

SO268/2

3rd Weekly Report

14–20 April 2019



On Monday evening we arrived in the Belgian contract area to finish the baseline studies started during leg 1. Our first dive with the ROV Kiel6000 was dedicated to retrieving and sampling the food web experiment with labelled algae material that targeted holothurians. In the following days one of the remaining tasks was to sample benthic fauna in the designated reference area of the nodule collector system trial. In order to characterize the faunal communities living at the seafloor, the sediment sampling is complemented by video observations with the OFOS (Ocean Floor Observation System).

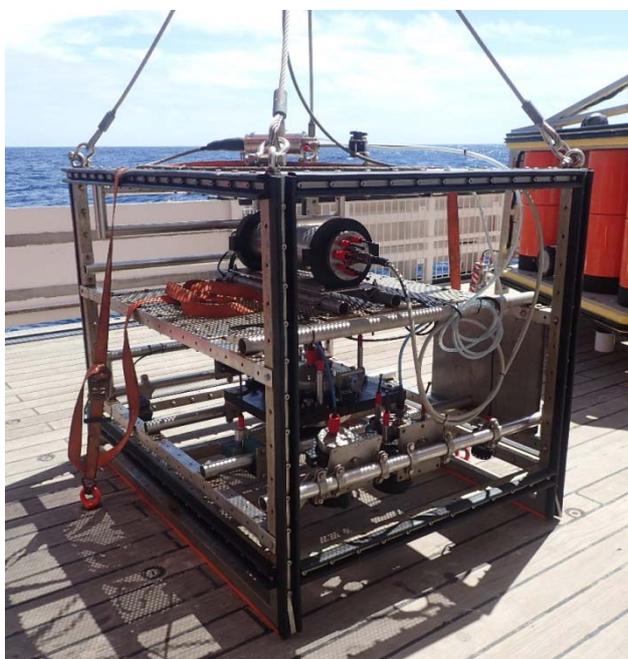
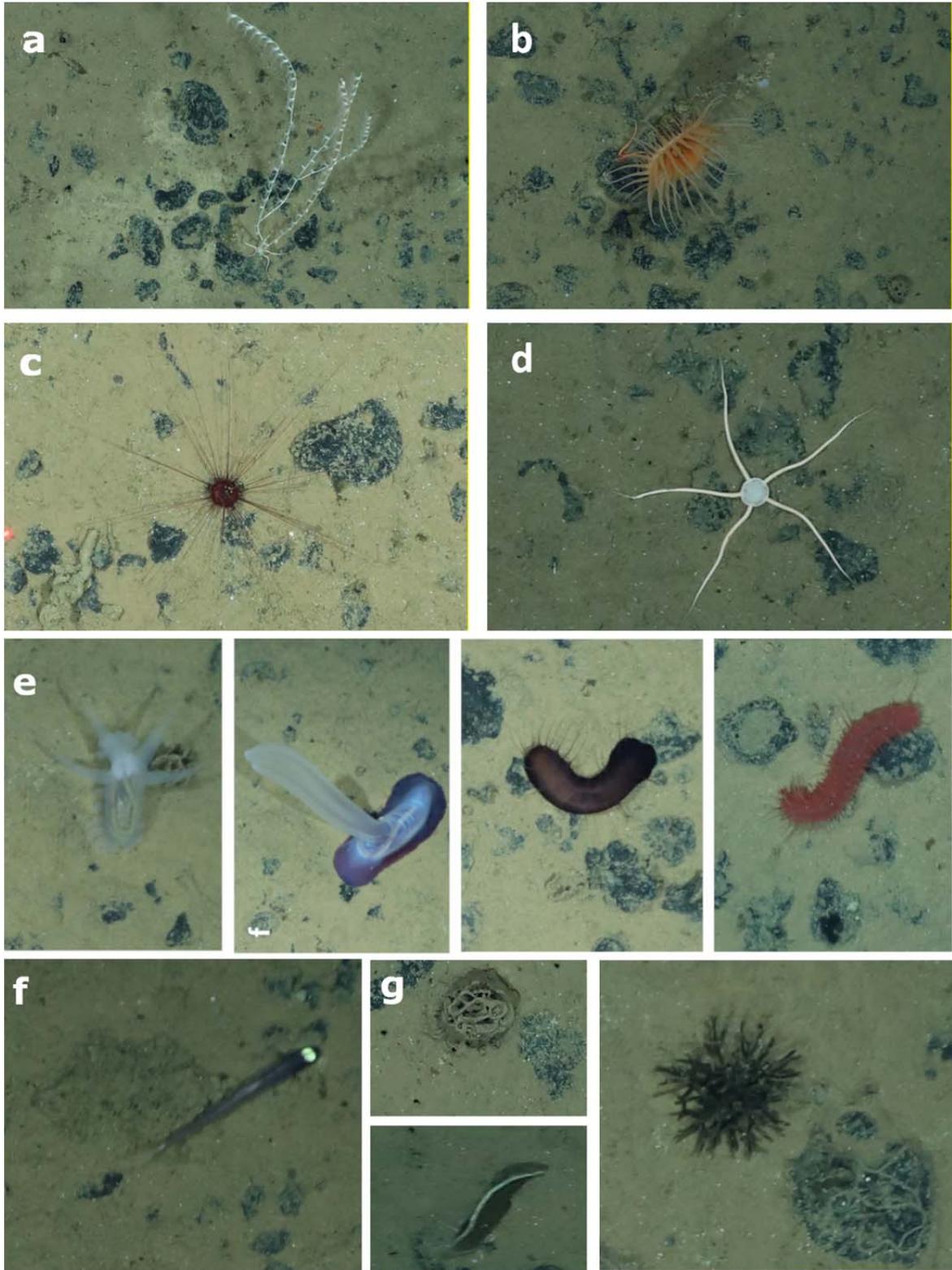


Photo (Yasemin Bodur): The OFOS (Ocean Floor Observation System) on Deck of RV SONNE during SO268.

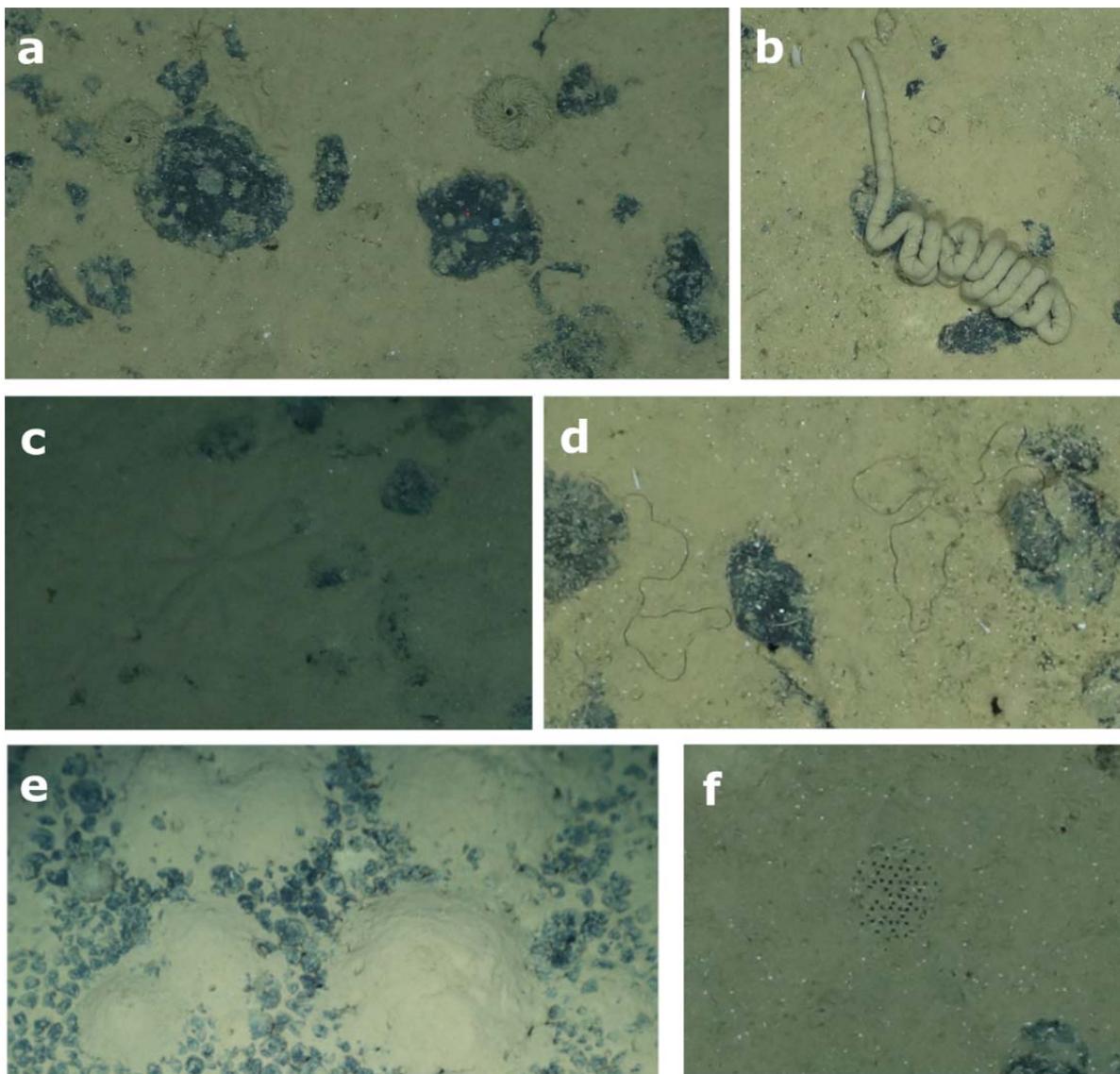
The OFOS is towed along a selected route by RV SONNE in a distance of about 1.5 m above the ground, while a high-resolution camera films the seafloor and takes still photos every ten seconds. The data is transferred to the ship via the cable by telemetry. Hence, the images are already analysed for the abundance and distribution of larger creatures, i.e. benthic megafauna, during the deployment to create habitat maps of the seafloor. The OFOS is particularly useful to count mobile organisms, such as sea cucumbers, brittle stars, and larger crabs that typically evade the sampling by box corer and multiple corer. Ten hours of OFOS deployment allow to map the seafloor along transect of a length of roughly ten kilometres or a total of 20,000 square metres. Sea cucumbers (holothurians) in all kinds of colours and shapes and deep-sea fishes contribute to the large fauna in the abyss. An iconic example is *Ipynops* sp. that possesses a translucent skull cap. Besides the mobile deep-sea creatures, there exists a plethora of sessile organisms that grow attached to the manganese nodules. Corals (Alcyonacea and Antipatharia), anemones (Actiniaria and Corallimorpha) and sponges (Porifera) are encountered regularly.



OFOS photos: Selection of a variety of fauna observed in the German and Belgian working areas in the Clarion Clipperton Zone: a) corals (*Alcyonacea*) b) anemone (*Actiniaria*), c) sea urchin (*Echinoidea*), d) brittle star (*Ophiuroidea*), e) four different sea cucumbers (*Holothuroidea*), f) deep-sea fish (*Ipnops* sp.), g) various *Xenophyophores* and nodules covered by *Komokiaceae*.

However, the most abundant species are so-called Xenophyophores and Komokiacea, unicellular organisms (protozoans). While in the German area they can be observed on almost every single nodule, we have encountered them less frequently in the Belgian area. Until today, little is known about these over-sized single-cell organisms. Among the open questions are, how old they get, how they grow and distribute spatially, and how they are related to each other. Both, Xenophyophores and Komokiacea, are foraminifera, however, they look very different from each other. In the German area Komokiacea are extremely abundant, but too small to be counted while OFOS is flying across the seabed.

Manganese nodules form a unique hard substrate habitat to attach to for this faunal community consisting of foraminifera, corals, anemones, brittle stars and other mobile and sessile species. Seafloor sediments itself are too fluffy and weak for these creatures to feel sufficiently comfortable. A key indicator is the fact that the mentioned mega fauna is far less abundant in nodule-free areas compared to nodule-covered seafloor.



*OFOS photos: Examples for traces of life at the seafloor in the German and Belgian areas in the Clarion Clipperton Zone. Except for the excrement of holothurians (b), the creators of all other shown traces are not identified so far.*

In addition the images allow recognition of details, such as worm burrows, holes in the seabed, partly buried molluscs, and other traces of life. Unfortunately, further attributions often fail due to the insufficient resolution of the photos and videos. In general, one gets the impression that almost every centimetre of seafloor is covered by some sort of trace, such as excrements of holothurians, suddenly disappearing burrows, meticulously arranged hexagonal holes or frayed dens. However, one should not forget that it is difficult to assign the ages of those life traces, because of the very miniscule sedimentation rates in the Clarion Clipperton Zone.

In the next few days two more ROV dives are scheduled to attain a high-resolution bathymetry of the designated collector trial area and to collect in situ benthic fluxes in the reference area. Late Easter Monday we will then return to the German contract area to observe the sediment resuspension by the passing eddy and to complete the missing baseline work.

Happy Easter on behalf of all SO268 participants,

Matthias Haeckel