FS SONNE Reise SO288

COMBO & HOMER

15.01.2022 – 15.02.2022

Guayaquil (Ecuador) – Valparaiso (Chile)

Weekly Report Nr. 3

24.-30.01.2022

At Sea, 21°01'S/71°48'W

Our third week at sea began with a general PCR screening on Jan. 24-25, 2022, while seafloor mapping of the northern flank of the Iquique Ridge continued. The existing map from cruise SO244 was extended northward to include seafloor structures in the Arica bend. Here, the oceanic Nazca Plate enters the deep-sea trench and is thrust beneath the South American Plate. The bending of the Nazca plate evokes pronounced fracture and fault structures that are clearly visible in the bathymetry.

After PCR test results were negative for all individuals not currently in isolation, we were able to complete the first instrument deployments on SO288 on Jan. 25, 2022, with a successful release test for the ocean bottom seismometers and two CTD stations for the biogeochemical and microbiological studies *(Fig. 1)*.

Fig. 1: CTD rosette on RV SONNE during its first deployment on SO288.

Photo: S. Kontradowitz, GEOMAR

On Jan. 26, 2022, at 08:00 a.m., the Remotely Operated Vehicle (ROV) went into the water for its first dive. The goal of the ROV dives is to recover the GeoSEA stations that were installed off northern Chile in 2015. After 1 hr 20 min, the ROV reached the seafloor at a depth of 2860 m. After another 50 min, the first GeoSEA station was sighted. The tripod was standing upright on the seafloor and showed minimal fouling, also the galvanized steel is in excellent condition after more than 6 years in the deep sea, so the instrument frames are usable again *(Figs. 2 & 3)*. Only the sacrificial anodes have lived up

to their name. The stations have sunk only a few centimeters into the thin sediment cover.

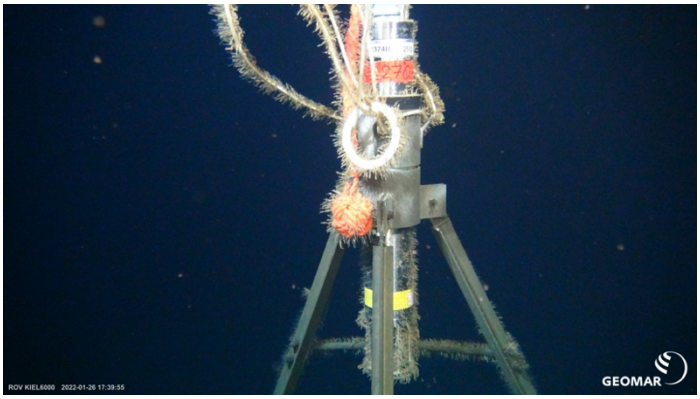

Figure 2: GeoSEA Transponder A108, installed on a steel tripod about 4 m high in a water depth of 2853 m. Only little organic material has settled on the station.

Photo: ROV KIEL 6000, GEOMAR

For recovery, a specially designed frame is used *(Fig. 3)*, which is guided over the sliding beam of the SONNE. This allows the station to be heaved while the ROV remains at depth. In this way, multiple stations can be recovered during one dive. Once the station is on deck, the recovery frame is deployed again and moved to the next station on the seafloor. This method is used for the first time on SO288.

Figure 3: GeoSEA transponder on the tripod frame during recovery and on deck. In the left figure, the recovery sled can be seen in the lower half of the picture. *Photos: S. Kontradowitz / H. Kopp, GEOMAR*

By Jan. 28, 2022, all eight stations including the frames were successfully recovered from the first working area. The high level of professionalism and many years of experience of the ROV team were decisive for the fact that all challenges that arose during the recovery with two wires in the water (ROV as well as recovery frame) could be 'untangled' quickly, so that we made up one working day in the schedule.

During the nights of Jan. 26-28, 2022, we completed an additional seven CTD stations to collect water samples. Some of the samples were immediately filtered on board and stored frozen or refrigerated for

analysis of chemical and biological composition at home in the laboratory. Most of the water was obtained from the deep sea (1500 m) to conduct incubation experiments on the degradation of organic material by heterotrophic microorganisms at *in-situ* temperature (2 °C) and in the dark in the ship's climate laboratories. During the night of Jan. 28, 2022, the Marine Snow Catcher, a large-volume water scoop that collects intact particles and associated microbial communities, and an *in situ* microbial incubator, which allows determination of microbial activity under hydrostatic *in situ* pressure conditions, were also deployed.

On Jan. 29, 2022, the last person was released from isolation after a PCR test, so that all five infected persons resumed their regular duties. At the same time, we recovered the five GeoSEA transponders on the oceanic Nazca plate seaward of the deep-sea trench, installed in water depths up to 4100 m. The transponders were extracted from the tripods by the ROV *(Fig. 4)* so that the frames could remain in place and new transponders be re-installed at a later time to record long time series. In the evening, the GI air guns and streamer were launched to image the subsurface structures beneath the tripods. Seismic recording proceeded overnight and without interruption during Jan. 30, 2022.

Figure 4: Recovery of ROV Kiel 6000 after its first dive.

Photo: S. Kontradowitz, GEOMAR

Everyone on board is well and happy that we were able to start the work program so successfully.

Greetings on behalf of all cruise participants from aboard FS SONNE,

Heidrun Kopp

Chief Scientist

GEOMAR Helmholtz Centre for Ocean Research Kiel