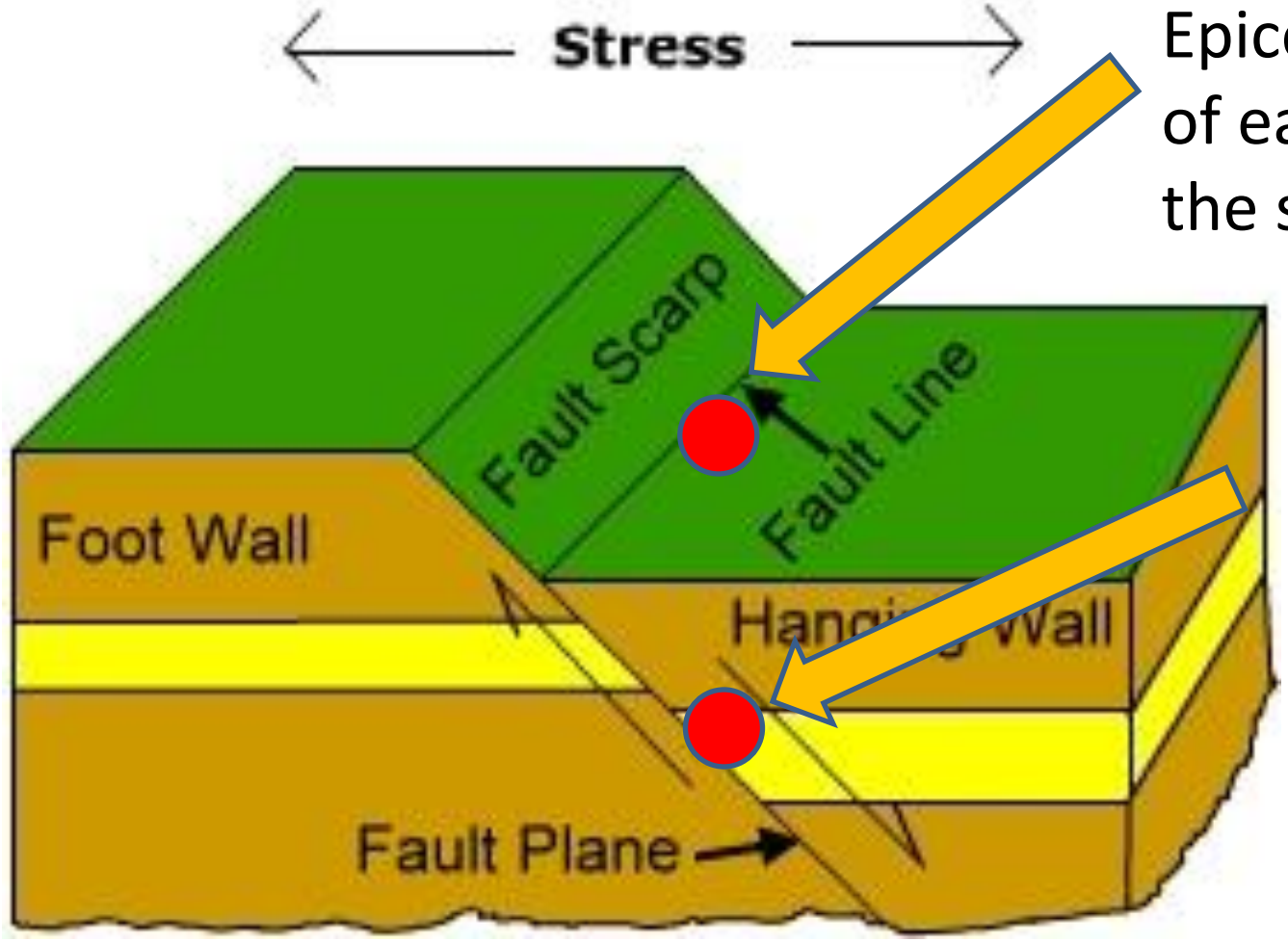
Locating Earthquakes

Objectives

- Map and locate the location of an epicenter of an earthquake
- Explain the process of triangulation to locate an earthquake

Monitoring the Location of an Earthquake: Where does an earthquake occur?

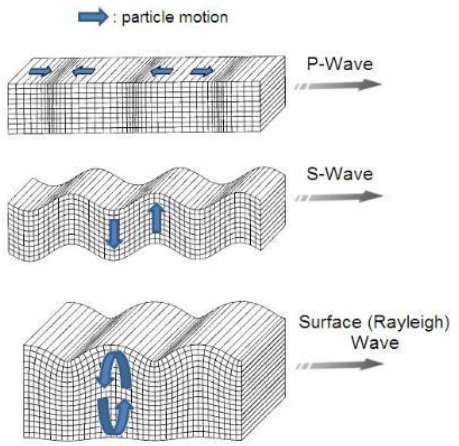


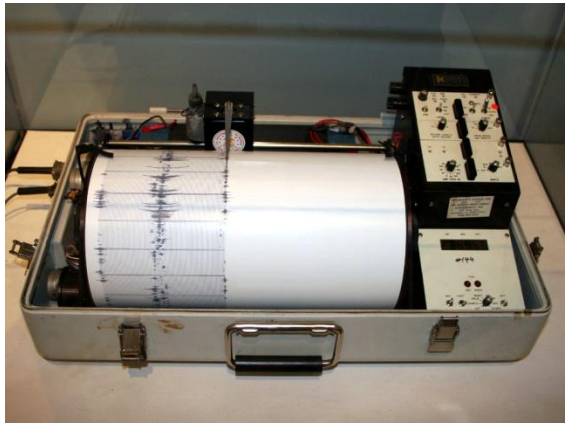
Epicenter – location of earthquake on the surface

Focus – area of slippage on fault below the surface where the earthquake happens

Monitoring an Earthquake: What records seismic waves?

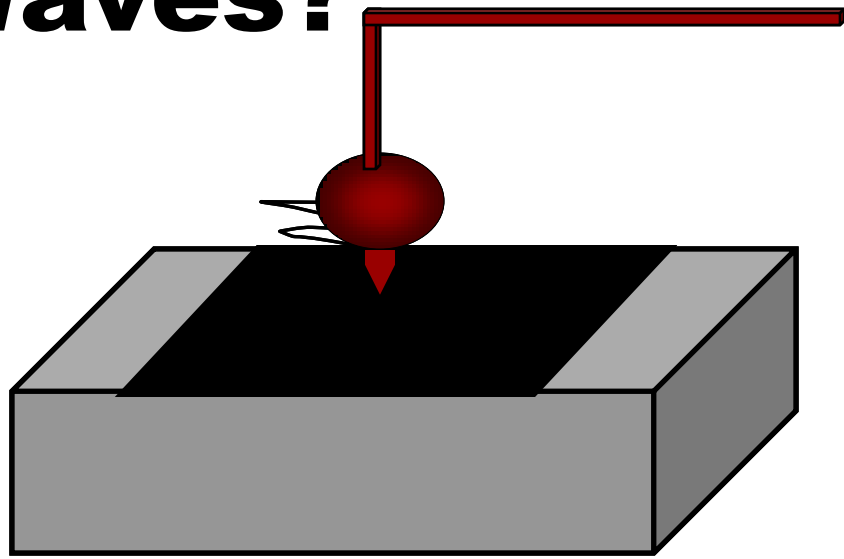
- Seismic Waves:
  the **waves** of energy caused by the sudden breaking of rock within the earth (P, S, Surface)
- Seismograph - an instrument that measures and records details of earthquakes, such as force and duration

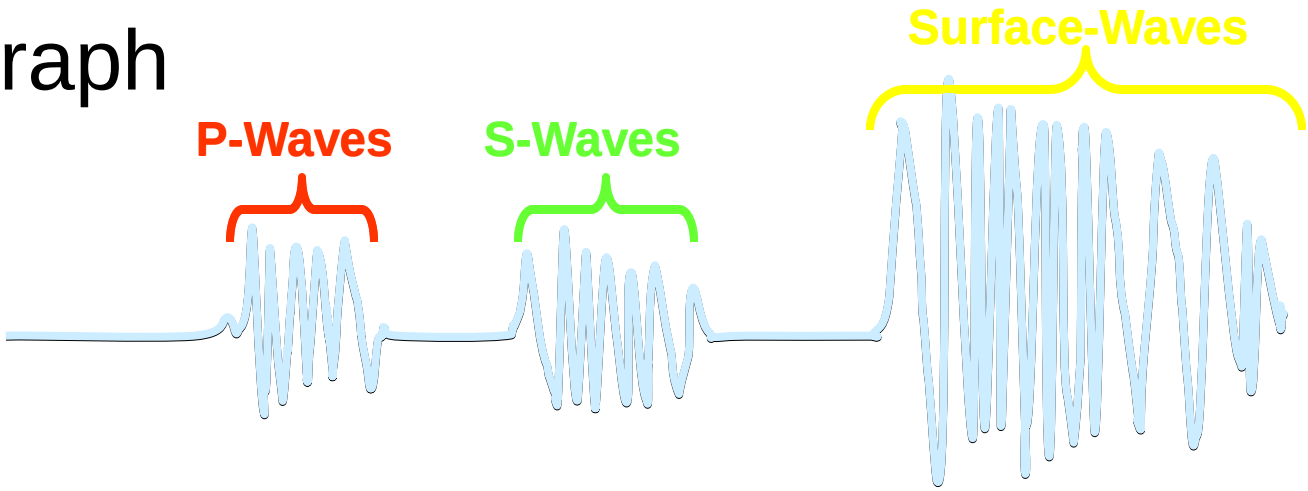




How do we recording Seismic Waves?

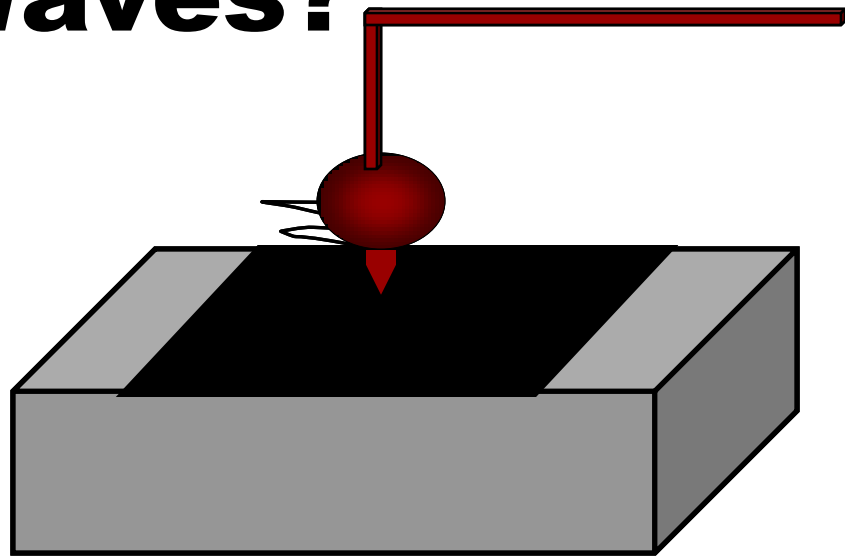
- After an earthquake seismic waves are released
- Seismic stations record these earthquakes with a seismograph

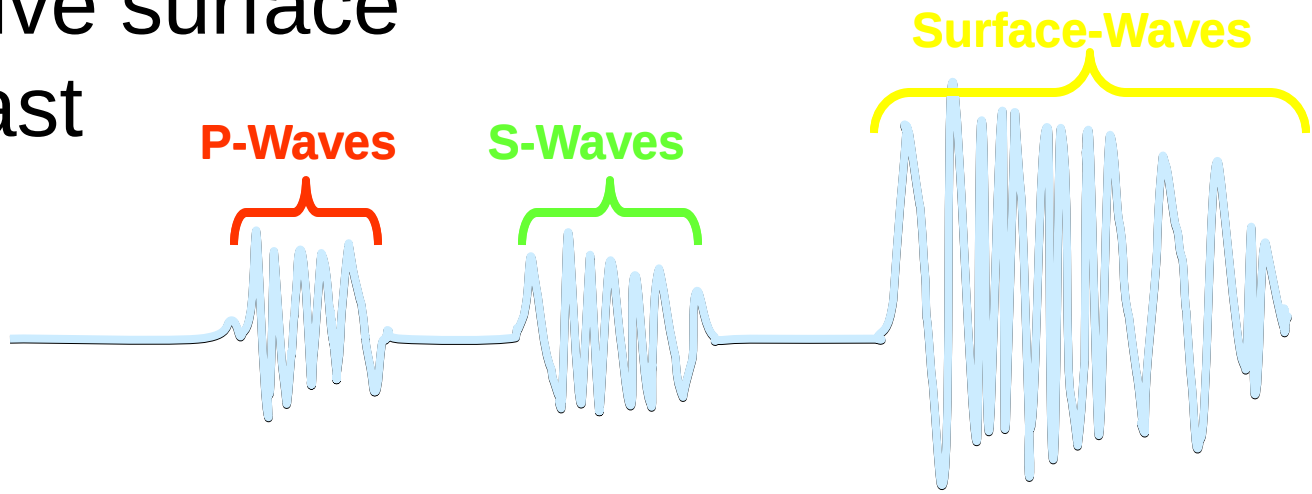




How do we recording Seismic Waves?

- These seismographs record P waves first since they are the fastest, the S-Waves second, and the destructive surface waves last

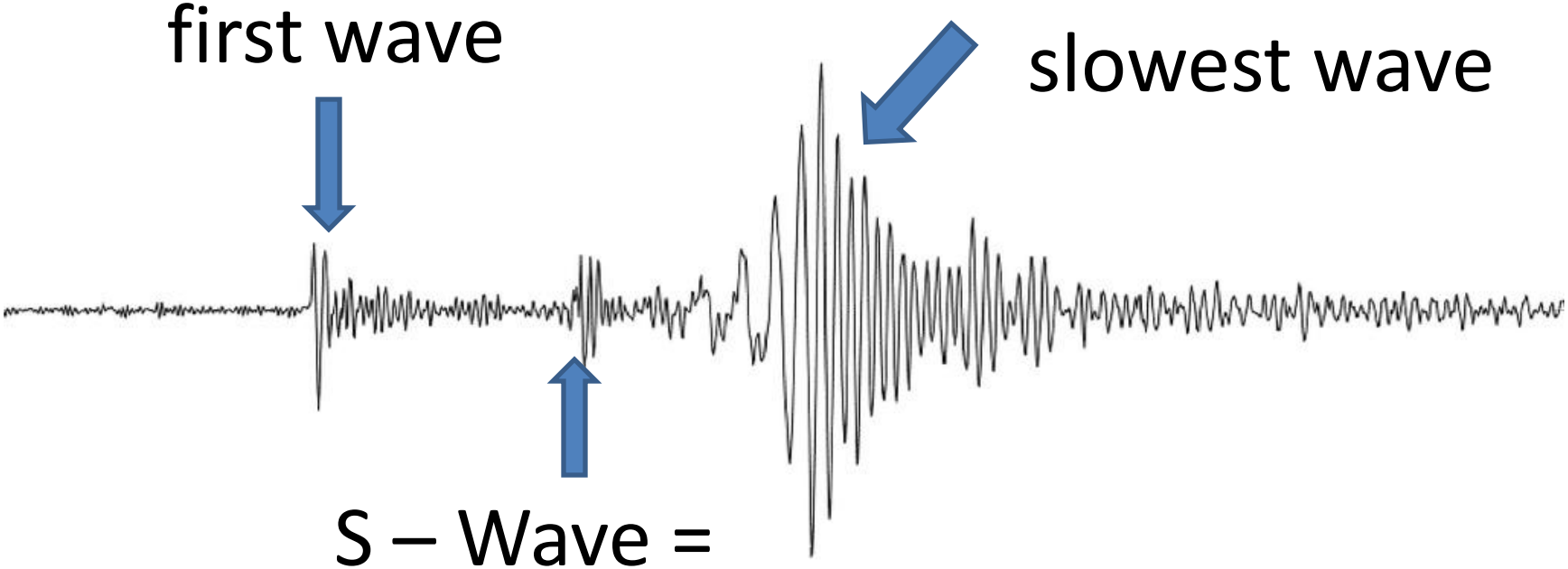




Seismogram

P – Wave =
first wave

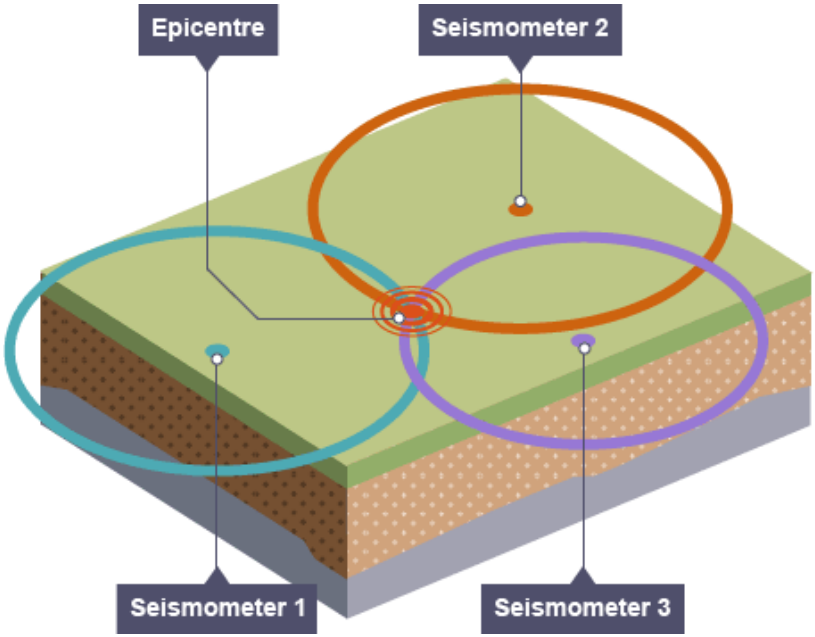
Surface Waves =
slowest wave



S – Wave =
second wave

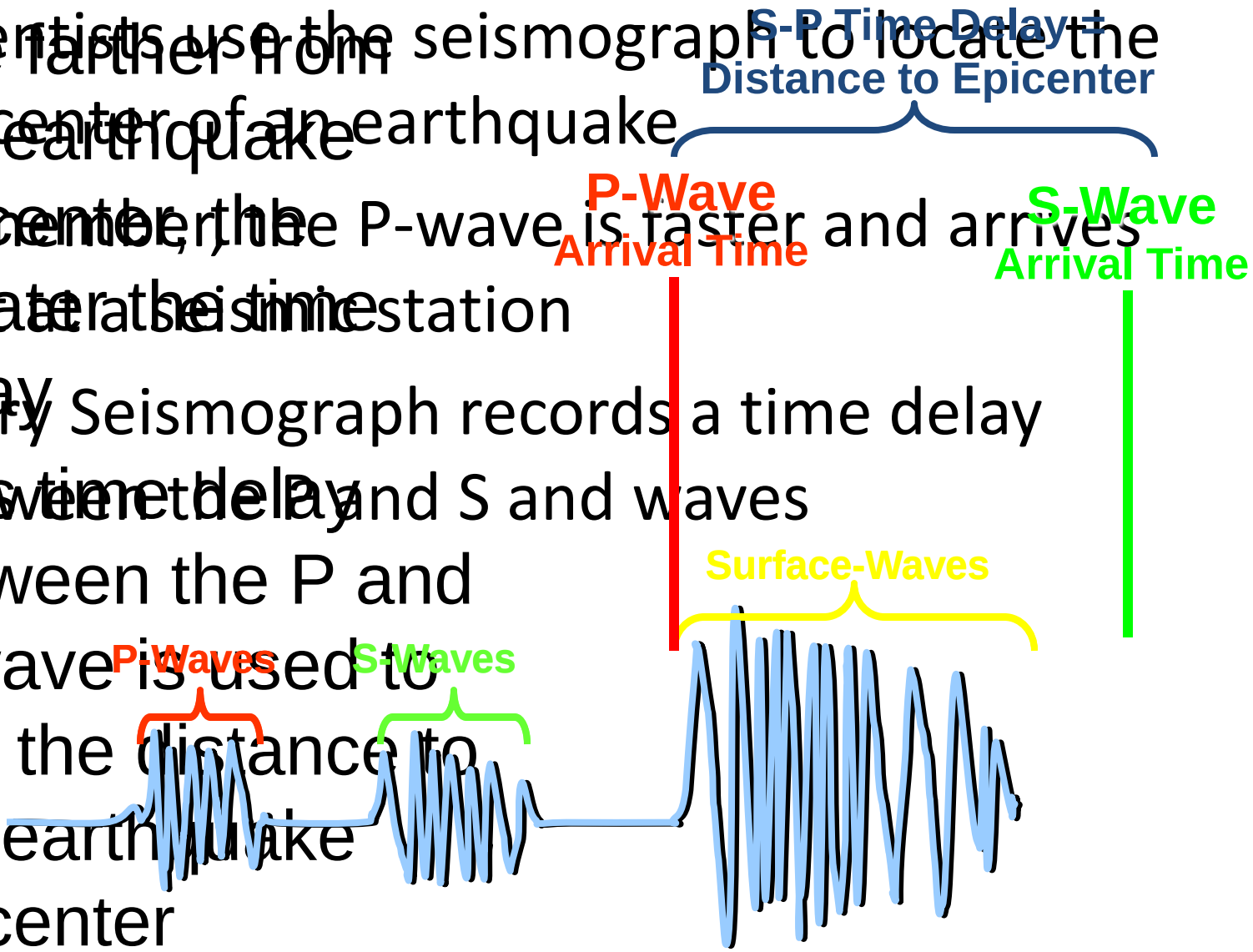
Determining Distance away from an Earthquake

- Triangulation: the process of using multiple seismic station seismograms to determine epicenter location
- It takes data from three seismic stations to determine the location of the epicenter of an earthquake.



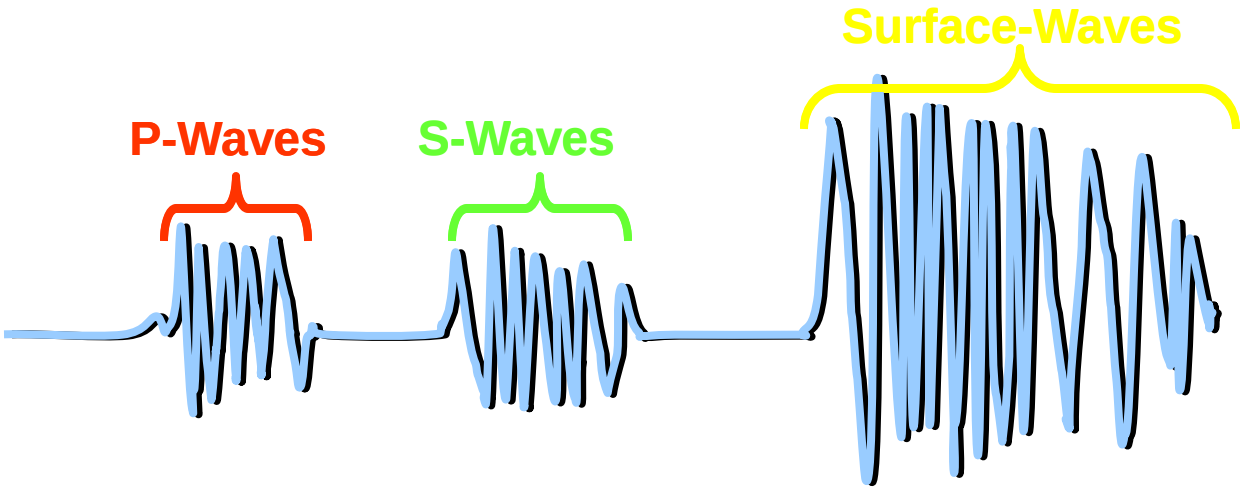
Distance To Earthquake Epicenter

- Scientists use the seismograph to locate the epicenter of an earthquake
- The farther from the earthquake epicenter, the greater the time delay
- Every Seismograph records a time delay between the P and S waves
- This time delay between the P and S wave is used to find the distance to the earthquake epicenter



Distance To Earthquake Epicenter

- Scientists use the seismograph to locate the epicenter of an earthquake
- Remember, the P-wave is faster and arrives first at a seismic station
- Every Seismograph records a time delay between the P and S and waves



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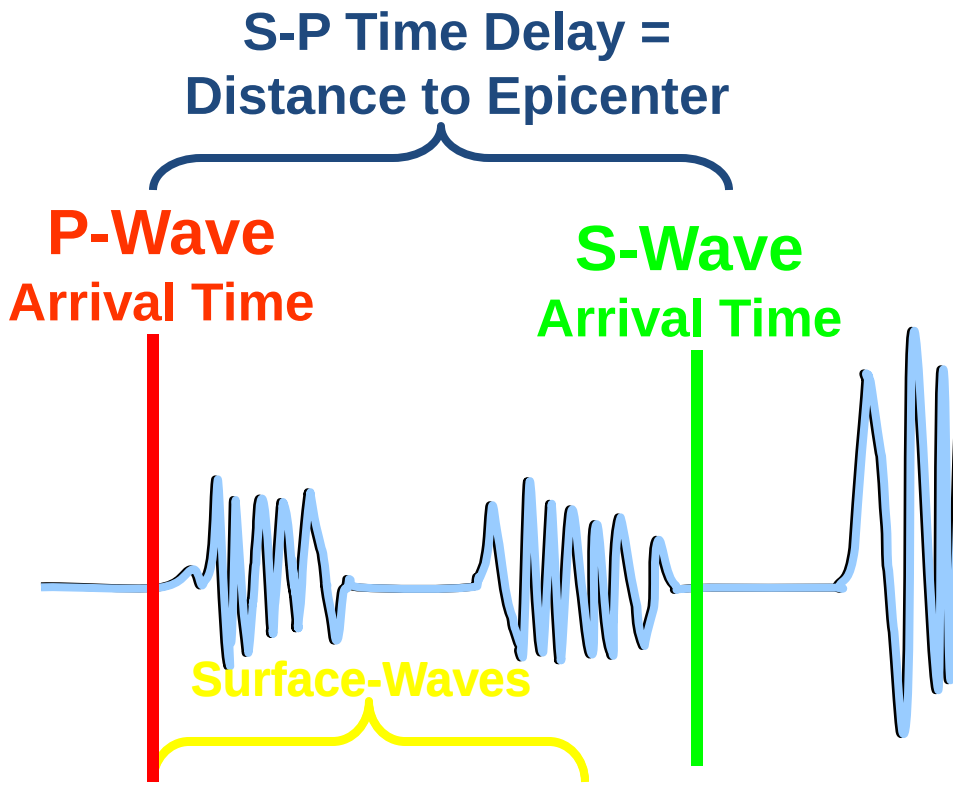
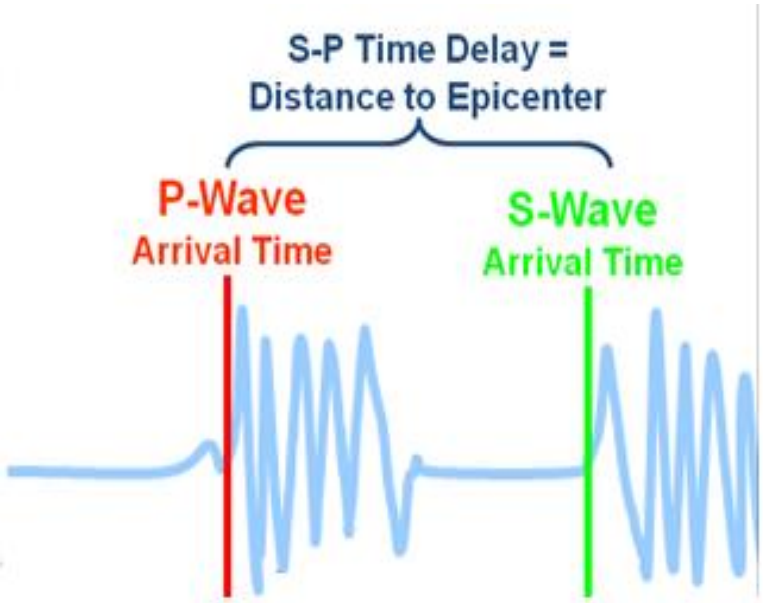


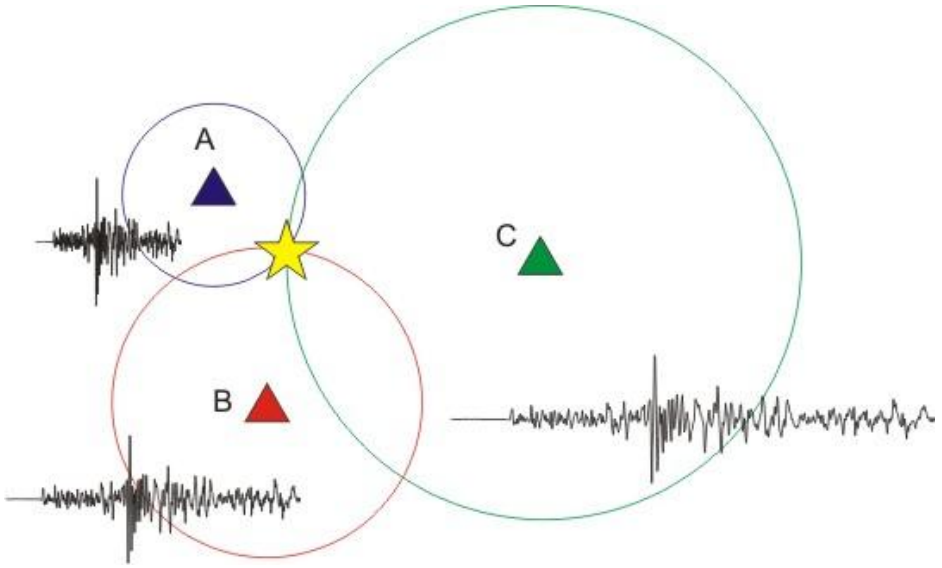
Determining Distance away from an Earthquake

- Scientist calculate time it take the waves to travel
- 100 km ÷ average speed of the wave = time
- Using the lag time and S-P interval, scientist calculate the distance from each city to the epicenter
- Distance = measured lag time (sec.) x 100 km ÷ lag time for 100 km



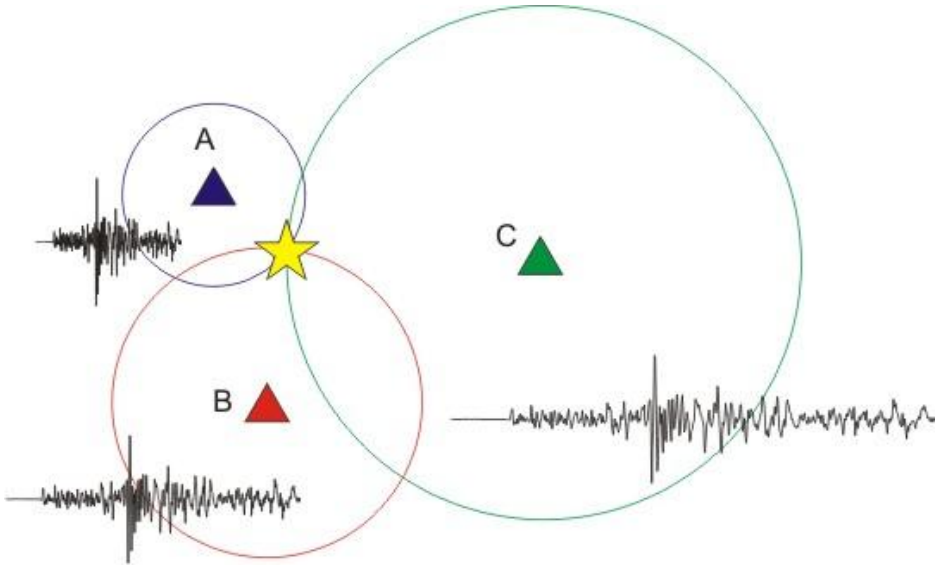
Determining Distance away from an Earthquake

- Use the scale on a map to measure distance away from the seismic station
- Using a compass, put the point on the seismic station and draw a circle
- We use a circle to represent that the earthquake could come from a distance all around the seismic station.

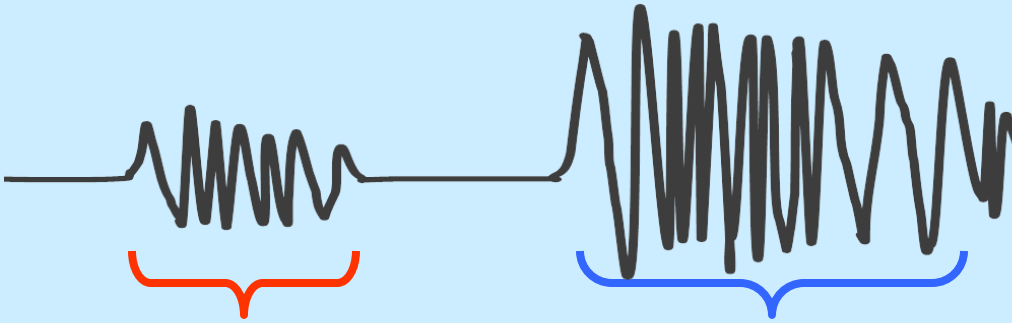


Determining Distance away from an Earthquake

- Repeat this process for the other seismic stations that recorded the earthquake
- The point where the circles intersect or come close to intersecting is where the epicenter of the earthquake is located

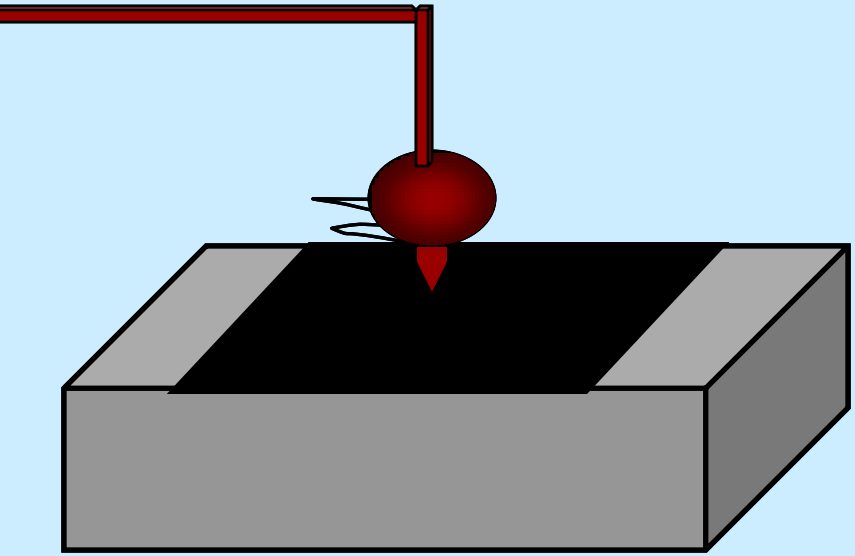


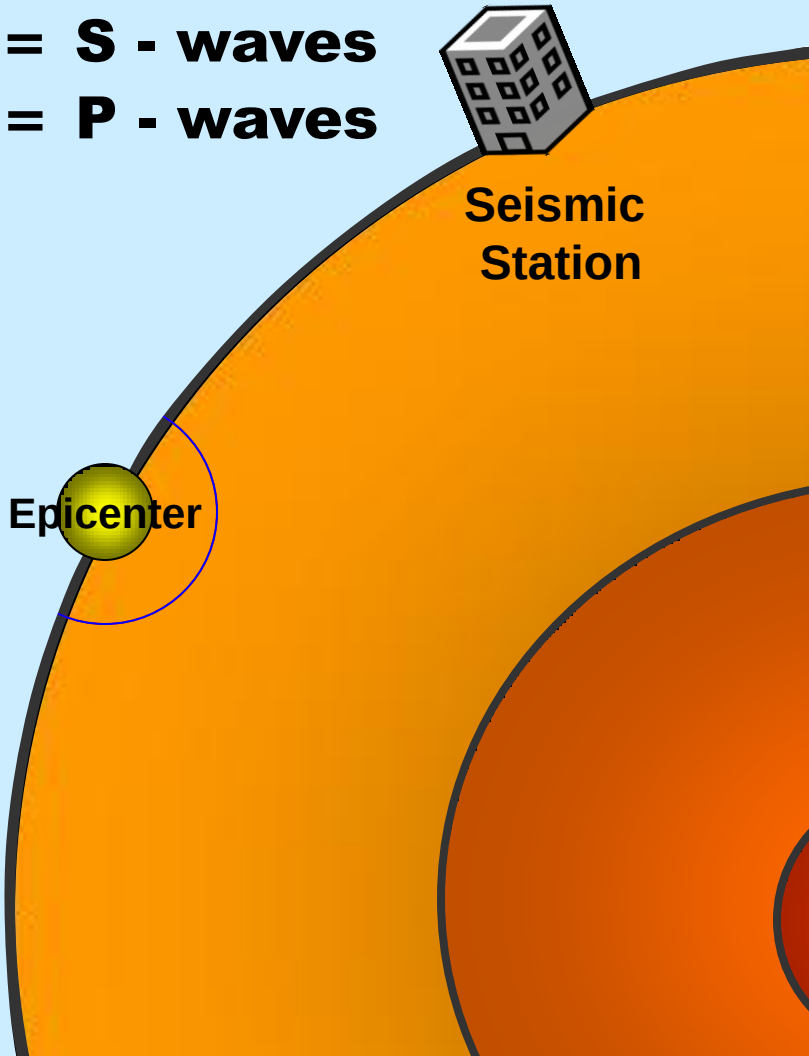
Distance to Epicenter



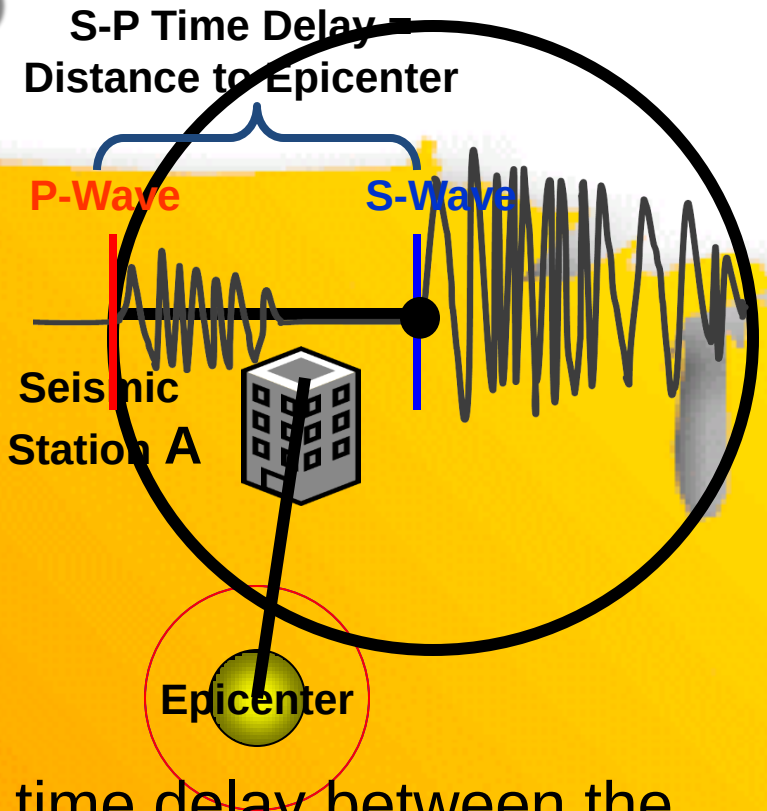
= S - waves

= P - waves





Distance to Epicenter



The time delay between the **S** and **P** wave gives us the Distance to the epicenter

In other words,

S-P Time Delay = Distance to Epicenter

Triangulation