

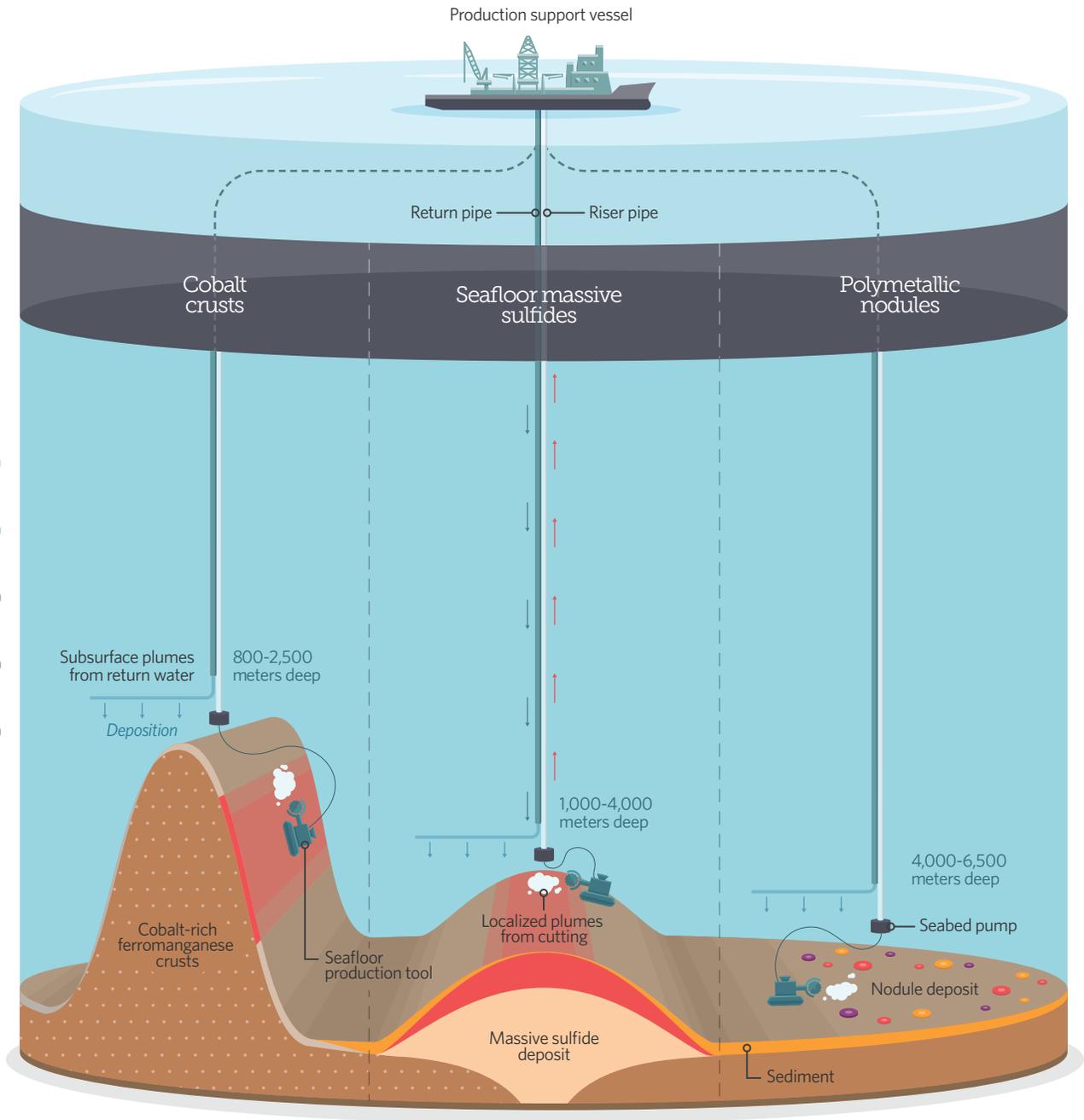
Deep-sea Mining: The Basics

Overview

The deepest parts of the world's ocean feature ecosystems found nowhere else on Earth. They provide habitat for multitudes of species, many yet to be named. These vast, lightless regions also possess deposits of valuable minerals in rich concentrations. Deep-sea extraction technologies may soon develop to the point where exploration of seabed minerals can give way to active exploitation.

The International Seabed Authority (ISA) is charged with formulating and enforcing rules for all seabed mining that takes place in waters beyond national jurisdictions. These rules are now under development. Environmental regulations, liability and financial rules, and oversight and enforcement protocols all must be written and approved within three to five years.

Figure 1
Types of Deep-sea Mining



Source: New Zealand Environment Guide
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The legal foundations

- **The United Nations Convention on the Law of the Sea (UNCLOS).** Also known as the Law of the Sea Treaty, UNCLOS is the constitutional document governing mineral exploitation on the roughly 60 percent of the world seabed that lies beyond national jurisdictions. UNCLOS took effect in 1994 upon passage of key enabling amendments designed to spur commercial mining. One of the distinguishing features of UNCLOS is its declaration that the international seabed and its mineral resources are “the common heritage of mankind” and that mining operations and other activities there should be conducted “for the benefit of all mankind.”
- **The Area.** The seabed beyond the national jurisdiction of individual countries is known as the Area. Coastal nations can control economic activity only within the boundaries of their national jurisdictions as determined by UNCLOS.

The ISA is the international organization tasked with regulating seabed mining in the Area. But UNCLOS also requires state parties to govern any seabed mining within their national jurisdictions in conformity with international rules, regulations, and standards.
- **International Seabed Authority (ISA).** The ISA is the international organization established by UNCLOS to manage activities in the Area. The ISA is tasked with establishing and enforcing the regulations under which UNCLOS member states can explore and exploit the Area’s mineral resources. A key element of the ISA’s responsibilities under UNCLOS is to “protect the marine environment from harmful effects” that may arise from mining activities. The ultimate authority of the ISA is its **Assembly**, which elects members of the ISA **Council**, an executive body that considers agenda items for final disposition by the Assembly. Many of the matters under consideration by the ISA come as reports and recommendations from the **Legal and Technical Commission** and the **Finance Committee**, the ISA’s expert advisory bodies. All four bodies convene each year at the organization’s headquarters in Kingston, Jamaica. Day-to-day activities of the ISA are managed by the ISA **Secretary-General**.
- **ISA contracts.** ISA member states are eligible to apply for contracts. Exploration contracts govern data-gathering, sampling, prospecting, testing, and reporting. Exploitation contracts govern all aspects of actual mining. In early 2018, 29 exploration contracts were in effect. No exploitation contracts have been submitted, but it is widely assumed that the first will come shortly after approval by the Assembly of a comprehensive Mining Code in 2020 or 2021.
- **Mining Code.** The ISA uses the term Mining Code to denote “the whole of the comprehensive set of rules, regulations, and procedures issued by the ISA to regulate prospecting, exploration, and exploitation of marine minerals in the Area.” The ISA Mining Code is currently under development. It will cover environmental, financial, reporting, and regulatory obligations incurred by contractors and the ISA itself.

Deep-sea minerals and where they are found

Plans for the exploitation of seabed minerals rely on the fact that some valuable substances can be found in greater concentrations in certain areas of the ocean floor than in most terrestrial sites. Sought-after commodities include **copper, cobalt, nickel, manganese, lead, lithium, titanium, platinum, gold,** and **zinc**. The ISA has signed exploration contracts for investigating three types of mineral resources:

Polymetallic nodules (17 ISA exploration contracts)



Cook Islands Seabed Minerals Authority

Polymetallic nodules contain rich concentrations of manganese, nickel, copper, and cobalt. They are found in abundance in a few ocean basins, most notably the Clarion-Clipperton Zone (CCZ), a great abyssal plain as wide as the continental United States that lies 4,000 to 6,000 meters below the surface of the eastern Pacific Ocean. Billions of the potato-size nodules are scattered on top of or half-embedded within the muddy bottom of the CCZ. Their exploitation would probably involve scraping 5 to 10 centimeters (2 to 4 inches) off the top of the abyssal plain, separating the nodules from the mud, pumping the nodules to a surface ship by means of a giant tube, and returning the entrained water and fine particles through another tube.

Polymetallic sulfides (7 ISA exploration contracts)



Polymetallic sulfide deposits are found in areas of underwater volcanic activity and seafloor spreading, usually at depths of 1,000 to 4,000 meters. Deposits are often located near tectonic plate boundaries. Hydrothermal vents release superheated, mineral-rich solutions. As these solutions cool, the minerals precipitate out, forming towers on the seafloor with high concentrations of valuable minerals. Deposits formed by these eruptions, along with shallow subsurface deposits, could provide rich but moderately sized areas for mineral exploitation. Operations would remove the sulfide-rich deposits and return water and fine particles through a tube.

Cobalt crusts (5 ISA exploration contracts)



Concentrations of valuable minerals are often found on the sides and summits of underwater mountains. The richest deposits are found at depths of 800 to 2,500 meters as crusts of seamounts in the western Pacific. Crust thicknesses can reach 25 centimeters (almost 10 inches), but more typical deposits run to 10 to 15 centimeters (4 to 6 inches). The basic mode of exploitation would be to remove the cobalt-rich layer on the seamount surface while leaving behind the less valuable rock beneath it.

As of 2018, there are 29 ISA-approved contracts for exploration in the Area.

Table 1
Contracts to Explore Polymetallic Nodule Areas

Sponsoring state(s)	Contractor	Expiration date
China	China Ocean Mineral Resources Research and Development Association	2021*
France	IFREMER (French Research Institute for Exploitation of the Sea)	2021*
Germany	Federal Institute for Geosciences and Natural Resources	2021
Japan	Deep Ocean Resources Development Co. Ltd.	2021*
South Korea	Government of the Republic of Korea	2021*
Russia	JSC Yuzhmorgeologiya	2021*
Bulgaria, Cuba, Czech Republic, Poland, Russia, Slovakia	Interoceanmetal Joint Organization	2021*
India	Government of India	2022*
Nauru	Nauru Ocean Resources Inc.	2026
Tonga	Tonga Offshore Mining Ltd.	2027
Belgium	Global Sea Mineral Resources NV	2028
United Kingdom	UK Seabed Resources Ltd.	2028
Kiribati	Marawa Research and Exploration Ltd.	2030
Singapore	Ocean Mineral Singapore Pte Ltd.	2030
Cook Islands	Cook Islands Investment Corp.	2031
United Kingdom	UK Seabed Resources Ltd.	2031
China	China Minmetals Corp.	2032

* These contracts were set to expire but received a five-year extension for exploration. International Seabed Authority, "Seabed Council Puts Forward Two Candidates for Election of Secretary-General; Approves Six Exploration Contract Extensions; Begins LTC Election Debate" (July 18, 2016), <https://www.isa.org.jm/news/seabed-council-puts-forward-two-candidates-election-secretary-general-approves-six-exploration>.

Source: International Seabed Authority, "Deep Seabed Minerals Contractors," accessed May 1, 2018, <https://www.isa.org.jm/deep-seabed-minerals-contractors>

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Table 2

Contracts to Explore Polymetallic Sulfide Areas

Sponsoring state	Contractor	Expiration date
China	China Ocean Mineral Resources Research and Development Association	2026
Russia	Government of the Russian Federation	2027
France	IFREMER (French Research Institute for Exploitation of the Sea)	2029
South Korea	Government of the Republic of Korea	2029
Germany	Federal Institute for Geosciences and Natural Resources	2030
India	Government of India	2031
Poland	Government of the Republic of Poland	2033

Source: International Seabed Authority, "Deep Seabed Minerals Contractors," accessed May 1, 2018, <https://www.isa.org.jm/deep-seabed-minerals-contractors>

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Table 3

Contracts to Explore Cobalt-Rich Ferromanganese Crusts

Sponsoring state	Contractor	Expiration date
China	China Ocean Mineral Resources Research and Development Association	2029
Japan	Japan Oil, Gas, and Metals National Corp.	2029
Brazil	CPRM (Geological Survey of Brazil)	2030
Russia	Ministry of Natural Resources and Environment	2030
South Korea	Government of the Republic of Korea	2033

Source: International Seabed Authority, "Deep Seabed Minerals Contractors," accessed May 1, 2018, <https://www.isa.org.jm/deep-seabed-minerals-contractors>

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This fact sheet was updated on June 6, 2018, to reflect updated information on deep-sea mining exploration claims and the timetable for developing International Seabed Authority seabed mining rules. It was previously updated on April 3, 2017, to correct several data points regarding the status of seabed mining and the rules being developed.

For further information, please visit:

pewtrusts.org/seabed

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