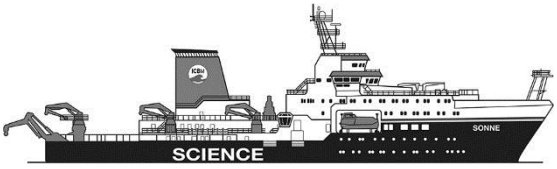
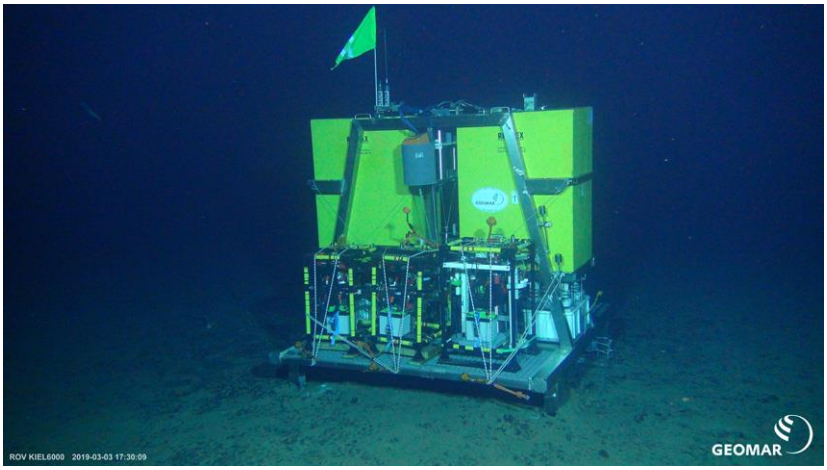


SO268/1

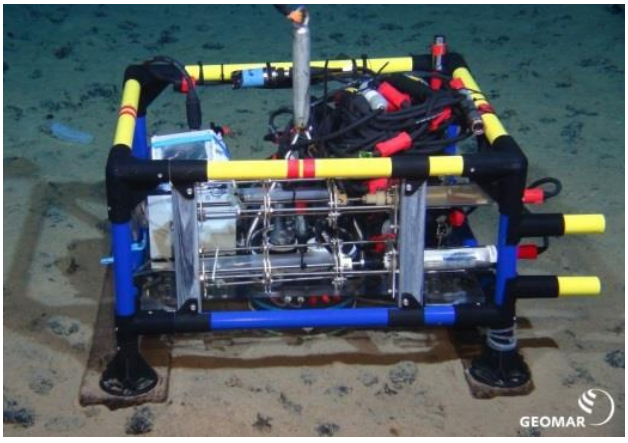
3rd weekly report

04.-11.03.2019

The second week at sea started again with some technical problems und draw backs in the work plan. The second deployment of the AUV was dedicated to perform photo mosaicking of the trial area equipped with a camera and LED flash light system build at GEOMAR. Before, this had been used successfully during cruise SO239. For this purpose, the AUV has to fly in close profiles in about 7 m distance to the seafloor. Unfortunately, we had to notice after recovery that although the AUV had followed the pre-programmed profiles but it did not take any pictures. Furthermore, the trim of the vehicle was not ideal, forcing the AUV to use all of its propulsion power and to drop the emergency weight to get back to the sea surface. As the photo mosaicking is an important mission of this cruise, the team started to analyze the failures immediately. The following time after this station sediment sampling with the multi corer was continued and the second ROV dive performed. During this dive, it was possible to take the benthic chambers and profilers which had been deployed by both elevator landers at the seafloor before and to initiate the pre-programmed measuring cycles. Unfortunately, the dive had to be abandoned too early again due to continuous leakage of oil.



Elevator 1 at the sea floor. The ROV pilots fly to the lander and remove the scientific instruments to deploy them at selected spots on the sea floor. At the end of the measurements the instruments are placed again on the elevator and secured by rubber bands for their lift back to the sea surface.



Benthic chamber for the determination of the oxygen consumption of the sediment.

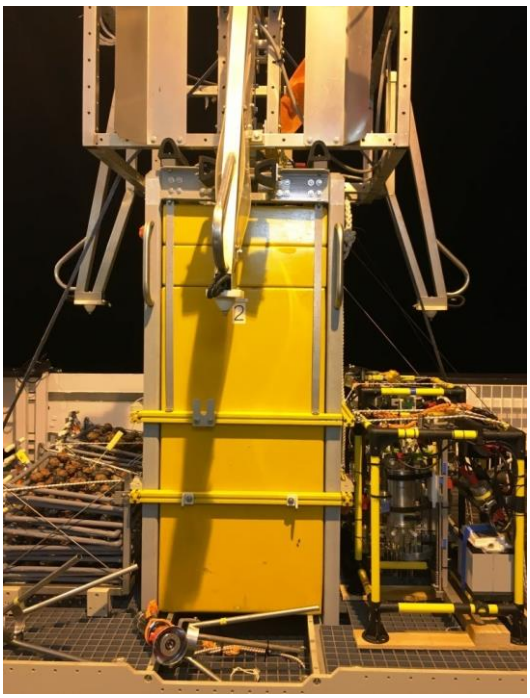
Microprofiler for the measurement of oxygen profiles with fine glass electrodes in the sediment.

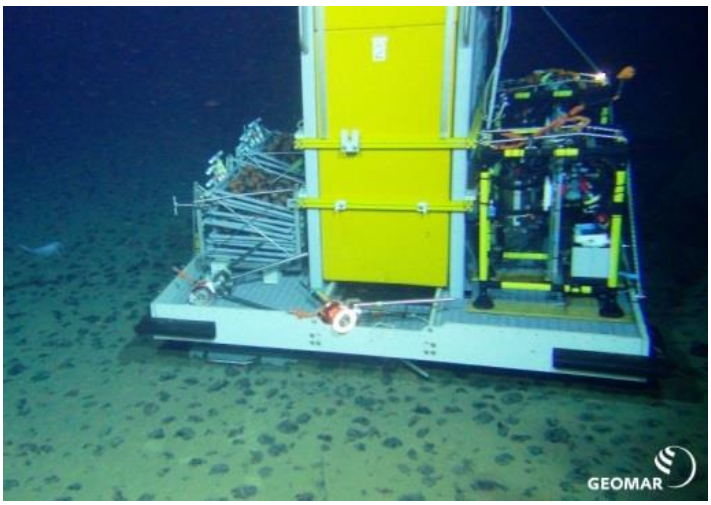
Nevertheless, the sixth box corer finally provided the long desired sediment sample for the quantitative determination of the macro fauna. After this, a long OFOS profile was conducted over the trial area and the surrounding to determine the distribution of polymetallic nodules and the associated mega and macro fauna. In the afternoon of March 4, a 500m-long mooring of the BGR with a sediment trap and current meters was recovered successfully followed by the 2nd CTD station with in situ pumps and 2 box corer stations. In parallel, the ROV team used the day without a dive to inspect the problems in the hydraulic system of the ROV and exchanged the old, apparently defect hydraulic pump by a new one with the support of the ship's engineers.

During the following ROV dive on March 5, some of the scientific instrumentation was placed back on elevator 2, 3 frames with artificial nodules were placed for a recolonization experiment and one benthic chamber was retrieved by the ROV before the dive had to be terminated. However, our attempts to recover the elevator by acoustic release of the bottom weight showed no success. By using the acoustic ranging of a transponder it became obvious, that despite a positive reply of the releaser, the lander was still in 4080m water depth at the sea floor. During the night sediment sampling with multi corer and box corer continued.

The 4th ROV dive started with the mechanic release of elevator 2 and subsequent recovery by using the zodiac. Due to increasing wind and wave conditions this became a substantial challenge for the deck's crew. Meanwhile, the ROV continued a targeted sampling of the macro fauna. After the last samples and scientific modules were placed on elevator 1, it was released by the ROV as well and recovered by the vessel after the ROV was back on deck. During the night, another long OFOS transect was conducted until noon followed by a short ROV dive to complete the sediment sampling by push corers. In parallel to this, elevator 2 was inspected and tested with great care on deck and a problem in the release mechanism was found and solved.

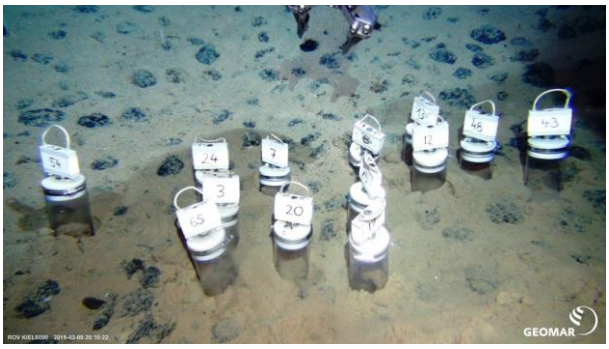
In the early morning of March 8 elevator 2 equipped with 3 micro profilers, 2 racks with 26 nodule frames, 2 stand-alone cameras and 3 amphipod traps was deployed video-guided at the seafloor of the reference site in the German contract area.



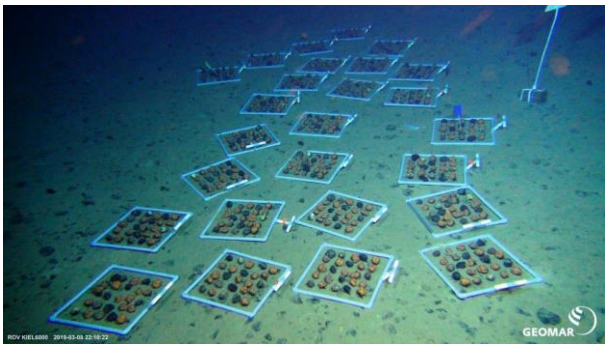


Left: Elevator 2 with launcher on top on deck and (above) carrying the scientific instrumentation to the seafloor.

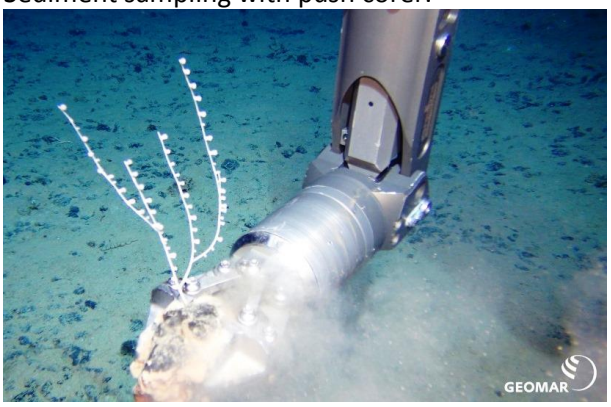
On the following 5th ROV dive with 2 benthic chambers on the „porch“ (stage underneath of the cameras and manipulators) of the ROV all modules were deployed and measurements initiated as well as 26 nodule frames were placed on the sediment for a recolonization experiment. This was the first dive without a substantial loss of oil.



Sediment sampling with push corer.



Recolonization experiment with artificial nodules.



Carefull sampling of nodules with settlement of fragile macro fauna on top.


Rocket like start from the seafloor: mechanical trigger for release of the lander’s bottom weight for accend back to the sea surface.

After recovery of the ROV, a successful AUV test dive was conducted to test the camera system and the trim of the vehicle in 200m water depth. Unfortunately, the dive for photo mosaicking, being shifted already for several times, had to be abandoned due to the increased wind and wave conditions. As an alternative the multi corer was deployed for sediment sampling.
On March 9, the 6th ROV dive was performed in the reference area again for sampling the fauna and sediment sampling by push corer, recovery of the used modules with the elevator and with 2 modules on the porch. A subsequent AUV dive followed, which had to be abandoned again. After this, a last sediment sampling with multi corer and box corer followed today before we recover the transponder net and another BGR mooring and start transit to the Belgian contract area. On board all cruise participants look forward to a short phase of relief to continue there the intensive sampling program with fresh energy.

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

Peter Linke