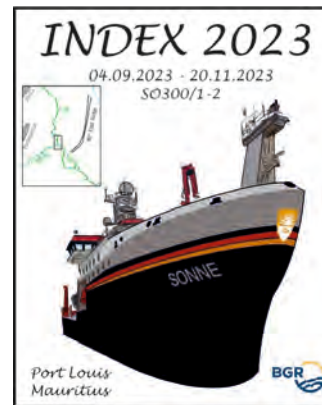


## RV SONNE cruise SO300/2

### INDEX 2023

29 September – 08 October 2023

At sea 23° 47.7' S, 69° 33.6' E



### Weekly report No. 1 (29/09 – 08/10)

The scientific cruise INDEX2023 – SO300/2 started on Friday, 29 September 2023 in Port Louis (Mauritius) with the mobilization of the scientific equipment. A successful harbor test of the Canadian ROV ROPOS on 2 October finalized these mobilization work and afterwards RV SONNE started her 670 nautical miles transit towards the first working area. The objective of cruise SO300/2 is to continue the geological and environmental investigations in the BGR license area for the exploration of massive sulfides in the Indian Ocean which are based on a contract between the Federal Institute for Geosciences and Natural Resources (BGR) and the International Seabed Authority (ISA). This exploration work has been started in 2015 and SO300/2 is the second leg of the INDEX2023 exploration campaign.

In total, 26 scientists take part in this cruise. They are from BGR, the University of Hamburg, GEOMAR Helmholtz Centre for Ocean Research Kiel, the Hafen City University Hamburg, the Integrated Environmental Solutions uG Wilhelmshaven, the Scottish Association for Marine Science as well as from Gibson Geosciences Consultants, Sudbury (Canada). Furthermore, four trainees with geological background, two from Philippines, one from Chile, and one from DR Congo participate. The objective of their participation is to be trained in marine exploration of seabed minerals. During this cruise we will again use the remotely operated vehicle (ROV) ROPOS which is run by the Canadian Scientific Submersible Facility. Moreover, the cruise is accompanied by Willi Schumann, a TV journalist who will report about the exploration and environmental work in different media formats such as blog entries, photo and video stories.

During the transit into the working area several meetings with the crew took place to prepare a safe deployment of all scientific instruments. Additionally, the scientific program was introduced during a science meeting and safety instructions were provided and a safety training was carried out.

RV Sonne passed the EEZ border of Mauritius on 05 October at 03:00 LT (5 hours ahead of UTC) and the multibeam EM 122 was switched on to record bathymetric data of international waters for the SEABED 2030 initiative. The vessel arrived Cluster 01 of the BGR license area on 05 October at 02:30 pm. The first station was the successful recovery of a 570 m long mooring which was deployed one year ago during the INDEX-2022 cruise. All cups have sampled particles and closed properly, 18 passive samplers to measure dissolved bioavailable elements in the water column were retrieved and the two currents meters mounted to the mooring were also recovered. With this mooring the investigation of biogeochemical fluxes through the water column in Cluster CL 01 ended after 6 years of consecutive sampling and

measuring. The mooring will be moved into the KAIMANA hydrothermal field in Cluster 05 to start monitoring the environment in a massive sulfide field. To complete the biogeochemical investigations in CL 01 two CTD/Rosette station were carried out to sample the entire water column.

Afterwards RV Sonne started her transit to Cluster 04 where she arrived on 06 October at 17:30 LT. First station was the deployment of a short mooring equipped with a still camera and mackerel baits. It stayed on the bottom for 24 hours, took still pictures every 5 minutes of fish being attracted by the baits and was successfully recovered on 07 October. This way we want to investigate the fish standing stock on a ridge axis close to hydrothermal fields and off-axis.

A calibration of the USBL system Ranger 2 was realized during the night from 06 to 07 October followed by the successful recovery of another, this time long mooring (2840 m) equipped with three sediment traps, three current meters, and 27 passive samplers. The samples and data of this mooring will be treated with and downloaded during the upcoming days, the mooring will be maintained and prepared to be re-deployed. After recovery of the mooring two gravity cores were taken on inactive hydrothermal mounds of the ALPHA hydrothermal field, one in the NW corner of the field and one from the eastern border. The former retrieved 144 cm hydrothermal sediment, the latter retrieved 28 cm background sediment (foraminifera ooze). The last station on 07 October 2023 was the deployment of the deep-towed bathymetric sled HOMESIDE with which a ca. 20 km long track of high resolution bathymetry southwest of ALPHA was recorded.

On Sunday, 08 October the first ROV ROPOS dive was carried out with surface mapping, sampling, and measuring temperature gradients at the border of the ALPHA hydrothermal field. We found a new site with diffuse, low-temperature fluid venting. With this dive, we now know the areal extent of this hydrothermal field stretching 2 km NW-SE and 900 m SW-NE hosting three active high-temperature vent sites, one diffuse venting site and eight inactive ones.

All participants of cruise SO300/2 are well and look forward to the challenging scientific program of the next six weeks.

Best regards on behalf of the entire crew,

Thomas Kuhn, Federal Institute for Geosciences and Natural Resources (BGR)

Chief Scientist



*RV SONNE leaving the port of Port Louis (Mauritius). Photo: W. Schumann.*