

INDIA IS SPLITTING IN TWO: GEOGRAPHY

NEWS: India is Splitting in Two—Geologists Warn of Major Tectonic Shifts

WHAT'S IN THE NEWS?

Recent geological studies reveal that the Indian Plate is undergoing *delamination*, a process where part of the plate splits and sinks into the mantle, increasing seismic risks. This challenges the conventional idea of continental plate stability under plate tectonics.

Recent Discovery: Delamination of the Indian Plate

- **Delamination** refers to the process where a portion of a tectonic plate detaches and sinks into the mantle.
- New geological studies suggest that the Indian Plate is currently undergoing this process, creating deep fractures and instability.
- This discovery has significant implications for understanding continental plate behavior and seismic risks.

Geological Context and Motion of Indian Plate

- The Indian Plate is moving northward at approximately **5 cm per year**, one of the **fastest continental drifts** on Earth.
- This movement is part of the broader **plate tectonics theory**, explaining how continents shift over geological timescales.
- The ongoing **collision between the Indian Plate and the Eurasian Plate** has been occurring for the past **60 million years**.
- This collision is directly responsible for the **uplift of the Himalayas** and ongoing crustal deformation.

Scientific Evidence Supporting the Split

- **Seismic Wave Analysis:** Seismologists have detected anomalies in the propagation of earthquake waves beneath Tibet, indicating the presence of a **vertical tear** in the Indian Plate.
- **Gas Emissions:** The discovery of **helium-3 isotopes** in hot springs across the Tibetan Plateau provides chemical evidence of deep Earth processes. These gases originate from the mantle, supporting the hypothesis of plate rupture.
- **Cona-Sangri Rift:** A major surface fault in the Tibetan region that may be **physically linked** to the delamination occurring beneath the surface.

Potential Consequences of Plate Delamination

- **Increased Earthquake Risk:**
 - As the Indian Plate splits and sinks, it may create **intense pressure and stress** within the crust.
 - This could result in **frequent and high-magnitude earthquakes**, especially along the Himalayas and Tibetan Plateau.
- **Surface Deformation:**
 - The crust may rise, sink, or twist unpredictably due to underlying instability.
- **Challenge to Traditional Models:**
 - Traditionally, continental plates were considered **rigid and stable**.
 - This discovery suggests that **continental plates can also undergo internal deformation**, similar to oceanic plates.

Broader Implications for Plate Tectonic Theory

- **Dynamic Nature of Continents:**
 - This new evidence supports the idea that **continental plates are more flexible and mobile** than once thought.
 - Delamination could be a **global process**, not restricted to the Indian Plate.
- **Need for Revised Models:**
 - Geologists may need to **update existing tectonic theories** to accommodate plate splitting, internal tearing, and subsurface instability.
 - This has implications for **earthquake prediction, volcanic activity monitoring, and understanding crustal evolution**.

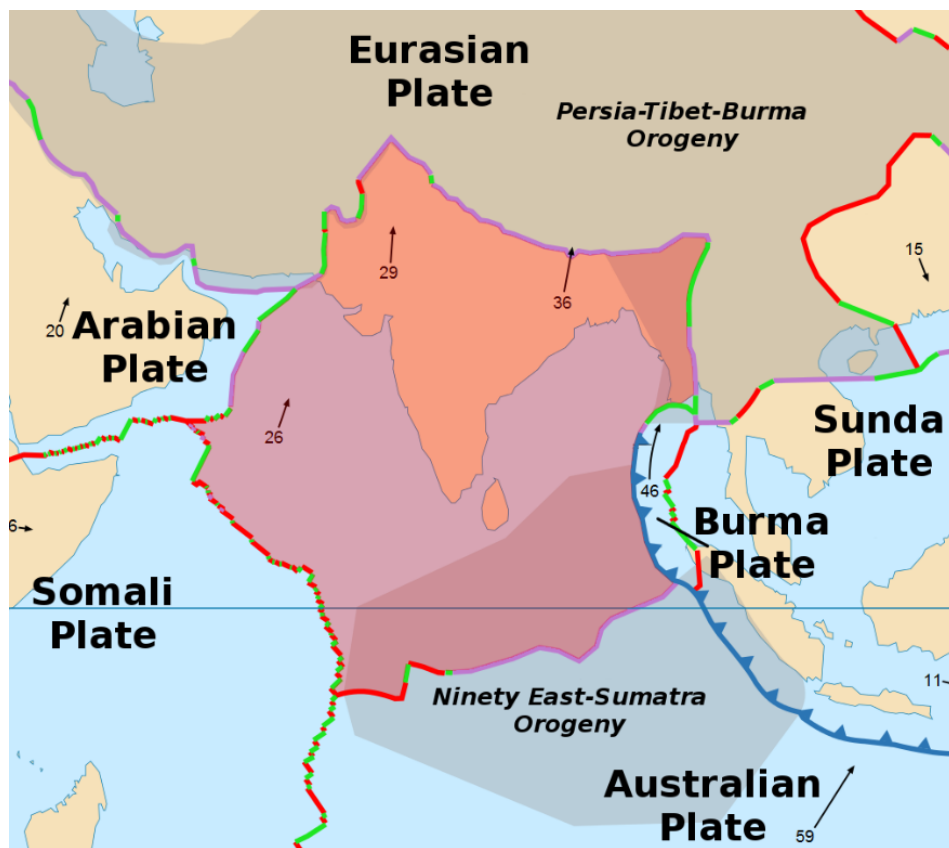
Overview of Plate Tectonic Theory

- The Earth's lithosphere is divided into **seven major and several minor plates**.
- These plates **float over the semi-fluid asthenosphere**, driven by convection currents in the mantle.

Types of Plate Boundaries and Interactions

- **Convergent Boundaries:**
 - Plates **collide** with one another.
 - Outcomes depend on the types of plates involved:

- **Oceanic-Continental:** Oceanic plate subducts beneath the continental plate (e.g., Andes Mountains).
- **Oceanic-Oceanic:** One oceanic plate subducts, creating island arcs (e.g., Japan).
- **Continental-Continental:** No subduction; instead, plates crumple and form mountains (e.g., Himalayas).
- **Divergent Boundaries:**
 - Plates **move apart**, and new crust forms as magma rises.
 - Example: **Mid-Atlantic Ridge**, where the American Plates move away from



the Eurasian and African Plates.

- **Transform Boundaries:**
 - Plates **slide past each other horizontally**, causing earthquakes.
 - Occur mostly in oceanic ridges, but also on land (e.g., **San Andreas Fault**).
 - **Transform faults** are fractures where such lateral movement takes place, typically **perpendicular to mid-ocean ridges**.

Source: <https://indiandefencereview.com/india-is-splitting-in-two-geologists-warn/>