

SO 262: Expedition MANGAN 2018 with RV SONNE

Weekly report No. 6 (7th to 13th of May 2018)

During the sixth week of our expedition we finished the sampling programme for biodiversity investigations with multicorer and epibenthic sledge deployments in the second working area, which lies in the very east of the German license area. On request of colleagues from UK Seabed Resources Ltd (UKSRL) and the University of Hawaii, we recovered a mooring equipped with two sediment traps from the UKSRL license area on Tuesday morning. The sediment traps were deployed by UKSRL three years ago and, contrary to their original plan, could not be recovered since. As the traps were moored only 40 nautical miles to the north of our



position, we decided to attempt their recovery. The batteries of the acoustic release are rated to just two years and thus it was questionable whether the capacity was still sufficient to set the mooring free from its anchor weight at 4200 meters of water depth. No answer was obtained from the releaser even after repeated transmission of the release code, but to everyone's delight the mooring surprisingly surfaced in front of the vessel after about an hour and was quickly recovered onboard. The nature and quantity of sinking particles which were collected by the traps over the course of a year can now be investigated in this area that lies 1500 kilometers away from the continent. These data will be made available to us for comparison with the results of our own sediment trap that we have recently deployed.

After this exciting recovery, we continued our exploration work in the third working area between Tuesday afternoon and Friday morning, which is the "Preservation Reference Zone" (PRZ) of the German license area. We have previously obtained samples from the PRZ on an annual basis for the study of biodiversity between 2013 and 2016. The PRZ is located within a morphological depression with a water depth of maximally 4400 meters, and north of an extensive seamount chain stretching 60 kilometers in east-west direction and rising 1000 to 1500 meters above the abyssal plain. It serves as a reference area for comparison with potential future mining areas in order to evaluate the impact of mining on the ecosystem. We have now continued the biodiversity time series by sampling with the multicorer and the epibenthic sledge. In addition, we deployed two current meters at a central position within the PRZ in order to determine current strengths and directions throughout one year. Along a 13.5-kilometer-long video sledge transect from the lower part of the seamount chain into the PRZ, we were able to detect three 1.5-meter-wide EBS tracks from former years and a fresh track from the day before. Whereas manganese nodules were covered by a thin sediment layer produced by suspended and resettled particles especially to the south of the fresh EBS track, the nodules close to the old tracks were free of such sediment "blanketing". As already described from the first working area, this shows that resettled particles from a plume are

capable of resuspending and drifting away ("nodule cleaning"), for example during phases of enhanced current velocities.

To investigate the hydrodynamic effects of large topographic structures on the current regime in the flat deep-sea plain, we carried out a tow-yo transect with the CTD from the top to the foot of a 2100-meter-high seamount (see figure below) from Friday afternoon to Saturday morning, covering one complete tidal cycle.

A strong reflector at eight meters sediment depth has been repeatedly observed in the recordings of sediment echo sounders in the eastern part of the license area during previous expeditions. This was assumed to represent a spatially extensive layer of buried manganese nodules. To check whether this assumption is correct, two sediment cores of nearly 10 and 15 meters length were obtained from this area. The nodule layer was indeed verified at a core depth of 7.60 meters. Applying average sedimentation rates of 3 to 6 millimeters per thousand years, a change in sedimentation rate apparently occurred 1.3 to 2.5 million years ago that led to the burial of these nodules.

Overall, we were able to successfully achieve all the objectives of our planned work program and are currently terminating the exploration programme after 177 deployments in total and finishing with a final dredge tow. On Monday morning, we will start the transit to Suva (Fiji) where we will arrive on the 29th of May. The successful completion of our exploration programme is largely due to the professional and dedicated work of the captain and crew of RV SONNE, and we would like to thank them sincerely for their support.

With best regards from RV SONNE,
Carsten Rühlemann



Photo: S. Sturm

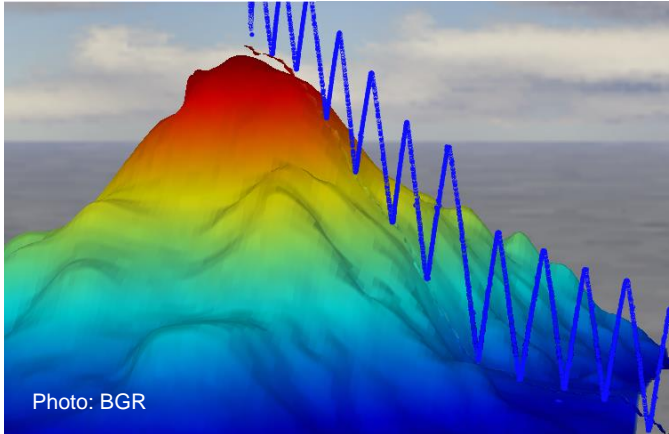


Photo: BGR



Photo: S. Sturm

Upper left: floats of the sediment trap mooring after surfacing in the UKSRL license area. Right: hoisting the upper sediment trap onto deck at the aft of RV SONNE. Lower left: graphic representation of the CTD tow-yo profile along the slope of a 2100-meter-high seamount in the German license area.