Ny-Ålesund Newsletter

30th Edition – June 2012

Funding provided for enhanced observation

The Norwegian Mapping Authority is getting NOK 23.1 million to start construction of a new observatory in Ny-Ålesund. Photo: Bjørn-Owe Holmberg

The Norwegian Mapping Authority (NMA) has received NOK 23.1 million to start building a new geodetic observatory which will permit accurate climate monitoring in the high north. This funding has been provided in the revised national planning budget, and the government has also secured further financing for the planned facility.

Great
"This is great news," says NMA director general Anne Cathrine Frøstrup. "We're very pleased, and can now get started properly on a job which will be highly significant for the future. Precision measurements by this observatory underpin everything we do. And we'll acquire a key role in the global network of similar observatories."

Decision
The Norwegian government took a decision before Christmas 2011 that a new observatory would be built at Ny-Ålesund in the Arctic Svalbard islands.

In addition to the initial appropriation of NOK 23.1 million, the government has proposed an authority totaling NOK 196 million so that orders can be placed for the next few years. This means that the project is fully funded, with a total investment of NOK 219 million.

New antennas incorporating the latest technology and a satellite laser ranging instrument will ensure better Earth observation and a sounder basis for global studies of climate change.

Project
"We're looking forward to starting this work," says divisional director Per Erik Opseth at the NMAs Geodetic Institute.

"We'll be building a new observatory with new antennas in an Arctic climate, and are now working to establish a main project for the work.

"Our goal is to place an order for the antennas as soon as the governor of Svalbard approves the observatory's environmental impact assessment."

Movements
Signals received from outer space by the observatory's very long baseline interferometry (VLBI) antennas makes it possible to map movements in the Earth's surface, its speed of rotation and its exact position in the cosmos.

Such mapping is necessary in order to calculate the orbit of Earth observation satellites. Precise orbital data are required for accurate climate monitoring.

Constructing the new observatory in Ny-Ålesund will take five years from the start of work until the antennas are ready. That will be followed by three years of measurement overlap to safeguard time series before the existing infrastructure is shut down.

By Anne Jørgensen, NMA

Visits to Ny-Ålesund

Several national and international delegations have visited Ny-Ålesund since January this year:

In March the Minister of Foreign Affairs, Mr. Jonas Gahr Støre and the Vice President of the European Commission and High Representative of the European Union for Foreign Affairs and Security Policy, HE Ms. Catherine Ashton made a short trip to Ny-Ålesund during their visit to Svalbard.

The Division Board for Energy, Resources and the Environment of the Research Council of Norway made a study tour to Tromsø and Svalbard and visited Ny-Ålesund during the tour.

The Norwegian Minister of the Environment, Mr. Bård Vegar Solhjell hosted the Nordic Council of Ministers, Ministry of the Environment when they visited Svalbard. They visited Ny-Ålesund on the 26th of March.

From 2-4 April Kings Bay AS and the Norwegian Polar Institute hosted guests from the Czech Republic. The delegation was in Ny-Ålesund to do fact finding for possible scientific activity there.

Later in the month two other national groups visited. The Standing Committee of Transport and Communication visited on 12th of April and Secretary Generals of various ministries and other members of the official Norway visited on 27th of April.

Another Norwegian committee visited late May: The Standing Committee on Education, Research and Church Affairs.

More information about these visits is available on the Kings Bay AS web-site.

Ny-Ålesund Symposium 2012

The sixth Ny-Ålesund Symposium was opened 21st of May by Trond Giske, Minister of Trade and Industry, Norway. The theme for the Symposium this year was;

"Towards a green economy: the role of technology"

The Symposium was a great success with several interesting presentations and discussions.

The participants gathered in Ny-Ålesund. Photo: Kings Bay AS

AWIPEV news

The new AWIPEV overwintering team has been present at the station since mid April. In the beginning of June the new team will start to take over the responsibilities.

Sebastien Barrault as station leader from Rudolf Denkmann, **Winfried Markert** as observatory engineer from Andrea Groß and **Pierre Lizée** as logistic engineer from Christophe Brière.

Since 1st of May Ny-Ålesund site for radio sounding and atmospheric surface observations operated by AWIPEV has become a station of GRUAN, the Reference Upper Air Network of the Global Climate Observing System, for providing long-term high-quality climate records and accurate observations. GRUAN web site: http://www.gruan.org.

An ODL measuring station (gamma dose probe instrumentation for radioactivity measurement) will be installed in the following days on the new platform extension on the roof of the NDACC observatory.

37 research projects taking place at the station have been granted for 2012. The list is available on AWIPEV web site http://www.awipev.eu.

AWIPEV overwintering teams 2011 and 2012 with Jürgen Gräser (station support AWI Potsdam, in the center with the radio-sound balloon), from left to right: Sebastien Barrault, Pierre Lizée, Rudolf Denkmann, Andrea Groß, Christophe Brière, Winfried Markert. Photo: AWI

By Rudolf Denkmann and Sebastien Barrault, AWI

37th NySMAC meeting

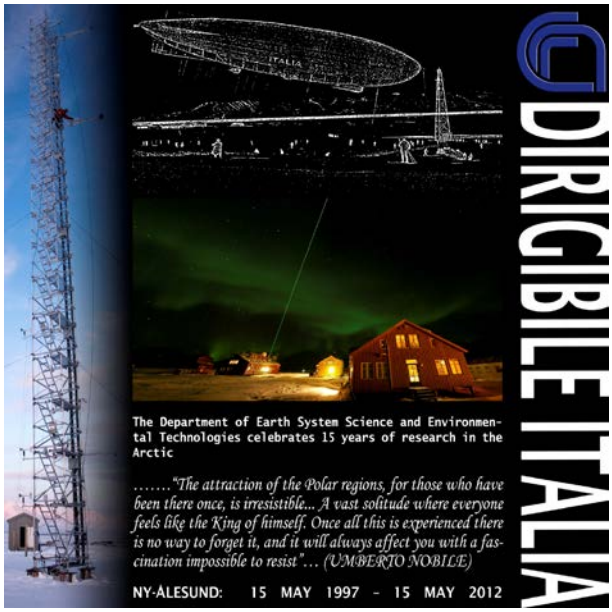
The 37th meeting is scheduled to November 2012. Venue for the meeting will be Groningen, The Netherlands.

Planning of the 11th Ny-Ålesund seminar has also started and will be discussed further at this meeting.

ASSW2013 and 38th NySMAC meeting

The 38th meeting will be held during ASSW2013 in Krakow, Poland 14-20 April.

15th Anniversary - "Dirigible Italia"



15th of May 2012 was the 15th anniversary of the inauguration of the CNR Arctic Station "Dirigible Italia".

Summer UAS activities in Ny-Ålesund

Norut will perform a one month (9 July-9 Aug) campaign with its unmanned aircraft systems this summer focusing on measurements of the Cryosphere. The goal is to test the new long range aircraft with instrumentation to measure sea-ice properties, glacier properties and atmospheric properties. A payload consisting of two spectrometers, laser altimeter, camera and met pack as well as a precision dual antenna dual frequency GPS will be flown. The plan is two overfly Lance during the July 21st to August 6th cruise north of Svalbard. This will give us transects of sea-ice properties across the marginal ice zone.

The sea-ice measurements are aimed measuring the following properties:

- Ice fraction
- Melt pond fraction
- Ice spectral albedo
- Ice freeboard

These activities are therefore coordinated with NPI, NILU and University of Tromsø which will gather ground based and satellite data. We also plan to do measurements over Holtedalsfonna and Kongsvegen Glaciers with the same payload to measure the following properties:

- Surface elevation
- Dynamics
- Albedo
- Glacier facies

There will also be done vertical profiles of upwelling radiances over Kongsfjorden downwind of the power plant and cruise ships to investigate the ability to extract aerosol information from the spectroscopic measurements. These activities are funded by the NRC Arctic EO project and the Fram Centre Sea-ice project.

By Rune Storvold, NORUT

NPI Sverdrup Station News

At the time of writing, the Sverdrup Station awaits the first researchers to arrive and open the summer season. About 100 researchers with 1300 lodging days in 24 projects are expected during summer, which corresponds to a quite similar number of guests as in 2011. A detailed list of the numerous projects can be found at http://sverdrup.npolar.no/sverdrup_booking/project

Field work on the glacier. Photo: Max König, NPI

During summer, the Sverdrup Station will experience a re-organization of its personnel structure. Starting already in July, the Sverdrup Station will adopt a similar solution for its personnel as has been implemented at the Mapping Authority in Ny-Ålesund. While the logistics engineer will remain in its 100% position, there will be three engineers and one station leader, each within an 80% position working three month in Ny-Ålesund, followed by a work-free month. This way, there always will be – besides the logistics engineer -- three people present at the station while one is on leave for his work-free month. We see that this solution has worked very well for the employees at the Mapping Authority and we expect that this approach will better meet the work demands of the winter season, where we now always have three engineers present versus only one to two during recent years.

Also in Tromsø, new personnel will help the Sverdrup Station and Ny-Ålesund. Last autumn, Nalan Koç started in her position as research director and already paid several visits to the Sverdrup Station to get a picture of the needs of Ny-Ålesund, the new organization of the station, in close communication with the station personnel, being a first result. Starting this spring, Inger Solheim will help with the task of coordinating research in Ny-Ålesund. Additionally, Stephen Hudson Hudson has started in his new position as atmospheric scientist and in his work he will closely collaborate with the engineers at the Sverdrup Station, especially regarding the radiation measurements.

By Max König, NPI

Student camp 2013

Only three stations (Korea, Italia and India) have committed to participate in 2013, therefore the student camp is cancelled. Svalbard Science Forum will make no further attempts to revive the camp, but the plans made and work done so far is available for those interested.

SSF Cooperation Workshop No. 3: **Changes in snow/ice and pollutants and their effects on terrestrial ecosystems**

By Christiane Hübner, SSF

Svalbard Science Forum (SSF) as part of the Research Council of Norway organized a 'SSF cooperation workshop' with 24 experts from three scientific fields (snow & ice, ecology and pollutants) in Oslo 13-16 February 2012. The workshop brought together scientists who have Svalbard and the Arctic as a base for their research, and was supplied by scientists with expertise and experience from working in other cold regions.

The participating researchers presented their own work and considerations on knowledge gaps and potential cooperation. The workshop discussed prioritized knowledge gaps revealed during the presentations, links between the different fields of research and potential common projects and collaboration.

8 projects were prioritized to achieve more together through cooperation and joint efforts. They all have the potential to fill main gaps of knowledge, combine fields of research and create more cooperation and collaboration if put into action. These are (in non-prioritized order):

1. Identification of climatic parameters that have been recorded
2. Spatial and temporal variability of snow-pack properties in non-glaciated areas of Svalbard
3. Melt water release of pollutants to terrestrial ecosystems
4. Local pollution vs. long-range transport: biomonitoring and source markers
5. Impacts of winter stress events: Extreme winter weather and pollution shock on community development
6. Spring: Changes in onset of spring and impact in terrestrial ecosystems
7. Autumn: Date onset of soil freezing and snow cover in the autumn
8. SNOW.MELT - Impact of snow melt on soil development

Workshop participants:

From the left: Heikki Hänninen, Krzysztof Migala, Josef Elster, Piotr Glowacki, Elisabeth Cooper, Jan Kavan, Lennart Nilsen, Bronislaw Wojtuń, Sergey Vlasov, Åshild Pedersen, Elisabeth Isaksson, Irina Solovyanova, Anna K. Sinisalo, Margit Schwikowski (in the middle), Birgit Sattler, Terry Bidleman, Mark Hermanson, Mariusz Grabiec, Crispin Halsall, Bartek Luks, Stef Bokhorst and Kaj Mantzius Hansen. Not present: Roland Kallenborn and Halvard R. Pedersen (photo).

The impact of river inputs on plankton: *in situ* experiment planned in Kongsfjorden

Fanny Narcy, IUEM, France
Anette Wold, NPI
Stig Falk-Petersen, NPI

The impact of river inputs on processes and fluxes within the plankton community of Kongsfjorden will be studied experimentally during the PREDIC project, funded by the Arctic Field Grant.

Transparent cylindrical bags of $1m^3$ (mesocosms) will be deployed near shore close to Ny-Ålesund during the 3 first weeks of August 2012. Melt water will be added to the mesocosms in a gradient design in order to follow the response of the different plankton compartments over time. In addition to following the biomass stocks and production of the different components of the plankton, stable isotopes will be used to quantify and follow the fate of bacterial carbon up to the mesozooplankton. Investigating the processes linking river discharge during the arctic summer to the plankton community of Kongsfjorden will bring insights on the underlying causes of the spatial and seasonal variability of plankton data collected during the transect survey implemented by NPI.

Moreover, measurements of the quality and quantity of the downward flux of particles will be monitored during the PREDIC experiment, and related to the data from the sediment trap deployed by the ECOTAB project.

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Monitoring of Svalbard reindeer

Åshild Ønvik Pedersen, PhD Terrestrial ecologist, Norwegian Polar Institute, aashild@npolar.no

The endemic Svalbard reindeer is monitored because it is a key species of the terrestrial ecosystem in Svalbard, is sensitive to climate change and is hunted in parts of central Spitsbergen. In April 2012 the annual winter monitoring survey of Svalbard reindeer in Brøgger peninsula and adjacent areas took place. These areas are unique locations to study the relationship between reindeer population dynamics and climatic drives of population change.

The Norwegian Polar Institute has since the re-introduction of 15 animals in 1978 monitored the Svalbard reindeer (Rangifer tarandus platyrhynchus) in the Brøgger peninsula and adjacent areas. The introduced population grew exponentially to 360 individuals by 1993, but declined to below 100 individuals during the winter of 1993/94 because of extreme winter conditions generating ground ice blocking access to forage resources. This decline was due to a combination of mortality and migration out of the area (Aanes et al. 2000). Since 2000 Sarsøyra and Kaffiøyra are also monitored to account for the areas where individuals migrated to. Currently the Svalbard reindeer is included as an indicator species in the «Environmental Monitoring Program for Svalbard and Jan Mayen» and data are annually reported to MOSJ (http://mosj.npolar.no/no/).

Research has documented climatic variation to be among the most important factor impacting population dynamics of the Svalbard reindeer. Ground ice, snow pack properties and summer temperatures are the most important factors (Aanes et al. 2000; Aanes et al. 2002; Kohler & Aanes 2004; Hansen et al. 2011). In late January 2012 Ny-Ålesund experienced extreme weather conditions with large amounts of rain on snow (ROS) resulting in ice locked pastures for reindeer. Almost 100 % of the low-land survey pits were covered by thick ground ice with mean values reaching much higher than the last 'extreme' year in 2010. Recent research based on the NPI long-term monitoring has demonstrated empirically a strong negative effect of reindeer population growth rate from ground ice (Hansen et al. 2011).

This year we observed several animals in poor body condition, increased frequency of carcasses and several strategies to escape locked pastures on the tundra. In some of the locations reindeer used high-altitude habitat where ground ice may be much less severe (Hansen et al. 2010) or they aggregated in large groups in relatively small areas on the tundra with available vegetation. Svalbard reindeer have small home-ranges (Hansen et al. 2009) and when pastures are locked they may move in order to escape poor conditions. Stien et al. (2010) demonstrated ground ice to cause immediate increase in range displacement of reindeer due to ice-locked pastures. Animals were also observed along the sea-shore where they likely grazed on washed-up kelp and seaweed. Hansen and Aanes (2012) described in a recent article that up to 21 % of one of the sub-populations in the study areas used the seas-shore habitat for foraging. Calves were over-represented among the individuals applying this foraging strategy which likely indicates a last attempt to avoid starvation.

Climate projections suggest a substantial future increase in ROS events with warmer and wetter winter climate (Førland et al. 2009) which likely will increase the frequency of ice-locked pastures in winter. The Brøgger study locations serve as important and unique sites to observe changes in winter climate and extreme weather events and their direct influence on large herbivore population dynamics.

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Svalbard reindeer. Photo: Ronny Aanes.

Why Svalbard is rising

New measurements explain why the uplift of the Svalbard islands is larger than the models predict.

Halfdan Pascal Kierulf, researcher, Norwegian Mapping Authority
Ove Christian Dahl Omang, researcher, Norwegian Mapping Authority

The uplift measured at Ny-Ålesund in Svalbard reflects changes in the regional ice cover during the last Ice Age, after the Little Ice Age and today.

But the geodetic observatory operated in this Arctic settlement by the Norwegian Mapping Authority (NMA) has long shown the rise to be higher than predicted by geophysical modelling.

Comparing gravimetric readings with measurements by GPS and very long baseline interferometry (VLBI) makes it possible to understand the surprisingly large uplift in Svalbard and why this is so much bigger than the models predict.

At the moment, the uplift in Ny-Ålesund is about 8.5 millimeters per year. But this figure also varies considerably from year to year.

The latter correlates closely with current ice melting. Combining various measuring techniques makes it possible to separate out the various processes and thereby to say something about ice melting in the various periods.

Slow and rapid
When a lot of ice melts, the immediate consequence is rapid uplift of the crust – a quick elastic response. This comes to a halt when no ice is melting. The process has yielded an average rise of 3.3 millimeters per annum over the past 10 years.

Another component of uplift can be attributed to ice melting at the end of the last Ice Age. This is a slow process – a visco-elastic response, and movements of mass in the mantel are required for it to take place. The models suggest that this rise should be about 1.7 millimeters per annum in the area around Ny-Ålesund. In other words, the actual uplift is much higher than the models indicate.

Today's elevation and elevation change is largely measured with the geodetic techniques GPS and VLBI. Both are deployed in Ny-Ålesund. They are supplemented by gravimetric readings which measure gravitational changes with extreme accuracy.

Gravitational changes
Measurements of the Earth's gravity and changes in it provide supplementary information on uplift. If one point rises, it will also move further from the Earth's centre of mass and the force of gravity will decline. This is what a gravimeter measures.

Since a quick rise consists largely of height changes rather than movements in the Earth's interior, the gravitational change can be derived simply by looking at the alterations in elevation.

Slow uplift, on the other hand, also leads to movements of mass in the mantle, which also change gravitational force. Measuring these changes in addition to elevation changes makes it possible to discover more about the underlying processes driving uplift.

Both gravitational and elevation measurements show large variations from year to year. These correspond with the expected outcome of rapid uplift caused by ice melting in the area. The melting of glacier ice near Ny-Ålesund is regularly measured by the Norwegian Polar Institute.

Little Ice Age
Looking at the whole series of measurements over 10 years, however, it can be seen that both uplift and gravitational changes are larger than expected. Comparing the variance from expectation for both gravity and elevation indicates that the underlying process involves movements of mass in the mantle.

In other words, we are probably dealing with a form of slow uplift. Models for the last Ice Age are unlikely to be so poor that this could explain the shortfall in uplift. The most probable reason for the excess uplift is ice changes in a later period.

Glaciers on Svalbard are known to have receded after the Little Ice Age, which ended in the islands around 1870. Further research will show whether this can really explain the whole variance between measured and calculated uplift.

Observatory contributes
The Norwegian Mapping Authority is planning to upgrade its geodetic observatory in Ny-Ålesund. This facility forms part of an international network of such stations and, with its unique location in the Arctic, ranks as perhaps the most important of these units. The observatory undertakes measurements to identify a number of different Earth observational parameters, including uplift.

The uplift measured at Ny-Ålesund reflects changes to ice volumes in the area during the last Ice Age, the Little Ice Age and today. By combining gravity and uplift, the various processes can be separated out. That in turn makes it possible to say something about ice melting in the various periods.

A good understanding of the geophysical processes on Svalbard is essential for optimum utilisation of the observatory at Ny-Ålesund and for using its results to draw conclusions about geophysical conditions and climate, both locally and globally.

The geodetic observatory operated by the Norwegian Mapping Authority (NMA) at Ny-Ålesund. Photo: Bjørn-Owe Holmberg

ECOTAB – Effect of Climate change On The Arctic Benthos

Nathalie Morata / LEMAR / France (nathalie.morata@gmail.com) http://www-iuem.univ-brest.fr/ecotab

It is now generally admitted that effects of climate change are enhanced in polar areas. Those changes will have repercussions on the entire ecosystem functioning and carbon cycling, although it is yet unclear how benthic organisms will respond to those changes in food sources and environmental conditions. The overarching goal of the ECOTAB project is to investigate how climate-induced changes in biological (food sources) and environmental conditions (temperature, pH, salinity), will impact the Arctic benthos. This project will combine existing data, new field data, and a new experimental approach which will test various scenarios of food (i.e. high food quality, low food quality) and pH, salinity, temperature (perturbation experiments) therefore improving understanding of present state Arctic coastal ecosystem function, and prediction of possible feedback scenarios of the ecosystem to changes in a less ice-rich Arctic due to climate warming.

This project will take place at the AWIPEV research station in Ny-Ålesund Svalbard. In 2012, the 3 field campaigns will take place May 13th to May 29th, July 30th to August 13th and 2 weeks in October. During these campaigns, water, sediment trap and sediment samples will be collected at 3 stations from the glacier to the open water.

Celebration of May 17 in Ny-Ålesund

Norway's constitution day celebrated in Ny-Ålesund. Photo: Max König, NPI

Topics from the 36th NySMAC meeting

Topics from the previous NySMAC meeting held in Stockholm, Sweden 20-21 March 2012:

- Acceptance of agenda and follow up on minutes decisions
- Status reports from member institutions
- Information from Kings Bay AS
- Svalbard Science Forum work report
  - Funding programmes
  - RiS database
  - International student camp
  - Cooperation workshops 2012
  - Update and renewal of webpage
- New Geodetic Earth Observatory in Ny-Ålesund – project update
- Flagship programmes – how to proceed with further work
- Access to Ny-Ålesund through national stations
- Progress of SIOS
- Environmental plan for East Svalbard
- Presentation of science projects to visiting tourists
- Plots for long-term vegetation studies
- 1:30.000 map will be available for the Ny-Ålesund area

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 *2013***

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