On Dr. Mohammad Ismaiel's Research Work

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Bay of Bengal ocean floor dates back to 92 million years ago: IISER study

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Pune: A new study by researchers from the Indian Institute of Science Education and Research (IISER) Pune has found that a large part of the ocean floor in the Bay of Bengal is about 92 million years old, providing a clearer timeline for how the region formed.

The study, conducted by Mohammad Ismaiel and Kolluru Sree Krishna, was based on magnetic and seismic reflection data collected from the seabed from central Bay of Bengal. The findings helped the scientists better understand the geological history of the northeastern Indian Ocean.

The team collected data using research ship-borne towing magnetic sensors, and compared it with satellite models and seismic reflection imaging which uses sound waves to map deep underground structures.

DEEP SEA CLUES

- The study area lies around 12 degrees North latitude, between two major underwater volcanic features — the 85°E Ridge and the Ninetyeast Ridge
- This is the first time that a 92 Ma age constraint has been provided for the Bay of Bengal region with more confidence

Ismaiel said, "Most of the crust in the region formed during a long period known as the Cretaceous Normal Superchron, between 120 and 83 million years ago. During this time, Earth's magnetic field did not reverse frequently, making it harder to determine the age of rocks using standard methods."

According to experts, Earth's magnetic field reverses at irregular intervals, averaging roughly every 2,00,000 to 3,00,000 years over the last 20 million years, with the last major flip occurring about 7,80,000 years ago.

Ocean floor dating is usually done by looking at magnetic stripes. Magma rising from the Earth's interior solidifies into new crust and the magnetic minerals within the rock align with the Earth's magnetic field which flips periodically. The ocean floor then creates a barcode of magnetic reversals that scientists can read.

▶ **Magnetic stamp, P 2**

Magnetic stamp reveals how Bay's floor formed & evolved

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The IISER team studied changes in the strength of Earth's magnetic field recorded in the rocks. They focused on identifying Q1, a globally recognized magnetic anomaly associated with a brief, intense fluctuation in the Earth's magnetic field strength about 92 million years ago. "Analysis of ship-borne magnetic profile data and magnetic regional mode led us to recognize this internal time marker," the researchers stated in the study.

The study area lies around 12 degrees North latitude, between two major underwater volcanic features — the 85°E Ridge and the Ninetyeast Ridge.

"We used both ship-based measurements and global magnetic models to trace patterns in the seabed. We also compared their findings with similar data from other ocean basins, including regions near Antarctica. This helped confirm that the magnetic signal we found matches the known Q1 marker seen elsewhere in the world," the researchers added.

"This is the first time that a 92 Ma age constraint has been provided for the Bay of Bengal region with more confidence," Kolluru said.

Despite identifying the Q1 marker clearly, the researchers said they could not confirm another marker, known as Q2, linked to an age of about 108 million years. They suggested that volcanic activity from the Kerguelen plume, which has generated massive amounts of volcanic rock for over 120 million years in this region, may have affected its signal.

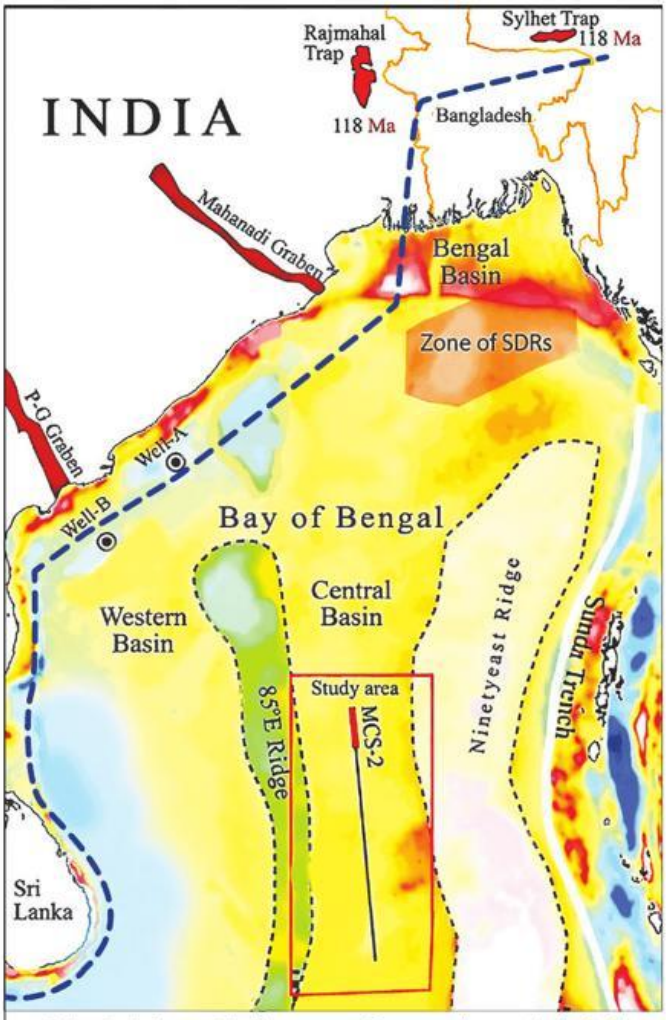
The study brings together different types of data, including magnetic readings and seismic images, to reduce uncertainty. The researchers said more detailed surveys could further improve understanding of the region.

"Higher-resolution geophysical surveys are required to further reduce uncertainties," Kolluru said.

The findings offer a clearer picture of how the ocean floor in the Bay of Bengal formed and evolved over millions of years, based entirely on evidence recorded in the Earth's magnetic field.

It also helps in understanding the deep, dynamic forces that have shaped the Earth's surface over millions of years.

18KM-THICK SEDIMENTS MADE EARLIER STUDIES MORE DIFFICULT



➤ **Seismic data used in the study showed that the oceanic crust in this area is about 6km thick typical for ocean floors and has formed between the two buried volcanic ridges**

➤ The researchers added that the ends of certain fracture zones in the region appear to line up with this 92 million-year mark

➤ The termination of oceanic fracture zones in the vicinity of Q1 anomaly may indicate the timing (92 Ma) of the plate's reorganization in the Indian Ocean, the study noted

➤ The team also pointed out that thick layers of sediment, known as the Bengal Fan, have covered the ocean floor over time. In some places, these sediments are up to 18km thick which made earlier studies more difficult