Research vessel METEOR

M134:
Port Stanley – Punta Arenas
First weekly report: 16 – 22 January 2017

On Monday, 16 January 2017, at 18:12 local time RV METEOR left the floating pontoon pier of Port Stanley Harbour for the three-day transit to the sub-Antarctic island of South Georgia, where the glacial shelf troughs will be the research targets. Prior to the departure of RV METEOR's 134th expedition, there has been port time at FIPASS-pier (Falkland Interim Port and Storage System), a floating platform in the natural harbour of Port Stanley that is formed by 7 permanently anchored, linked barges and connected to land by bridge (Fig. 1). The 6 containers with our scientific equipment had been loaded in Cape Town at the start of the previous expedition M133, therefore only the scietific party changed in Port Stanley. Most of the 28 scientists, engineers, technicians and students from Germany, the US, the UK, France, Switzerland and Austria arrived in Port Stanley on 14 January on the weekly plane from Santiago de Chile with stops at Punta Arenas, Chile and Rio Gallegos, Argentina before the plane landed at Mount Pleasant, the Royal Airforce airport on the Falkland Islands. The long flight time and the complicated connection from Europe are testiment to how remote the Falkland Islands are in the South Atlantic. So everybody was happy, after more than 2 days of travel, to board RV METEOR on 14 and 15 January. We used the short time in the harbour to set-up the laboratories, to mobilise the technical marine equipment on the work deck and to go for a last evening stroll ashore, where most of us walked to the close-by penguin beach called Gypsy Cove (Fig. 2).

Figure 1: Research vessel METEOR at the floating pier of Port Stanley (© vdL).

Figure 2: Magellanic penguins on the beach close to the harbour entrance of Port Stanley (© Markus Loher).

During our eastward bound transit from the Falkand Islands to South Georgia we left the Falkland Plateau on Tuesday, 17 January and crossed the Falkland Trough, a deep trough separating the Falkand Plateau to the north from the North-Scotia-Ridge in the south. The narrow east-west ranging North-Scotia-Ridge forms the northern edge of the small Scotia Plate, which shifts away from the South American macro plate by left-lateral movement. Despite a push from behind by the West Wind Drift, the METEOR made just 10 knots in transit. Presumably the barnacle cover on the vessel's hull has grown over the last few months slowing the vessel down. The slightly lowered speed had a positive effect on the bathymetry and sedimentological surveys which we did around the clock during transit. On Wednesday, 18 January we went passed the southern flank of a further elongated plateau called Shag Rocks, arriving at our planned work area of South Georgia on Thursday afternoon, 19 January. The first CTD station was done there in 2,455 m water depth to determine the sound velocity profile and to sample the water column, before we sailed eastwards to the shelf edge of the South Georgian micro-continent. Having arrived at our work area on

Friday, we started with mapping a 60 nautical mile long west-east running profile parallel to South Georgia's coastline. During an expedition in 2013 with RV POLARSTERN along the northern side of the island, discrete methane emissions were discovered for the first time by hydro-accoustics in the water column and confirmed with measurements by gas chromatographs. The emissions of methane were linked to shelf troughs, formed by ice streams from former glaciations, originating in the fjords of South Georgia and running as elongated gullies along the island's shelf to the shelf edge. The scientific aims of our expedition are to study these methane emissions in detail, to study their distributions, determine their origins and discover their effect on the surrounding environment.

The hydroaccoustic mapping profile, which first transects across the Ice Fjord Trough, then through the King Haakon Bay Trough and finally through the Jacobsen Trough, showed that methane emissions and flares were present in all three troughs (Fig. 3). As such the new findings from the southern side of the island were in line with those previsouly discovered along the northern side demonstrating that we study a phenomenan general to the troughs of the region. King Haakon Bay is well known as Sir Ernest Shackleton landed here after crossing the Scotia Sea from Elephant Island aboard the open boat James Caird.

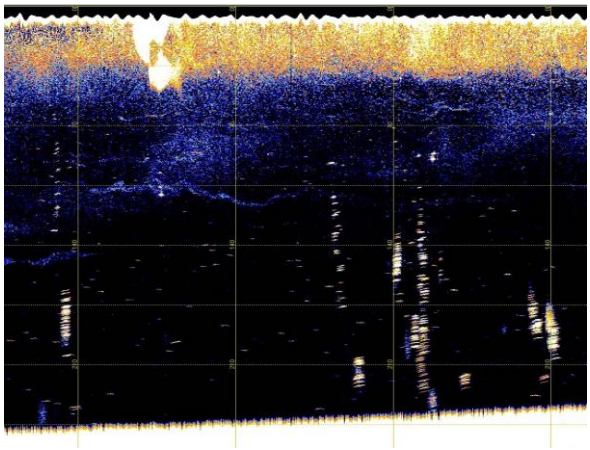

Figure 3: PARASOUND-recording of the water column in King Haakon Bay-Trough with gas emmision sites on the seafloor, which form vertical flares.

Figure 4: First deployment of MARUM ROV SQUID 2,000 m to study the shelf troughs (© vdL).

During the running of the hydroaccoustic mapping profile and in beautiful sunshine we were able to view the western part of the island with its snow-capped, jagged mountains reaching over 1,000 m in height and glaciers that flow from the high mountains to the coastline before calving into the sea. Many of us were facinated by this panoramic landscape and enjoyed the view despite the polar climate since our southbound crossing of the Polar Front. Of the three mapped troughs we swiftly decided to opt for the King Haakon Bay Trough as the one to sample. Comprehensive station work was carried out throughout Saturday 21 January and Sunday 22. CTD stations were used to sample the methane distribution in the water column, in addition to specific bottom water samples, multi-corer and gravity corer deployments. The MARUM-ROV (remote operating vehicle) SQUID 2,000 m undertook dives on both days to the seafloor and collected results which we will tell in the next weekly report.

Today the weather is foggy, but despite wind speeds of 4-5 Beaufort feels relatively calm. Air and water temperatures are about 2.5°C, to which we have already adapted to for the work on deck.

Best wishes on behalf of everyone on board,

Gerhard Bohrmann FS METEOR Sunday, 22 January 2017