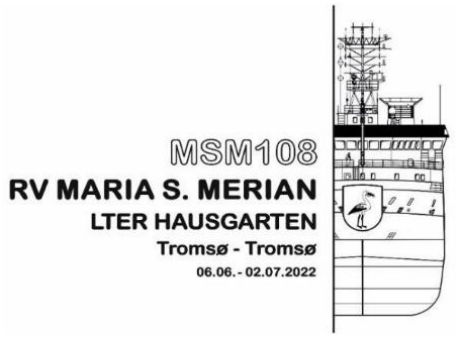
RV MARIA S. MERIAN - MSM108
06.06. - 02.07.2022, Tromsø - Tromsø



4th Weekly Report
27.06. - 02.07.2022

Ground Work

After giving an insight into the work of our planktologists and biogeochemists last week, in this fourth and last weekly report we want to go into the activities of our "bottom team", the benthologists.

Sediment samples from the deep-sea floor, including the organisms living on and in it, were taken with different bottom grabs, the so-called multiple corer and the box grab (Fig. 1). Sub-samples of the sediments obtained in this way are used, among other things, to determine the proportion of organic matter they contain. Plant pigments (chlorophylls and their degradation products) found in the samples serve as indicators for settled organic matter from the algal bloom in the uppermost water layers - this material represents the main food source for deep-sea organisms. Another parameter that is already measured on board is the activity of the bacteria living in the sediments. For this, we "feed" the bacteria with a special substrate and measure how quickly this substrate is degraded by the bacterial community. Other sub-samples are frozen or preserved in formalin for further biochemical and genetic studies in the home laboratory.

In order to be able to quantitatively and qualitatively record the smallest sediment-dwelling organisms, we take sub-samples from sediment cores obtained with the multiple corer. Bacteria that react particularly sensitively and quickly to environmental changes (e.g. in food availability) are in focus of our microbiologists' investigations. Horizontal and vertical distribution patterns of the so-called meiofauna, which are multicellular organisms with a maximum size of 1 mm, are being investigated as part of a doctoral thesis, with this work simultaneously expanding our unique meiofauna time series, which was started more than 20 years ago.

Larger sediment-dwelling organisms are collected with the box grab, which is used to cut out a cube-shaped block of sediment with a surface area of 50 x 50 cm and a height of 50 to 60 cm from the seabed. The sediment obtained in this way is passed on board through a set of sieves

with different mesh sizes and the so-called macrofauna left on the sieves is then preserved in formalin for later taxonomic studies in the home laboratory.

Large-scale distribution patterns of the megafauna living on the seafloor (e.g. crinoids, sea cucumbers, sea urchins and shrimps; Fig. 2) are documented with our so-called Ocean Floor Observation System (OFOS). The cable-connected camera system is towed at max. 0.5 knots about 1.5 m above the bottom along selected transects of about 4 km length and usually delivers 700 - 800 high-resolution images with each deployment (Fig. 3). Comparison with images obtained on previous expeditions allows us to detect temporal changes in the density and composition of the megafauna.

This concludes our report on the extensive research activities during the current expedition. The last days of the trip were characterised by clean-up work. All equipment and laboratory instruments that were used during the cruise were dismantled and stored in boxes and containers. Samples were preserved for later analysis in the home laboratory, and the data collected during the expedition was saved and partly already analysed. Finally, all laboratories and workrooms were intensively cleaned so that the following working groups would find clean working conditions for their cruise - just like we did at the beginning of our journey.

For 24 years now, we have been revisiting our HAUSGARTEN every year, thereby documenting natural variability and the effects of global change on a polar marine ecosystem. During this year's expedition, autonomous underwater vehicles were repeatedly deployed in the water column and on the seafloor. In addition, freefall systems, water and sediment samplers and towed camera systems were used. All this would not have been possible without the great seamanship of the deck crew, the professional support of the ship's technical staff, the excellent skills of the nautical officers and - not to forget - the always friendly and attentive care of the stewardess and the cooks.

We would like to express our sincere thanks to Captain Björn Maass and his crew for their hospitality, the trusting cooperation and the great atmosphere on board - and we are already looking forward to our next expedition with RV MARIA S. MERIAN!

On behalf of all participants,

Thomas Soltwedel

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Fig. 1: Recovery of the Multicorer (left) and recovery of the box corer (right) at a permanent sampling site of the LTER observatory HAUSGARTEN.

Fig. 2: Sea Cucumber (left) and Brittle Star (right) found at 1000 to 2500 m water depth on the so-called Vestnesa Ridge to the West of Spitsbergen.

Fig. 3: Aggregations of Sea Anemones and small Sea Cucumbers at the seafloor of the so-called Molloy Deeps (5500 m) in the eastern Fram Strait.