RV METEOR - M183

13.07. - 09.08.2022, Ponta Delgada - St. John´s

4th Weekly Report (01. - 07.08.2022)

Our exploration work on the eastern flank of the southern Reykjanes Ridge has been completed. Since the afternoon of August 4, we have been on our way to St. John's, where our research cruise will end on August 9. This last weekly report of the cruise gives an outline of the main results and names some of the responsible actors. Much was accomplished in 18 days of work. Selected sediment ponds in the aforementioned ridge flank were surveyed with the echosounders of the METEOR and examined for heat flow. The third of these ponds showed us strong evidence of directional flow through the ridge flank crust below the sediments by seawater already during the first traverse. After completion of our work, this sediment pond, which we named Squid Pond after its inhabitant, frequently encountered during the dives and also very present in the crise logo, is now very well characterized. From a total of 142 measuring points of the heat flow lance (Fig. 1), 107 were located in this pond alone. With 27 additional temperature measurements at 10-15 cm depth in the sediment taken during MARUM SQUID 2000 dives, we determined the heat flux at 134 locations. These data show very clearly that the northwestern shore of Squid Pond is slightly warmer than the opposite side.

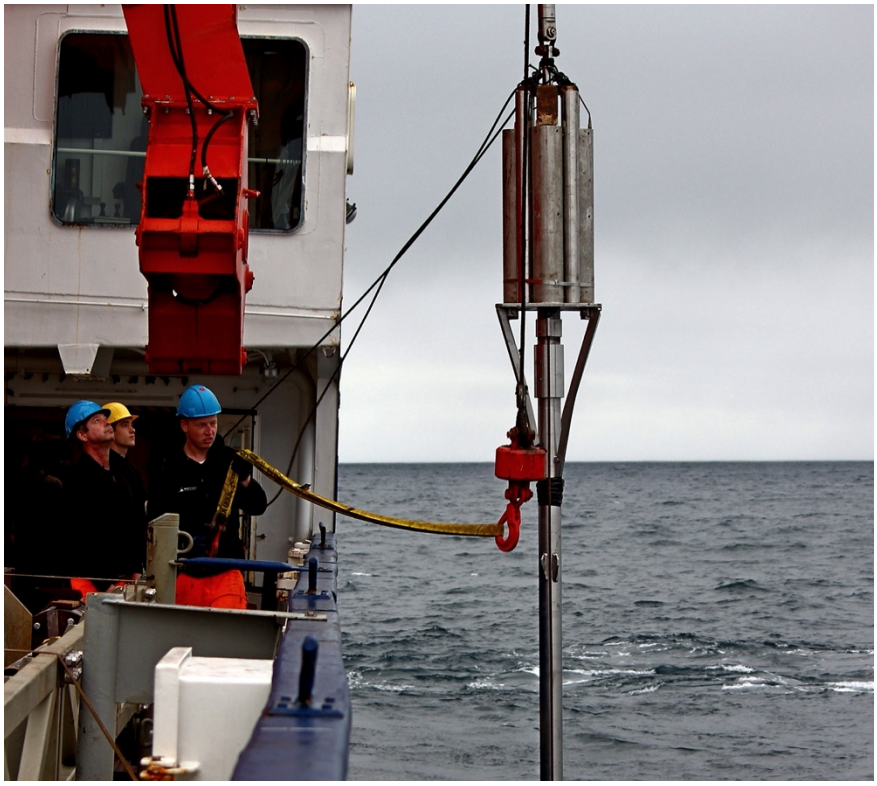

Fig. 1: The heat flow probe of MARUM was a crucial instrument during our survey work. It was deployed by Norbert Kaul, Niklas Warnken and Julian Seeliger. Photo: Aaron Roehler

At twelve locations in Squid Pond, sediment samples were punched out with the gravity sounder to as much as nine meters below the seafloor. Felix Schewe from MARUM is an expert in this type of sampling and was assisted by Aaron Röhler, Christopher Schmidt and Bert Engelen. These sediments consist of about 80% water, the composition of which allows statements about processes under the seafloor. More than 300 of these pore water samples

were collected; some material parameters were determined right on board, others will be determined after the end of the cruise by Jessica Volz and Christina Nadolsky at AWI and by Christopher Schmidt at GEOMAR. The microbial communities in the sediments will be studied by Bert Engelen at the University of Oldenburg. From the physical measurements, computer models of the flow of water in the crust are being set up at GEOMAR by Isabel Kremin and Kim Moutard. At MARUM, the sediments and rocks will be studied for their composition and physical properties. Already on board, Ramona Henn and Isabel Lange professionally scanned and described the cores. Very valuable work was done by Aike Albers, Paul Berndt and Isabel Kremin during the hydroacoustic reconnaissance stations in the working area. The surveys with the multibeam echo sounder and the sediment echo sounder were indispensable for the station planning.
Highlights of the station operation were the total of ten dives of the submersible robot MARUM SQUID 2000, which could be followed by all through the transmission to the geo-lab of the METEOR (Fig. 2). Nicolas Nowald, Vincent Vittori, Sophia Schillai and Steffen Klar had an excellent grip on the demanding technology and were always able to adapt very well to the changing requirements from the scientific party.

Fig. 2: In the geo-lab of the METEOR, the cruise participants could follow the events of the dives live with the diving robot MARUM SQUID 2000. Photo: Kim Moutard

The nature of the water body between the sediment pond and the surface was determined by multiple and systematic use of the CTD probe by Mario Esposito and Aaron Röhler. This work included two long-term measurements in the past few days to detect changes in the water column during the diurnal cycle as well as local differences in bottom water. Water samples were also taken during these missions, which were intended to provide information about how much carbonate is dissolved in the water and in what form, among other things. Long-term measurements will be provided by the purpose-built lander, which was deployed on July 22 and successfully recovered on August 4, much to everyone's relief. This work is carried out as a cooperation between MARUM and GEOMAR in the AIMS^3 network of the CDRmare.
The predominantly very calm sea was good for the smooth running of all station work (Fig. 3). However, things got exciting again, because during the last deployment of the heat flow lance there was an unexpected failure of the deep-sea winds, just when the instrument was at maximum depth. To everyone's great relief, however, the machine's engineers under Chief Björn Brandt were able to quickly identify the fault and rectify the defect.

Fig. 3: Like a duck pond: unusual for the North Atlantic. The predominantly very calm sea invited seagulls to linger and made station work pleasant and safe.
Photo: Aaron Roehler

Cruise M183 comes to a successful end. Excellent suitable locations for the deployment of of the MeBo seabed drill rig of MARUM in the coming year could be identified and characterized. Thus, the first step in the creation of a seafloor observatory has been taken. The scientific party (Fig. 4) worked very enthusiastically, harmoniously and purposefully and made leading this cruise extremely easy for me.
I owe a great debt of gratitude to the Captain, officers and the entire crew, because the cruise could hardly have run more smoothly and relaxed.

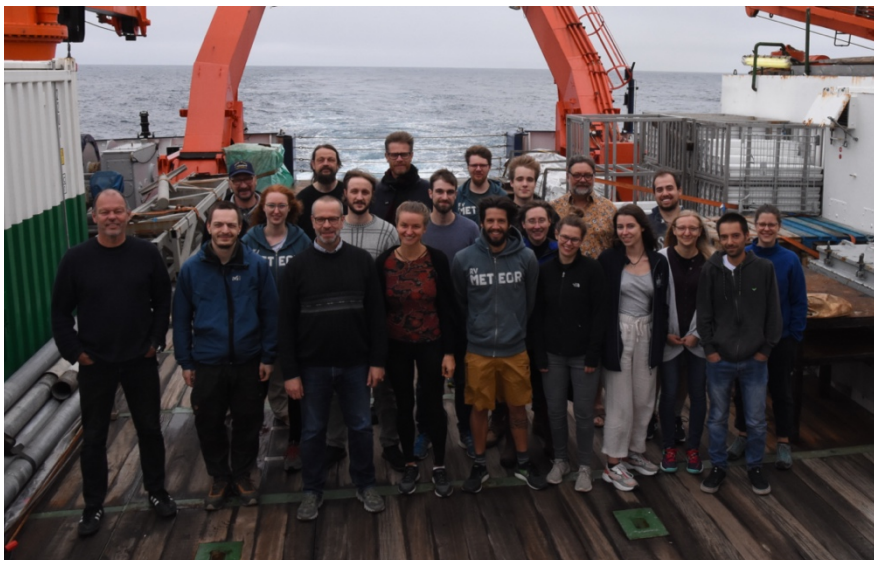

Fig. 4: On transit to St. John's, there was time for a group photo on Meteor's working deck. Photo: Henning Podbielski / Paul Berndt

With warm greetings, also on behalf of all those participating in Expedition M183,

Wolfgang Bach
(University of Bremen)

at sea near 50°N, 49°W