Research Vessel METEOR

M214: 25.10. – 13.12.2025
Las Palmas – Malaga - Iraklion - Iraklion

3rd Weekly Report: Nov. 3 - 9, 2025

As is customary after the METEOR departs from port, a positioning maneuver was conducted after leaving Malaga to provide everyone with practical training on the ship's life support systems. While theoretical instruction is important and valuable, practical exercises are crucial for those new to the ship or those who haven't sailed with us in a while. Since the cruise to the work area south of the Greek island of Crete took more than six days, the equipment preparations on board could be carried out calmly and with the utmost care. In the geology lab, the procedures for sampling using gravity corers and multicorers were rehearsed, and the sampling process for further analysis was discussed. The heat flow probe, which measures the heat flow on the seabed and in the top 5 meters of sediment, had been deployed on the Reykjanes Ridge during the previous METEOR cruise and was now being prepared for our expedition by the heat flow team. The hydroacoustics group conducted training for the operators of the multibeam echosounder and the PARASOUND sediment echosounder to ensure standardized procedures for data acquisition and processing. Our autonomous underwater vehicle (AUV) team used the time to prepare the MARUM SEAL5000 AUV for its first dive on the Gelendzhik mud volcano (Fig. 1).

Figure 1: The AUV team, consisting of three engineers and one female engineer, is preparing the MARUM-AUV SEAL5000 for its first mission. (© Elmar Schreiber).

Figure 2: The chief engineer of the METEOR usually begins his tour of the ship's engine rooms in the engine control room. (© Elmar Schreiber).

The last group to be mentioned is the CTD team, which conducts the physical and chemical measurements in the water column and essentially uses the ship's own CTD with the rosette and 24 Niskin water samplers to collect water samples at discrete depths. The transit time also gave us, and especially the chief engineer, the opportunity to show the engine rooms in detail to interested scientists (Fig. 2). In addition to all these preparations, there is a scientific meeting every day in which the scientists take turns presenting their areas of expertise and discussing the scientific objectives of the expedition. The program (FRINGE II) of the METEOR expedition, number M214, investigates fluid and gas vents in the accretionary wedge of the Mediterranean collision zone between the African and Eurasian tectonic plates. In the accretionary wedge, deposits are

accumulated by lateral pressure from plate convergence and form a complex underwater mountain range in the eastern Mediterranean, known as the Hellenic Arc. The "FRINGE II" expedition is part of the Bremen Cluster of Excellence at MARUM "The Ocean Floor – Earth's Uncharted Interface" and investigates geological structures, fluids, and gases that occur along prominent fault systems, where previous studies have identified deep-rooted mud volcanism and fault deposits on the ocean floor. The sediments appear to originate, at least in part, from depths corresponding to the plate boundary between Africa and Eurasia, extending into the subduction channel and the hydrated mantle wedge of the Hellenic Subduction Zone beneath Crete, Greece. This expedition is a continuation of the FRINGE I expedition, which took place with the research vessel SONNE in 2020, the year of the COVID-19 pandemic. The data from this expedition therefore form the basis of our research program, allowing us to build directly upon it.

Figure 3: View from FS METEOR of the Lipari Islands in the Tyrrhenian Sea with Vulcano in the foreground, Paneria and Stromboli to the right. (© Gerhard Bohrmann).

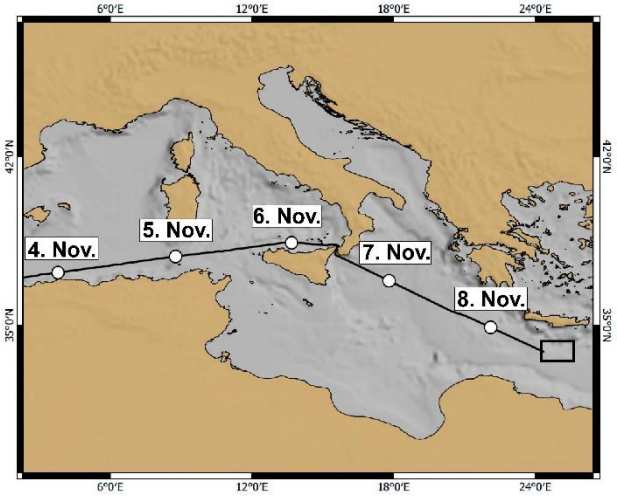

Figure 4: Map showing the route in the eastern Mediterranean to the work area south of the island of Crete where we started station work on Saturday, 8 November.

The journey east from Malaga led through the Alboran Sea, across the Balearic Basin, south of Sardinia, into the Tyrrhenian Sea, and along the northern coast of Sicily (Fig. 4). In fine weather, we were able to admire the volcanoes of the Aeolian Islands (Fig. 3). We then proceeded through the Strait of Messina, across the Calabrian Arc of the Ionian Sea, to the Mediterranean Ridge, where we reached the study area on Saturday afternoon and began the scientific work program with the first CTD station, reaching a depth of 2,200 m. During the night, we conducted extensive mapping using the multibeam echosounder and, in particular, the Parasound sediment echosounder over several mud volcanoes of particular importance to us, which we intend to investigate in greater detail during the expedition. On Sunday, 9 November, the MARUM AUV-Seal5000 was launched for the first time to conduct micro-bathymetric surveys of the Gelendzhik mud volcano. We are pleased to have finally begun the actual research work after the long transition period. We plan to report on the initial results next week.

All participants are healthy!

Best regards also on behalf of the cruise participants,
Gerhard Bohrmann R/V METEOR, Sunday 9 November, 2025

We will be reporting on our expedition M214 in a weblog:
https://www.marum.de/FringeII.html