

Ny-Ålesund Newsletter

37th Edition – May 2016

The return of the Arctic tern.

By Maarten Loonen, University of Groningen, Arctic Centre.

Geolocators are widely used on small migratory birds to follow their timing of migration. A geocator is a small datalogger which stores the minimum light level over an interval of 5 minutes. It is attached to a bird ring and it logs light levels for a whole year (Fig. 1). The bird has to be re-caught, before the data can be analysed. The daily light profile provides day-length and sunrise/sunset. With these data it is possible to calculate a position of the bird at about 200 km accuracy. The advantage of a geocator is that it is light (0.65 g). The disadvantage is that the bird needs to be re-caught and that geolocation does not provide a location fix in continuous light or close to 21 March and 21 September when daylength is similar at all latitudes (Fig.3). In Ny-Ålesund, Arctic terns have been equipped with a geocator and are now returning to their breeding colony. Data from 2014 have been analysed and figure 2 shows the positions of the birds in April (left) and May (right) in the year 2014, against a map with ocean chlorophyll levels.

With a little bit of imagination, you can conclude that the Ny-Ålesund birds are under way from the Antarctic to the Arctic at this moment.

In recent years, predation levels of nests in town by arctic foxes and glaucous gulls have been quite high. But we will do our utmost to discover the birds with geolocators and retrieve the data. We will again put a new geocator on the same bird, because the difference in timing between years is one of our interests. To share with you a bit of excitement on this research: note that the birds fly north using assistance by the trade winds (southern hemisphere easterly winds, northern hemisphere westerly winds). This winter, the southern hemisphere had a record high value for El Nino. This phenomenon effects the weather and might force the terns to change their pattern.

For me the Arctic Tern is the weather man. I look at the website <http://www.windyty.com> and try to imagine how this little bird copes with a storm.

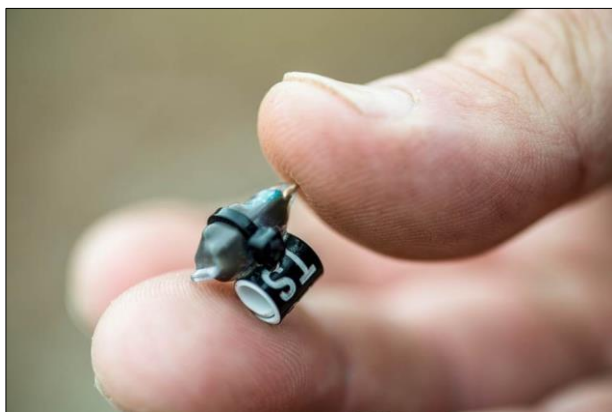


Fig 1. Geocator used to follow small migratory birds and their migration.

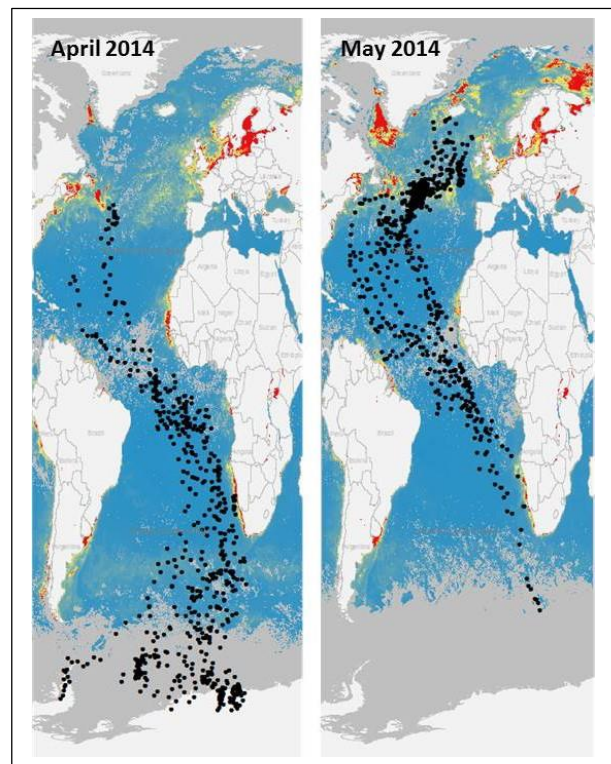


Fig 2. Arctic tern location in April and May 2014. Colour indicate ocean chlorophyll levels.

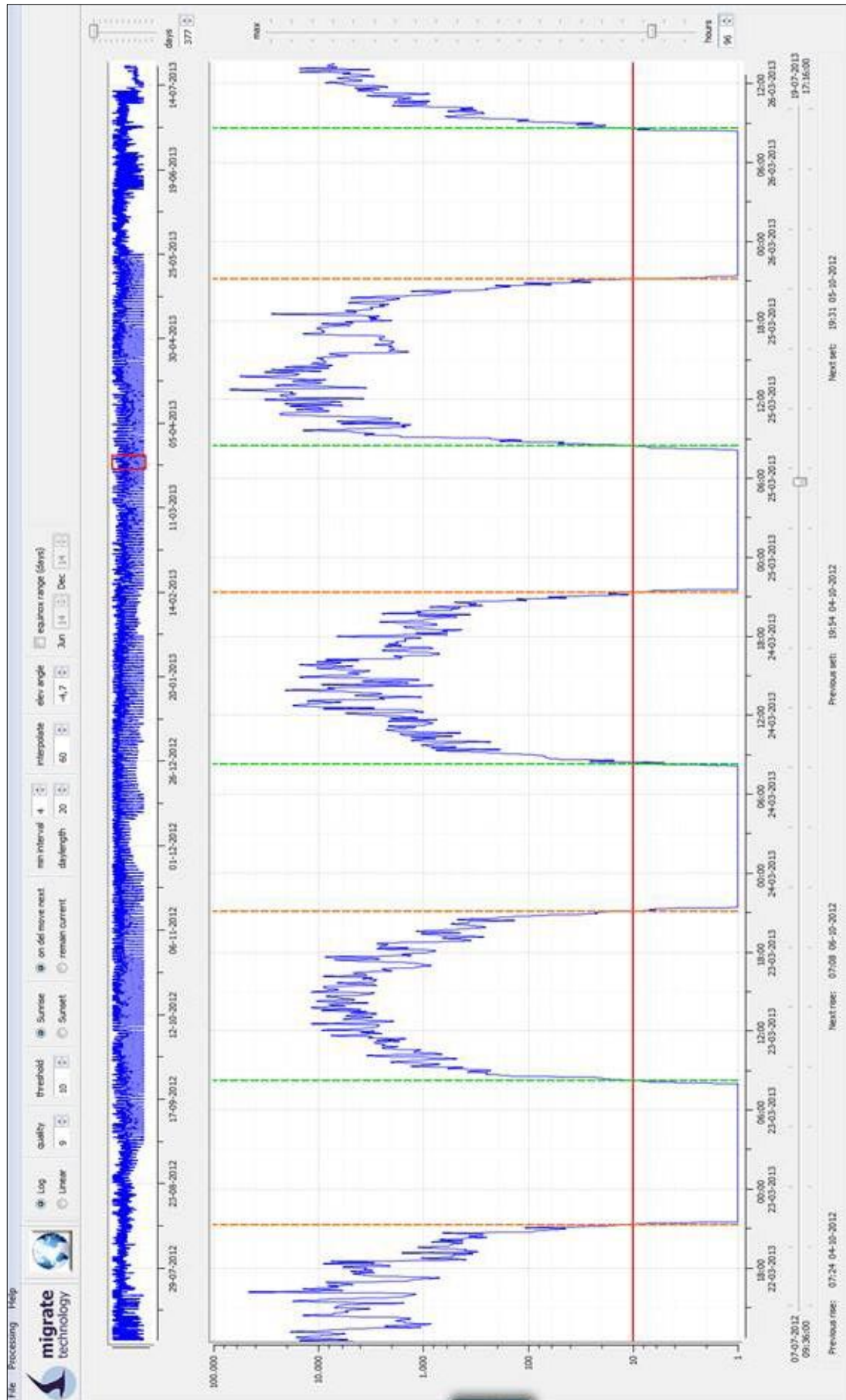


Fig 3. Tern light

Microbial communities in permafrost-affected peatland.

By Mette M. Svenning and Alexander T. Tveit, UiT The Arctic University of Norway, Tromsø.

A substantial part of the Earth's soil organic carbon is stored in arctic peatlands, yet sensitive to global warming. These peatlands represent large sources for emissions of the greenhouse gases methane (CH₄) and carbon dioxide (CO₂), end products of microbial soil organic carbon degradation. To predict future CH₄ and CO₂ emissions, an in depth understanding of microorganisms and their metabolic network in Arctic soils is required.

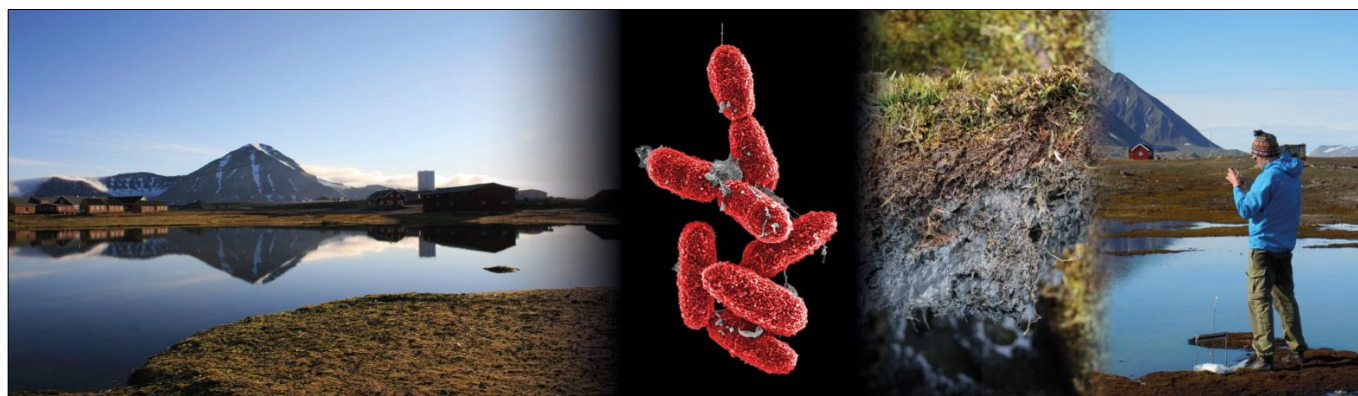
The Arctic peatlands on the Brøgger peninsula represent model sites both for *in situ* and experimental studies of peat ecosystem responses to climate change. These peatlands host a complex community of microorganisms that are the major players in organic carbon degradation. All three domains of life including Bacteria, Archaea and Eukarya participate in a cascade of degradation steps, eventually resulting in the emission of CH₄ and CO₂. The organic material stem mainly from plants stored through time due to low temperatures and short active frost-free seasons. Our combined study of the genes (metagenomics) and transcripts (metatranscriptomics) in the peatlands has given us a detailed insight into this “invisible”, but very important microbial world.

The microorganisms living in these soils are well adapted to low temperatures producing large amounts of CH₄ and CO₂ even at 0–10 °C, the range of summer temperatures for CH₄ producing soils. Temperature increase in these soils leads to changes in the microbial metabolic networks, causing large increases in CH₄ production.

Before reaching the atmosphere, CH₄ can be consumed by CH₄ oxidizing bacteria that require oxygen. Their activity depends on the water level in the soil. Water saturation leads to low oxygen concentrations causing direct releases of CH₄ to the atmosphere.

The CH₄ oxidizing bacterium *Methylobacter tundripaludum*SV96 (see picture below) was isolated 20 years ago from the peatland around Solvatn, Ny-Ålesund. Since then our research and results from other research groups, has confirmed the importance of this specific CH₄ consumer in low temperature ecosystems. *M. tundripaludum* strains are the major CH₄-oxidizers in diverse circumpolar ecosystems including freshwater lakes and soils in Canada, Siberia, Greenland, Northern Norway and Svalbard.

Our research and education in arctic microbial ecology started in Ny-Ålesund 1996 and has since then included several projects with field activity. The Ny-Ålesund research facility has been a key platform for our studies of microbial communities in permafrost-affected peatland. The current and future studies address the biodiversity in Arctic soils, microbial adaptation to low temperatures, seasons and how increased temperatures will affect the microbial communities and their activity in the Arctic.



What is sustainable hunting and trapping in Svalbard in the era of climate change?

By Eva Fuglei and Åshild Ø. Pedersen, NPI, Rolf A. Ims, Institute for Arctic and Marine Biology, UiT, Bernt-Erik Sæther, Centre for Biodiversity Dynamics, NTNU and Nils Chr. Stenseth, Centre for Ecological and Evolutionary Synthesis, UiO.

Climate change in the Arctic is taking place very rapidly. Ecosystems will be affected so heavily that it is very difficult to predict the consequences, including those for species that historically have been hunted and trapped. In this situation, both science and management are moving into unknown terrains. What has used to be sustainable harvest and knowledge-based management may not be that any longer, when the climatic premises for arctic wildlife fundamentally change. How can researchers, managers and hunters prepare for this new reality?

The SUSTAIN project

SUSTAIN is a research project financed by the Norwegian Research Council (2016-2018) with the ambition to answer this question. Scientists will together with managers, hunters, and trappers of natural resources search for sustainable management strategies for ecosystems exposed to rapid climate change. This cooperation between scientists and “end-users” is of particular importance for the project and will be conducted by means of a “Strategic foresight” protocol, where the end-users are active participants in the research process.

SUSTAIN Svalbard

SUSTAIN has focused on a sample of marine, limnic and terrestrial ecosystems in Norway, where Svalbard is one of the terrestrial ecosystems. There are many reasons why Svalbard is in focus. First, it is where the most rapid climate warming is happening. The terrestrial ecosystem in Svalbard is already exposed to a new climate regime - with temperatures far above normal. Second, the ecosystem is relatively simple and due to long-term monitoring of the harvested species reindeer, rock ptarmigan and arctic fox by the Norwegian Polar Institute, the researchers in SUSTAIN have a good understanding of how the harvested species are affected by climate change – at least so far. Third, Svalbard has a well-organized system of competent managers and trappers/hunters. This forms an excellent basis for applying the “Strategic foresight” protocol. The group of end-users in SUSTAIN Svalbard includes Longyearbyen hunting and fishing organization and other representatives for trappers-/hunters, as well as managers from the Governor of Svalbard, Norwegian Environment Agency, Ministry of Climate and Environment, and Norwegian Polar Institute.

Challenges

The researchers in SUSTAIN have ideas for how to use data and models to predict how the harvested

species in Svalbard will respond to possible scenarios for future climate and harvest/trapping.

From a researcher perspective, an important goal is to investigate whether harvest/trapping may act to increase or reduce the impact of climate change on species and ecosystems. Another important question is if existing data, knowledge and models are sufficient to give such predictions, or if the monitoring of the ecosystem has to be changed or become intensified to provide robust research-based management. Such perspectives and questions is also likely to be of importance to the end-users. However, the end-users may have other knowledge needs to practise rational management and harvest-/trapping in the years to come. Their perspectives are also highly important because of their thorough knowledge about how things work in practice. There may also be different views between researchers and end-users about what should be the criteria and goals for sustainable management. It is of importance to explore and discuss such different views.

Climate change is unquestionable the largest challenge for future management of the environment – specifically in the high north. To be able to act rationally - science, management and resource exploitation needs to change gear with regard to how each of the party perform their respective fields, and not at least concerning how they interact. The 3-year research project SUSTAIN will for sure not provide any final solution to how the ecosystems in Svalbard should be managed in an unknown future. However, SUSTAIN will at least provide a new standard for what can be fruitful intersections between research, management and nature-use, and to create a baseline for an enduring partnership.



Photo: Trond Østvang

Information from Kings Bay AS

By Marzena Kaczmarek, Kings Bay AS

New strategic plan for Kings Bay, 2016-18.

The new Kings Bay strategic plan for 2016-18 is recently finished. It outlines the mission of Kings Bay; the vision and the company's goals and how Kings Bay plan to achieve them. The plan is freely available and can be downloaded from the Kings Bay website: http://kingsbay.no/kings_bay_as/strategic_plan/

Summary of 2015 research in Ny-Ålesund.



Research activity level in 2015 remained similar to 2014 (14437 man-days and 14501 man-days respectively). However, the focus of research changed from mostly marine biology in 2014 to use of new technologies in field research (especially UAV) and integrated environmental research. Traditionally, the Sverdrup station (who hosts both NPI and institutions without own facility in Ny-Ålesund) and AWIPEV had most research days.

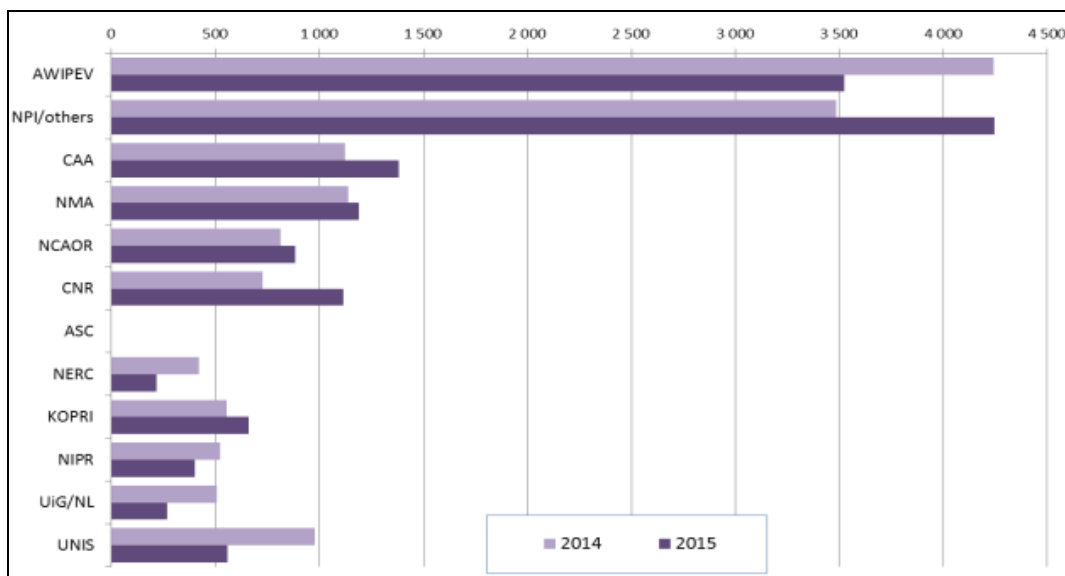


Fig. 1: Research man days per station 2014-2015

However, Italy, China, Republic of South Korea and India were noticeable active last year with a few larger multidisciplinary projects running for several months. (Fig. 1: Research man days per station 2014-2015)

The utilization of Kings Bay Marine Laboratory was less in 2015 than a year earlier. (Fig. 2 User days per month at the KBML, 2013-15). We observe that there are longer periods with high activity in the marine laboratory; stretching from spring to autumn and showing occasional burst of activity during the polar night.

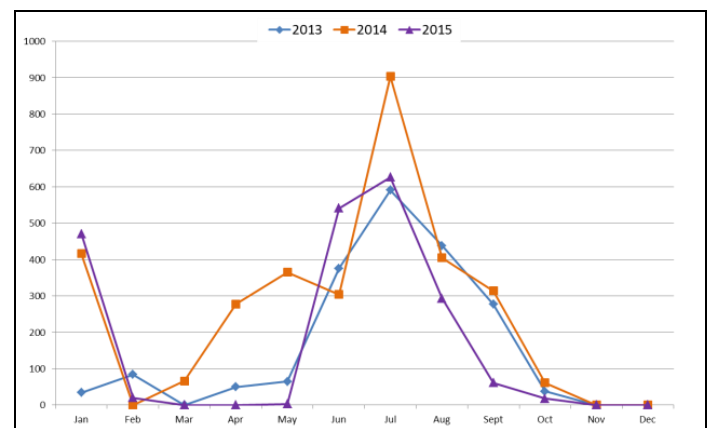


Fig 2 User days per month at the KBML 2013-2015

The last year marked expanding current possibilities (e.g. new observatory for the Norwegian Mapping Authorities, machine garage/conference facility, sewage filtering system and the Sensitive Light Observatory).

Restoration of old steam locomotive “Nr.2”



The beloved, old and charming locomotive, “Nr.2”, probably the most photographed element in Ny-Ålesund, is now undergoing a thorough restoration. Thanks to the Svalbard Environmental Protection Fund granted to Kings Bay, we were able to send the locomotive to the mainland where it is taken care of by experienced hands of train restoration experts in Sørumsand. The locomotive is scheduled to return to Ny-Ålesund in September 2016. The wagons also need some restoration work, but this part can be done on site.

Along with the “Nr.2”, funds for face-lifting have also been allocated to the London-houses. The interior of “London 3” will be renovated this year, before the University of Groningen takes it over as part of their research station in the summer.

New exhibition in the museum



A new exhibition in Ny-Ålesund Museum will be opened in May this year. The historical part of the exhibition will be brand new, and it focuses on both the mining history and the early science days in Ny-Ålesund. The information centre will be an integrated part of the historical exhibit.

The museum will be open for anyone to visit. It will give a comprehensive view of the rich history of the place, the scientific research taking place here, and also tell the visitors a little bit about whom the people that live here are.

To view the sketches, see <https://www.kubity.com/p/pdGrXA>

Ny-Ålesund Symposium 2016



The Symposium is organized by the Ministry of Education and Research, the Ministry of Climate and Environment, the Ministry of Foreign Affairs, the Ministry of Trade, Industry and Fisheries, the Ministry of Justice and Public Security, and the Research Council of Norway in cooperation with Kings Bay AS. DNV GL (Det Norske Veritas (DNV) and Germanischer Lloyd (GL) is co-organizer and sponsor of the Symposium.

This year's symposium will take place in Ny-Ålesund 19-21 September. The theme, “Planet Ocean - Unlocking the potential of ocean-based industries”, focuses on oceans as important source of food as well as fossil and renewable energy resources.

The host of 2016 Symposium will be Ms. Monica Mæland, Minister of Trade and Industry and Mr. Per Sandberg, Minister of Fisheries of Norway. Participation is limited to 45, by personal invitation only.

C2S3: Community Coordinated Snow Study in Svalbard.

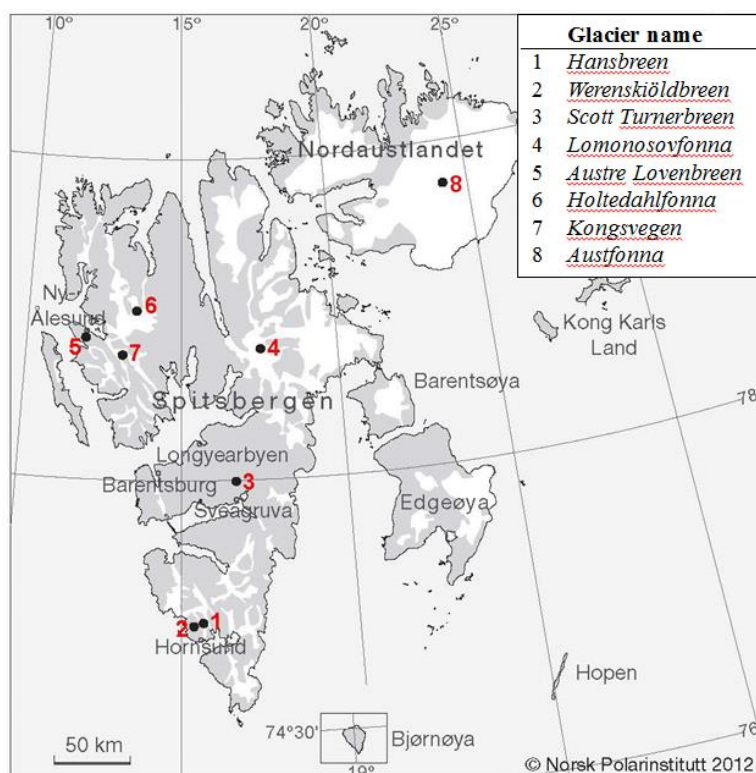
Funded by the Svalbard Science Forum (Norwegian Research Council) under the Svalbard Strategic Grant 2015 call.

By Jean-Charles Gallet, Norwegian Polar Institute

The aim of this pilot project is to investigate the potential link between the physical properties of snow, its chemical signature, microbiology, and the content of Black and Organic Carbon. Currently, very few studies have been looking into the link between the carbon content and the micro biology in Arctic snow. Furthermore, none of these have been trying to link the chemical signature (major ions) with the water isotopes and the type of snow found in the snowpack. Thus the main aim is to investigate how all these measurements can be linked together? Can we determine a signature according to the source and the climatic conditions? Is there any microbiological activities in the snow and can this be linked to the carbon content or to the chemical signature?

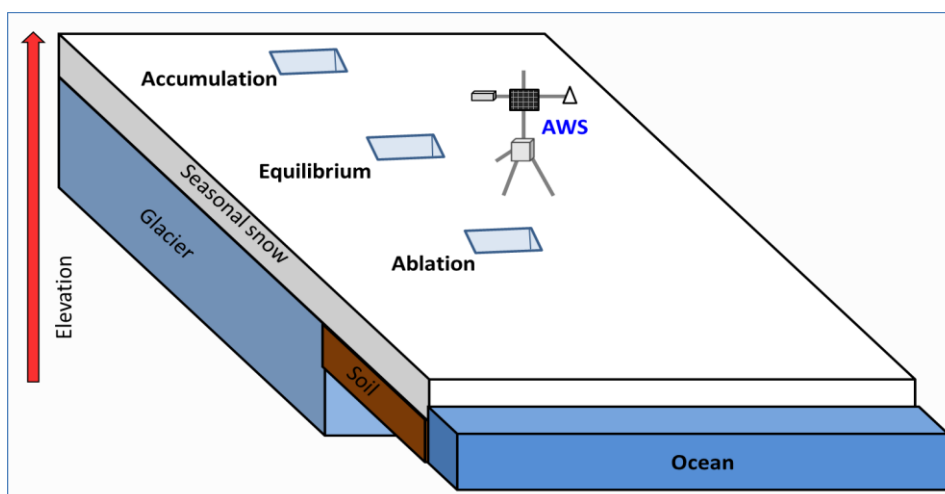
To dig into such questions, we aim at sampling at five different locations in Svalbard, several glaciers and over several altitude gradients: the ablation,

the equilibrium and the accumulation part of each targeted glacier. Three glacier are located around Ny-Ålesund, representing the small, medium and large glacier size in Svalbard. Two glacier are located in Hornsund, one around Longyearbyen, and the two ice cap in central part (Lomonosovfonna) and western part of Svalbard (Austfonna) are also targeted. The project is made possible through a strong collaboration between the different institutes and the use of existing logistic. The project is simply adding to existing scientific and/or monitoring project. The sampling is done in April-early May 2016. Some samples will be processed on site and some will be sent to the different collaborators for analyzes. The project consortium consists of 15 institutes, almost 10 nations, and mostly young scientists. The PI institutes are Norwegian Polar Institute, Uppsala University, University of Lyon and Gothenburg University.

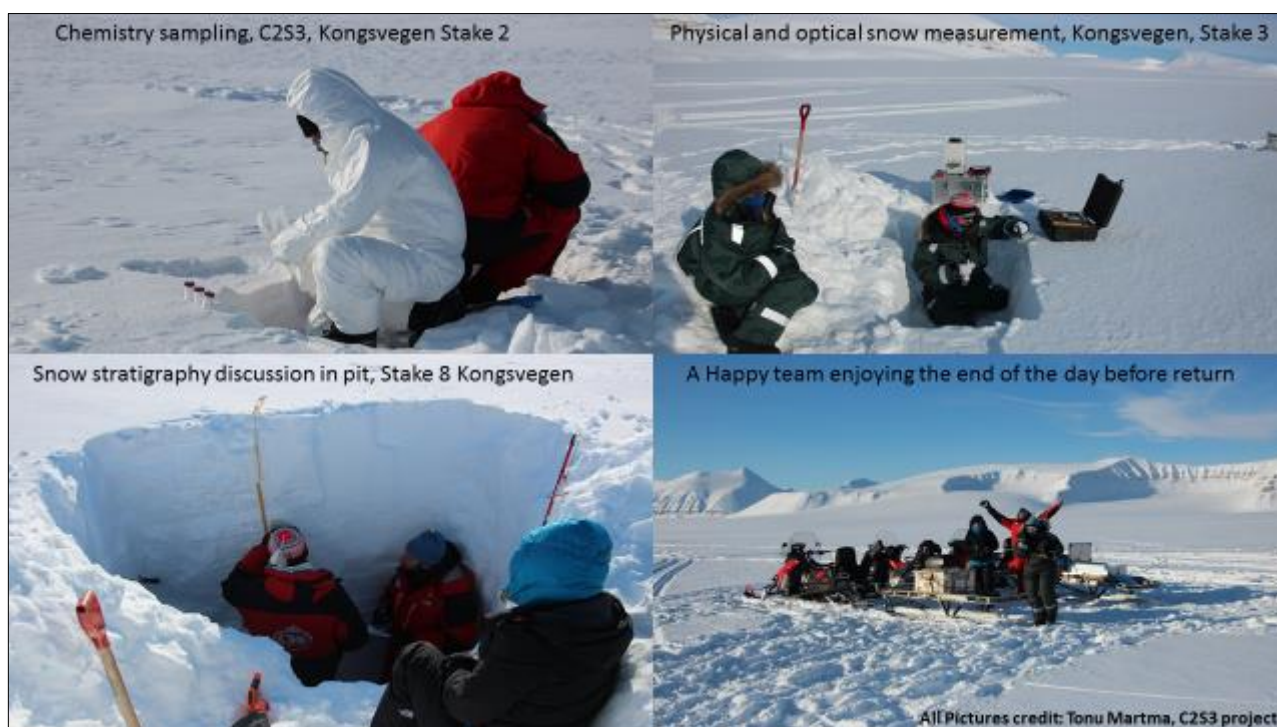


Snow sampling for Snow physics, Black carbon, Microbiology, Major ions and Water isotopes.

Three pits / glacier



Snow will be excavated until the last summer layer. Sampling will be done on the three mentioned areas above and possibly as close as possible to any weather station in order to obtain the best information on the building of the snowpack. The sampling is done according to protocols written for this project and distributed before the field work. The protocol has been discussed during a previous workshop during which the C2S3 idea came out.



European clean air policies unmask Arctic warming by greenhouse gases

By: Annica Ekman, MISU, Hans-Christen Hansson, ACES and Ilona Riipinen ACES, all Stockholm University

The drastic cut in sulfate particle emissions in Europe partly explains the amplified Arctic warming since the 1980s, shows a new study published in *Nature Geoscience*. The team, which consists of scientists from Stockholm University and the Norwegian Meteorological Institute, say that their surprising finding highlights an even more urgent need for reducing greenhouse gas emissions to mitigate Arctic climate change.

Human activities, such as industrial production, transport, power generation, and wood burning emit large amounts of tiny pollutant particles containing, for example, soot and sulfate, into the atmosphere. High airborne amounts of these particles, also known as aerosol particles, cause about 400.000 premature deaths every year in Europe and can be transported over long distances. Aerosol particles have different sizes, as well as chemical and physical properties, all of which determine their climate effects.

"Soot particles absorb solar radiation and warm the climate, in a similar way as greenhouse gases, such as carbon dioxide, do. Sulfate particles, on the other hand, reflect solar radiation and act as seeds for cloud droplet formation, cooling the climate as a result," says Juan Acosta Navarro, PhD student at the Department of Environmental Science and Analytical Chemistry (ACES) and the Bolin Center for Climate Research, Stockholm University, and co-author of the study. He continues: "The overall effect of aerosol particles of human origin on climate has been a cooling one during the last century, which has partially masked the warming caused by the increase in greenhouse gas emissions."

Sulfate emissions, which cause, for example, acid rain, peaked in the 1980s in Europe and North America, which led to the implementation of strict regulations to reduce them. The new study shows that these policies had a profound effect on the Arctic.

"Using a numerical climate model we found that sulfate reductions over Europe between 1980 and 2005 could explain a significant fraction of the amplified warming in the Arctic region during that period due to changes in long-range transport, atmospheric winds and ocean currents. In other words, thanks to air quality regulations implemented in Europe, part of the masking effect of aerosol particles has been reduced, revealing the true warming of the Arctic by greenhouse gases," says Annica Ekman, Professor at the Department of Meteorology (MISU) and Bolin Center for Climate Research, Stockholm University who also co-authored this study. The scientists expect further warming in the Arctic as levels of greenhouse gases will continue to increase and aerosol particle emissions will likely decrease to combat air pollution in different parts of the world.

Besides the inspiration for this study given by the long term climate observations with strong warming trends at Ny-Ålesund aerosol observations from Zeppelin has been used to check the modeling. The results show a enhanced warming generally in the Arctic due to the strongly decreased sulfur emissions in Europe but especially around Svalbard.

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News from Svalbard Science Forum

By Karoline Bælum, SSF

Arctic Field Grant 2016 Applications

For the 2016 call the AFG received 77 applications of which 43 projects from 9 different nations were completely or partly funded to a sum of 2,5 mill, giving a 55% success rate. 20 of the projects take place in the Kongsfjorden area, most focusing on biology and glaciology. A list of all funded projects can be found on the SSF webpage. The majority of the applications were very good so it was not an easy task to distribute the funds and the competition was hard. The next call for proposal will be out in September 2016.

Svalbard Strategic Grant Applications

For the 2016 call 15 applications for workshops and projects were evaluated. 2,85 million was handed out to 2 workshops and 6 collaborative projects.

Several of these center on Ny-Ålesund amongst them the Atmosphere flagship program activities for 2016-17 and a Ny-Ålesund glacier massbalance workshop.

The Research in Svalbard (RiS) database

The partners in RiS (Kings Bay, the Governor of Svalbard and the Research Council) have agreed that Kings Bay represents RiS in Ny-Ålesund and Bjørnøya. When the research communities in Ny-Ålesund and on Bjørnøya have suggestions for improvements the point of contact is Kings Bay. Error messages can be directed directly to SSF (as has always been the case) for immediate action.

Topics from the 44th NySMAC meeting

held in Stockholm, Sweden 26-27 April 2016:



The participants gathered in the Vasa-muséum in Stockholm.

44th NySMAC meeting

- Status reports from member institutions
- SSF work report
- The Ny-Ålesund Charter
- Proposal to deploy an induction magnetometer in the Chinese Yellow River Station in Ny-Ålesund
- A novel microwave radiometer/radar for Arctic clouds at AWIPEV.
- Disconnect film project
- COAT (Climate-Ecological Observatory for Arctic Tundra) Brøggerhalvøya
- NySMAC Project Information and Discussion Forum (PID)
- Update on possible development and plans for a calibration laboratory in Ny-Ålesund.
- Information from Kings Bay AS
- SIOS update
- 45th NySMAC meeting in Xiamen, China

Input to Ny-Ålesund Newsletter

If you would like to contribute to future editions of this newsletter, please e-mail nysmac@npolar.no.
Editor: Ingrid H. Storhaug, NySMAC Secretariat. Next edition: November 2016.

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