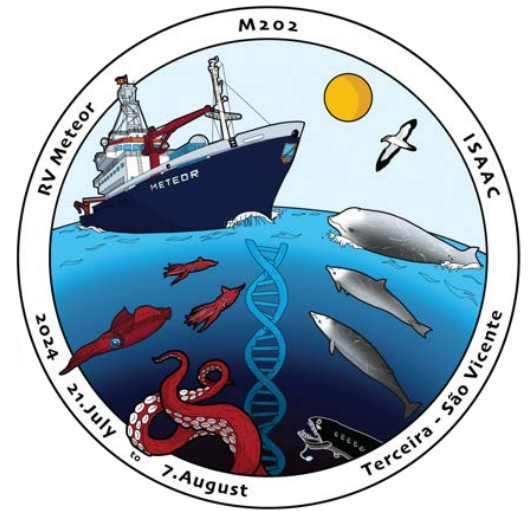


RV Meteor

Expedition M202 „ISAAC“

21.July – 07.August | Terceira – Mindelo



3. Weekly Report (29.7. - 04.8.2024)

The second week of our cruise M202 started with ADCP transects and a test of the profiling PELAGIOS. The profiling PELAGIOS is attached to the CTD-rosette and takes 3-4 pictures per second on its way up and down the water column (Fig. 1). This deployment was the first test of the system. On the morning of July 29, we recovered two Nautilus camera systems for the last time during this cruise. The week before, the Nautilus camera lander did not release as planned after sending an acoustic signal. However, the lander has a back-up galvanic release that corrodes after a defined time in seawater. This happened on the night of the 28th to 29th of July and in the morning of July 29, we recovered the lander successfully.



Figure 1: The profiling PELAGIOS attached to the CTD.

Subsequently, we fished with the Rectangular Midwater Trawl (RMT8+1) for six hours in sperm whale habitat between 0 and 950 m, over 1300-1400 m of seafloor depth. During the four RMT trawls we deployed, we collected 2506 fish specimens belonging to 83 taxa that were identified by our Azorean colleagues (Fig. 2). This includes two new species records of the families Myctophidae and Sternoptychidae for this area. The most abundant family in the catches was Gonostomidae, followed by Myctophidae. *Cyclothone* sp. was the most abundant genus in the trawls (76.7%). Another highlight was the collection of the barrel-eye fish *Opisthoproctus soleatus*. It is known for its transparent head and upward-looking eyes to spot prey from above. The barrel-eye fishes' eyes and other specimens with unique eyes were conserved in liquid nitrogen for further analysis in the laboratory at home.

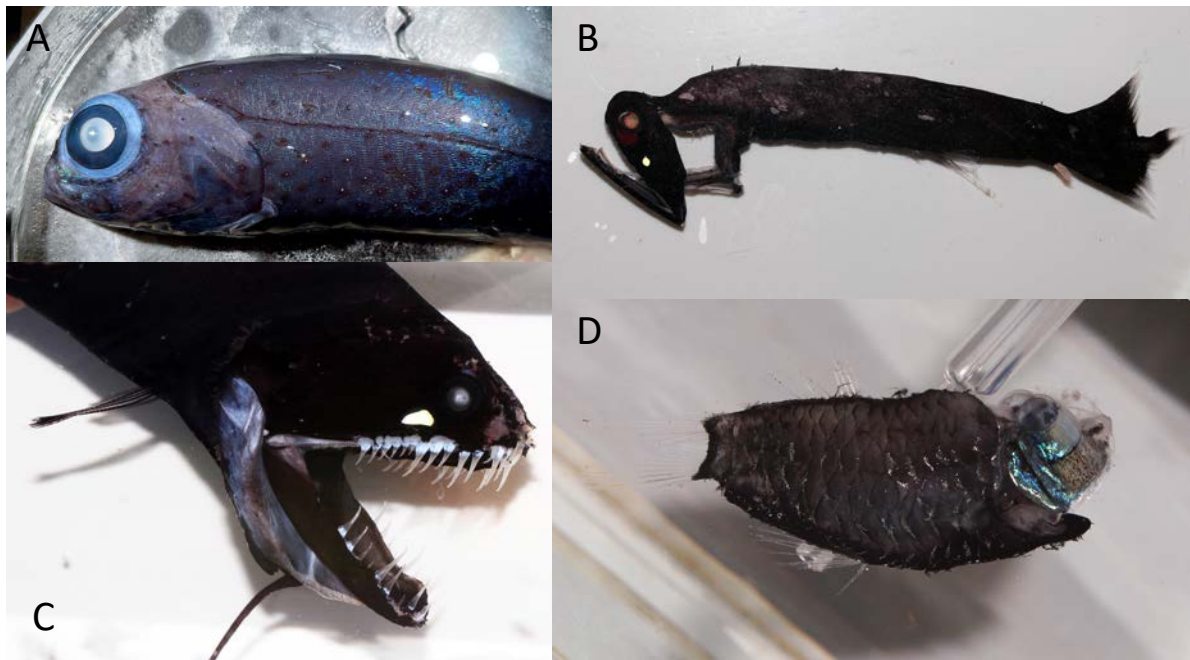


Figure 2: Fish caught in the RMT. A) *Xenodermichthys* sp.; B) *Malacosteus niger*; C) *Melanostomias* sp.; D) *Opisthoproctus soleatus* with tubular eyes. Photos by Zuzana Musilova



Figure 3: Cephalopods caught in the RMT. Above left) *Heteroteuthis dispar*; Above right) *Onychoteuthis* sp.; Below left) *Liocranchia reinhardti*, Below right) *Pyroteuthis* sp. Photos by Sophie Schindler

We collected 34 cephalopod specimens including *Planctoteuthis*, *Heteroteuthis dispar* and *Liocranchia reinhardti* and also sampled 178 individuals of gelatinous zooplankton (Fig. 3). We were also interested in the collection of amphipods and polychaetes to test their visual abilities during behavioral experiments (Fig. 4). Although little sunlight remains in the deep ocean, these animals have evolved extraordinary vision to see in dim light or detect bioluminescence. Understanding their vision may not just inform us about their adaptations, but also inspire bioengineered designs like low-light cameras or visual processing algorithms.

In total, we were able to conduct 11 experimental runs (lasting 5.1 hours each), testing 32 animals including hyperiid amphipods and ostracods.



Figure 4: Left) The amphipod vision team preparing the next vision experiments. Right) The hyperiid amphipod, *Scina* with a total body length of 18mm.



Figure 5: Left) Lipid and fatty acid experiments on deck. Right) Zooplankton samples from the multinet. Photos by Eleonora Puccinelli

During the last weeks, the eDNA team collected seawater from eleven CTD casts and collected 550 Sterivex filters in total. The DNA on the filters will be analyzed for cephalopod, fish and marine mammal DNA at GEOMAR. The seawater from the CTD was also used for lipid and fatty acid analysis of phytoplankton. In an experimental setup on board, the amount of lipids and fatty acids were measured that are produced by phytoplankton (Fig. 5)

On July 30, a second passive-active acoustic tracking (PAAT) mooring was deployed at the recovered mooring site. This mooring contains eight hydrophones to track and localize high-frequency beaked whales and other animals. Two echosounders (WBAT) are attached that can discriminate between prey groups by using two different frequencies (38 and 70 kHz). After deployment, we localized the mooring's position using the ship's hydrophone extension unit (Spargel). The first mooring was deployed over the side, but due to the size and length of the second one, it was deployed over the A-Frame in the back. Both moorings will record for one year and will be recovered next year. After the last RMT on July 29, the coax cable which was

going over the back for the RMT, was needed over the side for OFOS (Ocean Floor Observation System) deployments. The crew therefore rearranged the cable and terminated it, so that we could use it for the OFOS deployments over the side of the ship. OFOS was deployed on July 30 for four hours. Highlights were a *Mastigoteuthis* and the pelagic octopus likely *Vitreledonella richardi*. In the evening, we started our last ADCP transect for the cruise along the canyon. On the morning of the 31st, we needed to offload the Nautilus camera, echosounder and some of the mooring equipment to a smaller boat to transport the equipment to our collaborators on shore, so that they could stay on Terceira with the land team. To do so, we went to the bay of Angra do Heroismo. The sea conditions were perfect and the operation went smoothly, only lasting for 20 minutes. Following this, the ship tested the safety boats and we then started our transit to Cape Verde around 11 am accompanied by some common dolphins. Our work off Terceira has thus been completed successfully. We collected all the data we aimed for with the help of the crew, the atmosphere on board is extremely pleasant and we now started packing all the gear that is not needed for our 24-hour work off Cape Verde, starting next week.

Best wishes from aboard the RV Meteor on behalf of all participants.



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