

# Earthquakes



## **Forces in Earth's Crust:**

**Stress - A force that acts on rock to change its shape or volume.**



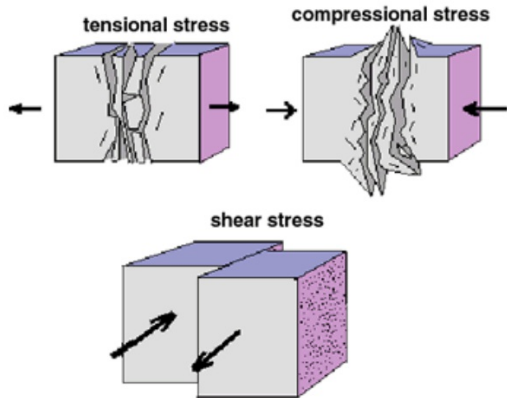
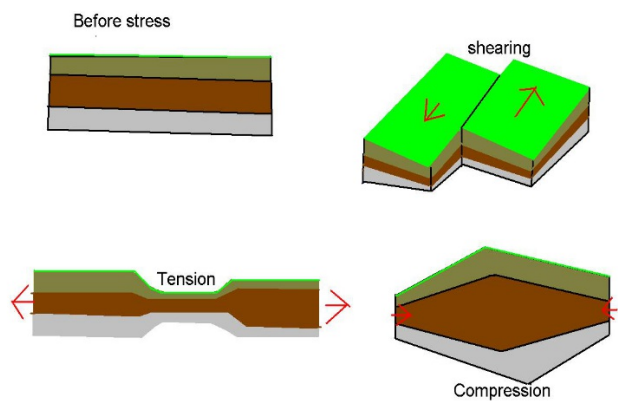
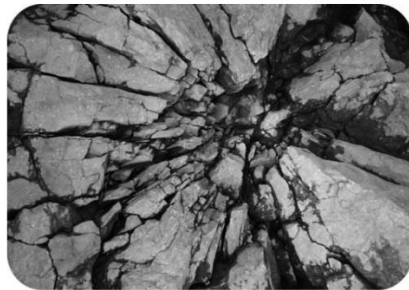
**Often expressed as force per unit of area. Stress increases as force increases, stress adds energy to the rock. The energy is stored in the rock until it breaks or changes shape.**

**Tension, compression and shearing work over millions of years to change the shape and volume of a rock.**

**Tension**

**Compression**

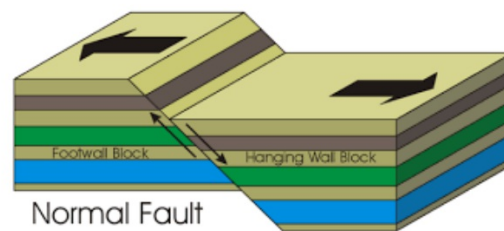
**Shearing**



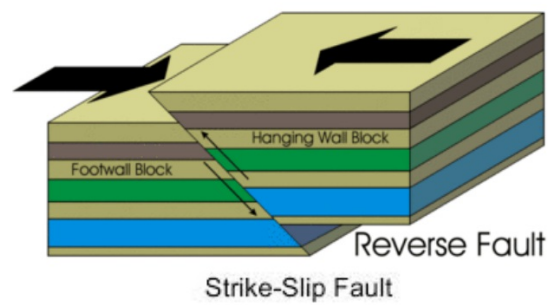
<https://www.youtube.com/watch?v=errbXXyeGD4>

## Fault Formation

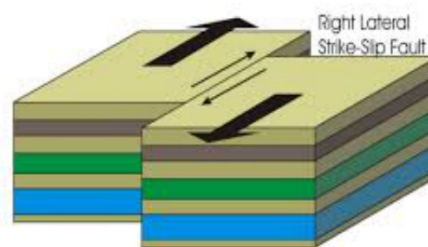
When enough stress builds up in rock, the rock breaks creating a fault.



Normal Faults



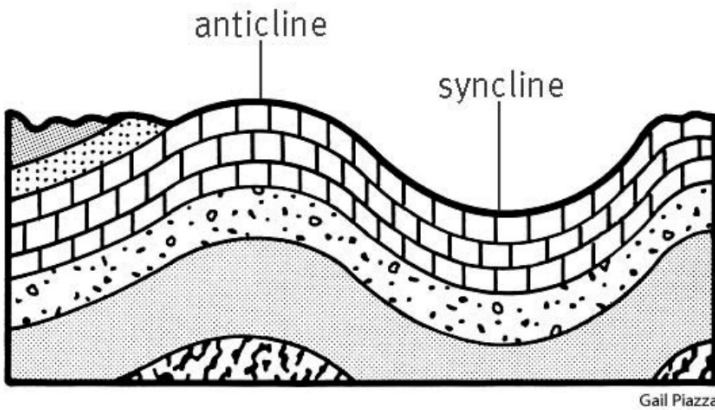
Reverse Faults



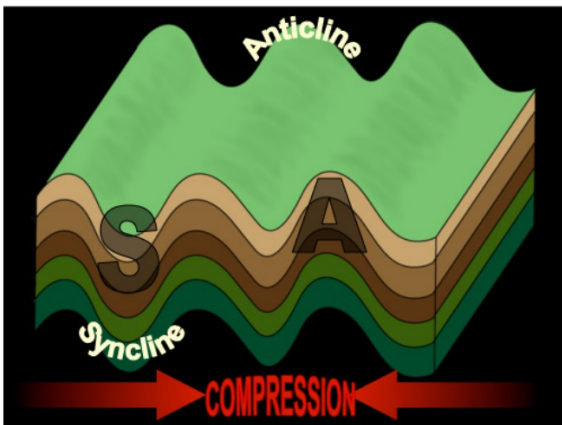
Strike-slip Faults

<https://www.youtube.com/watch?v=W1FJL2K4Yrc>

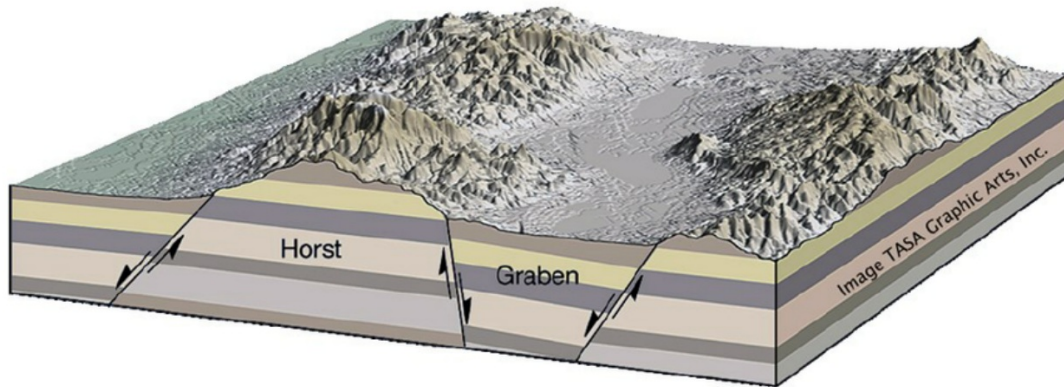
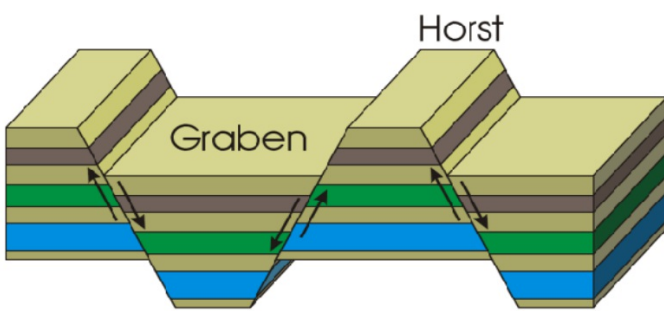
Over long periods of time the forces of plate movement can change a flat plain into features such as anticlines and synclines, fault-block mountains and plateaus.



Gail Piazza

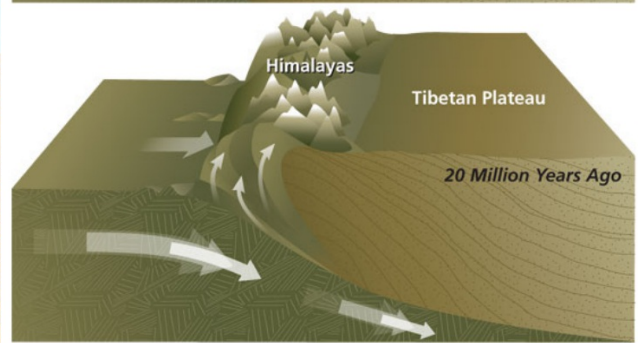
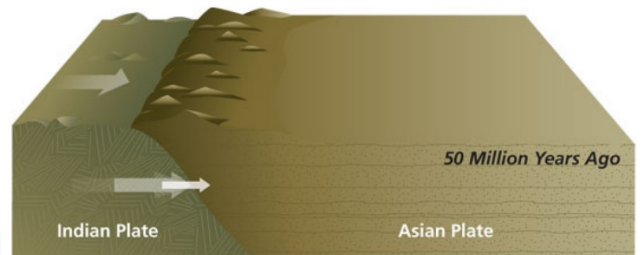


## Fault-block Mountains



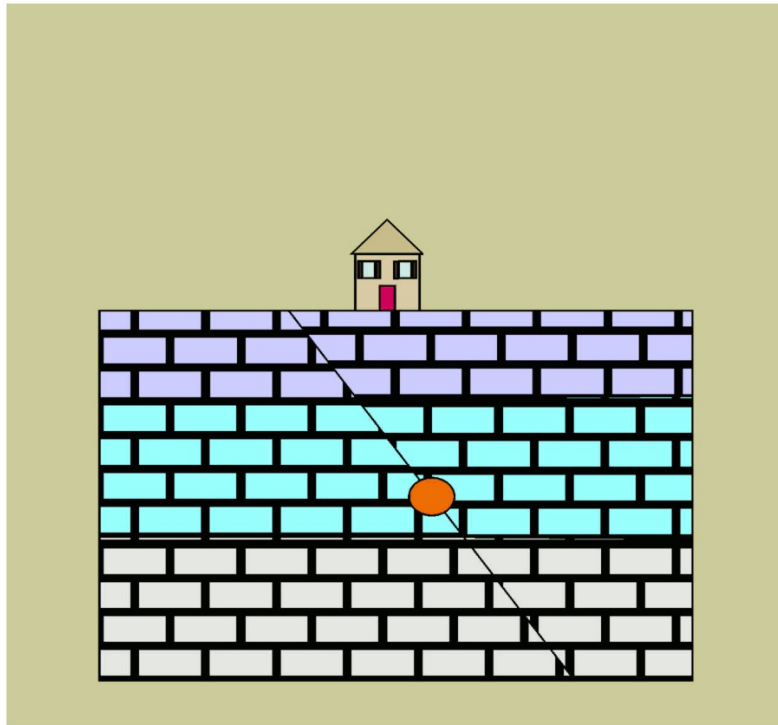
## Plateau

Large area of land high above sea level.  
Formed when earth's forces push up a large area.



## **Earthquakes:**

**Shaking and trembling that result in movement of rock beneath the earth's surface.**

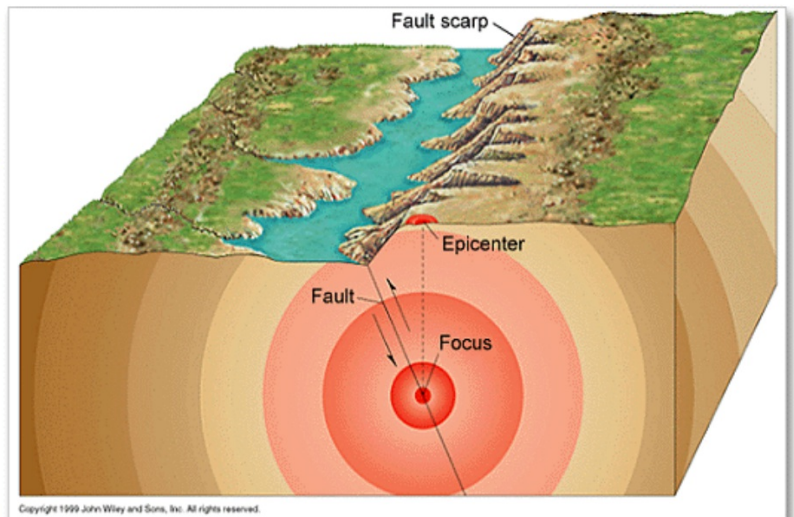
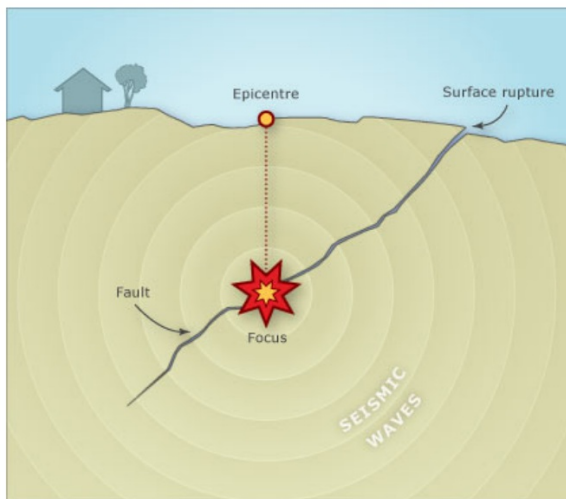


[https://www.youtube.com/watch?v=hYGig\\_xdPM](https://www.youtube.com/watch?v=hYGig_xdPM)



**Focus**

**Epicenter**

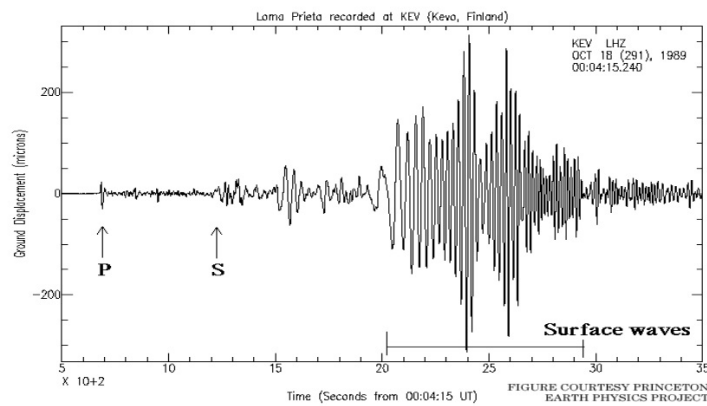


**Seismic waves are vibrations similar to sound waves. They travel through the earth carrying energy released by an earthquake.**

**P Waves**

**S Waves**

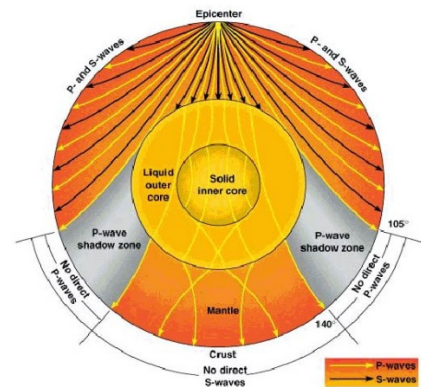
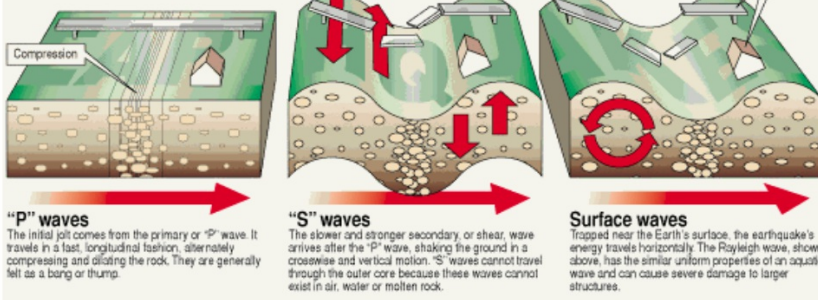
**Surface Wave**

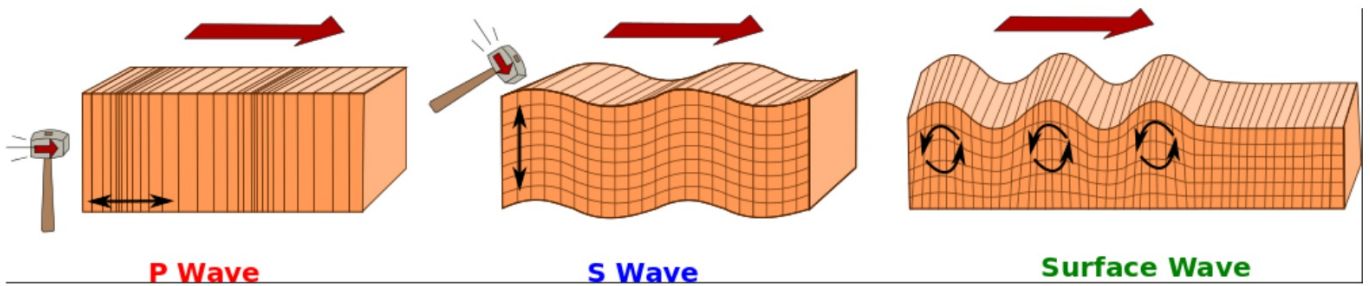
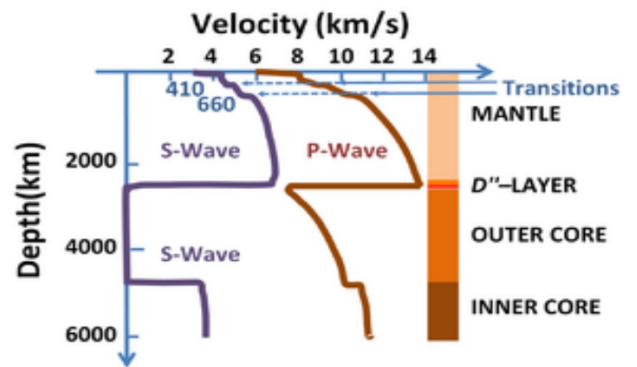
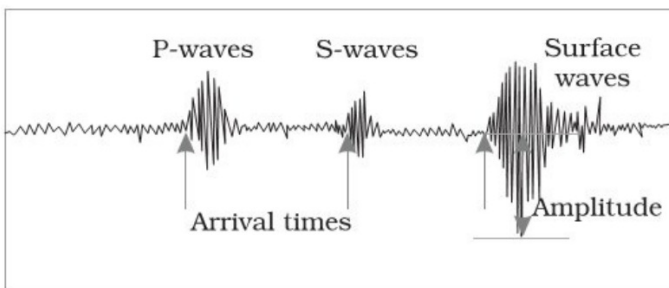


**Seismic waves**

An earthquake produces several types of seismic waves, each causing extensive degrees of damage.

Surface waves rolling through rocky basins are usually long and slow-rolling waves. If strong enough, they are mostly a threat to larger structures, such as bridges and high-rises. Smaller structures are able to ride out the wave and remain intact.





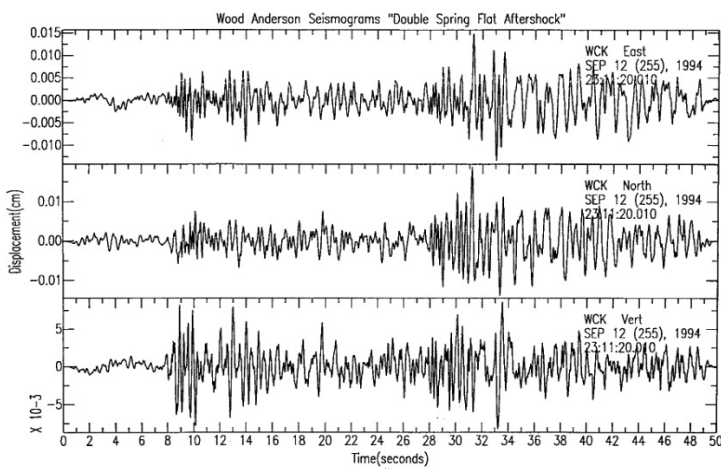
<https://www.youtube.com/watch?v=wDfIgoXaXis>

## How Are Earthquakes Measured?

**Modified Mercalli Scale - Amount of damage or shaking that is felt.**

**Richter Scale - The size (magnitude) of an earthquake measured on a seismograph.**

**Moment Magnitude Scale - Rates the total energy an earthquake releases.**



### The Richter scale

**Great**  
Can cause major destruction over areas several 100 kms across

**Major**  
Serious damage over larger areas

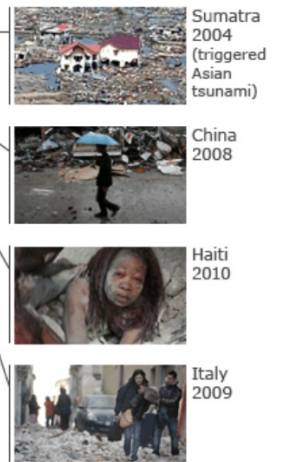
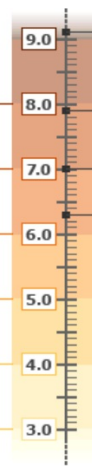
**Strong**  
Affects areas up to 100km across

**Moderate**  
Affects small regions, causing slight damage

**Light**  
Often felt, rarely causes damage

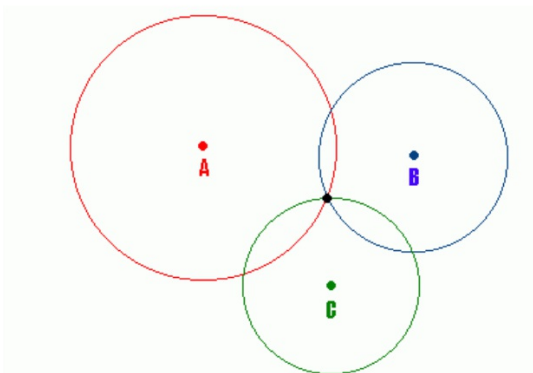
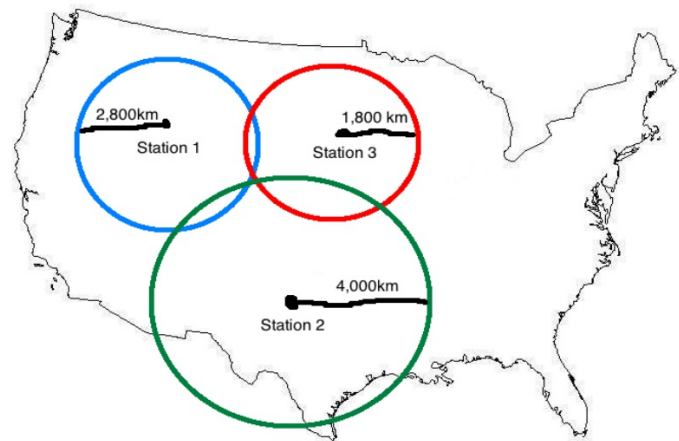
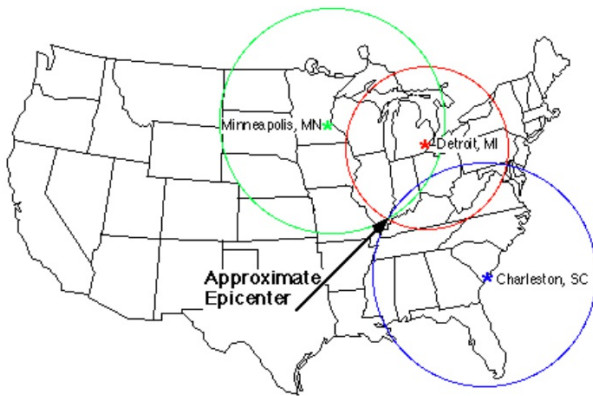
**Minor**  
Recorded though not generally felt

**Micro**  
Only recorded locally



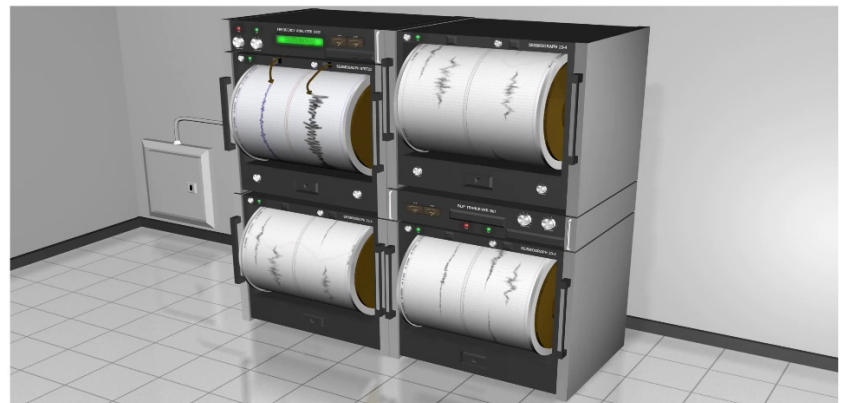
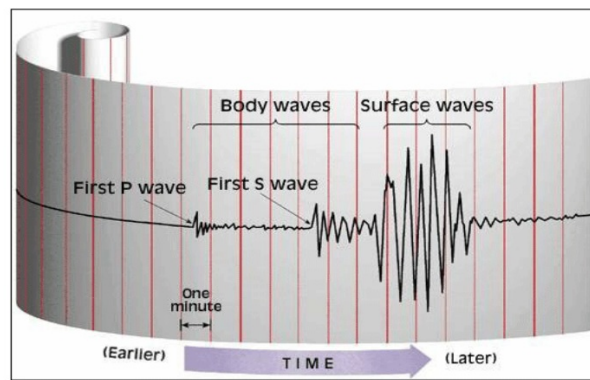
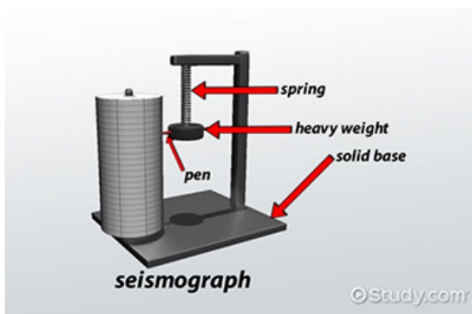
## Locating an Epicenter

Geologists use seismic waves to locate an earthquakes epicenter.



Earthquake epicenter requires at least 3 recording stations to localize.

## How Seismographs Work



<https://www.youtube.com/watch?v=Gbd1FcuLJLQ>

<https://www.youtube.com/watch?v=NI8v1iSRtxA>

## Earthquake Risk Around the World

