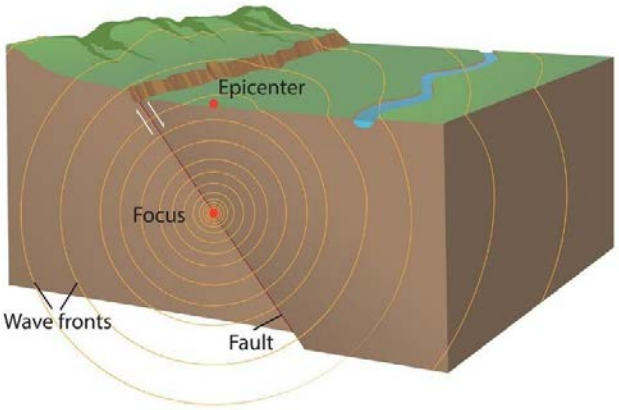
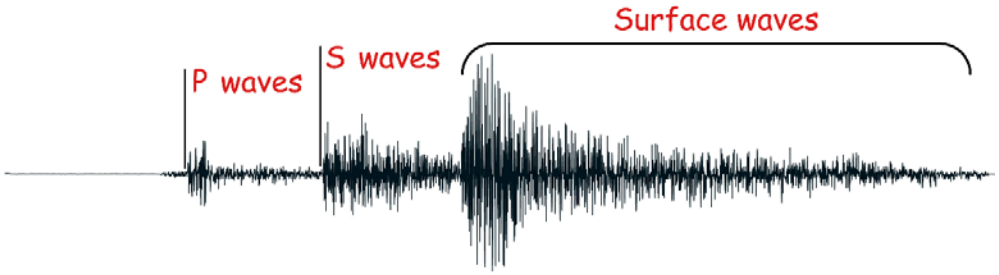
Seismic Waves: Locating the Epicenter—Scientific Background

Most earthquakes occur along cracks in the ground called *faults*. Faults (and earthquakes) are common where plates meet, such as along California's San Andreas Fault, which runs from San Francisco to Los Angeles. Plate movements cause the rock on either side of the fault to move very slowly. If the rock becomes stuck along part of the fault, tension can build up until the rocks move violently and suddenly. This is an earthquake.

When an earthquake occurs, *seismic waves* emanate outward from the *focus* of the quake, where the rocks moved below Earth's surface. The *epicenter* is the point on Earth's surface directly above the focus where the shaking is first felt.



There are three types of seismic waves. The first type are primary waves, or P waves. Along the P wave, the bedrock moves back and forth, parallel to the direction of the wave. This is an example of a longitudinal wave. Next are the secondary waves, or S waves. As an S wave passes, the bedrock moves side to side at a right angle to the direction of the wave. When P and S waves reach the surface, they combine to form rolling surface waves, causing the ground to move in a circular motion as the waves pass. Because they combine the energy of P and S waves, surface waves are the largest and most destructive waves. The three types of waves can be identified on a seismogram, which shows the level of shaking over time.



Because P waves travel through bedrock more quickly than S waves, the time difference between the P- and S-wave arrival times increases with distance from the epicenter. This can be used to measure the distance from the epicenter to the seismograph station. By using data from three seismograph stations, the exact location of the epicenter can be triangulated.

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