**RV MARIA S. MERIAN - MSM108**
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**3rd Weekly Report**
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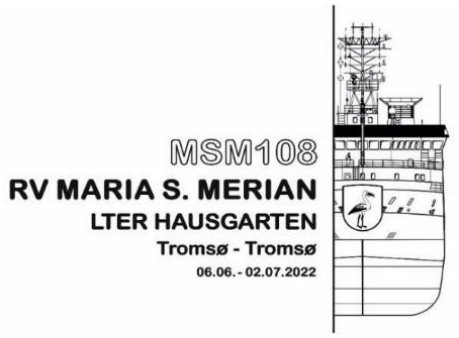


## Water World

As already introduced in the last week's report, today we will focus on the water column work at the LTER (Long-Term Ecological Research) observatory HAUSGARTEN, where the PEBCAO (Plankton Ecology and Biodiversity in a Changing Arctic Ocean) group with members from AWI and GEOMAR carry out intensive investigations of ocean chemistry and biology from the surface to the deep ocean.

The PEBCAO group began its studies on plankton ecology in the Fram Strait already in 1991 and intensified its efforts in 2009 within the frame of the HAUSGARTEN time-series investigations. Since then, we combined classical bulk measurements of biogeochemical parameters, microscopy of plankton organisms, optical methods, satellite observations, and molecular genetic approaches to compile information on the annual variability in plankton composition, primary production, bacterial activity and zooplankton composition.

One of our work horses is the CTD / Rosette Water Sampler (Fig. 1). The CTD measures conductivity, temperature, and water depth. From the conductivity of the water sample, we are able to determine the salinity of the water. Additional instruments used on the device include oxygen sensors, which measure dissolved oxygen concentrations, and a PAR (Photosynthetically Active Radiation) sensor, which detects distinct light levels. The CTD is lowered towards the seafloor producing continuous water column profiles from the water surface to the bottom. Along the way, discrete water samples are collected at predetermined water depths with so-called Niskin bottles that are arranged next to each other in a rosette (Fig. 1).

After recovery of the system, water samples were taken to the lab and processed for a range of biogeochemical parameters that allow us to determine the distribution, composition and cycling of organic carbon in the water column. The sample processing almost exclusively requires filtration and our work is accompanied by the constant (unfortunately not so quiet) hum of several vacuum pumps. Most filter samples are then stored cold or frozen for later analysis in the home laboratory at GEOMAR or AWI.

Additional samples are taken to study the phytoplankton composition and to determine the heterotrophic microbial activity in the water samples, applying radioisotope methods on board. So far, we processed 25 CTD / Rosette Water Sampler casts along an east-west transect in the eastern part of the Fram Strait (as an example, Figure 2 shows the temperature distribution along this transect) as well as at the northernmost and southernmost station of the HAUSGARTEN observatory.

Special focus was laid on the phytoplankton community in surface waters. Samples were taken using a simple plankton net and fixed for later analysis at the home lab. A subsample was microscopically investigated alive right after sampling and almost a hundred different species were found so far. The phytoplankton composition provides a rough indication of the water masses the samples come from and sometimes can also guide us towards deciding how much water to filter for a given parameter. This can be important as there is nothing worse than sitting in the lab in the middle of the night waiting for the last two millilitres of water to go through the filter….

To investigate the distribution and abundance of larger zooplankton we use a so-called Multinet (Fig. 3) that akin to the CTD / Rosette Water Sampler can take samples at discrete water depths. So far, we have taken three casts with the Multinet, and samples were preserved for analysis at the home lab.

By the end of the week, we were able to conduct repeated sampling in a 24-hour period at a station on the Vestnesa Ridge off Svalbard to study changes in the vertical distribution patterns of phyto- and zooplankton at short time scales in relation to different biogeochemical parameters - a very exciting additional study that will nicely complement our long-term studies at HAUSGARTEN.

Our fridge, freezer and all available shelf space in the ship’s laboratories is already full to the brim with samples to be analysed back home, but more will be added over the next few days until we have to finish our job for this year and to set sail for Tromsø.

We are still enjoying the great atmosphere on board and send greetings to our loved ones at home!

This report was prepared by Alexandra Kraberg, Theresa Barthelmeß, Talea Brinckmann and Kevin Becker from the Alfred Wegener Institute, Helmholtz-Center for Polar- and Marine Research (AWI) and the GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel.

*Fig. 1: Deployment of the CTD / Rosette Water Sampler off Spitsbergen.*

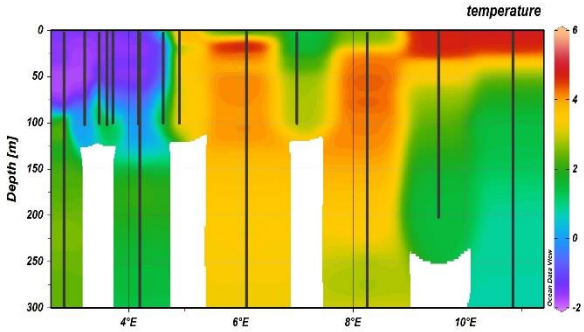


*Fig. 2: Temperature distribution across Fram Strait between 3° and 11°E registered in the upper 300 m of the water column.*

*Fig. 3: Deployment of the multinet to catch zooplankton organisms at discrete depths in the water column.*