

The earth's radius is 6,370 km. No one can reach the centre of the earth and make observations or collect samples to tell us about the earth's interior. How scientist know about it?

SOURCES OF INFORMATION ABOUT THE INTERIOR –

1. Direct Sources:
 - a. Mining: scientist also collect samples of rocks and material from mining areas. For e.g. Gold mines in South Africa which are as deep as 3 - 4 km. From there we know it is very hot and dense deep inside earth.
 - b. Drilling projects: some deep drilling projects such as “Deep Ocean Drilling Project” at Kola in Arctic Ocean and “Integrated Ocean Drilling Project”, have provided large volume of information about the density and temperature inside the crust.
 - c. Volcanic eruption: As and when the magma comes out to the surface, during volcanic eruption it becomes available for laboratory analysis.
2. Indirect Sources:
 - a. Mining: after finding the rate of change and radius of the earth scientists have estimated the values of temperature, pressure and the density of materials at deeper depths.
 - b. Meteors: The material and the structure observed in the meteors are similar to that of the earth because they developed out of same materials same as the earth.
 - c. The other indirect sources include gravity anomalies, survey of magnetic field, and seismic activity give us information about the distribution of mass of the materials in the crust of the earth.

EARTHQUAKE

Why does the earth shake?

- Earthquake is the shaking of the earth due to release of energy that occurs along the fault line.
- Tectonic plates along the fault tend to move in opposite directions and the friction locks them together. However, due to their continuous movement at some point of time they overcome the friction.
- When this happen they slide past one another abruptly. This causes a release of energy.
- The point where energy releases is called focus/hypocentre Above the focus point on the surface it is called epicentre.

Types of Earthquake waves – body waves and surface waves.

- Body waves are generated due to the release of energy at the focus. There are two types of body waves. They are called P and S-waves.
 - P-waves move faster and are the first to arrive at the surface. These are also called ‘primary waves’. The P-waves are similar to sound waves. They travel through gaseous, liquid and solid materials.
 - S-waves arrive at the surface with some time lag. These are called secondary waves. An important fact about S-waves is that they can travel only through solid materials.

- Surface waves: The body waves interact with the surface rocks and generate new set of waves called surface waves. These waves move along the surface. These waves are more destructive. They cause displacement of rocks, and hence, the collapse of structures occurs.

Types of Earthquakes

- The most common ones are the tectonic earthquakes. These are generated due to sliding of rocks along a fault plane.
- A special class of tectonic earthquake is sometimes recognised as volcanic earthquake. However, these are confined to areas of active volcanoes.
- In the areas of intense mining activity, sometimes the roofs of underground mines collapse causing minor tremors. These are called collapse earthquakes.
- Ground shaking may also occur due to the explosion of chemical or nuclear devices. Such tremors are called explosion earthquakes.
- The earthquakes that occur in the areas of large reservoirs are referred to as reservoir induced earthquakes.

Measuring Earthquakes

- The magnitude scale is known as the Richter scale. The magnitude relates to the energy released during the quake. The magnitude is expressed in numbers, 0-10.
- The intensity scale is named after Mercalli, an Italian seismologist. The intensity scale takes into account the visible damage caused by the event. The range of intensity scale is from 1-12.

STRUCTURE OF THE EARTH

1. The crust - the Outer most solid part
 - a. It is brittle in nature,
 - b. The mean thickness of oceanic crust is 5 km whereas that of the continental is around 30 km.
 - c. It is thin under the oceans and thick under the continents.
2. The mantle - Second layer from the top of the earth
 - a. It extends from Moho-discontinuity to a depth of 2900 km.
 - b. The upper portion of the mantle is called ASTHENOSPHERE which is the source of magma that come out from volcano.
 - c. Crust and upper most part of the mantle is called Lithosphere.
 - d. Lower mantle is in solid state.
3. The core
 - a. It extends from 2900 km to 6300 km depth
 - b. Outer core is liquid while inner core is solid
 - c. The core is made of heavy metals such as Nickel and Iron
 - d. It is also called as Ni-Fe layer.

VOLCANOES AND VOLCANIC LANDFORMS

Major types of volcanoes:

1. Shield Volcanoes:
 - a. Are the largest of all the volcanoes e.g. the Hawaiian volcanoes.
 - b. Mostly made up of basalt, a type of lava that is very fluid, therefore, these volcanoes are not steep.

- c. They are characterised by low-explosivity.
 - d. The upcoming lava moves in the form of a fountain and develops into cinder cone.
2. Composite Volcanoes:
 - a. Lava that is erupted is cooler and more viscous.
 - b. These volcanoes often result in explosive eruptions.
 - c. Along with lava, large quantities of pyroclastic material and ashes find their way to the surface.
 - d. This material accumulates locally around the vent and forms layers.
 3. Caldera:
 - a. These are the most explosive of the earth's volcanoes.
 - b. They are usually so explosive that when they erupt they tend to collapse on themselves rather than building any tall structure.
 - c. The collapsed depressions are called calderas.
 4. Flood Basalt Provinces:
 - a. The lava is highly fluid and flows for long distances.
 - b. The Deccan Traps from India, presently covering most of the Maharashtra plateau, are a much larger flood basalt province.
 5. Mid-Ocean Ridge Volcanoes:
 - a. These volcanoes occur in the oceanic areas.
 - b. There is a system of mid-ocean ridges more than 70,000 km long that stretches through all the ocean basins. The central portion of this ridge experiences frequent eruptions.

Types of Volcanic Landforms:

- Depending on the location of the cooling of the lava, igneous rocks are classified as volcanic rocks (cooling at the surface) and plutonic rocks (cooling in the crust).
- The lava that cools within the earth makes different forms. These forms are called intrusive forms.
- BATHOLITH: A large body of the magma material that cools in the deeper depth of the crust. They are dome shaped, cover large areas, and they are granite bodies.
- LACOLITHS: A large dome shaped with a level base and connected through pipe like conduit from below.
- LAPOLITHS: A concave shaped lava formation
- PHACOLITHS: wave typed lava formation
- SILL: horizontal sheet of lava
- DYKES: vertical lava formation