

Seismology-at-school in Nepal

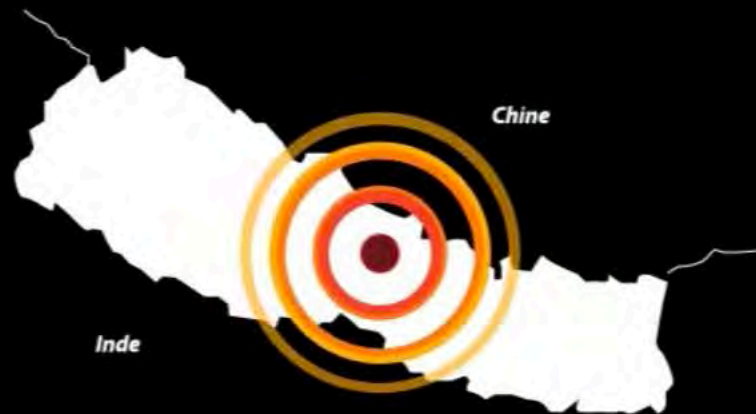
Earthquake Resilience



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2015
77 km De Katmandou
Népal
Magnitude 7,8

The earthquake of April 25th 2015 in Nepal is characterised by a **7.8 magnitude**.

It was followed by **3 aftershocks** of magnitude **greater than 7** within the **next 2 months**.

The epicenter of this earthquake was 77 km from Kathmandu and the tremors have been felt as far as New Delhi as well as throughout northern India

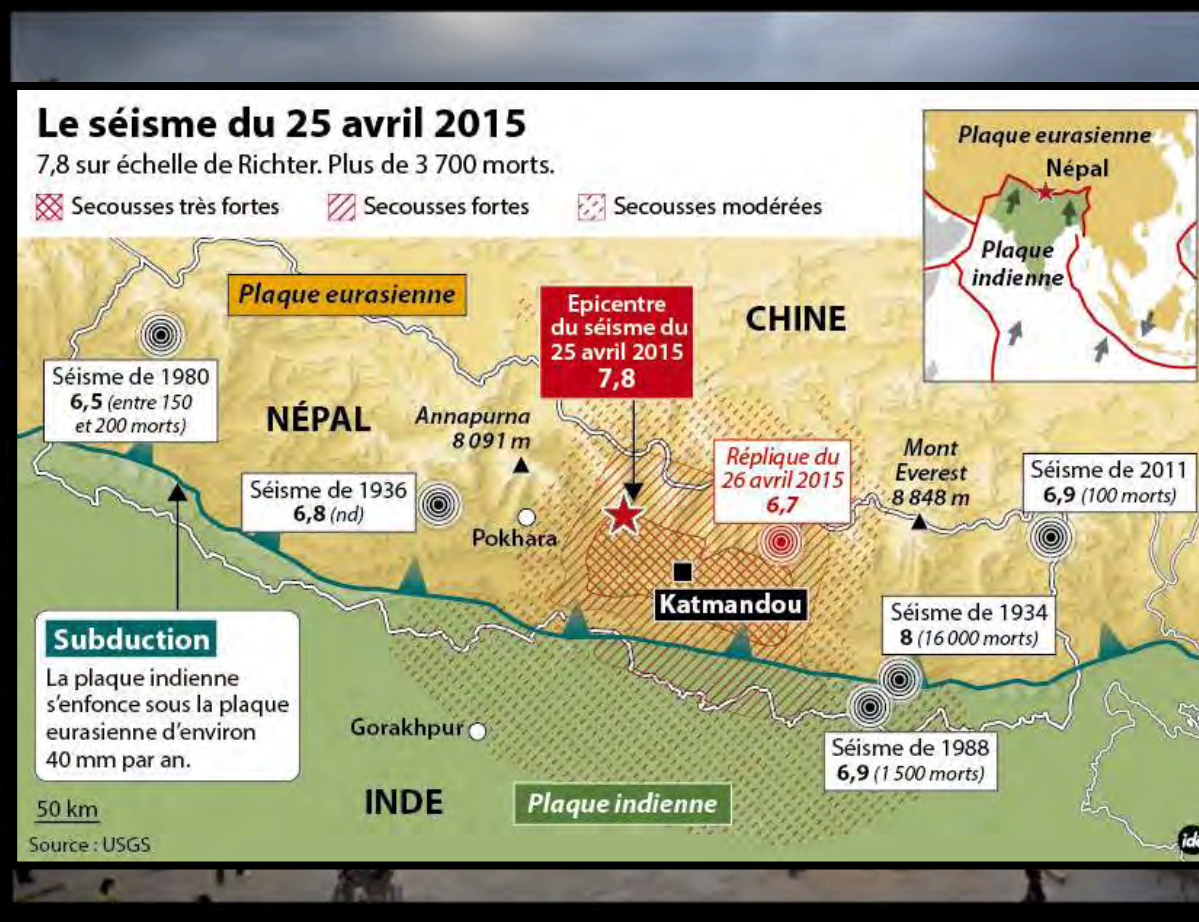
The satellites measured the **displacement** of the surface by nearly **2 meters** in the region of Kathmandu.



The number of victims is high because of the magnitude and the fragility of the houses. More than **8900** dead, **21 000** seriously injured and **3.5 million** homeless.

The earthquake was felt up to **1900 kilometers** away from the epicenter. Large casualties in **India**, **China** and **Bangladesh** were identified.

Significant impacts include **exceptional landslides** causing the loss of more than 500 people, entire villages have been destroyed, as well as important historical monuments in major cities such as Kathmandu. It is **the most powerful earthquake in Nepal since 1934**.



Earthquake consequences :

The tremors lasted up to 2 minutes, moving Mount Everest 3 cm southwest.

The earthquake caused avalanches on Mount Everest burying 2 mountain-camps and taking 139 people.





HOW TO EXPLAIN WHY THE EARTH SHAKES DURING AN EARTHQUAKE ?

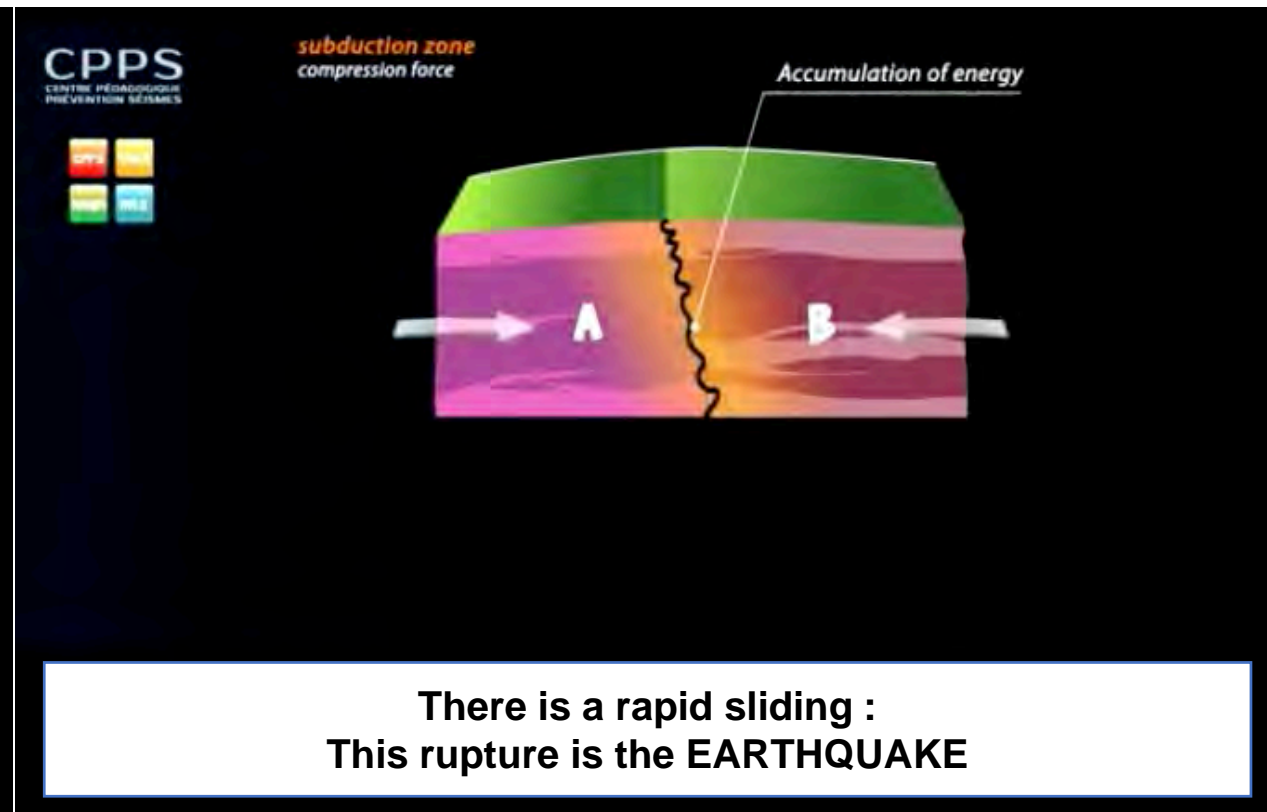
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As you have seen, the Earth is composed of several RIGID plates that are moving on the surface of the Earth.

When these plates collide, they locally deform themselves at the plates' boundary (mountains, subduction, strike-slip).

However the physical STRESSES are distributed throughout the plate.

As the plates aren't homogenous (nature of the rocks, etc.), there will be rock deformation, creating small to large faults.

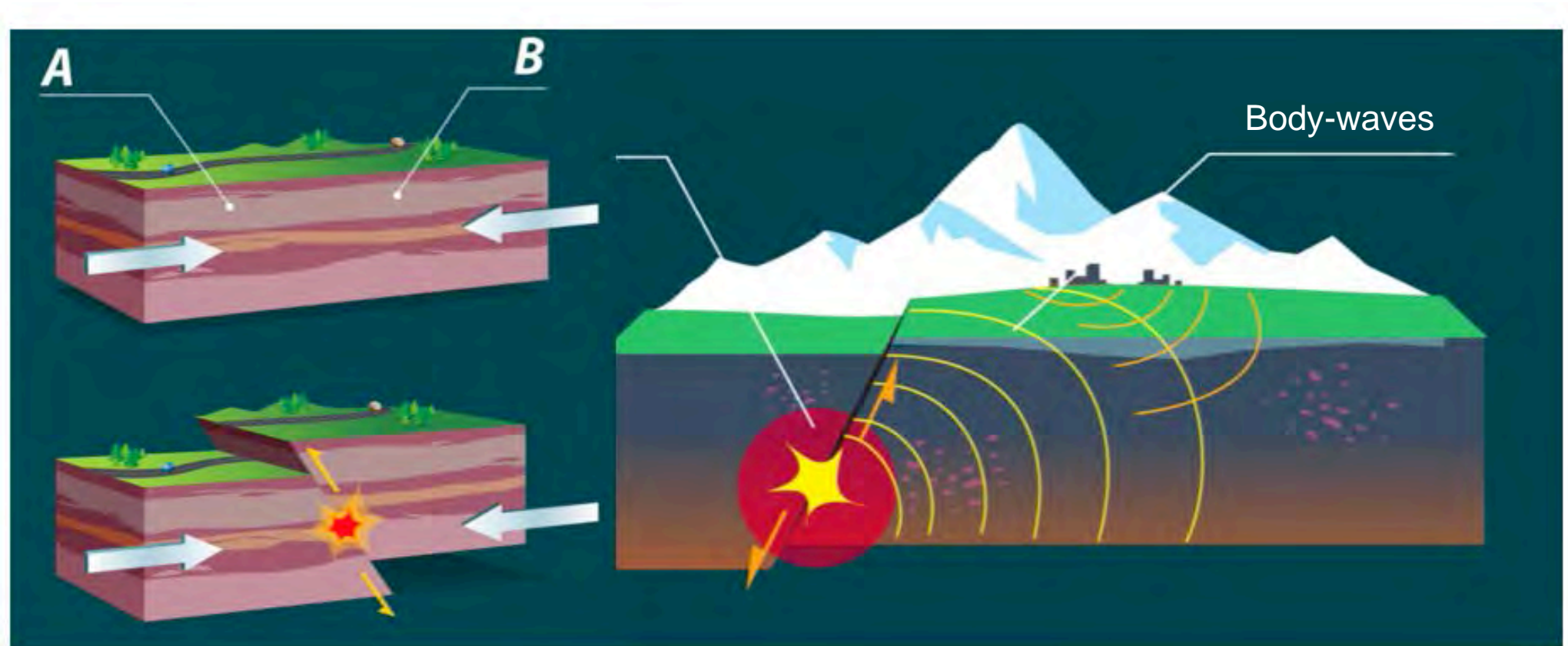


Along the faults, the asperities cause a high resistance to sliding. The movement between the 2 sides of the fault is locked.

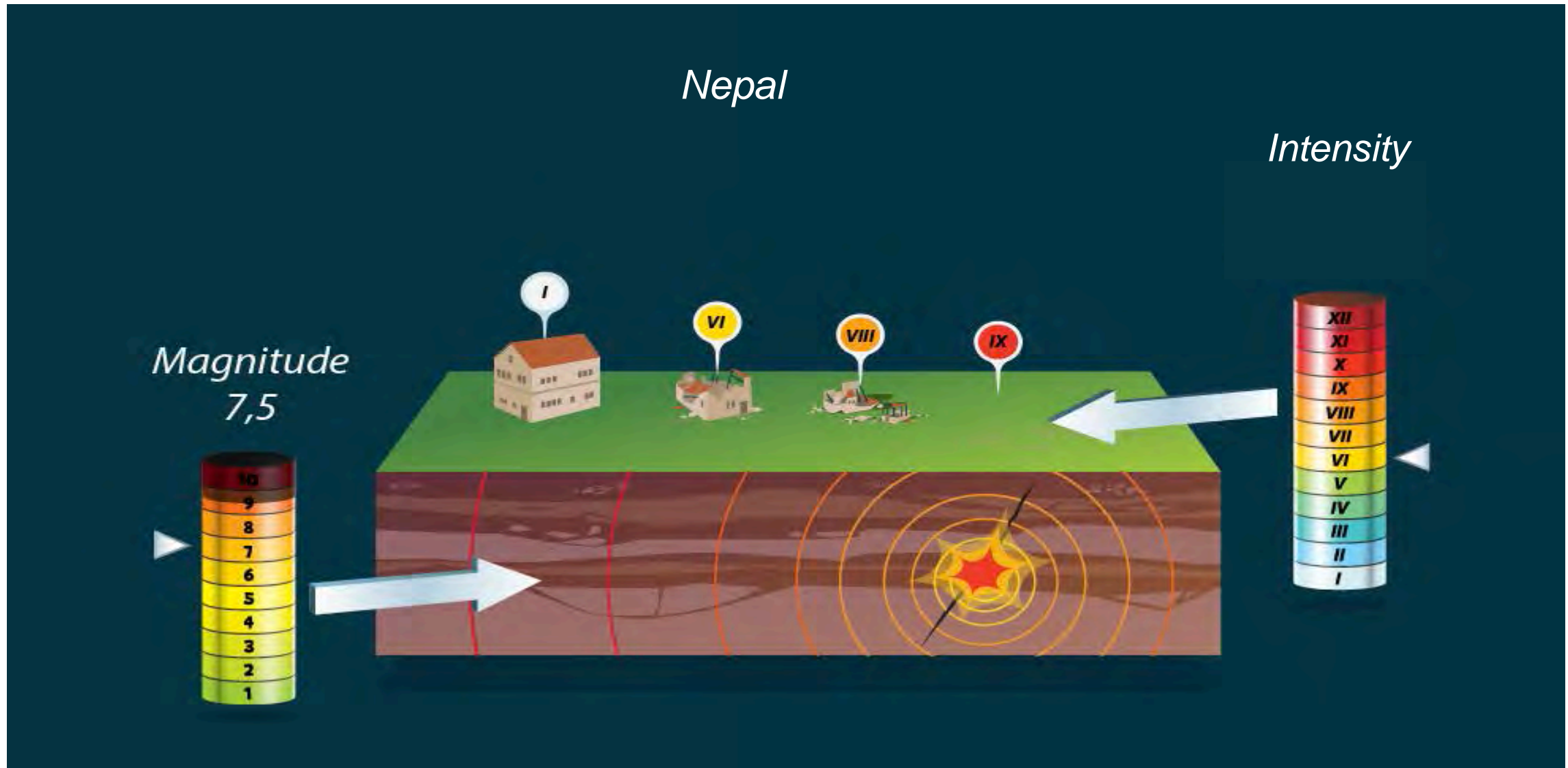
Slowly, **STRESS** accumulates along the fault.

When the rock resistance limit is reached, there is **RUPTURE**.

This is the source of the earthquake. This rupture causes of a rapid release of a large amount of **ENERGY** in the form of heat (70%), seismic waves (30%) and a violent sliding along the fault, with a displacement between the 2 sides.



Magnitude and Intensity measure different characteristics

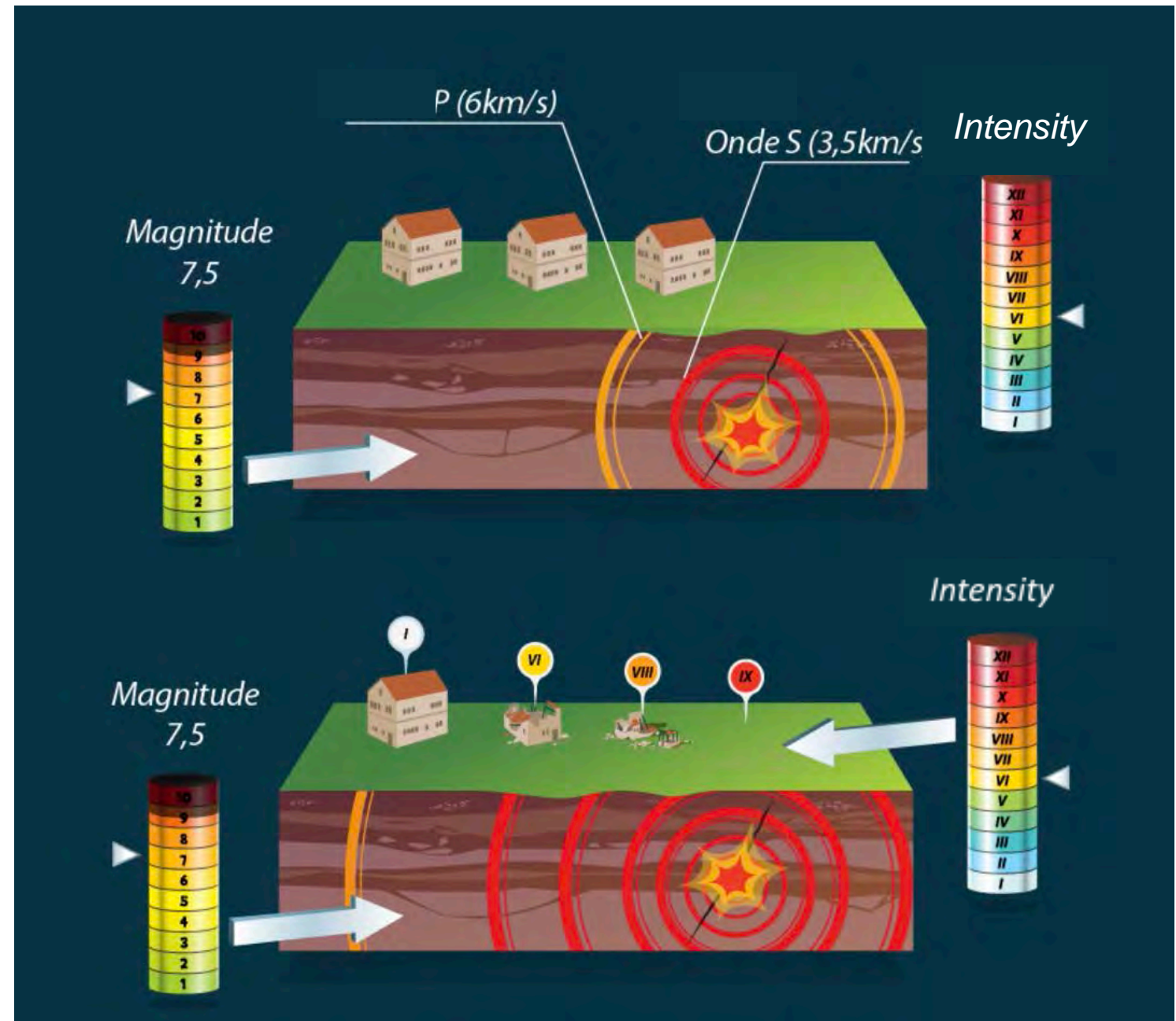


Magnitude and Intensity measure different characteristics

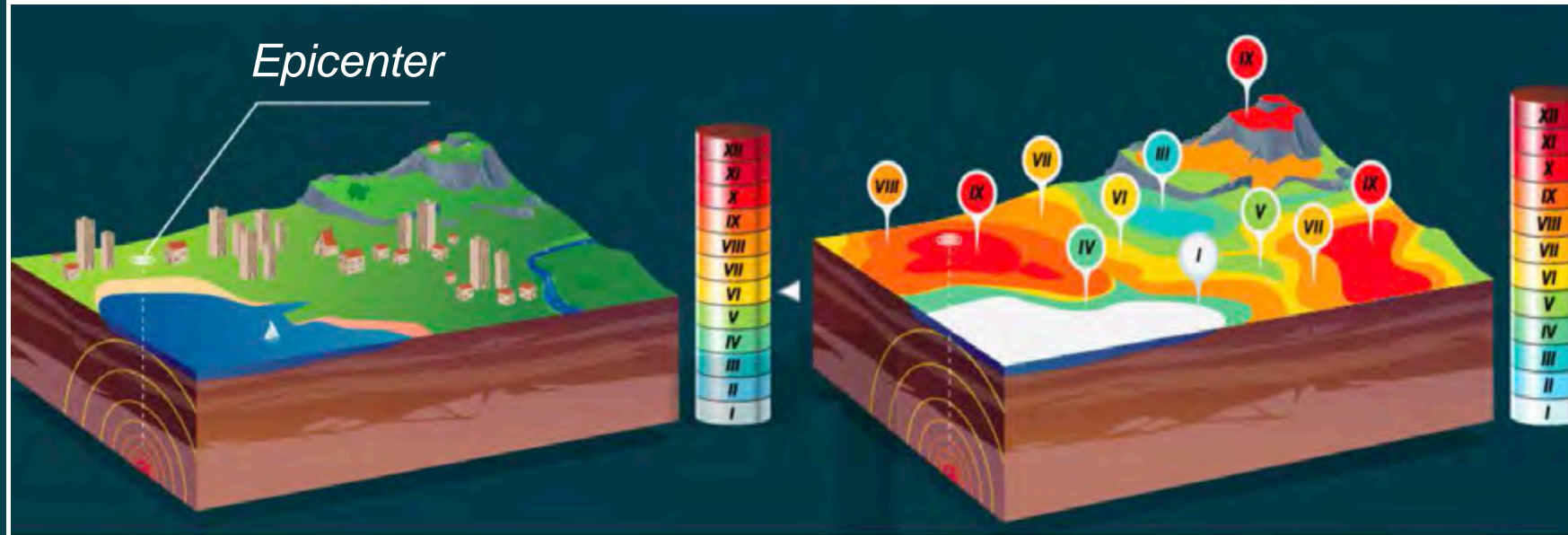
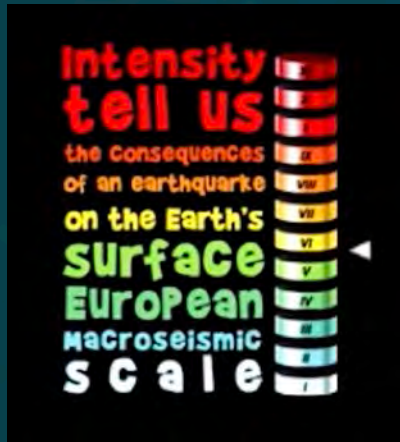
For 1 earthquake

Only 1 Magnitude

Several Intensities
I, II, III, IV, V, VI....XII



Intensity



Intensity measures the strength of shaking produced by the earthquake at a certain location.

Intensity is determined by the effects on people, built structures, and the natural environment.



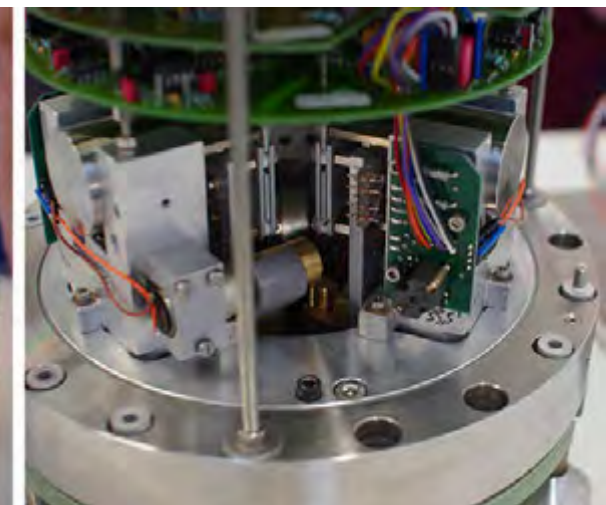
The magnitude of moment, noted as M , is a logarithmic representation of the **energy released** by the earthquake in the form of seismic waves.

Each earthquake has only 1 magnitude, independent of the location of observation.

Estimated from the seismic data, **the magnitude is measured on an open scale.**

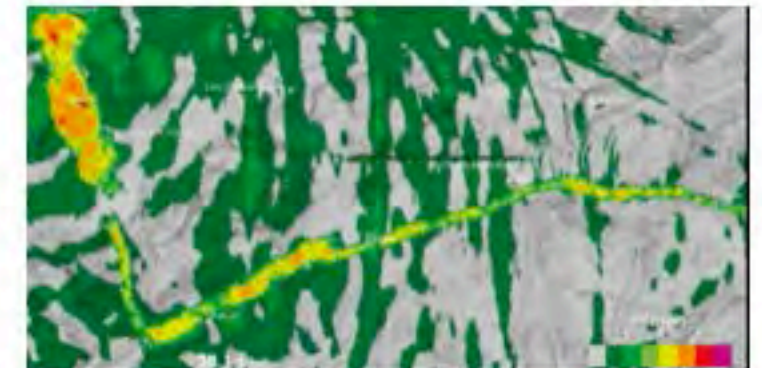
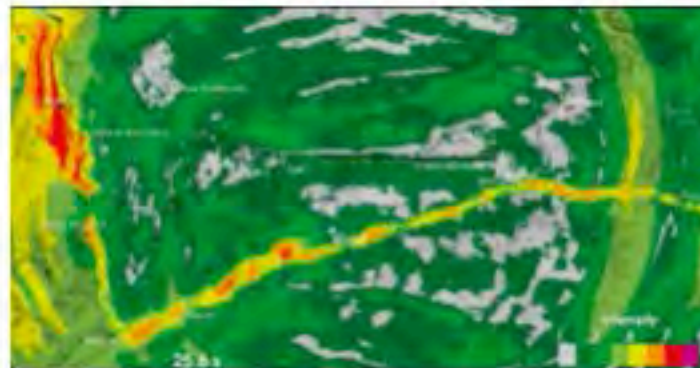
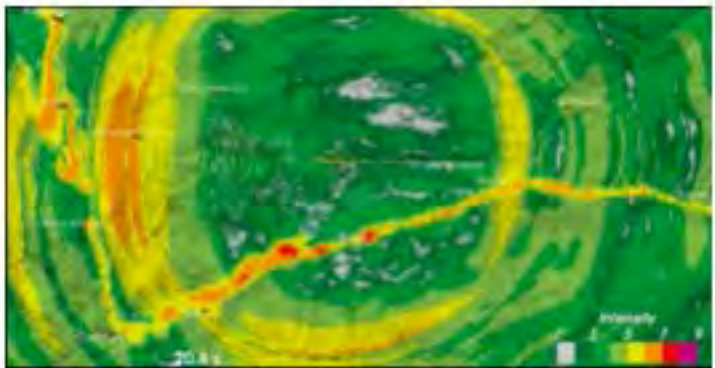
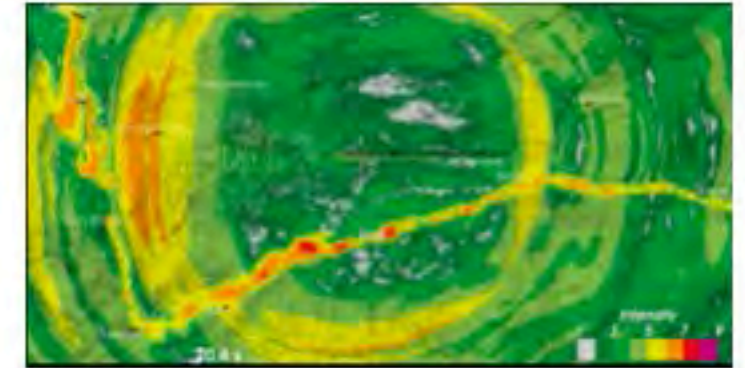
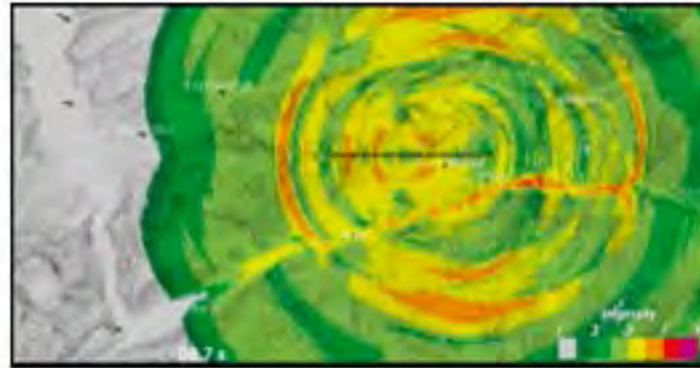
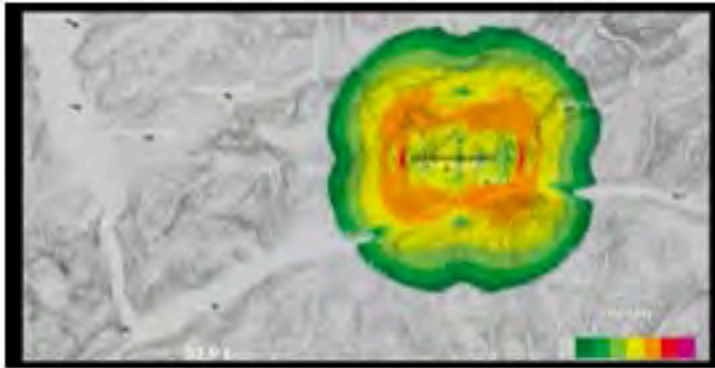
In practical terms, since the implementation of seismic instrumentation, no event has exceeded 9.5 (Chile, 22 May 1960).

Generally, **people feel earthquakes from magnitude 2.5 and above.**



When an Earthquake occurs...

There are three basic types of seismic waves – P-waves, S-waves and surface waves. P-waves and S-waves

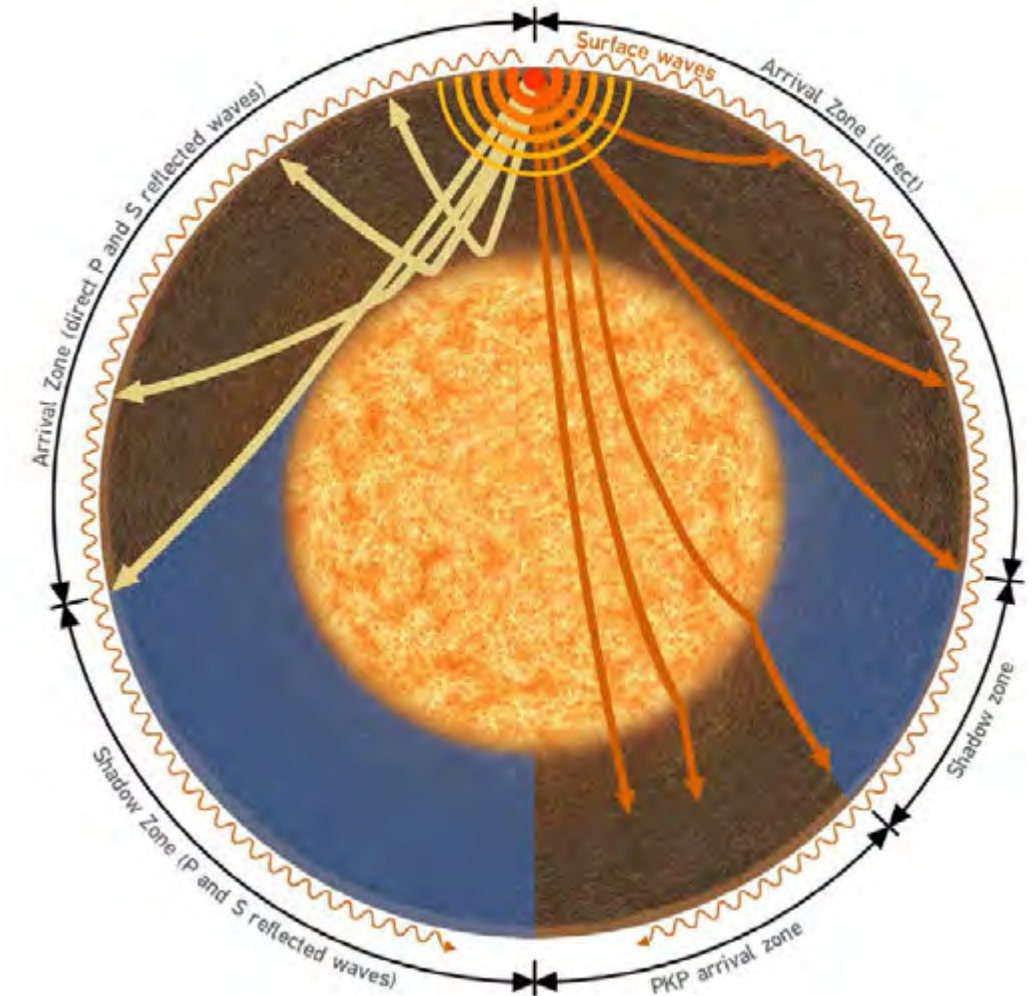
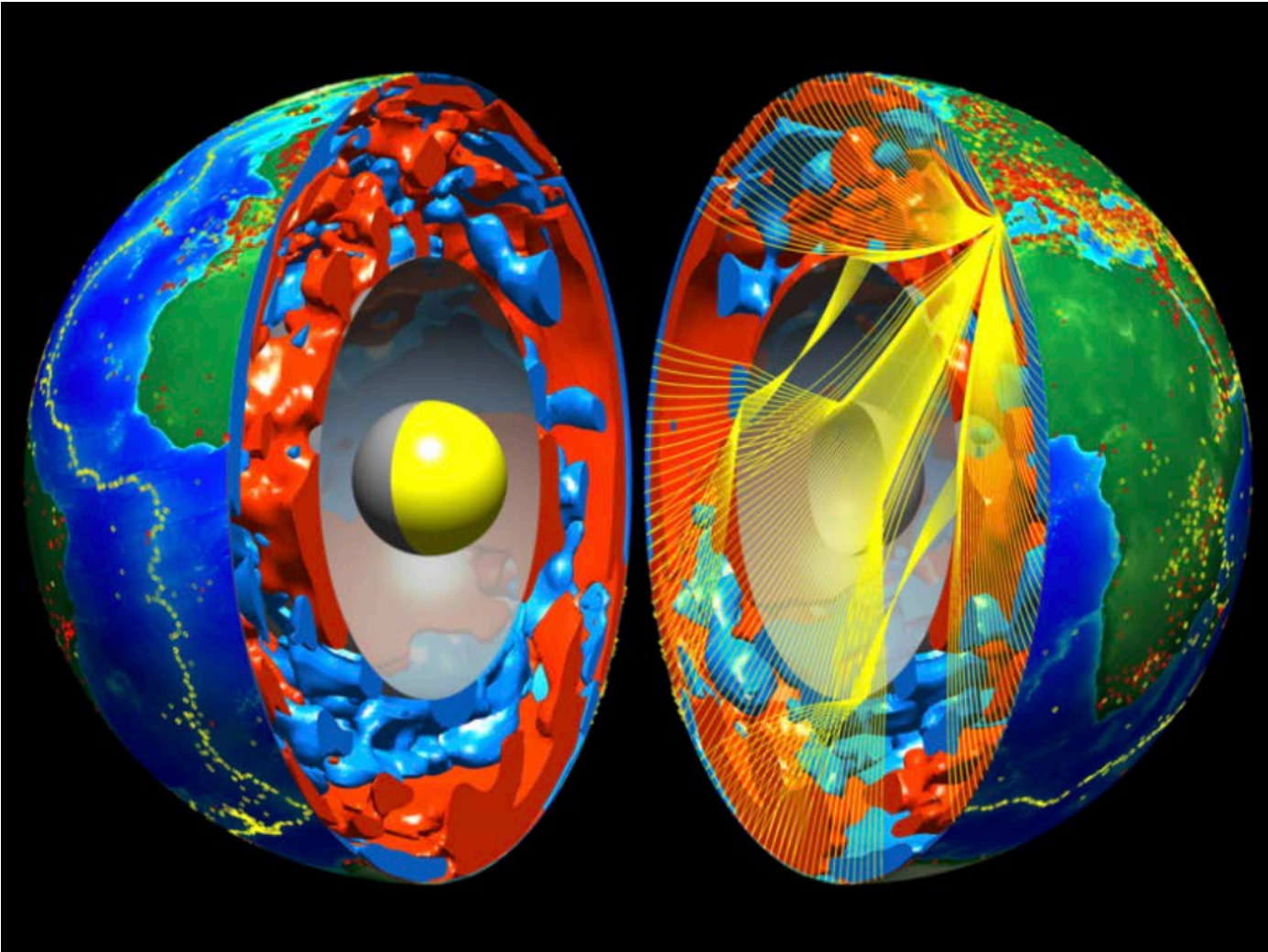


Understand Earthquakes

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A seismic wave is a wave that travels through the Earth, as the result of a tectonic earthquake. There are 2 types of seismic waves, namely 'BODY waves' and 'SURFACE waves'. There are 2 kinds of BODY waves: primary (P-waves) and secondary (S-waves).



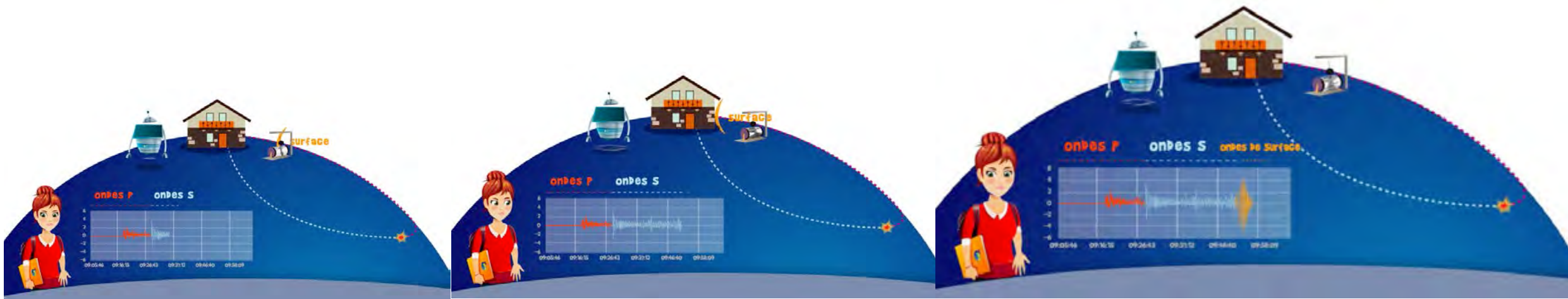
When an Earthquake occurs... Understand wave propagation

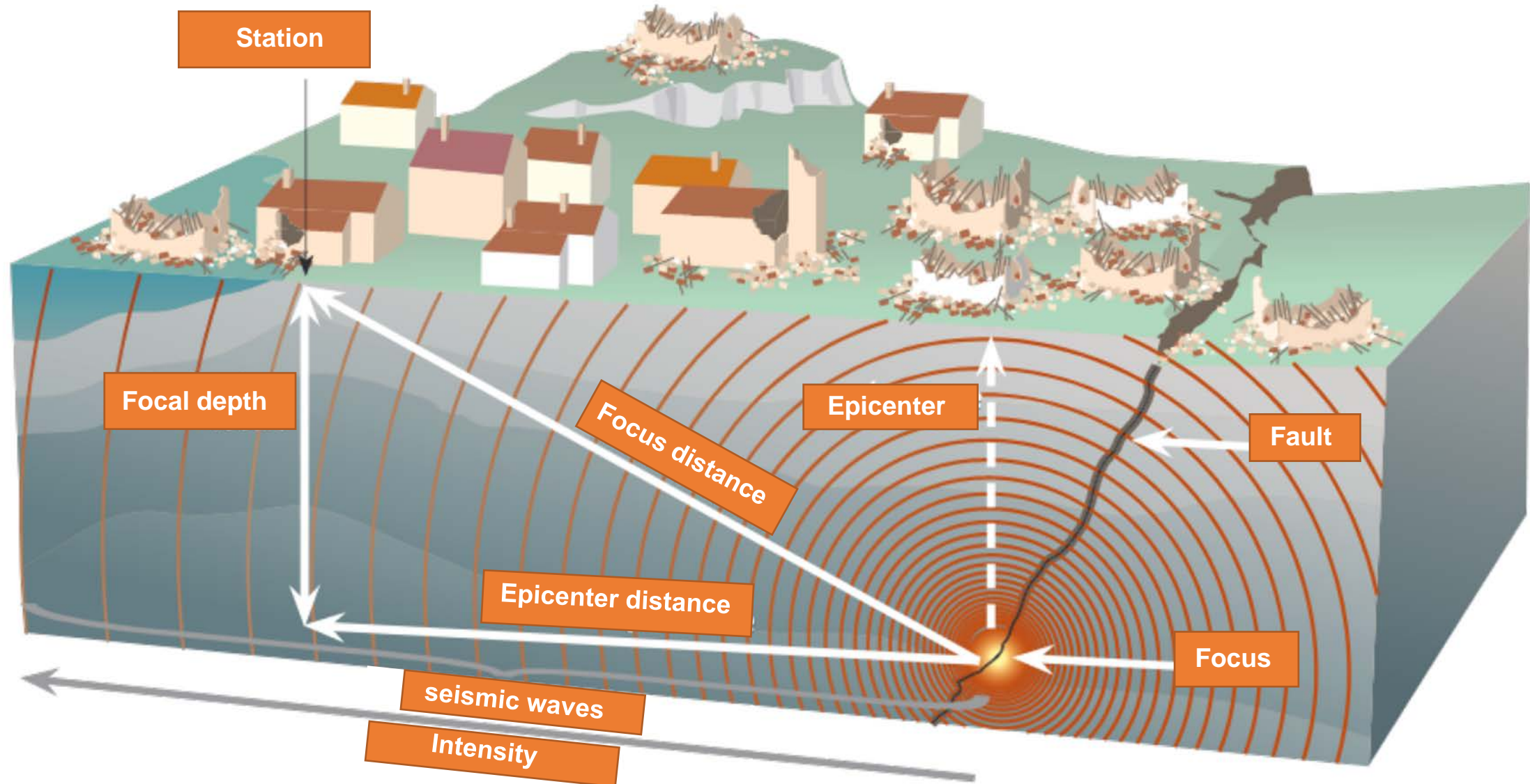


P-waves are compressive waves and the first one recorded (responsible for the big bang noise).

S-waves are destructive shearing waves . The S-waves don' t propagate in liquid media.

Surface waves are the slowest and most destructive waves.







A powerful quake, then hundreds of aftershocks. Death and destruction have brought fear and nightmares in their wake. Psycho-social support to hardly hit communities aims at healing the minds of earthquake-affected villagers, before some develop chronic symptoms.



Rebuilding Schools after the 2015 Nepal Earthquakes

