

ANT XXIII/4 Weekly Report No. 5 (to the Amundsen Sea, West Antarctica)
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This week, we are operating in our main research area of the eastern Pine Island Bay. As reported in the last weekly letter, the positive sea-ice situation opened a gateway into the bay through a polynya and gave us a chance to gain access through the back door into this rarely visited region. It became clear to us that we had only a few days time for our sampling and survey program before we had to return, because new sea-ice was beginning to form again due to the low temperatures. We began with an investigation of the sea-floor of an area which was covered by parts of the Thwaites Ice-Shelf until a few years ago. Here, we also found troughs eroded to about 1300 m below the sea-level from which we took sediment samples. Farther we went toward the fast-ice and ice-shelf boundary off the mighty Pine Island Glacier. We surveyed parts of the inner continental shelf in front of the Pine Island Glacier with seismic, sub-bottom profiler and swath bathymetry methods and found that an area of the size as large as the state of Niedersachsen consists of hard rock formations without any of the usual sediments on top. Only a few thin layers of soft sediments lie at the bottom of the deep troughs. Where are the large amounts of sediments which have obviously been transported into the bay by the downward flowing glacier? A possible explanation is that an ice-sheet, which had advanced to the outer continental shelf during the last ice age, retreated very fast only during the last few thousand or even hundreds of years so that there was little time for sediment deposition. Only after careful analyses in our institutes of the seismic data and the trough sediment samples we can say if this scenario was true.

Our helicopter pilots undertook an extraordinary job when they, on a single day, transported two different geologist teams and the GPS team to the nunataks of the Hudson Mountains, and deployed a fuel depot for a British land expedition in the following season. The geologists and volcanologists collected rock samples from the volcanic nunataks which peak out from the ice-sheet. These samples will tell when the volcanoes have been active and which sort of magma they were formed from. Our British colleagues collected further samples of eroded and transported rocks to analyse them for exposure uncovered by the last ice-sheet.

The excellent flight weather gave our helicopter-magnetic team the opportunity to cover almost the entire Pine Island Bay with survey lines. Their survey data will be used for a map of the earth-magnetic field anomalies of the bay. Together with seismic data, we will be able to map geological and tectonic units for the structure of earth's crust. During one flight, elephant seals were sighted on a small rocks island. These large seals are normally only found in northern regions of Antarctica. Therefore, it is almost a sensation to find these animals so far south. We sent a team to the island to photograph and film these groups of elephant seals for documentation.

In the meantime, new sea-ice was being formed in Pine Island Bay due to the cold temperatures. It was time for Polarstern to leave this bay, and on Thursday night, we started our track through the sea-ice belt in the north. With the help of satellite ice images and helicopter reconnaissance flights, we chose the best route. The ship had to fight through large and thick ice-floes during the first hours before they became smaller. We reached the open ocean on Saturday morning. According to our expedition plan, we will continue our research of the next days in open water off the continental shelf of West Antarctica. Our next destination are the Marie Byrd Seamounts.....

With best regards and wishes to all of you at home who are also looking forward for spring to arrive.

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(Chief Scientist)