



# Hidden Mantle Layers

## Why in News?

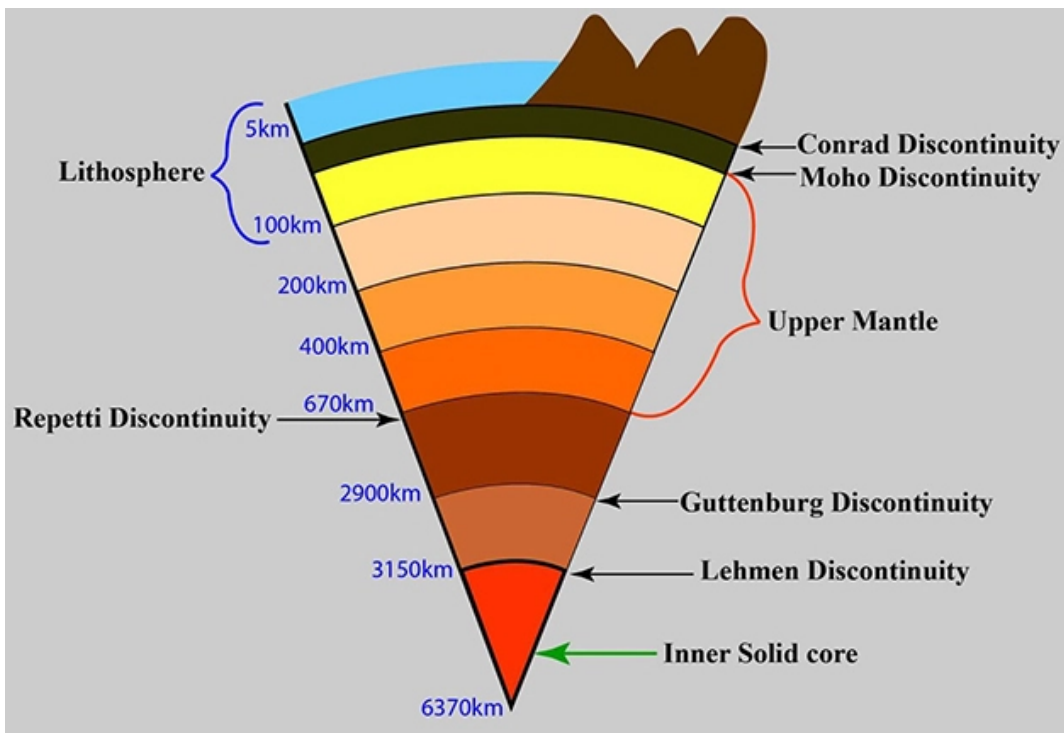
According to two new studies, the mantle, a **layer of solid rock sandwiched between the [Earth's upper crust](#) and [lower core](#)**, has been **hiding two new layers**.

## What are the New Studies Suggest About Hidden Mantle Layers?

- The **first layer is a low viscosity zone in the upper mantle**, approximately **100 kilometres thick**, which was discovered by **studying deep earthquakes** (2018 Fiji earthquake of 8.2 magnitude) **using GPS sensors**.
- The **second layer is a partially molten layer that extends from 90 km to 150 kilometres** and sits below the tectonic plates.
  - This layer was discovered by **analysing seismic waves from earthquakes** and suggests a higher temperature.

## What is the Mantle Layer of Earth?

- **About:**
  - The Earth's mantle is a layer of solid rock that extends from the bottom of the crust to the top of the core, with a thickness of approximately **2,900 kilometres (1,800 miles)**.
  - The mantle is the **largest layer of the Earth's interior, making up about 84% of the Earth's volume** and about 68% of its mass.
- **Composition:**
  - The mantle is **composed of silicate rocks rich in iron and magnesium**, and is divided into the upper mantle and the lower mantle.
- **Significance:**
  - The mantle is an important part of the Earth's structure and plays a critical role in the **[geologic processes](#) that shape the planet's surface**, such as **plate tectonics and volcanic activity**.
  - The mantle's viscous properties govern convection — the **transfer of heat between areas of different temperatures**.
    - The heat generated by the core is transferred through the mantle, which **drives the motion of the [tectonic plates](#)** on the Earth's surface.



## UPSC Civil Services Examination, Previous Year Question (PYQ)

### Prelims

**Q. In the structure of planet Earth, below the mantle, the core is mainly made up of which one of the following? (2009)**

- (a) Aluminium
- (b) Chromium
- (c) Iron
- (d) Silicon

**Ans: (c)**

### Mains

**Q. Define mantle plume and explain its role in plate tectonics. (2018)**

**Source: DTE**