

Ny-Ålesund Newsletter

26th Edition – June 2010

The Ny-Ålesund Symposium 2010

The latest Ny-Ålesund Symposium was opened on Monday 21st of June by H.R.H. Crown Prince Haakon of Norway, who is the patron of the event. His presentation was followed by Minister of Research and Higher Education, Tora Aasland. After their opening presentations, the theme was recent advances in knowledge about Arctic climate change.

For the two following days the focus remained on Arctic climate change, solutions and the way forward.

Presentations were held by attending researchers, industry representatives and many others. Discussion and debate was led by the chair, former prime minister Gro Harlem Brundtland.

So for these three days, Ny-Ålesund formed the backdrop for a conference that helps further political and industrial support for alternative energy sources and more efficient energy usage in a global perspective. A fitting role for one of the worlds foremost sites of Arctic and climate research.

By Håvid Falch, Kings Bay AS



Participants at the Ny-Ålesund Symposium 2010. (Photo: Linda Bakken, Kings Bay AS)

New team at AWIPEV

AWIPEV, the French-German Arctic Research Base in Ny-Ålesund, has currently changed its overwintering crew for the season 2010-2011. Sébastien Barrault is base leader, Thomas Bouchard is Logistics Engineer and Christian Konrad is Observatory Engineer.

The base personal this summer counts 2 extra people:
- Former base leader, Marcus Schumacher is staying in Ny-Ålesund until end of July. He will be the contact person for all EPOCA issues

- Max Schwanitz is leading and supervising all diving activities until the end of July.

Ny-Ålesund Science Plan

The new Ny-Ålesund Science Plan has been endorsed by NySMAC and adopted by Svalbard Science Forum. It is effective from 15 June 2010 and covers the period 2010-2013. It can be downloaded from here: <http://www.svalbardscienceforum.no/pages/baseNyAa.htm#SciencePlan>

NySMAC presentation

Presentation of “Ny-Ålesund – Kongsfjorden International Research Base” is available on the NySMAC web-site.

Sverdrup Station

After the traditionally busy month of April with sea ice researchers, glaciologists and biologists studying seals, the month of May is rather quiet before activity starts increasing again in June. At present we expect for all of 2010 a total number of 213 scientists with 2561 lodging days in 66 projects, but registrations are not fully complete yet. We would like to remind our guests again of our application deadlines February 15th for spring and April 15th for summer projects, which we require for our own planning purposes.

Svenn Erik Pedersen finished his two year contract as logistics engineer at the Sverdrup Station in May 2010 and we wish to thank him for his work during this time. We will miss him as a very valuable and pleasant member of our team at the Sverdrup Station. As successor we are happy to have Steinar Aksnes as our new logistics engineer. Since he will not be starting with us before August, Leif Arild Håhjem, who had the same position at the Sverdrup Station a few years ago, helped us in May and Wojtek Moskal arrived and will again be helping us during the busy summer months.

On the Zeppelin mountain a 15 meter mast was installed by NILU, which will be used for air intakes to the Zeppelin station. For the Sverdrup Station measurements the renewal of the albedo station will be the major project during summer.

For any questions please feel free to contact stationmanager@npolar.no Max König will be at the station during May/June and September/Oktober, while Fiona Danks this year covers the periods March/April and July/August.

By Max König, Norwegian Polar Institute

Information from Kings Bay AS

Fiber Optic Cable

The Norwegian Government has decided to rise 60 mill NOK in order to establish a fiber optic cable between Longyearbyen and Ny-Ålesund. This is an important investment for all nations and researchers in the small village with 13500 research days last year, and clearly gives signals from the Norwegian Government that underline the importance of Ny-Ålesund also as an future arctic village for monitoring and research. Especially the measurements done by the Norwegian Mapping Authority requires sending large packages of data in real time, which is vital due to the fact that these measurements are needed in a global network to be analyzed and compared. But also other research projects and nations assume benefits from this “electronic highway”, hopefully already from late 2011.

Visit from ministers in India and Norway

The Norwegian minister of Research and Higher Education Tora Aasland, and the Indian H'ble Minister of Science and Technology and Earth Sciences Prithviraj Chavan visited Ny-Ålesund on Sunday 06 June. They had a brief from Kings Bay AS on Ny-Ålesund as a Research arena, in addition to a visit in the Marin Laboratory where H'ble Minister Chavan handed over a Polymerase Chain Reaction Machine used to amplify segments of DNA in

molecular biology, relied on thermal cycling.

The Indian station Himadri, Alfred Wegener Institute, Institute Paul Émile Victor and Norwegian Mapping Authority gave very informative presentations about their ongoing projects. The ministers also visited the Zeppelin Station by cable car, and this made their stay perfect both in a professional and social way. The visit indicates that India has long term plans with their research programs in Ny-Ålesund.

Cruise season

The cruise ships has started their season, and NY-Ålesund was seen by Hurtigruten Fram on Friday 04 June. Brining 200 passengers this made a pre-taste on some of the upcoming summer activity which make impact on the research village and their inhabitants. Last year 30.000 cruise tourists found their way to Ny-Ålesund. 20.000 came by overseas ship using heavy oil, and 10.000 by minor local vessels from Longyearbyen. From 01 January 2015 it will be prohibited to enter Kongsfjorden with ships carrying heavy oil, due to the fact that Forlandet and North-West Spitsbergen Nationalparks blocks the inlet to Kongsfjorden. In the future this may reduce the amount of big ships and the number of visitors.

EPOCA

The EPOCA project is running as planned. The mesocosms have arrived by ship late May and are now in the sea, sampling has started according to the plan. This will run until mid July when the mesocosms will be taken out of the sea and transported back to Germany by ship. This project involves close to 50 scientists during this period and make a very high activity level at Ny-Ålesund, in addition to several other ongoing projects.

By Roger Jakobsen, Kings Bay AS

Reindeer on the ice

By Ronny Aanes (NPI), Brage B. Hansen (NTNU) and Jack Kohler (NPI)

Reindeer have been in Svalbard for at least 5000 years. From 1860 to the beginning of the 1920s there was uncontrolled harvesting of the Svalbard reindeer. The reindeer hunt provided food for export to the mainland, for hunters and the whale industry, as well as just for recreation. This wholesale slaughter resulted in a near extinction of the Svalbard reindeer; by the 1920s it was estimated that less than 1000 individuals remained. In some areas, like Brøggerhalvøya, all the reindeer were gone. Norwegian authorities took action finally and banned hunting of Svalbard reindeer in 1925. Sporadic observations and counts during the following decades showed that the Svalbard reindeer increased in numbers, recolonizing some areas that it previously had occupied.

Until 1978, however, there were no reindeer on Brøggerhalvøya and surrounding areas. In that year 15 reindeer were reintroduced to Brøggerhalvøya as part of the “Man and biosphere”, a research program initiated by UNESCO that aimed at gathering knowledge about how humans could best develop the foundation for a rational use and conservation of the planet's natural resources. The objective of the reintroduction of reindeer on Brøggerhalvøya was to examine the dynamics of a newly established population, and to see how it would affect the resource base (i.e. the food plants). While the introduction of a species seems radical by today's standards, most of the ice-free areas on the Svalbard archipelago are currently occupied by reindeer, and it is very likely that Brøggerhalvøya would too have eventually been reoccupied by natural means.

Since the reintroduction in 1978 the number of reindeer has been counted annually on Brøggerhalvøya and surrounding areas. After the reintroduction the population responded as expected to the ungrazed, food-rich environment, growing exponentially in the following years. By 1993 the population was found to be 360 individuals. Then in late autumn 1993 extreme amounts of precipitation were followed by freezing temperatures to form a thick layer of ground-ice across Brøggerhalvøya, locking much of the feeding ground for reindeer. In Spring 1994, less than 80 individuals were found left on Brøggerhalvøya. Many reindeer died of starvation, but others migrated out of the area during the winter of 1993/94. For instance, some 40 individuals migrated to Sarsøyra, which also had been without reindeer since they were wiped out by hunting, where they established a new population. Two years later reindeer were also found further south at Kaffiøyra. Sarsøyra and Kaffiøyra have been populated continuously by reindeer since then.

The 1993-94 ground-icing that led to the dramatic reindeer population decline remained a singular extreme event in the recent climatic history of the Ny-Ålesund area until this past winter, when similar conditions led again to a nearly continuous sheet of ice forming across the lowland plains of Brøggerhalvøya. In Ny-Ålesund it was a challenge even to get from the residences to the dining hall. Naturally, this year's ground-icing again had an impact on the Svalbard reindeer population, although the story becomes more complicated now that the reindeer population has spread well out from its original area.

Photo 1: Ground-ice in (a) Luzula heath and (b) Dryas ridge at Sarsøyra in late winter 2010. The ridges are important food spots for the reindeer. This year they were inaccessible due to ice.



The main monitoring of the reindeer population in the area takes place during March/April each year, with the team is located in Ny-Ålesund and at "Monaco" at Sarsøyra. Two men on snowmobiles survey predefined areas for reindeer that, at the end, cover the whole area (Brøggerhalvøya, Garwoodhøgda, Sarsøyra and Kaffiøyra). The routes are defined in a way that minimizes the risk of counting the same reindeer twice. When counting we categorize the animals in adult males and females, and calves (that actually are 9 months at this time). When not counting we dig snow-pits by hand and measure the amount of ground-ice and snow depth, including measures of ice-layers in the snow across the monitoring area. During summer we walk across the area on foot to estimate the calf production, and note number of calves born per female.

The annual monitoring of the reindeer has proven to be extremely valuable for studying the causes and consequences of the observed population fluctuations. The Svalbard environment provides a significant advantage for such studies as there is no general competition with other species (except in some limited areas, with geese), negligible predation (although a few reindeer may be killed by polar bears, there is no evidence that this affects the dynamics of a given population), and no harvesting (except a small quota for the inhabitants of Longyearbyen). Hence, the number of factors that may affect the population dynamics is generally reduced to weather/climate, competition between reindeer for food (density dependence) and plant-reindeer interactions. We have found that these three main factors all influence the dynamics of a given population to some degree, alone or in concert with each other. Currently we are focusing on the relative effects of winter- and summer conditions (regarding variation in weather and available resources), and the effect of extreme weather events, like winter rain and ground-icing.

The Brøggerhalvøya reindeer population has been monitored annually since 1978. Since 2000 we have also measured the occurrence and thickness of ice on the ground (i.e. "ground-ice"), snow depth and the number of ice layers in the snow on selected spots on Brøggerhalvøya, Sarsøyra and Kaffiøyra. This was initiated to have in situ measurements of the snow pack properties and the amount of ice. Such data enables us to quantify empirically how variation in weather and climate influences reindeer forage accessibility, rather than using meteorological data as a proxy for examining the biological effects of mild and wet winter days. This data set has been extended by incorporating data from the ongoing measurements of glacier mass balance and snow pack properties that were started by Norwegian Polar Institute in the 1960s.

Previously, there has been little snow and ice data for examining the connection between climate and icing on one hand, and icing conditions and the dynamics of reindeer on the other hand, and current knowledge is mainly based on anecdotal descriptions. Our research group has published one paper on this subject; we modelled ground-ice formation and found a clear evidence for its negative impact on the reindeer population dynamics. However, the model was supported by only a few observations of ice.

We now have 9 years of data with measurements of both number of reindeer and the amount of ice accumulated on the ground. Preliminary analysis shows that the relationship is robust and clear: the more ground ice, the lower the population growth rate in Svalbard reindeer. This can, despite the short time-series, be shown for all the three main research areas - Brøggerhalvøya, Sarsøyra and Kaffiøyra. The relationship between ice and the decrease in population growth rate is anchored in the reindeers' ability to survive and reproduce under such conditions. During winters with a large amount of ground-ice and poor forage accessibility, more reindeer die. Furthermore, fewer calves are produced the following summer, as females in poor condition may delay reproduction to later years and save energy to survive during the bad year.

As mentioned, the effect of ice was particularly evident and noticeable for the Ny-Ålesund inhabitants during the past winter of 2009/10. Three particular weather events, from November to February, gave mild weather and rain on frozen ground. We measured an average of 14 cm ground-ice on the lowland plains around Brøggerhalvøya, and ground-ice was observed up to ~300 m.a.s.l. In previous years, roughly half of our sampling locations were found to be ice-free; this past winter only 1 of 60 locations had no ice.

As previously described, such ground-icing can make forage inaccessible for reindeer over large areas. During the monitoring of the area in 2010 a relatively large number of reindeer carcasses were observed, as well as observations of reindeer dying during the three weeks monitoring period. In fact, we have only counted fewer reindeer on Brøggerhalvøya on two occasions since 1985. Throughout the entire study area, the meta-population was nearly halved compared to last year (2009).

So what are the options for reindeer when much of the ground is covered by ice, and hence their food? During years with no ice the reindeer feed on the lowland plains, either digging through the snow or feeding on snow-free ridges. When the lowland plains are covered by ice the reindeer move higher up, seeking an altitude with less or no ice on the ground. Especially on Sarsøyra and Kaffiøyra there are many observations of reindeer in extremely steep slopes of mountains and even on the peaks of the highest mountains. This means that in icy years, large proportions of the population have been observed above the altitude (ca 200 m a.s.l.) that is usually considered to delimit the "available" grazing range for Svalbard reindeer. Hence, there may be very important foraging areas at high altitudes, serving as food-refuges during winters with extreme conditions. It remains to be shown how sustainable these high-altitude resources are. Also, in 2010 as much as 1/3 of the population on Sarsøyra was observed feeding on seaweed that had been thrown onshore during periods of rough sea and strong winds. Seaweed is salty and hard to digest, and nearly half of the reindeer using this as food had diarrhea. Another factor we need more detailed information on is migration patterns. Reindeer can, in theory, migrate in and out of the monitored area owing to area-specific snow or ice

conditions. Such migration patterns are important to quantify in order to model and predict the future for this particular meta-population as well as Svalbard reindeer in general. Currently we have no reasons to believe that many reindeer migrate to or from this part of Svalbard, but the details remain to be investigated.

The Arctic is warming up faster than the global average, and this region may therefore act as an early warning to other areas regarding e.g. biological effects of global warming. Climatic models and predictions point out that the future Arctic will be warmer, wetter and wilder in the future as the temperature continues to rise. As this implies more frequent warm days and more precipitation during the cold season we could predict than winters with heavy icing on the ground and/or in the snow pack will be more common in the future. Based on our research results and future downscaled climate projections for Ny-Ålesund, we believe that ground-ice will be a more common challenge in the Ny-Ålesund area in future winters, both for people and reindeer. Unfortunately, the effect of such conditions is currently easier to predict for humans than for reindeer.

Topics from the 32nd NySMAC meeting

Topics from the previous NySMAC meeting held in Copenhagen 12-13 April 2010:

- Exchange of information.
- Status reports from Svalbard Science Forum:
 - CUI – One entrance portal for the researchers
 - Arctic field grant 2010
 - Workshops
- Georg H. Hansen from Norwegian Research Council presented challenges and opportunities of SIOS and the phase it has entered now. The full presentation is available on the NySMAC web-site.
- Hans E. Foss Amundsen, Earth and Planetary Exploration Services (EPX) gave a presentation of "AMASE – Arctic Mars Analog Svalbard Expedition".
- Capacity and needs in Ny-Ålesund during the high season were discussed
- Monitoring of local environment – status from NILU
- A KIRB highlights (of results) folder/display in information center and NySMAC Presentation
- Strategies for integration/resource pooling
 - Experiences of marine lab
 - Experiences of ARCFAC
- Status of flagship documents and Ny-Ålesund Science Plan
- VLBI 2010 – renewal of the activities at the observatory in Ny-Ålesund
- Radio quiet conditions in Ny-Ålesund
- Organising of Ny-Ålesund seminar postponed to 2011
- ASSW2011 in Seoul end of March

33rd NySMAC meeting

The next NySMAC meeting is scheduled to week 37 (mid-September) in Ny-Ålesund. The 34th meeting will take place during ASSW2011 in Seoul end of March 2011.

Legacy and current use pesticides recorded in an ice core from Holtedahlfonna

Mark Hermanson (UNIS)
Elisabeth Isaksson (Norwegian Polar Institute)

In the spring of 2005 a 125 m deep ice core was drilled at Holtedahlfonna, at 1150 m asl, about 40 km NE of Ny-Ålesund. The drilling was a collaboration between scientists from NPI, University of Utrecht and University of Uppsala. The ice core is estimated to cover the past 400 years.

We have analyzed the uppermost 35 of this core (dating to the early 1950s) for the input of 47 current use pesticides (CUPs) and 17 legacy pesticides (LPs). The 64 compounds included insecticides, herbicides and fungicides. Nine different CUPs and ten LPs were observed in at least one of six core segments dating to 1953: 15 of these were found in enough core segments to reveal time-related trends. CUPs often observed included chlorpyrifos, dacthal, α - and β - endosulfan, endosulfan sulfate, trifluralin, and γ -HCH. LPs most often observed included methoxychlor, α - & γ -chlordane, cis- & trans-nonachlor, endrin, dieldrin, and p,p'-DDE.

The current-use pesticides are intended to have short lifetimes in the environment, often decomposing in air by hydroxyl radical oxidation. In polar darkness, or in a dry atmosphere, however, that effect is nil. Our research is showing us that the atmosphere can deliver pesticides over

long distances as gases or attached to particles suspended in air. Most of the pesticides are being transported to Svalbard by fast-moving winds from agricultural areas in Europe and Asia or, in other words, from the south and east. They are deposited during snowfall or rain, or, as gases, may condense in cold air. There is evidence that amounts of some CUPs on Svalbard are growing and need to be watched in the future.

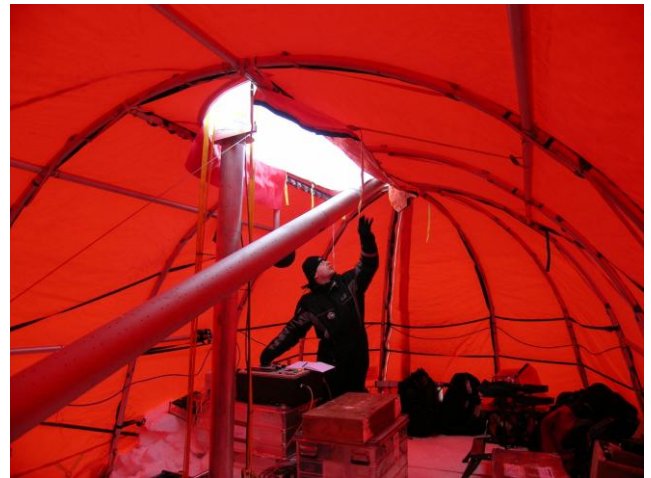
Since 2000, researchers from Environment Canada, the University of Pennsylvania (USA), the Norwegian Polar Institute in Tromsø, and now UNIS, have collaborated on investigating pesticides in ice cores and snow pits also from Austfonna, Lomonosovfonna, and Holtedahlfonna. Our findings show that there are differences in amounts and numbers of pesticides reaching different parts of Svalbard. Austfonna, for example, received about twice as many different pesticides during the 1986 – 1998 period than found at Holtedahlfonna. Austfonna also had higher concentrations of most of the pesticides found at both sites. Analysis of air mass movements showed that air masses from Europe and northern Asia are more often flowing to Austfonna than to Holtedahlfonna, increasing the opportunities for pesticides to reach the northeastern part of Svalbard.

These results are accepted for publication on Journal of Geophysical Research:

Ruggirello, R. M, M. H. Hermanson, E. Isaksson, C. Teixeira, S. Forsström, D.C. G. Muir, V. Pohjola, R. Van de Wal, H. Meijer. Current-use and legacy pesticide deposition to ice caps on Svalbard, Norway. Accepted for Journal of Geophysical Research -Atm .



Camp 3. Ice core drill camp on Holtedahlfonna in March 2005.



Lifting the drill: Inside the drill tent with ice core barrel being lowered into the hole.

Input to Ny-Ålesund Newsletter

If you would like to contribute to future editions of this newsletter, please e-mail nysmac@npolar.no. Any ideas or suggestions for topics are also welcomed. Editor: Marit R. Pettersen, NySMAC Secretariat. Next edition: January 2011

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