

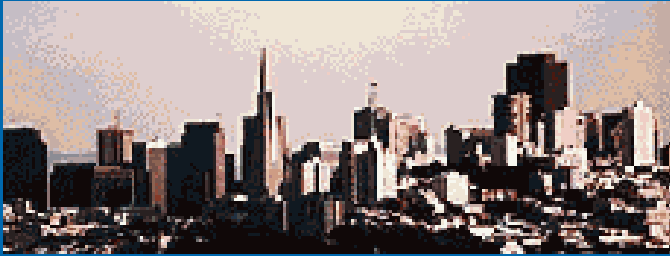


Ch 8.1 Earthquakes

Objective:

- *Be able to understand why and where earthquakes occur.*
- *Be able to compare and contrast the epicenter and focus of an earthquake.*

What are Earthquakes?



- Vibrations of earth are called Earthquakes.
 - Caused by slippage along a break in earth's crust.
- Each year, more than 30,000 earthquakes occur worldwide that are strong enough to be felt.
 - 75 of them are major earthquakes



Where do they start?

➤ Earthquakes usually occur when rocks under stresses suddenly shift along a Fault.



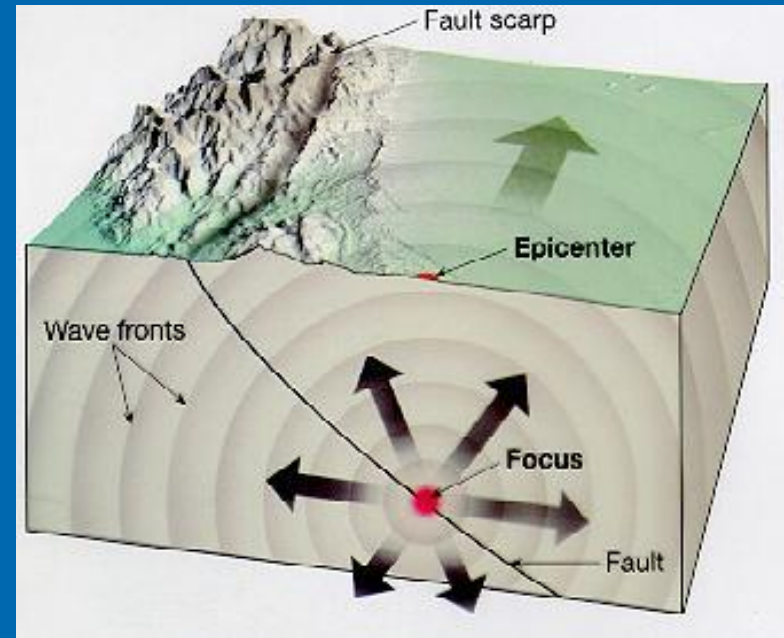
➤ Fault is a crack or fracture in earth's crust.

➤ *The San Andres Fault in California is the most studied fault.*

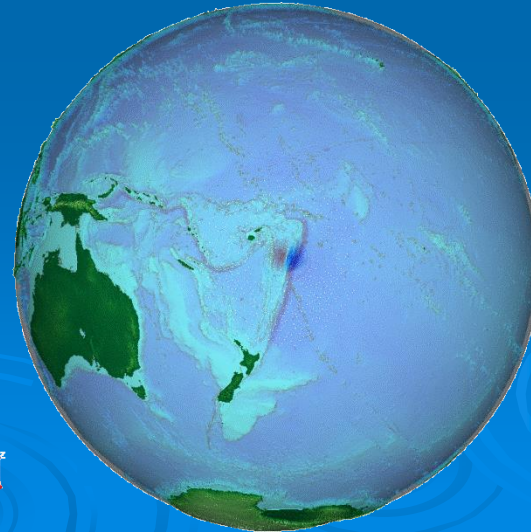


Focus vs. Epicenter

- Where movement of rocks first occurs is called the focus.
(*below crust*)

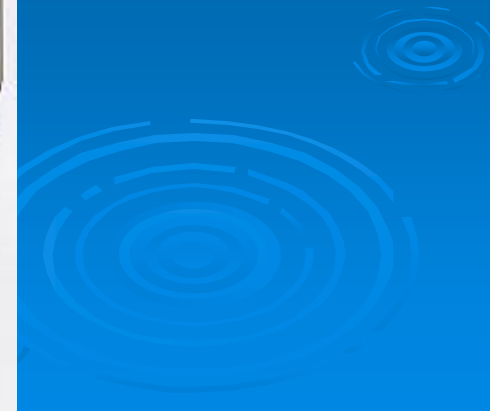
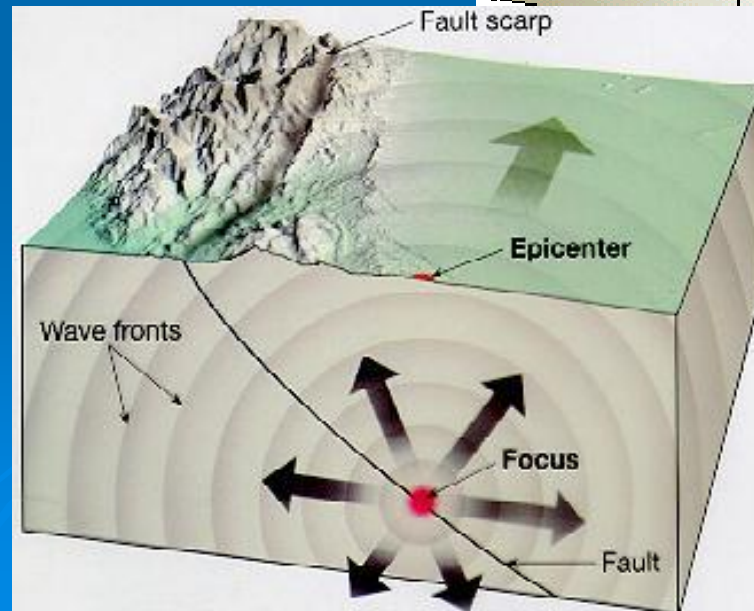
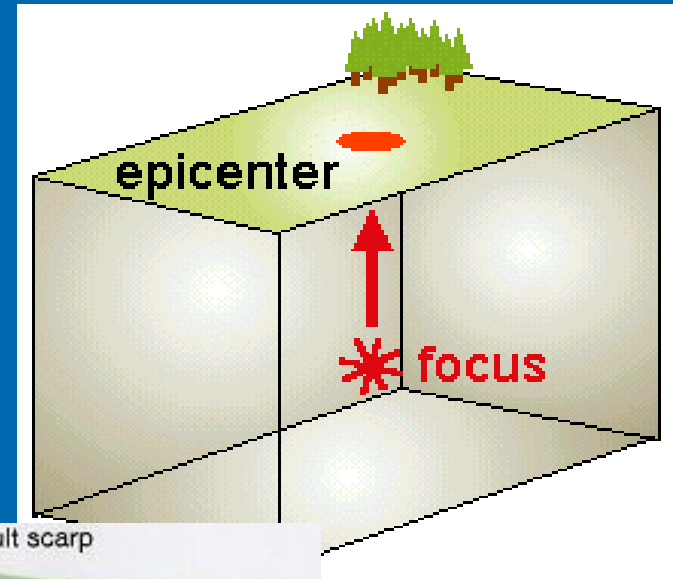


- Energy is released in all directions from the focus.



Focus vs. Epicenter

- The point on the earth's surface directly above the focus is called the epicenter



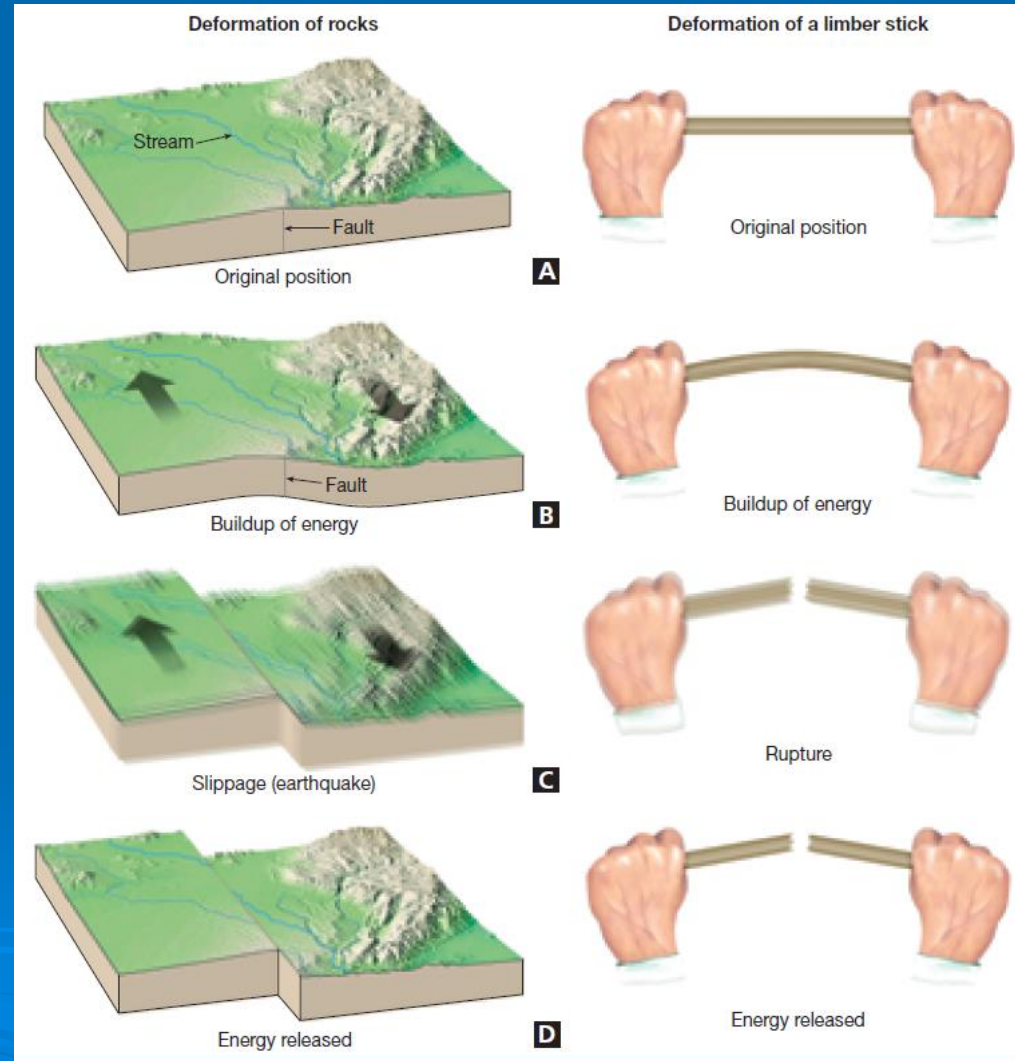
DID YOU KNOW...

- 1906 California Earthquake shifted the western side of the San Andres Fault as much as 4.7 meters to the North.
- *Had a better understanding of earthquakes after the event.*



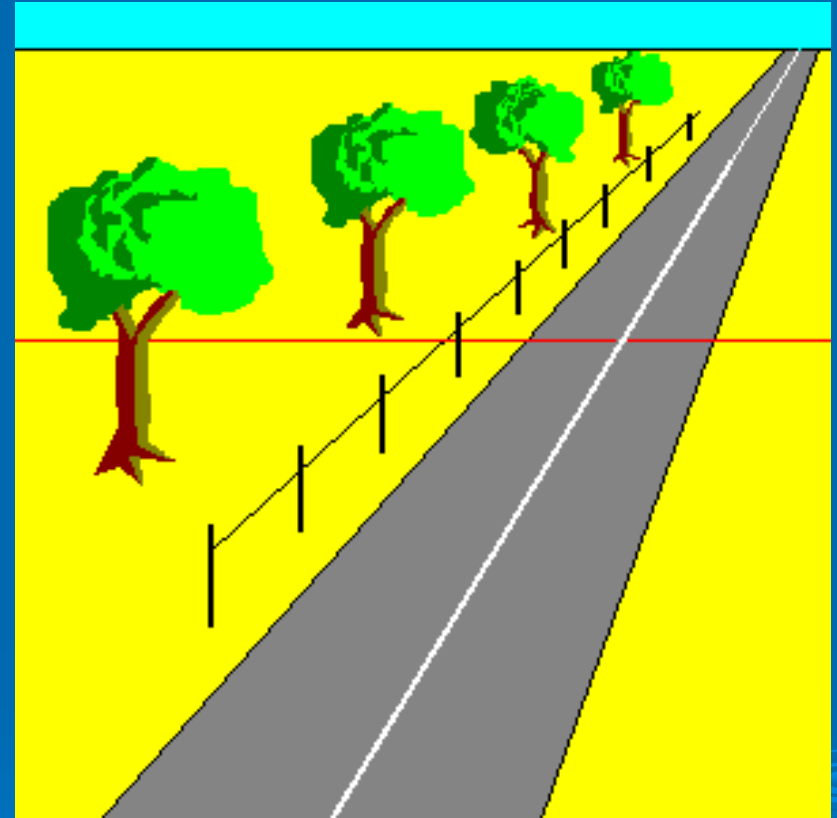
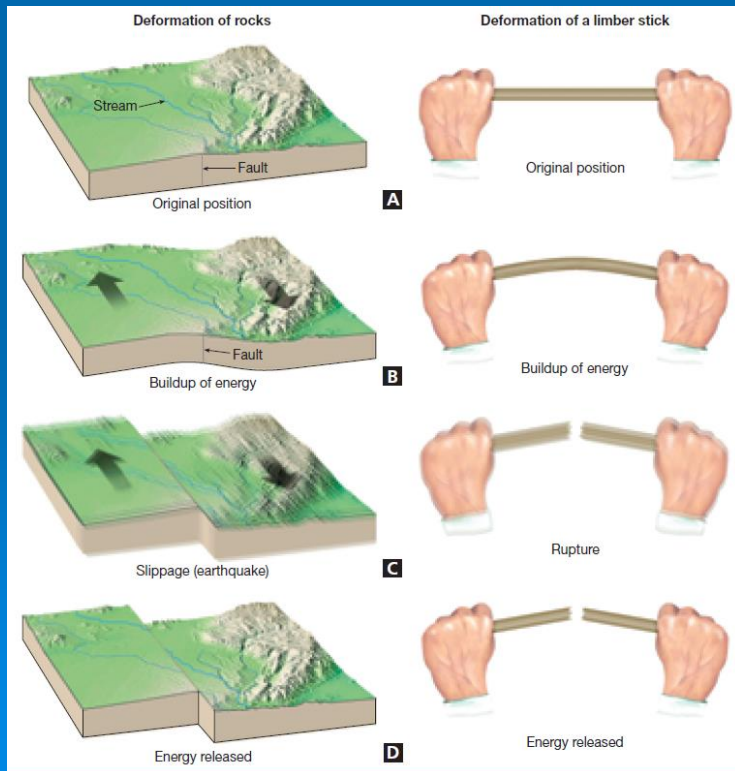
Elastic Rebound Hypothesis

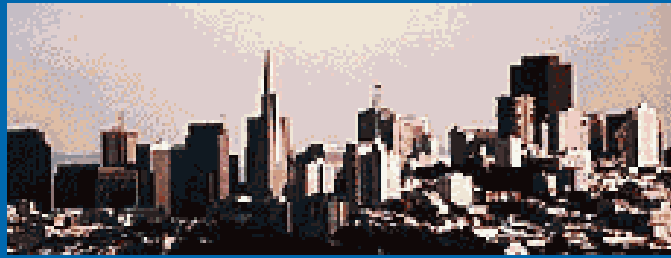
- The springing back of the rock into its original place is called elastic rebound.
- Rocks first bend, then break and release stored energy.
- This is true for most earthquakes.



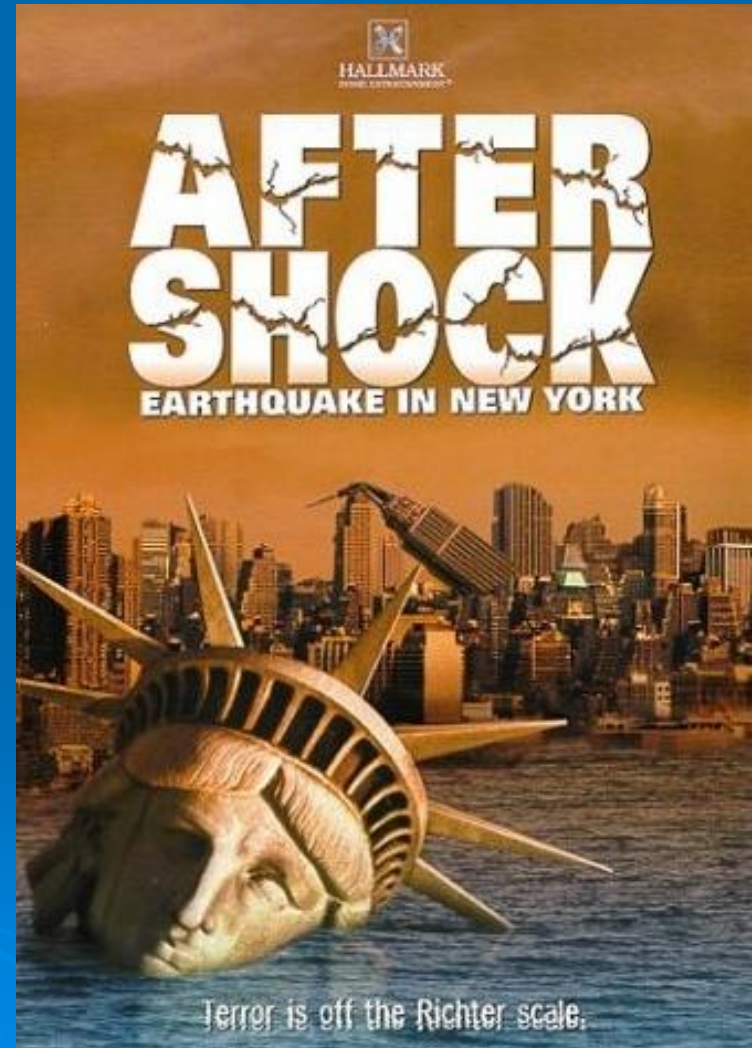
Elastic Rebound Hypothesis

- The energy released in the form of vibrations is called seismic waves





- Foreshocks are small bursts of shaking called tremors that precede earthquakes.
- Tremors that follow an earthquake are called aftershocks.



New Madrid Fault

- 250 mile long fault in the Midwest.
- Related to the processes at plate boundaries or glaciers.



Structural failure

- Port-au-Prince, Haiti
- Jan. 12, 2010
- Magnitude: 7.0
- Killed 230,000



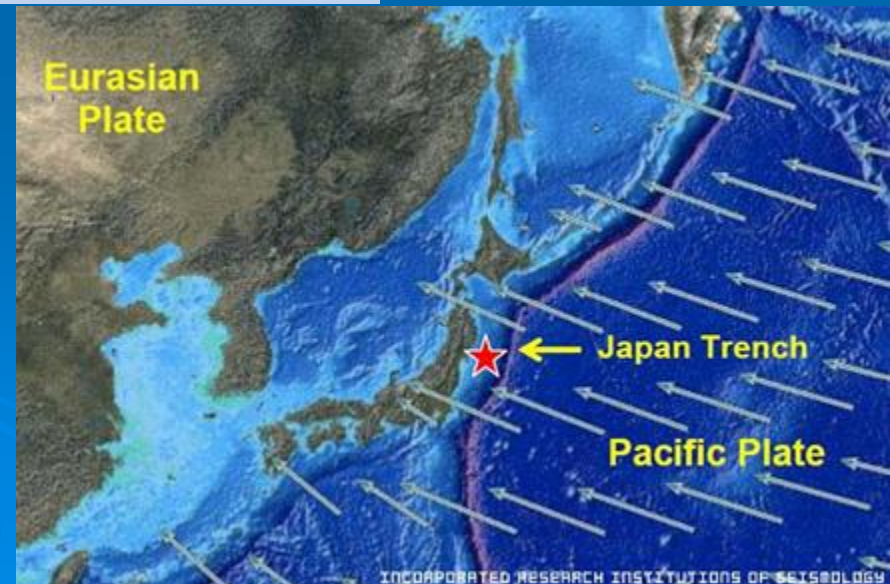
Structural failure

- South America
- Concepcion, Chile
- Feb. 27, 2010
- Magnitude: 8.8
- Killed over 700



Japan Earthquake

- A 9.0-magnitude earthquake hit Japan on March 11, 2011.
- The number of dead and missing is nearly 13,000.



Landshift

- Government Hill School, March 27, 1964
- Anchorage, Alaska
- Magnitude 9.2



How Many Earthquakes Happen Each Year?

➤ There are over a million quakes annually, including those too small to be felt. The following table shows the average frequency of different magnitudes.

- Description - Magnitude - Frequency per year
 - Great - 8.0+ - 1
 - Major - 7.0-7.9 – 18
 - Large - 6.0-6.9 – 120
 - Moderate - 5.0-5.9 - 1,000



How Many Earthquakes Happen Every Month? Day? Minute?

- Per month.....Approximately 80,000
- Per day.....Approximately 2,600
- Per minute.....Approximately 2
- And, per second, one earthquake is felt approximately every 30 seconds.



How Deep Do Earthquakes Occur in the World?

- Earthquakes occur in the crust or upper mantle which ranges from the surface to about 800 kilometers deep (about 500 miles).



Where Did the Largest Known Earthquake Occur?

- A magnitude 9.5 earthquake in Chile in 1960 was the largest known earthquake and resulted in over 6,000 deaths. It triggered a **tsunami** or seismic wave (incorrectly known as a tidal wave) that killed people as far away as Hawaii and Japan. Chile is also on a **subduction zone**.

What Was the Largest Earthquake in the United States?

- The great Alaska earthquake of March 27, 1964, is the largest earthquake in the United States. It had a magnitude of 9.2. 115 people died, with most of the deaths due to the tsunami it generated. Shaking was felt for an estimated 7 minutes, and raised or lowered the ground surface as much as 2 meters (6.5 feet) in some areas and 17 meters (approx. 56 feet) in others. The length of the ruptured fault was between 500 and 1,000 kilometers (310.5 and 621 miles). The amount of energy released was equal to 12,000 Hiroshima-type blasts, or 240 million tons of TNT.



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