25 August 2020

Lyell Centre and Heriot-Watt scientists join project to understand and minimise impacts of collecting minerals from the deep sea

- DeepGreen, a Canada-based battery metals start-up is investing over $60 million USD to accelerate a massive collaborative programme to address outstanding questions on the potential environmental impacts of collecting polymetallic nodules from the deep seabed in the Pacific Ocean
- Experts from the Lyell Centre and Heriot-Watt University will join researchers from the UK National Oceanography Centre, Natural History Museum (London), University of Gothenburg, University of Leeds, Florida State University, University of Hawaii, Japan Agency for Marine-Earth Science and Technology, and Texas A&M on the project to build society's knowledge of the deep sea
- Groundbreaking in scope and scale, over 100 researchers will study the water column from seabed to surface, using ROVs, seafloor landers, nets, and sophisticated sensors and moorings

Scientists from the Lyell Centre and Heriot-Watt University have joined DeepGreen Metals Inc's deep-sea discovery programme to characterise the potential impacts of lifting polymetallic nodules up from the bottom of the Clarion Clipperton Zone (CCZ) of the Pacific Ocean.

The programme will include dozens of discrete studies of pelagic and benthic biology, bathymetry and ecosystem function of the CCZ as part of DeepGreen's environmental and social impact assessment (ESIA) for its proposed polymetallic nodule collection project.

The data collected will enable informed decision-making and regulatory development in advance of the commencement of a new resource industry which has the potential to provide billions of tonnes of the critical battery metals required for society's transition to clean energy.

The participation of independent scientific institutions in DeepGreen's ESIA underscores the company's commitment to transparency during the exploration phase of an industry that some NGOs oppose on the grounds that there is currently insufficient information about the deep sea to make informed decisions about impacts.

Dr Greg Stone, DeepGreen's chief ocean scientist, said: "This is a collaboration of the best minds in ocean science coming together to answer many important questions about deep-sea ecosystem function and connectivity throughout the water column

"The programme will enable DeepGreen to put forward a rigorous, peer-reviewed environmental impact statement to the International Seabed Authority, setting a high bar for this new industry."

One of the primary concerns that researchers will address is the impact of sediment plumes on deep-ocean fauna throughout the water column, and at varying spatial and temporal scales.

Professor Andrew Sweetman from the Lyell Centre, a strategic partnership between Heriot-Watt and the British Geological Survey, will assess sediment biogeochemistry and seafloor ecosystem function using state-of-the-art seafloor landers. Sweetman will also document the biodiversity of seafloor predators and scavengers using specialised deep-sea video platforms.

Professor Ted Henry from Heriot-Watt's Institute of Life and Earth Sciences will lead ecotoxicological investigations to determine the effects of toxicants and disturbances associated with deep-sea mining activity on critical organisms that inhabit these unique ecosystems. Research will address effects on organisms at the level of their molecular biology, effects in tissues, and whole organism responses.

Professor Andrew Sweetman said: "This project builds on the Lyell Centre's extensive expertise in deep-sea mining related issues, and deep sea technology development.

"We'll be working with partners from around the world to document baseline biodiversity and ecosystem processes in the 4km deep water column and at the seafloor to reduce the impacts from mining and ensure stakeholders can make informed decisions about any activity in the Clarion-Clipperton Zone."

Professor Ted Henry said: "Very little is known about the ecotoxicology of organisms found in the deep sea.

"Deep-sea organisms have unique physiology and the effects of exposure to toxicants and environmental disturbance could have profound consequences on their survival.

"The DeepGreen project will provide the opportunity to obtain novel information on responses of deep-sea organisms to mining activities and inform models to predict and manage impacts of deep-sea mining activities in the future."

The global team of environmental scientists will work to deliver a state-of-the-art baseline biological survey of DeepGreen's NORI exploration area to meet or exceed international regulatory requirements under the International Seabed Authority (ISA), established by the UN Convention on the Law of the Sea (UNCLOS). DeepGreen will use the insights and knowledge gained from the comprehensive survey to inform engineering decisions in order to further develop technologies to collect and uplift polymetallic nodules with as little impact as possible to the ocean.

Contribution to wider science

The multi-year, integrated research programme will characterise the marine environment and species from the seabed of the abyssal plain up through the water column, to the surface of the ocean, studying everything from microbes to whales. All output and data generated by the programme will be shared with the international community, and samples collected from the deep sea will be sent to labs around the world for analysis. This will advance the wider fields of ocean science, medicine and technology.

Mission to supply metals for the clean energy transition

With society's demand for battery metals booming due to the transition to clean energy and electric vehicles, DeepGreen believes that polymetallic nodules from the deep sea — a rich, concentrated source of nickel, copper, manganese and cobalt — present significant opportunities to reduce the most serious impacts that arise from mining metals on land.

ENDS

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