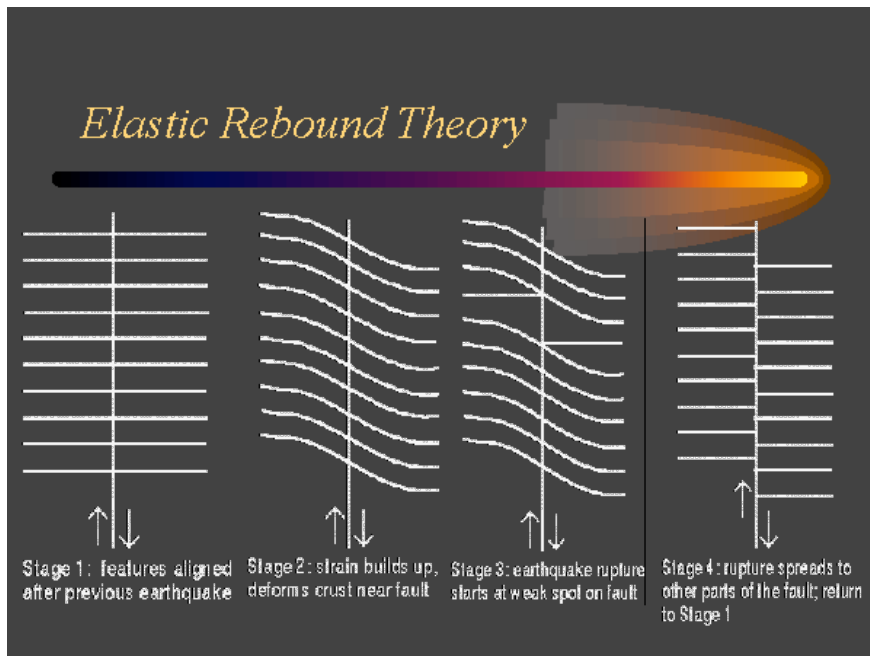


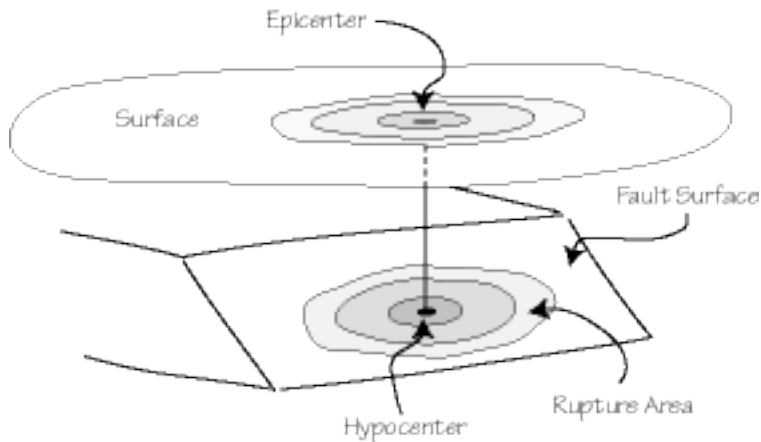
### Elastic Rebound Theory

The theory was first proposed in 1906 by H.F. Reid following the San Francisco quake. He based his theory on strike slip faults such as the San Andreas fault. It states that rocks begin to deform under stress and as the stress becomes greater, the fault ruptures. Following the rupture the rocks rebound to their original shape.



<http://www.science.sjsu.edu/scied/255/cmanganaro/img003.gif>

The rupture starts at the hypocenter (focus) and propagates away from that point in an irregular pattern. The amount of rocks that are ruptured determines the size of the quake.



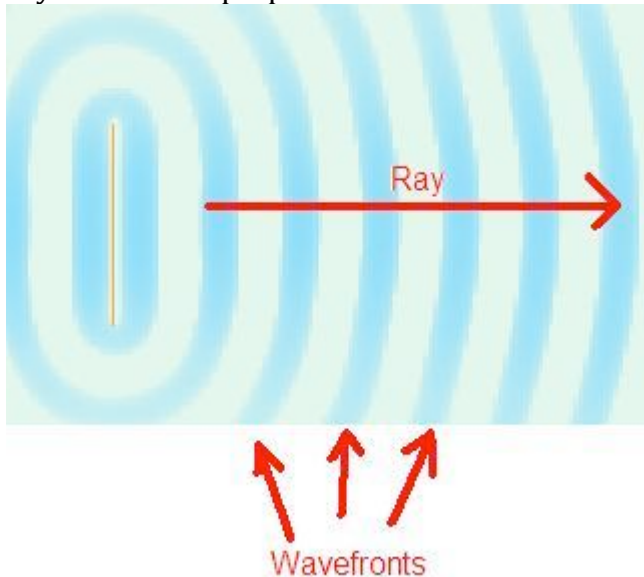
[http://eqseis.geosc.psu.edu/~cammon/HTML/Classes/IntroQuakes/Notes/Images\\_specific/epi\\_hypocenter.gif](http://eqseis.geosc.psu.edu/~cammon/HTML/Classes/IntroQuakes/Notes/Images_specific/epi_hypocenter.gif)

The focus (hypocenter) is where the rupture begins and energy is released in waves.

The epicenter is the spot on the map directly above the focus.

Waves move in wave fronts.

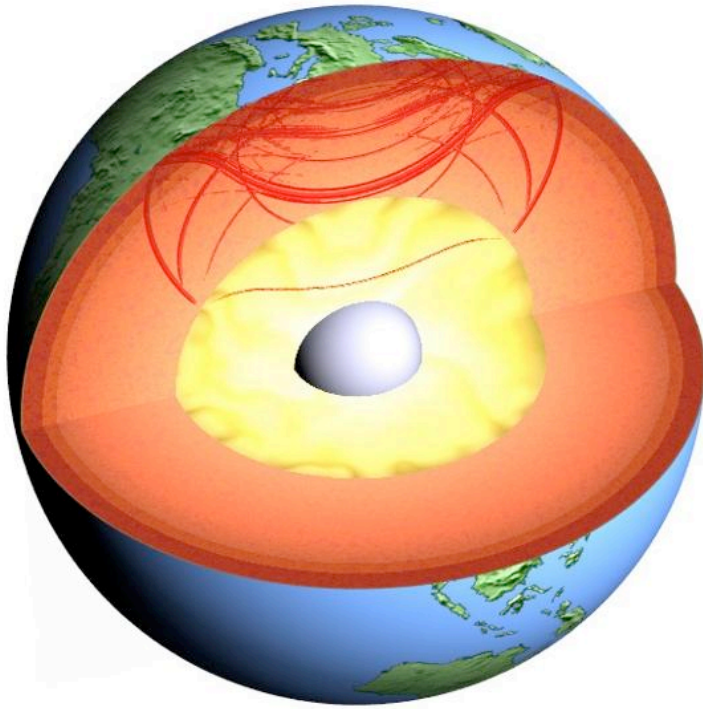
Rays are drawn perpendicular to wave fronts to indicate direction of movement.



<http://ibphysicsstuff.wdfiles.com/local--files/traveling-waves/WaveFrontRay.jpg>

A wave is a traveling disturbance, i.e. sound waves.

Seismic waves disturb the material that forms the Earth.



[http://www.bgr.bund.de/EN/Themen/Seismologie/Bilder/Sei\\_seis\\_ctbto\\_g.property=default.jpg](http://www.bgr.bund.de/EN/Themen/Seismologie/Bilder/Sei_seis_ctbto_g.property=default.jpg)

There are four main types of waves: P, S, R, & L.

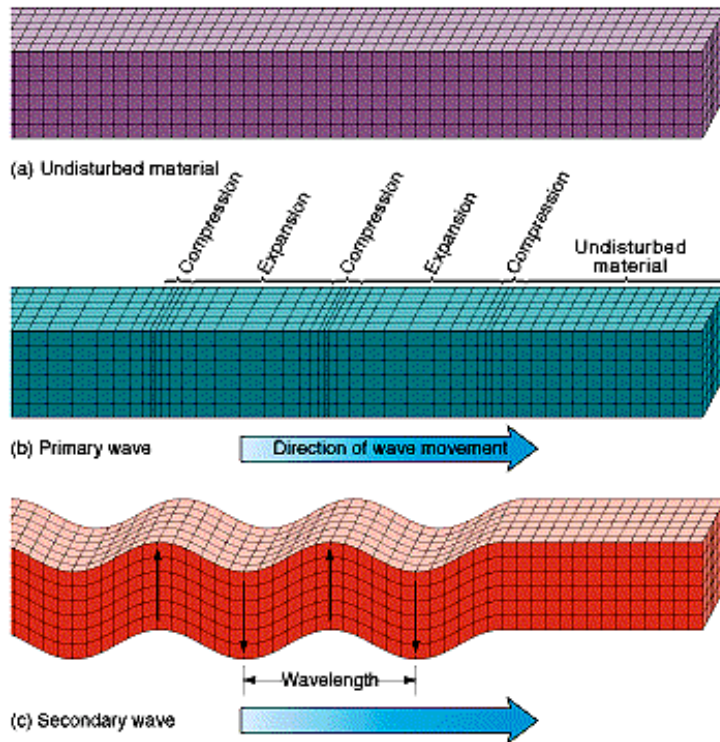
Body Waves – travel through the interior of the earth.

Two main types of body waves: Primary and Secondary

P Waves – Primary – Compressional: travel through solid, liquid and gas.

S Waves – Secondary – Shearing: travel only through solid.

These are the first two wave to arrive after an earth quake.



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[http://www.globalchange.umich.edu/globalchange1/current/lectures/nat\\_hazards/d08\\_08.gif](http://www.globalchange.umich.edu/globalchange1/current/lectures/nat_hazards/d08_08.gif)

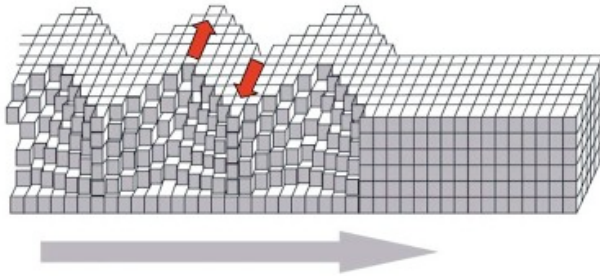
Surface waves – travel only along the surface and die out with depth.

R Waves – Rayleigh – same motion as S Waves but all the motion is on the surface.

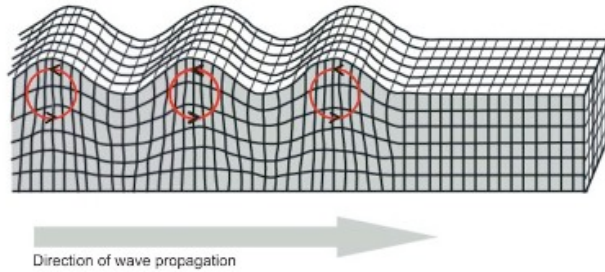
L Waves – Love – least common but most damaging. They have a shearing motion.

## Surface waves

### Love wave



### Rayleigh wave



<http://warmowski.files.wordpress.com/2008/04/earthquake-l-r-waves-passage.jpg>

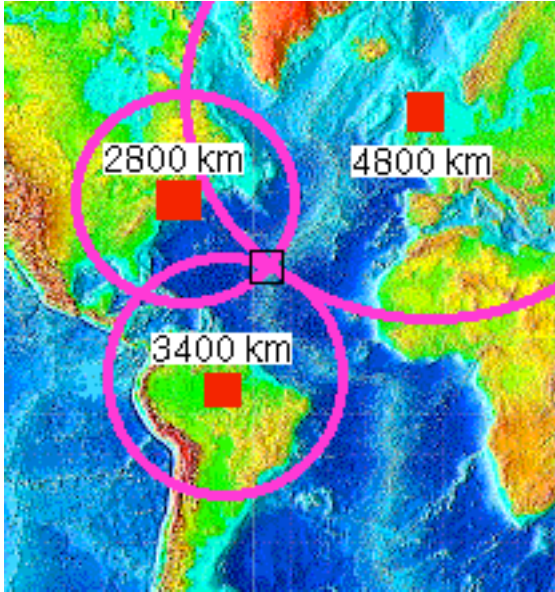
Each of the 4 types of waves travels at a different velocity and can be calculated with different, complex equations.

P-Waves are the fastest, S-Waves are the second fastest then the surface waves.

By the time the surface waves arrive, there are many wave reflections so they can be difficult to distinguish on a seismograph.

No surface waves occur from a deep quake.

In order to find the location of a quake, travel times for waves and several seismic stations are used.



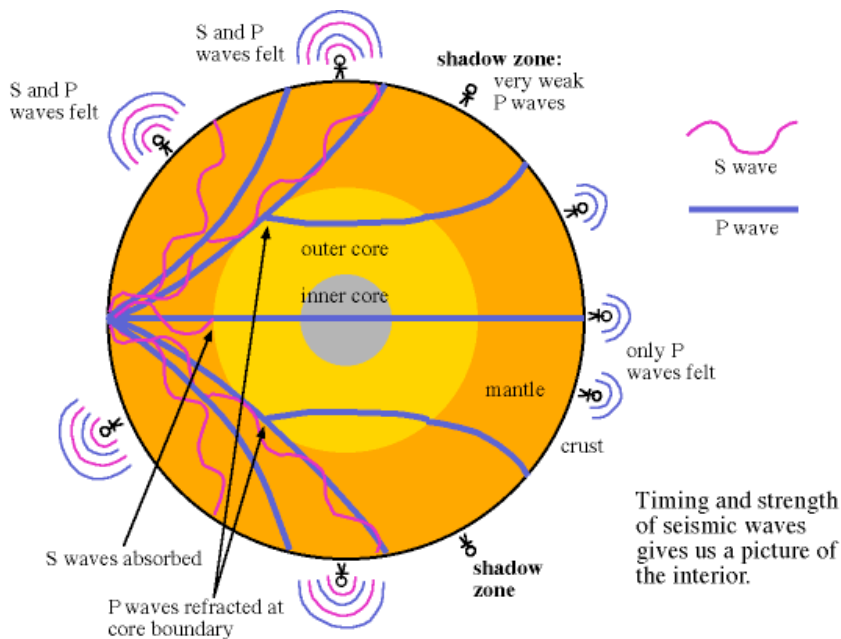
<http://www.seismo.unr.edu/ftp/pub/louie/class/100/eq-loc.GIF>

Seismology is the study of earthquakes.

Direct waves: S Waves do not travel through the liquid outer core.

Some waves can be either partially or totally reflected or refracted.

Some waves can be converted to other types of waves as they cross from the crust to mantle or to core.



<http://www.astronomynotes.com/solarsys/seismicb.gif>

Wave Interactions:

In phase – makes waves bigger

180° out of phase – cancels waves out

Different waves – new waves and patterns created.

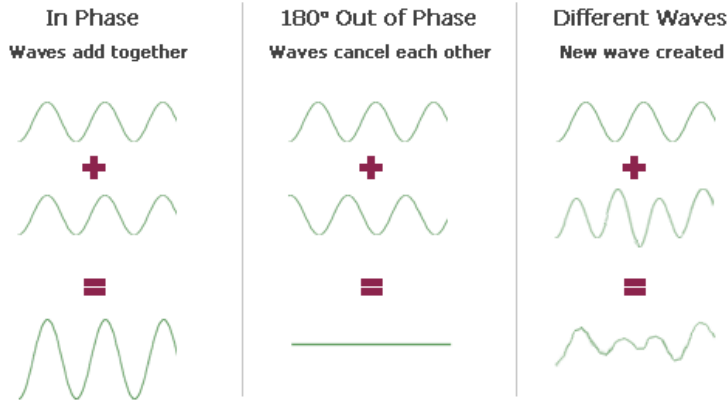


Image courtesy of [www.mediacollege.com](http://www.mediacollege.com)

<http://www.mediacollege.com/audio/images/wave-interaction.gif>