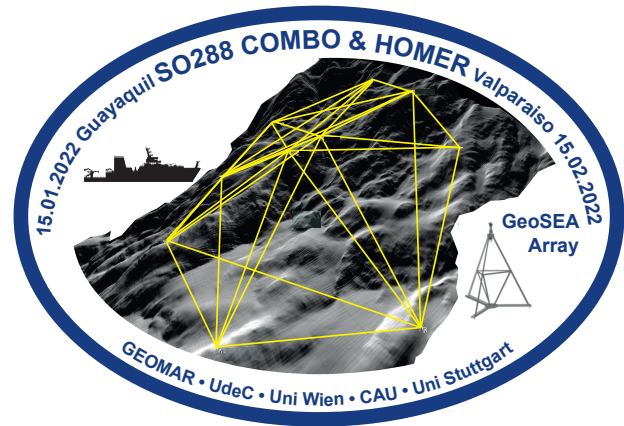**RV SONNE Cruise SO288**

COMBO & HOMER

15.01.2022 – 15.02.2022

Guayaquil (Ecuador) – Valparaiso (Chile)

Weekly Report Nr. 5

07.02.-13.02.2022

At Sea, 24°58'S/71°42'W

On 07.02.2022 we started with the ninth dive of the Remotely Operated Vehicle (ROV) to recover the remaining three GeoSEA transponders from water depths of more than 5 km. There was great joy and relief at the successful recovery of all transponders, especially given the delayed start of the work program. This was only possible due to a change in strategy of the ROV dives: instead of the entire mooring tripod, only the sensors and data carriers were recovered *(Fig. 1)*. What can be put into words so simply is a difficult challenge for the ROV pilots and pilot. On land, this would be comparable to trying to release a cable tie from an anchorage at the summit of Mont Blanc in the valley with a gripper arm, tucking it in so that no plastic debris remains, and then pulling a stuck probe out of a rack without jamming it. This is where the entire expertise of the ROV team came into play, as well as the high motivation to leave not a single probe behind at the end, despite isolated setbacks and very long dive times.
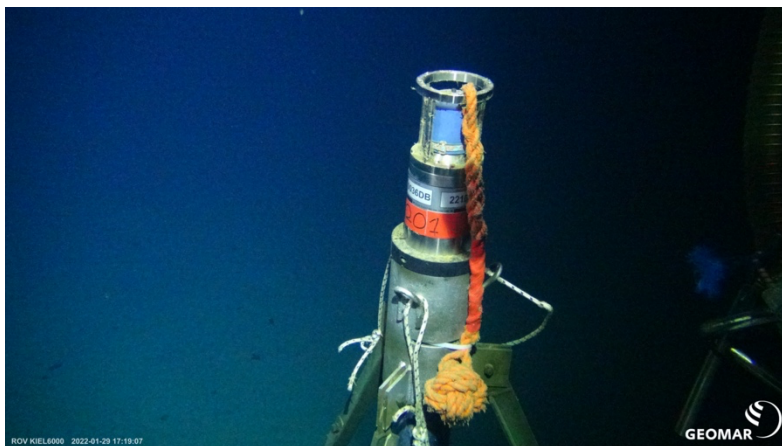

Figure 1: Sensor on the tripod head. The so-called monkey fist (orange rope) is fixed by a cable tie, which must first be detached by the ROV gripper arm. Then the transponder on the monkey fist is pulled out of the frame. The sensors sit so tightly in the frame that the ROV gripper arm does not have the necessary force for this, but the transponders must be released with the gripper arm fixed by vehicle maneuvering.
Photo: ROV Kiel 6000, GEOMAR

Three more CTD deployments for the microbiological work were followed by a short transit to the AREA2 work area, where the seismic work was taken up, which had already started with the reflection seismic survey. In addition, 6 ocean bottom seismometers were now installed on the seafloor. The data recording was done on 08.02.2022 with the G-gun air pulse array. All ocean bottom seismometers were already recovered the following night. Thus, all planned work in AREA2 could be completed and we went back to the first working area AREA1. Here, too, we were initially unable to complete the seismic

surveys during the first weeks, so that the reflection seismic program was now continued and completed after about 20 hours on February 10, 2022 *(Fig. 2)*.
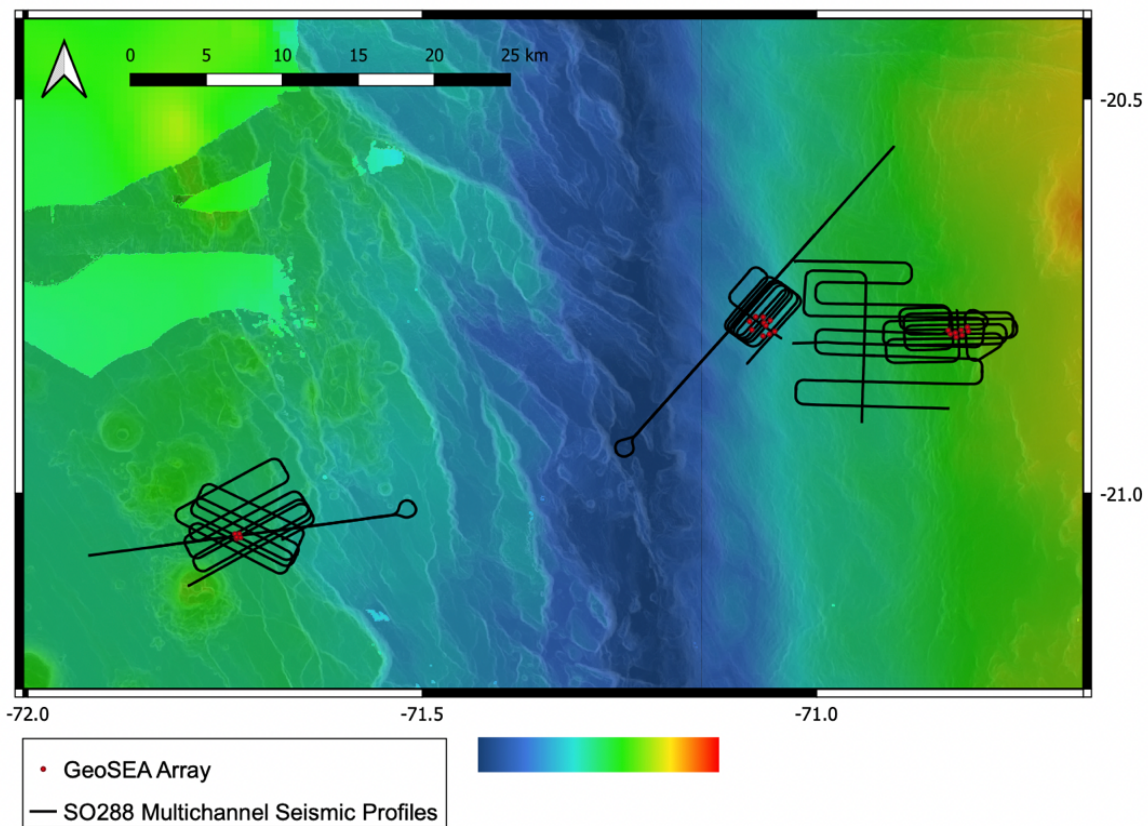

Figure 2: Overview map of the seismic profiles (black lines) recorded on SO288. The red dots show the location of the GeoSEA networks (AREA1 in the east, AREA2 in the west). The seismic surveys reveal faults and fracture structures as well as deformation patterns on the seafloor and at depth that can be correlated with the measurements of the GeoSEA networks.
Map: M. Kühn, GEOMAR

A night transit to the south brought us to the sea area off the Chilean city of Taltal. No comprehensive high-resolution bathymetry maps of the seafloor exist in this region so far, so our last scientific station of cruise SO288 will include echosounder mapping of the active plate boundary and continental shelf between 25°S and 26.5°S. This work will also be carried out in this sea area in preparation for Expedition SO297 in spring 2023 to install long-term moorings here with Chilean partners.

On Feb. 13, 2022, we completed our last station and headed south on transit. An extraordinary expedition comes to an end for us. After a bumpy start due to Corona, we were nevertheless able to carry out our research work and bring it to a successful conclusion, not least due to the professional and efficient support of the crew of FS SONNE, to whom we owe our special thanks.

On board everyone is still healthy and well. Currently we are in the process of clearing the laboratories and packing containers, processing last samples and data and slowly preparing for the hopefully not so wet and cold weather at home.

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

Heidrun Kopp

Wissenschaftliche Fahrtleitung

GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel