



RV SONNE - SO297 "PISAGUA"

24.02. - 11.04.2023
Talcahuano (Chile) - Guayaquil (Ecuador)

6th Weekly Report

27.03. - 02.04.2023

At sea, 24°38,44'S / 70°56,2"W, 02 April 2023



We started the week with the acquisition of MCS data along profile P2. At 08:00, the streamer and air guns were hauled in to recover the first stations of profile P2. We started in the west with OBS P134 and were able to release and recover the OBS/OBH by the morning of 28 March without any major problems. Between station recoveries we mapped smaller areas near the profile, such as a seamount of the Taltal Ridge, the top of which is only 630 meters below sea level and rises about 2500 meters above the surrounding seafloor (Figure 1). Along the profile, eight OBS/OBH remained to the east. We deployed two additional OBS on the western side of the profile to obtain a small array of 5 OBS/OBH for an anisotropy experiment (Figure 2). In the solid Earth,

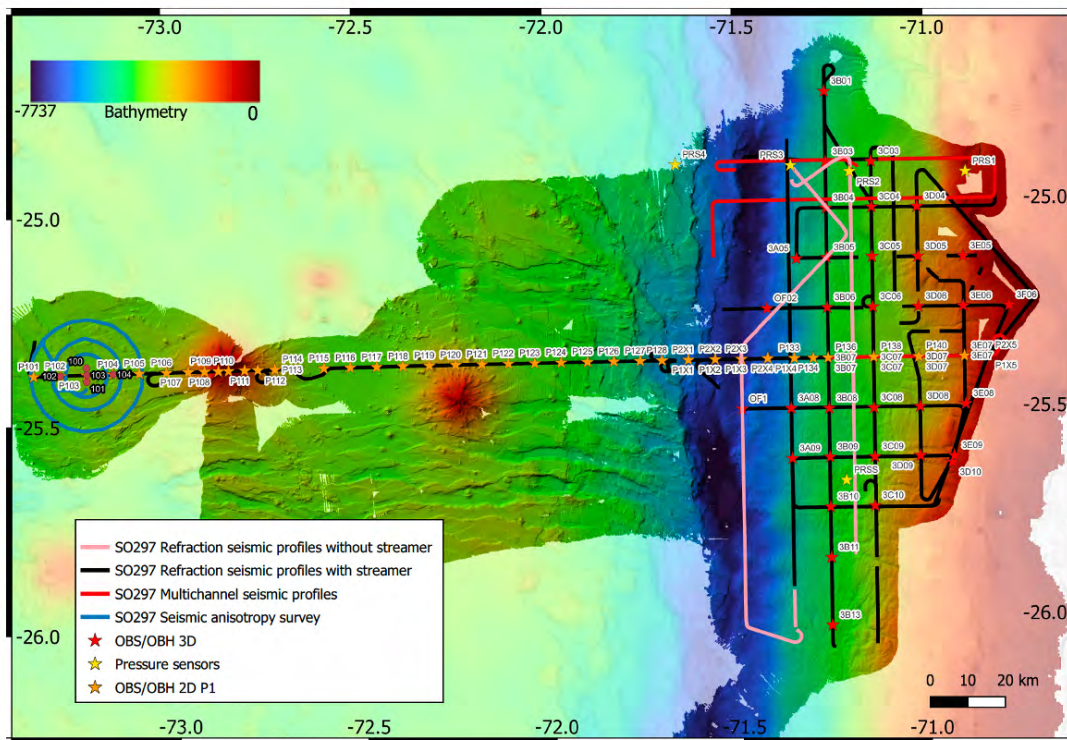


Figure 1: Map showing station locations and multibeam coverage. (as of 30 March 2023). Figure: M. Kühn



seismic waves propagate at different rates in different directions, i.e., the wave fronts have an elliptical shape (as opposed to circular wave fronts on a water surface). This effect is called anisotropy. To measure anisotropy, the air guns were deployed on the starboard side (28 March 2023 10:20 am) to sweep three circles of 3, 5, and 8 nautical miles radius around the OBS stations by 29 March 13:00 (Figure 2). Following this experiment, the 5 OBH/OBS were recovered. On the night of March 30, we headed east again to dismantle the remaining 8 stations on profile P1 and mapped a new area overnight with multibeam. Dismantling of the remaining stations went smoothly and finished at 17:00.

On the night of March 31, we visited the three Chilean pressure sensors along latitude 24.8°S (Figure 1) to verify their operation. This is done by deflecting an acoustic modem to 60 m water depth and reading the data and status of the device from the seafloor. We were able to read data from all three of the IMO's pressure sensors from the seafloor and during the past week, all devices functioned as designed.

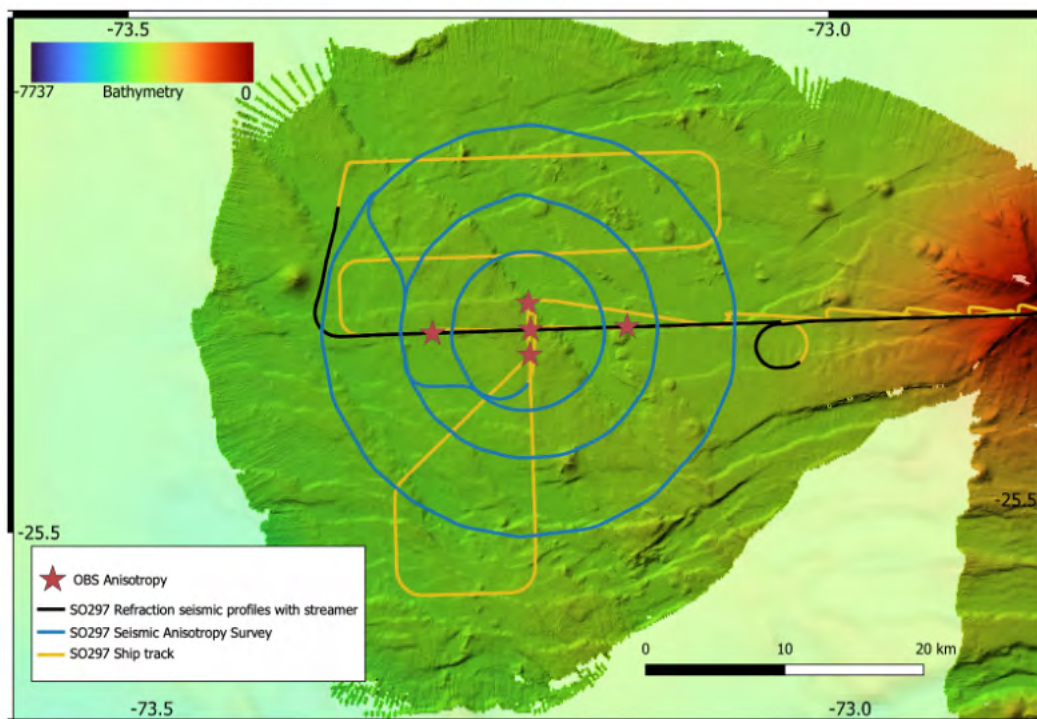


Figure 2: Map showing station distribution and ship track for the anisotropy experiment on the oceanic plate. Figure: M. Kühn.

On 31 March and 1 April, the two pressure sensors from GEOMAR were installed during the day at 5400 m and 4650 m water depth. As with the IMO stations, a pressure



sensor from Sonardyne is used, this was mounted on a modified GEOMAR OBS instrument carrier with a concrete anchor (Figure 3). A sketch of the deployment procedure can be found in SO297 Weekly Report No. 4. After deployment, both stations worked flawlessly. However, at the first station, we first encountered a strongly dipping seafloor, and the inclinometer showed a tilt of 22° . The instrument was then hoisted 50 meters and moved 150 meters to the north by ship. One hour later, the instrument was horizontal and fully functional on the seafloor.

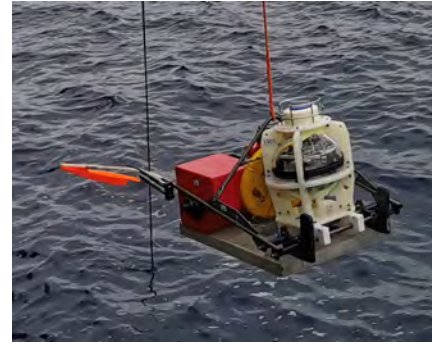


Figure 3: Drift-free pressure sensor on the GEOMAR OBS cage shortly before deployment. Photo: D. Lange

On the evening of 01 April 2023, we drove to the deployment position of OBH 3D10, which had responded but not released during the dismantling of the 3D experiment on 22 March. The station has an automatic time release. This was set for 02 April at 04:30 UTC, or 00:30 shipboard time. Overnight we were able to triangulate the position of the OBH acoustically at ~1900 m water depth very well, but it did not automatically ascend with the time release, nor did it respond to our release signals.

Currently (2 April 2023, 13:00) we are trying to recover the OBH from the seafloor with dredging equipment and hooks (Figure 4). For this purpose, a deep-sea cable (>7,500 m) is laid out in a circle around the station with a radius of three cables (~555 m) and then slowly tightened so that the hooks can catch the station and hoist it onto the deck.



Tonight (April 2), we begin the transit to Guayaquil and will continue multibeam mapping of unmapped seafloor as we traverse the work area toward the port of Guayaquil into the evening of April 4.

During the last six weeks, we have so far achieved all the goals of the voyage. The atmosphere on board is good and the cooperation with captain and crew is excellent.

Everyone on board is in good health, greetings from the FS SONNE on behalf of all participants,

Dietrich Lange

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(GEOMAR Helmholtz-Centre for Ocean Research Kiel)



Figure 4: Anchors at the end of the chain and cable used for dredging. Photo: B. Bauer