Expedition M210 "Dive@MAR 2"

3. Weekly Report, 11.05.2025

The hydrothermal field on the Saldanha Seamount was discovered in 1998 by the French deep-sea submersible Nautile and has not been visited since. Accordingly, little is known about its nature, and according to current knowledge, the occurrence of hydrothermal fluids is limited to diffuse effusions, while no focused hot springs or chemosynthetic communities have been found to date. We therefore used CTD towyos to search for a hydrothermal plume, i.e., the cloud of particles from the typical black smoke of hydrothermal vents that rises and spreads horizontally a few hundred meters above the seafloor. The extent and strength of the plume signals provide clues to the origin of the plume and thus to the location of the hot spring on the seafloor.

CTD/Rosette water samplers are used for towyos. These are normally lowered from the ship into the depths, where their sensors measure the vertical profiles of various physical and chemical parameters in the water column, such as temperature, density, salt content, and oxygen content. To detect hydrothermal plumes, turbidity meters and so-called Eh sensors are also used to detect black smoke particles and measure the redox potential in the water, which is influenced by reduced compounds such as hydrogen or methane, whose presence in turn indicates a hydrothermal origin. Our results do not yet allow any clear conclusions to be drawn, and we will continue our search at a later date.

However, the weather forecast for our working area was initially poor, with wind speeds of up to 9-11 Bft and wave heights of 6-7 meters. We therefore interrupted our work after recording a few CTD/Rosette water sampler profiles and left the area in rough seas early on Tuesday afternoon to wait out the weather in the shelter of the Azores island of Pico from Wednesday to Thursday. Early Thursday morning, we headed back toward our work area. On the way there, we used the multibeam echo sounder to record a bathymetric

line in an area of the FAMOUS segment of the Mid-Atlantic Ridge where plume signals had been detected in the early 1990s, indicating the presence of a hydrothermal vent on the seafloor. During the night from Friday to Saturday, we continued our work with the CTD/Rosette in the working area.

The cause of the defect in the ROV's cable suspension had been identified and repaired. The results of several load tests were positive and were verified by the manufacturers of the ROV, winch, and cable, so that diving could once again become the focus of our activities. Unfortunately, however, the sea was still too rough, with cross seas from two different swells, meaning we had another Saturday without diving. Today, Sunday, we were finally able to get back in the water with a dive at the Rainbow hydrothermal vent, where we collected samples of hot and diffuse fluids and some hydrothermal vents.

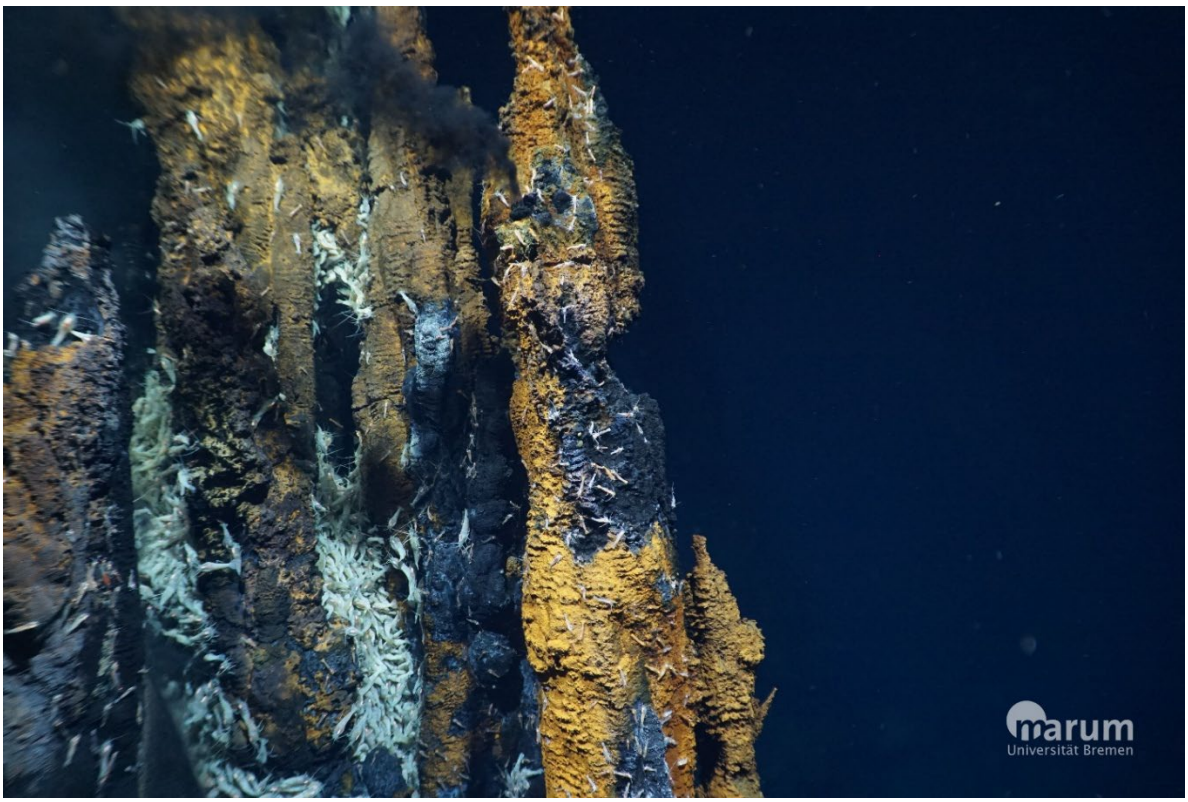

Figure 1. Hydrothermal vents with Rimicaris exoculata *shrimp in the Rainbow hydrothermal field.*

We are delighted with the great working atmosphere on board and the fantastic support provided by the crew to the scientific team, and we are eagerly looking forward to next week.

Warm greetings from aboard,

On behalf of all cruise participants

Christian Borowski