DEEP FOCUS

GRUPOiSQ

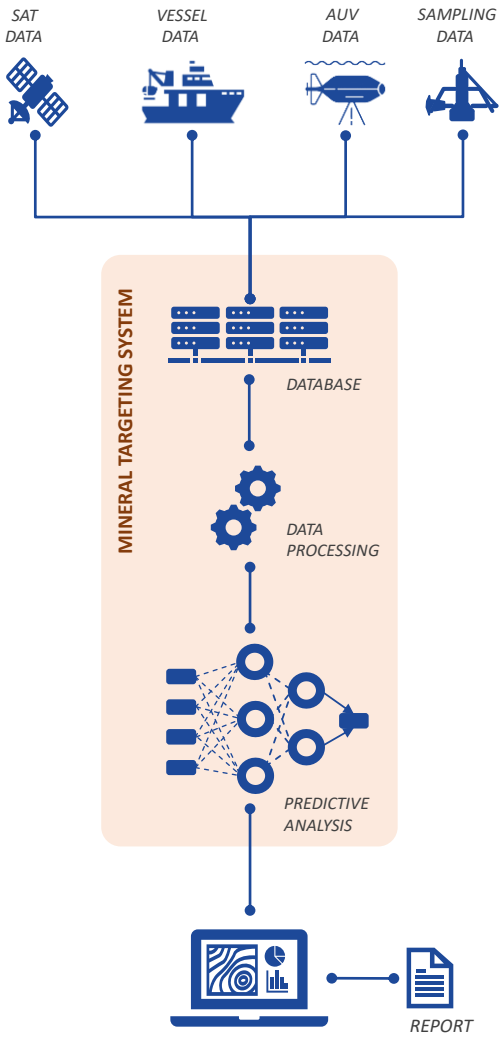
CASE STUDY

CAPABILITIES OF THE AI-POWERED MINERAL TARGETING SYSTEM

Manganese nodule resource assessment in Minamitorishima Island EEZ

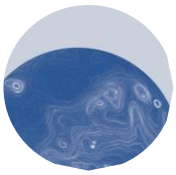
AI-POWERED CONSULTING FOR RESPONSIBLE AND SUSTAINABLE DEEP SEA EXPLORATION

Our concept to fast-track your critical minerals exploration project in the deep sea



CONCEPT

Our innovative AI-powered mineral targeting tools enable quantitatively assess marine mineral resources across scales as well as map ecosystem vulnerability. The predictive models train on several thousand deposit-specific geological and biological examples, creating new knowledge and consistent, high-quality predictive insights to support decision-making.



THE BIG PICTURE

The continually evolving mineral targeting system combines data from multiple sources, including satellite remote sensing, with AI and machine learning to globally assess deposit-specific multi-commodity predictive maps at regional to camp scale and define possible vulnerable ecosystems following the FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas.

A CLOSER LOOK

When further detail is needed, high-resolution data and geological sampling data can be fed into the mineral targeting system pre-trained machine learning models to get more specific information about the area or site of interest. This yields a winning combination to guide decisions and increase the chances of success at much lower discovery risks and costs.

Deep sea exploration for mineral deposits is capital-intensive, time-consuming, and risky. It requires much information to manage risk and make a discovery.

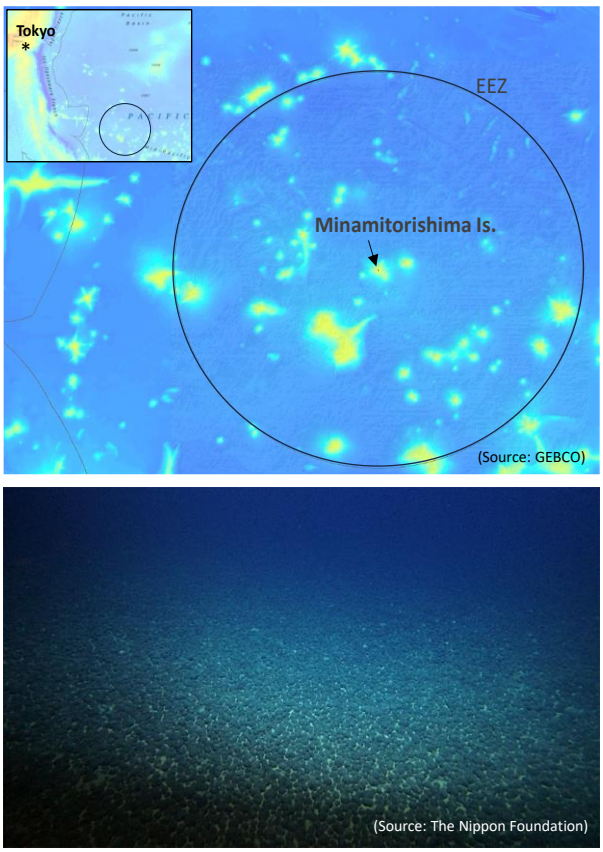
Minamitorishima Island EEZ nodules: current resource estimate

This use case focuses on the definition of high-value prospective areas within the Minamitorishima Island EEZ seabed area, and an overall resource assessment for the entire area.

The Minamitorishima Island is the easternmost island in Japan, located nearly 2000 km southeast of Tokyo. The exclusive economic zone (EEZ) based on the baseline of the Minamitorishima Island is some 430,000 km^2.

The presence of a dense (up to 40 kg/m^2 in places) field of spherical manganese nodules 5 – 10 cm in diameter at depths of some 5,500 meters was first discovered during a survey in 2010[(1)]. However, although the nodules found seem to hold enough density and quality of clean energy transition minerals such as nickel and cobalt – essential for lithium-ion batteries – to be of economic interest, a detailed survey for identification of promising areas and resource assessment was only conducted 14 years after.

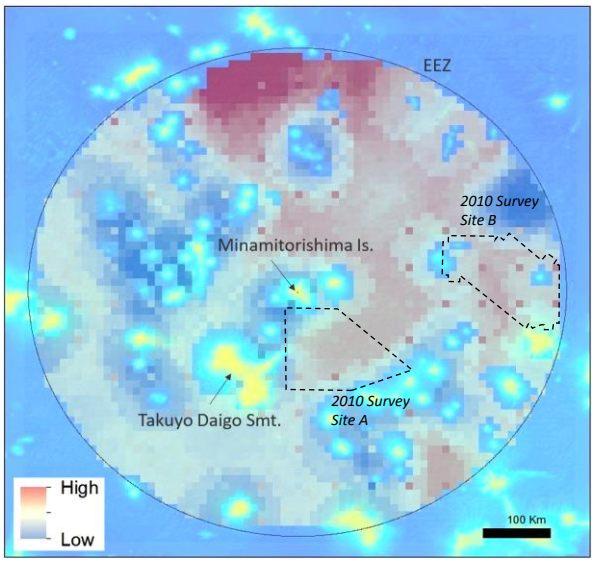
As a result, just about 100 seabed sites were tested for nodules, covering an area of only 2% of the EEZ area. This means that other potential high-value target areas may have been overlooked. Still, estimates point to over 200 million tonnes of manganese nodules in the identified promising areas, with a contained metal of 740,000 tonnes of nickel and 610,000 tonnes of cobalt – equivalent to 11 and 75 years of Japan's consumption, respectively[(2)].



Location and bathymetric map of the Minamitorishima Island (upper image), and photograph (lower image) of the manganese nodules field on the sea floor found in the 2024 survey conducted by researchers of The Nippon Foundation and the University of Tokyo.

(1) Machida et al. (2016), https://www.jstage.jst.go.jp/article/geochemj/50/6/50_2.0419/_article
(2) https://www.japantimes.co.jp/news/2024/06/22/japan/science-health/tokyo-island-rare-metals-find/

In the analysis performed, we have identified an unknown area showing high nodule abundance and demonstrated that our targeting system is an effective method for predictive mapping of rich nodule resource target areas.

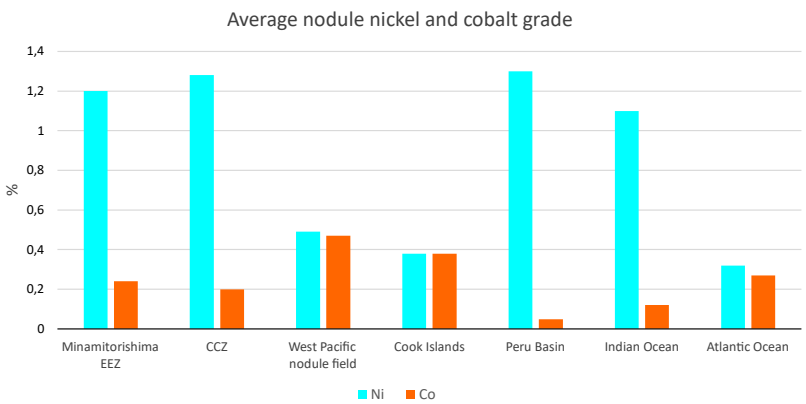


Predictive nodule abundance map results showing several dense and rich nodule exploration target areas in addition to the 2010 surveyed sites[1].

Exploration target generation

The results for predictive quantification of nodule abundance within the Minamitorishima Island EEZ seabed area show several exploration target areas in addition to the promising areas identified in the sites surveyed, in particular in the northern sector of the EEZ. Here, a highly promising and unknown area with over 10,000 km^2 showing high nodule abundance continuity is defined.

Overall, the inferred resource in Minamitorishima Island EEZ exceeds 1.6 billion tonnes of nodules @ 1,2 % nickel and 0,24% cobalt. When compared with the average nickel and cobalt grades from other known areas rich in nodule resources, the results also show that the Minamitorishima nickel and cobalt grades are comparable to those in the Clarion-Clippertone Zone, the Peru Basin and Indian Ocean.

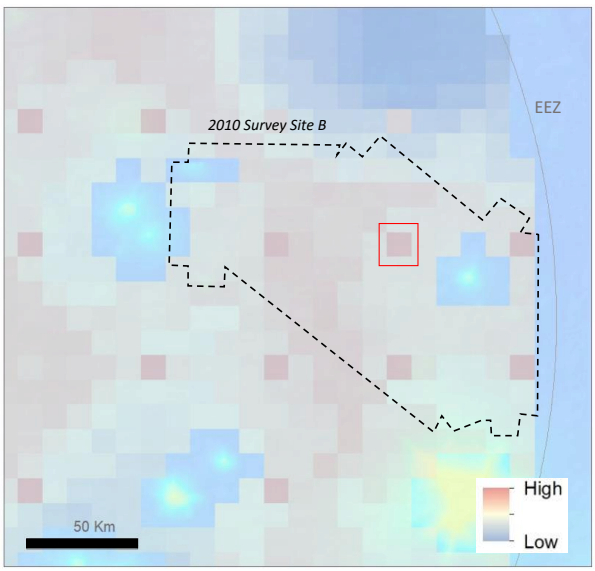


Estimated average nickel and cobalt grade comparison with other known areas rich in nodule resources[3]. CCZ – Clarion-Clippertone Zone.

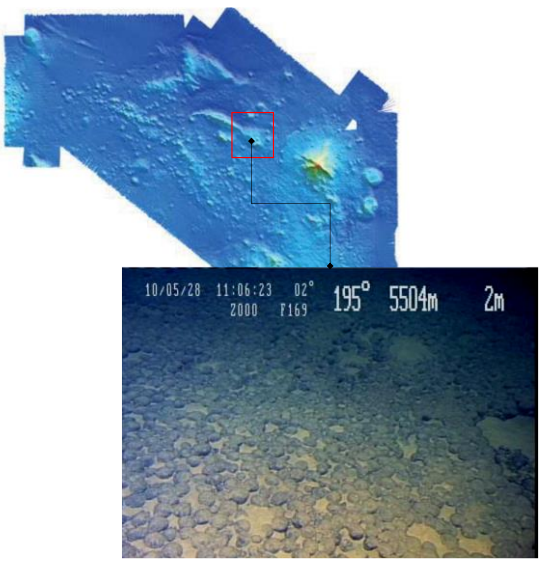
(3) Mizell et al. (2022), https://doi.org/10.1007/978-3-030-87982-2_3

Also, a comparison with the results from the survey conducted in 2010[1] enables us to validate the predictive results and demonstrate that the mineral targeting system is an effective method for predictive mapping of rich nodule resource target areas and to fast-track and support exploration decision-making while reducing risk and costs.

As depicted in the flowing map, the mineral targeting system identifies a high nodule abundance area in the same place where the 2010 survey conducted in site B found a dense and rich nodule field.



Detailed of the predictive nodule abundance map in survey site B showing a high nodule abundance area (red square) which matches the dense and rich nodule field found in site B.



Detailed bathymetric map of 2010 survey site B and photograph (lower image) of the manganese nodules field found on the sea floor[1].

About Us

Deep Focus is a Portuguese consultancy company founded in 2023 that delivers AI and machine-learning-based services to support responsible and sustainable deep sea mineral exploration and vulnerable ecosystem mapping.

TARGET 2

Mission

Our mission is to efficiently support decision-making and accelerate the discovery of high-value sources of critical and strategic metals for the energy transition while ensuring minimum biodiversity harm.

TARGET 3

TARGET 1

AI-POWERED CONSULTING FOR RESPONSIBLE AND SUSTAINABLE DEEP SEA EXPLORATION

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