

Research Vessel MARIA S. MERIAN



MSM 57:

Reykjavik – Longyearbyen - Reykjavik
Sixth Weekly Report: 29 August – 07 September,
2016

After the storm with high winds and seas over the weekend, we started a transit back East to continue with MeBo drilling. The weather system shifted the ice-edge further South-East, so our attempts to map the Molloy Deep were cut short due to abundant ice floats. However, being close to the ice helped managing the weather. First, we deployed a gravity core into a known active seep area of Lunde Pockmark to recover sediments with gas hydrates. Due to the POSIDONIA positioning system we were able to locate our equipment on the seafloor within a few meters of accuracy, despite 1200 m water depth, and sample these small seep areas. Upon recovery, we saw gas bubbles being emitted from the seafloor with the PARASOUND hydro-acoustic imaging systems. When the gravity core broke the sea surface, it was already degassing vigorously from dissociating gas hydrates. Despite this ongoing dissociation, due to the temperature increase and pressure reduction, we were able to sample sufficient gas hydrate and preserve it in liquid nitrogen. The entire 2.5 m of core recovered contained gas hydrate (Figure 1). Geochemical shore-based analyses will define which of the three gas hydrate structures were found, or whether a mix of structures may be present, which we anticipate, based on our ship-based gas analyses.



Figure 1: White layers of methane hydrate appear parallel to sediment layering at an active seep within the Lunde pockmark.



Figure 2: A rare glimpse of Prins Karls Forland, an 80 km long island on the west side of the Svalbard archipelago, which was typically hidden in fog and low cloud cover.

The same day, we started another MeBo drill site in 391 m water depth within a region of known gas flares, about 80km further to the East at the continental margin of Svalbard. This new drill site was set to complement previous drillings and recover sediment sequences previously missed. MeBo reached a total depth of 26.5 meter below seafloor, and the sediments recovered from this new drill site were again of mostly glaciogenic origin (boulder clay with fist-size drop-stones). A surprise was a 40cm thick layer of authigenic carbonate formed by cementing mostly fine-grained sediments. This sequence was recovered by the MeBo rotary system.

This last week's weather was quite variable, but we also enjoyed a few glimpses onto the mountain range of Prins Karls Forland (Figure 2). After several gravity cores and additional seafloor

mapping surveys, we completed our last MeBo drill site on Thursday and Friday. The drilling to a depth of 33m recovered almost 20m of sediment, allowing for a detailed sub-sampling program.

At the bottom of the drill hole we encountered free gas, which forced us to abandon this drill site. This gas-bearing layer, mapped seismically prior to our cruise, likely feeds the many natural seafloor gas flares in the region.

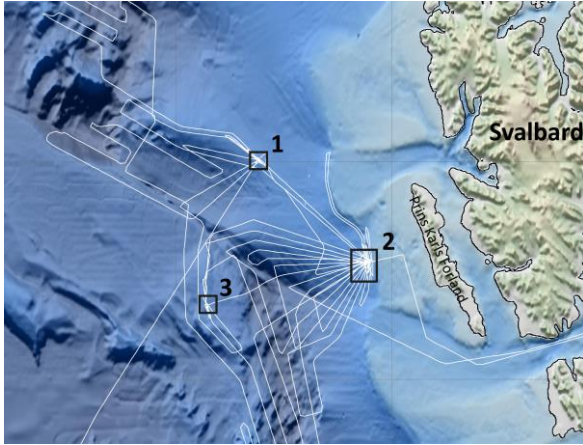


Figure 3: Chart showing our study region during expedition MSM57 west of Svalbard; white lines: ship's route, 1 = Vestnesa Ridge, 2= upper continental margin, 3 = Svyatogor Ridge.

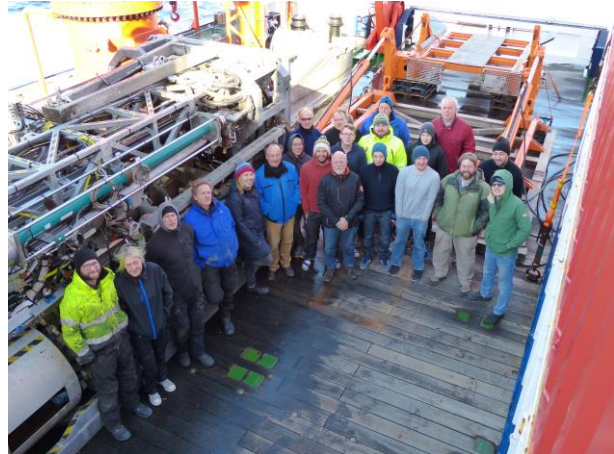


Figure 4: Group-photo of scientific crew of second leg of MSM57 next to the MeBo drill rig on the aft deck of the MARIA S. MERIAN.

On Saturday we officially ended the science projects and MARIA S. MERIAN started her 4-day voyage back to Reykjavik, Iceland. During the night from Saturday to Sunday we had advanced far enough south to encounter a few hours of full darkness again – after weeks of midnight sun an unusual experience. The same night, the research vessel POLARSTERN crossed our path about 30 nautical miles away on her transit from eastern Greenland to the Barents shelf, where she is expected to arrive in Tromsø, Norway, on September 6th. Today on Sunday, scientists are busy to clean and pack all scientific equipment, analyze the last samples, and complete the cruise report. This will continue on Monday and Tuesday, until we arrive Wednesday morning in Reykjavik. That will be the official end of Expedition MSM57 and the scientists will return to their respective homes.

The success of this cruise was possible due to all on board: crew and science teams and I would like to take this opportunity to thank all for their exceptional performances. Special thanks go to Captain Björn Maaß and his crew, who supported the scientific team at any time and with great flexibility. I also would like to thank the MeBo team who had to drill very challenging environments during this expedition. Of course, I also want to thank all supporters ashore, including the shipping company Briese in Leer, the Control Centre German Research Vessels in Hamburg, the Senate commission of the German Research Foundation (DFG), the logistics support and administration at MARUM, as well as the Office of Foreign Affairs for applying and securing the research permit.

Best regards on behalf of all cruise participants,

Gerhard Bohrmann

FS MARIA S. MERIAN, Sunday, 4 September, 2016