

Class: IX

Teacher: VARUN SALHOTRA

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Subject: GEOGRAPHY

CHAPTER-4

STRUCTURE OF EARTH

Good Morning Students,

This is the lesson of Class IX Geography. In this lesson we will study about Sources of Earth's Interior and Structure of Earth.

Introduction

- The Study of Interior of the Earth is outside the domain of Geography.
- Its elementary knowledge is very essential for the Geographers because the Nature, Mechanism and Magnitude of Endogenetic Forces that originates from deep inside the Earth.
- It is very difficult task to have a perfect knowledge about the Earth's Interior, but **Seismology** has helped to gain some valid knowledge about the Earth's Interior.

Sources of Earth's Interior

(1) Temperature:

- As we go down the surface of the Earth, the temperature goes on increasing at the rate of 1°C for every 32 metres. At this rate, temperature at the depth of 48 kms is between 1200°C to 2000°C .
- The source of Volcanic Eruption is at the depth of about 48 kms because all the materials present at this depth cannot remain in solid state due to high temperature.
- The Temperature at the core of the Earth is more than 4000°C .
- In the upper layer of the Earth, important source of heat is **Uranium** and **Thorium**.

→ The minerals inside the Earth is found upto a depth of 100 kms. Below this depth they are found in minimum quantity.

THERMAL CONDITIONS OF EARTH

* At 48 kms $\longrightarrow$ 1200°C

* At 400 kms $\longrightarrow$ 1500°C

* At 5100 kms $\longrightarrow$ 4300°C

(2) Pressure:

- The pressure exerted by the weight of the Atmosphere inside the Earth's Surface is also used to determine the Structure of Earth's Interior.
- One Atmospheric Unit equals to a pressure of about 14.7 lb per sq inch.
- At this rate, at the depth of 2500 kms, the pressure is about one million Atmospheric Unit.
- Moreover, the pressure is estimated about 3.5 million Atmospheric Units.

(3) Density:

- The average density of the Earth is 5.5 g/cm^3 .
- The surface layer of the continents that is composed of SIAL has density of 2.7 g/cm^3 .
- The middle layer that consists of SIMA has density of 4.3 g/cm^3 .
- The core of the Earth that consists of NIFE has density of 16 g/cm^3 .

Structure of Earth's Interior

(1) Crust

- It is the outermost layer of the Earth.
- It is very thin layer and has an average thickness of about 60 kms.
- It forms less than 1% of the Earth.

It is divided into 2 parts:

(a) SIAL:

- * It is the uppermost layer of the crust.
- * It consists of Silica and Aluminium.
- * The average thickness of SIAL is 25 kms from the surface.
- * SIAL is thick over continents and very thin or absent over ocean floor.
- * The average density of SIAL is 2.7 g/cm^3 .

(b) SIMA:

- * The layer below SIAL is known as SIMA.
- * The average thickness of this layer is about 35 kms.
- * It is the oceanic crust that is composed of dense rock material.
- * The average density of SIMA is 3.0 g/cm^3 .

* The Boundary between Crust and Mantle is known as Moho discontinuity.

(2) Mantle

- It is composed of Silicates of magnesium and iron.
- Its mean density is 4.5 g/cm^3 . It varies 3 g/cm^3 at top to 5.5 g/cm^3 at the base.
- Average thickness of mantle is 2800 kms.
- It is sub-divided into upper mantle and lower mantle.
- The upper mantle is known as Asthenosphere and it is in semi-liquid state.
- The lower mantle is known as Mesosphere and it behaves like solid due to extreme pressure exerted by overlying layers.
- The temperature in the mantle is 850°C in upper portion and 2208°C in lower portion.
- The line that divides mantle and core is Gutenberg Discontinuity.

Cone

- The innermost layer of the Earth is known as cone.
- This layer is also known as Barysphere.
- Radius of cone is about 3500 kms.
- The cone is composed of Nickle and Ferrus, so it is also known as NIFE.
- The outer cone behaves like liquid and does not let the Earthquake Waves pass through it.
- The inner cone behaves like Solid layer due to extreme pressure exerted by the overlying layer.
- The density of the cone is between 13g/cm^3 to 15g/cm^3 .
- The temperature of cone is estimated about 5000°C .
- The iron present in the cone of the Earth loses its magnetic property due to very high Temperature.