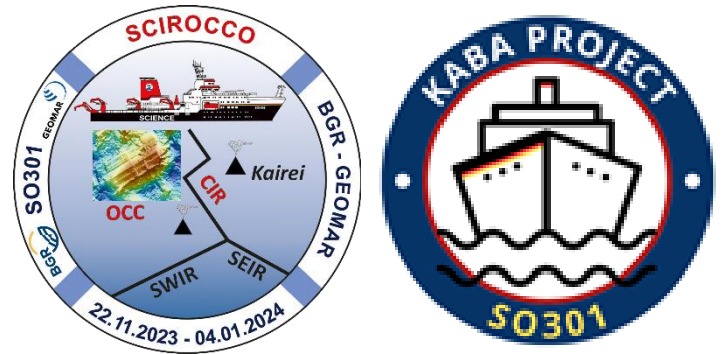


FS SONNE cruise SO301

SCIROCCO & KABA

22 November, 2023 – 4 January, 2024

Port Louis (Mauritius) – Port Louis



At sea 25° 27.8' S, 69° 22.7' E

Weekly Report Nr. 1 (22/11 – 26/11)

The scientific expedition SO301 with the two research projects SCIROCCO and KABA departed from Port Louis at 19:30 on 22 November. Due to the extensive mobilisation work with twelve scientific containers in addition to five containers for the delivery to RV SONNE, it was not possible to cast off until the evening on the day of departure. After a safety briefing, a safety drill with a general alarm was carried out on the first day at sea. The transit of 750 nautical miles into the working area, which lies at 70° E and 25° S, began. The first days of transit in strong winds and 3 metres waves were used to set up the equipment and laboratories. An evening lecture programme also began, which intends to present the projects, scientific methods and ongoing research work as well as to discuss initial results of this expedition.

Both, the SCIROCCO project and the secondary user project KABA are being carried out during the SO301 research cruise. The SCIROCCO project is entitled "Seismic Imaging at the Central Indian Ridge: Structure and Formation of Oceanic Core Complexes". The overall aim is to image the complex fault system at the Central Indian Ridge in the working area in order to better understand structures and processes of magmatism and crustal extension. At slow spreading mid-ocean ridges, there is an interplay between magmatic accretion and tectonic stretching. During tectonic extension phases, oceanic core complexes (OCC) are uplifted from the lower crust or upper mantle to the seafloor along large, long-lived detachment faults. The pronounced large fault system offers numerous pathways for fluids. If magmatic heat sources are also present, active hydrothermal systems can form, which might develop into potential deposits for massive sulphides.

The target area on the Central Indian Ridge is located directly north of the Rodriguez triple junction, where three mid-ocean ridges meet. At 25 °S there is a prominent large OCC and the active Kairei hydrothermal field. Both structures will be investigated geophysically during this expedition using a network of seismic reflection profiles with an 8 km long hydrophone cable, 45 ocean bottom seismometers (OBS) and potential field methods. The OBS are placed along two refraction lines across the plate boundaries and in a 3D array for tomography through the OCC.

The secondary user project KABA is entitled "Ramifications of Venting at the Kairei Hydrothermal Field for Bathypelagic Microbial Processes in Consort with Carbon and Metal

Cycling". During this cruise the hydrothermal plume of the Kairei vent field will be investigated. The aim of this programme is to determine how the leakage of hydrothermal fluids influences microbial life and the biogeochemical cycle in the bathypelagic ocean above the Kairei hydrothermal field. For this purpose, the ship's own CTD rosette is equipped with various additional sensors and pumps and a trace-metal-free titanium rosette is used to sample the plume and the water column.

The scientific crew of SO301 consists of 30 participants. The SCIROCCO project is a collaboration between the Federal Institute for Geosciences and Natural Resources (BGR) with 15 participants and the Helmholtz Centre for Ocean Research Kiel GEOMAR with six participants. Two marine mammal observer from Brazil and France (EPI company) monitor the ship's surrounding waters optically and acoustically during the seismic work. For the KABA project, seven scientists from Bremen are taking part, belonging to the MPI For Marine Microbiology, MARUM, Constructor University and the University of Bremen.

On 25 November at 2:00 a.m., the EEZ from Mauritius was left and an OBS releaser test of 51 devices was carried out at a water depth of 1000 m. In response to an acoustic command sent from the ship, the devices released a hook, that drops the anchor weight of the OBS so that it rises to the surface. The functionality of all the required releasers was verified.

Today, 26 November at 12 noon, we reached the westernmost end of the working area. A reference measurement is currently being carried out there with the ship's own CTD rosette and the titanium rosette, which was lowered to the sea floor after a first device test to provide a reference profile far outside the zone of influence of plumes.

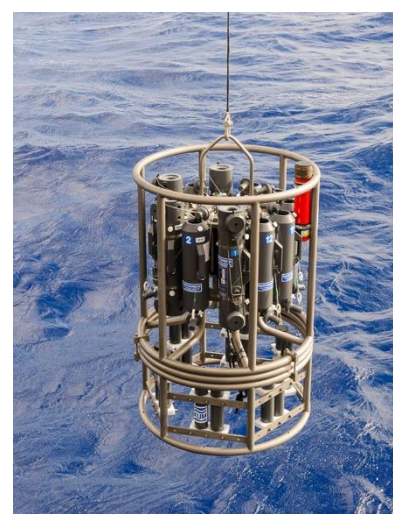
Best regards on behalf of all participants,

Martin Engels, Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)

Chief Scientist



1 CTD-rosette of RV SONNE (Foto: Nico Fröhberg).



2 Titanium rosette for sampling trace metals (Foto: Nico Fröhberg)