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Further to the North and two more stations

[18. March 2019] During the last week, we continued our northward travel to the Erebus and Terror Gulf completing two more stations. Another highlight were curtesy visits between the Polarstern and the Argentinian vessel Almirante Irizar.

Once the station work was done, we searched our way out of the Weddell Sea and out of the ice to spend the remaining time in the Powell Basin. There in open water, hopefully the teams that have so far collected only very little or no data or samples also have a chance to conduct some research. Saturday evening, we passed once again through the Antarctic Sound leaving the Weddell Sea, the ice and Antarctica for good. Currently, we are at the western flank of the Powell Basin conducting our first station in open water.

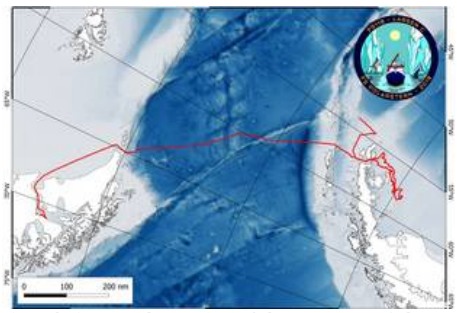

Fig. 1: Cruise plot. (Photo: Karte: S. Dreutter; Logo: A. Purser)

Fig. 2 OFOBS image from a typical drop stone from 400 m depth in the Weddell Sea (Photo: A. Purser.)

The two stations in the Weddell Sea were both in the Erebus and Terror Gulf to the East of the Antarctic Sound. They were relatively close together with the first of the two stations at approximately 63°59'S/55°54'W and the second station at approximately 63°49'S/55°42'W. During station work, it was always a challenge to find patches of open water large enough to deploy our equipment. This was particularly tricky for our towed equipment. The epibenthic sledge is a device that once lowered to the seafloor opens two flaps and simultaneously collects biological samples at the seafloor and 1 m above the seafloor. The advantage of this device is that in the samples even delicate, small organisms are well preserved. To collect samples, it, however, needs to be towed over the seafloor. This meant that for deployments we needed a stretch of approximately a kilometre of open water. The same was true for our other towed benthic sampling gear, an Agassiz trawl (AGT). An AGT is a metal rectangle with a sturdy bag of net attached designed to collect larger, more robust fauna like for example brittle stars or larger crustaceans. In the ice conditions we encountered, using these devices was quite a challenge, but the combined experience of ship and scientist let us succeed in the end and good samples were collected. In addition to the sampling devices also, the Ocean Floor Observation and Bathymetry System (OFOBS) was deployed.

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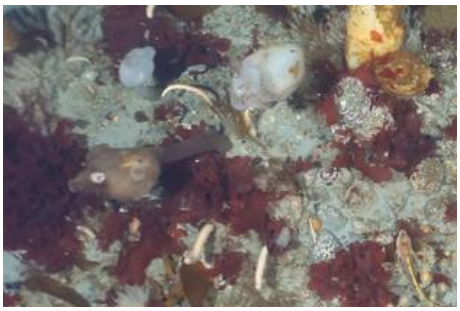

Fig. 3: OFOBS image from 50 m water depth from Nachtigaller Shoal. (Photo: A. Purser)

Fig. 4: Organisms from trawls. (Photo: H. Griffiths)

OFOBS is a towed camera and sonar system, which can be used to collect 26 megapixel images and HD video of the seafloor in realtime to the ship. The device is lowered to a couple of meters above the seafloor to take the best quality images, and is then dragged by the ship, or by ice around the ship, for the duration of a dive. Sidescan and forward sonar systems allow detailed maps of the seafloor to be generated about 40 m on each side of the device. The images and maps can be used for other cruise participants to decide where their equipment can best be placed on the seafloor, so it is often useful to run the OFOBS for a few hours when reaching a new, unexplored area of seafloor.

Additionally, the collected photo images and videos can be used by geologists and biologists to better understand the environments surveyed and the mix of fauna present. OFOBS was successfully used at all sites. In addition, it was deployed, when the ship was parked in the ice. Whenever the ice drift was large enough OFOBS was deployed. In times when the ice-drift exceeded 0.2 knots, the speed of OFOBS through the water was sufficient to stabilize OFOBS. In addition, sediments were collected with a gravity core and a multicore. A gravity core is a steal barrel with the plastic liner and a two tonne weight on top that is lowered into the seafloor. The multicore samples the top 30 cm of the seafloor and the overlying bottom water. Eventually, we managed to deploy most devices and they worked well despite the difficult ice conditions. In this way, we were able to add samples and data to the knowledgebase of the western Weddell Sea.

Fig. 5: Farwell to Antarctica. Evening in the Antarctic sound. (Photo: B. Dorschel)

Fig. 6: Nachtigaller Shoal. (Graphic: A. Purser)

While we were working in the Erebus and Terror Gulf, the *Almirante Irizar* was anchored about 20 nm to the west supplying the Argentinian Antarctic base Marambio. This opportunity was used to exchange invitations and a delegation of the *Almirante Irizar* visited *Polarstern* on the 12th of March with a return visit on the 13th. Both visits were very well received and gratitude was expressed.

Finally, we left the Weddell Sea through the Antarctic Sound in the evening of the 16 th of March. Antarctica gave us an amazing farewell with evening sun, racing clouds and a mixture of light ice and rocks. Certainly once again memories to remember. Since then, we are in open water with no land in sight. Just a couple of minutes ago, we have arrived at our fist station in open water. Currently, the oceanographers on board are recording salinity, temperature and depth data in the water column.

Now in open water, the last phase of our expedition of intense surveying and sampling has started. With the ship moving like a ship again, we have to re-grow our sea legs. After the long and stable time in the ice, it may take again some days to adjust.

Looking forward to a busy time, on behalf of all expedition participants, I sent regards from a grey and misty Southern Ocean.

Boris Dorschel