

# RV METEOR M193 “REPLENISH”

*Limassol – Jeddah*

## 2. Weekly Report (11.09 - 17.09.23)



The RV METEOR reached the working area on Tuesday morning the 12<sup>th</sup> September at 02:30 LT. Since the research permit had not been granted at that time, the ship remained in a waiting position outside the requested work area. Fortunately, the research permit arrived on the same day at about 14:30 LT whereupon we immediately started the work program north of Al Wajh Lagoon in a 40-50 km wide strip between the coastline and the maritime border of Saudi Arabia. The area covers a water depth range of about 500 to 1650 m, which is morphologically highly structured due to salt tectonics. High ridges dominate separated by mini basins. The agenda initially included a 3 ½ day seismic block using the University of Hamburg's 144-channel digital streamer. To protect marine mammals and sea turtles from possible disturbance by the underwater acoustic sound from the seismic signal sources, we also have four observers on board who accompanied the seismic and hydroacoustic measurements around the clock. Parallel to the seismic measurements, the hydroacoustic sensors of FS Meteor were operated: the Parasound, Multibeam (EM710 and EM122) and the 38 kHz ADCP. The Parasound enables high-resolution imaging of the subsurface down to a depth of about 50 m, the multibeam maps the topography of the seafloor, and the *acoustic doppler current profiler* (ADCP) records ocean currents down to a water depth of 1000 m.

The acoustic signal from the pneumatic sound sources, penetrates up to 1 km into the subsurface, where it is reflected at material boundaries. Hence, the echo received by the digital streamer represents an image of the subsurface structures. The objective of the seismic survey is to record the stratigraphy in the working area, the sedimentary bedding conditions and tectonic structures, and to locate suitable sediment sampling locations for the up to 12 m long gravity cores. The seismic data are used to reconstruct the sedimentation processes in the siliciclastic-carbonate depositional system in the distal area of the Al Wajh platform, which is characterized by arid and pluvial phases. Unfortunately, the seismic survey had to be stopped

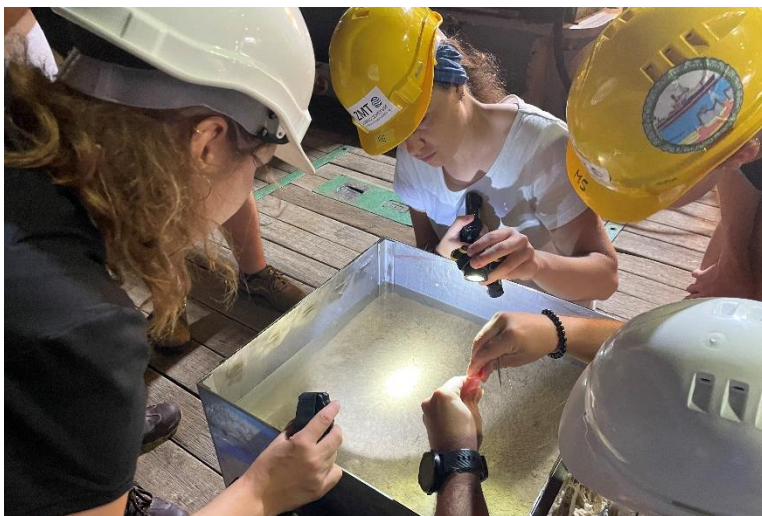


Figure 1: Observation of the seafloor fauna caught by a box core. (Photo: H. Westphal).

after 4 hours of operation on the 13<sup>th</sup> September at 10:50 LT, because the compressor had switched off automatically to protect against overheating. The problem has been solved in the meantime and the profile acquisition was continued on the 15<sup>th</sup> September at 12:30 LT and is expected to end on the 19<sup>th</sup> September at 01:30 LT.

In the period between seismic deployments, several VanVeen grabs and box cores were ob-

tained at water depths ranging from 960 to 1180 meters. Seafloor sampling focused on the record of planktic organisms, particularly planktic foraminifera and pteropods, as well as the



Figure 2: Deployment of a gravity core with the landing rack of the FS Meteor. (Photo: V. Vahrenkamp).

sapropel layers. The deep basins, largely cut off from terrestrial input, represent a potential climate archive for the northern Red Sea.

benthic life. The remains of those organisms allow the reconstruction of climate and environmental change such as, for example, the episodes of strongly elevated salinity in the Red Sea during the ice ages, when the connection to the Arabic Sea was restricted. On the 14<sup>th</sup> September at 10:25 LT, the first ROV dive was undertaken to study deep-water coral habitats about 30 km offshore at depths of 748 to 684 m on the steep slope of a submarine ridge. While the seafloor is mainly populated by shrimps and gastropods, also rare small coral mounds occurs. These were sampled for identifying and characterizing the corals and the accompanying fauna.

Around midnight on the 14<sup>th</sup> September, two gravity cores were successfully recovered from a 1050 m deep mini-basin located about 13 km northwest of the ROV station. The cores were divided into 1 m sections and stowed unopened in a reefer. The objective of sampling the isolated offshore mini-basins is the reconstruction of the climatic events based on dust and

With best regards on behalf of all participants of the expedition M193,

Thomas Lüdmann

(University of Hamburg)