R/V Maria S. Merian

Expedition MSM119 “RIFLOR2”

08.07.2023 – 12.08.2023

St. John‘s – St. John’s

Weekly report #5

In the week from 31.07.-06.08. we had good weather conditions without exception, which we mainly used for three boreholes with the MARUM MeBo70. The gravity corer and dredge as well as the in-situ temperature lance were used between the deployments of the seabed drilling robot.

In total, we managed to drill three boreholes through overburden sediments into the oceanic crustal basalts in the past week. Two of the drill holes were drilled in pairs on a relatively young portion of the ocean ridge flank approximately 80 meters apart. The chemistry of the crustal fluids and the temperature changes deep in the borehole are to be recorded over a period of two years.

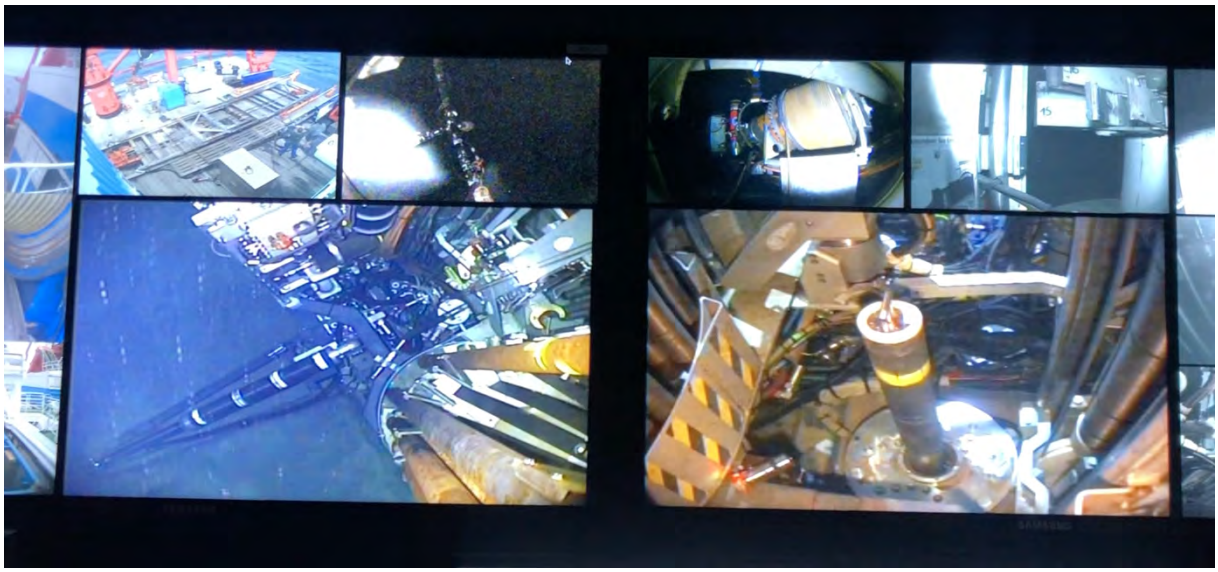

Figure 1 View of some of the control screens inside the MeBo control container. Here the pilots prepare the take-off maneuver back to the MERIAN. A borehole observatory can be seen on the bottom right with a white cover and yellow marking.

A third hole was completed in Squid Pond where the ridge is slightly older. This borehole was also fitted with an osmo-sampler observatory and is thus used to record a geochemical time series (see Fig. 1). The measuring principle envisages that after the end of the drilling, a drop weight is guided via a spindle into the basaltic crust, where the connected thin Teflon line sucks the fluids into a 300m-long coil. After recovery, the 300 meters of Teflon hose can be cut into small time segments and analyzed. In this way, changes in hydrothermal flow over a period of two years can be analysed later in shore-based laboratory measurements at MARUM.

Both the Osmo-sampler and the borehole plugs for temperature monitoring can be unscrewed (Fig. 2) and can be recovered with the remotely operated vehicle (ROV) on later expeditions and exchanged for other observatories.

Figure 2 Left: The MeBo70 is serviced on deck between two deployments and loaded with new drill rods. Right: Simple borehole plug that has an autonomous temperature measurement system mounted inside. This drill rod is the last to be set before the MeBo takes off; the instrumented plug will be recovered in two years by ROV.

We still have two working days left on the Reykjanes Ridge before we have to start the at least 4-day transit back to St. John's in Newfoundland.

Kind regards on behalf of the entire MSM119 team

Achim Kopf (Chief scientist)