

RV METEOR

Expedition M192-2 „BRIDGEHELL“

20.08. – 05.09.2023, Pireus - Limassol



2. Weekly Report (August 28. – September 03., 2023)

The expedition M192-2 was successfully continued this week. Various samples could be recovered with the Van Veen grab, the multicorer, the CTD water sampler rosette and with the remote operated vehicle (ROV) MARUM ROV-SQUID.



Figure 1 (left): The MARUM ROV -SQUID is lowered into the water (Photo: Solveig Bühring)

Figure 2 (right): The control center of the MARUM ROV -SQUID (Photo: Joely Maak)

On Monday, 28.08., there were technical problems with the MARUM ROV -SQUID, so that alternative sampling of the seafloor was carried out with the Van Veen grab and the multicorer. The CTD water sampler rosette was used to sample the rising hydrothermal plumes. On Aug. 29, the METEOR was moved to the study area northwest of Milos to conduct further investigations. The northern work area includes the western and eastern shoulders of the Milos Bay graben structure as well as the two volcanoes east of Antimilos. The ROV dive on August 30th along the western margin fault zone of the graben showed evidence of young tectonic activity and abundant CO₂ degassing (**Figure 1** and **Figure 2**). Three hydrothermal precipitate samples (**Figure 3**) and one rock sample were recovered during the dive with a 30 cm high sulphur chimney as a highlight. Ten stations with the Van Veen Grab yielded three samples of hydrothermally altered volcanic rocks, 13 volcanic samples ranging from glassy lava to finely laminated volcanic ash, and two carbonate crusts. The samples were largely recovered along the NW fault zone of the Milos Bay graben structure, but the apparently freshest lavas occurred in the centre of the basin, possibly

indicating young eruptions in this region. The sampling of the supposedly youngest volcano east of Antimilos recovered carbonate in water depths less than 150 m and sediments in greater depths.



Figure 3: Hydrothermal rock (Photo: Wiebke Schäfer)

The following day, another very successful dive was completed, sampling hydrothermal vents at the rim of a crater at a depth of about 200 m.

Due to technical problems, which unfortunately could not be resolved by the day of departure from our study area, we were unable to conduct any more dives on the following days. Instead, the remaining time was used to deploy the Van Veen grab and multicorer in the planned dive area. This was highly successful. Although the multicorer has no video support, we still managed to sample a hydrothermal field directly. In order to do so, we used the ship's EM710 multibeam echo sounder, which is installed about 35 m forward of the sliding beam in Meteor's hull. However, by varying the beams angle 10° aft, we were able to adjust it so that we could see the seafloor at 200 m water depth just below the multicorer's deployment point. With the help of the DP (Dynamic Positioning) of the Meteor, we were able to guide the CTD directly into the rising gas plumes and place the multicorer precisely in the fields of gas emission (extremely outgassing sediments could be sampled twice, **Figure 4**).



Figure 4: Multicorer core with degassing channels in the sediment (Photo: Joely Maak)

For trace metal analyses on the gained water samples, 20 liters of a background sample was obtained at a deep location, far from the hydrothermal vents, at 450 m depth. For this purpose, trace metal-free water samplers (so-called GoFlo bottles, **Figure 5**) were lowered to depths on a metal-free Kevlar rope and the bottles were closed by a drop weight. The analyses of this background sample serve as a reference value for unaffected seawater in the home laboratory and as a basis for laboratory experiments with seawater.



Figure 5: Eva Meckel (Constructor University) and boatman Michael Zeigert fix a trace-metal GoFlo bottle on a Kevlar rope (Photo: Andrea Koschinsky)

Meanwhile, we are still exquisitely supplied and everyone on board is well and in high spirits. Thanks to the extremely harmonious cooperation with all departments of the ship's crew, the station program could also run smoothly on this leg of the cruise, although the exploratory character and technical uncertainties often require a high degree of flexibility. The results of our cruise so far are very promising and we are looking forward to the results of the analyses in the laboratories of our institutes. Yesterday, on Saturday, September 2., the station work could be completed and we are now on our transit to Limassol, which we should reach on Tuesday morning.

With best regards, also on behalf of the rest of the cruise participants,

Solveig Bühring

At sea, 35°N, 28°E