SO 262: Expedition MANGAN 2018 with RV SONNE

Weekly report No. 8 (21st to 28th of May 2018)

Suva! We have just anchored close to the port of the capital city of Fiji and are currently waiting for a free berth. Our expedition with research vessel SONNE ends here after eight very successful weeks, comprising 30 working days in the German license area for the exploration of polymetallic nodules. During the two-week transit from the working area to Fiji, we have started to process and evaluate the vast amounts of data that were obtained during the cruise and have summarised the initial results for the cruise report. Altogether we were able to meet all the objectives that we had previously defined for this expedition – and even exceeded them.

To start off with, we carried out a detailed study of the natural baseline conditions of biodiversity and environment at the seafloor and in the water column within and in the vicinity of the area that has been chosen for a collector component test next year. After the test, which is planned for April 2019, the same area will be investigated again in order to identify the environmental impact of nodule collection in comparison to these baseline conditions.

During transit, the biologists have been able to sort and classify 4430 specimens from the 103 sediment and water samples that were taken for biological analysis. One surprising result was that they retrieved a large number of planktonic organisms from the oxygen minimum zone between 100 to 800 meters of water depth. In the forthcoming months, the biologists will continue to process their sediment and water samples in the home laboratories in order to classify the organisms by means of morphological and molecular-genetic methods and to determine the diversity, density and geographical range of faunal species.

The inventory of scavenger diversity has shown strong similarities across the different lander deployments with just a few dominant species. The average rate at which the mobile scavengers consumed the albacore tuna served as bait was 880 grams per day, which is a high value compared to other deep-sea areas. These experiments have also indicated a distinct successional pattern in arrival time of different scavengers. Amphipods appeared first, followed by several species of grenadier fish, cusk eels, and eelpouts (which ate the amphipods instead of the tuna), and finally shrimps, crabs and others. Differences in arrival time and assemblage composition of scavengers were potentially controlled by bottom current direction and speed, geological or topographic features such as nodule size or the proximity to hills and seamounts, and the swimming speeds of different species.

Another important aim of the cruise has been to sample and explore an economically promising nodule field using the box corer and the video sledge. Forty-three seafloor samples obtained from a 340 square kilometre area showed consistently high nodule abundances of 23 kilograms per square meter on average, with very high metal concentrations of 3% nickel, copper and cobalt. The total quantity of manganese nodules in this area amounts to eight million metric tons (wet weight), which could sustain two to three years of deep-sea mining. Preliminary geostatistical analyses suggests an "indicated resource" classification of the deposit according to the Australian JORC standard. The statistical processing of our samples has also proven that the numerical modelling of the deposit based on neuronal networks is sufficiently precise to show that the area immediately surrounding the analysed nodule field is also very prospective.

Tomorrow, on Tuesday the 29th of May, the containers with our technical equipment and scientific samples will be loaded off the vessel before the next group of researchers comes on board. The successful completion of our exploration programme has largely been due to the professional and dedicated work of the captain and crew of RV SONNE, and we would once again like to thank them sincerely for their competent and professional support.

With best regards from RV SONNE,
Carsten Rühlemann

Participants of cruise SO262 (back row): Benjamin Gillard, Robert Sommerfeldt, Milena Wales, Katja Uhlenkott, Robert Harbour, Thomas Kuhn, Anna Wegorzewski, Sarah Menke, Angelika Bruns, Carsten Rühlemann, Sahar Khodami, Henning Wedemeyer, Katja Schmidt, Simone Sturm, Timur Ercan, Oliver Kefel, Pedro Martínez Arbizu, (front row): Abner Nghoongoloka, Annemiek Vink, Nicole Gatzemeier, Christine Edullantes, Christian Wöhrl, Nancy Mercado Salas.

For additional information on the expedition, please have a look at the following sites of the German Federal Ministry for Education and Research (BMBF):

https://www.fona.de/de/expedition-mit-dem-forschungsschiff-sonne-die-meere-als-rohstoffquelle-23378.html

https://twitter.com/BMBF_Bund/status/996739539770249216

https://www.facebook.com/pg/bmbf.de/photos/?tab=album&album_id=1497067423756391

and in the blog of our colleagues from the Heriot-Watt University (including videos):
https://mbebist.wordpress.com/