Cruise SO 313 with RV SONNE

Louisville Ridge

At See 27° 38'S, 174° 13'W

3. Weekly report (16.06. – 22.06.2025)

The third week of the SO313 cruise began with successful TV grab stations on the lower and middle slopes as well as on the summit area of Burton Seamount in the southern working area. The high-resolution bathymetric and optical mapping made it possible to determine suitable positions for sampling with the TV grab. In this way, larger ferromanganese crusts up to 5 cm thick could be broken out of the bedrock under video control. While the smooth surfaces of the crusts from the summit area indicate the influence of near-bottom currents, the botryoidal surfaces (i.e. a cauliflower-like surface) of the deeper crusts are indicative of calmer precipitation conditions. The substrate of the ferromanganese crusts consists mainly of conglomerates or breccias with unsorted fragments of volcanoclastic material (see Figure 1).

However, detailed sediment sampling on the slope of Burton Seamount failed. The multicorer was unable to penetrate the partially compacted sediments despite video-controlled positioning. As the summit area of Burton Seamount is largely free of sediment, it was not possible to take samples there either.

The sampling programme at Burton Seamount was completed for the moment during the night of 17 June with several L-ADCP/CTD stations. RV Sonne then began her transit back to Seamount 420 in the northern part of the working area. During this transit, the Louisville and Rigil Seamounts as well as Seamounts No. 85 and 1310 were further mapped with the ship's multibeam echosounder EM122.

After arrival at Seamount 420 in the late afternoon of 18 June, the scientific work was continued with a multinet station through 4000 m water column followed by the EM122 mapping of the eastern flank of the seamount. At around 21:20 local time, the ship's master was informed by New Zealand authorities of a distress call from a sailing boat that was approximately 120 nautical miles north of us. In accordance with international regulations, we made our way to the sailor's position to help him deal with his situation. Eventually, the sailor was able to continue his journey on his own and RV Sonne returned to the working area to resume EM122 mapping at around 05:30 on 20 June. Due to this incident, the scientific work was suspended for 31 hours.

The Guyot-type Seamount 420 stretches 65 kilometres east-west and north-south at its base. It rises from 5000 metres and its summit plateau is located at a water depth of approx. 1600 metres. In the centre of the summit plateau there are several circular structures with a diameter of up to 2.5 km, which rise about 100 m above the plateau (see Figure 2). The backscatter data from the EM122 mapping indicate a heterogeneous seafloor composition. The presence of sediments was confirmed by a video sled station on 20 June. On 21 June, we were therefore able to carry out a biological sampling programme with epibenthic sled (1 station), TV multicorer (3 stations) and seamount sled (1 station) on the north-eastern section of the summit plateau. Both net cups of the epibenthos sled were filled with sediment and small organisms. The multicorer had to be reduced from 12 to 6 cores in order to apply more weight to the

individual cores. This was the only way it could penetrate the compacted sediment. Sampling with the seamount sled from the summit plateau to the upper slope of the seamount, on the other hand, went without complications. However, the quantity of organisms was very low. In addition to starfish, brittle stars, pieces of coral and a few crustaceans (see Figure 3), pumice stones were also collected for geological analysis. The low number of organisms sampled reflects the relatively low colonisation of the seamount, which we also observed with the video sled.

On 21 and 22 June, further video stations were carried out in order to interpret the various backscatter data and to prepare for sampling the seabed in the area of different facies (crusts, sediments, rocks). The central bathymetric structures were also video mapped. These are evidently volcanic structures, with outcropping rocks being intensively coated with ferromanganese crusts and with a large number of sessile animals attached. Sampling of these structures is planned for the coming days.

During the night of 21.06 to 22.06, the scientific programme was completed with several L-ADCP/CTD stations and a trace metal CTD station. Water samples were collected for ultrafiltration (i.e. fractionation of particles from the water column down to molecular size) and for helium isotopy.

All participants of SO313 are well.

Best regards,

Thomas Kuhn (Chief scientist)

Summit plateau (1600 m) Slope (2200 m) Slope basis (4000 m)

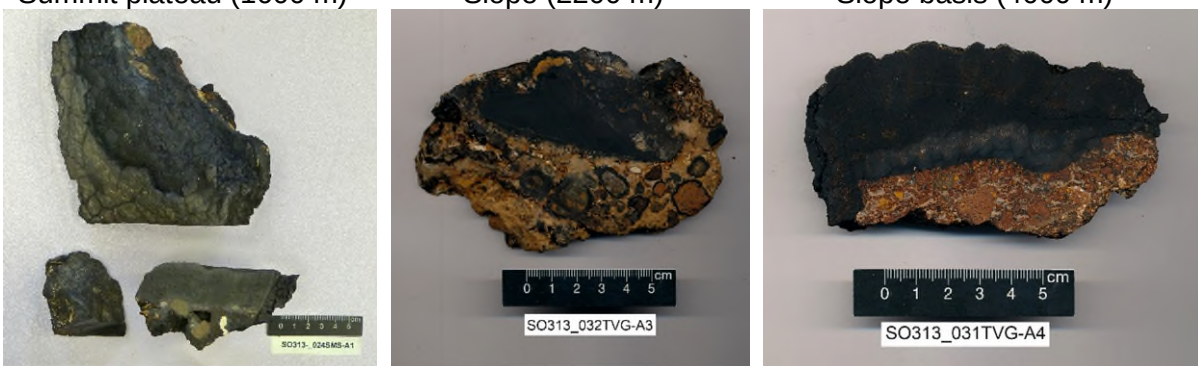

Figure 1:Ferromanganese crusts from Burton Seamount.

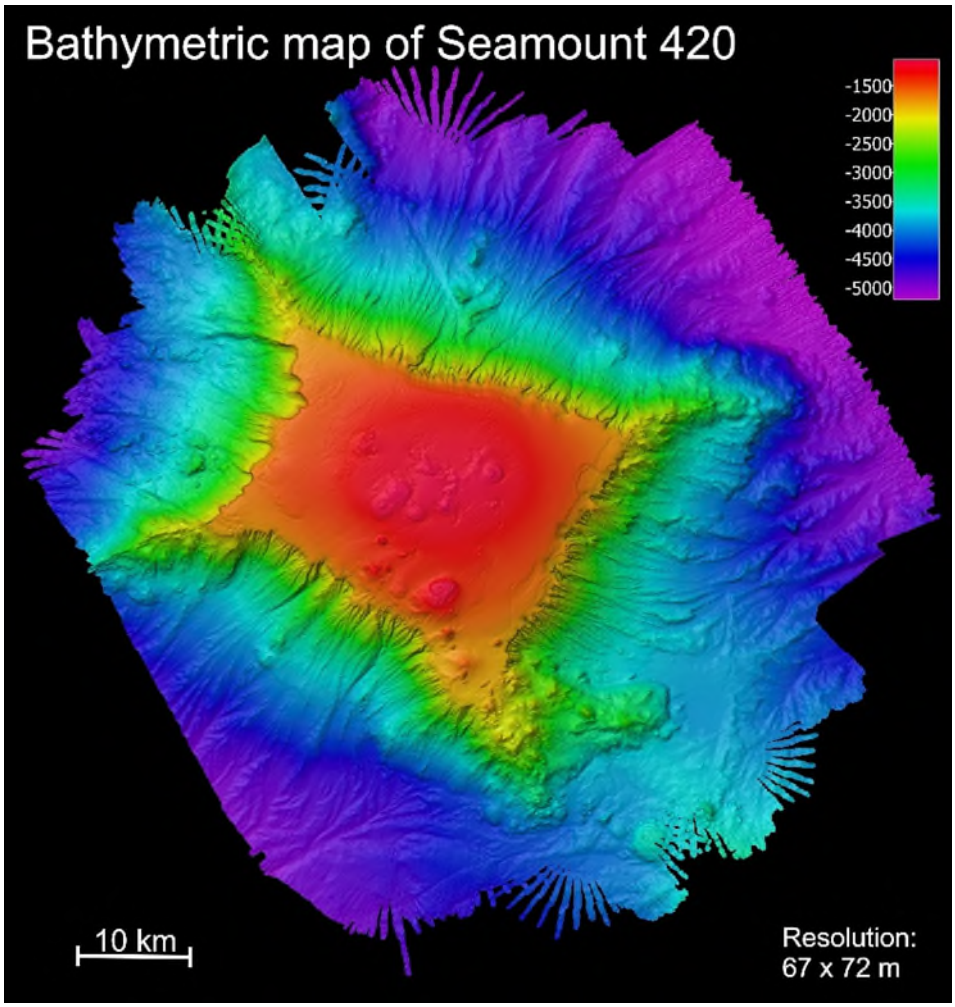

Figure 2: Bathymetry of Seamount 420 based on EM 122 data of RV SONNE.

Figure 3: Chirostylidae crabs live in the pore space of pumice. Photo: N. Gatzemeier.