M197

(30.12.2023 – 06.02.2024)

6th Weekly Report (29.01.2024 – 04.02.2024)

The week started with a rising swell (up to 3m) and wind (up to 9Bft) and a sighting of a water spout (Figure 1). Under these conditions it was decided not to deploy the in-situ pumps or the multicore at one station. The remainder of the deployments were successfully carried out (CTDs, the PELAGIOS video camera system, and zooplankton net deployments). Conditions calmed significantly overnight and the next day all deployments were conducted, with only the closing mechanism of multicore device triggering too early due to the ships motion in the remaining swell. Fortunately, sea and wind conditions progressively calmed throughout the remainder of the week as we headed northwest. By the time we reached our station at one of the deepest points of the Mediterranean, the multicore functioned successfully and sediments were retrieved from a depth of 5km (Figure 2).

Figure 1. *Water spout sighting. Photo: Leda Cai (CMMI).*

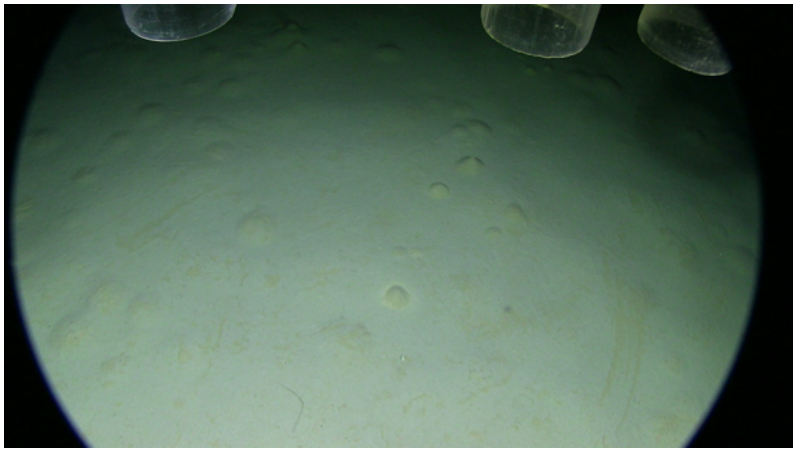

Figure 2. *Video still of sediments at 5km depth – our deepest site and one of the deepest points in the Mediterranean.*

Zooplankton: Zooplankton are a critical component of the marine ecosystem, at the trophic interface between the phytoplankton (which undertake photosynthesis) and larger animals such as fish. They also contribute considerably to the transport flux of organic carbon from the surface ocean to depth, thereby regulating the partitioning of carbon between the ocean and the atmosphere. We have deployed different types of nets for collecting zooplankton at every station throughout our cruise. The WP2 and WP3 nets (Figure 3 left) have different mesh sizes to capture different size fractions of plankton throughout the entire upper water column (the nets are hauled throughout the upper 200-500 m). These zooplankton samples are preserved, analysed under the microscope, and additional samples are taken for DNA analysis. These nets are followed by the so-called multinet (Figure 3 right), which as the name suggests, has multiple nets that shut at different depth horizons. This enables the characterization of zooplankton at specific depth ranges in the water column from ca. 750 m deep to the surface (Figure 4).

Figure 3. *Night time deployment of the WP2 net (left) and Multinet (right).*

Figure 4. *A selection of Oncaeidae, the smallest copopods in the ocean, collected by the zooplankton nets on M197. Image: Tamar Guy-Haim and Merav Gilboa (IOLR)*

In addition to the zooplankton nets, we are also deploying the so-called PELAGIOS underwater video camera system (Figure 5 left). This device is towed through the water at slow speeds (ca. 1 knot) at different depths between the near surface and 1000 m deep. The video camera captures images of organisms such as jelly fish (Figure 5 right), that can later be analyzed to identify the amount and diversity of species. As the Eastern Mediterranean is warming rapidly, there are increasing numbers of invasive species of jelly fish entering from the Red Sea. These have been well-documented in shallow, near-coastal areas. On M197 we are conducting a baseline assessment in the open ocean, including deeper waters, with a focus on what species are present and their abundances.

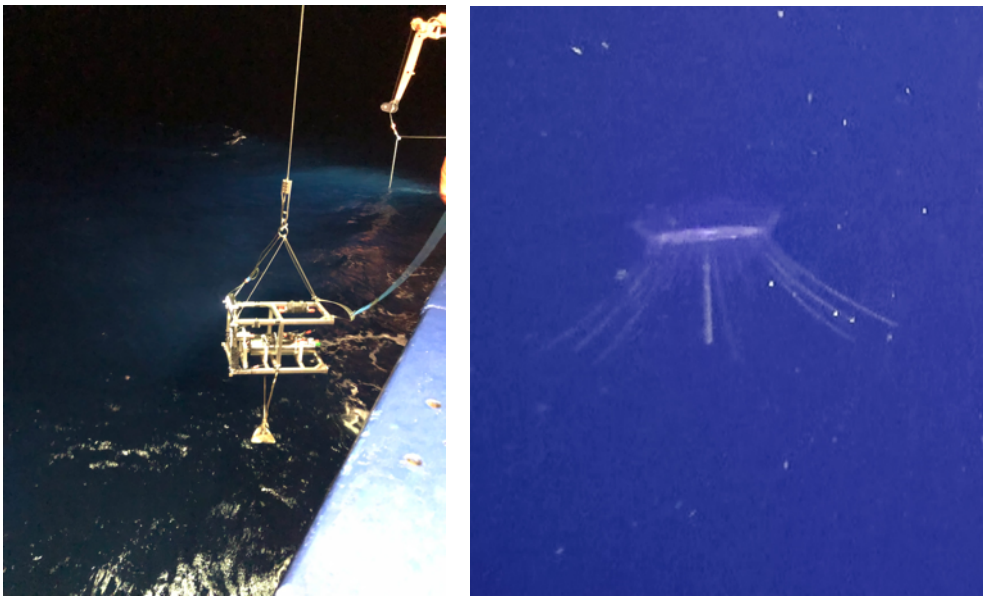

Figure 5. *Left: PELAGIOS underwater video camera deployment. Right: PELAGIOS observation of Solmissus.*

Microplastics: Microplastics have been reported to act as vectors for pollutants that can potentially bioaccumulate in marine food webs, but their distributions remain poorly characterized in the open ocean. In addition to the range of chemical and biological measurements and samples being collected, we also have a researcher from the Cyprus Marine and Maritime Institute onboard as part of the scientific team (Dr. Leda Cai) who is collecting samples for analysis of microplastics in the water column and in surface sediments. Seawater samples that are passed through filter membranes to collect the microplastics, as well as scoops of surface sediments, which will be later identified and counted using a microscope (Figure 6).

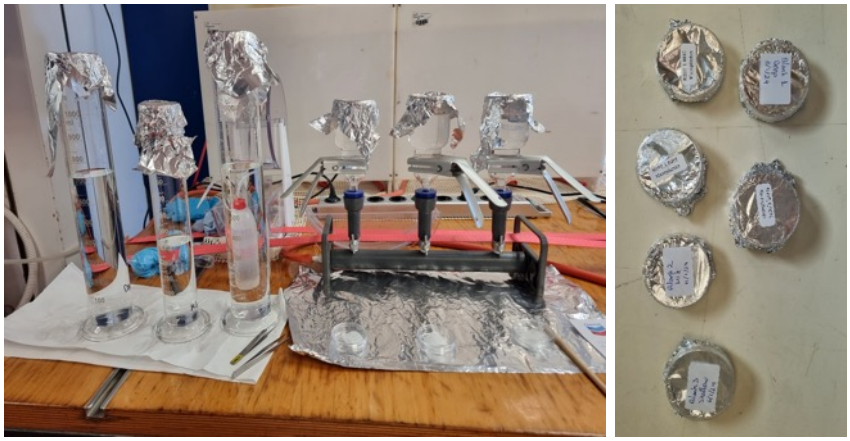

Figure 6. *Glass measuring cylinders and aluminium packaging for the collection and storage of samples for microplastics. Photos: Leda Cai (CMMI).*

Live video call with school children: Following the success of last week's live video call with school children, we had a second event this week to explain the research we are conducting and to take them on a tour of the ship. This time, thirty classrooms joined the live stream with ca. 1000 school children watching! At the end there was a question-and-answer section, where the scientists tackled questions ranging from 'How does climate change impact the distribution of phytoplankton?' through to 'Do you still go to the supermarket to buy food?' (Figure 7).

Figure 7: *Scientist Merav Gilboa (IOLR) answers a question during the live video call with school children.*

On 04.02.2024 we had our last science station and began to pack up our equipment and clean laboratories. This will continue into tomorrow, when we will conduct our final transit to Catania, Sicily. We expect to arrive in port at ca. 09:00 local time on 06.02.2024. There, we will carry out final packing of equipment containers and also hand over our frozen samples to a specialist courier company who will transport them to GEOMAR (Kiel).

The scientific team thanks Captain Apetz and the entire crew of the RV Meteor for the excellent support and care over the last six weeks. Their professional and easy-going attitude has helped make this research expedition both a success scientifically and enjoyable to be a part of. We also thank the DWD team for supplying us with detailed and up to date weather forecasts that have been particularly useful on the cruise. Finally, we thank the Leitstelle Deutsche Forschungsschiffe and Briese Research for their continued support.

With best regards from 18.73 °E, 37.50 °N,

Tom Browning and the M197 research cruise participants