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JOGMEC Conducts World's First Successful Excavation of Cobalt-Rich Seabed in the Deep Ocean;

Excavation Test Seeks to Identify Best Practices to Access Essential Green Technology Ingredients While Minimizing Environmental Impact

After reviewing a detailed environmental impact, the Japan Oil, Gas & Metals National Corporation (JOGMEC), commissioned by the Japan Ministry of Economy, Trade and Industry (METI), has conducted the world's first successful excavation test of a cobalt-rich crust (Note 1) on the seabed of Japan's exclusive economic zone (EEZ), marking a major technological step forward in the development of its ocean mineral resources.

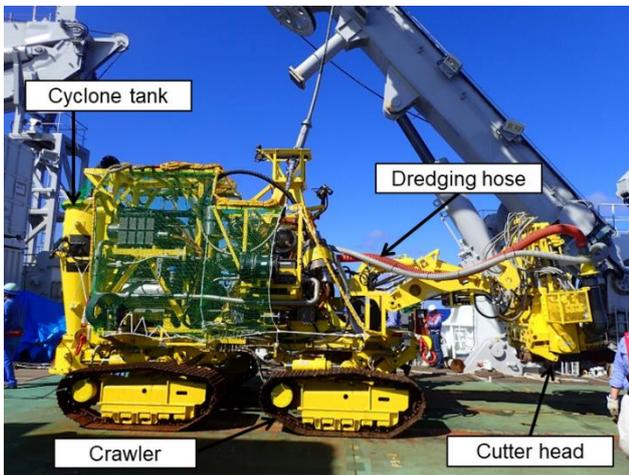
JOGMEC's prior research revealed the possibility of a significant amount of cobalt and nickel - two essential ingredients for batteries - on the seabed, and it is expected to become a valuable domestic resource in the future.

Conducted in collaboration with industry, academia and the government of Japan, and led by JOGMEC staff under research team leader Yoshiaki Igarashi, the tests were held under various conditions, including over sloping and sandy seabed. The team also carefully monitored for any impact on the surrounding environment, prior, during, and following the excavation of the crust to rule out any serious environmental impact.

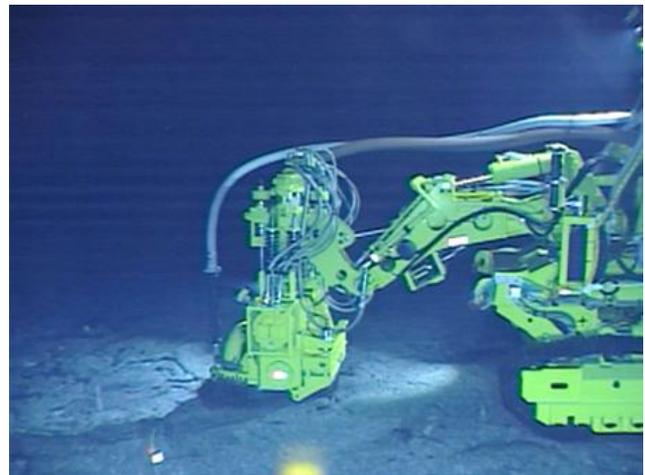
Using a crust-excavation testing machine developed and built in Japan, JOGMEC collected 649 kilograms of cobalt and nickel-rich seabed crust during a world-first test aboard the marine resource research vessel "Hakurei" in July, 2020.



JOGMEC's marine resource research vessel "Hakurei"



Crust-excitation testing machine



The machine on the seabed

According to prior research, it is expected that the area tested around the Takuyo No. 5 Seamount contains enough cobalt to meet Japan's demand for 88 years and enough nickel to meet Japan's demand for 12 years.

Going forward, based on the 2019 Japanese Government Ocean Energy & Mineral Resource Development Plan, JOGMEC will analyze the results and verify the technology's efficiency, before commencing work on a new excavating machine specifically designed to excavate the crusts.

Next, with an eye to 2022, JOGMEC will use the crust samples collected in this latest excavation test to commence scaled-up mineral processing (Note 2) and smelting & refining (Note 3) tests, as well as – in parallel – begin evaluating the resource quantity and environmental impact around the Takuyo No. 5 seamount.

Key words

Note 1: Cobalt-rich (ferro-manganese) crust

The crust is a manganese oxide with a thickness of about several millimeters to over ten centimeters that covers basement rocks from the summit to the slope of the seamount at a water depth of about 800 to 2,400 meters scattered on the seafloor of the northwestern Pacific region, and contains cobalt, nickel, copper and platinum.

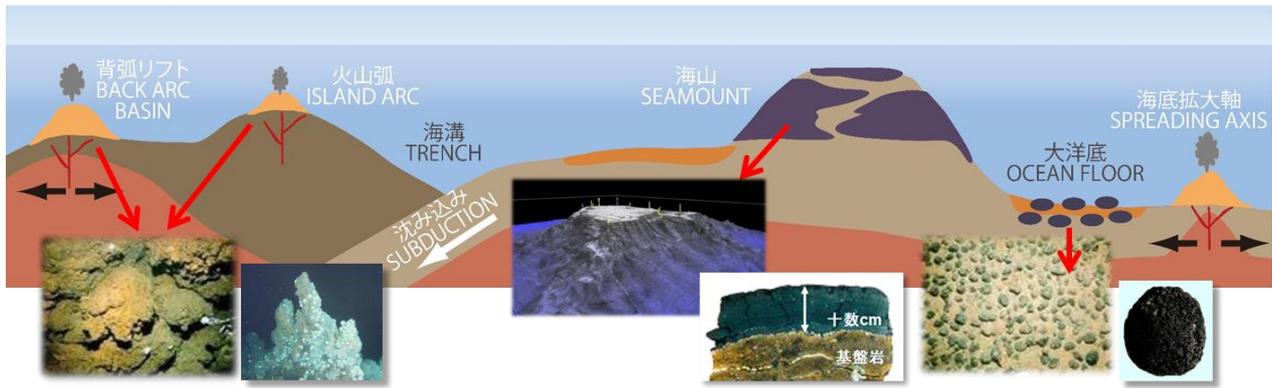
Note 2: Mineral processing

It is a series of processes such as crushing ores and removing unnecessary minerals for separating useful minerals from ores. In the crust mineral processing test conducted by JOGMEC, it was done by crushing sample crusts and the basement rock was separated and removed by using the difference in specific gravity.

Note 3: Smelting & refining

It is a series of processes for extracting a specific metal from ore or a useful mineral obtained by mineral processing. In the crust smelting & refining test conducted by JOGMEC, the crust sample after removing the basement rock was melted in a high-temperature furnace to concentrate the metal content. By doing so, cobalt, nickel, and copper were extracted from the solution dissolved with a chemical solution.

(Reference) Ocean mineral resources



	Seafloor hydrothermal deposit	Cobalt rich crust	Manganese nodule
Characteristics	Polymetallic massive sulfide ore deposits formed by precipitation of metal components contained in hot water ejected from the seafloor	A manganese oxide with a thickness of about several millimeters to over ten centimeters that covers basement rocks from the summit to the slope of the seamount	An ellipsoid manganese oxide distributed on the seafloor with size of 2 to 15 diameters
Located area	Okinawa, Izu/ Ogasawara	Minami-Tori-shima Island	The Pacific
Containing metals	Copper, lead, zinc, gold, silver	Cobalt, nickel, copper, platinum, manganese etc.	Copper, nickel, cobalt, manganese etc.
Sea depth	700 to 2,000 meters	800 to 2,400 meters	4,000 to 6,000 meters