Expedition MSM84
St. John's – St. John's, Newfoundland

Weekly report no 4
July 8 to 14, 2019

We spent the past few days collecting seismic data along profiles through and across the glacial troughs of the Labrador shelf. When we encountered particularly interesting sites at the seafloor, we would stop to take geological samples. The longest sediment cores we recovered were longer than 15 m. These long cores were not collected to date and characterize glacial marks left behind by the retreating ice stream. Instead, we aim at reconstructing the dynamic history of Labrador shelf ocean currents through the past few thousand years with these cores. At the end of the last glacial, when the ice sheet already was on the wane, an ice-dammed lake formed from melt water in the interior of Canada. This lake, named Lake Agassiz, was larger than any present-day lake. In the course of the further retreat and melting of the ice sheet, some 8200 years ago, the ice dam was broken by the lake, and a huge amount of freshwater was released into the North Atlantic through Hudson Bay, which is located just north of our working area. This event certainly can be described as a large-scale environmental catastrophe, and it resulted in a significant disturbance of the established ocean current system on the Labrador shelf.

During our expedition, we were often accompanied by large and beautiful icebergs. (Foto: Felix Gross)

On the long sediment cores, we will carry out different types of measurements in the home labs. For example, we will pick single-celled organisms, so-called foraminifera, from the sediment layers. Foraminifera build an outer shell made from chalk. At death, their shells sink to the ocean floor and get embedded in the sediment. The composition of the chalk shell varies with changing environmental conditions in which the foraminifera grow, and catastrophic events

such as the freshwater release from Lake Agassiz are archived in their shells. Determination of the shell composition allows us to reconstruct environmental conditions such as temperature and salinity for the past, and subsequently we can also study the disturbance of the ocean currents. We will also perform other measurements on the sediments, one of which helps us to reconstruct times when the Labrador shelf was covered by a permanent but floating ice mass such as today's ice cover of the Arctic Ocean.

The Expedition MSM84 team. (Foto: Emmerich Reize)

We finished our geological sampling work yesterday. Today and tomorrow are dedicated to collecting our last seismic profile. The geologists are busy packing their boxes and stowing them away in the containers. Microscopes are getting packed, the sturdy steel pipes cleaned, and last but not least all labs need to be cleaned – the next group of scientists shall be able to immediately start their work on the next expedition. Tonight, we will have our final meeting where all onboard findings of the different working groups will be presented. We will also discuss about how to proceed in the near future – when will our containers be back in Germany? Who is around to help unloading? Who is going to perform which type of measurement on the samples? And when will the results be available to others? All this needs to be well-coordinated since many national and international colleagues are involved in the project, even though not everybody was able to join us on board. They are eagerly awaiting samples and results.

After all seismic work will be finished tomorrow evening, we will celebrate our successful expedition with a farewell party that is well-deserved by everybody on board!

A big and cordial thank-you goes to the Captain and crew of Maria S. Merian. Without you and your active support, we would not have been able to collect such a wealth of scientific data!

All participants are cheerful and send home greetings.

Labrador shelf, July 14, 2019, 54°47.481'N / 56°1.469'W

Catalina Gebhardt & the Expedition MSM84 team

(Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung)

https://www.awi.de/forschung/geowissenschaften/geophysik/expeditionen.html