

Surveying the Arctic for new species

The Centre for Geobiology explore active geothermal springs on the Arctic Mid-Ocean Ridge. The objective is to find new animal species and examine how mining operations on the seabed will impact on the environment. **TEXT** KIM E. ANDREASSEN

In July and August 2014, the UiB Magazine travelled with researchers from the Centre for Geobiology (CGB) at the University of Bergen (UiB) on the expedition: Hydrothermal vent field on the Arctic Mid-Ocean Ridge.

With the assistance of the research vessel G.O. Sars and high-tech measuring equipment, the researchers surveyed and collected samples from recently discovered volcanic deep sea areas around the island of Jan Mayen, which stretch from 150 to 2,500 metres under the sea. These areas may contain unknown animal life and large mineral deposits.

Using unmanned underwater vessels, the researchers have so far made

detailed surveys of volcanic areas and geothermal springs. They did this with the assistance of a new sonar technique, which provides images with more than one hundred times the resolution attained previously.

“This provides important new knowledge about volcanic and hydrothermal activity. It has also given us new information about the prevalence of metal deposits in the seabed,” said Professor Rolf Birger Pedersen from CGB, who headed the expedition.

Swarming with life on the seabed

Outside Jan Mayen one finds Mohns Ridge and Kolbeinsey Ridge, which are an Arctic extension of the Mid-Atlantic Ridge. Here, the continental plates slide away from each other and create volcanic activity. When the seawater presses down into the crevices around the volcanic area, it is warmed up and pumped up to the surface through channels.

Around the geothermal springs, where boiling water and chemical deposits settle on the seabed, black smokers are created.

On the most recent expedition, the researchers have collected geological and



biological samples from the seamounts along Mohns Ridge which is located 80 kilometres north-east of Jan Mayen, Kolbeinsey Ridge and the so-called Loki's Castle. The largest seamounts are 3,000 metres high.

Among these underwater versions of the mythical Nordic landscapes Dovre and Jotunheimen there is totally unique animal life as well as microorganisms that can survive in extreme temperatures. These microorganisms constitute the very roots of biological life on earth and may tell us something about how life on earth originated.

“We have discovered over 50 new species in these areas since the centre commenced operations in 2007,” Pedersen said.



MICRO-ORGANISMS IN THE DEEP, DEEP SEA: UiB's Centre for Geobiology is a Norwegian Centre of Excellence. Researchers from the centre are searching Arctic waters and have discovered a number of new species, giving mankind new knowledge about biology and geology in the deep sea. PHOTO: CENTRE FOR GEOBIOLOGY

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The geologists and biologists on board the research vessel have taken many samples of these organisms.

“We are talking about newly-formed geological landscapes and unique ecosystems. Data and samples that are collected during our expeditions provide

new knowledge about biology and geology in the deep sea,” explained Pedersen.

The researchers have also placed measuring instruments on the seabed north of Jan Mayen to monitor CO₂ emissions from the volcanoes. The objective is to study the extent of the emissions and how they impact on the environment in the area.

Subsea mining operations

On their expeditions, the researchers also use Bathysaurus, a remotely operated vehicle (ROV) to explore in more detail two areas near Mohns Ridge which

they discovered in 2013. Among other things, the researchers are interested in identifying metal deposits.

Large amounts of minerals and metals such as iron, copper and zinc are deposited around the geothermal springs. There may also be gold and silver.

“The geological experiments are part of the EU-financed project Midas. The goal is to gain an understanding of the possible environmental impact of mining operations in the deep seas. Norway has enormous deep water areas with large amounts of resources. Even though we are, first and foremost, conducting basic research, this research may result in commercial operations in the long-term,” Pedersen said.

The researchers at CGB will also attempt to cultivate microorganisms on and below the seabed in their natural environment.

“The experiment relates to bio-prospecting and the hunt for special enzymes that can be used on an industrial scale in the pharmaceutical and chemical industries,” Pedersen told the UiB Magazine when we joined him one of his expeditions. ●

FACTS

Centre for Geobiology

- Centre for Geobiology (CGB) is a research centre at the University of Bergen (UiB).
- The centre has been awarded status as a Centre of Excellence (SFF), a scheme that is administered by the Research Council of Norway.
- SFF status is awarded to research groups that conduct long-term research at a high international level.
- CGB's objective is to bring together researchers from different academic disciplines in an international and multidisciplinary group to generate new, fundamental knowledge in the intersecting field between geology and biology.
- Professor Ingunn Hindenes Thorseth is the director of the centre. Professor Rolf Birger Pedersen was centre director until summer 2014.
- Read more about the centre on their homepage: uib.no/en/geobio



Professor Rolf Birger Pedersen, Department of Earth Science, University of Bergen. PHOTO: UiB