

From Longyearbyen through the Northeast Passage towards the Siberian Arctic

[10. September 2018]

Monday (03.09.18). Since early Monday morning “Polarstern“ is anchoring in the Isfjorden, directly off Longyearbyen, and waiting for the new crew and the new group of scientists, who will be embarked for the coming Leg.



Fig. 1: “Polarstern” anchoring in the Isfjorden off Longyearbyen, with people arriving via zodiac. (Photo: R. Stein/AWI)

A small group of scientists including the chief scientist, already arrived today, most of the people, however, will show up tomorrow. As “Polarstern“ cannot enter the harbor pier directly, all people have to use the zodiac – certainly a rocking adventure for most of us (Fig.1).

Tuesday (04.09.18). It's rainy, from time to time short periods with some sun shine. The main group of scientists has arrived in time, and the embarking procedure can start in the afternoon at 15:30. About one hour later, all people are onboard. Our departure is scheduled for tomorrow morning, Wednesday (05.09.18), at 10:00, more or less directly after the “Bullen Show” - a meeting with information about the life and rules onboard and safety instructions given by Captain Thomas Wunderlich and his officers, ending with a safety training. This was at least the plan, however, a plan that we had to revise next morning: A medical case of emergency required a visit in the Longyearbyen Hospital, we had to postpone our departure. On one hand regrettable, on the other hand also somehow soothing for everyone of us. This gives us the feeling of “safety and health of the single person first”! Around noontime, our doc Norbert Jaeger and his patient are back onboard with positive news – everything is fine, the patient can stay with us, joining the coming Arctic adventure. This final decision certainly takes a load off the patient's mind.

We are complete now, ready to go – 44 crew members and 49 scientists, helicopter pilots, and technicians from a large number of different institutions in Germany, Canada and Russia. „Anker hoch“ (Hiev up the anchor) – at 16:00 we start steaming through the the Isfjorden towards the open Norwegian Sea, calm sea, slightly snow-covered mountainsides, small-sized retreated glaciers in deep trough valleys as traces of glacier advantages during past major glaciations. Although the few rays of sunshine have been replaced by some drizzle during the last about two hours, quite a large number of curious scientists persists staying on the peildeck, impressed by this fascinating scenery. Five days of transit are ahead

of us, most of this transit through the Northeast Passage, the Russian Extended Economical Zone (EEZ), before we reach our main working area and can start with our research program. But even if we cannot do any research activities within the Russian EEZ, boredom does not show up.

Thursday and Friday (06./07.09.18). During these first days, all groups become active, working in the labs, testing or preparing instruments, down-loading software, having small and/or large meetings etc. These activities will certainly also continue beyond these days. Meanwhile we have entered the Arctic Ocean and changed our course toward the east. That means, we strictly follow this course along the continental margin towards the Siberian Arctic for the coming days, crossing several time zones. This requires to adjust our clocks to follow the daylight. Today during the night, we will start with this procedure.



Fig. 2: Polar bear on a drifting ice floe. (Photo: M. König/Uni Kiel)

Saturday/Sunday (08./09.09.18).

Concerning research, a free weekend! At least early risers and revellers do realize first small and tiny ice floes passing the ship on Saturday early morning around 04:00. Towards noontime, these ice floes become bigger, scarring along the outside of “Polarstern”, a type of noise one probably never will forget. Shortly later, between 12:30 and 14:00, strong excitement for

many people onboard, especially for the Arctic tyros, when they listen to the announcement via ship’s loudspeaker by our nautical officer Lutz Peine: “Polar bear at portside”. In this short time span, four large ice floes with polar bears are observed relatively close to the ship, one polar bear seems to sleep on the ice floe, one is running (Fig. 2), and another one, hidden behind an ice ridge, is staring at three walruses sitting at the same ice floe – is the latter the beginning of a feast or a tragedy? The outcome of this confrontation we never will find out as the ice floe and its passengers rapidly get out of our sight.



Fig. 3: Sun set and first real contact with pack ice: A spectacle for the Arctic tyros on deck. (Photo: R. Stein/AWI)

Fig. 4: The Logo of Expedition PS115/2 with the main working area, the Lomonosov Ridge between North Pole and Laptev Sea continental margin. (Photo: Alfred-Wegener-Institut)



Also on Sunday it remains wintery, almost relating to Christmas: Outside the deck is covered by snow, inside we enjoy the lunch with roasted goose, red cabbage, dumplings and ice cream as dessert (delicious! – many thanks to our cook Jörg Meißner and his team). Finally, another fascinating scenery is observed by those who stay outside when “Polarstern“ slowly passes through a field of thicker pack ice, accompanied by a gorgeous sun set (Fig. 3).

Certainly, this weekly report is quite “wintery and research-free”. The transit through the Russian EEZ did not allow to do any research. On the other hand, however, this route under more or less ice-free conditions did allow a rapid and favorable (in terms of fuel consumption and costs) travel to our research area – at the end quite probably a significant advantage. Thus, we are still in a good mood, having in mind that our research will start quite soon, shortly after midnight when we have left the Russian EEZ. Our research will start in the Gakkel Deep, a more than 5000 m deep central rift valley of the Gakkel Ridge, the active volcanic mid-ocean ridge. And then? What will happen during the coming weeks after we have reached our main working area, the Lomonosov Ridge (Fig. 4)? What about the ice conditions? Do we reach the major research goals of our expedition? etc. The next weekly report will certainly deal more with the scientific background and goals of the expedition and hopefully also present some exiting news about our scientific work here onboard this wonderful ship “Polarstern”.

That’s it for today. We send our best wishes to all our families and friends at home.

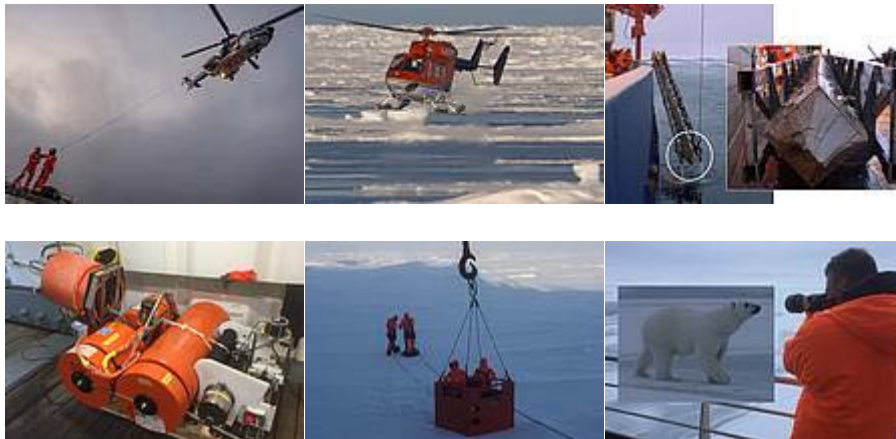
Ruediger Stein

(Sep 09, 2018)

We are ready to start – About Super-Puma, polar bear, kastenlot and OBS

[18. September 2018]

Monday (10 Sep 18). Shortly after midnight, (the first weekly report with positive news about the start of our research in a few hours has just been sent out) bad news for us: a case of medical emergency, the expedition's program has to be stopped, we have to steam with full speed back to Longyearbyen – a long way! At 19:45, however, good news from the captain: tomorrow evening we will have a rendezvous with a long-range rescue helicopter NE of Svalbard at 81°N/41°E where a rescue team will take-over our patient.



Tuesday (11 Sep 18). On one hand we continue our daily work. 07:00 Meeting on the bridge (Captain, Chiefmate, Chief engineer, Chief ELO, Doc and Chief scientist); 08:15 Meeting in the meteorology office where our “Weather Max” (Max Miller, meteorologist from the Deutsche Wetterdienst/DWD) gives us the latest information about the weather conditions in our present working area, the Arctic Ocean, as well as our home cities/countries; 08:30 Morning meeting of the Chief scientist with latest information about present research activities. On the other hand several crew members are involved in preparing the helicopter transport of our patient scheduled for 22:00 in the evening. Whenever needed support is also coming from the scientists.

At 22:39, twilight times, loud unusual noise above us. The long-range rescue helicopter (also known as “Super Puma”) is arriving to take-over our patient. For preventive medical reasons captain and doc have decided that a second crew member will also join this helicopter transport. The whole action of takeover of the two persons just lasted 12 minutes (!). Exactly at 22:51 the helicopter starts the trip back towards Longyearbyen. Our best wishes are with the two patients. Good and safe trip home and quick recovery! Deep respect and many thanks to the rescue team for this excellent and professional job!



Fig. 1: The long-range rescue helicopter ("Super Puma") is waiting for our two patients. Our chief pilot Harald de Jager and technician Victor Santos are "holding the connection" to the helicopter. (Photo: C. Rohleder/DWD)

Wednesday and Thursday (12 and 13 Sep 18). No real big events. We are still steaming through the Russian EEZ – no permission to do any research. Thus, we mainly continue testing instruments, introducing the "tyros" into the different types of geological methods, techniques and instruments that are used on deck and

in the labs, etc. Furthermore, a series of further talks are given in the third ArcTrain seminar. As we are still steaming towards the east, we set the clock another hour forward (being now five hours ahead of UTC time).



Fig. 2: Chiefpilot Harald de Jager and pilot Lukas Piotrowski during a landing manoeuvre on a small ice floe. (Photo: Thorsten Eggert/AWI)

Friday (14 Sep 18). An important day as we should leave the Russian EEZ around noon, the beginning of our research activities is coming closer and closer. At 10:00, chief pilot Harald de Jager and pilot Lukas Piotrowski start a first testing flight, a training for Lukas to land on ice floes

(Fig. 2). Further flights with scientific missions – of course outside the Russian EEZ – are planned for the afternoon.

At 12:27 ship's time we make it!! We are leaving the Russian EEZ, we can start with our research! Instruments and registration units that are of major importance for our geoscientific program – i.e., gravimeter, magnetometer, Hydrosweep, and Parasound – are switched on (Some details about these instruments will be given by our experts during one of the coming weekly reports).

At 13:18, directly after lunch time, Gerit Birnbaum (AWI sea-ice specialist and leader of one of the sea ice projects onboard) and her two team members Niels Fuchs (AWI) and Marcel König (Uni Kiel) are leaving the ship via helicopter, starting the first sea ice observation flight. By using their own camera that has been installed in one of our helicopters just a day before the start of our expedition, they map the distribution and size of meltwater ponds of a larger area in the neighborhood of "Polarstern". At 14:50, the helicopter is back on the ship. Unfortunately, the second afternoon flight has to be cancelled as the visibility conditions are getting worse.

Around 18:00, the geologists get their first station. A "Giant Box Corer" ("Großkastengreifer" – GKG) is used to sample the undisturbed near-surface sediments. At 21:00, the GKG is on deck. A perfect run - the large box (with a cross section of 50cm x 50cm) is almost completely filled with sediments that is now available for sampling by the scientists onboard. Certainly enough that all people get the material they need for their studies. At the same time when the GKG people are "playing with the mud", our "super corer", the Kastenlot, a large-sized 12m long box with a cross section of 30cm x 30cm and equipped with a 3.5 tons weight on top, is going down to the sea floor. At 22:41, the kastenlot is reaching the seafloor.

Another hour later, the core is on deck, almost 8 m of penetration, the „Zipfelmütze“ preserved under the core catcher (Fig. 3) – an optimum run!

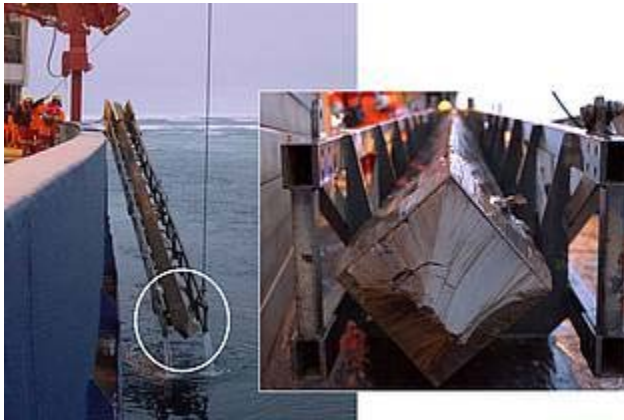


Fig. 3: The Kastenlot comes on deck, with intact „Zipfelmütze“ – a perfect run! (Photo: Thorsten Eggers/AWI)

The Kastenlot core is on deck – however, the work of the deck’s people is not finished yet. The two giant boxes still have to be separated from the 3.5 tons weight and transported into the lab – a not easy and heavy work that needs strong help from the deck’s crew. This work is done close to midnight – enough for today with all the kastenlot work. The next step, that

means the opening of the kastenlot boxes, we will leave for tomorrow. Now, we are just steaming towards the east, towards the “OBS area”.

Saturday (15 Sep 18). In the morning, first bad news from our “Weather Max” to the sea ice people: Weather conditions are too bad for doing any helicopter flight today. However, we are already thinking about alternatives during the coming “OBS” activities to make the sea ice people happy again – let’s see!



Fig. 4: The “OBS-System“ with several sensors for monitoring the micro-earthquakes, releaser, pinger etc.. (Photo: R. Stein/AWI)

What is behind the “OBS“ activities, what does it mean? OBS stands for “Ocean Bottom Seismometer“ (Fig. 4). Such instruments can be deployed at the seafloor to monitor automatically the occurrence of micro-earthquakes. Our four OBS systems we have onboard, are deployed at the northern flank of the Gakkel Deep in a water depth of about

4000 m, using the crane on starboard side. After unfastening the connection between OBS and the crane, the OBS (equipped with a pinger that allows to monitor the trip to the seafloor) is sinking downwards. John Scholz (AWI-geophysicist and lead PI for the OBS work here onboard) and Ship’s ELO Winfried Markert are following the voyage of the OBS through the water column and its landing at the seafloor on a screen. For all four OBS systems, everything runs perfectly! They will now stay at the seafloor for 12 months, monitoring the earthquake activities in the Gakkel Ridge area. In autumn 2019, they hopefully have completed their mission successfully and can be recovered again. Let’s cross our fingers!!

During the OBS activities we are also able to accomplish some of the wishes of the sea ice people. A sea ice group led by Gunnar Spreen (Uni Bremen), is using the Mummy Chair to get on the ice. Four persons, two for the work on the ice and two for the security (i.e., polar bear watch and handling the safety rope connecting people outside with the Mummy Chair) are under the way (Fig. 5). Their mission is to deploy a drift buoy and to measure sea ice thicknesses. Both actions are carried out successfully. The drift buoy sitting on the ice floe will now start its journey through the entire Arctic Ocean towards Fram Strait, the exit to the North Atlantic.



Fig. 5: The sea ice group gets on the ice floe by using the Mummy Chair. (Photo: R. Stein/AWI)

Fig. 6: A polar bear is visiting us, coming very close. The overview photo (R. Stein/AWI) shows Thorsten Eggers (AWI) when he is zooming in the polar bear. (Photo: Thorsten Eggers/AWI)



During the next OBS station, a similar sea ice action was planned as well, however, it remains a plan. A big hungry polar bear shows up (Fig. 6), comes close to the ship looking for a late afternoon snack or a dinner meal. Thus, our own mission becomes a “Mission Impossible”, and we continue to the final OBS station for today. There, everything seems to be ok. Gerit and Heike Zimmermann (geochemist from the AWI Potsdam) are on the ice (of course with two further people responsible for the safety of the group). They can start with their activities, can do some ice thickness measurements. When they continue with their ice coring, the main part of their mission, “he” shows up again (or is it his brother?). In any case, it’s a polar bear and our sea ice mission has to stop immediately, within a few seconds all people sit in the Mummy Chair for a safe ride back to the ship. With these final activities a very successful and interesting day comes to an end.

Sunday (16 Sep 18). Early Sunday morning. The second geological station is on the today’s program. We are still working in the Gakkel Deep area, 5000 m of water below us. Thus, running the sampling gears takes some time. At 02:00 the GKG goes to water, the gravity corer (“Schwerelot” – SL) follows three hours later (of course after the GKG is on deck!). Again, both runs are very successful.

After having finished this station, the geology says “goodbye” for work on deck during the coming three days and gives the lead to the geophysicists (the cruise lead, of course, remains in the hand of a geologist). In about an hour, the geophysicists will start deploying their airguns and streamer, the beginning of a long west-east seismic profile. What’s behind this project, why they are doing this? These questions will be answered in the next weekly report.

That’s it for today.

We are in a good mood and send our best wishes to all our families and friends at home.

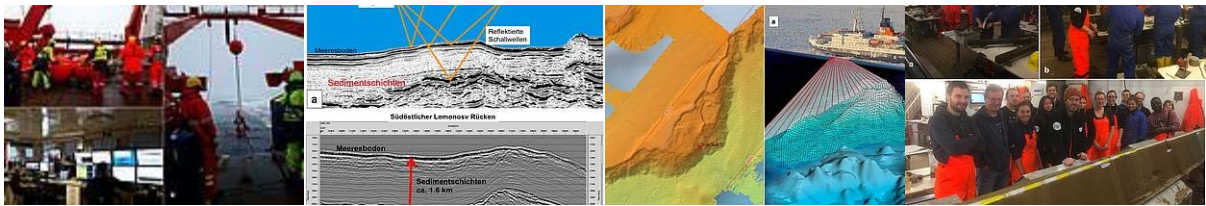
Ruediger Stein

(Sep 16, 2018)

With geophysics and geology towards 83°05'N – the northernmost position of our expedition

[25. September 2018]

Monday/Tuesday (17/18 Sep 18). A new week begins - fog, calm sea, ice free. Nothing reminds us that we are in the Arctic Ocean (but this may change soon when we are steaming northwards end of this week!).



Something, however, has changed in comparison to the last weeks. As mentioned at the end of the last weekly report, the geophysicists have started their geophysical profiling, it's running since Sunday morning, realized by a „wum“ every 15 seconds. What's behind this “noise”, i.e., what are the scientific goals, what's the technical approach? This can be best explained by Estella Weigelt, AWI geophysicist and leader of the geophysics team onboard “Polarstern”.



Fig. 1: (a) Deployment of streamer with stabilisation birds. (b) The air pulser array is deployed. (c) The seismic room and headquarter of the geophysicists. Here all Instruments are watched: is the pressure for the pulsers ok, do they release regularly, are (Photo: E.Weigelt/AWI)

A major aim of our expedition is to perform seismic profiling across the central and the southern part of the Lomonosov Ridge for imaging of sedimentary structures and supplement the profiles obtained during “Polarstern” Expedition PS87 in 2014 in the surroundings of proposed locations for future scientific drilling operations within the International Ocean Discovery Program (IODP). To improve the pre-site survey, cross-lines to existing profiles shall enhance the imaging of sedimentary strata and the depth calculation of target reflectors to be reached at the proposed IODP sites.

So, what are the geophysicists doing here onboard “Polarstern”? After a great breakfast with delicious pancakes they have started in the morning of Sep 16 to deploy the streamer (Fig. 1a) and the air-pulsers (Fig. 1b). Four air-pulsers, filled with pressure air of 150 bar, are released every 15 s. The produced sound signal penetrates the water and ground below the sea floor up to several km depths. The sound waves are reflected at different layers and these reflections recorded by a streamer - a 600 m long chain of hydrophones towed behind the ship (Fig. 2a). The recorded reflection signals image the layering and structure of sedimentary packages (Fig. 2). Best records are achieved by a constant speed of 5 Kn, which is no problem for “Polarstern” in the 1-2 m thick sea ice. Additionally, the streamer

depth can be controlled and lowered to 30 m depth below thicker ice. But fortunately, we soon reach open water after our start at the Gakkel Deep, and a long survey across the Amundsen Basin, along the Lomonosov Ridge, and finally far into the Makarov Basin has been absolved.

Three days long the monotonous "wum" of the air-pulsers enjoys the geophysicists. But marine animals could be annoyed by such a noise. Thus, a "MMO-watch" (Marine Mammal Observer) has been organized by the scientists, especially the ArcTrain students (Many, many thanks to all of them!). Day and night, they spy for any marine mammals such as whales, polar bears or walruses, always ready to inform the seismic watches. In case these animals would appear in a range of 500 m around the ship, we would immediately interrupt our running seismic profiling. This fortunately has not been necessary so far as no animals have been observed during the first phase of our seismic work.

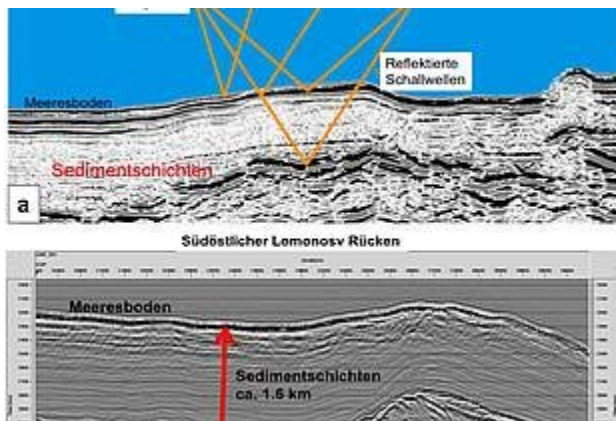


Fig. 2: (a) Principle of reflection seismics: Air pulsers directly towed behind the ship release a sound which is reflected at different layers in the ground. The reflected signals are recorded by the streamer (chain of hydrophones) (Source: E. Weigelt/AWI (Photo: K.Berglar/BGR; E.Weigelt/AWI)

First results of seismic lines along the Lomonosov Ridge look very well (Fig. 2b). At the cross-points to former surveys up to 1600 m thick undisturbed and parallel sedimentary layers can be identified, suggesting ideal drilling locations. Furthermore, the profile through the

Amundsen Basin indicates an interesting 400 m high elevation. A part of this seamount has already been recorded in 2014 by sub-bottom profiling and bathymetry surveys. But up to now it's not clear if this rise results from a mud volcano close to the seafloor, or if it presents a deeper structure. As imaged in the new seismic lines this seamount rises from the crust and penetrates all sedimentary layers, thus indicating a magmatic origin.

After this short excursion into the field of geophysics (Thanks Estella!) back to the daily routine program. Since today (Wednesday 19 Sep) the geology is again the driving force in our research activities. At the moment working at the aft deck is quite convenient, air temperatures around +1 °C, a totally smooth sea surface. Besides the giant box corer and gravity corer, the first use of the multicorer during this expedition is scheduled. By means of the multicorer, totally undisturbed near-surface sediments can be obtained. Eight 50 cm long plastic tubes are cautiously pushed into the sediment by one run. When the plastic tubes are on deck and brought into the sediment lab, an intensive sampling routine starts. The sediment piles are cut into 1 cm thick slices, stored in glass vials or plastic bags, some are stored at -20°C, some at +5°C, etc. What procedure is used depends on the type of post-cruise study to be done later in the home labs.

On Thursday (Sep 20) a highlight is on the program – at least for the geologists. During the Polastern Expedition PS51 in 1998 (from our PS115/2 people, crew members Uwe Grundmann, Lutz Peine, Ecki Burzan und Michael Martens, and scientists Norbert Lensch, Estella Weigelt and the Fahrtleiter have already been onboard at that time – welcome in the club of the “Glorious Seven” and congratulations to the 20. Anniversary of this event!), a “strange” sediment core has been recovered. The lower half of that core looks totally different in comparison to the upper part. Different colors, different grain size and much higher density values, faulted sediment layers – simply strange. Does this abrupt change represent a hiatus? Are several thousands to million years missing? During Expedition PS87 in 2014 we have recovered a sediment core close-by to our present study area (Uwe Grundmann, Michael Martens, Norbert Lensch, Frank Niessen, Michael Schreck and the Fahrtleiter have

also been onboard and can certainly confirm this statement) where later studies could prove the presence of a hiatus and an age of 6-9 Ma for the basal sediments of that core. These old sediments have been recovered from an area of Lomonosov Ridge that is characterized by slide scars and steep slopes that allow old sediments cropping out at the surface. This gives us the unique chance to core these old sediments by our simple coring devices we have onboard (i.e., the gravity corer) – an exciting story might be the outcome!!

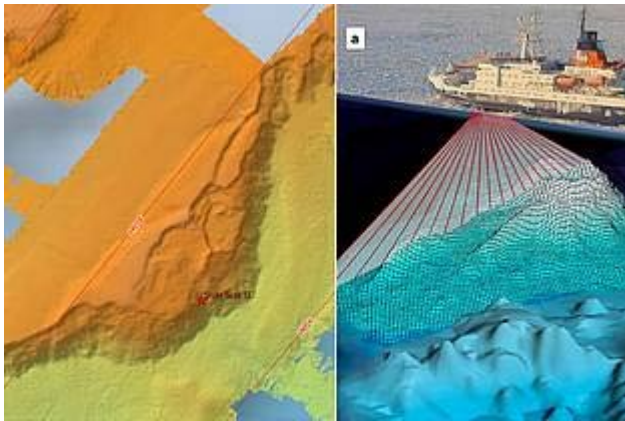


Fig. 3: (a) Scheme explaining the functioning of the multibeam system (from H.W. Schenke, 2008). (b) 3D bathymetry map of the region around the slide scars at the southern Lomonosov Ridge. The red star indicates the location of Core PS115/2_17-1, recoring (Photo: Melanie Steffen, Sophia Andree, Lamis Oberwinster/AWI Bathymetrie-Gruppe)

However, first of all the prerequisite for this is a precise information about the seafloor topography and the structure of the subsurface sediments. The first set of data can be obtained by a Hydrosweep bathymetry survey, the latter from

Parasound profiling. Some background about how the Parasound systems works will be explained by our Parasound specialist Frank Niessen in one of the next weekly reports. Some background about the Hydrosweep system will be given by our Hydrosweep Bathymetry Team Melanie Steffen, Sophie Andree and Lamis Oberwinster in the following:

Our Hydrosweep shipboard swath bathymetry system is used to explore the surface under the deep sea. The ocean has a certain landscape or topography like the land, but it is hidden under vast masses of water. This topography is called bathymetry. To find its characteristics it is necessary to look through the water. Light would make it only for a few meters, but sound is very well propagated in the water column. So we choose sound and in a depth of several thousand meters it makes sense to use a deep frequency such as 15 kHz. Therefore a transducer (very fine device, which is able to send and even receive acoustic signals) is mounted under the research vessel (Fig. 3a). From the timespan it takes the signal to reach the seabed and come back, the depth can be calculated. That is what a multibeam echosounder does. The result is a point cloud of all reflected soundings, which in our cruise, depending on the depth and characteristics of the water, covers a width of 5 – 10 km. From this point cloud a high-resolution map is made. The further we sail, the more complete it gets. Especially undersea features such as seamounts and slide scars make it exciting. It is always fascinating to map a „complete“ area, while unmapped parts leave questions open (“What might the rest look like?”). Before the data are ready to be used, however, it has to be post-processed in multiple steps to clean the data for outliers that may appear due to systematic errors. The final result is definitely worth to do such work as demonstrated in the produced 3D bathymetry map of the slide scar area (Fig. 3b).

Back to our approach. How do we proceed? We know now size, extension and steepness of the slide scar area, have selected coring stations considering the Hydrosweep and Parasound data. These coring stations are, however, very close to each other. Thus, a precise navigation is needed to bring the ship, or more important, the coring gear to the right spot. This is only possible if you have the right person on the bridge and an additional person (many thanks to our ELO Winfried Markert) who is following the “pinger” signal (Remark: a “pinger” is attached to the coring gear that allows to record the position of the coring gear very exactly). Fortunately, we have both, the detailed Hydrosweep & Parasound data and the excellent crew members to carry-out this precise coring successfully. Five runs of the gravity corer have been done within a few hours. Many thanks to all the people from crew and science who have been involved in this “coring event“. Now, we have to wait a few days (weeks? months?) because our specialists (maybe Micha Schreck?) have to find the right

fossils to prove that these sediments are really a couple of million years old. Let's cross our fingers for the success!



Fig. 4: (a) and (b) Action in the large wet lab. Cores are described and sampled, boxes cleaned etc.. (c). Happy faces behind a beautiful kastenlot core (from left to right: Nikolai Wöhlthjen, Frank Niessen, Rémi Lenny, Camille Brice, Adalbert Pfeiffer, (Photo: R. Stein/AWI)

The weekend is coming – if you look into the labs (Fig. 4) or follow the work on the aft deck, however, no difference is obvious.

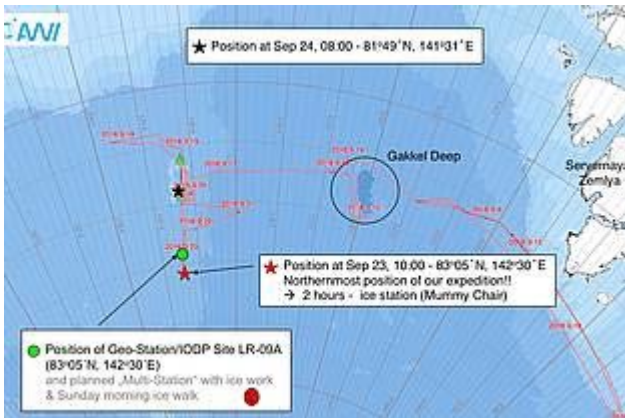


Fig. 5: Map with our cruise track and the northernmost station of our expedition. (Photo: Alfred-Wegener-Institut)

On Friday and Saturday (Sep 21/22) routine work is going on as every day in the week. For Sunday (Sep 23), however, a major event is planned, a “Multi-Station” during which – besides the normal geo-station work with giant box corer,

multicorer and kastenlot/gravity corer - a major 6-hours sea-ice station on a larger ice floe is planned. In addition, as a highlight and social event, all crew and science members should have the possibility for a Sunday morning walk on the ice floe. This is our exciting plan! Unfortunately, however, it remains a plan! We get up on Sunday morning, stay on the bridge looking for our large ice floe since 05:30 – no success at all. Only small ice floes around, nothing else. The captain and the Fahrleiter decide to continue for another two hours towards the north – again nothing! Finally, we have to give up our plan of the “Multi-Station” selected for scientific but also social activities. It's really a pity, especially for the tyros, the young people, students etc. who are in this Arctic Ocean environment for the first time. Instead of having this “Multi-Station”, a two-hours ice station with meltwater pond studies and sampling, ice coring and deployment of drift buoys is carried out at our northernmost location – 83°05'N, 142°30'E (Fig. 5) (about the results of these as well as earlier ice station activities you will get more information during the next weekly report), followed by a normal geology station with giant box corer, multicorer and kastenlot corer. At about 19:00, the geophysicists take over – similar to the last Sunday – and start their seismic profiling towards the south.

That's it for today. We send greetings to all our families and friends at home.

Ruediger Stein

23.09.2018

- with contributions by Estella Weigelt (geophysics program) and the Bathy Dream Team Melanie Steffen, Sophie Andree & Lamis Oberwinster (Hydrosweep program)

A mosaic of silence, storm, sea ice and kastenlot

[01. October 2018]

Monday (24 Sep). A new week begins – quite similar to the last one. For the next three to four days we have to listen to the “music of the geophysicists”, every 15 seconds the monotonous “wum” will enjoy us.



Tuesday (25 Sep) – hump day is reached. 20 days are behind us, 20 days are ahead of us. There are a couple of other exciting aspects that make this day unique: a beautiful sunrise, calm sea, no ice at all, many birds are surrounding the ship. Are we really in the Arctic Ocean? I am sure we are as I trust our nautical officers on the bridge.

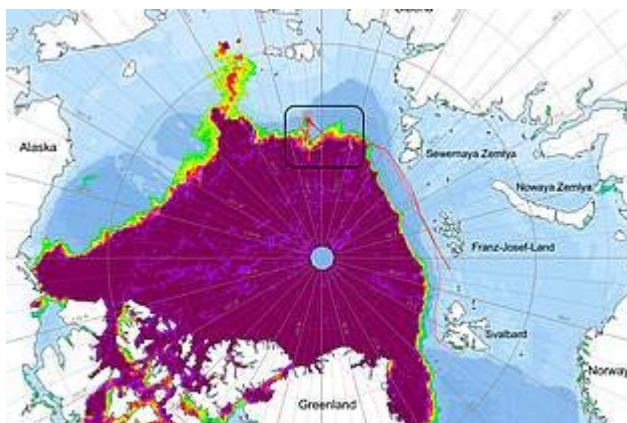


Fig. 1: Arctic sea ice cover in mid-September 2018; colors from dark purple, red, yellow and green = decreasing ice concentration from 100% to about 20%; light blue = ice free. Black rectangle = working area; red line = course track until Sep 19. (Photo: <http://mapserver.fs-polarstern.de:8081/mapviewer>)

The Arctic sea ice simply has reached another prominent minimum as has been observed in several different Arctic regions this year and described in the public literature and press releases a few weeks ago. The Arctic marginal seas and their adjacent continental margins are more or

less ice-free whereas the central Arctic Ocean is still covered by heavy pack ice (Fig. 1).

But let's come back to this unique beautiful sunset and the very calm sea – is this extreme silence (of course, here we have to exclude for some minutes the “music of the geophysicists”) real or is it misleading? Is it perhaps the calm before the storm?? Listening to Weather Max's report in the morning this is not an unrealistic option!! Weather and model forecasts predict stormy weather with high waves for Wednesday/Thursday (26/27 Sep). Who really knows what's ahead of us?

Two days later (Thursday 27 Sep, 08:15) we know the truth! Max' weather forecast from Tuesday was not so bad – later today or latest during the coming night we will get very strong winds (8-9 Bft) with 3 to 4 m high waves. Thus, our geophysicists decide to bring the 3000m long streamer as well as the airguns on deck. The danger is too high to damage the streamer. In less than four hours, streamer, blubs and airguns are on deck, and we are ready steaming towards the north, ready for another geological station. This has been at least our plan!



Fig. 2: "Polarstern" steaming from wavy open-water conditions into more ice-covered area, searching for the next geological station. (Photo: R. Stein/AWI)

Friday (29 Sep), 06:00 in the morning – ready to run the geological gears. Meanwhile, however, waves have become higher and higher, a strong swell has been established. The ship is moving up and down, and the work with the heavy geological gear becomes difficult and – even more important – dangerous. After a short inspection of this situation on the aft deck, captain, chief mate and chief scientist immediately decide to stop all running activities, the geological station is cancelled. Instead, we are steaming towards the east into the ice (Fig. 2), looking for a station where ice and swell conditions allow hazardless operation of our geological gear.

Four hours later, around 10:00, we stop for running a geological station with giant box corer, multicorer and kastenlot corer. As the weather and visibility conditions are good enough as well, contemporaneously to the geo-station work two helicopter flights are scheduled, making our ice people happy (to have happy people around is always good and important for the whole life onboard). They get the chance for ice observations and the deployment of a drift buoy.

Ice observations from the helicopter and the deployment of drift buoys, these are two key aspects of interest of our ice people onboard. Thus, they should get the chance to introduce themselves and tell us what they are doing here and why. Go ahead, ice people!

Our sea ice team focuses on three different topics. Niels Fuchs, Gerit Birnbaum and Marcel König investigate melt ponds, which presently refreeze. They are currently only present on second-year ice floes, which did not melt completely during the summer season. The new ice on the melt ponds is considerably darker than the surrounding floe surface. Hence, melt ponds decrease sea ice albedo also in the period of refreezing. The project aims at increasing the quality of areal fraction and melt pond albedo derived from airborne and satellite remote sensing measurements. Heike Zimmermann is mainly interested in the bottom part of the second-year floes and the ice algae that live there. She develops methods to search for ice algae DNA in sediments that are thousands of years old, and with a little luck, to find clues about the sea ice extension of the past. Gunnar Spreen deploys buoys in our working areas to contribute measurements of air temperature and air pressure to the Year of Polar Prediction (YOPP). Additionally, a dense net of buoys is deployed, which allows to analyze ice drift and ice deformation on a local scale.

In their project, Niels, Gerit and Marcel link airborne measurements by using the "Polarstern" helicopter to ground-based measurements on the ice. In order to obtain so-called ground-truth data and to validate the airborne measurements, ideally an area with melt ponds should be first observed with the airborne cameras followed by ground-based measurements. This ideal combination of measurements could not be performed so far due to unfavourable ice

and weather conditions. Up to now, Niels and Gerit have carried out four measurement flights. Images taken by an RGB-camera and a hyperspectral camera will allow to derive pond characteristics (areal fraction, albedo) in a radius of 90 km around Polarstern. Almost all ponds on smaller and bigger ice floes in our working areas were melted entirely through during summer. A 5-10 cm thick layer of grey ice with a bulk salinity of about 10 g/kg is now covering them. Only their shape makes them distinguishable from new ice in intermediate floe areas.



Fig. 3: Radiation measurements over a refrozen melt pond during the ice station on 23.09.2018. (Photo: Lukas Piotrowski/HeliService)

During the two-hour ice station on 23 Sep 2018, Marcel could perform ground-based measurements on a refrozen melt pond (Fig. 3). He measured spectral reflectance of the ice surface and ice thickness, ranging from 5 to 7.5 cm, at different sites. The quality of the reflectance measurements could be increased by means of a double-spectrometer setup,

which allows a correction of changes in illumination during a measurement cycle. Videos taken with an underwater camera below the ice cover proof that the pond has melted through the ice floe before refreezing.

Sea ice contains a high diversity of microorganisms like unicellular algae. These can be found in small channels filled with brine, especially in the bottom part of the ice that is connected to the sea water, which provides nutrients for the algae. In summer, the sunlight can penetrate the ice, allowing an algae bloom at the ice bottom, which is visible as a yellow-brownish coloration of the ice. The drilling of ice cores on an ice floe by Heike on the 23.09.2018 permits the collection of algae samples. By applying DNA metabarcoding (a specific part of the genetic code can be used similarly to a barcode in a supermarket) the samples can be used to make inferences about the species composition in the ice.

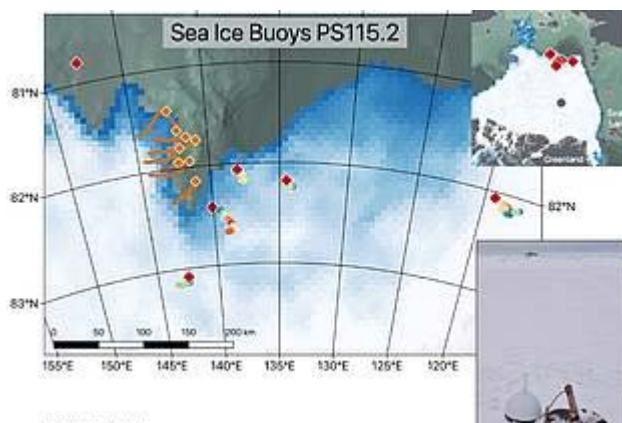


Fig. 4: Starting points of the 15 buoys deployed so far (two in water, the rest on ice floes; image lower right). Colored lines = drift route of buoys; sea ice cover (28 Sep 2018): blue (little ice) to white (100% ice concentration). (Photo: Alfred-Wegener-Institut)

In the Arctic, and especially in the remote location of the Arctic we are in, there is only a small amount of weather observations like air pressure and temperature available. Numerical models therefore have problems to reliably predict the weather and climate in the Arctic, which also influences the quality of

weather forecasts for more southerly latitudes like Europe. It is the goal of the Year of Polar Prediction (YOPP) to change that. From 2017 to 2019 a huge amount of extra observations are taken in Polar regions, models are getting improved, and also we are a small part of this international project. By now Gunnar deployed seven of the nine YOPP buoys, which measure air temperature, pressure, and sea ice drift. These buoys will drift with the ice for more than a year and every hour transmit their observations by satellite to observational centers. The drift of the buoys can be followed under <http://meereisportal.de>. Some of the buoys already traveled more than 100 km since their deployment. The YOPP buoys were

deployed equally along the route from the ship or by helicopter to sample an as large area as possible (Fig. 4, red diamonds).

In a second experiment, an array of buoys measures the drift and deformation of the sea ice on a more local scale (Fig. 4, orange diamonds). Next year in October, "Polarstern" will be frozen in and drift with the sea ice for one complete year, starting from a location a bit north of the one we are currently. In the framework of this large international MOSAiC project also an array of autonomous measuring stations will be deployed in a radius of 40 km around "Polarstern". The eight buoys deployed by us will provide data about sea ice drift and deformation from this year, to have a comparison to and as an outlook on the expected situation during MOSAiC next year.

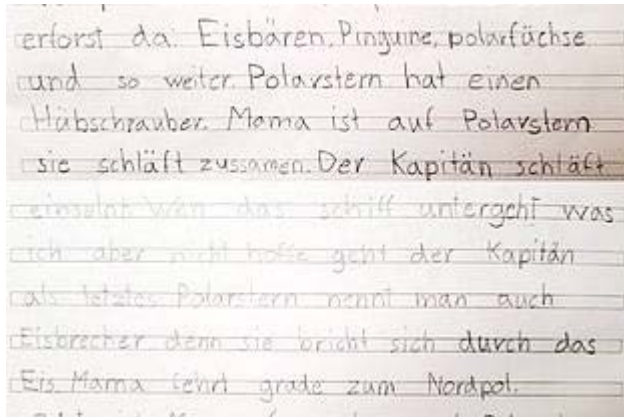


Fig. 5: A short school essay by Emil Schmengler, dealing with the self-selected theme "Polarstern" and sent to his mom here onboard. (Photo: Alfred-Wegener-Institut)

Many thanks to the ice people for this detailed excursion into their ice business! But now let's come back to our running daily business. It's still Friday (28 Sep), the kastenlot (my subfinal!?) is just under the way to the seafloor. Exactly at lunch time, the kastenlot core is on deck – 9 m in length!! The full splendor, however,

becomes first obvious on Sunday afternoon after the kasten (the box) has been opened. A sedimentary section of 8.8 m in length (the longest core we got so far during this expedition!) characterized by beautiful color cycles, changes in structure and texture, etc. – just beautiful!! What secret is behind all these cycles and changes, what kind of story in terms of climate change these sediments can tell us? For answering these questions we need the results of our future studies of these cores. That means, we have to wait of a couple of months, maybe years!

At the end of this 4th weekly report – today is Sunday (30 Sep) – I would like to share with you a little nice, interesting and touching contribution, a school essay by Emil Schmengler, dealing with the self-selected theme "Polarstern" and sent to his mom here onboard (Emil has certainly recognized and described the duty and importance of the captain of "Polarstern" quite correctly).

That's it for today. Kind regards to all our friends and families at home from the "Polarstern", also in the name of all cruise participants,

Ruediger Stein

30.09.2018

- with a contribution of our sea ice people Gerit Birnbaum, Niels Fuchs, Marcel König, Gunnar Spreen und Heike Zimmermann)

About old stones, Arctic weather, farewell to the Arctic and Heinz Rühmann

[09. October 2018]

Monday (01 Oct 18). The final research week starts. For today as well as tomorrow a full coring program for the geologists has been scheduled. At two potential locations selected for drilling within the IODP program multicorer, giant box corer, gravity corer and kastenlot corer are used successfully to sample the near-surface sediments.

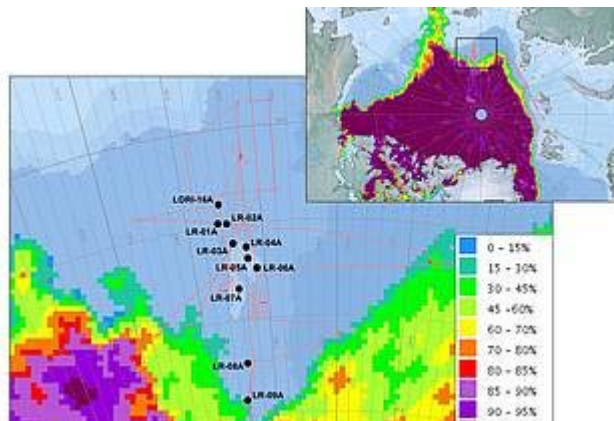
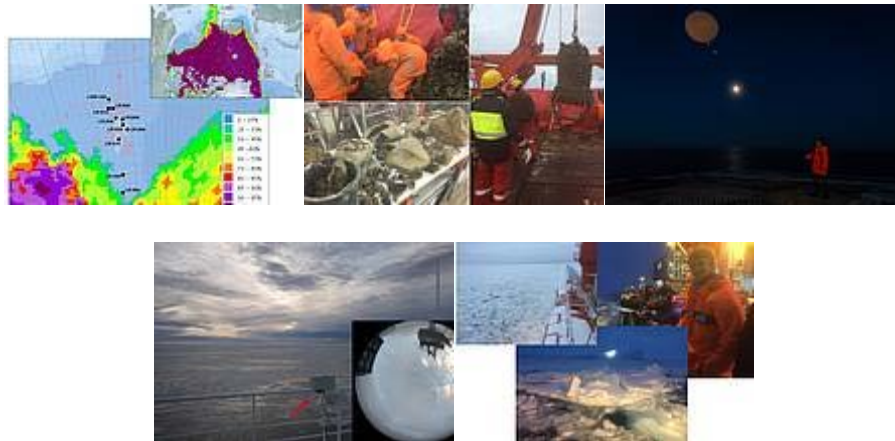


Fig. 1: Arctic sea-ice concentration in mid-September 2018. Red line indicates cruise track. The locations of potential IODP drill sites of the scheduled and unfortunately later cancelled IODP Expedition 377 are shown. Note: all of the locations are in ic (Graphic: <http://mapserver.fs-polarstern.de:8081/mapviewer>)

Despite this success, however, a wistful feeling remains. Originally our “Polarstern” Expedition has been planned to be carried out as part of the IODP drilling campaign. Finally the already scheduled IODP campaign has been cancelled as the

additional money for hiring a Russian powerful icebreaker needed to break the ice under worst conditions, has not been available. This year, however, we did not find any ice at all the potential drill sites (Fig. 1), i.e., the drilling campaign could have been carried out without any additional icebreaker support. What a pity that we did not have known this in advance! Let’s hope and cross our fingers that the IODP drilling compaign will become reality before the end of the running IODP phase.



Fig. 2: The stone dredge is onboard (right picture), mud and stones are identified and cleaned (upper left), and then presented on a table in the wet lab (lower left). (Photo: R. Stein/AWI)

Wednesday (03 Oct 18). We wake up in the morning, pancake ice around us. Meanwhile we have steamed back to “our” seamount in the central Amundsen Basin. As you may remember from one of the earlier weekly reports we have – based on the new seismic data - postulated a magmatic source of this structure. To get a further proof of this hypothesis we would like to use the rock dredge to sample the seafloor. If the sampled rocks would be mainly composed of magmatic rocks we have another evidence for our hypothesis. At 07:05, the dredge goes to water, under the command of our technician Norbert Lensch. A water depth between 3500 and 4000 m – a long way to go! One hour down to the seafloor, one hour sampling at the seafloor, and one hour back to the ship. At 10:30 the dredge is on deck, a sack full with mud and stones (Fig, 2). After a “funny” cleaning action at the aft deck, a large collection of small and big stones is on the table in the wet lab (Fig. 2) – but no magmatic rocks, no basalt! A second dredge run in the afternoon gives exactly the same results, partly strongly weathered sand-, silt- and claystones, partly covered by thick manganese crusts. Even we did not recover magmatic rocks, these dredges can be regarded as another highlight. The recovered stones belong more or less all to the same type of sedimentary rock suggesting an in-situ origin from the top of the seamount. Furthermore these rocks are certainly “old”, i.e., of pre-Quaternary age. If we can date these rocks, we also would get an idea about the minimum age of the (probably) underlying magmatic basement rocks. Maybe the sedimentary rocks represent time intervals when the Arctic Ocean was much warmer and ice-free – Pliocene, Miocene or even older? No limits for our “geo-fantasy” at the moment as we do not have real data to prove any of these ideas. These data, however, will be obtained by our future detailed investigations in the home labs



Fig. 3: Only the moon is watching: Dirk Olonscheck at a launch of a radiosonde from the Helicopter deck during night. (Photo: Christian Rohleder/DWD)

Thursday (04 Oct 18). The last geo-station, a gravity corer goes to water very early in the morning. That’s it, the end of the geology sampling and coring program. At 08:30 then the ultimate station of our expedition: a final drift buoy is deployed via mummy chair. This becomes a very short station. The buoy has just been put on the ice floe when a polar bear mom and her kid show up, coming very close to the ship and the buoy. Some movement or noise on the ship has scared the polar bears, and we continued our voyage towards the west. Thus, we do not know whether our two polar bears will come back to the buoy, play with the buoy At 10:00, we stop all scientific research instruments and registration systems – this is the end of our research program!

The weekend, a special weekend (you will see later), is coming closer, introduced by pancake ice and thick fog, simply dull weather conditions! “Weather” is the key word – up to

now another minor program dealing with meteorological measurements, has not been introduced so far. Dirk, this is now your chance – go ahead!

During our cruise in the Arctic waters, Dirk Olonscheck from the Max Planck Institute for Meteorology (MPI-M) performs atmospheric measurements in collaboration with Christian Rohleder and „Weather-Max“ from the German Weather Service (DWD). The main part of this work is the launching of radiosondes attached to a weather balloon. While the DWD launches one radiosonde per day at 12 a'clock UTC, Dirk complements this base activity by launching three additional radiosondes per day every six hours (Fig. 3). This is part of the special observing period of the Year Of Polar Prediction (YOPP). Radiosoundings have a long tradition also in polar research. At the Third German Expedition to Antarctica in 1938/39, radiosondes were described the following: "The shining device is a tiny radio station, strong enough to be heard from a distance of 60 km. And due to a clever setup, this instrument of only about 1 kg of weight – including the battery – is constantly sending temperature, air pressure and relative humidity. Together with the wind data, the sum of the meteorological measurements provides everything that one can demand about the weather conditions. And this is from the sea level to more than 20 000 m height, i.e. far into the stratosphere." (*, translated from German)

Our radiosondes on board "Polarstern" only weight 100 g and the balloon is carrying them to a height of more than 35 000 m. However, for more than 80 years, the basic principle is the same! The collected data on the temperature, humidity and wind profiles of the atmosphere hopefully contributes to substantially improve the weather forecast here in the northern high latitudes, and are also used directly on board to judge the safety of our helicopter activities. As in earlier times, „the daily radiosounding belongs to breakfast, like brushing the teeth beforehand“ (*), but still many launches have plenty of visitors from both the scientists and the crew.

* Source: Ernst Herrmann (1941), "Deutsche Forscher im Südpolarmeer, Bericht von der Deutschen Antarktischen Expedition 1938-1939", Safari-Verlag Berlin

The especially curious ArcTrain students Amélie Desmarais and Samira Samini join the launches from early on. They get to know the procedure and were a valuable help for launching so many weather balloons in the last weeks. Many thanks to Amélie and Samira!



Fig. 4: A small device on the Peildeck (red arrow): The upward-looking cloud camera from MPI-M detects the coverage, structure and brightness temperature of the clouds by taking visible (small photo) and thermal images of the ceiling. (Photo: Dirk Olonscheck/MPI-M)

Thick low-level clouds and fog are characteristic for our cruise. Consequently, there has been rarely the chance for aerosol measurements that require an unobscured view on the solar disk to measure the direct solar radiation and to provide information on the number and size

of air-pollution and salt particles in the Arctic air. However, the weather conditions have been excellent for another research activity on board the ship: the detection of the cloud base height using a cloud camera system that takes visible and thermal images of the ceiling every 10 seconds (Fig. 4). While we can get information on the cloud coverage and the height of the cloud top from satellite data, the cloud camera provides a view from below. Hence, we collect high-resolution data of the spatio-temporal variability of the cloud base height by measuring the brightness temperature of the clouds. This allows for an estimate of the warming of the underlying air mass. With engaged support from the ArcTrain students

Amélie Desmarais and Aliaksandra Kazlova, we have already started to analyse the collected data on board.

We collected plenty of meteorological data during the expedition that will hopefully be an important contribution to a better understanding of the polar meteorology.

Many thanks, Dirk, for these insights into the weather business – but now back to our daily business, especially our weekend.



Fig. 5: We say good-bye to the Arctic and enjoy this unique scenery. (Photo: R. Stein/AWI)

Saturday (06 Oct 18). 07:00 on the bridge, the captain changes the course to 290, we are steaming through ice-free waters towards WNW. At 09:41 we pass $83^{\circ}05.1' N$, $56^{\circ} 24.4' E$! Actually nothing special, or? If you remember what has happened on September 23, you would say “yes, an important step”!! On

September we have documented (see 3rd Weekly Report) that with $83^{\circ}05' N$ we have reached the northernmost location of our entire expedition. This statement has to be withdrawn now! And we continue towards WNW: at noon we reach $83^{\circ} 12.5' N$! Where does this end? – although most of the people have not realized the change of our course and certainly do not know why! Meanwhile small pancake ice floes are passing the ship, becoming closer and bigger (Fig. 5, upper left). Slowly the penny dropped!! We are approaching the ice edge, we reach the ice edge at 18:00 – exactly in time with the beginning of our barbecue. And this is now really the northernmost position of our expedition: $83^{\circ} 38.7' N$, $44^{\circ} 08.3' E$! But this is not all – a few minutes later two polar bears on an ice floe (mom and kid, maybe the same we have seen three days ago?), followed by a – for Arctic conditions – already quite big iceberg, drifted along on starboard side. This is really a perfect staging by our captain that would fit into any movie. Congratulations and thanks a lot!! This makes our expedition to an unforgettable adventure to all the participants, especially the tyros. We have now some hours to enjoy this scenery and the farewell barbecue & dancing party, and say “good-bye” to the Arctic.



Fig. 6: Captain and Fahrleiter invite all crew and scientists to the „Feuerzangenbowle“ into the „Geräteraum“. (Photo: Max Pixel, Creative Commons Zero - CC0)

There is one person in our group, however, for whom this expedition is and remains unique and unforgettable - Ovie Benson, Bremen student from Nigeria. Today it's Ovie's 30. birthday that we all can celebrate together in front of this unique Arctic scenery. According to a Bremen unwritten law, the 30. birthday and being not married also ask for a “special treatment” (see the German “Wochenbericht”).

Sunday (07 October 18). At the end of the weekend another highlight has been scheduled for Sunday evening. Captain and Fahrleiter invite for a cinema evening into the "Geräteraum". The German cult movie "Die Feuerzangenbowle" with Heinz Rühmann as main actor is shown, and the real "Feuerzangenbowle" (= glogg with some rum) can be enjoyed while watching the movie.

One final week, and we are back home!!

Best wishes from all of us,

Ruediger Stein

07 October 2018

(with a contribution by Dirk Olonscheck/MPI Hamburg on "Meteorology")

About packing, cleaning, writing – and a thank you very much at the end

[15. October 2018]

Our research program has already been finished on Thursday last week at 10:00, and we have started our journey back to Bremehaven. In this final week of the expedition, other activities than research are dominating our daily life. These are mainly packing boxes, instruments etc., cleaning labs, writing reports etc.



Besides this, some other activities continue in the wet lab of the geologists. There are still a couple of cores that have to be opened, described and sampled. Some hurry is needed, as after having finished the sampling work, the sediment samples have to be stored in boxes, the wet lab has to be cleaned in time. Strict deadlines for all these activities are given by our 1WO Uwe Grundmann! Although routine (and sometimes boring) work is controlling our day life, some details should be listed here in chronological order.



Fig. 1: The Polar Lights (Aurora borealis) – a spectacle on the peildeck. (Photo: Gunnar Spreen/Uni Bremen)

Monday (08 Oct 18) and Tuesday (09 Oct 18) are the final busy days in the wet lab, opening cores, taking hundreds of samples. For a few hours, a stranger is watching the geologists doing their “mud work”, a little bird arrives, sitting in the wet lab, relaxing for some time before it continues his

journey to ??? Our daily morning meetings are shifted now to the afternoon, extended by short reports of first scientific results by the different working groups. Today (Tuesday), for example, Dirk Olonscheck tells us a story about the outcome of launching 90 (!) radiosondes. The “special highlight of the day”, however, are the polar lights, Aurora borealis, observed by many people on the peildeck – fantastic, really impressive! (Fig. 1).

Wednesday (10 Oct 2018) – a special day with an unexpected event – at least for those who are not onboard and thus do not know the background. We change our direct course to

Bremerhaven for a short stop in Tromsø. The stop in Tromsø has been scheduled to embark nine engineers and technicians who will directly start onboard Polarstern with some prework to prepare the large-scale and time-consuming reparation work to be done during the coming shipyard stay in Bremerhaven. Nine new people - in “exchange” with our four HeliService guys Harold, Lukas, Thomas and Victor as well as two persons from the crew and science party.



Fig. 2: At the Grøtsund-Pier near Tromsø: Polarstern in „living“ letters. P = Cynthia; O = Camille; L = Frithjof; A = Amelie; R = Pascal; S = Charles; T = Aliaksandra; E = Dirk; R = John-Robert; N = Rudy, Sophie & Jolien. (Photo: Ryan Love/MUoN Canada)

We are steaming towards Tromsø, cloudy conditions and drizzle. At 08:30 the pilot comes onboard, two hours later we arrive at the Grøtsund-Pier north and quite far away from Tromsø City (where we “normally” stay at the Breivika Pier). The Grøtsund-Pier is different, a little bit

hopeless, looking like a security area. A positive aspect, just with our arrival the sun shows up, nice weather for a walk towards Tromsø City – but not for us. But at least – and we all are very happy with this – we can go outside the ship, walk in front of the ship, play even soccer or just enjoy seeing Polarstern from outside and under sunny conditions. Our short stay in Tromsø is impressively documented in the “living letters” of the name Polarstern, arranged on the pier in front of Polarstern (Fig. 2). Two hours later, all people are back onboard, we are leaving, steaming through a beautiful fjord landscape towards the North Atlantic, accompanied by sunshine, some drizzle and a rainbow – again a great scenery.

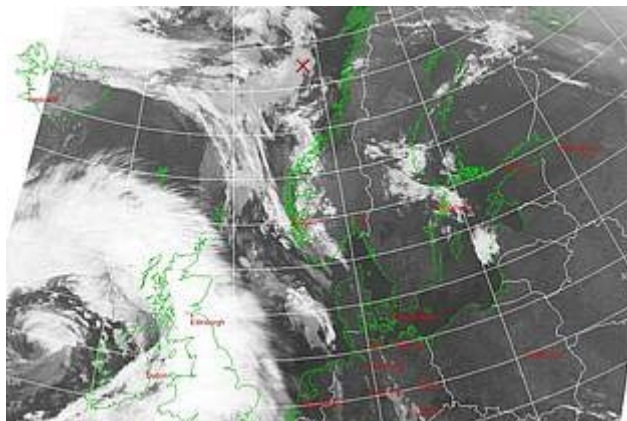


Fig. 3: The storm is coming! Satellil photo from 12 Oct 18, 04:38 UTC. The red cross shows the position of Polarstern at that time. (Photo: www.fs-polarstern.de/images/Wetter/satpic/)

Thursday (11 Oct 18). Most of us are still involved in packing and writing activities. In the geo-wet lab, the main cleaning event has started – some real fun (?). Instead of playing with mud, the geologist are playing with water – it’s a real wet lab now. This procedure, however, is needed to get rid of all the traces of mud

distributed all over the lab. In the evening we have a social event in the Zillertal, Heike Zimmermann and Lutz Peine are celebrating their 99. birthday.

Friday (12 Oct 18). At the 08:15 meeting our Weather-Max announces a strong storm for the coming night, wind speeds of 8-9 Bft, maybe 10 Bft are possible (Fig. 3) – That means, the ship may strongly move up-and-down. The ship has to be prepared for this storm to avoid that things are flowing around, become destroyed, and people become injured. We are prepared – the storm may come!! During our science meetings at 16:30 and 19:30, results of the geology and geophysics programs, respectively, are presented, and we already realized some first ship’s movement.

Saturday (13 Oct 18), shortly after midnight. Now it starts, Weather-Max has been right. From hour to hour, the storm becomes stronger and stronger, the waves higher and higher. Some of us enjoy it, some others certainly not, many even do not realize it during their sleep. During the day, the storm loses its power rapidly, and we can speed-up again towards Bremerhaven. In the afternoon we have another science meeting, the ArcTrain students are

talking about results and impressions of their work onboard Polarstern. In the evening, a lot of people are watching the soccer game Netherlands – Germany. Not an exiting result for most of us (Germany lost 0:3), but a few people loudly applaud – acceptable for our dutch Anouk and Jolien, but why Camille who is from Montreal....?



Fig. 5: Cruise track of Polarstern Expedition PS115/2, Longyearbyen - Tromsø. (Photo: Andreas Winter/ELO Polarstern)

Fig. 4: Farewell Reception in the Blue Saloon – a thank-you-very-much to all crew and scientists. (Photo: Ryan Love/ MUoN Canada)



Sunday (14 Oct 18), the last Sunday onboard. Captain and chief scientist (Fahrtleiter) have invited for the official farewell reception in the Blue Saloon at 16:00 (Fig. 4). Time to say good-bye and, especially, thank-you-very-much to all the different groups. As chief scientist of this expedition, I would like to highlight that the success of this expedition strongly depended on the excellent cooperation between crew and scientists, and this in all situations, and during day and night. For this strong support throughout the entire expedition, I cordially thank our Captain Thomas Wunderlich and his crew!! Many thanks also to Harold de Jager and his HeliService Team. The ArcTrain students having a very different background knowledge (i.e., geology/paleoceanography, sea ice physics, modeling), have been so active all the time in helping all our meteorological, sea ice, geophysical and geological working groups on deck and in the labs as well as taking over many hours of Parasound and marine mammal watches. Thanks a lot to ArcTrain!!! Of course, I also would like to take the opportunity to thank the GeoTeam under the lead of Micha Schreck to handle all the many metres of gravity and kastenlot cores, giant box corer samples and multicorer tubes etc., without any grumbling and snarling. At least I myself had the feeling that besides all the hard work they still had some fun with the mud etc.. Many, many thanks, especially also to you, Micha. Finally, I would like to come back to our Captain. Thomas, many, many thanks for your long and personal laudatio to my own person as this has been my last Polarstern expedition (was it really my last one ?.....).

But this is for sure now the last weekly report of this expedition. It's all over now! 7680 nautical miles we have sailed together onboard Polarstern (Fig. 5), have become a team, a successful team, and perhaps also friends. Now, we separate, go home in different directions. I wish all of you a good and safe trip home. See you sometimes again, somewhere, in Bremerhaven, Bremen, Canada, China, Russia or onboard Polarstern? Goodbye, Au revoir, and Auf Wiedersehen!!

For last last time during this expedition, kind regards to all our friends and families at home from the Polarstern, also in the name of all cruise participants,

Ruediger Stein

(14.10.18)