

Diary 12 – 13 August 2011

Glacier-Elvis from Outer Space

Every summer since 2007 Austrian Glaciologists from ZAMG (Austrian Centre for Meteorology and Geodynamic in Vienna) spent a few weeks in the Zackenberg Region. This year the two of us (Gernot Weyss and me, Gernot Resch) are here for four weeks. Our main area of interest is the Freya Glacier on Clavering Island, just a few kilometres away from the Station, on the other side of Tyroler Fjord, situated behind Mount Moltke. A Swedish scientist, Hans W:Son Ahlmann started some research on this glacier back in 1939 but had to stop his work after some years. During the International Polar Year 2007/2008 glaciologists from ZAMG had the idea to continue his work.

This year's plan is called "Project Refreeze". The goal is to quantify the amount and influence of refreezing melt water on the mass balance and runoff of Freya Glacier. The refreezing of melt water is known to be an important factor for the mass balance of Arctic Glaciers. During the short summer, they face high ablation rates (we measured up to 8 cm per day during the last week), but not all the water receives the runoff. The current estimation is that about 60% of melt water refreezes in different layers within the snow or firn column of the glacier. It is proposed that melt water storage inside snow should be divided into water storage by refreezing on to single snow grains and the accretion of superimposed ice between snow (or firn) and the underlying glacier ice. The growth of superimposed ice (SI) is controlled by the thermal properties and depends on the amount of available melted water and will continue as long as the underlying media remains below the freezing point. Arctic Glaciers are colder than the ones found in the European Alps and so the melt water may fill up crevasses and it's also likely to form stalactites and stalagmites during this refilling-process, which is nice because you have to jump over fewer crevasses.

For our investigations, we packed our bags with large amounts of chocolate, Travellunch-Nasi-Goreng and some instruments and went over for a week to Clavering Island. Søren and Lone brought us to the shore near the Skille-Valley and with a "goodbye civilization" we found ourselves alone on the island. We built our camp a 15min-walk from the shore, at the orographic right side of the valley. Most of the instruments stayed in ZARGES-boxes at the landing point. At first, the important thing was to build up the tent, look for water and cook something because we were already very hungry and didn't have the time to eat lunch back at the station... We planned to stay for 6 days on the island, but packed for 10 in case of anything would go wrong. During the last year's there were storms or bad weather which can make the fjord-crossing impossible for the small boat for some days. "Goodbye Zackenberg" also meant "Goodbye Sun" for our time at the tent because we only had sun during some hours in the night and in the afternoon. Time we planned to be working on the glacier. For most of our time in the tent we were in the shadows of the surrounding mountains, which made it a little cooler in combination with the cold air flowing down from the glacier. We had two small waterstreams coming out of Mount Moltke right next to our camp, so we could get fresh water without walking long distances. Wolfgang and Bernhard, two colleagues in Vienna, did camp here in 2007 and because it was a little higher than the flat valley we would be save from floods during possible storms. Gernot and Jakob Abermann, a colleague from Innsbruck, did face this problem two years ago on a different camp-site 20 minutes from our tent. Also the higher position gave us a good sight over the area to see Polar Bears already when they where some kilometres away. But there were no bears during our stay; just two Muskoxen (a mother with a possible two-year-old) accompanied us, always staying at a distance of around 150m, watching all our steps.

It was late afternoon when we first packed our bags with some water pressure-sensors to walk to the moraine of Freya Glacier, which would be the first part of our daily way-to-work during the

next days. We returned after some hours and got in our sleeping bags early at around midnight. This would be the earliest sleeping time during our visit.

The next days we would leave the tent usually around 10.30 after having breakfast, doing the 08.00-Zackenbergl-call via our Iridium-phone to let the station know that everything's all right, preparing our instruments and backpacks which weighted around 25-30kg. After about 1 hour of walking over the moraines we reached the glacier-runoff-stream. Gernot knew it from the last years, but this time he was two weeks earlier at the island than before. The small stream he knew turned into a wild, 4m wide white-water-river where we searched our way over slippery snow patches, wet stones and some climbing-sequences right next to the water up the valley. Cold catabatic winds from the glacier, mountain shadows and the water made this quite a chilling part of our walk. After two kilometres of moving very carefully we reached the steep front of Freya. Finally some real soil to walk on! For the next 6 kilometres we would walk on the ice (usually up to 880m where we built up our AWS (automatic weather station), collecting data from our ablation stakes from former years on the way up. The method is quite simple: 1,5m long stakes get bound together and drilled up to 9m into the ice. Every stake has a different coloured tape on it. So it's easy when you reach one you measure the distance between the top of the stake and the ice, take a look at the colour and then you know how much ice melted since the last measurement. During the short summer, Freya faces some pretty high ablation rates: 10cm between 2 days was not quite unusual during our measurements. After entering the world of ice and rocks we spent the rest of the day walking over the ice, jumping over crevasses and working.

Gernot spent at least 2 weeks each year since 2008 on Freya, so he knew her very well - where to go and where not to go, and where to watch your steps carefully. The most dangerous areas on an Arctic glacier in summer are probably the ones hided under a white cover of snow. You cannot see if there are pits filled with icy water (in the upper superimposed ice-zone) or small crevasses. And so you mostly jump over the white patches or avoid them if possible -maybe there is solid ice under it, maybe a 10 m deep-hole. On our way up to our working place we passed streams of supraglacial meltwater which ran quite fast because of the lack of friction on their surface. While filling up our hydropaks (always fascinating how much time you can spare when you don't have to stop and getting the water bottle out of your backpack) or getting some water for cooking (something warm in the stomach is usually a good idea when you spend your days and nights on ice) you had to hold it tight because otherwise they would have been lost.

Between 4-5 hours away from the tent we reached our daily working place: The superimposed-ice- and percolation-zone. This was the place where we carried a 4m long mast (the photos of Gernot carrying this damn heavy metal-thing over the slippery snowpatches and stones all the way up to our working-place on the usual Wednesday photo-night looked really nice) and most of the sensors (windspeed, temperature, radiation, air-moisture, etc.). While sitting on my backpack, angry that my lab-tested, well-thought and perfectly-prepared technique of putting the snow-temperature-sensors on some wooden sticks would not work the way it was intended, Gernot was working on the AWS. I started being angry about the screws which always got stuck and didn't look up for one hour while working with a knife (to unstick them) and the screwdriver. Then I needed a break and wanted to make some coffee out of glacier ice. But damn, I left it in the tent. So no coffee this time. Luckily, we always had 4 pieces of Rittersport-chocolate with us, for the short breaks as some kind of energy-refill. After walking some meters on the ice for warming up and a chocolate-break with Gernot I took a look at the watch: 22.30. That day (the 2nd on the glacier) we had a heavy-carrying-day and we arrived at the AWS-place at around 17.00 after a long walk. After we drilled the hole for the mast we started to work. At first we thought: Okay, let's work a bit and get home earlier this time (on our 1st glacier-day we left the tent at 10.00 and returned at 05.00 in the morning), but then with the long walk up here in our minds, we kept

working until 02.00 and returned to the tent at 04.20, so still earlier than before. After each of the first two long days we made a relaxation-day with sleeping until lunch, cooking (the first days we didn't took the cooker with us to spare fuel and had bread, cheese and sausages instead) and preparing the next glacier-day. Also, we had to get the sensors from the shore to the tent and prepare them.

The weather was perfect: Almost no wind, sunshine (so you get some warm solar-radiation during the night) and absolutely no clouds. The last two times Gernot was up here, he always had at least some days of snowing and storms, so he was quiet happy about the perfect conditions. After some days a (at least I think so), human thing appeared in our minds: At first you are totally happy that you get what you want. After some days you get used to it and the happy feelings turn into sorrow about "what if I lose it?" and therefore you can't enjoy it as much as the days before or the days where you imagined yourself having it. This happened to us with the weather. At first we were so happy that there were no storms this time, but after some days we saw some tiny clouds appearing over the mountains and looked at them as they were the foresight of a possible storm coming in and always thought: what if we have rain and a storm during the next day?

On our first day on the ice we made it to an unnamed peak above the glacier at about 1345m. Our colleagues named it "Panorama Mountain" because some years ago they spent a day on the Peak, taking panorama-photos every hour. We did arrive at the peak around midnight and enjoyed the view with some chocolate (of course) and a hot cup of tea. Suddenly the wind stopped for some time and it was completely silent. A poem I found in the Zackenberg-library came to my mind:

The sounds from the Arctic become voices from the deep,
which keep talking from the endless time,
where we humans,
are just guests for a moment.

On the way down we passed some strange phenomenon: There was an estimated 150x100m-hole in the ice, a view hundred meters below our AWS. We don't know yet why at this particular place the ice melted (maybe warm meltwater came into it to the side, melted a cave and it broke in some years ago). But while walking all day long on shimmering ice I did imagine a flying undersauce would perfectly fit in there. And suddenly a picture of a spaceship landing right next to us, steam coming out and the late Elvis with 150kg, in a shimmering, sparkling, shiny white suite stepping down to the glacier and dancing the blue-suede-shoe-dance came to my mind. The day we returned to the station, Lone was listening to Elvis in the kitchen whilst cooking. Sometimes, the world is a strange and funny place ;) It was 06:20 as we got back to the tent. The day before, we returned at 03:00 and went back to the glacier at 07:00 after having a short breakfast so we were a bit sleepy. After packing our stuff and carrying it to the shore it was 08:30. So we would have 30 minutes until Søren and Philipp would arrive with the boat. Perfect time for some healthy chocolate-breakfast with the last nut-schnapps out of my grandmother's cellar (just to get us some refreshment on the ice). But the Danish are always punctual, and shortly after sitting down and the shore, enjoying the sounds of the sea and opening the chocolate we heard the boat. So no schnapps in the morning this time!

Back in the station, we had the very rare opportunity of watching a serious Musk ox vs. Polar bear-encounter. An old bull passed by very close, directly heading towards our Fake-Polar bear which is being used for the shooting-training. It went very close to it, standing for minutes without movement and looking very un-musk ox behaviour). After some time it seemed to have

made its decision: He made a quick step forward, knocked our poor Polar bear down and proudly continued his walk towards the shore.

This week, we had to say goodbye to Julie and Philip who went back home to Denmark and Nuuk... But we don't need to be sad and are glad to welcome some new and some well-known faces to the station which has now a population of 18 scientists, mainly from Denmark but also from Russia, Korea, Finland, Canada, Sweden and Austria. In exchange for Philipp, Søren now takes care of the logistics. This week will be very busy for the logistics and GeoBasis-team because the cargo-ship has arrived in Daneborg which means cargo-transporting by Twin-Otter nearly every day and building up some new instruments. Also, some pilots and scientists from the DTU Space will be sleeping here during the next days, which mean that our four star chef Lone will be very busy.

The saddest thing about leaving the station was that we couldn't attend this year's party with the Sirius Patrol from Daneborg. We just heard whispered rumours about whipping, midnight-volleyball-sessions, pull-up-competitions and similar things. But what happens in Zackenberg stays in Zackenberg...

Best things for the end: Tapani found a little sensation during the last week: A caterpillar of *Colias hecla*, a butterfly which was known to live in Greenland. But no one found the sweet green-yellow caterpillar itself (as far as we know), just the adult butterfly until Tapani arrived for his studies. In addition, some days after the first one he found a second one at the mossy wetlands near Mount Zackenberg.

Gernot Resch