

Chapter 3

INTERIOR OF THE EARTH

- The earth radius is 6370 km
- Most of our knowledge about the interior of earth is largely based on estimates and inferences.
- Information is obtained through
 - DIRECT SOURCES
 - INDIRECT SOURCES.

DIRECT SOURCES

- The most easily available solid material is surface rock or rocks we get from mines
- Volcanic eruption forms
- Scientists world over are working TWO PROJECTS
 - ❖ DEEP OCEAN DRILLING PROJECT
 - ❖ INTEGRATED OCEAN DRILLING PROJECT
 - ❖ The deepest drill at KOLA, in Arctic Ocean a depth of 12 km. These projects provided large volume of information

INDIRECT SOURCES

- ☐ Meteors – similar to that of the earth.
- ☐ Gravitation.
- ☐ Magnetic field.
- ☐ Seismic activity.

EARTHQUAKE

- An earthquake in simple words is shaking of the earth.
- It is a natural event.
- It is caused due to release of energy occurs along a fault.
- Rocks along a fault tend to move in opposite directions.

FOCUS / HYPOCENTRE

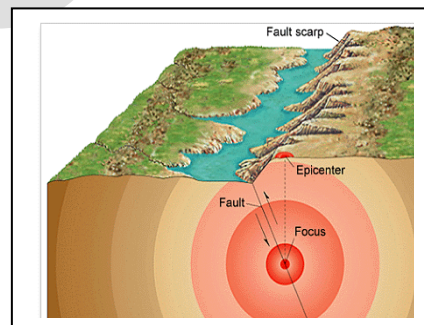
- ❖ The point where the energy is released.

EPICENTRE

- ❖ The point on the surface directly above the focus.

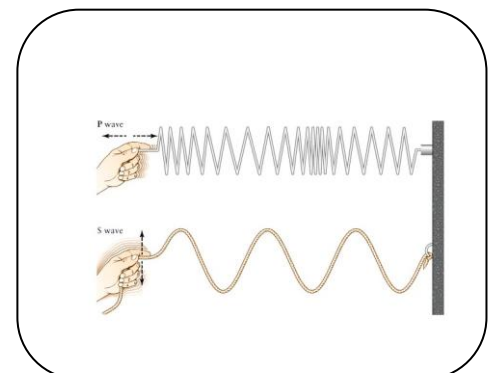
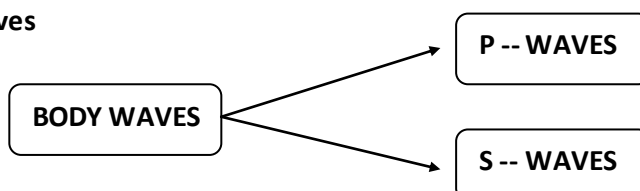
EARTHQUAKE WAVES

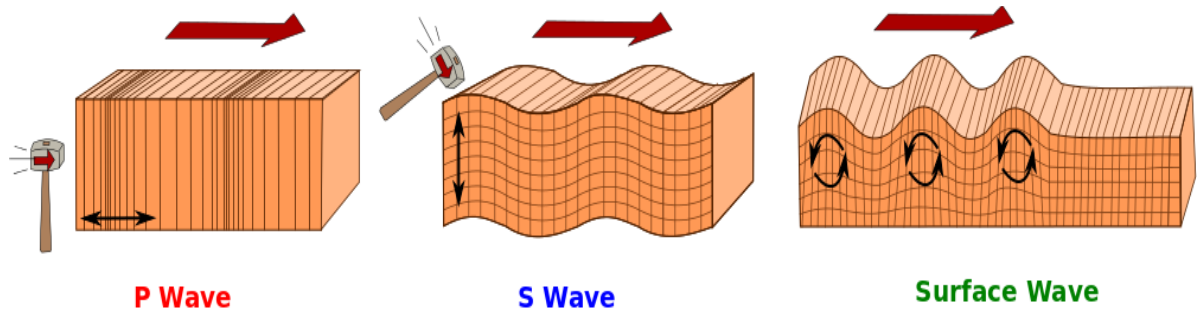
- All natural earthquakes take place in lithosphere.
- Lithosphere refers to the portion of depth up to 200 kms from the surface of the earth.



SEISMOGRAPH

- An instrument records the waves reaching the surface.
- Earthquake waves are basically TWO types
 1. Body waves
 2. Surface waves





P- WAVES/PRIMARY WAVES

- Move faster
- First arrive at the surface
- They travel through gaseous, liquid and solid forms
- Similar to sound waves

S- WAVES/SECONDARY WAVES

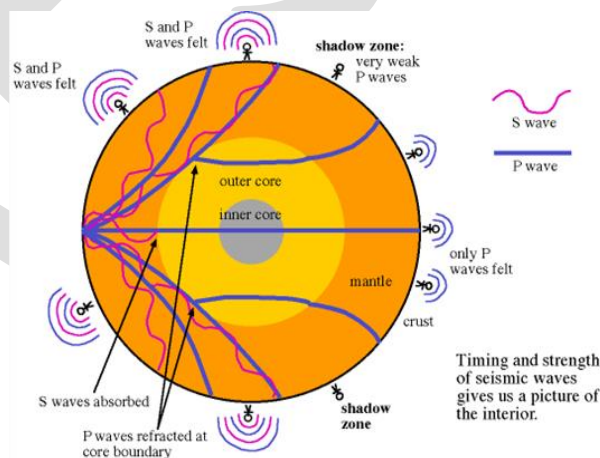
- Arrive at the surface with some time lag
- It travel only through solid materials.
- It has helped to understand the interior of the earth.

SURFACE WAVES

- The last to report on seismograph.
- These are more destructive.
- They cause displacement of rocks and collapse of structures.

SHADOW ZONE

Some specific areas where the waves are not reported such a zone is called shadow zone



TYPES OF EARTHQUAKES

1. **Tectonic** – due to sliding of rocks
2. **Volcanic** – confined to areas of volcanoes
3. **Collapse** – roofs of mines collapse
4. **Explosion** – explosion of chemical or nuclear devices
5. **Reservoir induced** – occur in the areas of large reservoirs

MEASURING EARTHQUAKES

Earthquakes are measured according to

1. Magnitude
2. Intensity

MAGNITUDE

- The magnitude relates to the energy released during the quake
- Magnitude scaled in RICHTER SCALE
- Expressed in absolute numbers 0 -10
- Richter scale invented by RICHTER

INTENSITY

- Intensity scale takes into account the visible damage caused by the event
- Intensity scaled in Mercalli scale
- The range of intensity scale is from 1-12
- Mercalli scale invented by MERCALLI

EFFECTS OF EARTHQUAKES

1. Ground shaking
2. Differential ground settlement
3. Land and mud slides
4. Soil liquefaction
5. Avalanches
6. Ground displacement
7. Floods from dam and levee failures
8. Fires
9. Structural collapse
10. Falling objects
11. Tsunami

STRUCTURE OF THE EARTH

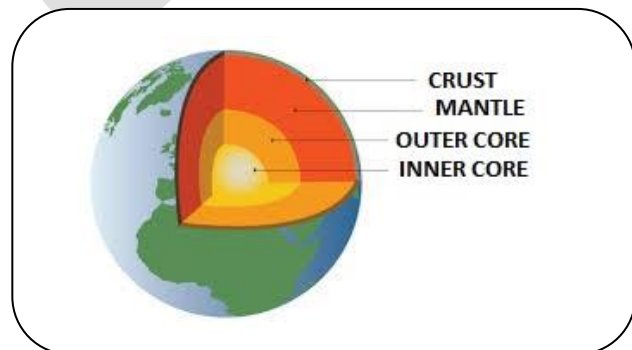
1. THE CRUST
2. THE MANTLE
3. THE CORE

THE CRUST

- It is the outermost solid part of the earth.
- The thickness of the crust varies under the oceanic and continental areas.
- Oceanic crust is thinner as compared to continental crust
- The mean thickness of oceanic crust is 5 km whereas continental is 30 km, in major mountain areas 70 km
- The oceanic crust is made up heavier rocks like Basalt, the density of 3 g/cm^3

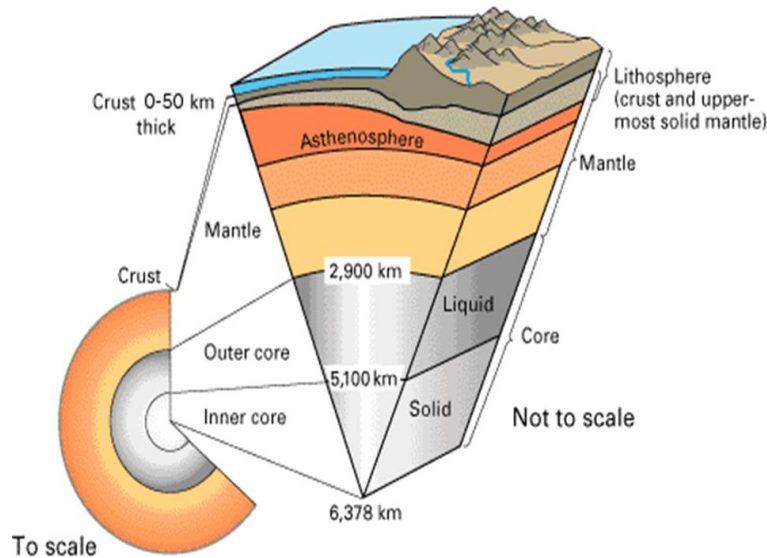
THE MANTLE

- It is the second layer, beyond the crust.
- The mantle extends from Mohos discontinuity to a depth of 2900 km.
- The upper portion of mantle is called Asthenosphere. It is to be extending up to 400 km. It is the main source of Magma
- The crust and the uppermost part of the Mantle is called Lithosphere. Its thickness 10 – 200 km
- The lower mantle extends beyond the Asthenosphere, it is in solid state.



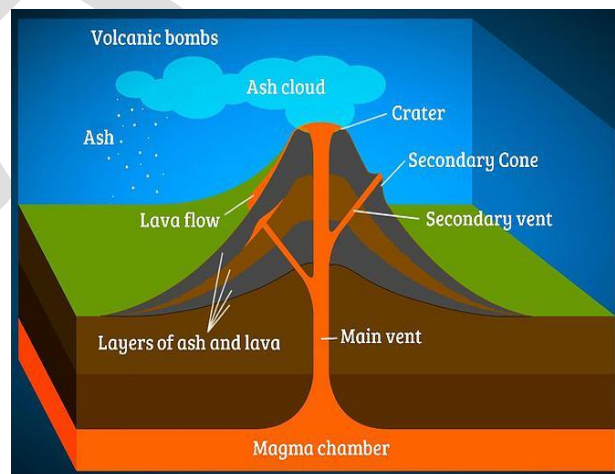
THE CORE

- Inner most layer
- The core is made up of very heavy material, sometimes referred as NIFE layer (Nickel + Iron)
- The outer core is in liquid state.
- The inner core is in solid state.
- The density is around 13 g/cm^3



VOLCANOES

- A volcano is a place where gases, ashes and lava escape to the ground.
- Active volcano have been released out in the recent past
- The material in the upper mantle portion is called Magma. Once it reaches the surface called as Lava.
- The material that reaches the ground – lava, pyroclastic debris, bombs, ash, dust and gases ... (nitrogen, hydrogen, argon, chlorine, sulphur....)
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TYPES OF VOLCANOES

1. Shield Volcanoes
2. Composite Volcanoes
3. Caldera
4. Flood Basalt Provinces
5. Mid - Ocean Ridge Volcanoes

SHIELD VOLCANOES

- The shield volcanoes are the largest of all the volcanoes
- These are mostly made up of Basalt
- They became explosive if somehow water gets in to the vent
- The upcoming lava moves in the form of a fountain and develops in to cinder cone
- The Hawaiian volcanoes are the most famous examples.

COMPOSITE VOLCANOES

- ❖ These are characterised by eruptions of cooler and more viscous lavas than basalt.
- ❖ Along with lava, large quantities of pyroclastic material and ashes find their way to the ground, this leads to the formation of layers at the vent.

CALDERA

- These are the most explosive volcanoes.
- When they erupt they tend to collapse on themselves rather than building any tall structure.
- The collapsed depressions are called Calderas.



FLOOD BASALT PROVINCES

- These volcanoes outpour highly fluid lava that flows for long distances, covered by 1000 sq.km of thick basalt lava flows.
- There can be series of flows with some flows attaining thickness of more than 50 m.
- Example: - Deccan traps.

MID-OCEAN RIDGE VOLCANOES

- ❖ These volcanoes occur in the oceanic areas.
- ❖ The central portion of ridge experiences frequent eruptions.
- ❖ There is a system of mid ocean ridges more than 70000 km long that stretches through all the ocean basins.

VOLCANIC LANDFORMS

- Depending on the location of cooling of the lava Igneous rocks are classified as
 - Volcanic Rocks- cooling at the surface.
 - Plutonic Rocks- cooling in the crust.
- The lava that cools within the crustal portions assumes different forms. These forms are called *Intrusive forms*

BATHOLITHS

- A large body of igneous material that cools deeper depth in the form of large domes.
- They cover large areas and depth may be several km.
- These are granitic bodies.
- Batholiths are the cooled portion of magma chambers.

LACOLITHS

- These are dome-shaped rocks with a level base and connected by a pipe-like conduit from below.
- These are located at deeper depths.
- The Karnataka plateau is spotted with Domal hills of granite rocks, now these are exfoliated, are the examples of *LACOLITHS and BATHOLITHS*

LAPOLITH

- Saucer shape intrusive rocks.

PHACOLITH

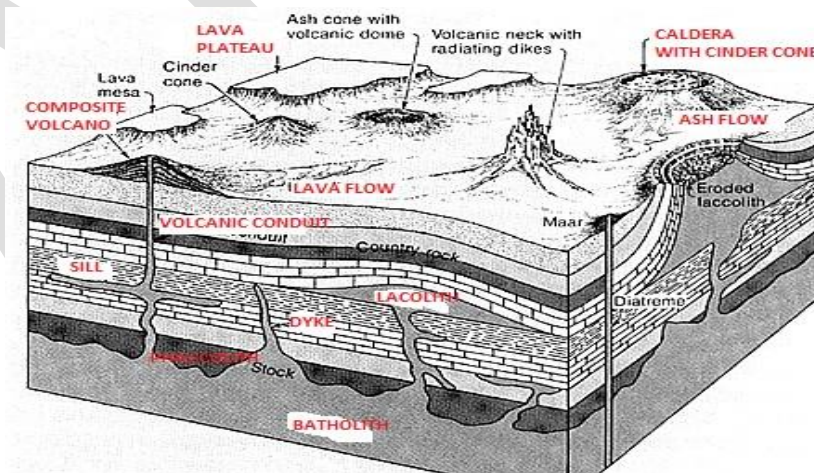
- A wavy mass of intrusive rocks, is found at the base of Synclines or at the top of Anticlines.

SILL AND SHEET

- The near horizontal bodies of the intrusive rocks are called sill or sheet.
 - ✓ The thick horizontal deposits are called **SILLS**.
 - ✓ The thinner ones are called **SHEETS**

DYKES

- ☐ When the lava cooled in the cracks and fissures to develop a wall-like structure. Such structures are called dykes
- ☐ Commonly found in the western Maharashtra



AFSAL.T

HSST GEOGRAPHY

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