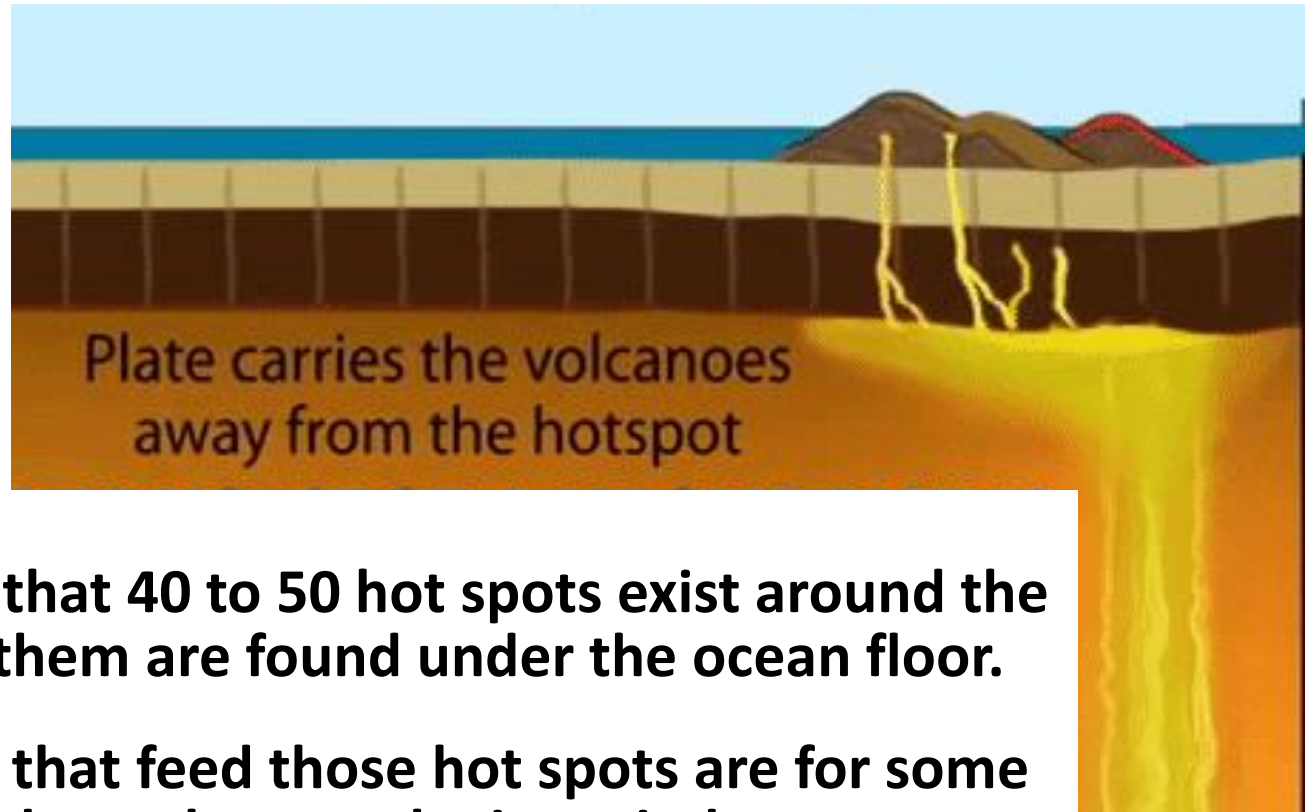


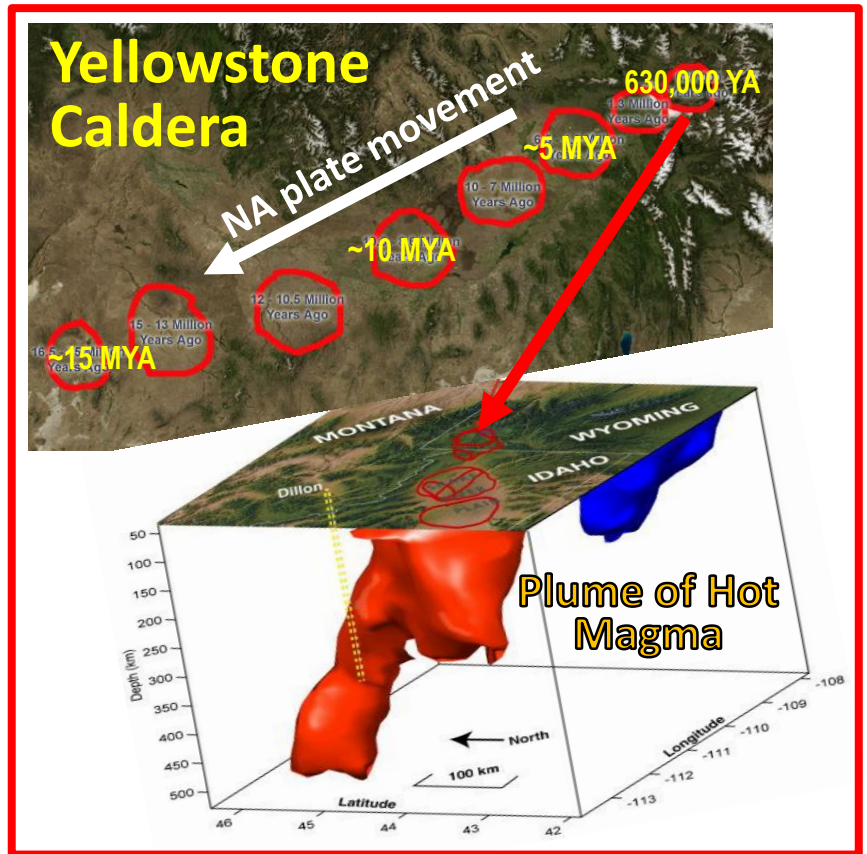
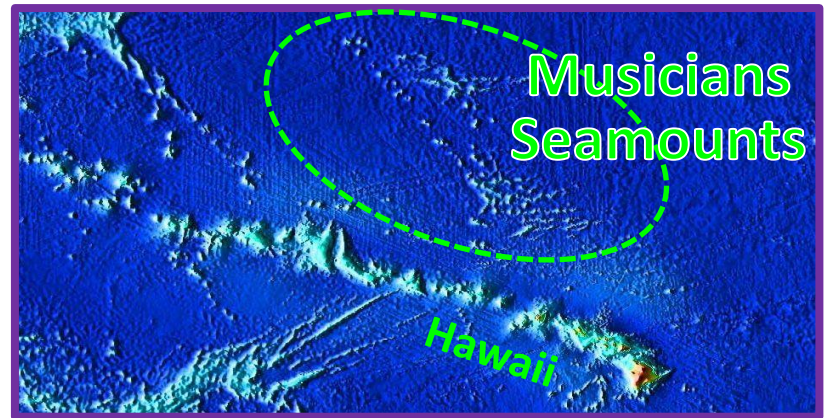
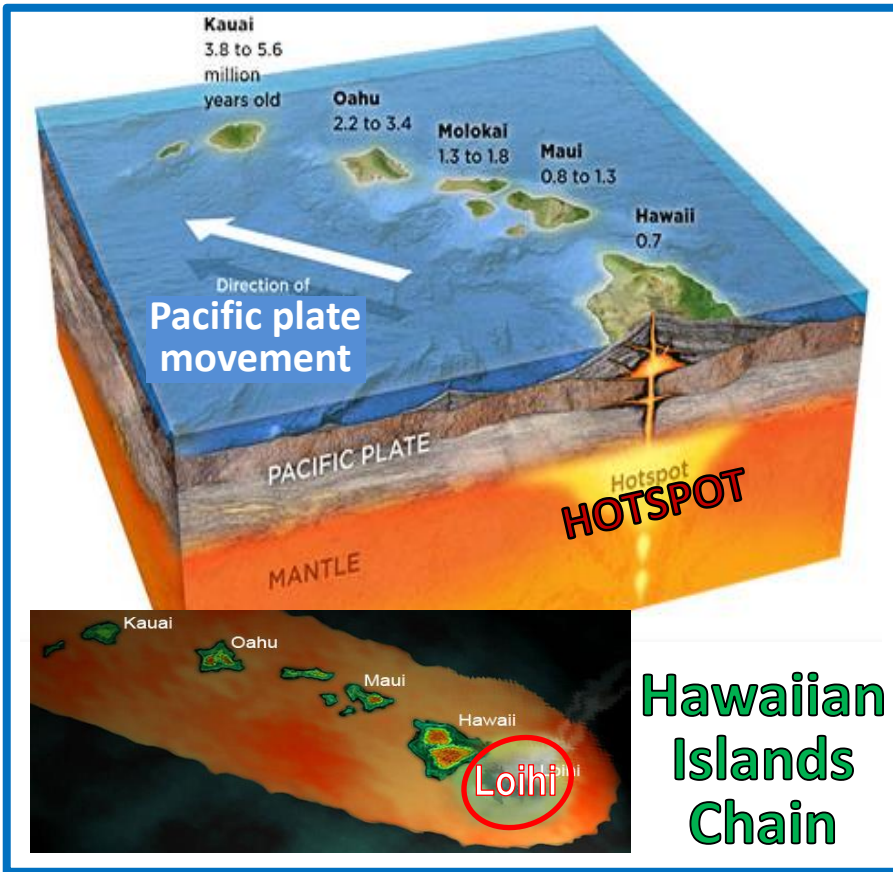
Hot Spot Volcanism

Hot spots are due to a **plume of hot magma** flowing up to the crust from the core-mantle boundary.

- Over time, the **tectonic plates of the Earth move over** the hot spots leaving a **trail of volcanoes**.



- Scientists think that 40 to 50 hot spots exist around the world; most of them are found under the ocean floor.
- Magma plumes that feed those hot spots are for some reason sustained over long geologic periods.
- Volcanoes carried far away from the hot spot become **extinct**.



Volcanic Landforms: Caldera

(Spanish for “cooking pot”)

Volcano rapidly empties its magma chamber, and support is lost. Overlying material collapses into the magma chamber: a caldera forms.

- **Explosive calderas**

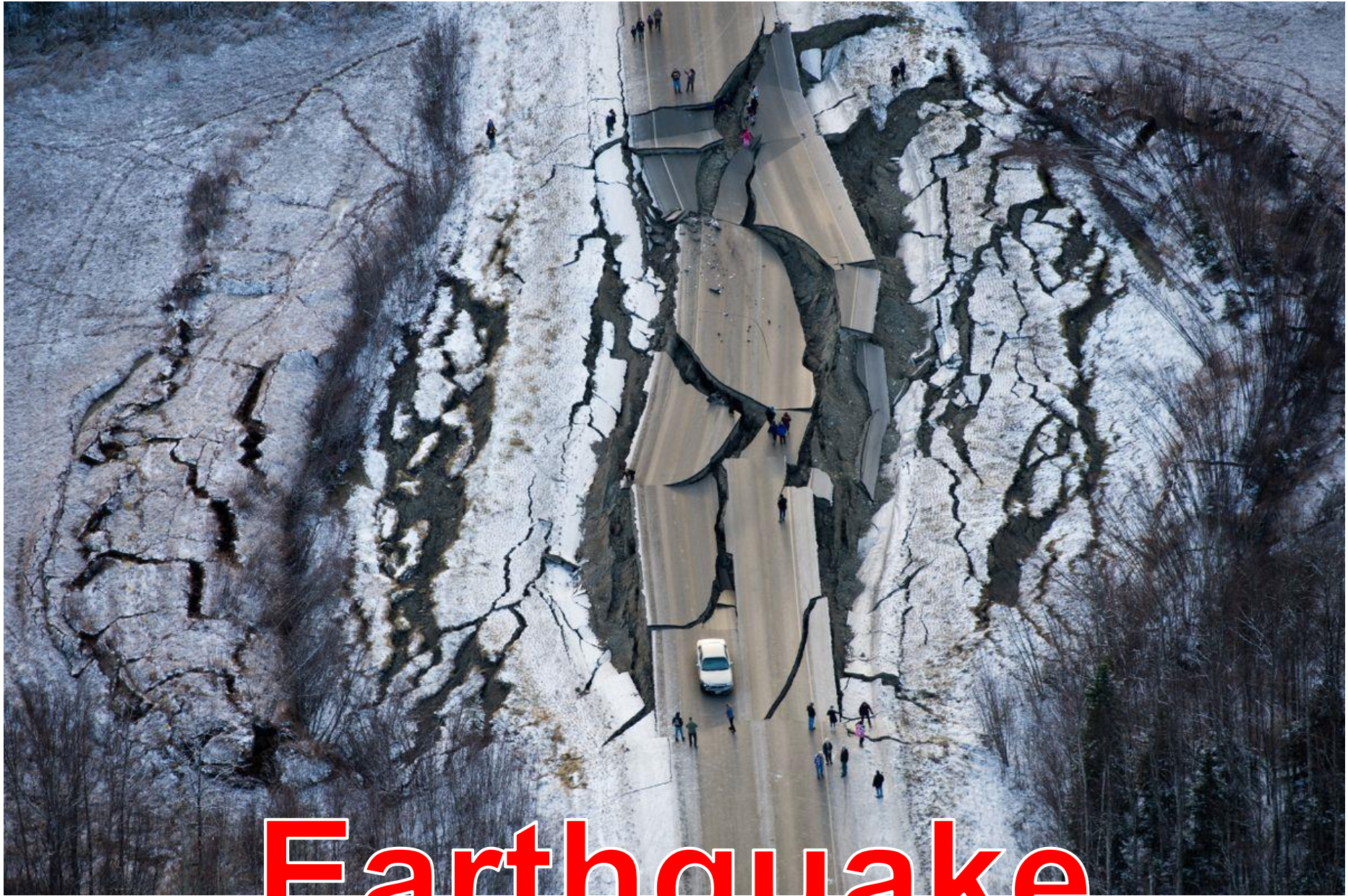
Silica-rich magma feeding these volcanoes has high viscosity; gases tend to become trapped at high pressure within the magma, resulting in explosion.



- **Non-explosive calderas**

Basaltic magma feeding these volcanoes is silica poor and much less viscous; the magma chamber is drained by large lava flows rather than by explosive events.





Earthquake

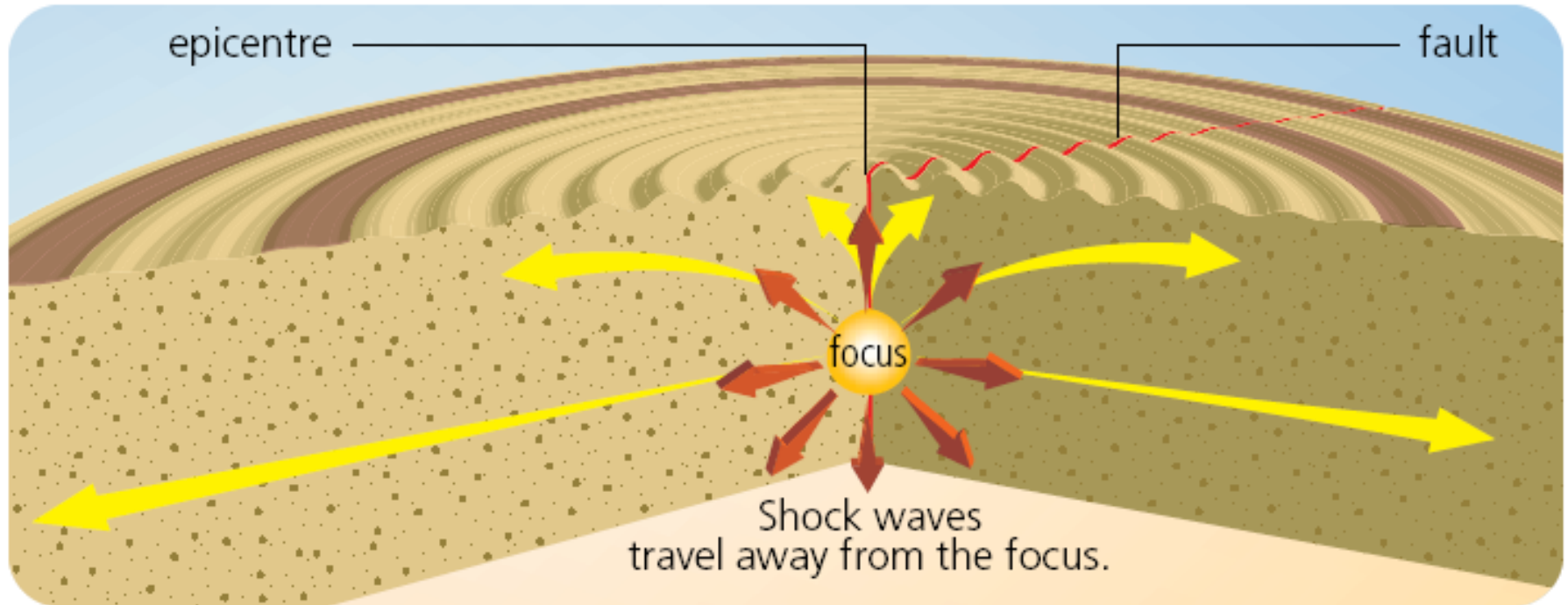
What is an earthquake?

Earthquake is the **vibration (shaking) and/or displacement of the ground** produced by the **sudden release of energy**.

- Rocks under *stress* accumulate *strain energy* over time.
- Stress results from tectonic plate movement, magmatic or volcanic activity.
- When stress exceeds strength of rocks, rock breaks and slips.
- Rock slippage/rupture occurs at the weakest point (*fault*).
- Strain energy is released as **seismic waves**.



Focus and Epicenter

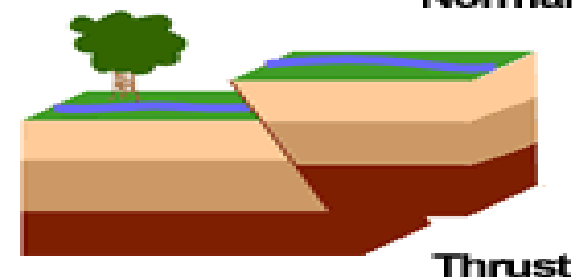
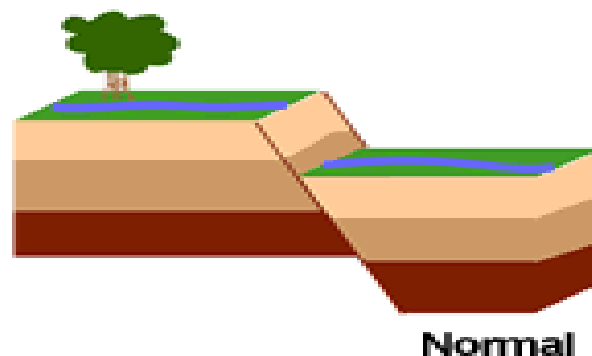
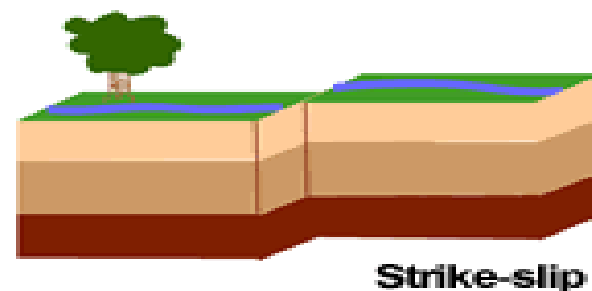


- **Focus** – point inside the Earth where an earthquake begins (*point of initial rupture*). The majority of tectonic earthquakes originate in depths not exceeding tens of kilometers.
- **Epicenter** – point on the surface of the Earth directly above the focus where the shaking is usually felt most strongly.

Geological Faults

Earthquakes most often occur along existing faults: **planar fractures in a volume of rock**, across which there has been significant displacement as a result of prior movement.

- **Strike-slip faults** are vertical (or nearly vertical) fractures where the blocks have mostly moved horizontally.
- If the rock mass above an ***inclined fault*** moves down, the fault is termed **normal**, whereas if the rock above the fault moves up, the fault is termed **thrust**.
- Faults are found alone or in clusters, creating a **fault zone**.



What type of faults are these?



↑
Normal



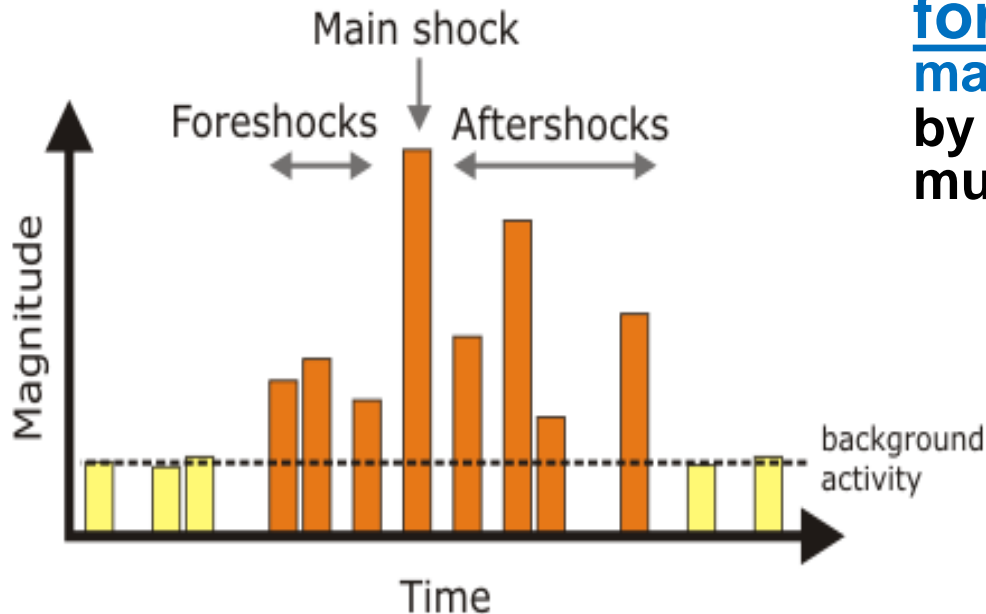
↑
Strike-slip



←
Thrust

Foreshocks and Aftershocks

Earthquakes often occur as a sequence rather than individual events:



- Small earthquakes, called **foreshocks**, often precede a **major earthquake (main shock)** by days or, in some cases, by as much as several years.
- **Adjustments of crust** (redistribution of stress on the fault) that **follow a major earthquake** often generate smaller quakes in the same area called **aftershocks**.

- **Bigger earthquakes** often have *more and larger* aftershocks and the sequences can last for years.
- **Earthquake swarms** are **sequences of earthquakes** striking in a specific area within a short period of time in which **no single earthquake has notably higher magnitudes** than the other.