# Earthquakes, Waves and effects

## What is an earthquake?

**An earthquake is a short tremor of the earth, which owes its origin to the internal forces of our planet.**

### Types of earthquakes depending on their origin:

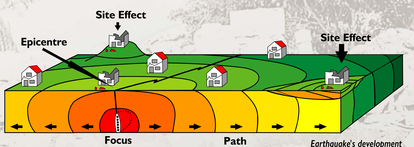
**1. Tectonic:**
These occur due to increasing stress on rocks caused by movements of the lithospheric plates (90% of earthquakes globally)

**2. Volcanic:**
These usually precede or accompany volcanic activity (7% of earthquakes globally)

**3. Collapse:**
small earthquakes that occur when underground caverns or mines collapse (3% of earthquakes globally)

### How tectonic earthquakes are produced?

As plates move against each other stresses are concentrated within rocks. These force rocks to break and move along the fracture creating faults. Each time that such a movement occurs an earthquake is produced and seismic waves are released carrying the seismic energy.
The area of the fault where a rupture is initiated and the seismic waves originate is called earthquake **hypocenter** or **focus** and is depicted by the weight point. Its projection on earth's surface is called **epicentre.**



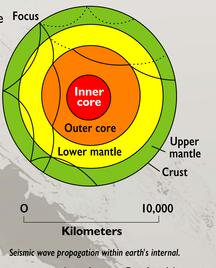
*Earthquake's development and wave propagation*

### Depending on their focal depth, earthquakes are divided in:

- **Shallow**, the focal depth measures less than 60 km.
- **Intermediate**, the focal depth measures between 60 and 300 km.
- **Deep**, the focal depth measures more than 300 km.

### What are the seismic waves?

When a fracture is initiated in the crust, energy is released in the form of vibrations which are called seismic waves. The seismic waves spread out to all directions around the focus; they gradually weaken as the distance from the focus increases. There are many different types of seismic waves, those transferring along earth's surface are called surface waves, while those penetrating earth's interior are called body waves. The surface waves (i.e. Love, Rayleigh) are transmitted only along earth's surface, carrying most of seismic energy.

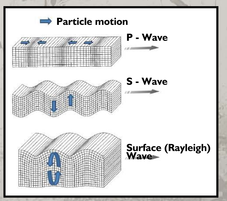


*Seismic wave propagation within earth's internal.*

The body waves are distinguished in primary and secondary:

**The Primary (P waves)** are faster and are recorded first at seismographs. They can travel through all types of matter (solid, liquid, gas) and can penetrate all Earth's interior.

**The secondary (S waves)** can travel only through solids.



*The way of particle displacement during P, S and R waves*


*"Faults displacing soft sediments in Crete"*

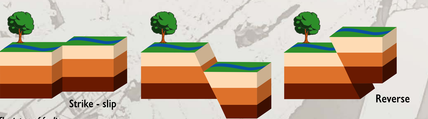
### Did you know that shallow earthquakes are usually the most destructive, as they are closer to surface?

### Fault types:

**1. Strike slip fault:**
The fault plane is almost vertical and the two fragments of the rock slide parallel to each other without significant vertical displacement component.

**2. Normal fault:**
The rock section above the fault plane moves downward relative to the section below the plane.

**3. Reverse fault:**
The rock section above the fault plane moves upward relative to the section below the plane. Reverse are further classified in overthrust (high angle) and thrust (more horizontal) faults.

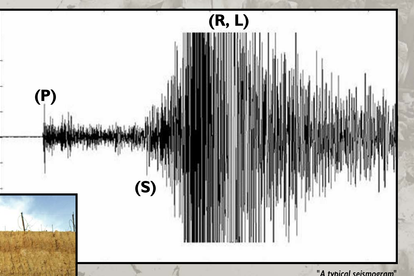


*The types of faults*

### Magnitude and Intensity

Magnitude and Intensity measure different characteristics of earthquakes.

- Magnitude describes the amount of energy released during an earthquake and is measured with Richter scale. It is a logarithmic scale that runs from 0 upwards and, theoretically, there is no maximum value but practically the maximum value is around 9,9. Each value releases about 33 times more energy than its former! Magnitude of an earthquake is the same everywhere observed.
- Intensity refers mainly to the effects of an earthquake and is commonly measured by Mercalli scale. It runs from 0 to 12. The intensity depends on the distance from the focus, the bedrock type, the magnitude and other facts. Intensity is also used to study historical earthquakes because the effects are those that can be found in records.



*"A typical seismogram"*

RACCE
Raising earthquake Awareness & Coping Children's Emotions

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