

RV METEOR

Expedition M192-2 „BRIDGEHELL“

20.08. – 05.09.2023, Pireus – Limassol



1. weekly report (August 20. - 27., 2023)

Expedition M192-2 is based on the findings from the 1st cruise leg (M192-1), which mapped bathymetry and gas seeping in areas southeast and northwest of the Greek island Milos. These maps were used during the first week of the 2nd leg to sample areas of hydrothermal activity. For this purpose, the Van Veen grab and the multicorer were used on one hand and on the other we performed observations and sampling with the remote underwater vehicle (ROV) MARUM SQUID.

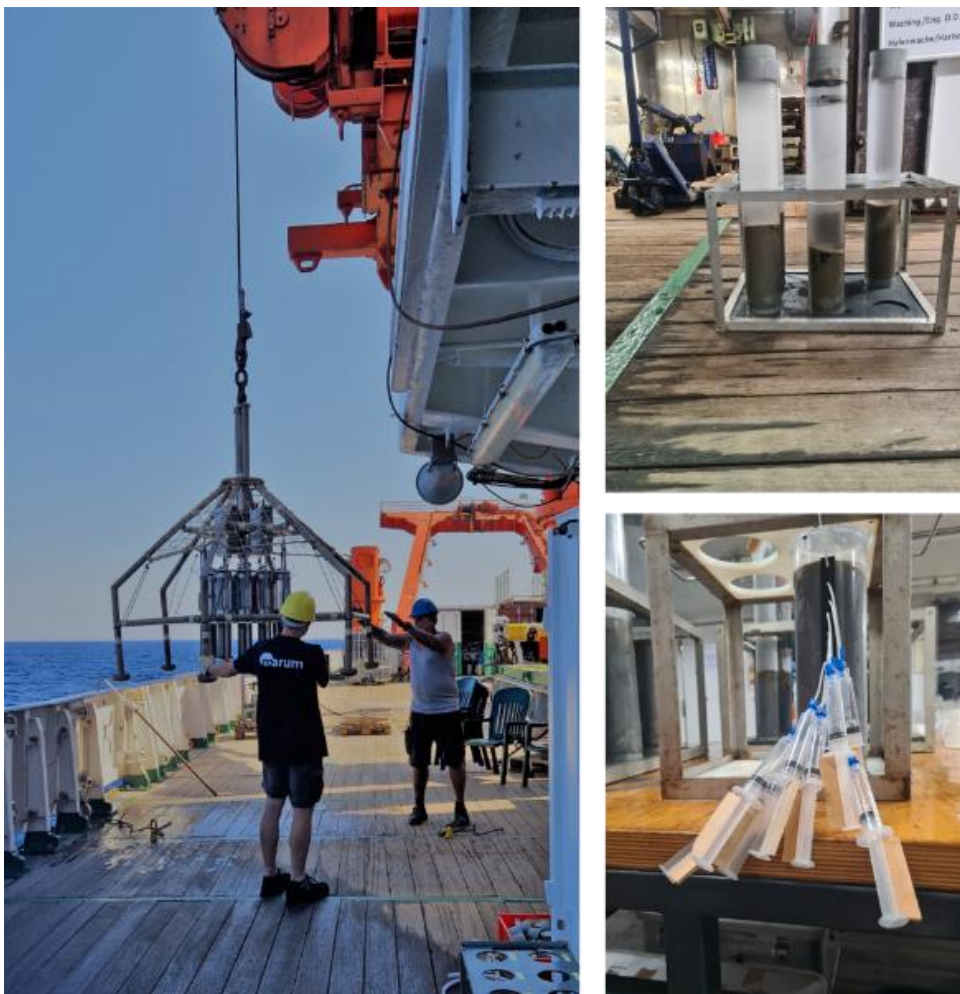


Figure 1: The multicorer comes back on deck (left), core tubes from the multicorer (top right), sampling of pore water with rhizones (bottom right) (Photos: Solveig Bühring)

Systematic explorations of the seafloor along hydrothermal areas were done with the grab; to see if the sediments had a sulfidic "smell" or if rocks of volcanic origin could be found. Samples were also sieved to retrieve animals from the sediment. If a site was found to be promising by examination with the Van Veen grab and if the sediment structure was soft enough, additional sampling was done with the multicorer (**Figure 1**). In an ideal case, the multicorer delivers intact sediment cores from which the pore water can be sampled (**Figure 1**). It was also sampled in 2 cm depth intervals for DNA and lipid analyses. These analyses will take place in the home laboratories.

In addition to the 16 CTD (conductivity, temperature, density) stations we ran during the 1st leg, we appended two more in other areas this week.

Furthermore, five extremely successful dives were made with the ROV SQUID this week. In our first dive on 22.08. we explored an area south of Milos. Here we were able to sample several diffuse hydrothermal fields whose sediments were partially covered with white microbial mats. Unfortunately, push core sampling was unsuccessful because the sandy sediments did not remain in the tube. In contrast, diffuse fluids were successfully sampled using a funnel and the KIPS system. For this sampling, the funnel is placed on a diffuse outlet on the sediment and the sampling/temperature lance of the KIPS system is placed into the opening. The temperature in the sediment could be determined with a temperature logger, the so-called T-stick, and was 132 °C at 20 cm sediment depth.

Unfortunately, the second planned dive had to be aborted twice due to technical issues before sampling started. On August 24., 25., and 26., we sent SQUID on very successful dives in the area east of Milos and discovered hydrothermal vents above with vent chimney structures, sometimes reaching several meters in height. These vents showed gas emission as well as fluids with temperatures between 40 and 180 °C. The Gas Bubble Sampler was successfully used to sample the rising gas bubbles. We were also able to sample various fluids with the KIPS system. In initial analyses on board, these showed pH around 5, elevated sulfide concentrations, and were highly reducing. Water samples were filtered on board with filter of differing pore sizes and samples were preserved for various further analyses including major and minor elements, trace metals, metal speciation and dissolved organics. Furthermore, pieces of vents were recovered whose initial optical examination revealed arsenic and antimony sulfides (**Figure 2**). White microbial mats and hydrothermal gases were also sampled.



Figure 2: Chimney structure with arsenic and antimony sulfides (Photo: right: Solveig Bühring, left: Palash Kumawat)

The 1st week of the 2nd cruise leg of our expedition has given us fascinating insights into this hydrothermal system and we eagerly await every day ahead. All on board are excited about the discoveries and work hand in hand in the station operation, which is made possible by the harmonious interaction of bridge, deck and engine. The sun shines every day and our position south of Milos protects us from the occasional strong winds from North. The hospitality is excellent, which additionally supports the pleasant atmosphere.

Additionally, we would like to refer to our expedition blog on the MARUM site:
<https://www.marum.de/Entdecken/Logbuch-M192.html>

With Milos in sight, I send sunny greetings, on behalf of all those participating in M192-2,

Solveig Bühring

At sea, 36°N, 24°E