



RV SONNE cruise SO299 DYNAMET

06.06. – 29.07.2023
Townsville (Australia) – Singapore

Weekly Report No. 6
10.-16.07.2023

At sea, 3° 04'N, 146° 38'E



Our sixth week at sea began with targeted sampling of mineralised sites using the video-guided grab. Specific samples were taken at two sites each in the 'Karambusel Vent Field' and at the 'Mussel Cliff' and thanks to the video image of the grab, the impact on the endemic ecosystem could be kept to a minimum. The samples from 'Mussel Cliff' are intensively mineralised, and commonly the shells of dead mussels or tubeworms have been replaced by sulfides but preserving their original shape (see photo). In the evening, we performed a station with the gravity corer in the crater of the 'Edison Seamount' followed by a dredge at the newly discovered 'Olepa Ples Seamount'. This station was quite surprising for our petrologists, as the variety of rock samples recovered is not known from any other submarine volcano in the area. This was followed by another ROV Kiel 6000 dive at Pikinini Seamount on Tuesday. The samples recovered consist of fine-grained volcanoclastics and dolomitised reef carbonates, all



Mineralised samples from the 'Mussel Cliff' site with pseudomorphs of the original fauna (e.g., mussels, tube worms). Foto: SO299 Scientific Party.

overgrown with manganese crusts. After the dive we headed north to sample the grabenshoulder of the Manus-Kilinailau Trench at night. Even at 6000 m water depth we encountered carbonates, which can be interpreted as further evidence of the vibrant tectonic history of the region. After the last station, we also left our main working area around Lihir Island and made our transit westwards and towards the Mussau Trench.

The whole of Wednesday we mapped along the Manus-Kilinailau Trench until we encountered the Mussau Trench and turned north. We continued this on Thursday and ran a first dredge on the southern part of the Mussau Ridge situated east of the adjacent trench. This revealed slightly altered basalts and hyaloclastites with unaltered, fresh volcanic glass. During the night, we mapped the central Mussau Ridge in preparation for the ROV dive on Friday and we also crossed the equator from south to north. The mapping allowed us to determine the most suitable location for the dive. On Friday we then conducted the twelfth and final dive with ROV Kiel 6000. In more than 3700 m water depth we observed deeply incised canyons and a great exposure of the upper oceanic crust. In contrast, the upper part of the investigated formation

then consisted of loose debris fans and fragile walls, which are indicative of the strong tectonic history in geologically recent times. A test of RV *Sonne*'s dynamic positioning system was also successfully carried out and the ship followed the ROV automatically, as a result of the new underwater navigation system. Acknowledgements at this point to the team of the ROV Kiel 6000 for their excellent work. The diving robot functioned flawlessly during all operations and all work could be carried out as planned.



The last samples are being recovered. Foto: Christoph Beier.

On our last working day on Saturday, after another successful safety drill, we conducted a dredge each on the central and the northern Mussau Ridge and finished mapping the structure at its northern end. On Sunday night, we left our working area and started our 13-day transit to Singapore. There is thus plenty of time for finishing our work in the labs, first scientific evaluations and packing the equipment before entering the port in Singapore.

The weather continues to be hot and humid and changeable with sometimes more or less heavy showers. Wind and sea were kind to us and all research work was completed as planned. All participants are well and the atmosphere on board is still excellent.

On behalf of all participants, greetings from aboard the RV *Sonne*,

Philipp Brandl
Chief Scientist