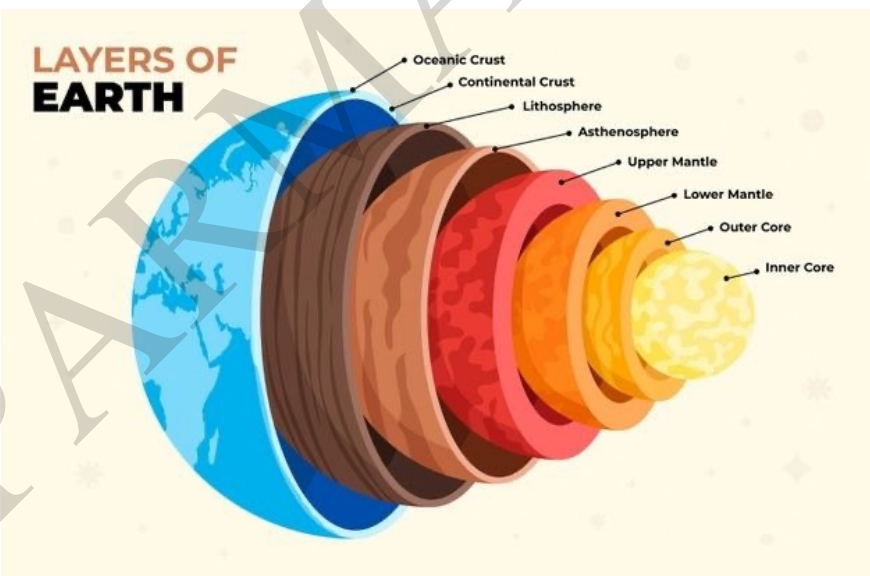
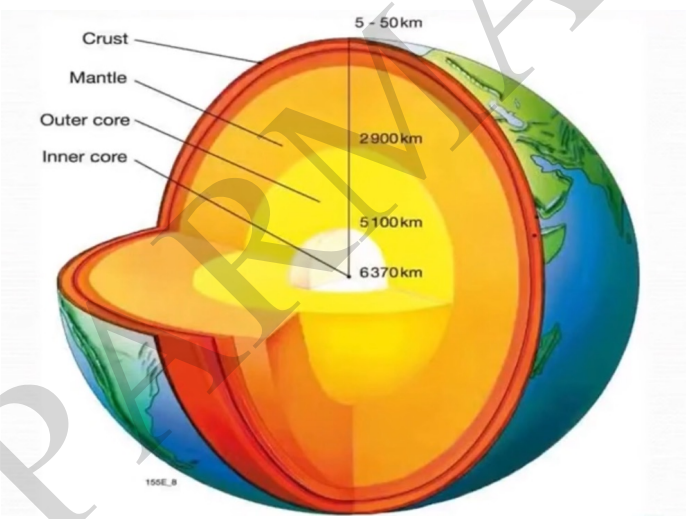
Earth's Interior
&
Plate Tectonic



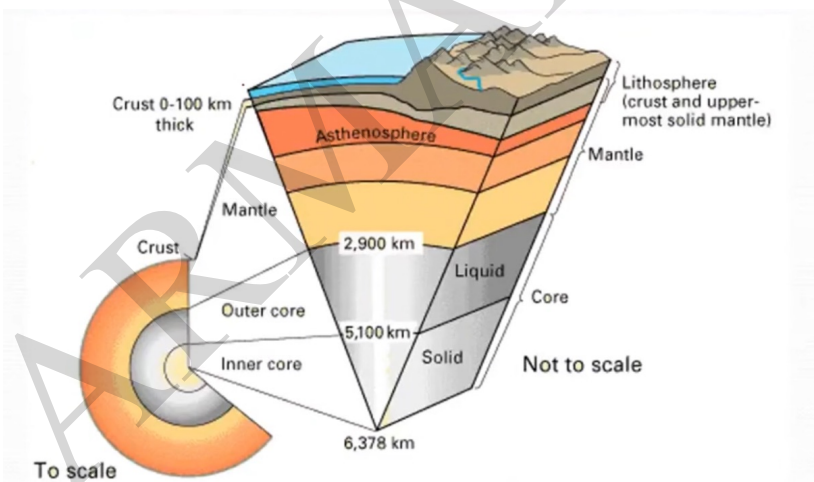
Earth's Interior

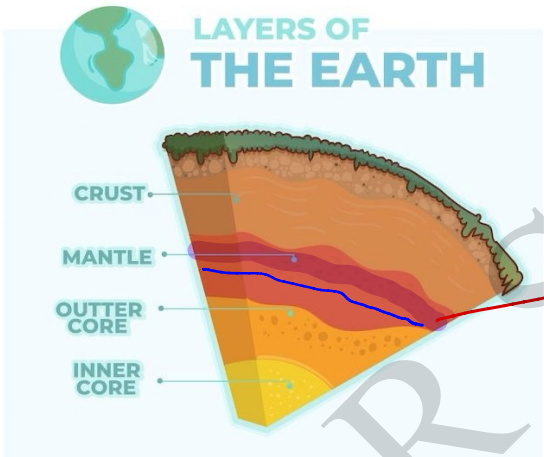


Four method's to know Earth's interior:

1. Temperature – indirect source
2. Volcanoes and rock – direct source
3. Meteorites – indirect source
4. Earthquakes – indirect source


Temperature
Volcanoes
Meteorites
Earthquakes


Crust 0-100 km thick
Lithosphere (crust and upper-most solid mantle)
Asthenosphere
Mantle
Mantle
Crust
2,900 km
Liquid
Core
Outer core
5,100 km
Inner core
Solid
Not to scale
6,378 km
To scale



Crust: made of Silica and Aluminium layer (SiAl)

- Thickness: 5–70 km

Two divisions:

1. Continental Crust:

- land part of crust
- 30 km (thick/lighter)
- made of Granitic rock

2. Oceanic Crust:

- water part of crust
- 5 km (thin/denser)
- made of Basaltic rock

Composition of Earth's crust:

- O → 46.4%
- Si → 28%
- Al → 8% (most abundant metal in crust)
- Fe → 5% (2nd most abundant)

Mantle: made of Silica and Magnesium (SiMa)

- Thickness: 2900 km
- Top layer: Solid form

Two divisions:

1. Upper Mantle
2. Lower Mantle

- Asthenosphere: semi-molten form (plastic form)

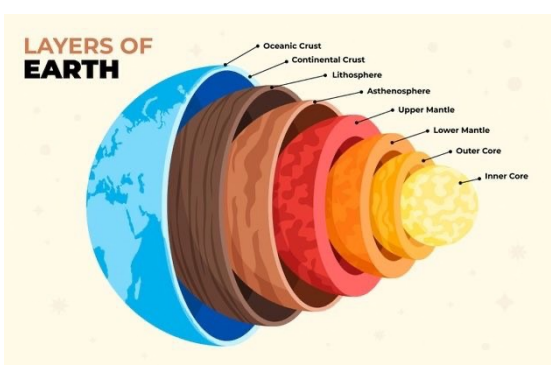
Core: made of Nickel and Iron (NiFe)

Two divisions:

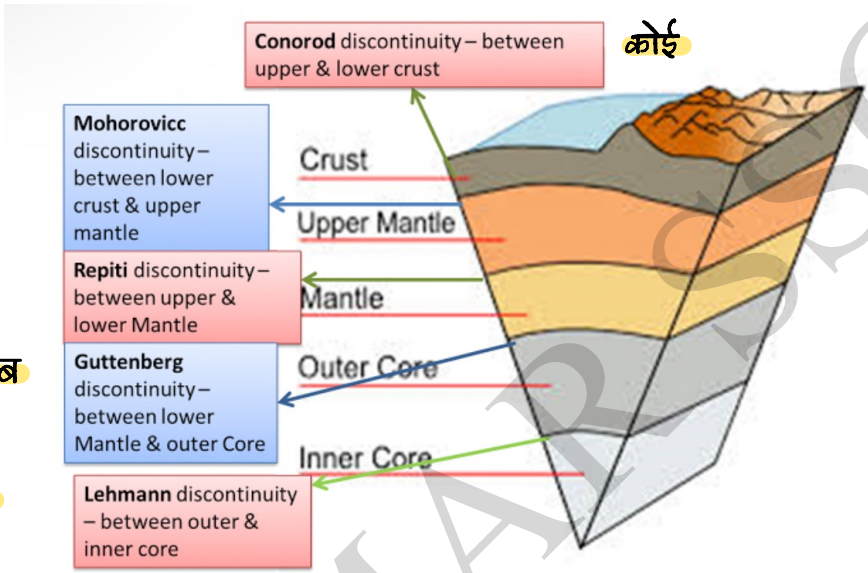
1. Inner Core: Solid form – 2200 km
2. Outer Core: liquid form (shows magnetic properties) – 1300 km

	Crust	Mantle	Core
By Volume	1%	84%	15%
By Mass	1%	68%	31%

- Lithosphere: Crust + Upper solid part of Mantle – thickness: 10–200 km
- Asthenosphere is not part of Lithosphere



Earth's Discontinuity



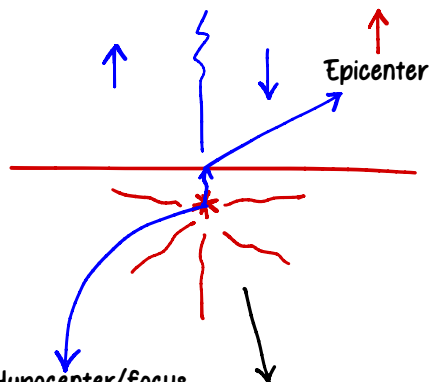
कोई
मुझे
Red
गुलाब
लाटो

S. No	Discontinuity	Layers	Depth
1.	Conrad	Outer and Inner Crust	45 km
2.	Moho	Crust and Mantle Inner Crust and Outer Mantle Inner Crust and Asthenosphere	100 km
3.	Repiti	Outer Mantle and Inner Mantle	700 km
4.	Gutenberg-Weichart	Mantle and Core Inner Mantle and Outer Core	2900 km
5.	Lehmann	Outer Core and Inner Core	5200 km

Earthquake

- An Earthquake is intense shaking of Earth's surface, which causes shifting of Earth's plate

Distance nearest to Epicenter = more destructruction



Hypocenter/focus (Place from where energy is released first)

Energy released due to movement of plates on the form of waves

Earthquake/Seismic waves

- Seismograph: an instrument that records earthquake waves

Waves

Body Waves → Rocks → Surface Waves/Love waves/L-waves

Rayleigh waves

- First to reach on surface
- 7-8 km/sec

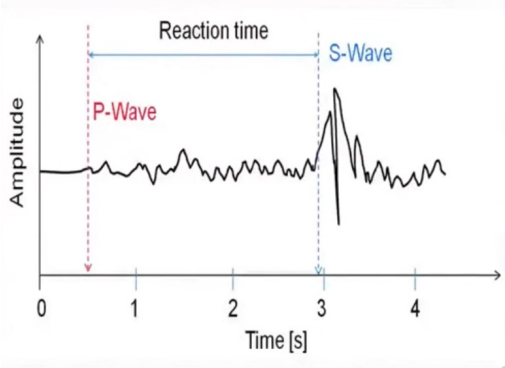
4-6 km/sec

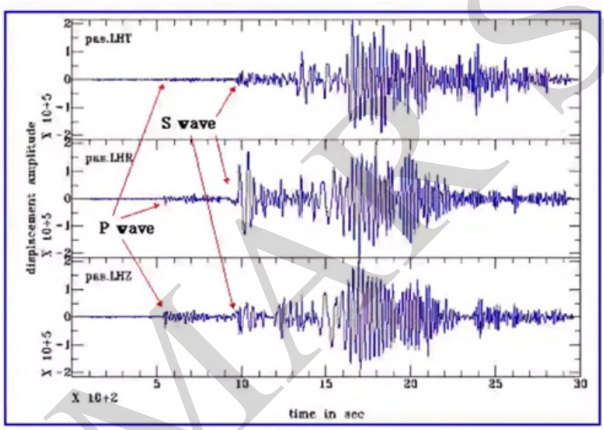
causes more destruction

P waves
- Travels fastest
- Longitudinal

S waves
- Transverse
- Can travel only in Solid medium

Speed ratio:
- Solid > Liquid > Gas (through all mediums)
- They resemble Sound Waves





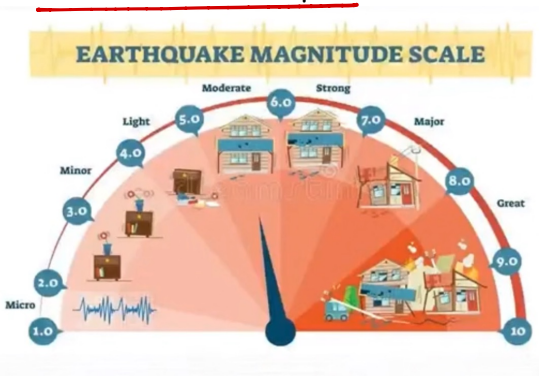
S waves

- creates Crest and Trough

P waves

- creates Compression and Rarefaction
- causes stretching and squeezing

Scales to measure Earthquake



Richter Scale

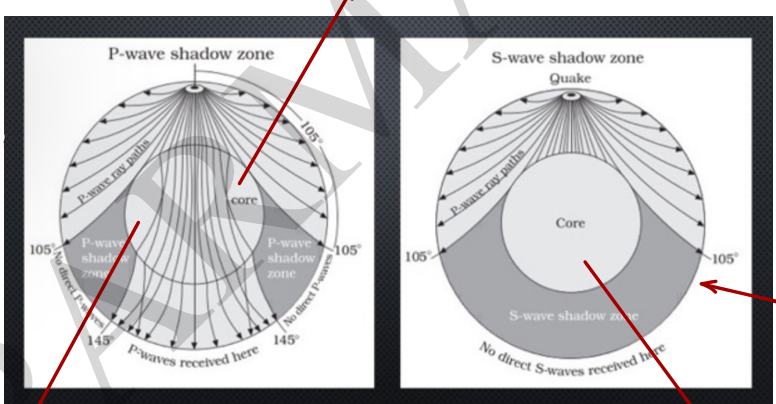
- Instrument to measure magnitude of Earthquake
- Magnitude: 0–10
- It is a limitless scale

Mercalli Scale

- Instrument to measure intensity of Earthquake
- intensity : 1–12

Shadow zone of waves

Liquid outer core

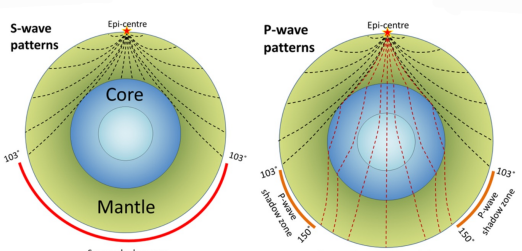


Large shadow zone

- 40% of Earth's surface (not recorded)

Slow speed

Liquid outer core



Tectonic plates

- Lithosphere makes plates comprising Crust and upper solid part of Mantle
- 7 Major + few minor plates

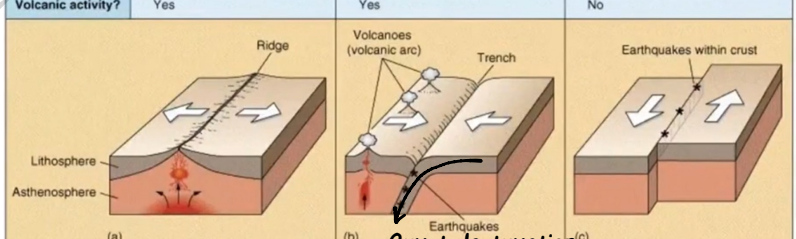
Large boundary: major plate

Minor boundary: minor plate

- Major plates marked in red
- Minor plates marked in blue

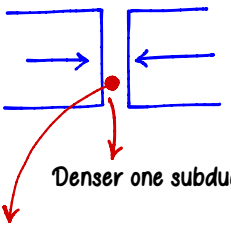
Different types of plate boundaries

Type of Margin	Divergent	Convergent	Transform
Motion	Spreading	Subduction	Lateral sliding
Effect	Constructive (oceanic lithosphere created)	Destructive (oceanic lithosphere destroyed)	Conservative (lithosphere neither created or destroyed)
Topography	Ridge/Rift	Trench	No major effect
Volcanic activity?	Yes	Yes	No



Crust destruction

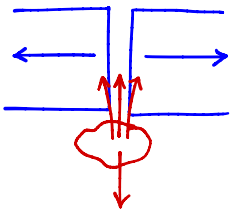
Convergent



Denser one subducts

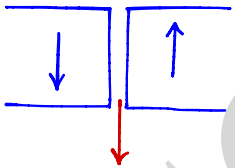
Subduction zone created
Asthenosphere melts
the crust causing crust
destruction

Divergent



distance created, causing lava to explode
New crust formation –
Constructive boundary

Conservative



Lateral Sliding
Conservative boundary

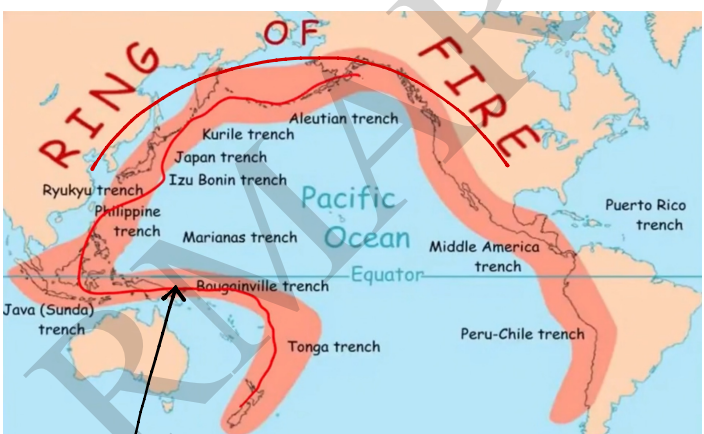


Plate boundary created,
these places are called–
Ring of Fire in Pacific
Ocean

Force behind plate movement:

- Convection occurs in the asthenosphere
  - The heat from the earth's interior causes currents of hot rising magma and cooler sinking magma to flow, moving the plates of the crust along with them

Seismic Zones in India-

Seismic Zone Map of India: -2002

About 59 percent of the land area of India is liable to seismic hazard damage

Zone	Intensity
Zone V	Very High Risk Zone Area liable to shaking Intensity IX (and above)
Zone IV	High Risk Zone Intensity VIII
Zone III	Moderate Risk Zone Intensity VII
Zone II	Low Risk Zone VI (and lower)