

Pilot Action

Ecological Aspects of Deep-Sea Mining

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Background

Global interest in the exploration and exploitation of deep-sea minerals is on the rise. Enabled by technological advances and driven by geopolitical, economic and scientific motivations, public and private alike are increasingly venturing to the edges of the continental shelves and into areas beyond national jurisdiction in search of new resources. However, deep-sea ecosystems and the potential effects of mining activities on them are poorly understood. Therefore, member countries of JPI Oceans decided to launch a joint research activity in the field.

Objectives

Jointly analyse the long-term ecological consequences of deep-sea polymetallic nodule mining to inform the international regulation of deep sea mining activities by:

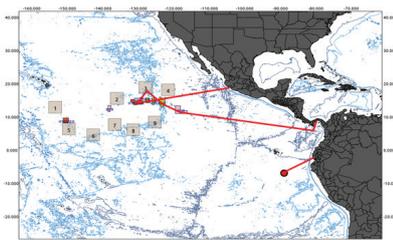
- Predicting the ecological, biogeochemical and hydrodynamic consequences of a mining impact.
- Testing a range of modern rapid assessment methods and monitoring techniques for defining the ecosystem status.
- Communicating the results to stakeholders and policymakers.
- Conducting a comparative baseline study across different deep-sea environments (eg. trophic states and seamounts)



In 1989, German scientists conducted the DiSturbance and re-Colonization Experiment (DISCOL) off the coast of Peru to simulate and investigate the environmental impact of nodule mining. Images of the undisturbed seafloor in the DISCOL Area prior (left), with plough marks directly after disturbance, 7 years and 26 years after the experiment. Thiel et al. & TUSCH (2001) - AUV Abyss, GEOMAR.

Progress

The German Federal Ministry of Education and Research (BMBF) provided 118 days of ship time for on-site research in the Pacific on the RV SONNE. Over the course of two cruises, researchers from 11 countries mapped habitats, studied deep sea ecosystems and investigated their functioning in addition to predicting and identifying the environmental implications of nodule and sediment removal, sediment plume dispersion and redeposition caused by mining activities. The project started in January 2015 and will run for 36 months with an overall budget of approximately €9.5m. Following the cruises which were finalised in October 2015, scientists



The cruise visited various claims of European Countries in the Clarion-Clipperton Zone (CCZ) in the Pacific Ocean. Another two cruises visited the DISCOL area off the coast of Peru.

are evaluating the collected data on-shore in the participating institutes. Preliminary results of the cruise show that the plough marks in the DISCOL area have hardly changed. Very little recolonization, low bioturbation and microbial activity was observed, implying that nodule mining will likely disturb the deep-sea ecosystem for many decades. Numerous seamounts were also detected in the deep sea which may make it difficult to mine on large continuous areas. Finally, the cruise has proven that the technology to conduct Environmental Impact Assessments and monitoring is available.

Next Steps

Scientific data analyses will be targeted towards formulating recommendations for deep-sea nodule mining. Workshops with policymakers, stakeholders, contractors holding exploration licenses and interested industry planning offshore mining activities will be organised to communicate the project results. Scientific data and results will be stored in public world-wide databases and will also be made available to the Legal and Technical Commission of the International Seabed Authority (ISA) to facilitate implementation into regulations.

Countries Involved

 Belgium	 France	 Italy	 Netherlands	 Norway	
 Germany	 Poland	 Portugal	 Romania	 Sweden	 United Kingdom

Find Out More



Consortium

Organisation

Country

GEOMAR Helmholtz Centre for Ocean Research Kiel	Germany
HGF-MPG Joint Research Group for Deep-Sea Ecology & Technology, Max Planck Institute Bremen	Germany
German Center for Marine Biodiversity Research, Senckenberg Gemeinschaft für Naturforschung	Germany
Biodata Mining Group, University of Bielefeld	Germany
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research	Germany
Jacobs University Bremen	Germany
Bundesanstalt für Geowissenschaften und Rohstoffe	Germany
MARUM, University of Bremen	Germany
National Oceanography Centre, Natural Environment Research Council	United Kingdom
Natural History Museum London	United Kingdom
Ocean & Earth Science, University of Southampton	United Kingdom
Royal Netherlands Institute for Sea Research	The Netherlands
International Research Institute of Stavanger	Norway
Norwegian University of Science and Technology	Norway
Centre for Geobiology, University of Bergen	Norway
University of Aveiro	Portugal
University of the Azores	Portugal
Marine Biology Research Group, University of Gent	Belgium
Royal Belgian Institute of Natural Sciences	Belgium
University of Szczecin	Poland
University of Lodz	Poland
Institut Français de recherche pour l'Exploitation de la Mer	France
Inter-University Consortium for Marine Science, Polytechnic University of Marche	Italy
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