During our 2-day transit to the Belgian contract area the wind and waves became stronger (6-7 Bft. with a high swell). When we arrived we deployed and calibrated the transponder network for the AUV. This was followed by a CTD water sampler carousel station to get water samples and a sound velocity profile to calibrate the ship's multibeam for the next survey in the new working area. The next stations were performed with the multiple and box corer providing samples for the benthic fauna team composed of 12 scientists representing 7 different research groups from Germany, France, Portugal, Belgium and Norway. They are interested in all living creatures, from very tiny ones (meiofauna, microscopic animals smaller than 1 mm) to larger animals (also called macrofauna) living in the sediments or attached to the nodules.
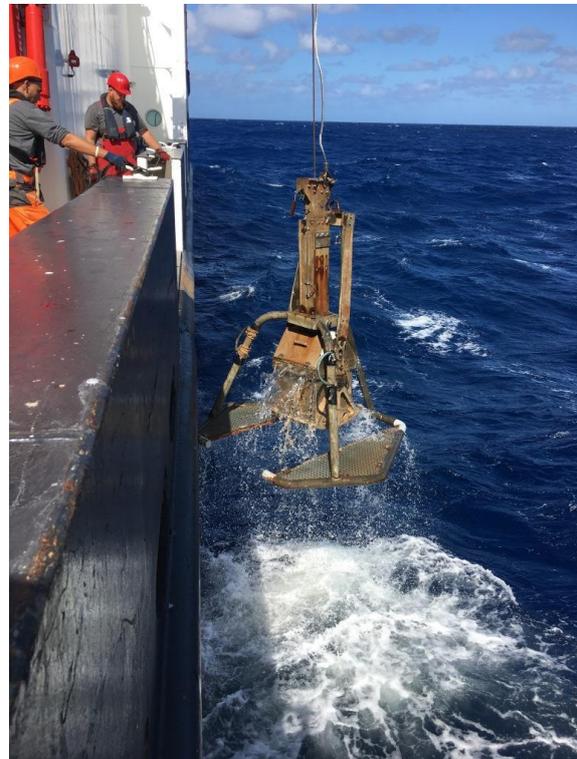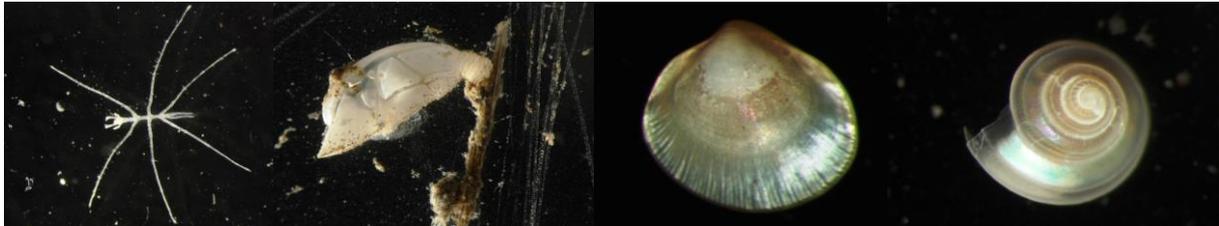


Recovery of the multicorer and the box corer (right).

Marine sediments are populated by animals of amazing shapes and adaptations, which are essential to the proper functioning of the ecosystem, playing an important role in benthic food webs and nutrient cycling, and they are characterized by a high sensitivity to environmental changes of the stable deep-sea conditions.

Indeed, these benthic living creatures (mainly worms, crustaceans, molluscs and foraminifera) are extremely abundant in the deep sea and in particular in nodule habitats. On this cruise, the task is to investigate the biodiversity and community structure of benthic metazoan communities before and after a mining impact event.
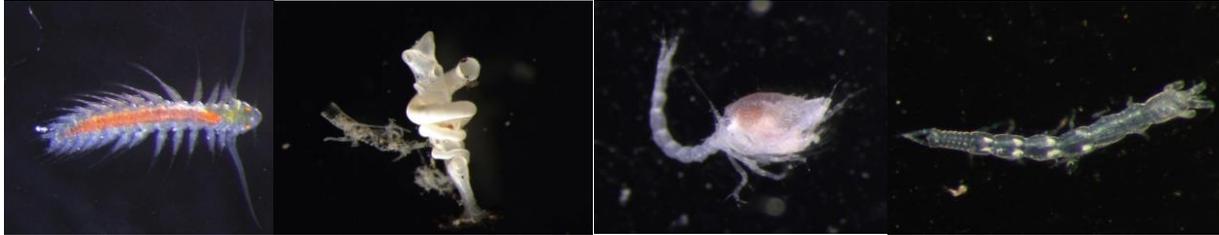
| Worm (polychaete) | Polychaete tube | Cumacea (crustacean) | Tanaid (crustacean) |



| Sea spider (pantopod) | Stalked barnacle | Bivalve (mollusc) | Gastropod (mollusc) |

The team collects sediments from the multicorer/pushcorer (meiofauna and environmental team: Pedro, Daniela, Ellen, Nancy, Regina, Magda and Teresa) and the boxcorer (macrofauna team: Patricia, Daniela, Helena, Eve-Julie, Ana). For the multicorer/pushcorer, once on board, they slice cores in a cold room at *in situ* temperature (which ranges from 4 to 5°C!). Part of these samples are fixed to allow for morphological identification, with the hope to find species new to science, other samples are preserved to allow for barcoding (molecular identification), so these new species could also be recognized on the basis of their genetic signature, associated with their morphological description. Other cores are sliced to be preserved in order to conduct metabarcoding (a comprehensive analysis to identify the living organisms that are present in the sediments, based on their genetic fingerprint). Finally, some sediment cores are taken for the analysis of environmental characteristics such as grain size, pigment concentrations, fatty acids and isotopes (proxies for food quantity and quality). From the boxcorer, at first nodules are sorted out and checked for animals living on the surface. Then, the sediment is sliced on deck, sieved in a cold room and all animals from the upper 10 centimetres are sorted and identified. It's a tedious work at the stereomicroscope, but this allows to take pictures of them when they are still alive or at least in good shape and to preserve correctly single animals for further morphological and genetic identification. We estimate that in this zone 2/3 of the species encountered are new to science! A lot of work for taxonomists!

So far, we have collected 9 successful multicorers and 6 boxcorers in the German area (BGR), from which we've already sorted more than 500 animals! We have now started to sample the Belgian (GSR) contract area and have already finished 2 successful multicorer and 4 boxcorer deployments.

Additionally, ROV Kiel 6000 was used to collect large animals - megabenthic epifauna - living on the sediment or attached to nodules. The team mostly focusses on porifera (sponges), alcyonacea corals, ophiuroids (brittle stars) and holothurians (sea cucumbers). So far, we have collected 45 specimens that will be used to study different aspects of their ecology and how they may be impacted by mining activities.

Stalked sponge with brittle star (ophiuroid) exposed in the bottom water.



Sponge with hiding brittle star (ophiuroid).



Soft (alcyonacea) coral.



Walking sea cucumber (holothurian).

For example, we will look at three main characteristics of alcyonacea coral ecology: feeding, life-cycle and microbiome, which are known to change with sediment loads on shallow-water corals. For this, we collected corals in separated containers to avoid contamination.

Today on Sunday 17th March, after a long OFOS transect during the night we continue our work with the ROV and the elevators in the Belgian area and will deploy the big Molab Lander, when the weather conditions allow us to lower it into the water.

Many greetings in behalf of the scientific party of SO268/1,

Peter Linke