1st Weekly Report M209

Mindelo-Ponta Delgada

21.3.2025-23.3.2025

M209 on RV METEOR is a collaborative effort to survey coastal deep-sea ecosystems in Cabo Verde waters. We aim to map the topography and biology of meso-and rariphotic reefs, island slopes and abyssal plains, and to reveal the unknown biodiversity. In addition we are interested in the deep water column which harbours organisms that form an unexplored midwater foodweb that nourishes commercially exploited fishes including tuna. Finally, we are interested how the topography of the island slopes and seamounts influence the interaction between the communities in the water column and the seafloor. To reach the scientific objectives we will apply a multitude of technologies including the remotely operated vehicle ROV KIEL6000 to document and sample the unexplored deep waters of Cabo Verde. We will work off Santa Antao, Fogo and Santiago, as well as Nola and Cadamosto Seamount. The ultimate goal is to collect information that can contribute to the conservation of pristine Cabo Verde marine habitats.

On 17.3.2025 the M209 advance party arrived in Mindelo. Part of the team went to the METEOR immediately after checking in the hotel, to meet members of the M208 expedition, and to exchange experiences, and information on logistics and equipment. We were happy to see that the 30 tonnes heavy winch container was already on board. On the morning of 18.3.2025 the complete advance party started mobilizing on RV METEOR which continued on 19.3.2025. At 11 am on 19.2025 M209 team members Vanessa Lopes, Keider Neves, Rui Freitas, Henk-Jan Hoving and Julian Stauffer gave presentations on cruise objectives at the Ocean Science Centre Mindelo.

On the morning of 20.3.2025 the complete team embarked on RV METEOR, and all continued cruise preparations. While the 8 expedition containers arrived in time in Mindelo on time, we discovered that all 5 ROV containers received extensive damage during the transport process from Kiel to Mindelo. Despite this damage the ROV team were able to mobilise to their full extent, the result of which was a successful harbor test on Friday 20.3.2025. This was only made capable through the support of the two deck fitters on board who helped repair the worst of the damage to the ROV containers, in particular patching a hole that had been punched into the roof of the ROV control van. This harbor test involved the deployment and recovery of the vehicles and optimizing the settings and buoyancy to prepare for use of the vehicle in ocean conditions.

In the afternoon of 20.3.2025 a group of Cabo Verde students from the UTA as well as additional interested people and crew from the research vessel of the NGO Biosfera1 visited the METEOR. Together with the officers of METEOR the visitors were shown around the labs and machine room of METEOR.

On 21.3.2025 RV METEOR left the harbor of Mindelo to transit to the first station off Tarrafal, Santa Antao. The transit was only 3 hours. The Cabo Verde archipelago is currently under influence of strong north east trade winds, which create challenging conditions for marine traffic and operations. However, our scientific stations are in the wind shadow of Santa Antao, and we are able to work under calm conditions in the deep sea. The first scientific equipment that was deployed was a CTD, which provided a sound velocity profile for multibeam mapping and we collected deep-sea water samples to filter environmental DNA or eDNA. eDNA are the genetic traces that organisms leave behind in the water (mucus, faeces etc.). With molecular genetic tools we can identify species in a region based on eDNA without seeing or capturing the individuals. We are particularly interested in detecting whales, sharks, cephalopods and fish with our eDNA samples. We complement the eDNA work with observational tools (towed cameras, ROV), net sampling and ship based observations.

Figure 1: The start of M209 with the RV METEOR leaving the harbor of Mindelo.

After the CTD we performed WP3 net deployments and sampled our first pelagic organisms. We proceeded with a calibration of the ships' Posidonia system, followed by multibeam mapping in the shallow zones of Tarrafal. The bathymetric maps provided the basis for the AUV deployment which took place on 22.3.2025. The AUV mapped a shallow part of the coastal zone from 56 - 83 m. While the AUV Kalle has been extensively used in the Baltic Sea, this AUV deployment was the first ocean deployment for the GEOMAR GIRONA AUVs.

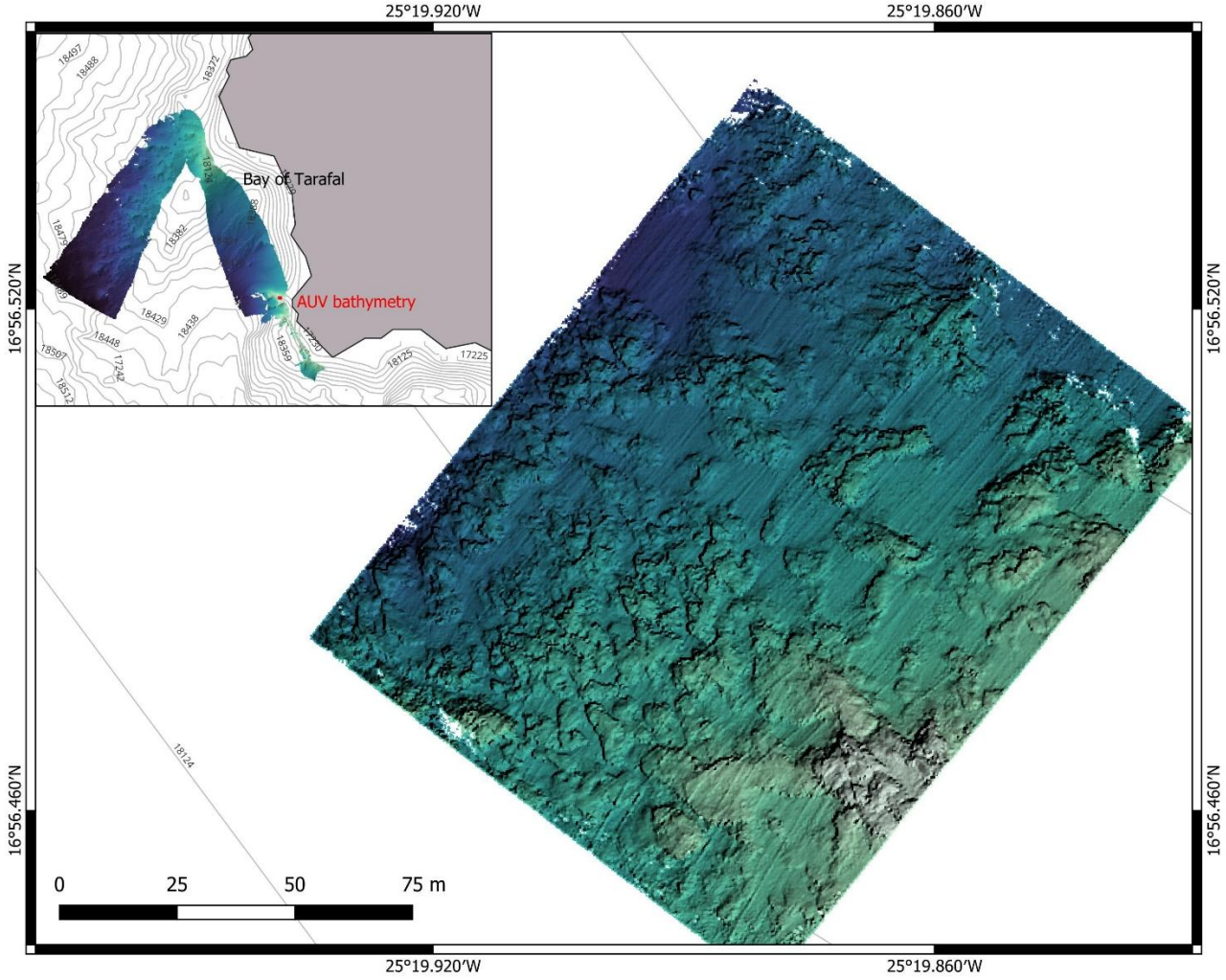

Figure 2: Bathymetric map based on data obtained by AUV Kalle, which was deployed off Tarrafal, Cabo Verde.

We then successfully used towed cameras PELAGIOS and XOFOS and were able to observe a highly diverse fauna and flora inside the water column and on the steep slopes reaching from less than 100 meters to 500 m water depth. Afterwards we performed an ADCP transect on Nola seamount in the night of 22.3.2025. This transect will form the basis for the biological work that we plan on Nola to understand the coupling between communities in the water column and the topography of the seamount.

On 23.3.2025 we used ROV KIEL 6000 to explore and collect fauna in the mesopelagic zone off Tarafal. We encountered a diversity of organisms, in particular gelatinous zooplankton such ctenophores, hydromedusae and siphonophores. Using specific collection tools on the ROV the pilots of ROV KIEL6000 were able to sample an impressive variety of delicate organisms, which we do not capture in the nets.

Overall, we had a successful and efficient start of M209, and we look forward to the coming weeks of collaboration with the ships's crew, officers and captain, and the scientific team M209.

Dr. Henk-Jan Hoving

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