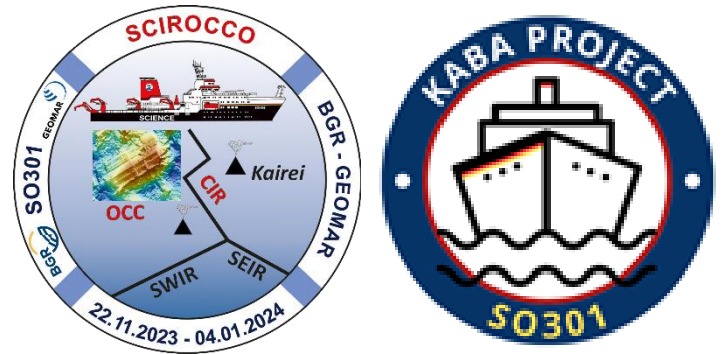


FS SONNE cruise SO301

SCIROCCO & KABA

22 November, 2023 – 4 January, 2024

Port Louis (Mauritius) – Port Louis



At sea 25° 19.5' S, 70° 2.2' E

Weekly Report Nr. 2 (27/11 – 03/12)

After the completion of the CTD reference station at the edge of our survey area, the week began with the deployment of the ocean bottom seismometers (OBS) along a first refraction profile of SCIROCCO, which extends from SW to NE across the oceanic core complex (OCC) and the Central Indian Ridge. Initially, 25 of 45 OBS were prepared and deployed; some already cover the 3D array around the OCC.

In the following two and a half working days, the KABA team carried out the first casts with the ship's own CTD rosette and the new Bremen titanium rosette in the area of the Kairei hydrothermal field. The ship's own CTD was equipped with two additional sensors for measuring the redox potential and turbidity. An in-situ pump was also installed to filter microorganisms and particles from the water column. Additional sensor packages from NOAA (MAPR) were attached to the wire of the CTD during the dives in order to extend the measuring range vertically.

The water samples obtained with the CTD are filtered in the laboratory for the analyses of dissolved gases such as methane and hydrogen, dissolved and particulate metals and for the determination of the microbial communities. Furthermore, we have taken many water samples for the analysis of microbial metabolism, such as methane, hydrogen and metal oxidation. The inserts with the titanium rosette are used to analyse the abundance of trace metals in the plumes.

The first dive over the active Kairei hydrothermal field, which is located on a hill, directly encountered the rising plume with clear signatures in temperature, turbidity and redox potential at depths of 2400 metres, as well as the laterally drifting plume at 2200 metres. The following Tow-Yo profile first circled the hydrothermal field at a distance of 500 metres in order to record the main propagation directions of the plume. This resulted in an axis from NNW to SSE with significant plume signals. This axis intersected the following Tow-Yo profile, but could only partially follow the particle cloud. This indicates a pronounced temporal variability that could correlate with tides on the seafloor. The upcoming dives aim to record the temporal variations and the full extent of the plume.

During this stationary work, a female fin whale and her young calf were observed for many hours on 29 November, both swimming slowly around FS SONNE and approaching within a few hundred metres. Watching fin whales for hours was a rare encounter, even for the whale watchers.

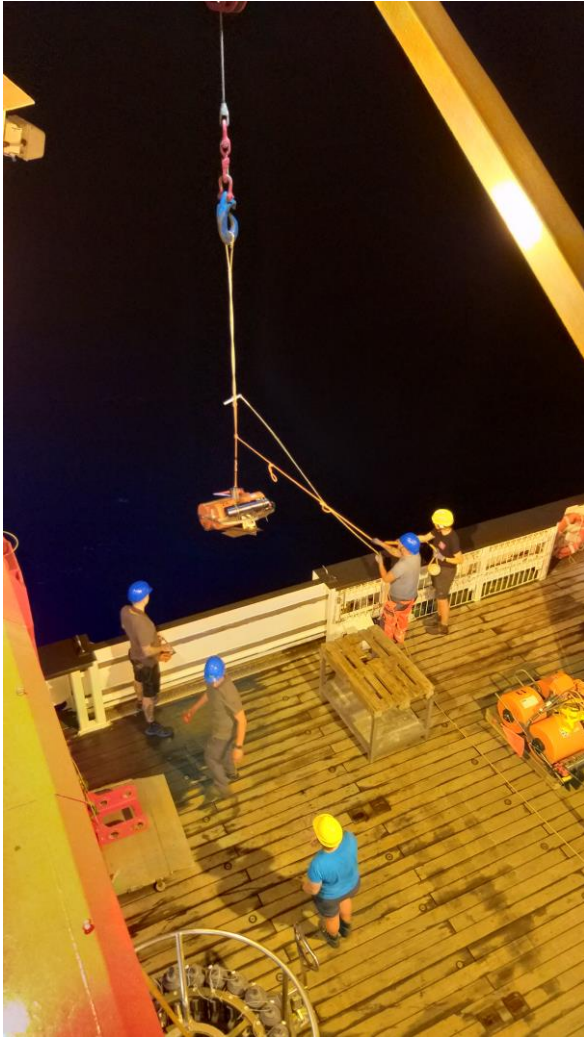
The remaining 20 OBS, which had been prepared in the meantime, were then deployed on the second half of the refraction profile. On 30 November, magnetometers, the PAM system for whale detection and the airguns were deployed in good weather conditions and the refraction profile was sailed for 24 hours. This was followed by the problem-free recovery of 19 OBSs, of which 15 OBSs were immediately prepared for the second deployment and deployed to complete the 3D OCC array. The first data review confirmed the correct functioning of all OBS; several refracted phases and even shear wave phases could already be recognised.

The Bremen scientists are currently conducting a second stationary 36-hour mission at the Kairei hydrothermal field with the CTDs. During the first dive, we started with a Tow-Yo profile running at right angles to the main propagation direction, followed by a profile in the opposite direction, which ended south of the Kairei field. However, only a slight plume signal was measured here. We then used the Titan rosette to obtain contamination-free samples for trace metal analysis. At the beginning of the subsequent CTD deployment at the same location, however, a strong plume signal was measured, which continued to the Kairei field. Here, we took many water samples for experiments in the lab during the next two-week reflection seismic program.

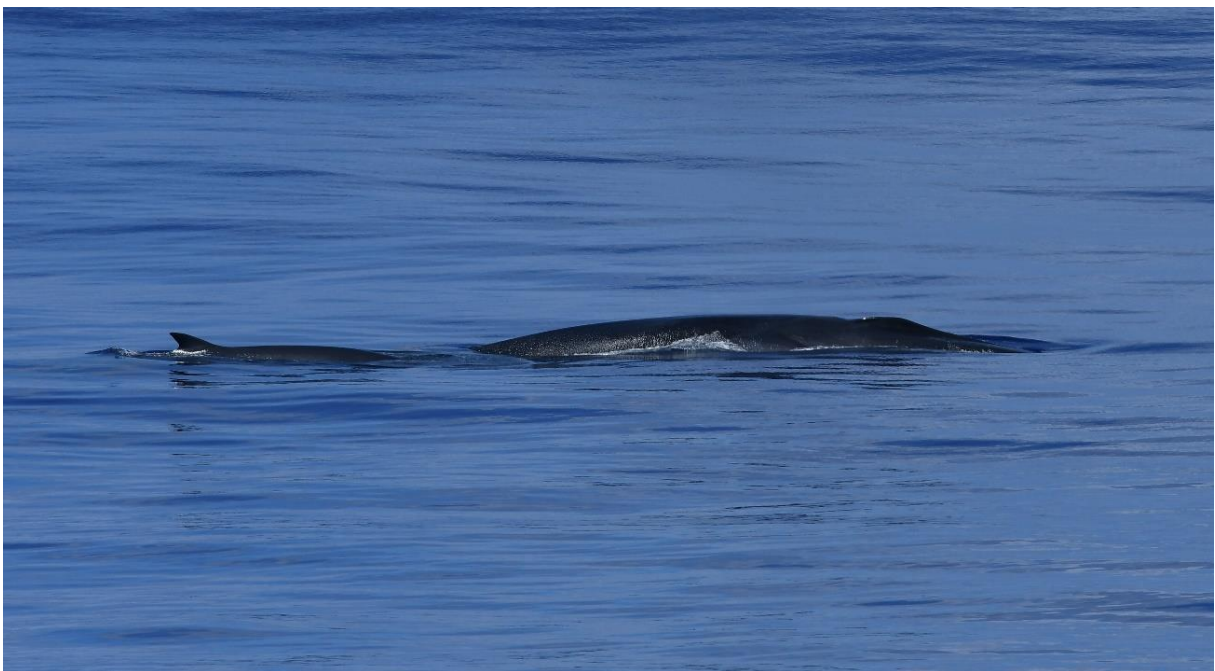
With best Advent greetings on behalf of all cruise participants

Martin Engels, Federal Institute for Geosciences and Natural Resources (BGR)

Chief Scientist



Deployment (left) and recovery (right) of ocean bottom seismometers (Foto: Martin Engels)



Fin whale *Balaenoptera physalus*, Mother and Calf (Foto: Morgane Belleville, EPI Limited)