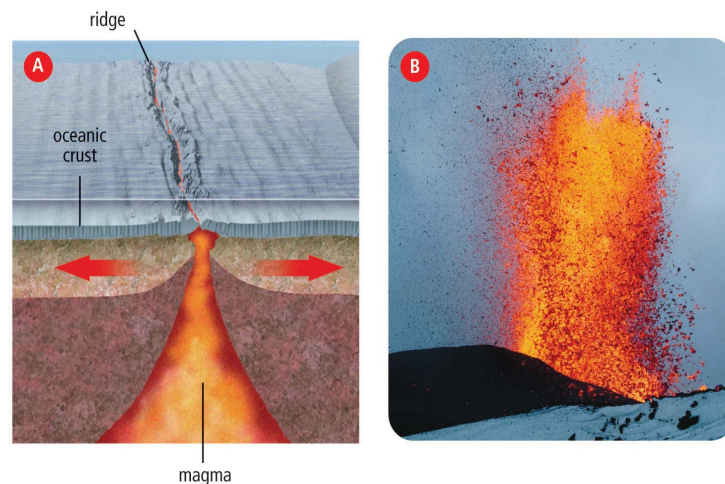


Figure 12.29 Ridges are due to rift eruptions under the ocean (A). The Krafla volcano, northern Iceland (B). Iceland is an island that is part of the Mid-Atlantic Ridge.