# Research Vessel SONNE

## SO279 (GPF 20-3_089)

04.12.2020 – 05.01.2021, Emden – Emden

3rd Weekly Report: 14 – 20 December 2020

We reached our primary working area south of the Azores in the afternoon of **13 December**. The weather was better than we hoped, with 2-4 m swell arriving from storms farther north, but low winds and sunny skies. Favorable conditions meant we could deploy the catamaran trawl to sample particles floating at the sea surface. Along with seaweed, shrimp, crabs, and small fish, the first tows returned an enormous number of plastic fragments (Fig. 1).

*Figure 1. Left: Catamaran trawl sampling particles floating within 30 cm of the sea surface. Right: A typical catamaran sample with lots of multi-colored plastic fragments. The brownish balls are air bladders from Sargassum seaweed. (© U. Panknin/GEOMAR)*

Nearly double cable length is required to operate the multi-net at 3000 m depth as planned. To reach these depths, the SONNE crew switched the ca. 6000 m winch cable for a 8000 m cable. With the help of the ship's scientific-technical support personnel (WTD), we unfortunately learned that the resistivity of the longer cable was too much for the net powering unit—one of the many challenges presented by deep-sea research. The crew then went through the laborious process of switching back to the shorter cable. The following multi-net deployment would be the first of many unsuccessful attempts, as the equipment was apparently too light and unstable to prevent turning at depth.

We postponed further multi-net tests and continued with water column and sediment sampling through **14 Dec**. This station (Station 3) was our deepest, at 5500 m, and most of our time on station was spent waiting for sampling devices to reach the distant seafloor and return to the surface. Nevertheless, the remaining sampling went smoothly, and we did a first video observation of the seafloor with the SONNE's OFOS (Ocean Floor Observatory System). We saw mostly featureless mud, but occasional red shrimp, purple fish, and sea cucumbers.

After the OFOS profile finished on **15 Dec.**, SONNE transited to Station 4. We arrived on **16 Dec.** at 4:00 in the morning and immediately began our sampling programme. The box cores returned with rather strange sediments—fine grained carbonates that behaved somewhat like a non-Newtonian fluid. The sediment was soft when gently pressed or shaken, but much harder when struck suddenly.

Sampling continued into **17 Dec.**, with more multi-net testing. The still unsuccessful multi-net was replaced with a Bongo net to collect particles from the water column down to a depth of 300 m. We then conducted our second OFOS dive, which was similar to the first dive except for a piece of rope or fishing net entangled in Sargassum seaweed. We frequently saw clumps of apparently decaying Sargassum on the seafloor, but this was our first piece of deep-sea litter.

*Figure 2. Floating Sargassum raft with extensive macroplastic debris. (© A. Mutzberg/GEOMAR)*

On **18 Dec.**, we transited to Station 5, filling two tanks with about 1500 L of clean water from the towfish while travelling. We arrived on station around 11:00, and completed the full program, again relying on bongo nets for sampling zooplankton and suspended particulates. While on station we also observed large rafts of Sargassum at the sea surface. The floating seaweed aggregates along wind-driven lines, stretching as far as the eye can see. Floating plastic litter accumulates with the Sargassum, and within one patch we saw large pieces of plastic sheets, crates, buckets, bottle caps, and rope (Fig. 2). Perhaps this sort of macro-sized litter is the parent material of some of the microplastics we find in the catamaran trawls.

We finished Station 5 on **19 Dec**. The OFOS dive revealed several pieces of macro-litter on the seafloor, including a plastic bag in apparently quite good condition (Fig. 3). It will be very interesting once we complete the dive mosaics and can put these observations in context of the area surveyed.

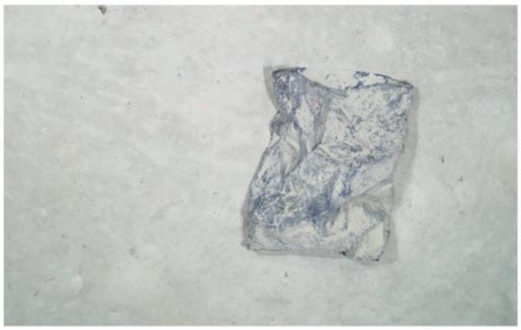

*Figure 3. Plastic bag on the seafloor at Station 5. (© GEOMAR)*

*Figure 4. A curious whale coming close during in situ pump deployment. (© E. Borchert/GEOMAR)*

This morning finds us at Station 6. The in-situ pumps are in the water, and we just had a surprising visit from a curious whale that approached close to the ship (Fig. 4).

With greetings on behalf of the SO279 cruise participants,

Aaron Beck, GEOMAR FS SONNE, Sunday 20 December 2020