Research Vessel POLARSTERN

PS119: 13.04. – 31.05.2019
Punta Arenas - Port Stanley
Seventh weekly report: 20. – 26. Mai, 2019

The expedition‘s stormy week

The rapid changes in weather condition, which hit us last weekend, was exemplary for the entire week. While we were able to achieve the 450th dive of MARUM ROV QUEST (Fig. 2) on the ridge segment E2 of the East Scotia Ridge on Saturday, the storm on Sunday, which we endured in the lee of Zavodovski Island, showed us that Antarctic winter has started. It was not until Monday, 4 a.m. on 27th of May, that we left our shelter behind the northernmost of the eleven South Sandwich Islands, to steam westwards to our hydrothermal work area E2. Of the two planned gravity- and multi-corer stations, we were only able to do one because of time constraints, sampling sandy layers with volcanic components, which seem to originate from the volcanic arc. On arrival at E2, initially an OFOBS profile running from East to West was planned to survey the known hydrothermal venting area with high-resolution micro-bathymetry. However, the weather forecast on Monday morning made us decide differently. For a safe and secure dive with ROV QUEST we require stable weather conditions with wave heights below 3 m for several hours. We are looking for these conditions 2-3 days ahead throughout our entire working area on the South Sandwich microplate. The working area extends over 5 degrees of latitude and 8 degrees of longitude, and our meteorologist is busy finding us the forecast for the best diving conditions in all of its regions. Because of the small-scale highs and lows and their movement, this is not always easy. On Monday morning, it became evident that on Tuesday and Wednesday diving conditions were only possible in the southernmost part, in the area of the Kemp Caldera. As the multiday forecast did not permit ROV dives in the North, RV Polarstern left at once to steam southwards bound to the Kemp Caldera. This enabled us to add a wide-scale line of a multi-beam survey to the already existing survey of the central spreading ridge. In the evening of the 21st of May the next ROV dive was meant to commence.

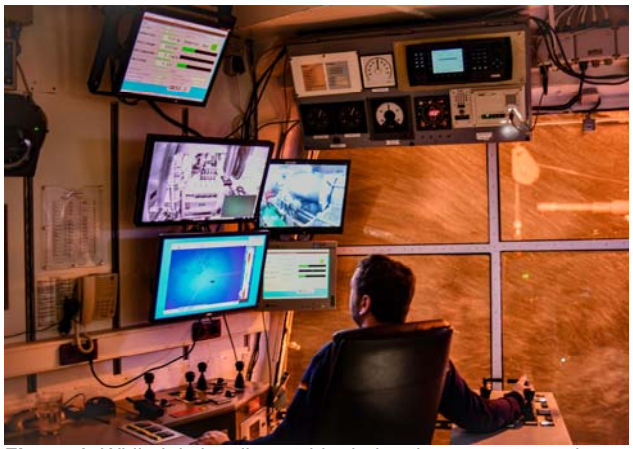

Figure 1: While it is hostile outside during the snow storm, the winch driver sits safe and dry in the winch room of RV Polarstern during equipment deployments (© Vdl).

Figure 2: Deployment of MARUM ROV QUEST via the A-frame of RV Polarstern. The aft working deck is almost completely filled by ROV vehicle, winch and containers (© Volker Ratmeyer).

However, we had to realise that because of unforeseeable technical problems with the ROV, no further dives during this expedition are possible, immediately leaving towards Saunders Island. There our team of volcanologists were able to proceed with their photogrammetry survey on

Wednesday, 22nd of May. While during the previous survey time, the north eastern side of Cordelia Bay and part of the south eastern flank of Ashen Hills were surveyed, this time drone flights to the western and northern areas of the island were achieved. Important data which enable the making of a topographic map of down to 10 cm resolution, were collected by optical and infrared cameras during the drone surveys. After sunset, RV Polarstern steamed to the Northwest to the spreading ridge. On Thursday, 23rd of Mai, several sediment and water column sampling events happened, which showed plume-like structures in the water column. Already in the night to Friday, the next storm arrived, which we could not avoid because of time constraints. As the meteorologist office on board was able to predict time and composition of the storm, we were able to plan gear deployments in line with the meteorological forecast. Although the weather model of the German Weather Service (DWD) can only use a few terrestrial base stations, as well as vessel and satellite data, it is extremely correct. Very important base-line data for the model are temperature, humidity, air pressure and using GPS-analyses, also speed and direction of air particles. These data are taken daily on RV Polarstern by staff of the DWD with radio sounder deployments via balloons which reach 30-35 m height above sea level. Twice per day, we received updated weather forecasts (Fig. 3), which were enormously important information during this expedition to make decisions regarding the selection of station positions.

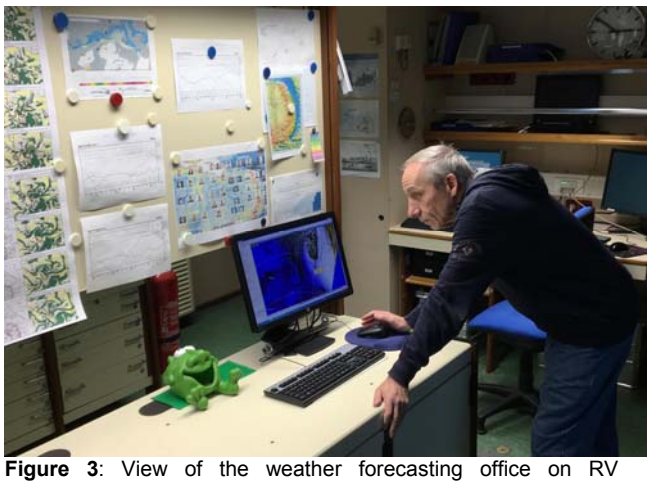

Figure 3: View of the weather forecasting office on RV Polarstern, run by staff of the German Weather Service Hamburg (© Gerhard Bohrmann).

Figure 4: Aerial photography of a fin whale taken on aerial survey effort. The elongated flat fin and the white lower right jaw are clearly visible (© Sacha Viquerat).

The whale observation team from Hamburg University did not succumb to the storm, even though the helicopter could not be deployed often for dedicated surveys due to severe threat of icing. The group thus intensified their research effort to dedicated surveys from the crow's nest of Polarstern whenever conditions did not allow helicopter operations. Valuable data sets on occurrence and distribution of cetaceans were collected in spite of the adverse weather situation. Once pooled with records from previous surveys on board of Polarstern, the forthcoming analysis will produce reliable and robust estimates on the occurrence, distribution and density of whales (and fin whales in particular, Fig. 4) within the study area.

Towards the weekend, we left the second storm of this week and its effects behind, and commenced the last station work. On these final tasks and the return transit to Port Stanley, we will report next week.

All expedition participants are well. With a cosy minus 6° C outside, best wishes in the name of all participants,

Gerhard Bohrmann R/V POLARSTERN Sunday, 26 May 2019