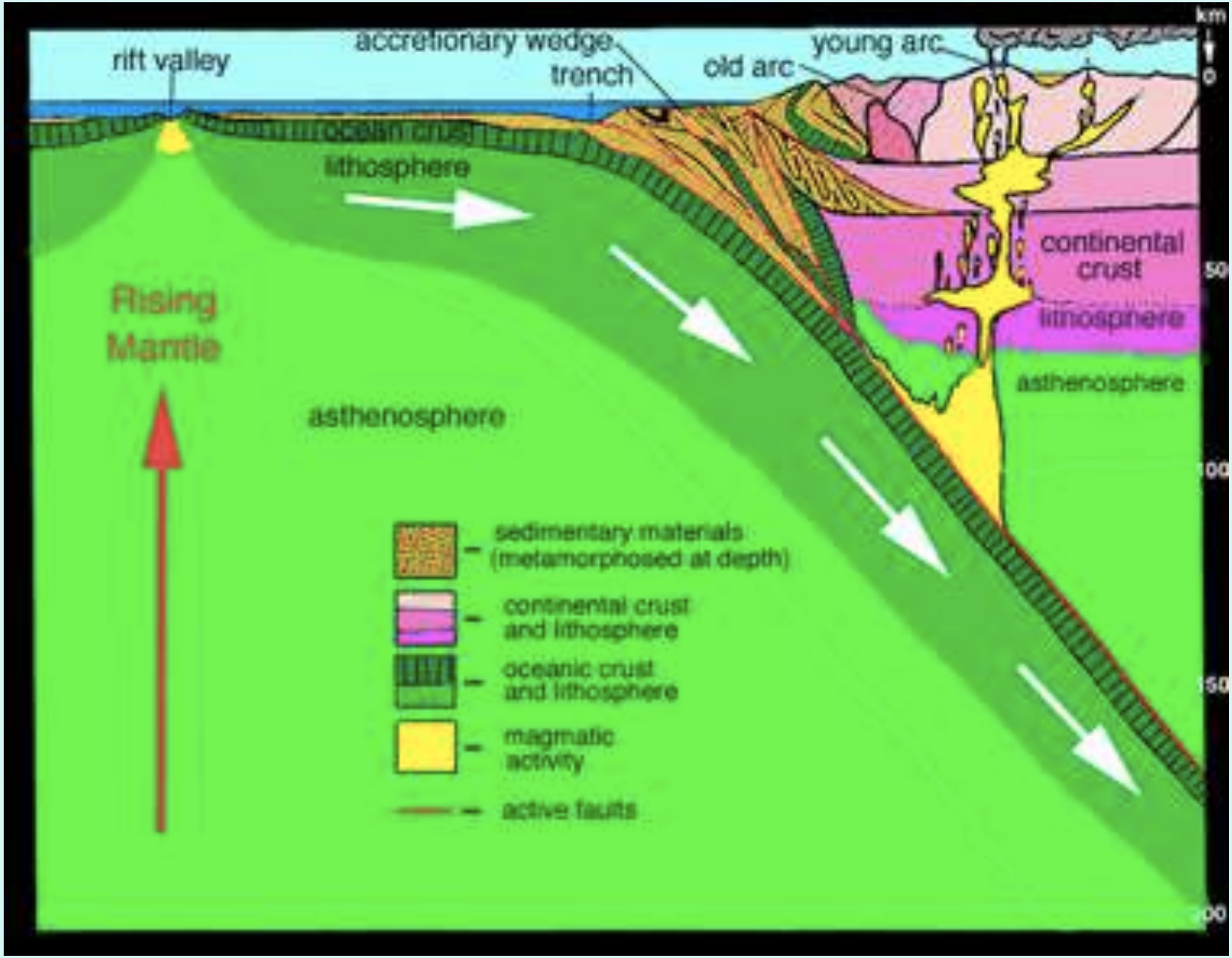
Earthquake Glossary

Dr. Raman kumar Biswas

7 Feb 2022

Accretionary wedge



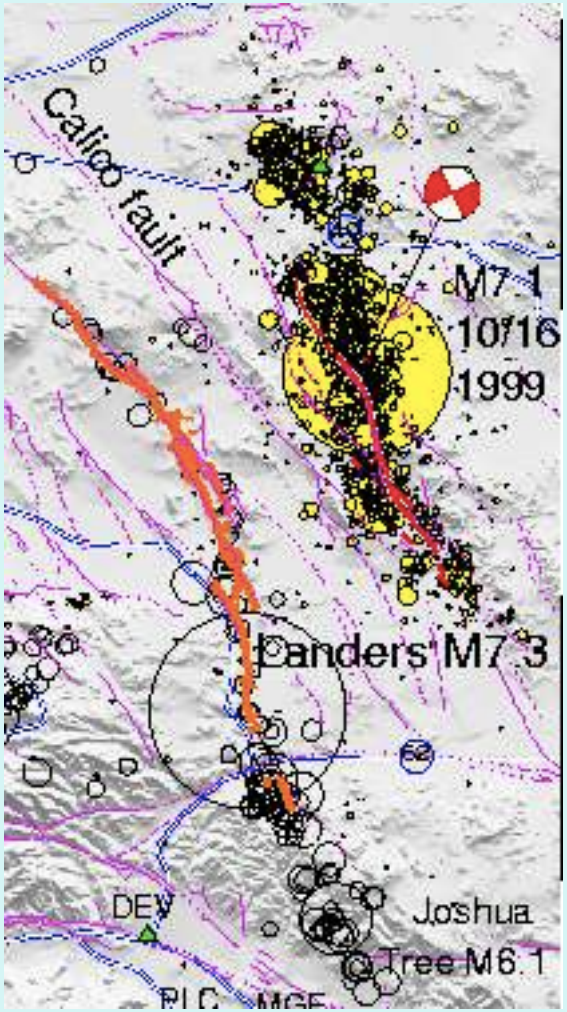
Active fault

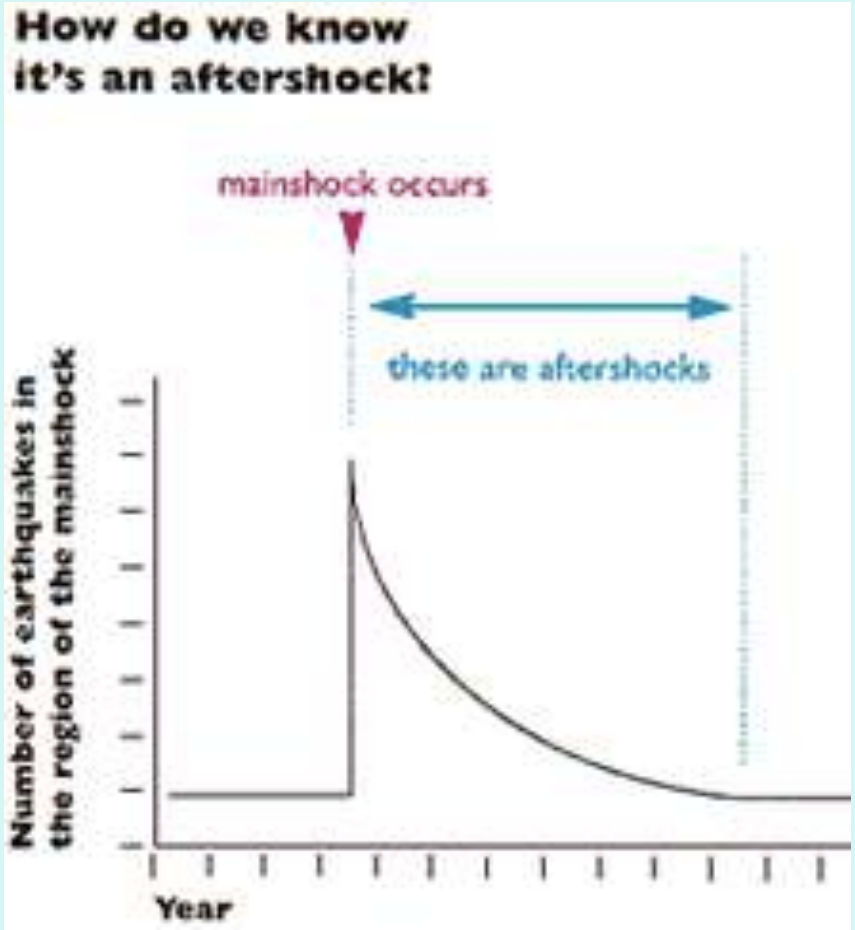
A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered to be active if they have moved one or more times in the last 10,000 years.

The Emerson fault, one of the segments that ruptured in the M7.2 1992 Landers, Calfornia earthquake. (Photo by Kerry Sieh, Caltech)

Aftershocks

Aftershocks are earthquakes that follow the largest shock of an earthquake sequence. They are smaller than the mainshock and within 1-2 rupture lengths distance from the mainshock. Aftershocks can continue over a period of weeks, months, or years. In general, the larger the mainshock, the larger and more numerous the aftershocks, and the longer they will continue.



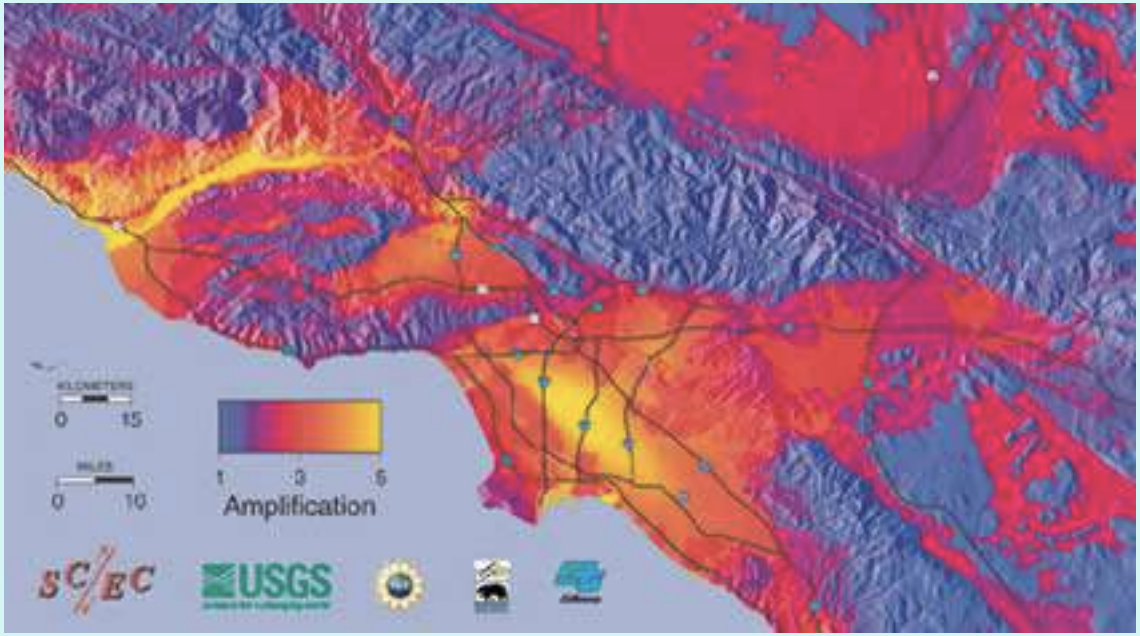


The Landers fault (red lines at left) and the Hector Mine fault and its aftershocks (red lines and circles at right). The Hector Mine earthquake was a magnitude 7.1, and it produced thousands of aftershocks. (Image courtesy of Egill Hauksson, Caltech)

Aftershocks

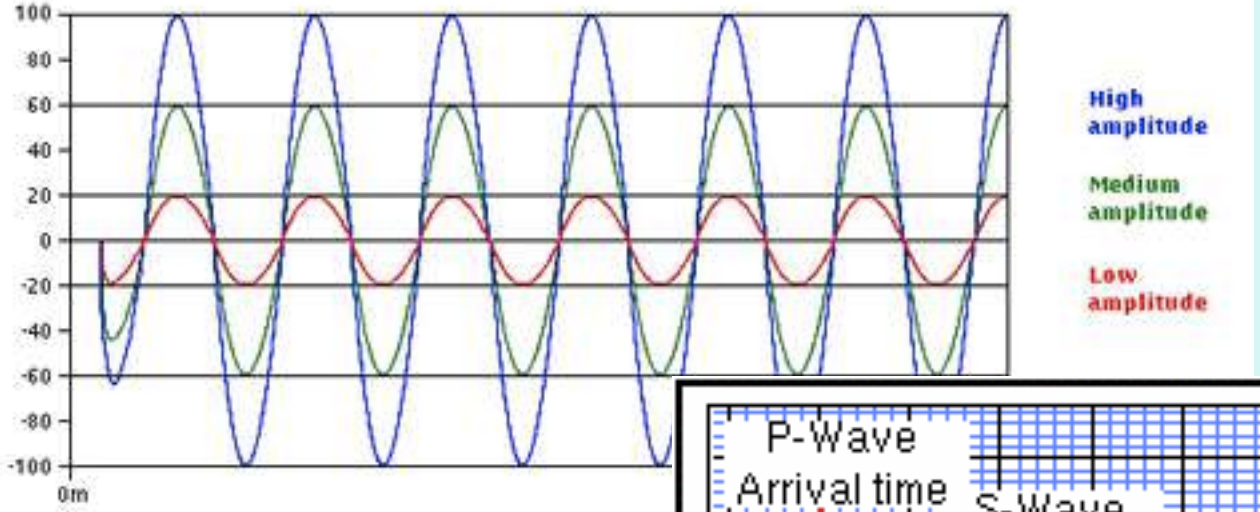
Amplification

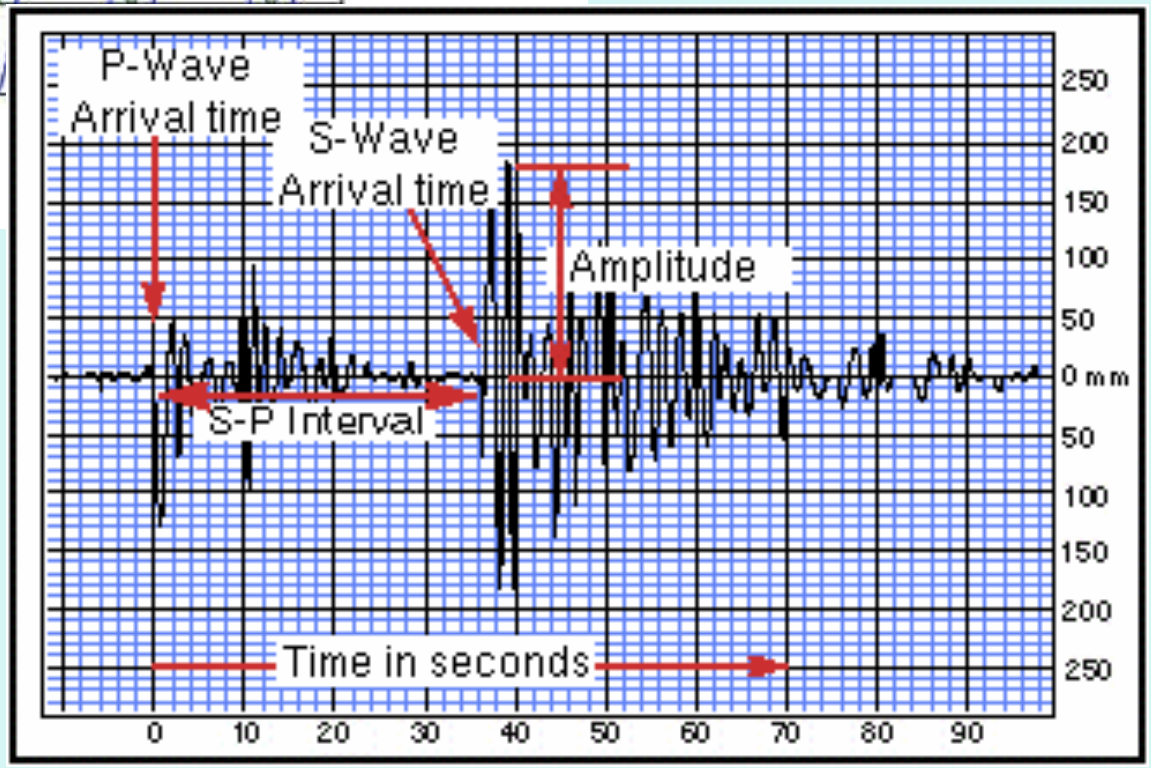
Shaking levels at a site may be increased, or amplified, by focusing of seismic energy caused by the geometry of the sediment velocity structure, such as basin subsurface topography, or by surface topography.



Amplitude

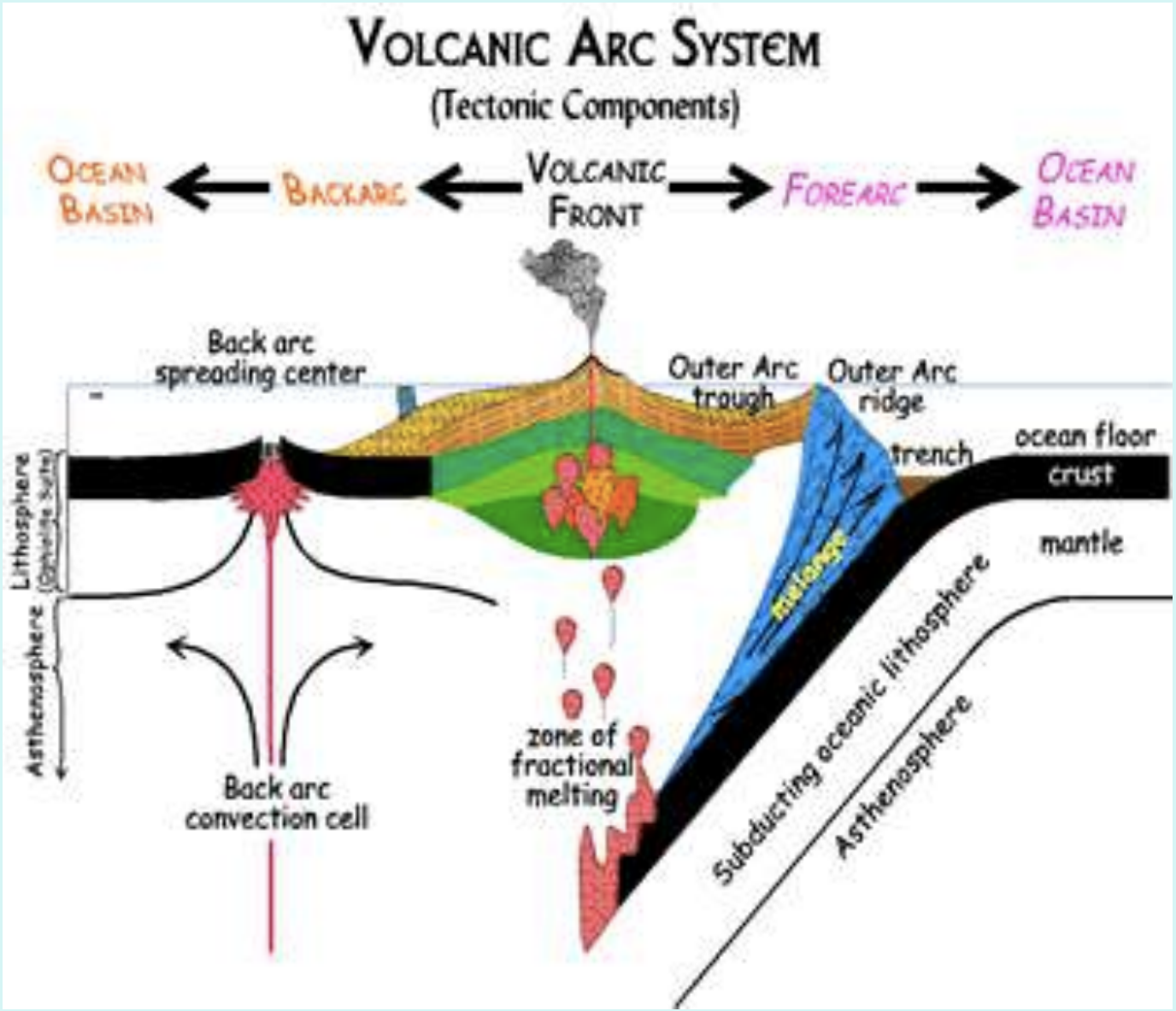
The amplitude is the size of the wiggles on an earthquake recording.





Arc

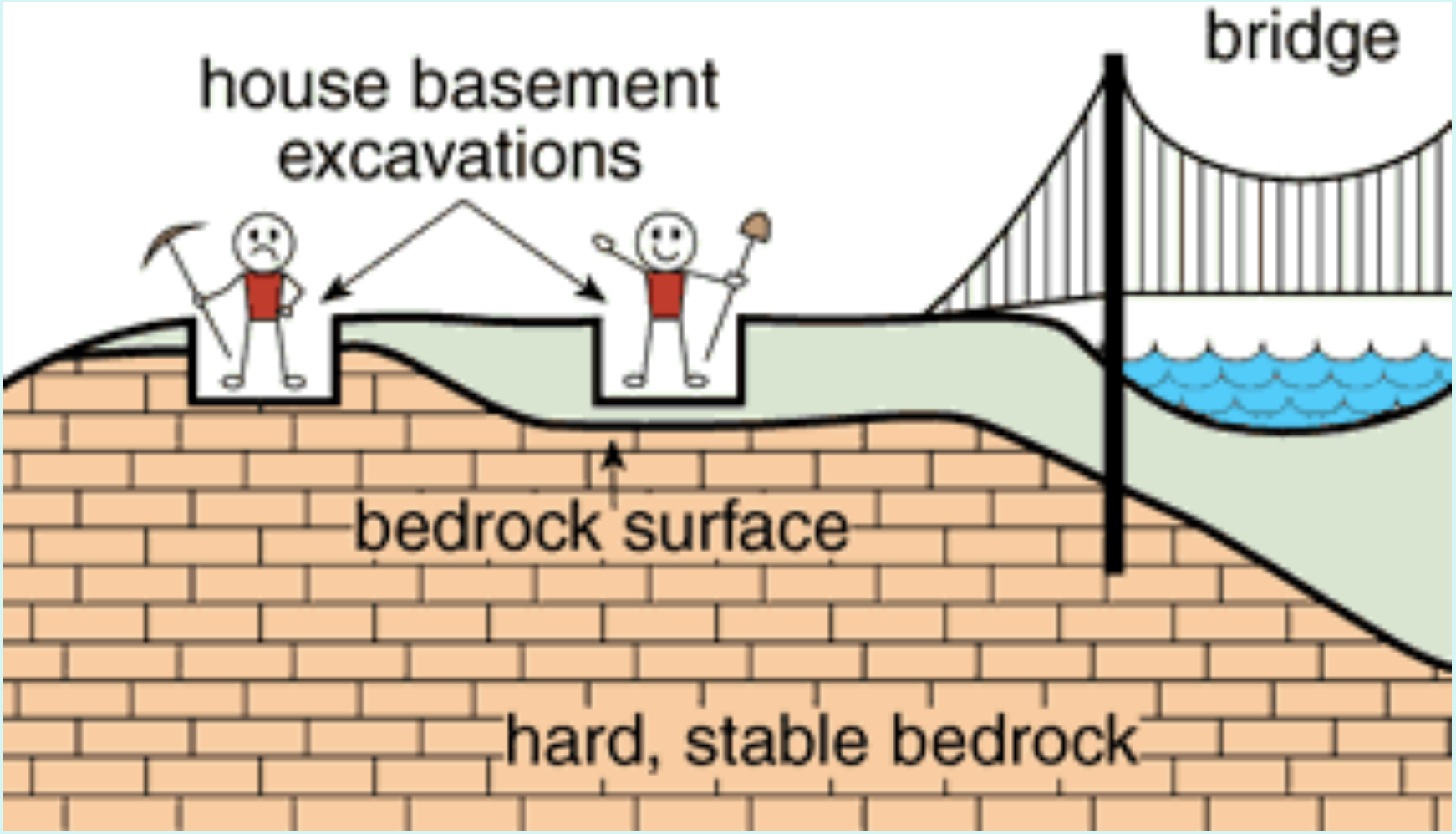
An arc is a chain of volcanoes (volcanic arc) that sometimes forms on the land when an oceanic plate collides with a continental plate and then slides down underneath it (subduction).



(Image courtesy of Lynn Fichter, James Madison Univ.)

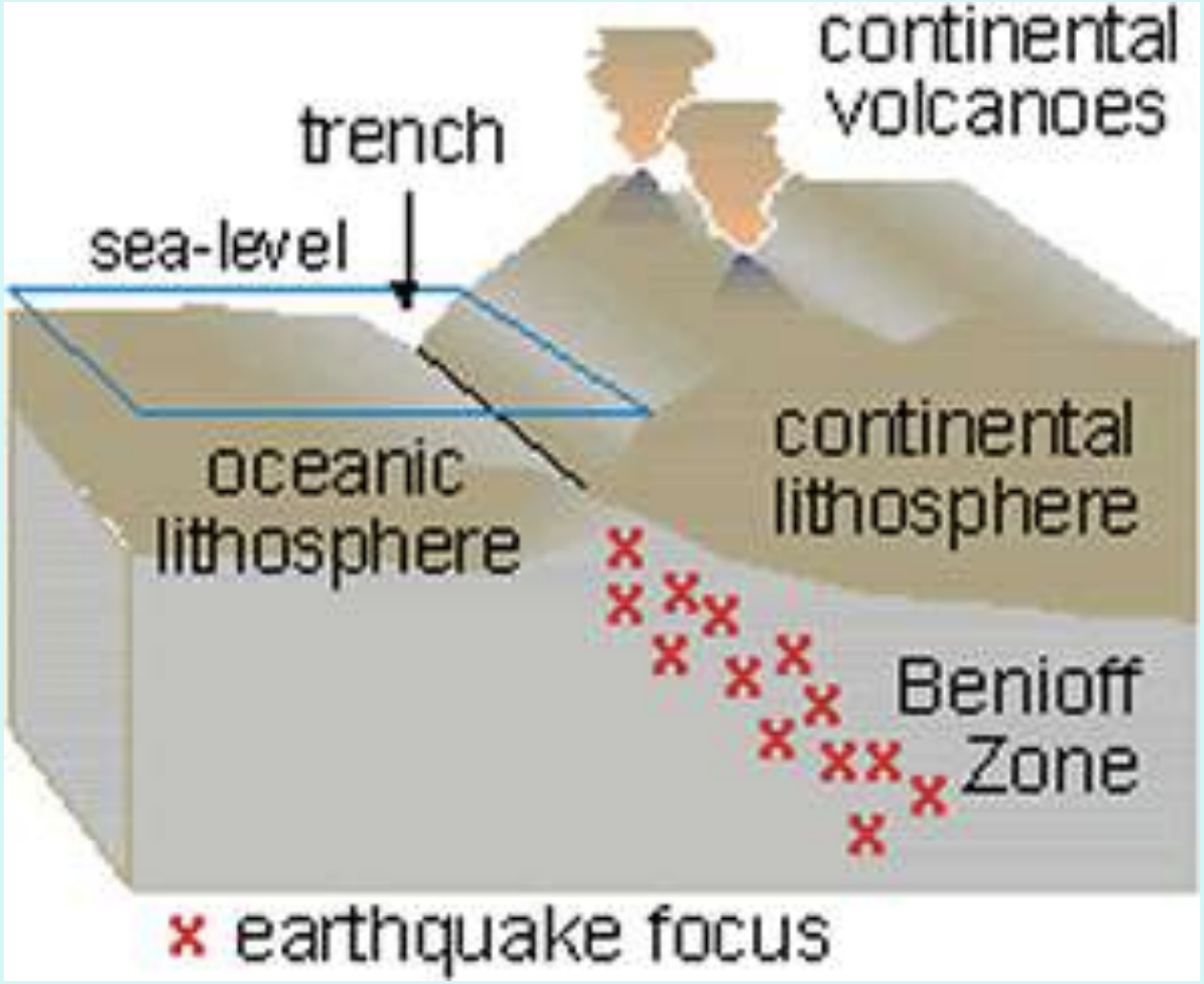
Basement

Harder and usually older igneous and metamorphic rocks that underlie the main sedimentary rock sequences (softer and usually younger) of a region and extend downward to the base of the crust.



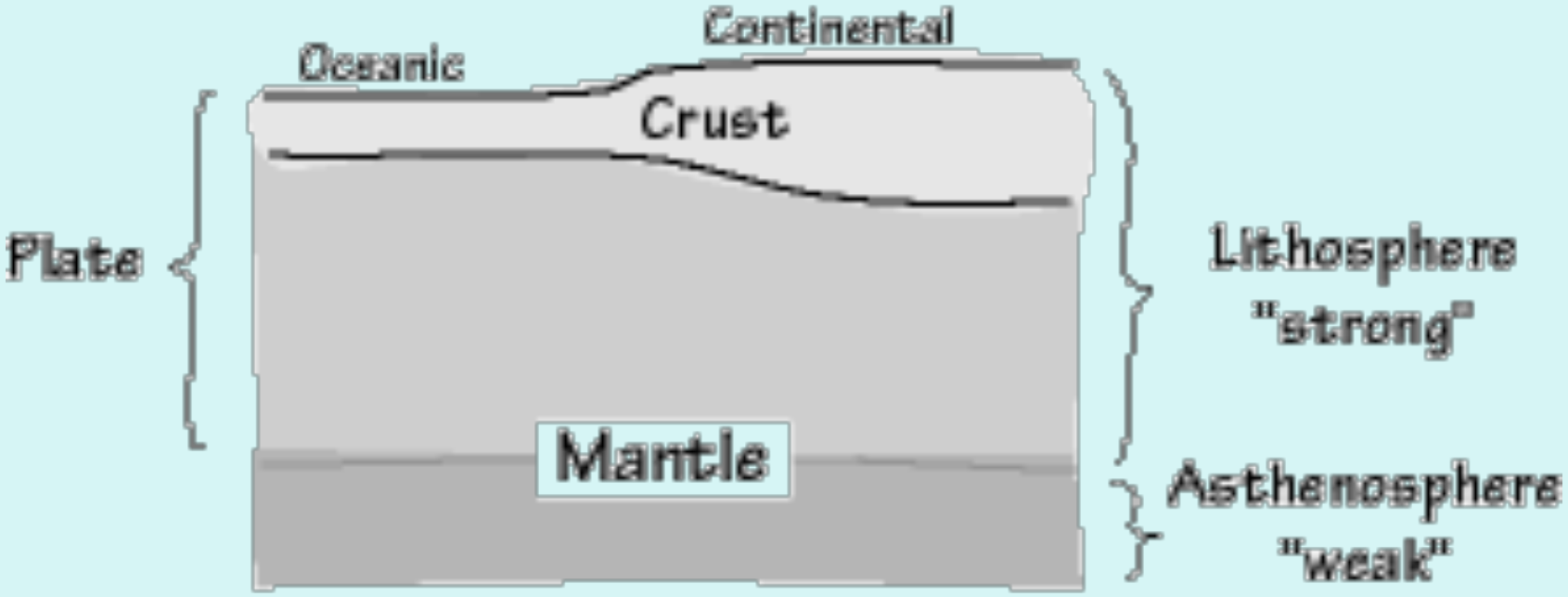
Benioff zone

A dipping planar (flat) zone of earthquakes that is produced by the interaction of a downgoing oceanic crustal plate with a continental plate. These earthquakes can be produced by slip along the subduction thrust fault or by slip on faults within the downgoing plate as a result of bending and extension as the plate is pulled into the mantle. Also known as the Wadati-Benioff zone.



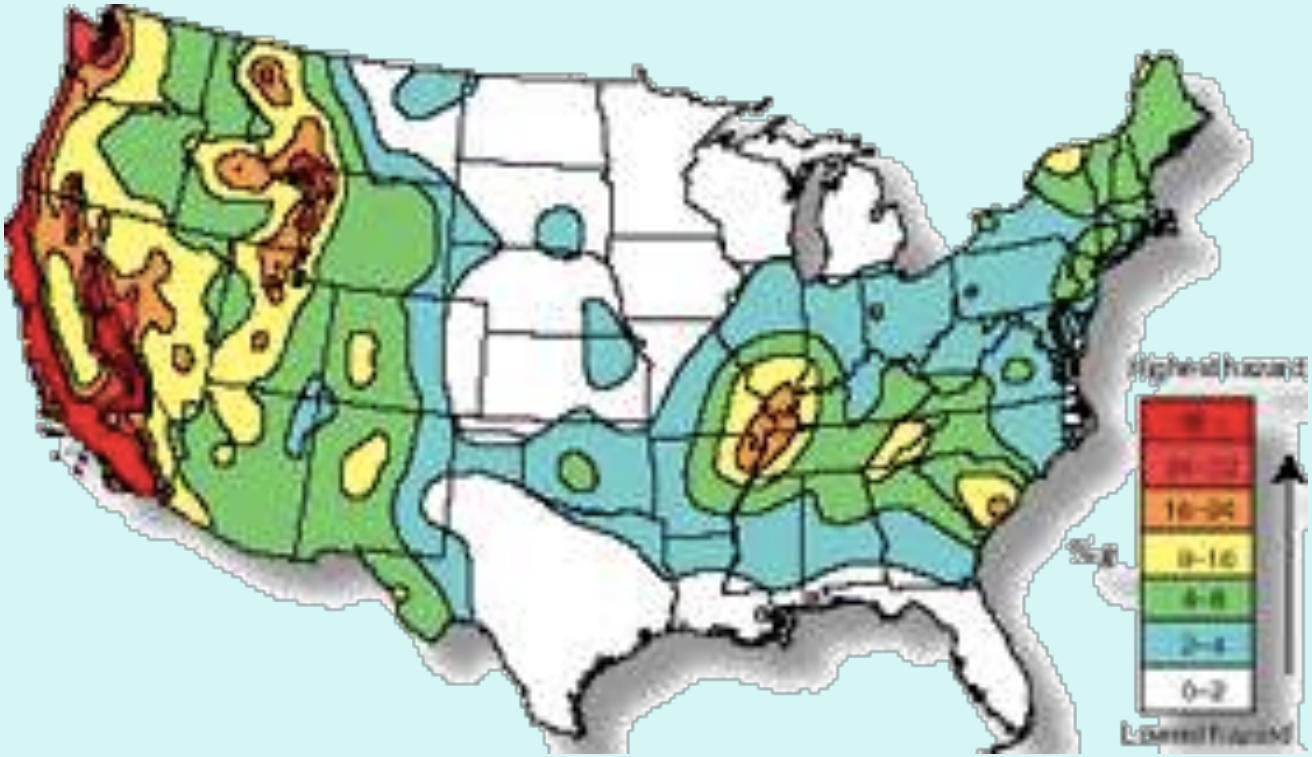
Brittle-ductile boundary

The depth in the crust where the crust changes from being brittle (tending to break) above, to being ductile (tending to bend) below. Most earthquakes occur in the brittle portion of the crust above the brittle-ductile boundary.



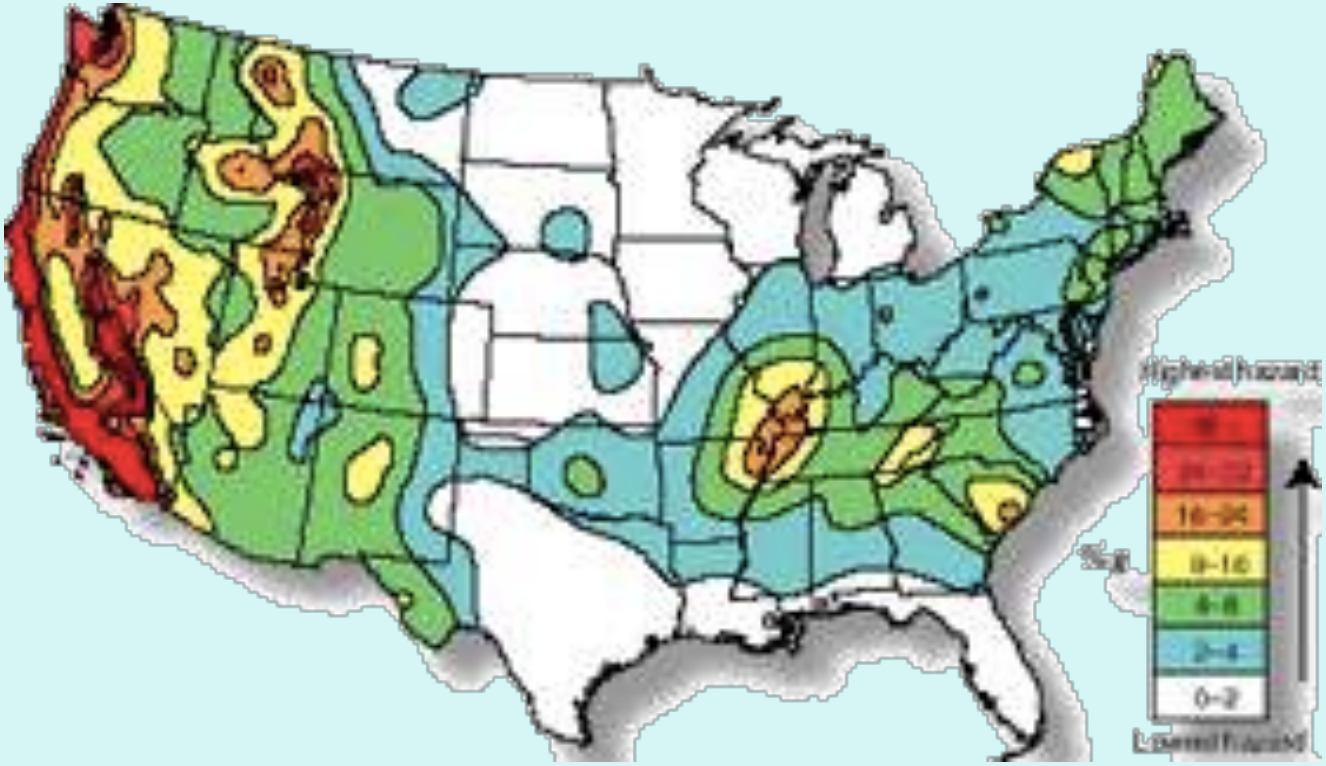
Earthquake risk

Earthquake risk is the probable building damage, and number of people that are expected to be hurt or killed if a likely earthquake on a particular fault occurs. Earthquake risk and earthquake hazard are occasionally incorrectly used interchangeably.



Earthquake hazard

Earthquake hazard is anything associated with an earthquake that may affect the normal activities of people. This includes surface faulting, ground shaking, landslide, liquefaction, tectonic deformation, tsunamis, and seiches.



Fault scarp

The fault scarp is the feature on the surface of the earth that looks like a step caused by slip on the fault.

Fault scarp produced by the M7.1 Hector Mine, Calfornia earthquake. (Photo by Ken Hudnut, U.S. Geological Survey)

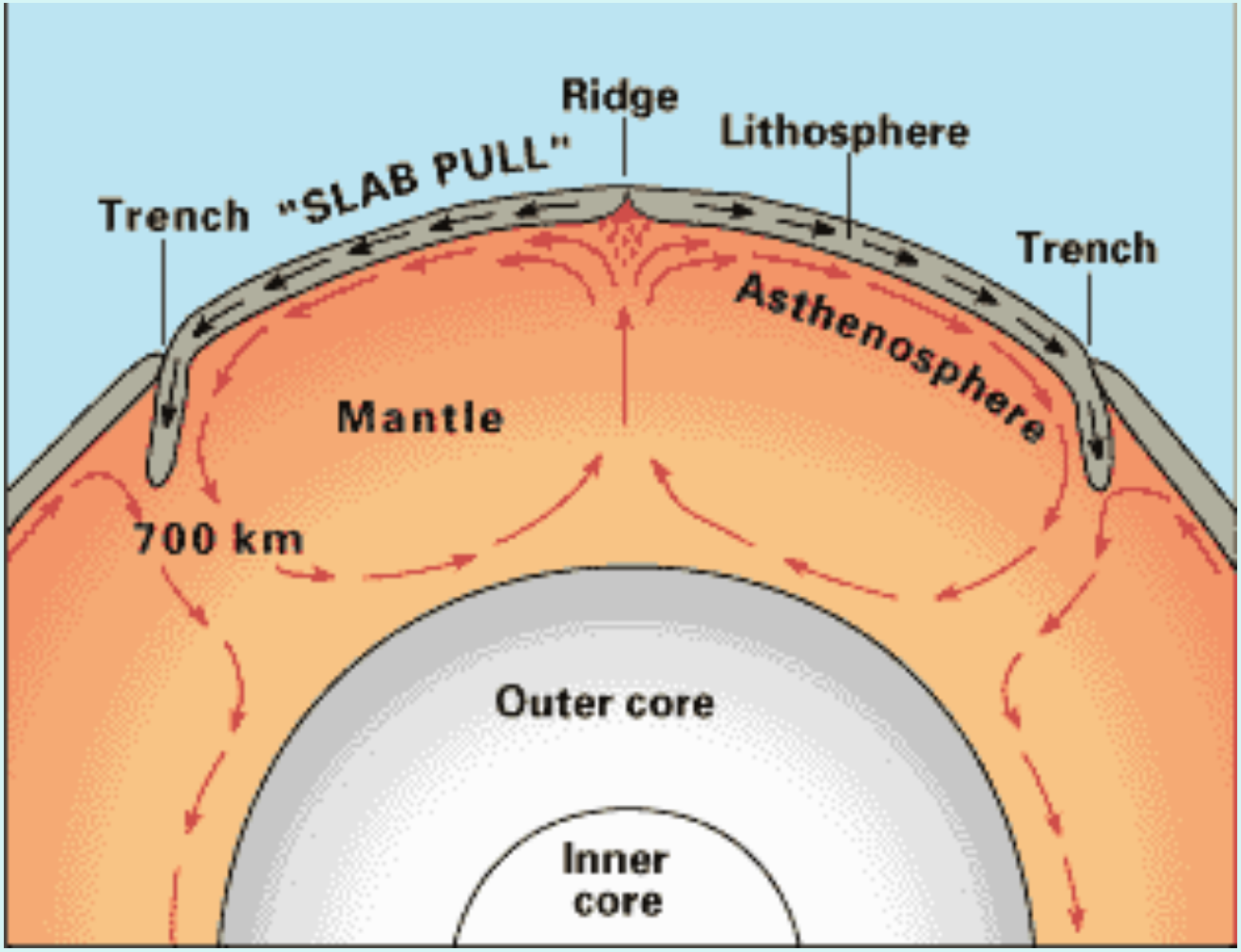
Intensity

The intensity is a number (written as a Roman numeral) describing the severity of an earthquake in terms of its effects on the earth's surface and on humans and their structures. Several scales exist, but the ones most commonly used in the United States are the Modified Mercalli scale and the Rossi-Forel scale. There are many intensities for an earthquake, depending on where you are, unlike the magnitude, which is one number for each earthquake.

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Oceanic trench

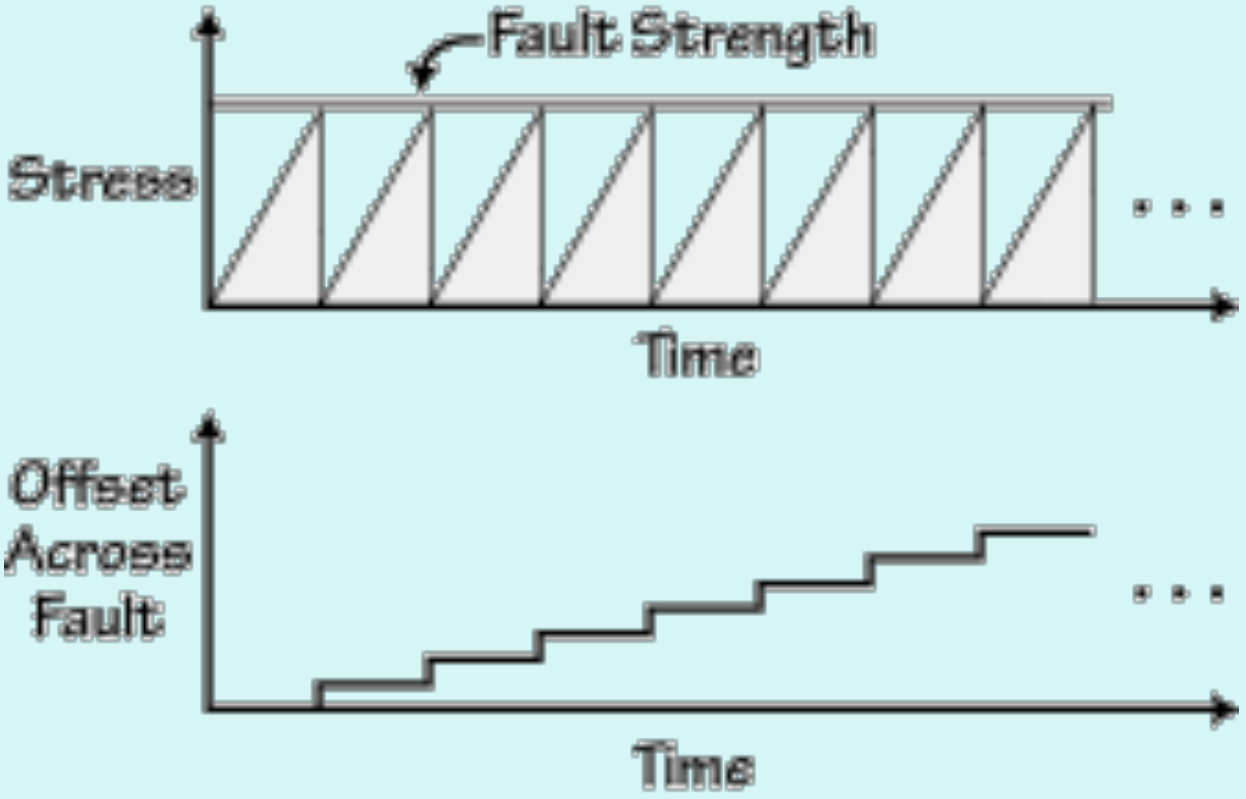
An oceanic trench is a linear depression of the sea floor caused by the subduction of one plate under another.



(Image from "This Dynamic Earth: The Story of Plate Tectonics")

Recurrence interval

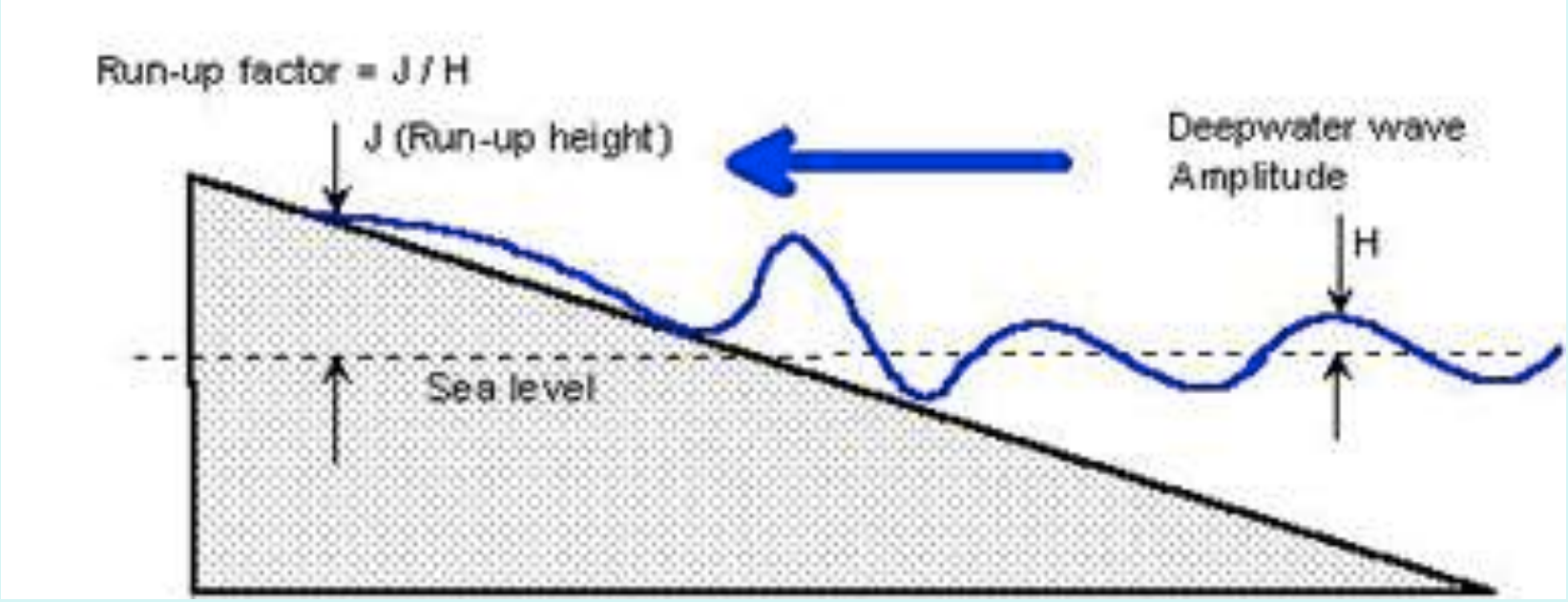
The recurrence interval, or **return period**, is the average time span between earthquake occurrences on a fault or in a source zone.



(Image courtesy Charles Ammon, Penn State)

Tsunami magnitude (Mt)

The tsunami magnitude, or Mt, is a number used to compare sizes of tsunamis generated by different earthquakes and calculated from the logarithm of the maximum amplitude of the tsunami wave measured by a tide gauge distant from the tsunami source.



Liquefaction

Liquefaction is a process by which water-saturated sediment temporarily loses strength and acts like a fluid... like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking.

Directivity

Directivity is an effect of a fault rupturing whereby earthquake ground motion in the direction of rupture propagation is more severe than that in other directions from the earthquake source.

Asperity

An asperity is an area on a fault that is stuck. The earthquake rupture usually begins at an asperity.

Attenuation

When you throw a pebble in a pond, it makes waves on the surface that move out from the place where the pebble entered the water. The waves are largest where they are formed and gradually get smaller as they move away. This decrease in size, or amplitude, of the waves is called attenuation. Seismic waves also become attenuated as they move away from the earthquake source