

FS SONNE - SO295 "NoduleMonitoring-2"

31.10. - 23.12.2022, Port Hueneme - Port Hueneme (USA)



7th Weekly Report (12. - 18.12.2022)

In the past week the work in the Belgian Licence Area, was successfully completed. After the weather-related cancellations of dives in the previous days, extensive ROV work could once again take place in the working area during the last week. Wind and wave conditions were borderline throughout and often the final decision to dive could only be made in the early hours of the morning. In the end, the experienced team of the ROV-Kiel 6000 was able to make four dives possible despite the difficult conditions. In the first dive of the week, the 'Food Pulse Experiments' deployed five days earlier in the Plume Impact Area were completed. Here, particularly high demands were placed on the ROV pilots: the fragile holothurians (sea cucumbers) incubated in the plastic chambers on the seafloor proved to be extremely agile during recovery, and at the same time rapid and precise work with manipulator and the 'Suction sampler' was required to transfer the animals into the collection boxes (Fig. 1). In the end, all three chambers were successfully sampled and recovered. The last three dives were mainly dedicated to measurements of oxygen microprofiles, targeted sediment sampling for studies of geochemistry and meiofauna and microbial communities, and collection of larger animals (megafauna). In addition, video and photographic surveys of the seafloor were conducted along transects. These provide additional information on disturbance-induced habitat changes and effects on seafloor organism communities. Since the ROV transects follow the course of OFOS transects, comparative studies can take place simultaneously to examine the effect of different survey methods. As previously in the German license area, different disturbance types and intensities were surveyed in different areas. On Dec. 13, ROV work took place in an area approximately 200m from the collector impact area. Based on an analysis of seafloor photographs from the OFOS and AUV, the thickness of the deposit of sediment stirred up by the collector had already reduced significantly in this part of the Plume Impact Area. This gives us an opportunity to record the effects of a medium-thickness disturbance. On Dec. 14, work continued in an area about 500m north of the collector impact area where sampling had previously occurred in 2021. Because currents were southeast at the time of the 2021 collector test, no sediment deposition has occurred in this area. Therefore, this area can be used for comparative measurements in close proximity to the collector impact area. The last dive was once again dedicated to investigations in the Plume Impact Area. In the immediate vicinity of the PATANIA II tracks, the sediment overburden was so thick that the nodules were almost completely covered and often not even visible as mounds on the sediment surface. Here, the profilers with the sensitive microsensors could only be set down 'on the off chance'. Fortunately, in most cases we hit the interstitial spaces of the nodules, so that the yield of useful measurements was unexpectedly high. Thanks to the efforts of the ROV team, most of the planned work could still be carried out successfully with the last dives in adverse conditions, even in the GSR license area. Only during the surveys, where equipment is deployed on the seafloor for several days and recovered in a second dive to the same station, a few cutbacks had to be made. Here, the risk of having to leave equipment on the seafloor in case of deteriorating weather conditions was considered too high. Thus, the deployments of the benthic chambers and the CUBEs to measure total oxygen fluxes and to study the benthic food webs at the last sampled stations had to be cancelled.



Fig 1.: plastic chamber with a deep-sea holothuria (sea cucumber).

On 13.12.2022, the 14th OFOS dive took place. This went from the Collector Impact area to the southeast to follow the plume spread in that direction. At the end of the transect, 4 km from the Collector Impact area, an 80 m submarine hill was crossed. The slope extended for 1 km, but the mountain ended in a cliff. By slowing the ship's speed, the individual steps of the cliff could be well recorded (Fig. 2).

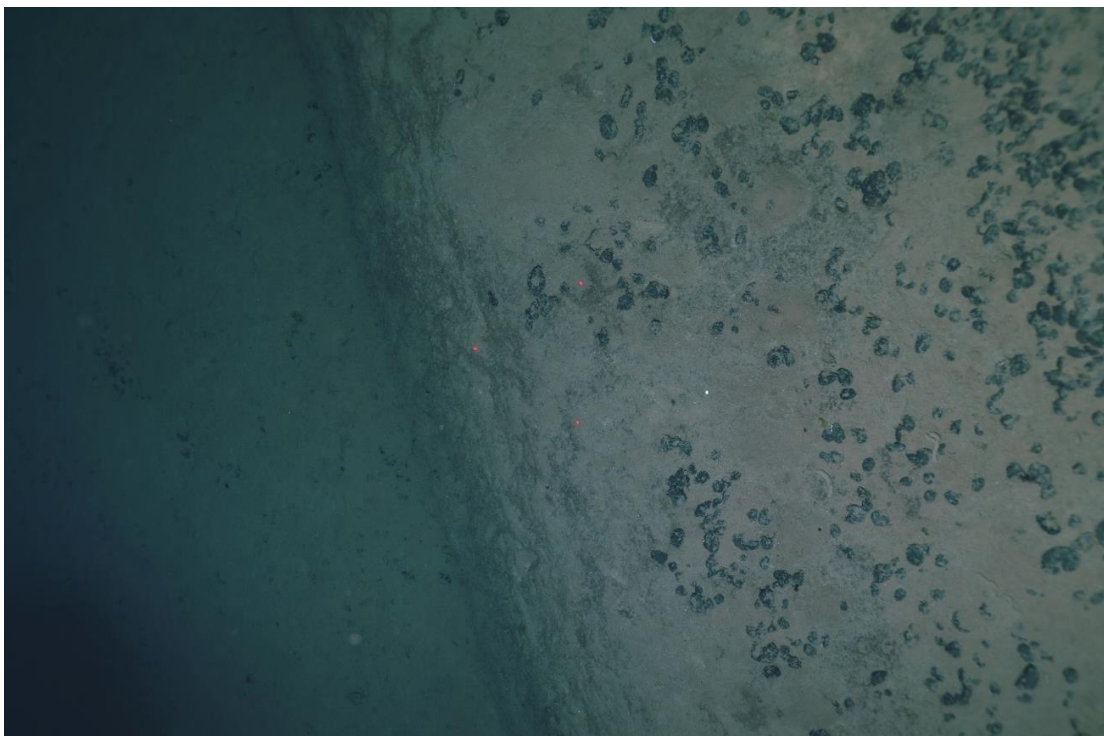


Fig. 2: OFOS image of the first stage of the cliff east of the Collector Impact area.

The last OFOS dive (16.12.2022) on this cruise was in the reference area within the GSR area. The transect ran from the southeast towards the northwest. During the dive, 'no-nodule' areas were crossed among others.

The megafauna on the seafloor was mainly represented by sea cucumbers and sea urchins. Round shallow sponges were also frequently observed (Fig. 3).

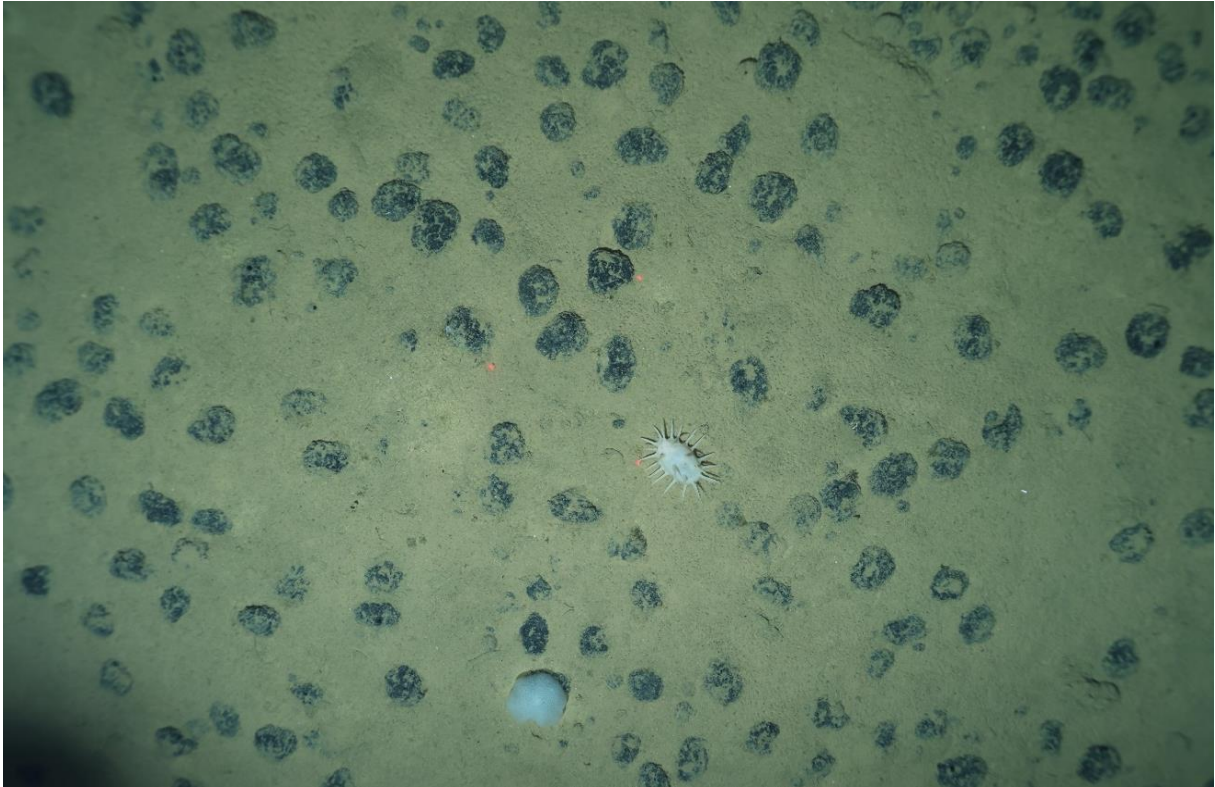


Fig. 3: OFOS image of a sea cucumber (Deimatidae) and a sponge in the GSR reference area.

The focus of the multicorer deployments this week was to sample the 'thin cover area'. Samples were taken along a gradient, at various distances from the collector area. The work with the multicorer was successfully completed (Fig. 4).



Fig. 4: Group picture after the last multicorer mission.

The boxcorer team finished sampling the reference area and then started sampling in the control area, which was successfully completed (Fig. 5).



Fig. 5: Group picture after the last boxcorer mission.

The AUV team was able to resume work due to the improved weather situation and dedicated the last dive to fill gaps in the photo mosaic of the entire collector area. After the successful dive, the two LBL transponders, which were deployed for AUV navigation and positioning, were recovered (Fig. 6).

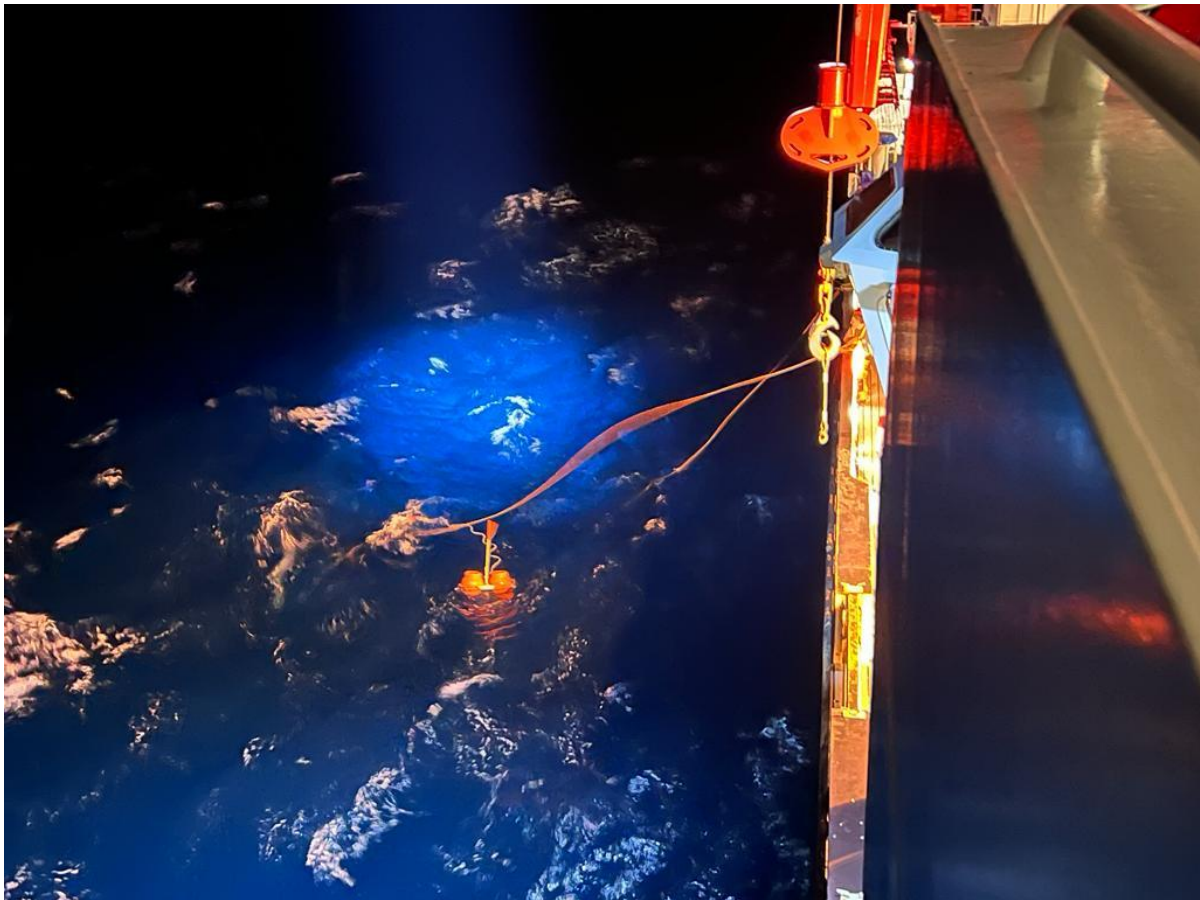


Fig. 6: Recovery of the LBL transponders.

The last instrument to be successfully run was a 7-hour bottom water scoop in the early morning of Dec. 17 (Fig. 7).

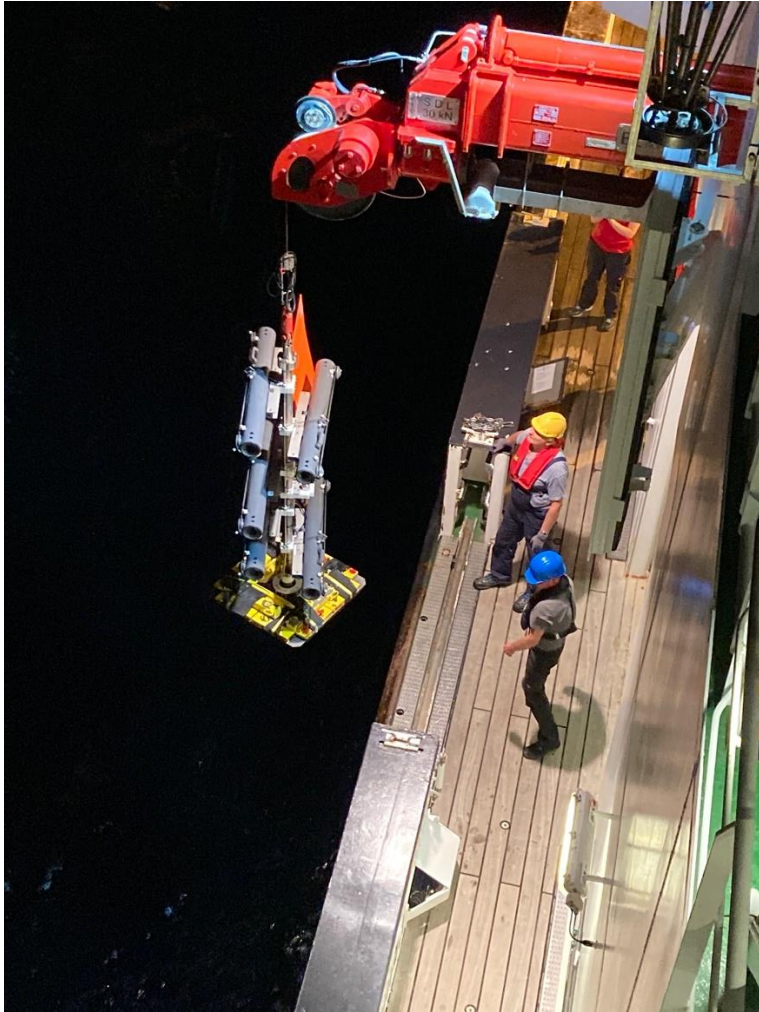


Fig. 7: The bottom water bailer is lowered into the water.

On Thursday the 15th and Friday the 16th December, the first containers were already packed, and the instruments were dismantled in some laboratories. Hundreds of boxes will bring the scientific instruments and the samples back to the respective institutes after the expedition.

After the successful deployment of the bottom water bailer, our 130-hour transit to Port Hueneme began. An exciting and very successful expedition is coming to an end.

Greetings on behalf of all cruise participants,

Pedro Martinez Arbizu

&

Felix Janssen

(DZMB Senckenberg am Meer)

(MPI-Bremen / AWI)