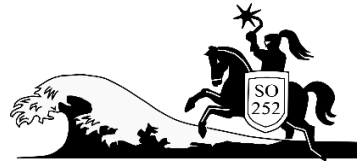


SO252: Ritter Island

6. Weekly Report



This is the sixth weekly report of cruise SO252 "Ritter Island". The past week was dominated by sea floor sampling and video observations. After we had retrieved the P-Cable system on Monday afternoon at 16:30 we conducted an one hour-long seismic test for over-/under-shooting. We rigged the seismic system into two two-section streamers and lowered the first one with a weight while floating the other one with a buoy in order to tow them above each other. The idea behind this experiment is that it should be possible to separate the up-going and down-going wave fields which would allow suppression of the ghost and the sea floor multiples. This technique may be applied in future seismic cruises either with P-Cable or for 2D seismics. After the test we started to collect multi-beam and Parasound profiles during the night to map out the distal part of the landslide deposit in order to quantify better its volume. This was also the night programme for all the other nights of this week. On Tuesday we conducted three HyBis dives. First, we took two samples from the newly developing cone, then we dove into the deepest part of the landslide scarp, and finally we tried to take a sample in the main debris flow plain south of Sakar Island, but the fibre optic winch system failed and we had to recover HyBis before a sample could be taken. On Tuesday we ran a long OFOS transect across the block west of the slide scar which appears to be a remnant of the original volcanic edifice although it is not entirely clear if it has been moved during the Ritter Island collapse. On Wednesday we deployed HyBis again after the winch had been fixed. We conducted two dives with the OFOS frame mounted underneath HyBis. The first transect ran from the hummocky facies into an erosional channel in the southern part of the failure area north of Umboi. We found evidence for high currents such as ripples and numerous corals on the exposed areas at around 500 m water depth but hardly any evidence for strong currents within the channel where we had expected them, which probably means that the channels have been incised during the Ritter Island collapse but were inactive since. The second dive started at the top of the highest cone structure and continued into the main channel with very similar observations as the first dive. On Friday we conducted four HyBis dives from the very distal area and moving progressively closer to Ritter Island. We found a wide range of different seafloor. The most distal part is covered by a fine sand debris flow deposit. The second site only showed hemi-pelagic sediments with big mud clasts. The third site showed typical fine sand and mud debris flow deposits. The fourth site was the most proximal one outside the barrier between Umboi and Sakar islands. The seafloor was flat and we recovered interlayered sands and muds without indications that they are related to the Ritter Island collapse. On Saturday we conducted four HyBis dives in the proximal area between Umboi, Sakar, and Ritter Island. The first dive sampled the flat area close to Umboi where we had thought we had discovered incised channels during the third

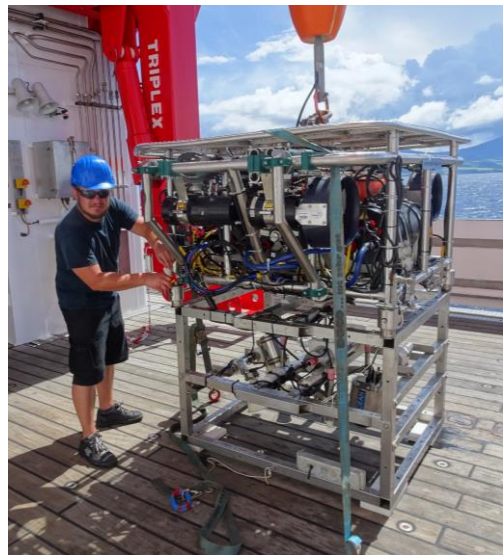


Figure 1: Engineer Eduard Fabrizius in front of HyFos (the combination of HyBis and OFOS video sledge) which served us well during the seafloor observations. Photograph: Swaantje Bennecke.

OFOS transect on November 30. It turned out that the seafloor topography is much more complex in this area with numerous round or oblong depressions and that we must have mistaken them for a channel during the first visit. We took a sample which consisted of poorly sorted debris with a thin hemipelagic mud on top. The second dive was carried out on the flank of a hummock and revealed various volcanoclastic sediments. The third dive visited the flank of the eastern cone structure. We managed to get a sample from the 30-40° steep side of the cone which consists of fresh looking volcanic rocks with unusually numerous samples that contain xenoliths. The fourth dive went to the flat area south of Sakar area where we tried to sample the dark patches at the break of slope. The seafloor must be very hard because HyBis hardly penetrated, scraping off only the uppermost hemipelagic sediments and some fine sand. This was the area where we also bent the gravity corer barrel during an unsuccessful coring attempt. On Sunday we conducted two long HyFos (HyBis with the OFOS video sled) video transects. The first one started at the southern end of the foot of the new crater all the way up to the crater rim and down into the crater. Inside the crater, the visibility was very poor and the very steep seafloor is covered by very fine, brown material that is in the water column draping the volcanic rocks. The dive continued to the southern tip of Ritter Island where a steep at least 30 m-high cliff exists. It consists of dense igneous rocks presumably dike intrusions. The second dive covered a long stretch at the 380 m contour line of Ritter Island's east side to a topographic depression in the slope further south. The slope was covered by small and large blocks, but with more drape than on Ritter Island's western side. This morning at 09:00 we took a TV-grab sample south of Sakar Island in the same area where we had previously tried to sample the seafloor with the gravity corer and HyBis. The TV-grab was completely full with an interlayered sequence of fine sands and hemi-pelagic muds with oxidized tops. At 11:00 we started the transit towards Noumea. Everybody on board is happy with the huge amount of high-quality data that we have managed to collect, but as always it will take time to make sense of it all. Preliminarily, it can be said that the Ritter Island event was probably smaller than previously recognized and that the event disintegrated the volcanic edifice to a much larger extent than expected.

On behalf of the cruise participants,

Christian Berndt (Chief scientist)