Earthquakes



What is an earthquake?

- Used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip
- Caused by volcanic or magmatic activity,
- Caused by other sudden stress changes in the earth.

Three Types of Faults

Strike-Slip



Thrust



Normal

What causes earthquakes?

- Tectonic plates move past each other causing stress. Stress causes the rock to deform
 - Plastic deformation does not cause earthquakes
 - Elastic deformation rock stretches then reaches a breaking point, releasing energy.



Elastic Rebound – deformed rock goes back to its original shape



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Focus – point inside the Earth where an earthquake begins Epicenter – point on Earth's surface above focus

epicentre fault

Figure 5

Comparing the focus and epicentre of an earthquake.

Typical Seismogram



Comparing Seismic Waves

Primary (P) Wave

- travels through liquids and solids
- pushes and pulls materials as they move through Earth
- travel about 8 km per second
- cause the first movement you feel in an earthquake

Both

- originate from same focus
- begin at same time
- can be felt at Earth's surface

Secondary (S) Wave

- travels through solids only
- makes the rocks vibrate up, down, or sideways
- travel at about 4.5 km per second
- usually cause more building damage

Figure 6

The two types of seismic waves that are produced by an earthquake cause different effects.

How do scientists calculate how far a location is from the epicenter of an earthquake?

- Scientists calculate the difference between arrival times of the P waves and S waves
- The further away an earthquake is, the greater the time between the arrival of the P waves and the S waves

How are Earthquakes Measured? Richter Scale



Tsunamis



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Formation of a tsunami

