

RV METEOR

Expedition M194 HEXPLORES

10.10. – 07.11.2023 | Jeddah, SA – Piraeus, GR



2. Weekly Report (16.10. – 22.10.2023)

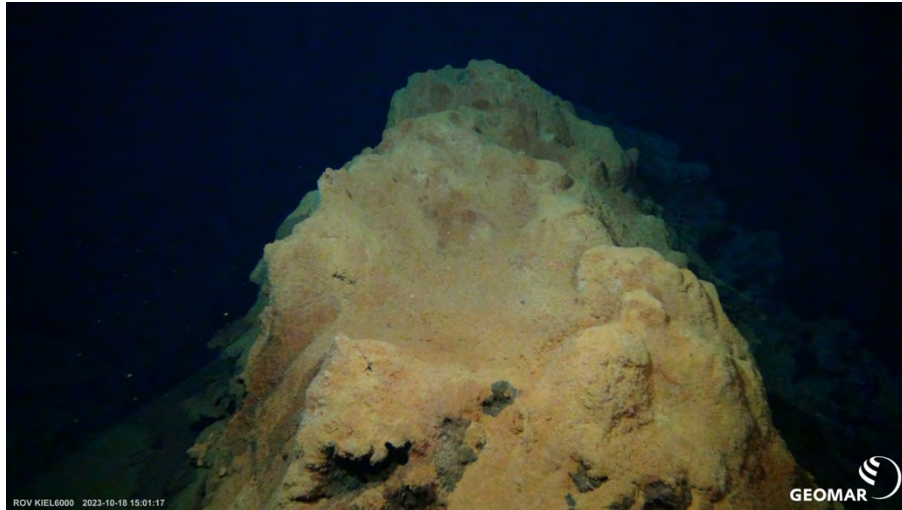
The second week of expedition M194 started with an ROV dive to 1850 m depth at Hadarba Deep in the central Red Sea. In this area, some weaker turbidity anomalies have been detected in 2021 and 2022. The seafloor in the dive area is very rough, and two young lava flows dominate the hydroacoustic images of the seafloor. Pinpointing a target is challenging, and a reconnaissance dive was performed to search for signs of hydrothermal activity and to verify age models of the youngest lavas in this area. We could not find signs of hydrothermal activity with ROV and moved to the nearby Hatiba Mons volcano. At night, we did a CTD TowYo to look for plume signals in the northwestern part of the volcano summit, where turbidity signals were detected in 2019 and 2022.



Larger animals, like this sea anemone sitting on an old pillow lava, are rare in the deep Red Sea.
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The next day, 17 October, started with a dive of ROV Kiel 6000 at Hatiba Mons, the largest axial volcano in the Red Sea rift. We sampled bacterial mats, recently discovered by the lead PIs, and took low-temperature fluid samples from this area for the first time. We also located several new sites of low-T venting and observed venting of shimmering water of up to 47°C. Some USBL issues in the late afternoon made it unsafe to navigate between the labyrinth of several meters-high hydrothermal iron oxide mounds. Thus, the dive was interrupted to get the ROV save on deck. We used the night hours to work on the USBL transponders and recovered gravity cores from the Hatiba Mons iron mounds.

The next day was used to finish the planned program of the last ROV dive during the morning, and we took additional samples of hydrothermal fluids and microbial mats in the so-called Farwah Safraa (Arabic for yellow fur) ridges on Hatiba Mons. In the afternoon, we visited another site of potential hydrothermal activity and found a surprisingly high amount of low-T venting (<30°C) and abundant, thick microbial mats in an area called Majarrah (Arabic for galaxy) Mounds.



A thick hydrothermal microbial mat forms a steep iron oxide mound in the Majarrah Mounds area at the summit of Hatiba Mons volcano, central Red Sea rift.

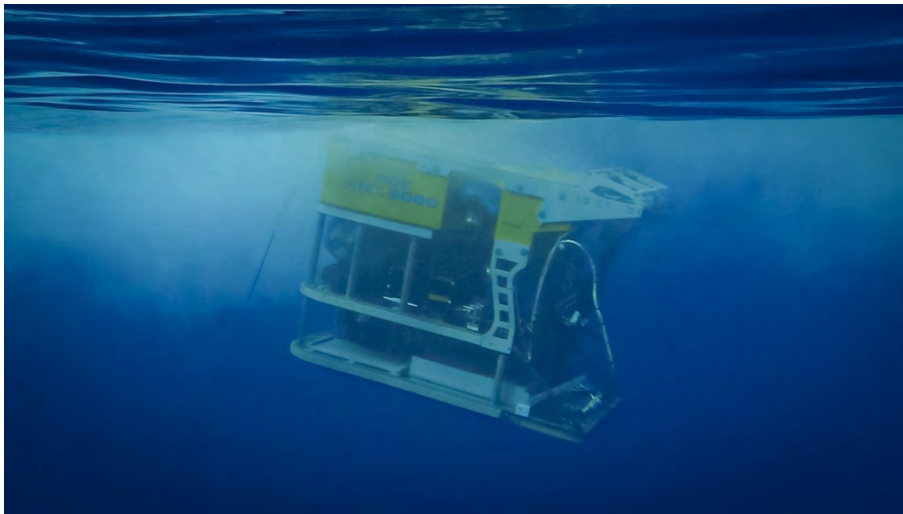
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During the night, we traveled further south to start a long CTD and MAPR (Miniature Autonomous Plume Recorder) tow-yo along the southern proportion of the Aswad Deep segment at about 20°54'N in the Red Sea Rift. We started the Tow-Yo on the morning of 19 October. Unfortunately, a medical emergency interrupted the scientific work, and we returned to Jeddah to disembark one crew member for medical treatment. In the meantime, he has arrived safely back in Germany, and we wish him a fast recovery.

After the detour to Jeddah, it was decided to postpone the planned station work at Aswad Deep and Poseidon Deep in favor of the more southern working areas and return later during the north transits. Thus, we headed towards working area 13 at 18°N in the Red Sea rift, where the submersible Pisces recovered a massive sulfide piece during the Soviet Red Sea Submersible Research expedition (Dec 1979 – Mar 1980). During the transit to the "Pisces volcano" (our working name after the Soviet submersible), we collected multibeam bathymetry data over formerly unmapped areas that will be added to our growing seafloor map of the Red Sea.

We arrived at "Pisces volcano" in the late afternoon of 20 October and started a CTD and MAPR TowYo over this site. This TowYo revealed many turbidity anomalies in three profiles over the volcano but without a systematic pattern. A reconnaissance dive over the volcano and an adjacent volcanic ridge showed pillow lavas of different ages but no signs of hydrothermal activity and, apart from some sharks and fish, almost no sessile deep-sea organisms.

We then proceeded towards working area 14, a magmatically stable segment center with a well-developed volcano that was rifted multiple times but still shows evidence of volcanic growth in the center. As usual, the work started with a CTD and MAPR TowYo along the axial valley in the night from 21 to 22 October. Several turbidity anomalies appeared in CTD and MAPR data but were randomly distributed in the water. Based on current measurements, we decided to explore the NW-SE striking eastern boundary fault for hydrothermal activity. There, we discovered multiple sites of low-temperature iron-oxide chimneys and microbes with well-visible venting of clear fluids (up to 30°C), similar to the northern and central Red Sea.



ROV Kiel 6000
under the surface
of the sea.
© Nico Augustin

Before proceeding with CTD measurements and ROV dives in our southernmost working area, we need to do a more extensive multibeam mapping to enhance the available seafloor maps. Therefore, we started mapping during the night to Monday and will proceed with diving soon.

All participants are doing well, and the atmosphere on board is excellent.

On behalf of all participants of M194, greetings from aboard the RV METEOR,

Nico Augustin

Chief Scientist