Emergence of Earliest Continental Landmass

Why in News

A new study has suggested that the **earliest continental landmass emerged 3.2 billion year ago instead of 2.5 billion years ago** (as per the continental drift theory).

- The study was conducted by researchers from **India, Australia and the US.**

Continental Drift Theory

- Continental drift theory **deals with the distribution of the oceans and the continents.** It was first suggested by a German meteorologist, **Alfred Wegener in 1912.**
- According to the theory, **all the continents formed a single continental mass- Pangea** and mega ocean- Panthalassa surrounded it.
- Around **200 million years ago Pangaea started splitting** and broke down into two large continental masses **as Laurasia and Gondwanaland** forming the northern and southern components respectively.
- Subsequently, **Laurasia and Gondwanaland continued to break into various smaller continents** that exist today.

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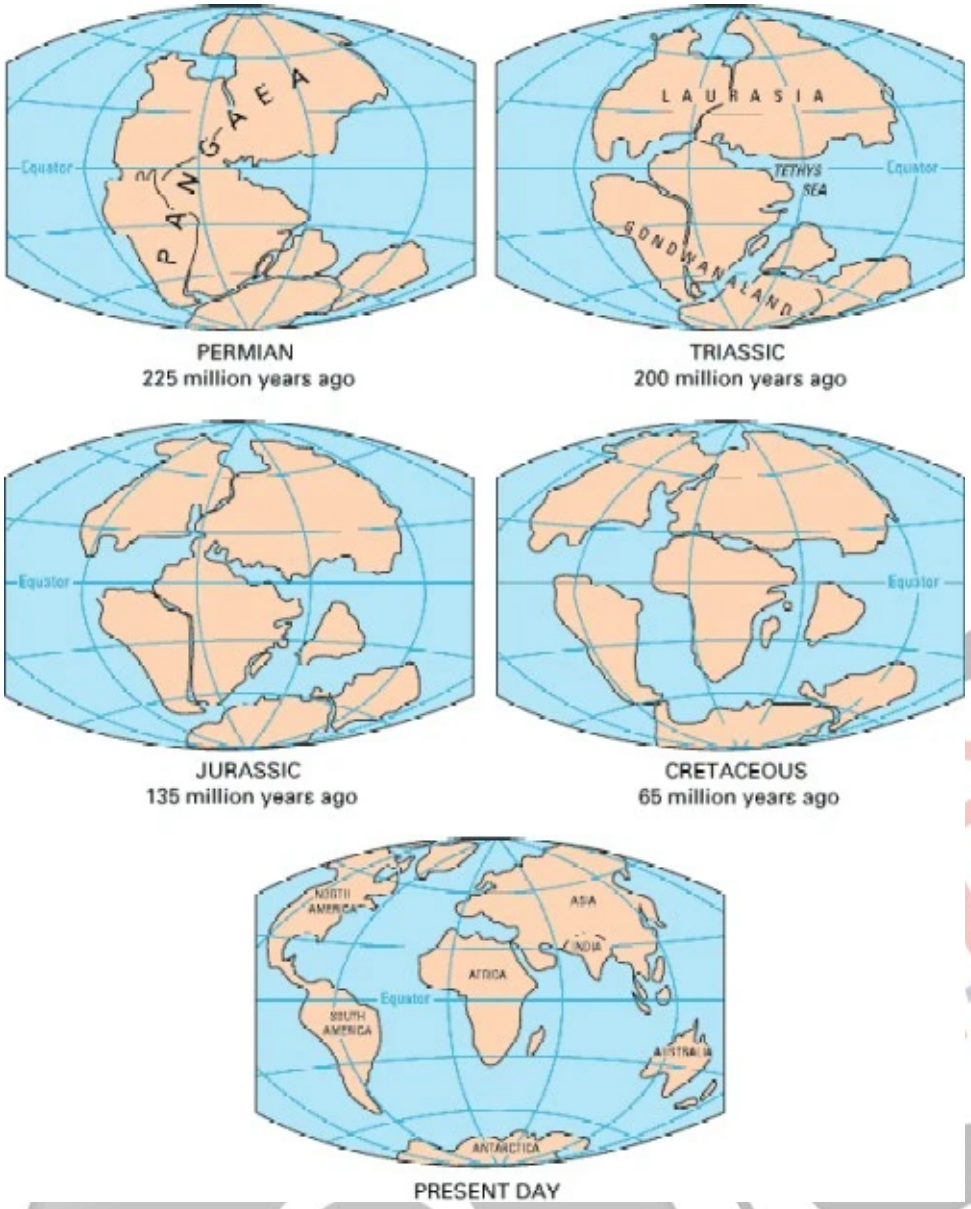
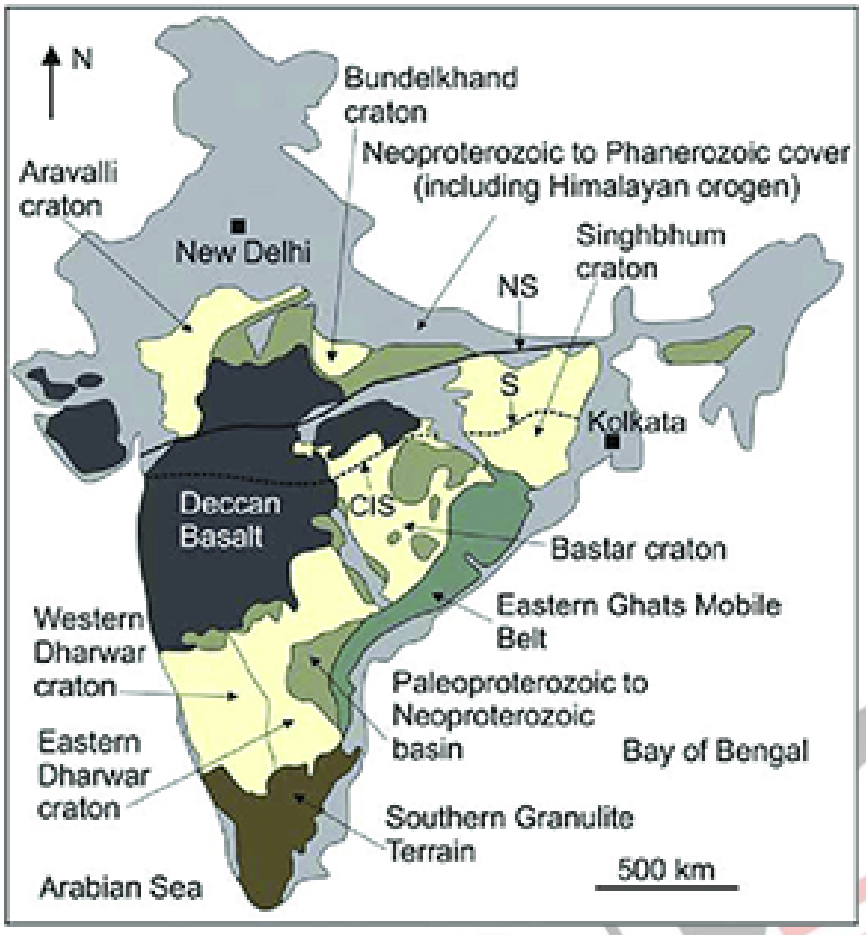


Key Points

- **About:**
  - The study has **challenged** the widely accepted view that the **continents rose from the oceans about 2.5 billion years ago.**
  - It suggests **this happened 700 million years earlier — about 3.2 billion years ago** — and that the **earliest continental landmass to emerge may have been Jharkhand's Singhbhum region.**
    - Patches of the earliest continental land, however, exist in Australia and South Africa, too.
    - Geological similarities have linked the Singhbhum craton to cratons in South Africa and Western Australia.
- **Major Findings:**
  - **River Channels, Tidal Plains and Beaches:**
    - The answer to when the first land masses were formed lay in the sedimentary rocks of the region. **Scientists have found a particular type of sedimentary rocks, called sandstones.**
    - Later on they **found the age by analysing the uranium and lead contents of**

tiny minerals.
        - These **rocks were 3.1 billion years old**, and were formed in ancient rivers, beaches, and shallow seas.
        - All these water bodies could have only existed if there was continental land. Thus the inference was drawn that the **Singhbhum region was above the ocean before 3.1 billion years ago.**
    - **Extensive Volcanism:**
        - The researchers also **studied the granites** that form the continental crust of Singhbhum region.
        - These granites are **3.5 to 3.1 billion years old** and formed **through extensive** volcanism that happened about 35-45 km deep inside the Earth and continued on-and-off for hundreds of millions of years until all the magma solidified to form a thick continental crust in the area.
        - Due to the thickness and less density, the **continental crust emerged above the surrounding oceanic crust owing to buoyancy** (the quality of being able to float).
- **Evolution of Organisms:**
    - The earliest emergence of continents would have **contributed to a proliferation of** photosynthetic **organisms**, which would have increased oxygen levels in the atmosphere.
    - Weathering of the cratons would have led to nutrient runoff, supplying the ocean with phosphorus and **other building blocks for early life.**
        - **Craton** are the stable interior portion of a continent characteristically composed of ancient crystalline basement rock.
- **Significance:**
    - At a time when the **entire world was debating about changes in climate**, it is very **important to understand how our atmosphere, oceans and climate came into existence** and how they interacted with geological processes operating deep inside Earth to make our planet habitable.
    - It will allow us to link the interior of Earth to its exterior in deep time.
        - India has three other ancient continental fragments — **Dharwar, Bastar and Bundelkhand regions.** To understand their evolution the study will serve as a template for studying these other cratons.



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