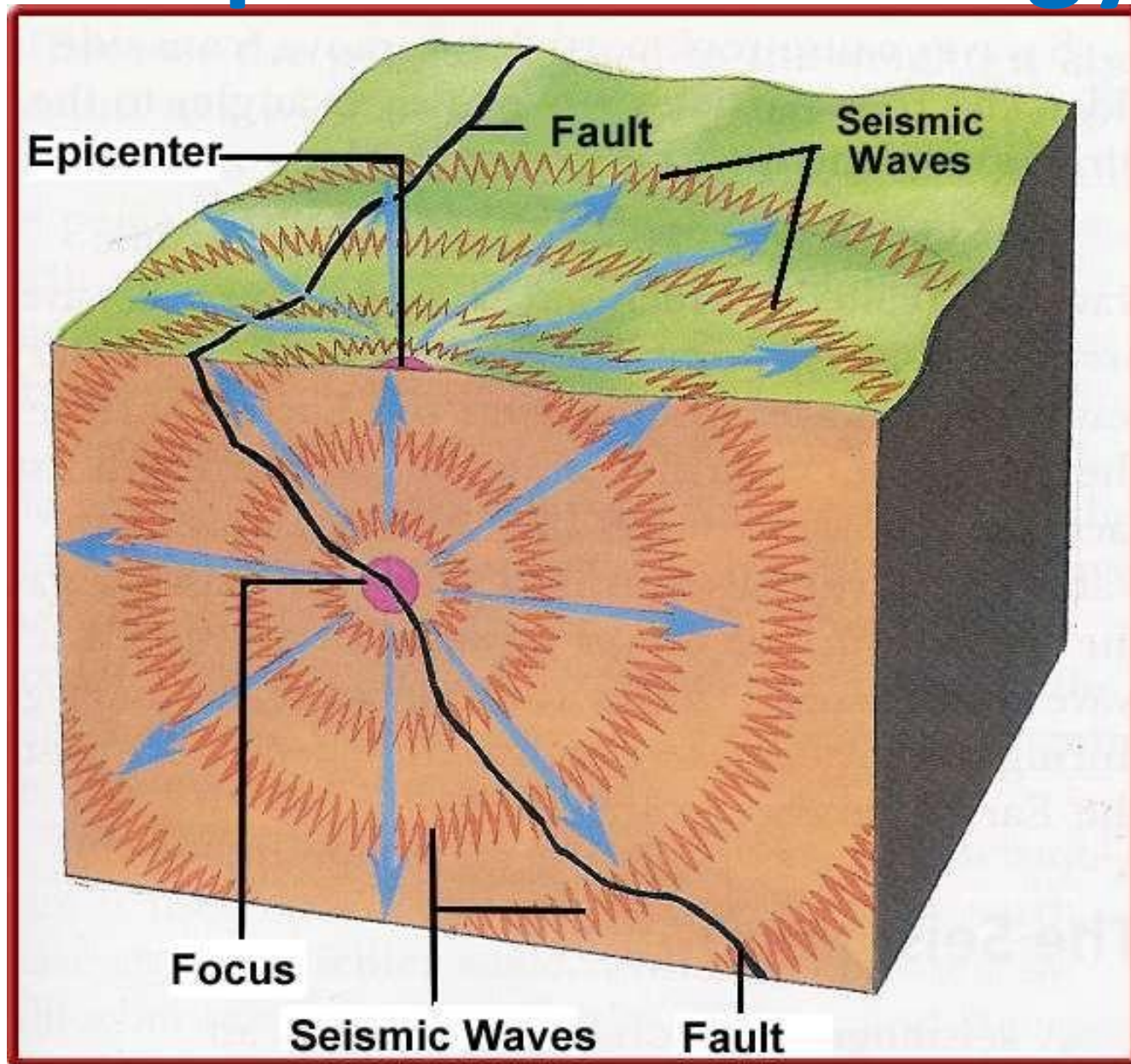




EARTHQUAKES

- An earthquake may be simply described as a **sudden shaking phenomenon of the earth's surface** for some reason or the other.
- It is also variously described as a sudden **vibrating** or **jerking** or **jolting** or **trembling** or **shivering** phenomenon of the earth's surface.

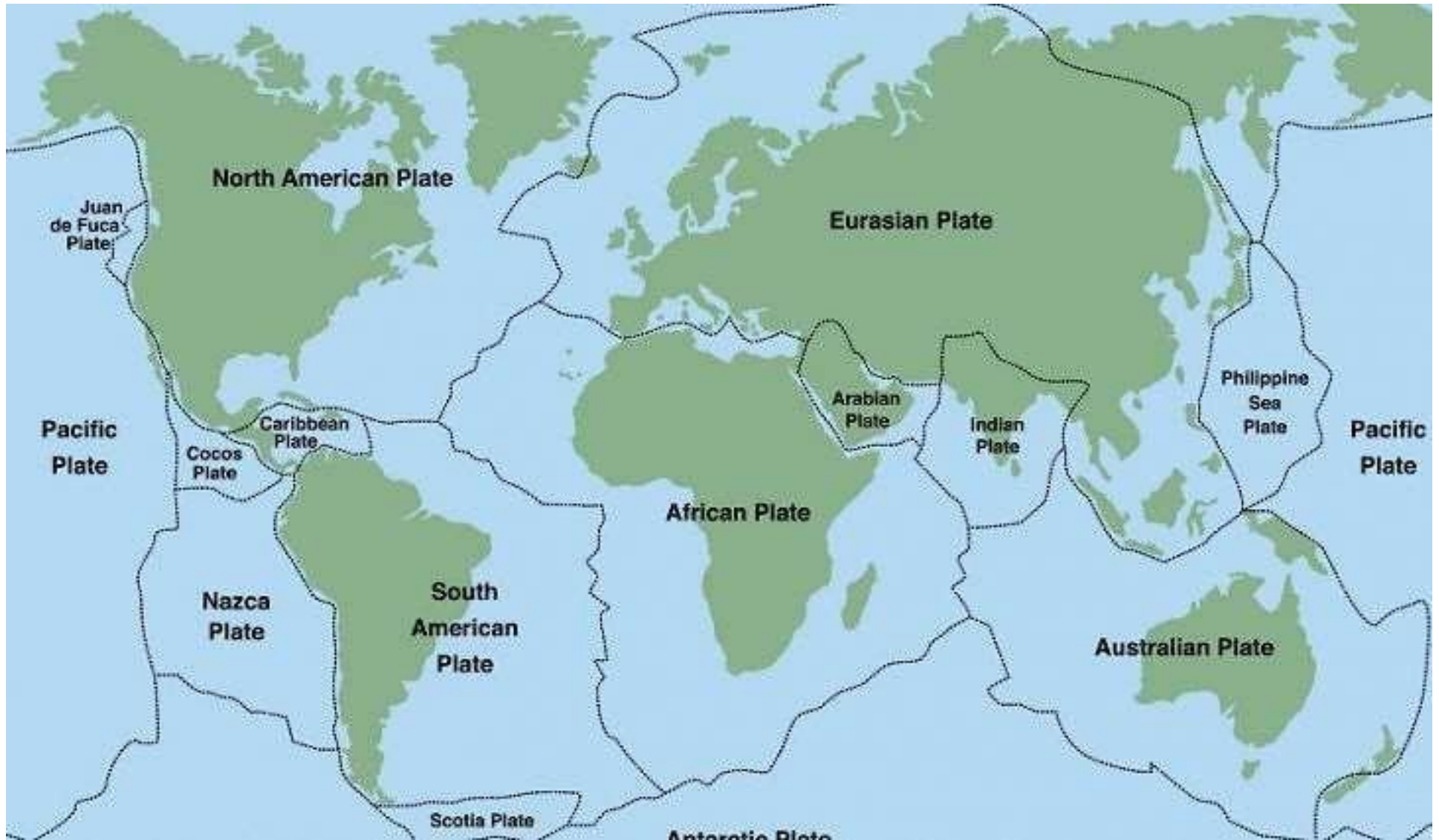
Earthquake terminology



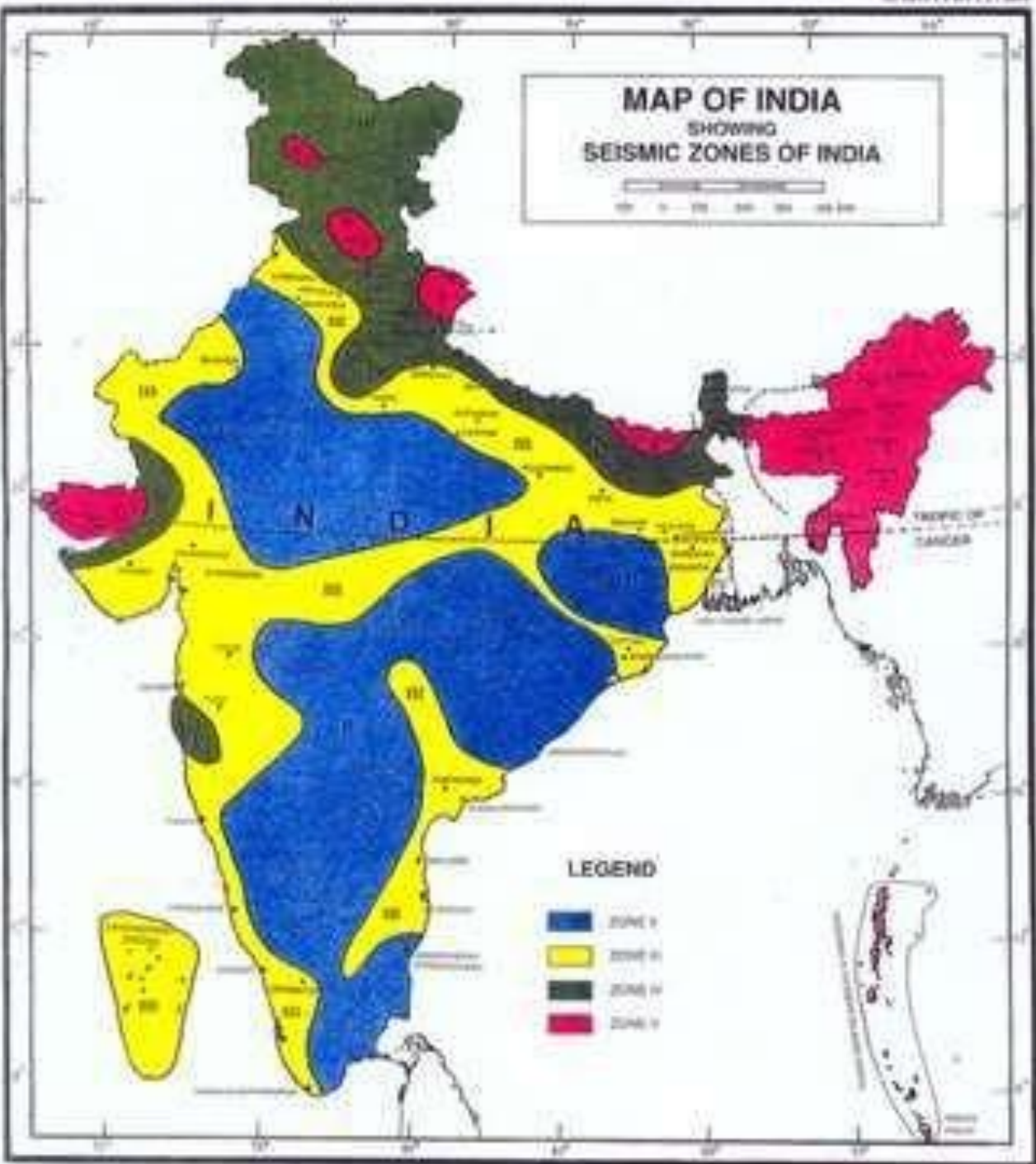
Classification of earthquakes

- Based on depth of their origin, earthquakes are described as
 1. **SHALLOW (<60KM)**
 2. **INTERMEDIATE (>60KM AND <300KM)**
 3. **EXTREME DEEP (>300KM)**
- Based on depth of their occurrence, earthquakes are described as
 1. **Tectonic**
 2. **Non-tectonic**

Tectonic plates







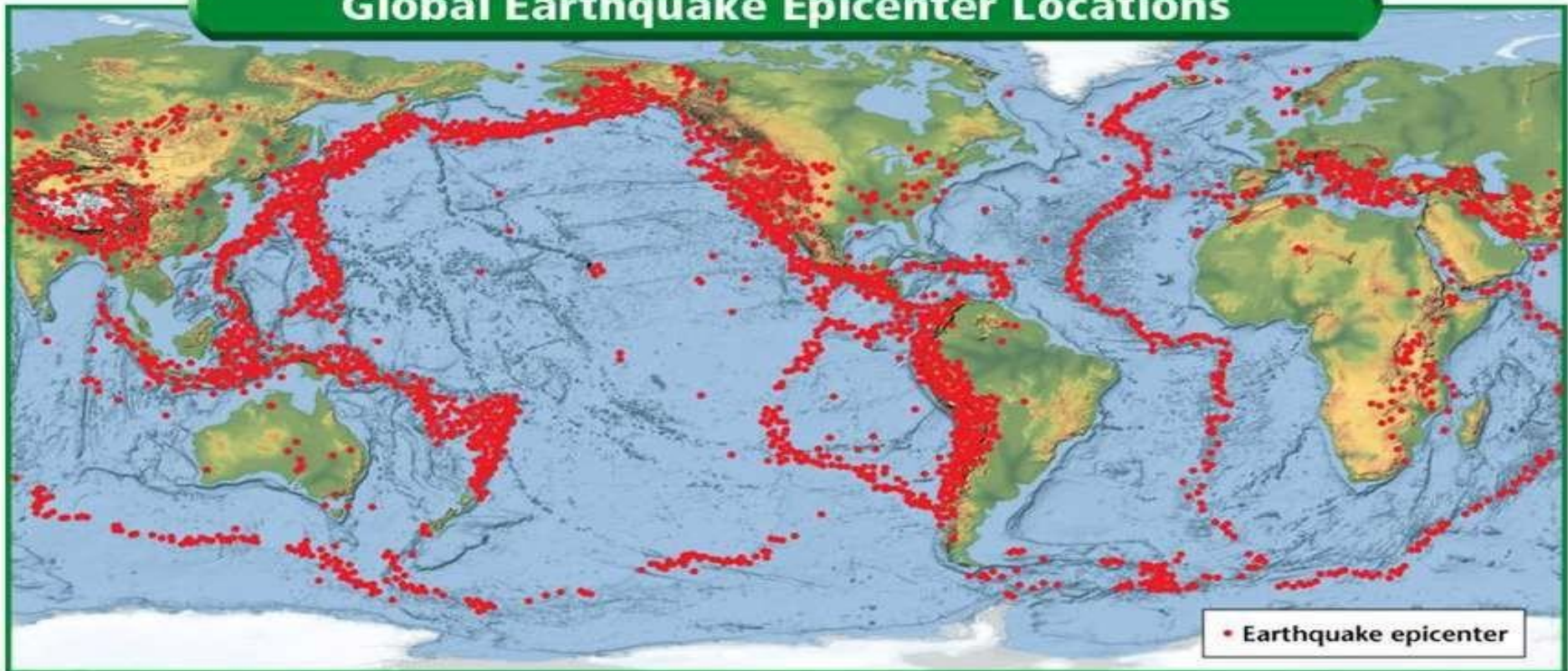
- **Tectonic earthquakes** are exclusively due to internal causes, i.e., due to disturbances or adjustments of geological formations taking place in the earth's interior.
- Generally these are less frequent and more intensive and hence more destructive in nature.
- **Non-Tectonic earthquakes** are due to external or surficial causes.
- These type of earthquakes are very frequent but less destructive.

- Non-tectonic earthquakes, occur due to variety of reasons, some of which are as follows.
 1. Due to huge water falls
 2. Avalanches
 3. Meteorites
 4. Landslides
 5. Volcanic eruptions
 6. Tsunamis
 7. Man-made explosions

Seismic belts and shield areas

Seismic Belts

Global Earthquake Epicenter Locations



Seismic belts are those areas where earthquakes occur frequently and shield areas are those places where earthquakes occur either rarely or very mildly.

Earthquake waves

- Earthquake vibrations originate from focus and are propagated in all directions.
- These vibrations through the rocks in the form of elastic waves.
- There are three types of waves called as
 - 1. Primary waves (P-waves)**
 - 2. Secondary waves (S-waves)**
 - 3. Love waves. (L-waves)**

P-WAVES

- These are also called as **primary waves**, *push-pull waves*, *preliminary waves*, *longitudinal waves*
- These are the fastest waves among all the seismic waves.
- They travel as fast as 8 to 13 Km/s.
- The P waves resemble sound waves because these too are compressional waves in nature.
- These waves can travel through solids, semi-liquids and gases.

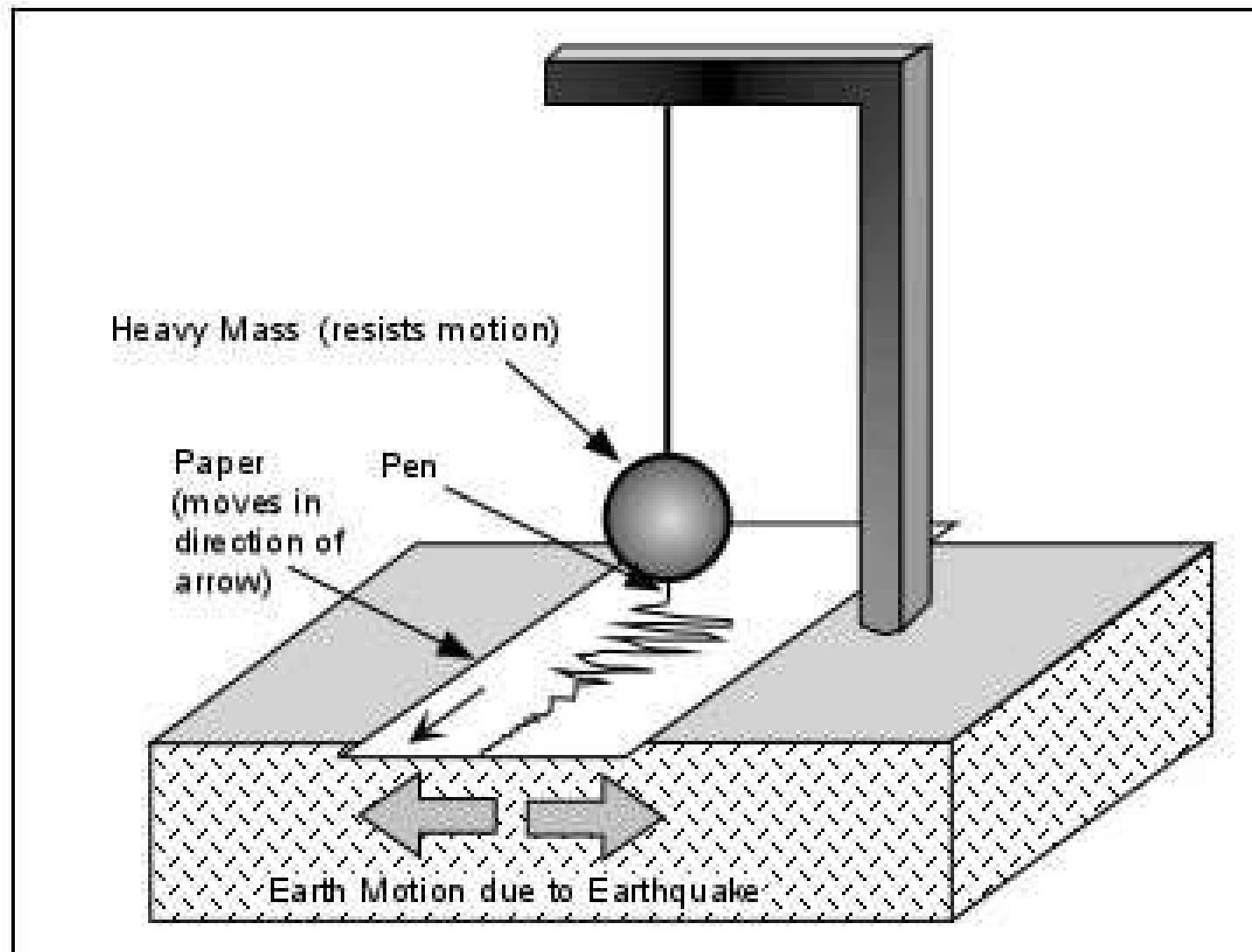
S-WAVES

- These are also called as secondary waves or traverse waves or shear waves.
- Compared to P waves, these are relatively slow.
- These can travel at a speed of 5 to 7 Km/s.
- These are like light waves.
- These waves are capable of travelling only through solids.

L-WAVES

- These are also called as love waves or long waves or surface waves.
- These are the slowest among the seismic waves.
- These can travel at a speed of 4 to 5Km/s.
- These waves are capable of travelling through solids and liquids.

Richter scale



Effects of earthquakes

Most of the earthquakes are minor and go unnoticed. But the major ones, though occasional, are responsible for heavy loss of life and property.

- 1. Destruction of various civil engineering constructions like dams, bridges, tunnels, roads and railway tracks**
- 2. Creation of irregularities and cracks in the ground.**
- 3. Causing landslides, blocking of roads and railway lines.**
- 4. Changes in courses of river due to faulting across them.**
- 5. Formation of new lakes, springs and water falls.**
- 6. Submarine earthquakes causes Tsunamis**
- 7. Heavy loss of life and property**

LAND SLIDES

- If a mass of earth or rock moves along a definite zone or surface, the failure is called a landslide
- There are three types
 1. DEBRIS SLIDES
 2. ROCK SLIDES
 3. ROCK FALLS







ROCK SLIDES

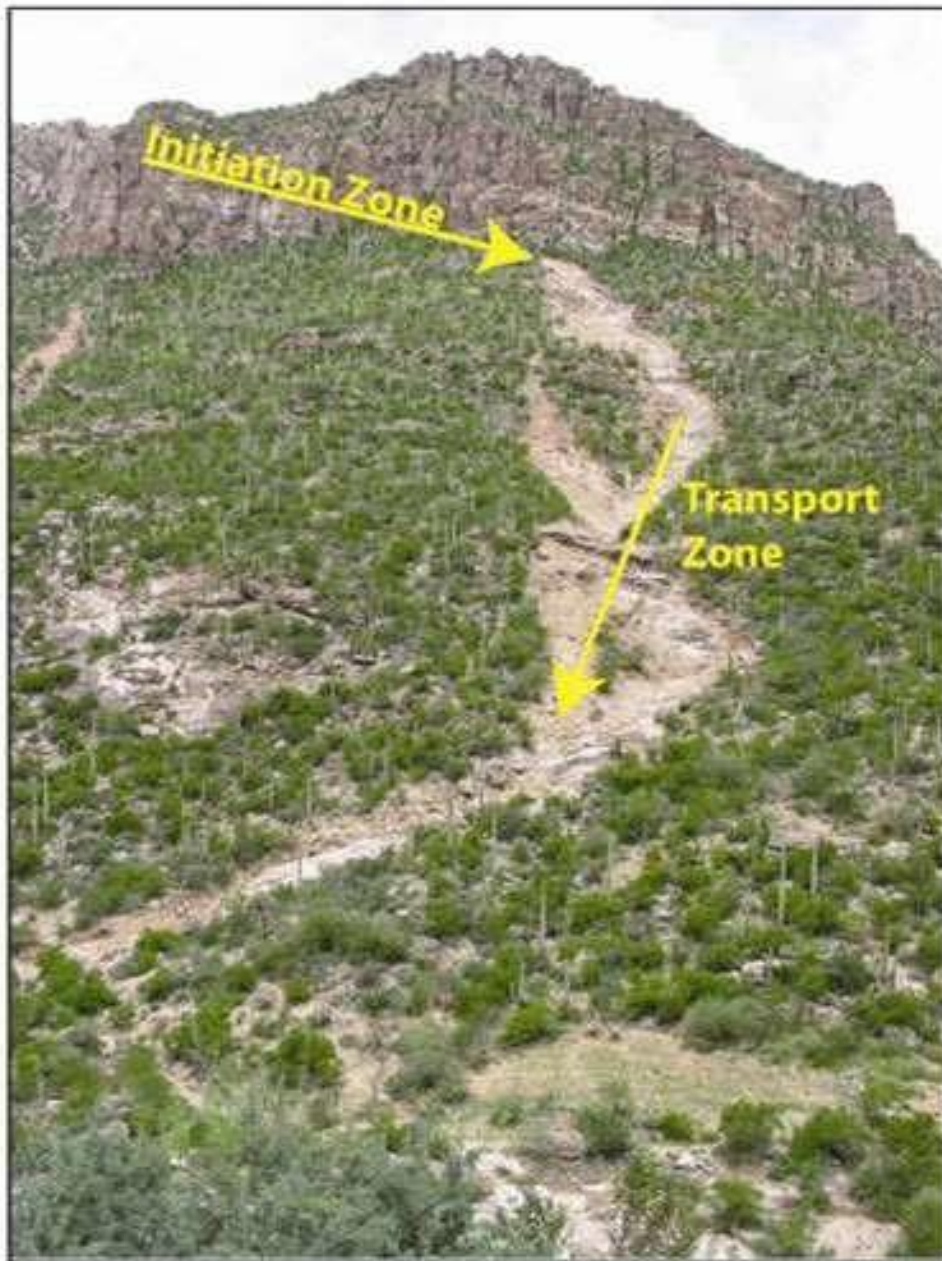




DEBRIS SLIDES







ROCK FALLS

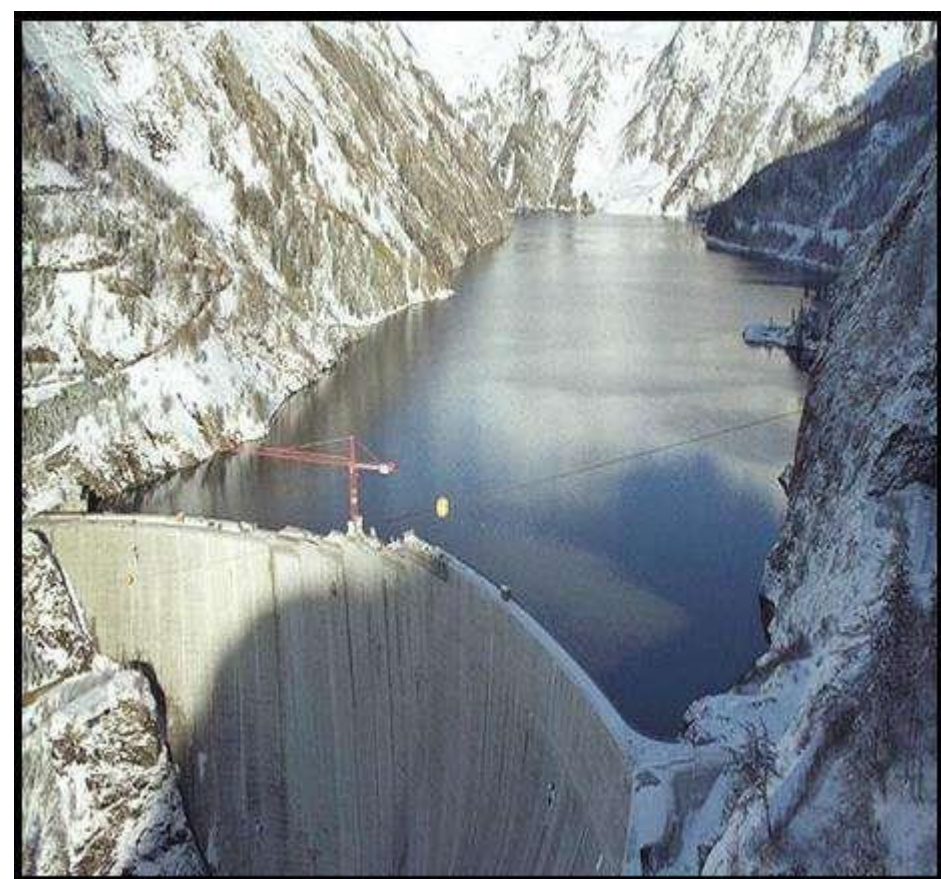






TOPIC 4

- Geology of dams and reservoirs
- Geophysical investigations



GEO
PHYSICAL
INVESTIGATIONS

