1. India Secures Licence for Polymetallic Sulphides - International Relations

India has secured a landmark license from the International Seabed Authority (ISA) to explore polymetallic sulphides on the Carlsberg Ridge. This move expands India's deep-sea mineral exploration rights but also highlights the geopolitical, environmental, and technological challenges of mining the high seas.

India Secures Licence for Deep-Sea Mineral Exploration

The Core News - India has successfully secured an exploration licence from the International Seabed Authority (ISA).

Resource and Location - The license is for exploring polymetallic sulphides in the Carlsberg Ridge, a vast underwater mountain range in the northwest Indian Ocean.

Global First - This is a landmark achievement as it is the first licence ever granted globally for exploring polymetallic sulphur nodules in the Carlsberg Ridge area.

India's Deep-Sea Applications and Rights

Recent Applications (January 2024) -

1. Carlsberg Ridge - The exploration licence has been granted.
2. Afanasy-Nikitin Sea (ANS) mount - This application is still pending approval. The region is also claimed by Sri Lanka, adding a layer of diplomatic complexity.

India's Existing Exploratory Rights -

2002 - India first obtained rights to explore polymetallic nodules in the Central Indian Ocean Basin (CIOB). After extensions, this licence is valid until March 2027.

2016 - India secured rights to explore polymetallic sulphides in another part of the Indian Ocean Ridge, valid until September 2031.

Types of Deep-Sea Mineral Deposits

1. Polymetallic Nodules

Formation - These are formed by the concentric layering of iron and manganese hydroxides around a core (like a shell fragment or a shark's tooth).

Appearance - They are potato-shaped concretions, ranging from a few centimetres to 20 cm in size.

Location - Found scattered on the abyssal plains at depths of 4,000 to 6,000 meters.

Key Metals - Manganese (Mn), Nickel (Ni), Cobalt (Co), and Copper (Cu).

Indian Rights - India holds exploration rights in the Central Indian Ocean Basin (CIOB).

2. Polymetallic Sulphides

Formation - They are created when hot, mineral-rich fluids from hydrothermal vents on the seafloor mix with cold seawater, causing metal sulphides to precipitate.

Appearance - They form chimney-like sulphide mounds and deposits around these vents.

Location - Found along mid-ocean ridges and hydrothermal vent fields.

Key Metals - Copper (Cu), Zinc (Zn), Iron (Fe), Lead (Pb), Gold (Au), Silver (Ag), and rare earth elements.

Indian Rights - India holds exploration rights in the Indian Ocean Ridge (2016) and the Carlsberg Ridge (2025).

3. Cobalt-rich Ferromanganese Crusts

Formation - These are formed by the direct precipitation of manganese and iron oxides from seawater onto hard rock surfaces over millions of years.

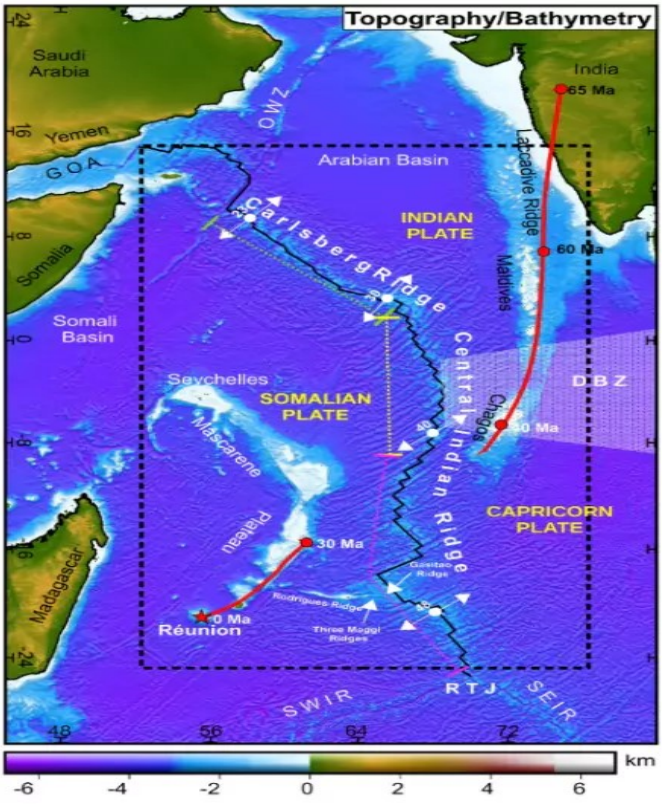
Appearance - They look like a hard, blackish crust, a few centimetres thick, coating underwater rocks.

Location - Found on the slopes and summits of seamounts (underwater mountains) at depths of 1,000 to 3,000 meters.

Key Metals - Manganese (Mn), Cobalt (Co), Nickel (Ni), Platinum (Pt), and rare earth elements.

Indian Rights - India's application for these resources is currently pending with the ISA.

Challenges in Deep-Sea Exploration



Environmental Concerns - There is a significant lack of clarity on the ecological impacts of deep-sea mining, with potential risks to unique and undiscovered marine biodiversity.

High Costs - Exploration and extraction at extreme ocean depths require highly advanced, specialized technology and massive financial investment.

Geopolitical Competition - Overlapping territorial and resource claims, such as in the Afanasy-Nikitin seamount, create diplomatic challenges between nations.

Uncertain Commercial Viability - Despite the vast potential, commercial interest from the industry remains limited due to the high costs and uncertain returns on investment.

About The Carlsberg Ridge

- The Carlsberg Ridge is a vast, 3,00,000-sq km underwater feature located in the Indian Ocean, specifically in the Arabian Sea. It is a mid-ocean ridge that forms the tectonic plate boundary between the Indian Plate and the Arabian Plate.

About The International Seabed Authority (ISA)

Establishment - The ISA was formed on 16 November 1994 under the UN Convention on the Law of the Sea (UNCLOS).

Headquarters - Kingston, Jamaica.

Membership - It has 169 members (168 States + the European Union). Notably, the USA is not a member as it has not ratified UNCLOS.

Mandate - To regulate the exploration and exploitation of mineral resources in the High Seas Area. To ensure the protection of the marine environment from any harmful effects of seabed activities.

The High Seas Area - This area covers 54% of the world's oceans and includes all waters beyond national jurisdiction (i.e., outside a country's Exclusive Economic Zone, territorial seas, or archipelagic waters). Any country wishing to explore or mine in the High Seas must first obtain permission from the ISA. Currently, nineteen countries hold such exploration rights.

Source - https - //www.thehindu.com/sci-tech/energy-and-environment/india-gets-licence-to-scour-new-part-of-indian-ocean-for-precious-metals/article70053704.ece