

A photograph of a person in winter climbing gear, including a purple helmet and goggles, ascending a steep, icy mountain slope. The scene is illuminated by a bright light source, possibly the sun, creating a high-contrast, blue-tinted environment. The person is in the lower foreground, looking upwards. The background shows jagged ice formations and a bright sky.

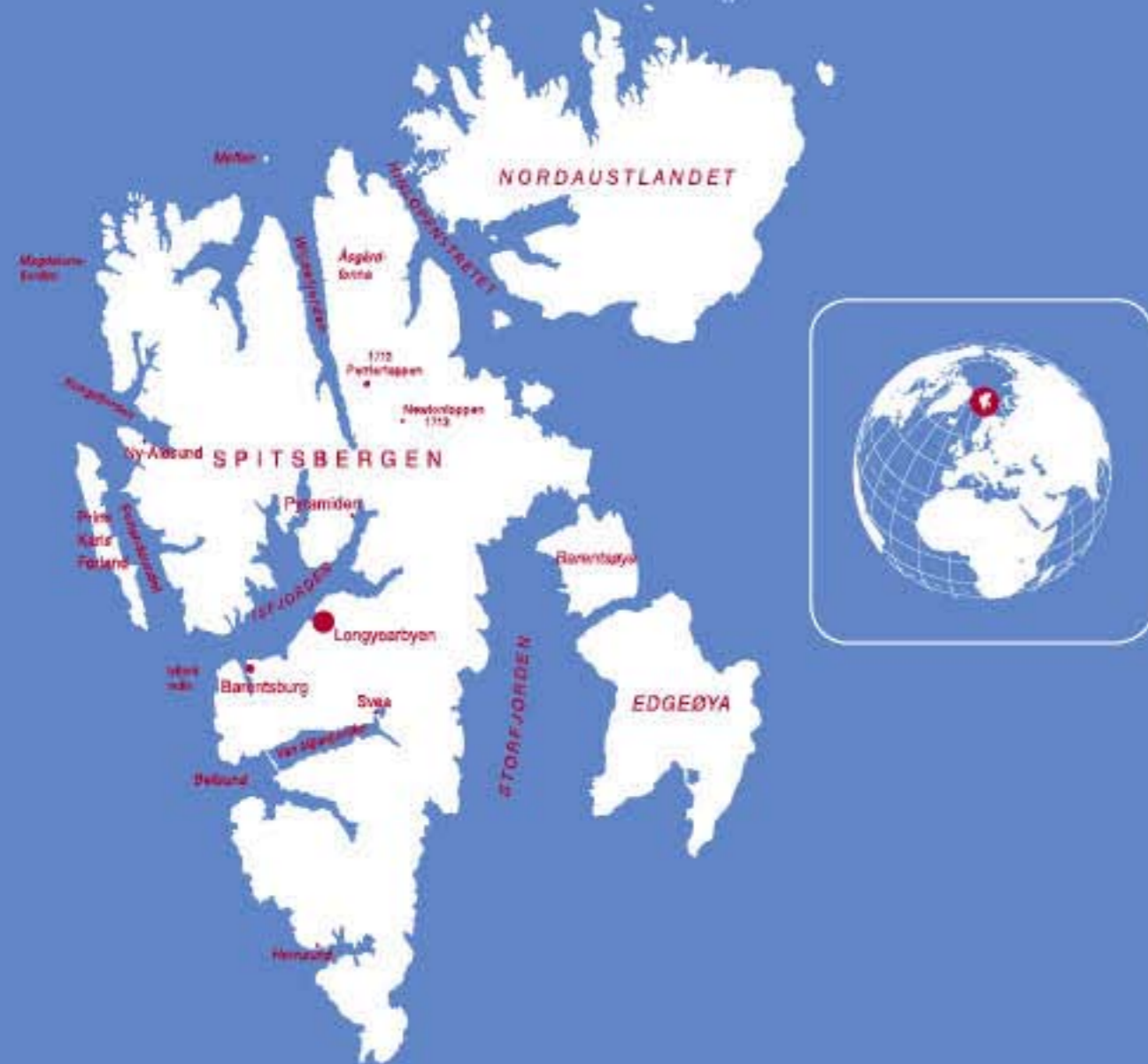
UNIS annual report 2006



UNIS

UNIS - The University Centre in Svalbard

map over svalbard



Front cover: Doug Benn, UNIS professor in glaciology, doing fieldwork in the ice caves of Hansbreen in Hornsund, the southernmost sound on Spitsbergen.

Photo: Jason Gullely

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from the director

The name of the fjord leading into Longyearbyen is Isfjorden, but there was no ice on the fjord this winter. The water temperature remained above freezing level and our suppliers kept bringing in their goods by ship. The situation was the same last year.

The United Nations panel for climate change released a new report in February 2007, stating that most of the observed increase in global temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations. The increase is believed to be man made.

In its projections for the future, the panel expects higher temperature increases in the Arctic than further south due to the accelerating effect of the melting sea ice. It also expects a dramatic reduction of the sea ice in the Arctic Ocean and a severe weakening of the Gulf Stream. The panel projects an increase in the sea level worldwide of 19 to 58 cm by the end of the century.

The University Centre in Svalbard specializes in the natural sciences and technologies of the high Arctic. We perform research and offer education in a variety of climate related fields. Our biologists study the adaptations of wildlife in the sea and on land to Arctic conditions. Our geologists study the dynamics and monitor the changes in permafrost and glaciers. Our geophysicists study the processes taking place in the seas, but also in the atmosphere. Our technologists are figuring out ways to deal with the effects.

The language of the UN panel is stronger than when they published their last report, which reflects that more data have been assembled and more evidence seems to add up in the same direction. Still, many questions remain unanswered, and there is a need to increase the efforts to describe what is happening, figure out why it is happening and design strategies to change the course. UNIS is perfectly positioned to contribute in these fields, being a unique academic institution in the high Arctic.

UNIS deals with these issues both as a research institution, contributing to the academic knowledge base, and as an educational institution. Young people come to Longyearbyen from all over the world to study the nature and processes of the high Arctic. At UNIS they get a unique opportunity to experience what they learn as well, as all our education is field based. Leaving UNIS with a Master- or Ph.D. degree, they go on to become the Arctic experts of tomorrow.

The average temperature in Longyearbyen was 5 degrees higher last year than the average of the past 50 years. Exactly why is a complex issue. Whatever the answer proves to be, it is urgent to understand what is going on.

April 2007



Gunnar Sand
Director

report of the board of directors 2006

The year 2006 was a particularly memorable one for the University Centre in Svalbard (UNIS). The King and Queen of Norway opened the Svalbard Science Centre, the Ministry of Education and Research and local authorities gave the all clear for the building of the Northern Lights Observatory, a group of marine biologists reached the final of a competition to become a Norwegian Centre of Excellence and attention from the outside world was greater than ever as a result of the Government's strategic focus on the High North and preparations for the International Polar Year.

The University Centre in Svalbard AS (UNIS) was established as a state-owned limited corporation on November 29, 2002, replacing the original institution established in 1994 by the four traditional Norwegian universities: NTNU (Trondheim), Oslo, Bergen and Tromsø.

The institution's objective is to provide studies and engage in research based on Svalbard's geographic location in the High Arctic and the special advantages this offers in terms of using the natural environment as our laboratory and arena for observation, data acquisition and analysis. Tuition shall be at university level and act as a supplement to the tuition offered at the universities in mainland Norway. Periods of study here shall form part of an ordinary programme of study and culminate with examinations at Bachelor, Master or PhD level. Studies at UNIS are very much international in flavour, and all instruction is given in English.

Studies

In 2006, UNIS offered four fields of study: Arctic Biology, Arctic Geology, Arctic Geophysics and Arctic Technology. A total of 43 courses were offered, of which 23 were at Master's or PhD level. A total of 310 students from 20 different countries took courses or worked on their Master or PhD theses. This equates to 113 student years. Nineteen Master's students and three PhD students graduated from UNIS in 2006.

The female component of students in 2006 was 45 percent, while the proportion of Norwegian students was 55 percent. Of the international students, 25 percent came from other Nordic countries, while 22 percent were from Germany. German students have really developed a sense for UNIS, in part as a result of the extensive coverage in the German media, including reports in both *Der Spiegel* and *Focus* magazin.

The total student numbers represent a reduction of 12 student years compared to 2005. This reduction is mostly at the lower level and is a consequence of the reduction of opportunities to combine programmes across disciplines and institutions as a result of the Quality Reform in higher education in 2003. The Directors are concerned about this unintentional effect of the reform. A principal challenge for UNIS in 2007 is to come à jour in relation to the Quality Reform.

Research

Marine biologists at UNIS are active participants in the ARCTOS research network, which in 2006 reached the final of the competition to become a Norwegian Centre of Excellence. Although the network did not prevail in the final round, it has a large assignment portfolio and a comprehensive PhD programme and will continue in 2007. The network is engaged in one of the International Polar Year (IPY) projects headed by UNIS: Cleopatra/PAN-AME, which is conducting research on climatic impacts on the amount and quality of plankton and algae in the ice zone.

The other IPY project, Permafrost Observatory Project: A Contribution to the Thermal State of Permafrost in Norway and Svalbard (TSP Norway), is headed by the Department of Geology. The project's aim is to determine whether the permafrost is thinning and chart the consequences of this for the landscape and infrastructure. UNIS is also participating in three other Norwegian-financed IPY projects.

During 2006, UNIS entered into a collaboration agreement with the EISCAT organisation on radar facilities and the new Auroral Observatory at the Coal Mine No. 7 Mountain. UNIS is now expanding studies of the upper atmosphere and will within a short space of time double the number of scientific staff in this area. The EISCAT collaboration is also a response to the authorities' desire for increased collaboration and better utilisation of the research infrastructure in Svalbard.

UNIS, together with NTNU and SINTEF, took the initiative to create a vision for a CO₂-free Svalbard by 2025. This vision is based on coal as a resource also in the future, but with CO₂ capture and depositing. Expertise from the Departments of Geology and Technology at UNIS is central in the initiative, which will be assessed by the Government in spring 2007.

Dissemination

UNIS used considerable resources on the dissemination of information, including through media contact, conference participation and presentations for visitors. In 2006, UNIS became a partner in the programme Studietur Nord and was already a partner in Svalbardkurset. UNIS is also active in the newly established Arctic Frontiers conference, which will be arranged annually in Tromsø.

UNIS arranged the Open Day at the Svalbard Science Centre on September 30 in conjunction with the Norwegian Science Week 2006. Exhibitions, lectures and competitions for the public were arranged to show the population of Longyearbyen the research activities taking place here. The event was attended by around 300 people and, as a result of this, was very successful.

Staff

As of December 31, 2006, the scientific staff at UNIS comprised 26 people in full-time employment, plus 20 Associate Professors and Research Fellows. There was a technical staff of eight and an administrative staff of 12. UNIS also hosts five externally-funded positions. UNIS had several vacant positions, which will be filled in 2007.

Gunnar Sand was appointed as the new Managing Director of UNIS at the Board of Directors' meeting on March 22, replacing Lasse Lønnum. Sand commenced his three-

year term on June 1. The Board of Directors thanks Lønnum for his good contribution during his two terms as UNIS Managing Director.

HES

Absence due to sickness at UNIS in 2006 was 0.53 percent. The institution has an agreement with the Longyearbyen Hospital concerning occupational health services and is certified as an IA enterprise. The Board of Directors decided at its December meeting to apply for ISO certification of the logistics function, including safety routines. There were no injuries or reports of serious occupational accidents or calamities resulting in serious material damage or personal injury. Modern building methods, materials and technical solutions provide a good indoor environment in UNIS' buildings.

UNIS is unaware of contamination of the wider environment to any significant degree as a result of the institution's operations.

Infrastructure and housing

The new Svalbard Science Centre was officially opened by the Norwegian King and Queen on April 26. This is a modern and exciting building featuring optimal facilities for studying and research. Also in 2006, the Longyearbyen Community council approved the plans for the new Auroral Observatory, which will be called the Kjell Henriksen Observatory. Construction work commences in 2007.

In 2006, UNIS took ownership of seven new family apartments and at year-end 2006 owned a total of 35 apartments. UNIS rents 20 studio apartments to Research Fellows and a further 19 to guest lecturers. In addition, the Student Welfare Organisation in Tromsø offers a total of 144 studio apartments to students. It is decisive for UNIS that the students have satisfactory living conditions, and the Board of Directors emphasises pursuing the good collaboration with the Student Welfare Organisation in Tromsø.

Economic development

Funds for operation and investment at UNIS are appropriated over the budget of the Ministry of Education and Research. In the period from 2001 to 2006, UNIS has had an average annual increase in operational appropriations of 10 percent.

In 2006, these appropriations totalled NOK 94,885,000, of which NOK 67,290,000 was spent on operation, NOK 23,600,000 was ear-marked for equipment and fittings at the Svalbard Science Centre and NOK 2,500,000 was ear-marked for the new Auroral Observatory. Over and above the appropriations from the Ministry of Education and Research Funding, UNIS received funding of NOK 12 million, comprising external project income for research of NOK 8.8 million, income from consultancy services and apartment rentals. UNIS has experienced an increase in external funding for research from 8 percent of its gross income in 2001 to 15 percent in 2006.

Forty-two percent of goods and services were purchased locally in Longyearbyen, according to the annual accounts for 2006.

The annual accounts show an operational surplus of NOK 4,664,748. After financial incomes, the annual accounts show a surplus of NOK 4,679,016

The institution's total assets at year-end 2006 were NOK 58,006,424, comprising NOK 20,181,650 of institutional buildings and NOK 11,855,163 of share-holder capital and other equity.

In 2006, salaries of NOK 516,414 and NOK 398,175 were paid to the Managing Directors, while the Chairman of the Board of Directors received a fee of NOK 35,000 and board members each received a fee of NOK 20,000. The institution's accounts were audited by PriceWaterhouse Coopers A/S.

Continued operation

The institution's annual account balance is presented on the assumption of continued operation. The reasoning for the assumption is in the prognosis for 2007 and the UNIS strategic plan for 2007-2012.

The Board of Directors' activities

The UNIS Board of Directors held five meetings in 2006, three of which were in Longyearbyen. Sixty-five matters were officially discussed.

Annual General Meeting

The Annual General Meeting was held in Longyearbyen on April 27.

The path forward

The Board of Directors approved at the December meeting a new strategic plan for 2007-2012. The starting point for the plan is that UNIS has reached a level which enables it to develop an academic institution of high quality in Longyearbyen, and that knowledge acquisition in the High North is an area of major strategic importance for the Government. UNIS' overall goal is that by 2012 it will be a leading international centre for Arctic studies. In order to fulfil this goal, UNIS must grow. The scientific departments must achieve a critical mass, which makes high quality possible. With respect to the universities in mainland Norway, UNIS must to a larger degree offer full semester modules, especially at Bachelor and Master of Science level.

The Board of Directors recognises that a larger UNIS will still be a small institution in an international context. The future must, therefore, be characterised by purposeful alliance building. UNIS shall work actively to improve the level of collaboration with other research providers in Svalbard and in the wider Arctic region to increase the utilisation of the existing research infrastructure. Gaining access to vessels which can satisfy UNIS' varied requirements will be a special challenge.

As part of the strategic plan, the Board of Directors approved the development of new courses within energy/environment. This work commences in 2007. The focus will be in the Department of Technology, but will also involve the Department of Geology. This initiative has been well received, particularly by the business community.

A major challenge for UNIS in the years ahead will be to secure the economic resources to realise its growth ambitions. This applies to positions as well as staff accommodation. The housing situation will become critical as early as 2007.

In concluding, the Board of Directors would like to thank all staff at UNIS for the good contributions they have made in 2006!

Longyearbyen 23. Feb. 2007

Kjell A. Sælen
Kjell A. Sælen
leder

Viva Mørk Kvello
Viva Mørk Kvello

Else Nøst Hegseth
Else Nøst Hegseth

Steinar Nordal
Steinar Nordal

Hanne Christiansen
Hanne Christiansen

Ragnhild Lundmark Daae
Ragnhild Lundmark Daae

Annik M. Myhre
Annik Myhre
nestleder

Gunnar Sand
Gunnar Sand
director



H.M. King Harald and Queen Sonja officially opened the Svalbard Science Centre on April 26, 2006.

Photo: Birger Amundsen.

UNIS leader group 01.01.07

the brown bag lunch seminar

statistics

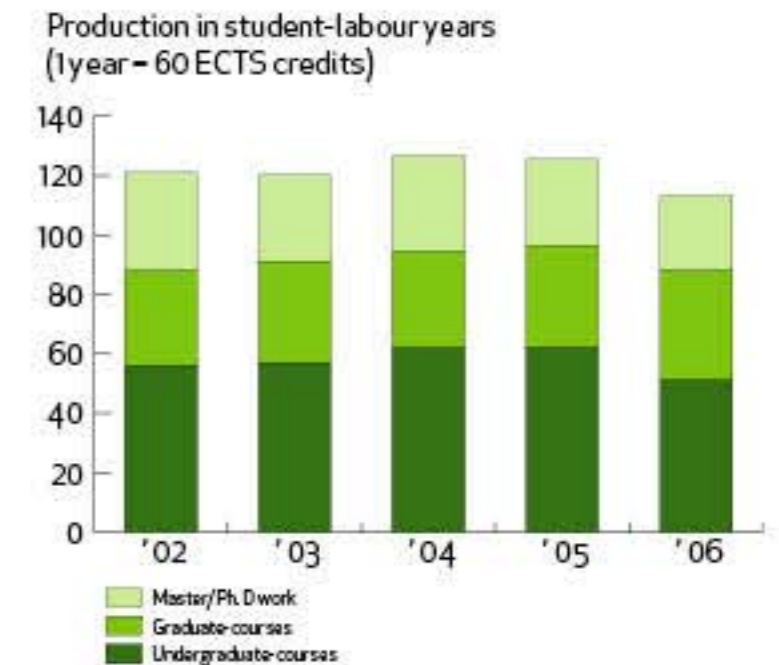
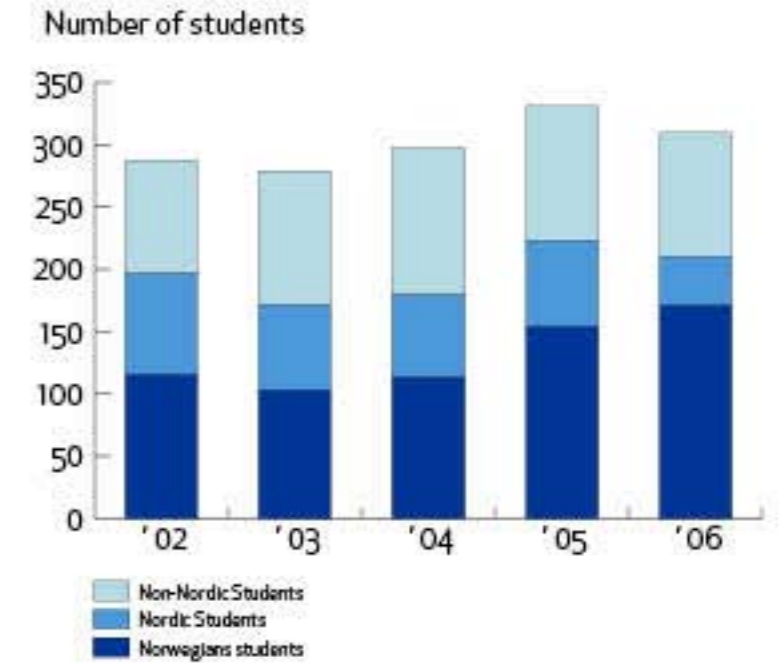
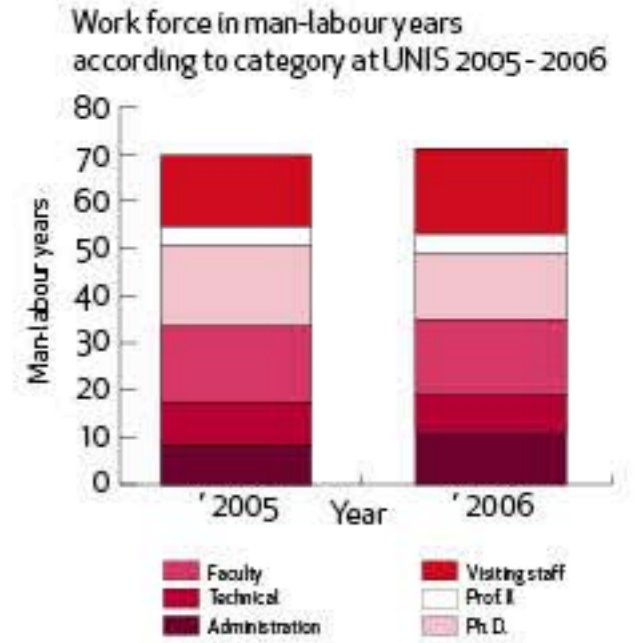
- Gunnar Sand, Director
- Helen Flå, Assistant Director
- Hanne H. Christensen, Department leader, Arctic Geology
- Steve Coulson, Department leader, Arctic Biology
- Ole-Christian Ekeberg, Student Council leader
- Roland Kallenborn, Department leader, Arctic Technology
- Dag Lorentzen, Department leader, Arctic Geophysics

By Sébastien Barrault

In 2006 a new public outreach venue was initiated at UNIS. Every Wednesday at noon UNIS becomes the interdisciplinary learning platform of the Svalbard Science Centre. The Lunch Seminar provides short (30-45 min.) presentations about scientific research that goes on at UNIS and other research organizations, while the audience can enjoy their brown bag lunch. With more than 30 presentations in 2006 given by Master and Ph.D. students, scientific staff and guest lecturers, the Lunch Seminar offers an informal scientific forum for discussions including all disciplines. Since last August, Lunch Seminar has opened its doors to all Longyearbyen, disposed to share the ongoing projects on Svalbard with the local population.



The UNIS Brown Bag Lunch Seminar has become a popular place for students, scientists and the local population to spend their Wednesday lunch hour.
Photo: Henrik Pryser Libell.



resultatregnskap pr. 31.12.2006

RESULTATREGNSKAP:

	Note	2006	2005
Driftstilskudd fra UFD	1	67 290 097	48 934 000
Eksterne prosjektinntekter		8 852 183	7 714 877
Øvrige inntekter	2	3 194 890	4 078 409
Brutto driftsinntekter		<u>79 337 170</u>	<u>60 727 286</u>
Direkte prosjektkostnader		8 295 637	7 056 843
Netto driftsinntekter		<u>71 041 533</u>	<u>53 670 443</u>
Lønn og sosiale kostnader	6	29 868 338	27 963 032
Felt-og toktkostnader		6 083 173	6 832 775
Øvrige driftskostnader	3	30 425 274	14 343 175
Sum driftskostnader		<u>66 376 785</u>	<u>49 138 982</u>
Driftsoverskudd		<u>4 664 748</u>	<u>4 531 461</u>
Finansinntekter og -kostnader			
Finansinntekter		531 589	257 300
Finanskostnader		<u>517 321</u>	<u>234 146</u>
Netto finansinntekter		<u>14 268</u>	<u>23 154</u>
Resultat før ekstraord.poster		<u>4 679 016</u>	<u>4 554 615</u>
Disponeringer: Til annen egenkapital		4 679 016	

balanse pr. 31.12.2006

BALANSE:

	Note	2006	2005
EIENDELER			
Anleggsmidler:			
Bygninger	4	20 181 649	7 932 953
Andeler Svalbardhallen	5	1	1
Sum anleggsmidler		<u>20 181 650</u>	<u>7 932 954</u>
Omløpsmidler:			
Varebeholdning		1 134 437	28 045
Debitorer		4 455 695	3 310 192
Andre kortsiktige fordringer	7	7 906 207	936 832
Betalingsmidler		24 328 436	25 550 376
Sum omløpsmidler		<u>37 824 774</u>	<u>29 825 445</u>
SUM EIENDELER		<u>58 006 424</u>	<u>37 758 398</u>
GJELD OG EGENKAPITAL			
Innskutt egenkapital		2 054 025	2 054 025
Opptjent egenkapital		9 801 138	5 122 122
Sum egenkapital	9	<u>11 855 163</u>	<u>7 176 148</u>
Avsetninger for forpliktelse			
Ubenyttet invester.tilsk.utstyr SFP		9 777 916	5 620 603
Utsatt innt.føring tilskudd Nordlysstasjonen		2 500 000	
Utsatt inn.før husleie Svalbard Forskningspark			1 734 000
Utsatt inn.føring tilskudd stipendiat			535 000
Sum avsetn for forpliktelser		<u>12 277 916</u>	<u>7 889 603</u>
Langsiktig gjeld:			
Boliglån SparebankEN		14 727 963	4 725 000
Sum langsiktig gjeld		<u>14 727 963</u>	<u>4 725 000</u>
Kortsiktig gjeld:			
Leverandørgjeld	8	11 243 067	9 875 394
Skyldige off.trekk og avgifter		3 059 326	2 370 645
Annen kortsiktig gjeld	10	4 842 987	5 721 607
Sum kortsiktig gjeld		<u>19 145 380</u>	<u>17 967 646</u>
SUM GJELD OG EGENKAPITAL		<u>58 006 424</u>	<u>37 758 398</u>



Despite that Svalbard is covered by only 6 % vegetation, the plants that are on the archipelago have an amazing ability to survive the harsh conditions, such as the Mountain Avens in Krossfjorden.

Photo: Bjørn-Erik Sandbakk.

arctic biology

The Department conducts research in Arctic biology and ecology as well as providing a full one-year curriculum of undergraduate studies as well as eight master's level courses. The strategic plan of the Department is to build up two arctic research groups, one in marine arctic ecology and one in terrestrial. This is in line with the new UNIS Strategic Plan 2007 – 2012 of creating centres of excellence and specialising in aspects of arctic science. In 2006 the Department consisted of five associate professors, five adjunct professors, one post-doc and four Ph.D. students.

2006 was a period of change for the Department, with two new full time members of staff arriving, while one professor and one post-doc left.

Terrestrial Ecology Research Group By Steve Coulson, Elisabeth Cooper and Inger Greve Alsos.

By the end of the year the terrestrial group consisted of three associate professors and two Ph.D. students. Research interests of the group include plant ecology, the dispersal and colonisation of the flora and fauna, soil ecology, population dynamics and ecophysiology.

2006 saw significant changes to the terrestrial staff. Ingibjörg Svava Jónsdóttir left UNIS after six years to be replaced by Inger Greve Alsos as the Terrestrial Botanist. Alsos joins UNIS from the National Centre for Biodiversity in Oslo and has considerable experience of fieldwork on Svalbard and in the wider Arctic. Inger has several ongoing projects, for example Dispersal potential of

plants based on AFLP fingerprinting analyses (ARKTØK), Circumpolar phylogeography of 18 Arctic-Alpine plant species (ARKTØK), Did vascular plant species and bryophytes survive the last ice age in Scandinavia? (SURVICE) and Challenges in assessing and forecasting biodiversity and ecosystem changes in Europe (ECOCHANGE).

The new position of Terrestrial Ecophysiologicalist was filled by Elisabeth Cooper who had recently completed a three-year research fellowship on the FRAGILE (FRagility of Arctic Goose-grazed ecosystems: Impacts of Land use change, conservation policy, and Elevated temperatures) project. Cooper has been carrying out research on vegetation on Svalbard since 1991 and has a Ph.D. on Arctic plant-ecophysiological responses to temperature with subsequent work on plant responses to grazing and climate changes, both at the individual species and ecosystem level. Previous employment includes a period at the Norwegian Polar Institute studying plant-reindeer-climate interactions with fieldwork on Brøggerhalvøya and Sarsøya and also vegetation mapping of the Sveagrava area. Cooper currently also runs the FRAGILE site in Adventdalen, investigating goose grazing and climate warming impacts on tundra ecosystems. Cooper's current research themes also include year-round measurements of tundra gas fluxes in different habitats, plant cold tolerance, effects of snow depth and icing on vegetation, and plant dispersal and establishment to and within Svalbard.

With Steve Coulson replacing Rolf Langvatn in 2005, the entire terrestrial staff has changed in the last two years. While this has led to some new directions, the changes have been in accordance with the strategy of the terrestrial group to focus more on the ecology of the flora and invertebrate fauna. Nonetheless, reindeer research continued with UNIS-funded Ph.D. student Veibjørn



Veiberg studying the role of tooth wear on reindeer life history in comparison with temperate ungulates. In June Coulson assumed responsibility as head of Department from Jørgen Berge.

Christiane Hübner completed her field work and began to write the thesis entitled "Spring stop-over in the Arctic: Implications for migrating geese and their food plants". First results indicate that moss is the most important food plant for geese during early Arctic spring and the intensive consumption may have a large impact on the vegetation. Clipping experiments showed that intensive grazing has a potential to reduce subsequent productivity of the moss shoots. However, natural grazing had little effect on the following moss growth compared to ungrazed moss. These results demonstrate that biomass removal in moss is compensated for by growth facilitation due to other aspects of goose grazing, such as mechanical breaking-up of the dense moss mat. The importance of Vårsolbukta as both a stopover site for geese and as a waiting area to fine-tune the arrival at the nesting sites without sacrificing body reserves was highlighted. These observations at Vårsolbukta indicate that stopover sites in Svalbard have multiple functions and they emphasize the need to identify more of these important sites for spring migrating geese in order to implement effective management actions.

Elisabeth Cooper became a co-supervisor of James Speed, a Ph.D. student based at the University of Aberdeen, but with fieldwork in Adventdalen and Sassendalen. James is working on a project entitled "The impact of goose grubbing on Arctic Tundra ecosystems" with the primary objective of investigating the implications for vegetation of spring feeding by the rising population of pink foot geese on Svalbard. The project aims to survey and develop spatial models of grubbing activity in tundra ecosystems, describe the impact of grubbing in different habitats, and evaluate the potential for grubbing to change vegetation community composition.

A new 300-level course, Arctic Winter Terrestrial Ecology (AB-329), commenced in November. This is the first time UNIS has run a course split between two semesters. The students attended UNIS for three weeks in November and returned for the final two weeks at the end of February / early March. During the first visit the students attended lectures on Arctic winter ecology, had field trips and lab work and established experiments designed to measure the over winter survival and activity of the flora, invertebrate fauna and microbiology. The results were determined and analysed when the students returned for the final two weeks of the course in February 2007. This course has proved highly successful and the participating students were pleased to have an opportunity to investigate winter ecological

processes in a cross-disciplinary way.

Four terrestrial master students completed their studies during 2006.

Marine Ecology Research Group **By Claudia Halsband-Lenk and Malin Daase**

In 2006 two associate professors, one post-doc and two Ph.D. students pursued research in Arctic Marine Biology. Most studies concentrated on various aspects of the ecology of pelagic (free living in the water column) invertebrates, particularly copepods, and their life history traits, as well as their interactions with the physical environment and within the Arctic food web. Weather conditions in 2006 brought about some new challenges for marine field work during winter: due to the poor ice conditions along the west coast of Svalbard studies of zooplankton population dynamics in Billefjorden, which had been on-going for the past five winters, had to be interrupted and field activities moved to van Mijenfjorden. Two master students were involved in field work there and initiated a comparative study of the zooplankton populations in the fjord and a nearby saltwater lake which is separated from the fjord during winter. Phytoplankton were also sampled in these locations.

Post-doc Claudia Halsband-Lenk (2005-2008) studied the degree of phenotypic variability in quantitative life history traits of zooplankton, such as body size and development time. The goal was to determine if this variability is important for our understanding of population dynamics on ecological time scales and three approaches were applied: (1) A comparison of field and lab-reared copepod populations with respect to the degree of variability in body length and width. It is assumed that the field population consists of individuals with potentially different environmental histories and thus should display higher variability than a lab-reared population that is kept under constant conditions over several generations. (2) The heritability of these traits. This is investigated via artificial selection on body size in both directions exerted on a lab population of *Acartia tonsa* over a number of generations. (3) Development rate was tested in approximately 250 individuals reared individually from egg to adulthood. Their development rates were compared with their siblings, both within and between offspring from several females. Part of the work was conducted at the Danish Institute for Fisheries Research in Denmark, where laboratory cultures of copepods and rearing facilities were available to train Halsband-Lenk in culturing techniques. Experimental cultures were then transferred to UNIS for continuation of experiments where Baltic and Arctic populations will be studied with identical experimental design. This approach will allow a comparison of the patterns of variability between populations subjected to very different environments and presumably

different selection pressure.

Ph.D. student Malin Daase continued her studies of zooplankton distribution in relation to hydrographic variability in the border area between Arctic and Atlantic waters. Zooplankton data obtained from extensive sampling in the last years, accompanied by measurements of physical properties of the water column, indicate that variability in water masses has measurable effects on zooplankton distribution and species composition in the study area. Three copepod species of the genus *Calanus* co-occur in the waters around Svalbard and together dominate the zooplankton biomass in Arctic and Atlantic waters. Analysis of the relationship between *Calanus* spp. abundance and the physical environment demonstrate the existence of simple relationships between zooplankton composition and variability in ocean climate. This suggests that the effects of climatic variability on *Calanus* spp. in this region are mediated primarily through transport and mixing of water masses.

To what degree the pelagic ecosystem and the resident food chains react to these variations is of major importance for our understanding of climatic effects on the ecosystems in the Arctic. This aspect is studied by PhD student Daniel Vogedes, who is working on the same organisms, but with a focus on food web dynamics in Isfjorden: foraging strategies of the Little Auk may give insight into the variability in *Calanus* species composition and distribution and their impact on the arctic marine food web.

Graduates 2006: **Cand. Scient / Master degree:**

Terra L. Birkgit: Response of High Arctic plants *Equisetum arvense* and *Dupontia fisheri* to experimental warming and barnacle goose herbivory in Svalbard.

Eirin M. Bjørkvoll: Plant-reindeer interactions on Svalbard.

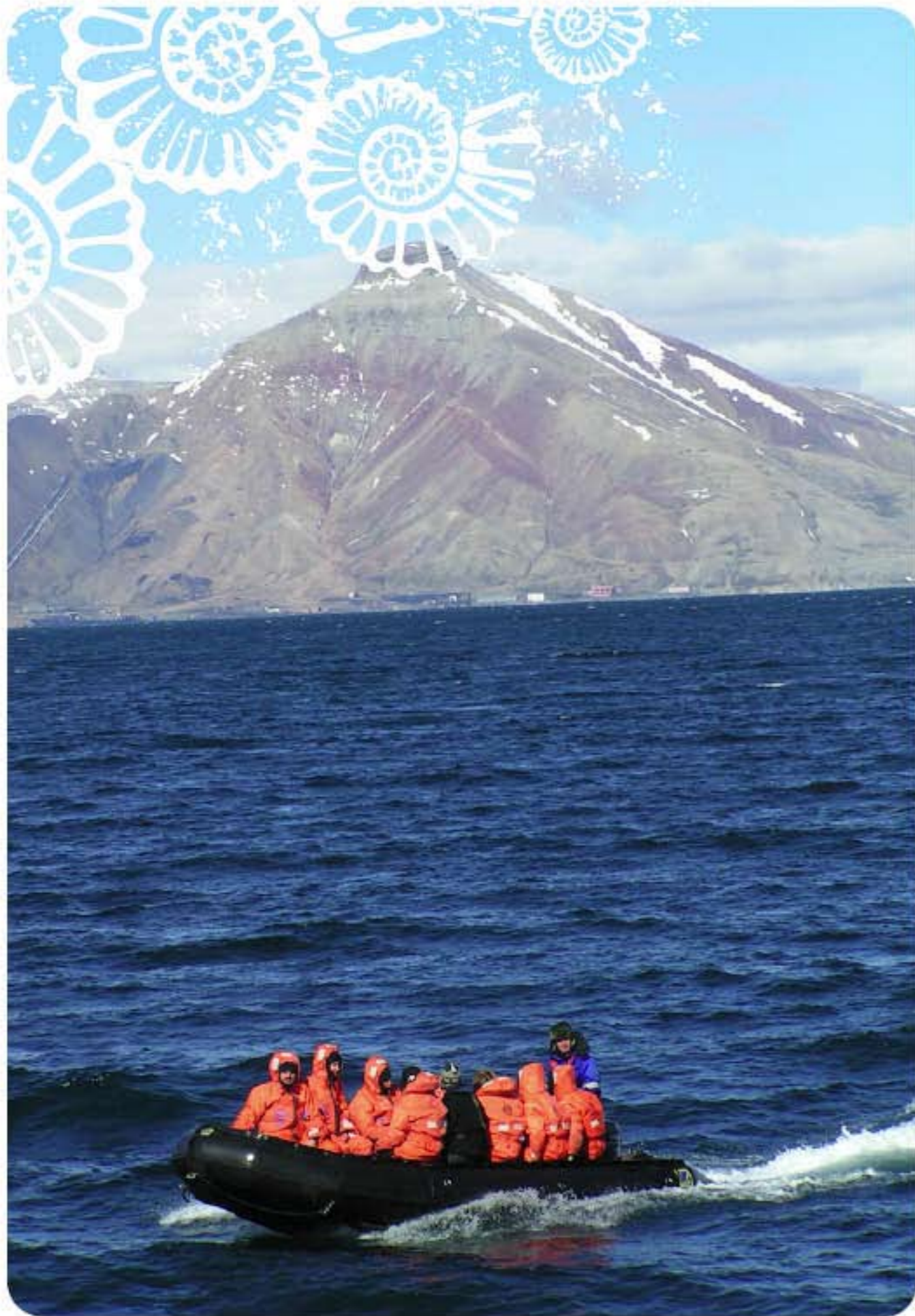
Beth Paludan Carlsen: Makroepifauna associated with *Laminaria digitata* and *L. saccharina*, Svalbard.

Paul A. Neveu: Response of *Cassiope tetragona* to growth temperature: a retrospective approach.

Eeva Soininen: Food selection of Barnacle geese (*Branta leucopsis*) in an arctic pre-breeding area.



Arctic biology students examining the trawl catch of the day onboard F/F "Jan Mayen".
Photo: Kai Lohbeck.



Arctic Geology students out on an excursion in Billefjorden in the summer of 2006. The abandoned Russian settlement "Pyramiden" can be seen in the background.
Photo: Nicole Baeten.

arctic geology

By Alvar Braathen

In 2006 the Geology Department performed research within six subjects in Earth Science; marine geology, Quaternary geology, permafrost and periglacial geomorphology, glaciology, sedimentology, and structural geology. The research vision of the department focuses on Svalbard, its fjords and adjacent shelf that together offer an excellent opportunity to study a wide range of landforms, processes, sediments and structures related to the development of the Barents Shelf and infill of sedimentary basins. As an area of terrestrial outcrop on the Barents Shelf, Svalbard provides excellent access to a vast range of basin settings, from the low-latitude infill of the Devonian basins, to the present glacial and periglacial erosion and infill of valleys and fjords.

By the end of 2006, the staff consisted of three full-time faculty (Benn, Braathen, Christensen) and three adjunct professors (Humlum, Ingólfsson, Nemeč). In addition, there were four UNIS based Ph.D. students (Kristensen, Luthje, Woldengen, Sund) and five external Ph.D. students.

The academic staff saw significant changes in 2006: By June, Gary Nichols left his Sedimentology position and returned to Royal Holloway University in the UK, after two years at UNIS. In December, Tove Nilsen left her Marine Geology position after two and a half years and returned to GEUS, Denmark. There were two arrivals; Doug Benn started in a professor position in Glaciology in January, and Alvar Braathen in a professor position in Structural Geology and Tectonics in June. In order to cover teaching obligations in sedimentology, professor Wojtek Nemeč (UiB) started in a one-year adjunct

position by March. Further, the Quaternary Geology position was advertised and later accepted by associate professor Anne Hormes (starting in February 2007), and the Sedimentology position was advertised in November. This position will likely be filled by the summer of 2007. The Marine Geology position will also be advertised.

In March 2006, Marta A. Ślubowska defended her Ph.D. thesis, titled: "Last deglaciation and Holocene reconstructions of Atlantic flow variability to the Nordic and Barents Seas with a special emphasis on the Svalbard continental margin". Her work was focused on the Atlantic waters. The ocean of the north represents a major source of heat and salt to the high northern latitudes, having a significant influence on the climatic and hydrographic conditions in the sub-polar and polar regions. Therefore, the aim of this work was to study the variability of the flow of Atlantic water (via the West Spitsbergen Current) along the Svalbard shelf through the last deglaciation and the Holocene (approx. last 17,000 years). Further, the paleoceanographic development of the northern and western Svalbard shelf was compared. The paleoceanography of the southwest Svalbard shelf, which is under the direct influence of the cold Polar water (the East Spitsbergen Current), was also assessed. In order to study these changes Marta used microfossils (foraminifera), stable oxygen isotopes, ice-rafted debris, lithology and magnetic susceptibility. The work was supervised by Tine L. Rasmussen (UNIS/UiTø), Nalân Koç (NPI) and Morten Hald (UiTø).

Ph.D. student Lotta Luthje has started the compilation of her Ph.D. thesis on "Paleocene coal depositional environment". This work is an investigation of the coal-bearing Firkanten Formation of Paleocene is based on detailed investigation of new cores from SNSK and field observations from Svea, Longyearbyen, and Ny-Ålesund. A new facies

analysis and depositional environment is suggested. Based on the preliminary results a detailed sequence stratigraphic analysis is developed giving new interpretation of the initial development of the foreland basin. Of special interest to the sponsor, SNSK, is the fact that the new models open for possible coal reserves further SSW than previous models predicted.

Ph.D. student Lene Kristensen continued her work on the permafrost - glacier interactions in the Paulabreen surge area in inner Van Mijenfjorden. In July, UNIS in collaboration with Norwegian Geological Survey, mapped the bathymetry of the fjord in front of the tidewater glacier Paulabreen, which has surged repeatedly into the fjord. The aim was to study the sub-sea landform and infer sub-glacial processes during and after a glacier surge. Work on land included studies of modern processes on an ice cored moraine using photogrammetric techniques.

Ph.D. student Monica Sund started her project in November, entitled "The dynamics and calving of glaciers". The work is a part of the IPY-project GLACIODYN (The Dynamic Response of Arctic Glaciers to global warming), where the focus is on the effect of glaciers on sea level change and on the fresh water input into fjords and embayment. GLACIODYN aims to increase the understanding of the mechanisms behind rapid changes in glacier dynamics. Calving glaciers constitute a substantial part in the fresh water supply to the world oceans. A new time-dependent model, which predicts changing ice front positions and calving fluxes for tidewater glaciers will be tested and developed using data from Kronebreen. Additionally, the dynamics of surging glaciers will be included in the Ph.D. work. The activity has already resulted in a first publication (Sund, M. 2006. A surge of Skobreen, Svalbard. *Polar Research* 25,115-122).

The research by Hanne H. Christiansen on permafrost and periglacial geomorphology is focused on process measurements of ice-wedge activity, snow cover and ground thermal relationships, active layer-permafrost dynamics and slope processes in the area around Longyearbyen. These activities were extended to the Kapp Linne area on the west coast of Spitsbergen, as an integrated part of the new UNIS course AG-327: "Holocene and recent climate changes in the high arctic Svalbard landscape". A new cooperation research project on solifluction with Prof. C. Harris, University of Cardiff, UK was initiated by installing a measuring station in Endalen registering continuously the movement of the ground surface. The cooperation on monitoring of different periglacial processes with Prof. N. Matsuoka, University of Tsukuba, Japan and adjunct Prof. O. Humlum, was extended with the establishment of a fully instrumented 15 m deep borehole in the rock glacier above Huset in

Longyear valley. A new local cooperation project on observations of snow avalanches and other slope processes in Svalbard was initiated in cooperation with Longyearbyen Red Cross, with a potential for inclusion of several other local institutions affected by avalanches. Monitoring of movement and thermal conditions in unstable rock slopes in Troms and Møre and Romsdal, Norway, were started in cooperation with Dr. L.H. Blikra, Norwegian Geological Survey and Hanne H. Christiansen. She is one of two coordinators on the IPY core project Thermal State of Permafrost, and will have the responsibility for coordinating the International University Courses on Permafrost and three other permafrost IPY core projects.



Professor Doug Benn initiated a new research program investigating the dynamics of calving glaciers in Svalbard, as part of IPY-37 Glaciodyn. A fieldwork campaign was designed to test a new theory of calving glacier dynamics, as described in two papers in press (Benn and others: *Annals of Glaciology*, *Earth Science Reviews*). Fieldwork into the geologic impact of glacier surges was completed on Paulabreen and Borebreen with Ph.D. student Lene Kristensen and Master student Martin Machiendo. Doug Benn also conducted research into the origin of englacial drainage networks, using speleological techniques to make detailed three-dimensional maps of their structure. Work was carried out on Longyearbreen (with Master student Daniel Muller), Hansbreen (in col-

laboration with the Polish Research Station at Hornsund), and in the Khumbu Himalaya, Nepal (funded by National Geographic Society). This comparative study has shown that englacial conduits can form by at least four different mechanisms, and has provided the first direct evidence for drainage formation by hydrofracturing – thought to be the chief mechanism responsible for routing water to the bed of polythermal glaciers and ice sheets.

Professor Alvar Braathen has involved UNIS in research activity on the tectonic, sedimentary and palaeokarst development of the Billefjorden Trough, a project based at the Centre for Integrated Research (CIPR) at UiB. He has also started new activity in the Tertiary fold-thrust belt on thrust related folds and fracture reservoirs, in collaboration with professors Steffen Bergh (UiTø) and Ken McClay (Royal Holloway University (RHU)), involving two new master students at UNIS and a PhD student from RHU. Both projects aim on developing petroleum geology analogues, utilizing modern day technology. In addition, Alvar has been heavily involved in the Fault Facies project, aiming on fault analysis in sandstone reservoirs. This work is conducted in close collaboration with CIPR.

Graduates 2006:
Ph.D. degree:

Marta A. Ślubowska: Last deglaciation and Holocene reconstructions of Atlantic flow variability to the Nordic and Barents Seas with a special emphasis on the Svalbard continental margin

Cand. Scient / Master degree:

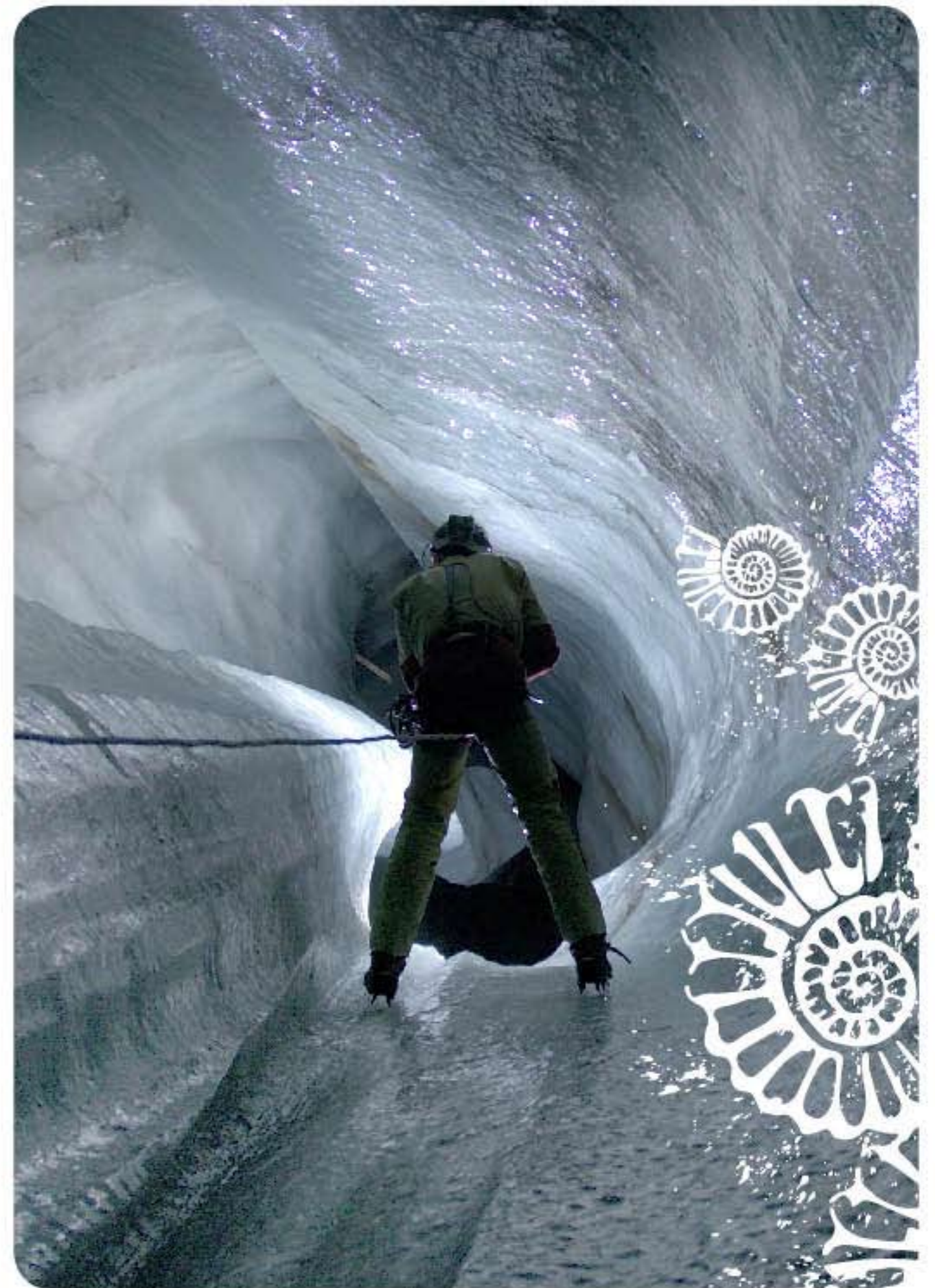
Karoline Bælum: Mapping the General Shape, Depth and Various Internal Structures of Tellbreen, a Glacier on Svalbard, by Means of GPR (Ground Penetrating Radar).

Jørgen Hollesen: Modelling subsurface temperatures in a heat producing coal waste rock pile located in Bjørndalen, Svalbard (78N).

Ullrich Neumann: Climate - glacier links on Bogerbreen, Svalbard: glacier mass balance investigations in central Spitsbergen 2004-2005

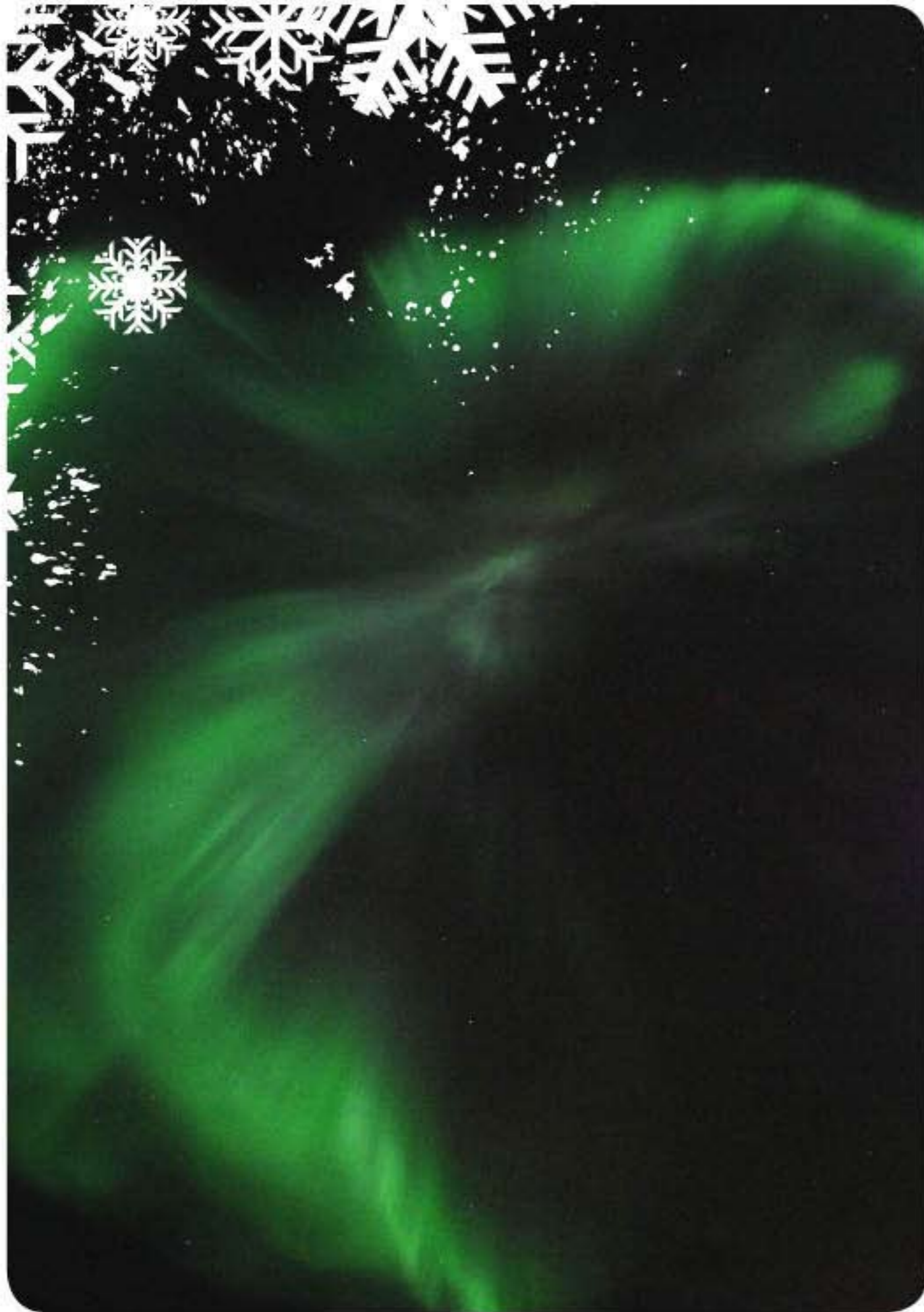
Rune Peersen: Sedimental processes on the Svalbard-Barents sea continental margin and glacial history of the Storfjorden area from LGM through the Early Holocene.

Mette Riger-Kusk: Hydrology and hydrochemistry of a High Arctic glacier: Longyearbreen, Svalbard.



The origin of englacial drainage networks is a field of study for the Geology department. UNIS has, in collaboration with the Polish Research Station in Hornsund, carried out fieldwork inside the ice caves of Hansbreen in the fall of 2006.

Photo: Jason Gullely



Aurora Borealis photographed at the Auroral Station in Adventdalen. The 2006/2007 Auroral season was the last season at the station in Adventdalen. From fall 2007 the Aurora will be monitored from the new Kjell Henriksen Observatory on the Breinosa mountain.

Photo: Jeffrey Holmes.

arctic geophysics

By Dag A. Lorentzen

With one new full time faculty position in Snow and Ice Physics, the Geophysics Department increased in 2006 to a total of five fulltime faculty. The department – with already established research within oceanography, meteorology, middle and upper polar atmosphere – also consisted of five Adjunct Professors and two Adjunct Associate Professors, as well as one post-doc and two Ph.D. research fellows.

Teaching was conducted at both undergraduate and graduate level, with seven and five courses respectively. An important part of all courses is the field work, which allows the students to operate research equipment in the field. The data collected are then typically used in course reports, giving the students valuable experience in analysing and presenting scientific data in a coherent manner.

In addition to the new faculty position in Snow and Ice Physics filled by Dr. Carl Egede Bøggild in January, the department also received a new Adjunct Professor position given by the Nansen Environmental and Remote Sensing Centre (NERSC) within the field of Remote Sensing. The position was filled in April by Dr. Stein Sandven, currently a research director at NERSC. In August Dr. Dag Lorentzen returned from his sabbatical year, and later in the fall another faculty member, Dr. Fred Sigernes, was promoted to full Professor.

Dr. Karolina Widell defended her thesis "Ice-ocean interaction and the under-ice boundary layer in an Arctic fjord" in June 2006. The aim of her study was to investigate aspects of ice-ocean interaction and the turbulent

boundary layer under sea ice. Her analysis is based on in-situ measurements carried out during spring season 2006 on the seasonal, landfast ice cover on Van Mijenfjorden on the west coast of Spitsbergen. In addition, three master students finished their thesis during 2006. The studies were made in various topics like plasma physics, remote sensing and oceanography. A trainee, Sanja Forsström, worked at the department in the period August –December 2006 with the working title "Hypsometric calculations for the Isfjorden systems and sea ice modelling"

The department operates the Auroral Station in Adventdalen, and the 2006/2007 Auroral season was the last season at the current station. A new Auroral station – the Kjell Henriksen Observatory – is now being built above the EISCAT site on the mountain of Breinosa, and will be ready for the 2007/2008 Auroral season. A test module for the instrument rooms at the new observatory was constructed during fall, and transported out to the old station in early December, where it was hooked up to the station power and network. An Ebert-Fastie spectrometer was installed and operated without complications for the remainder of the Auroral season. In addition to Auroral studies, Ph.D. student Margit Dyrland continues the work on the long time series of mesospheric temperatures and quality assures these measurements.

In December it was clear that the department would get funded for three years by the Norwegian Research Council (NCR), through the project PROEM – Plasma Research using Optics, EISCAT and Modelling. The funding includes running costs and a Ph.D. position, and research will be conducted on high density patches of ionospheric plasma drifting over the polar cap. These patches are known to disrupt radio communication at high latitudes.

As mentioned above, one extra Ebert Fastie Spectrometer has been installed to support the PROTONICS project. Ph.D. student Jeff Holmes continues to collect data from our dual site setup of spectrometers (Ny-Ålesund and Longyearbyen). A co-operation with the Polar Geophysical Institute in Apatity, Russia, has been initiated in order to improve model calculations of proton transport in the ionosphere.

During the Norwegian-Russian research seminar organized by the NCR and the Norwegian Polar Institute in Tromsø 9 – 10 March 2006, a group of members associated to upper atmospheric research on Svalbard compiled a list of actions to be taken in order to increase the cooperation on Svalbard. The aim of this proposal is to re-vitalize the co-operation between Norwegian and Russian upper atmospheric researchers on Svalbard. Existing research infrastructure that includes radars and optical stations in Longyearbyen, Barentsburg and Ny-Ålesund will be used to form a common multi-instrumental platform for studies of the upper atmosphere. Exchange of data in real time and calibration of instruments are key elements to be investigated.

The series of light weight airborne spectral imagers that has been developed in the department to detect spectral signatures of any target at high spectral and spatial resolution, are now used onboard the drones produced by NORUT IT in Tromsø (The CryoWing program). The first test flight including the payload from UNIS was conducted in May 2006 from the Longyearbyen airport. The aim of this program is to develop an unmanned aerial platform for monitoring spectral properties of any target at ground level. As part of this activity, Mathieu-Pierre Marmion defended his master thesis on attitude estimation based on Kalman filtering. In the field of snow and ice processes, research activities have been carried out in both Svalbard and Greenland. On Svalbard the activities have focused on analyzing the effect of surface reflectance on the Høganessbreen near Svea Nord. A running hypothesis is that change in the surface albedo is controlling the thinning of the glacier, due to increased absorption of solar radiation. A field project sponsored by the Danish Research Council to the ice sheet margin in Kronprins Christians Land at 80 degrees north in North-east Greenland had the focus of investigating the effect of black carbon on increased melting of the glacier ice. Results are still awaiting laboratory analysis. But, preliminary results suggest that the surface albedo and subsequent melt rates caused by airborne impurities deposited on the surface is more controlled by the ice crystal size than the total deposition of impurities. Another research project dealing with refreezing of melt water has led to simplified mathematical solutions to quantify this process. Such an analytical solution is attractive for incorporation in

climate models.

Research in meteorology has mainly been focusing on boundary layer processes and how the atmosphere interacts with the surface, both over land and over the ocean. Special attention has been given to atmospheric phenomena typical of the Arctic, such as air-sea-ice interaction and physical processes in stable boundary layers.



In autumn 2006 it became clear that the department will get funding and be an active partner in two polar-ocean IPY projects for the next three years: "IAOOS-Norway (Integrated Arctic Ocean Observing System) – Closing the loop" and "Bipolar Atlantic Thermohaline Circulation (BIAC)". The IAOOS-Norway project is a continuation of our research focus in the Fram Strait and the Arctic Ocean. The oceanography group at UNIS focus on how much heat the Atlantic Water (AW) core losses on its northward path along west Spitsbergen, and therefore also how this warm and saline water is guided into our fjord systems around Svalbard (Nilsen et al, 2006). In August, Jochem Floor finished his master thesis "Hydrographic variations, circulation and exchange processes in an Arctic fjord system", where he studied the dynamical processes controlling the on shore transport of AW towards the West Spitsbergen fjord systems.

The BIAC project is a continuation of our three-year effort to collect data in the Storfjorden coastal polynya through the project "Polar Ocean Climate Processes (ProClim)". In ProClim we have monitored brine-enriched water resulting from sea-ice formation in coastal polynyas and used Storfjorden as a laboratory for both observations and modelling. The winter of 2006

was the last ProClim field season at Kapp Lee on Edgeøya and we manage to collect in situ ocean and sea ice measurements in the active polynya. Supercooled water down to 0.037°C below the in-situ freezing point temperature was found in the Storfjorden polynya in the beginning of April 2006 during the end of a polynya event driven by cold winds from northeast. This is the first in-situ supercooling observed in an Arctic polynya

with concurrent hydrographic sampling. It is also the maximum subfreezing departure from the freezing point observed in the Arctic in recent years, with reduced instrument uncertainties and improved determination of the freezing point temperature, and with accompanying water samples and direct observations of frazil ice growth. The supercooling is connected to the large surface heat flux and the effective transport of frazil ice away from the ice edge.

Graduates 2006:

Ph.D. degree:

Karolina Widell: "Ice-ocean interaction and the under-ice boundary layer in an Arctic fjord" funded by Atmosphere/Ice/Ocean Interaction Studies, Polar USA-Norway NRF project 151447/720.

Cand. Scient./Master degree:

Jochem Floor: Wind-driven exchange across the West-Spitsbergen shelf

Njål Gulbrandsen: Polar cap patch occurrence rate over Svalbard, and its dependence on IMF By

Mathieu P. Marmion: Airborne attitude estimation using a Kalman filter



A helicopter is landing on the sea ice in Storfjorden to pick up scientists done with fieldwork. The UNIS Oceanography group has through the ProClim project collected data on coastal polynyas, using Storfjorden as a laboratory for both observations and modeling.

Photo: Frank Nilsen.



Snow avalanches are a constant threat during winter on Svalbard. UNIS' Arctic Technology department specializes in, among other things, engineering challenges related to building in environments prone to snow avalanches and landslides.

Photo: Helen Rykfors.

arctic technology

By Roland Kallenborn

The Arctic Technology Department offers state-of-the-art education and research opportunities in Arctic Engineering as well as in Arctic Environmental Technology and Chemistry. Arctic Engineering concentrates on engineering problems to be tackled when settling in the Arctic environment: living and building on frozen ground that may be subject to landslides and avalanches (Geotechnics), Arctic offshore oil and gas exploitation (Ice Mechanics, Geotechnics), and potable water supply (Hydrology). Arctic Environmental Technology and Chemistry concentrates on current and potential pollution problems, environmental impacts and feasible remediation techniques in Arctic areas.

The technological challenges deriving from increased human activity in the northern marine environments, as well as locally here on Svalbard, continue to be our main focus. The faculty staff continued to work on established relevant research programs at UNIS and new studies were initiated.

Arctic Engineering

The key topics within Arctic Engineering are permafrost and ice. We perform measurements and simulations of thermo-mechanical response in relation to onshore, coastal and offshore infrastructure. The main sites of our investigations are Longyearbyen, the Van Mijenfjord and Svea. We monitor ground temperature profiles down to 10 m depth in open country, down the supporting piles at the Science Park, and in the waste tip in Adventdalen. The development of the infrastructure and harbour facilities in Longyearbyen, as indeed in the Svea community, poses important scientific and engineering tests for our staff and students. The ice coverage in the Van Mijenfjord is usually stable throughout the season, allowing us

to perform seasonal studies without risk of losing essential equipment.

Several unique medium-scale experiments have been performed on the ice, close to the Svea community, over the past years. These experiments brought together a unique combination of real sea ice measurements and load-determinants. Ice conditions on the Van Mijenfjord were monitored and in-situ ice stresses were investigated. The main focus within this project was to investigate how environmental variables (meteorological and oceanographic) determine ice conditions. In the Barents Sea we performed our annual measurements and experiments on first-year sea ice ridges.

In his Ph.D. Fabrice Caline is studying the design of environmentally friendly shore protection structures. A full-scale test embankment is being built with local masses in Svea and will help understand the action of frost and sea ice. The project is supported by the coal mining company Store Norske (SNSG), the Research Council of Norway (RCN) and recently obtained the European Eureka innovation label. A second Ph.D. thesis is under progress where Sébastien Barrault investigates the "mechanical deformation of first-year landfast sea ice due to temperature variations". In this context, he examines in-situ how temperature variability induces internal forces by thermal expansion into a constrained sea ice cover. Most of the experiments are conducted in Sveabukta in the Van Mijenfjorden area.

Environmental Technology and Chemistry

Key topics of interest within Environmental Technology include: The fate of oil spills in an Arctic environment and possible counter-measure/remediation techniques; levels and spreading of persistent organic pollutants (PCB pesticides in reindeer, Arctic fox, Polar cod, lake sediment and seaweed); and spreading and effects of pollution from

local mining industry. Oil spills in an Arctic environment, for instance the waters around Svalbard, can be expected to behave significantly differently than oil spills in warmer waters, like the North Sea. The differences in spreading, evaporative loss, emulsification, dispersion and other factors add up to important modifications in operational oil spill contingency planning. There is a range of potential sources of oil spills in and around Svalbard, including fishing boats and freighters, tourist ships, and leakage or seepage from oil depots on land.

A three-year program funded by the RCN, Statoil and Norsk Hydro focuses on oil spills in an Arctic marine environment has been recently finalized. The Ph.D. program by Liv-Guri Faksness was an integral part of this project. A follow-up project has been funded focusing on weathering processes of oil spills under Arctic conditions. An integrated Ph.D. study will be integrated into this research project during autumn 2007.

A new environmental chemistry laboratory has been operational since 2005 for the trace analytical quantification of organic contaminants in Arctic environmental samples. In 2006 a set of experiments have been performed on fate and distribution of persistent organic pollutants including new emerging contaminants in Arctic environments. The laboratory consists of gas chromatographic equipment with electron capture, mass selective as well as flame ionisation detection. In addition, a high performance liquid chromatograph with variable wavelength detection (DAD) is available for the investigation of water soluble contaminants. The laboratory is currently actively in use for post-graduate courses (AT-321 and AT-324) as well as for research purposes.

In 2006, Monika Trümper started her new Ph.D. research on investigation of photochemical transformation processes of persistent organic pollutants on ice and snow surfaces under Arctic conditions. In addition, The Environmental Technology department has started the experimental part within two research project financed through the RCN for the investigation of pharmaceutical residues in sewage treatment processes under different climate conditions and the environmental behaviour of perfluorinated flame retardants in off-shore fire fighting foams, respectively. The M.Sc. studies of Tone Helland (Pharmaceuticals) and Knut Sømme (perfluoro Flame retardants) are closely related to these RCN financed research projects.

Graduates 2006:

Cand.Scient./Master Degree:

Roger Daniloff: In-situ burning of oil spills

Sigurd Ellingsen Lie: Stresses in first-year landfast sea ice



Oil spills in ice infested waters is a major research focus for the Technology department. Experiments with oil spills and remediation techniques are tested out in small areas on the ice, which requires digging out small pools in the sea ice. This image is from the Technology cruise with R/V "Lance" in May 2006.

Photo: Liv-Guri Faksness.

student council

By Ole-Christian Ekeberg

The student body at UNIS is unique in many ways. We are a group of people from all over the world. This makes the student environment very special here on Svalbard and gives something extra which the mainland universities just can envy us.

The students have representatives in the UNIS board (board representative and observer) and in the leader group at UNIS (the Student Council leader). These representatives are the students voice in the organization and we feel we can have our say in all matters that concerns us as students and UNIS as an institution.

Some student representatives in 2006:

Spring

SC Leader	Nina Seifert
SC Vice leader	Karin Nordkvist
Board representative	Simon Jessen
Treasurer	Dayle Edwards

Fall

SC Leader	Karin Nordkvist
SC Vice leader	Ole-Christian Ekeberg
Board representative	Ragnhild Lundmark Daae
Treasurer	Holger Schmithüsen

Student welfare

The student organization get an amount of money from UNIS each year for student welfare. This money is used on the different groups that exist. Most of the money goes to provide the welfare with increasing amount of outdoor equipment, sledges, cabin maintenance and equipment for the kitchens in Nybyen. The offers from the student welfare are used extensively, and are considered as great offers for all the students.

Student life

All in all the student body is very active and visible in Longyearbyen. In addition to their own outdoor pursuits and frequent arrangements in the Sports Hall, they also make an energetic contribution to the social calendar in Longyearbyen. Students devote a lot of energy to volunteer work, for example in the Polar Jazz festival. In addition, the local committee of "Solfestuka" asks students on a yearly basis to be in charge of several arrangements like "Take a chance".

Yet, despite all these diversions, a word of caution is called for. Many former students cannot stay away, thanks to the intimacy of UNIS, the astounding surroundings, the magical light, and the unforgettable excursions. In short, be warned: the Svalbard experience will alter you for life!

scientific publications

Scientific publications published with UNIS as author address in journals accepted by the Norwegian Association of Higher Education Institutions (UHR). The selection criteria for the 2006 publication list is different from previous years, thus the publication output in 2006 is not compatible with 2005 and earlier years. A more thorough UNIS publication list (incl. conference papers, etc.) will be available in the FRIDA database system at the end of 2007, see: <http://wo.uio.no/as/WebObjects/frida>

Arndt, C.E. & Swadling, K.M. (2006). Crustacea in Arctic and Antarctic sea ice: distribution, diet and life history strategies. *Advances in Marine Biology* 51: 197-315. DOI: 10.1016/S0065-2881(06)51004-1

Arndt, C.E. & Beuchel, F. (2006). Life history and population dynamics of the Arctic sympagic amphipods *Onisimus nanseni* Sars and *O. glacialis* Sars (Gammaridea: Lysianassidae). *Polar Biology* 29 (3): 239-248. DOI: 10.1007/s00300-005-0045-x

Benn, D.I. (2006). Glaciers. *Progress in Physical Geography* 30 (3): 432-442. DOI: 10.1191/0309133306pp491pr

Benn, D.I. & Lukas, S. (2006). Younger Dryas glacial landsystems in North West Scotland: an assessment of modern analogues and palaeoclimatic implications. *Quaternary Science Reviews* 25 (17-18): 2390-2408. DOI: 10.1016/j.quascirev.2006.02.015

Benn, D.I., Owen, L.A., Finkel, R.C. & Clemmens, S. (2006). Pleistocene lake outburst floods and fan formation along the eastern Sierra Nevada, California: implications for the interpretation of intermontane lacustrine records. *Quaternary Science Reviews* 25 (21-22): 2729-2748. DOI: 10.1016/j.quascirev.2006.02.018

Berge, J., Johnsen, G., Nilsen, F., Gulliksen, B., Slagstad, D. & Pampanin, D.M. (2006). The *Mytilus edulis* population in Svalbard: how and why. *Marine Ecology Progress Series* 309: 305-306.

Beuchel, F., **Gulliksen, B.** & Carroll, M.L. (2006). Long-term patterns of rocky bottom macrobenthic community structure in an Arctic fjord (Kongsfjorden, Svalbard) in relation to climate variability (1980-2003). *Journal of Marine Systems* 63 (1-2): 35-48. DOI: 10.1016/j.jmarsys.2006.05.002

Biebricher, A., **Havnes, O.**, Hartquist, T.W. & La Hoz, C. (2006). On the influence of plasma absorption by dust on the PMSE overshoot effect. *Advances in Space Research* 38 (11): 2541-2550. DOI:10.1016/j.asr.2005.02.061

Carlson, H.C., **Moen, J.**, Oksavik, K., Nielsen, C.P., McCrea, I.W., Pedersen, T.R. & Gallop, P. (2006). Direct observations of injection events of subauroral plasma into the polar cap. *Geophysical Research Letters* 33 (L05103). DOI:10.1029/2005GL025230

Christiansen, H.H., French, H.M. & Humlum, O. (2006). Response to S. Gruber concerning 'Permafrost in the Gruve-7 mine, Adventdalen, Svalbard'. *Norsk Geografisk Tidsskrift* 60 (2): 166. DOI: 10.1090/00291950600717833

Company, R., Serafim, A., Cosson, R., **Camus, L.**, Shillito, B., Fiala-Médioni, A. & Bebianno, M.J. (2006). The effect of cadmium on antioxidant responses and the susceptibility to oxidative stress in the hydrothermal vent mussel *Bathymodiolus azoricus*. *Marine Biology* 148 (4): 817-825. DOI: 10.1007/s00227-005-0116-0

Cooper, E.J. (2006). Reindeer grazing reduces seed and propagule bank in the High Arctic. *Canadian Journal of Botany* 84 (11): 1740-1752. DOI: 10.1139/B06-052

Dollery, R., Hodkinson, I.D. & **Jónsdóttir, I.S.** (2006). Impact of warming and timing of snow melt on soil microarthropod assemblages associated with Dryas-dominated plant communities on Svalbard. *Ecography* 29 (1): 111-119. DOI: 10.1111/j.2006.0906-7590.04366.x

Fernandez-Leborans, G., **Arndt, C.E.** & Gabilondo, R. (2006). Protozoan epibionts and their distribution on the Arctic ice-amphipod *Gammarus wilkitzkii* from Spitsbergen, Norway. *Arctic, Antarctic and Alpine Research* 38 (3): 343-356. DOI: 10.1657/1523-0430(2006)38[343:PEATDO]2.0.CO;2

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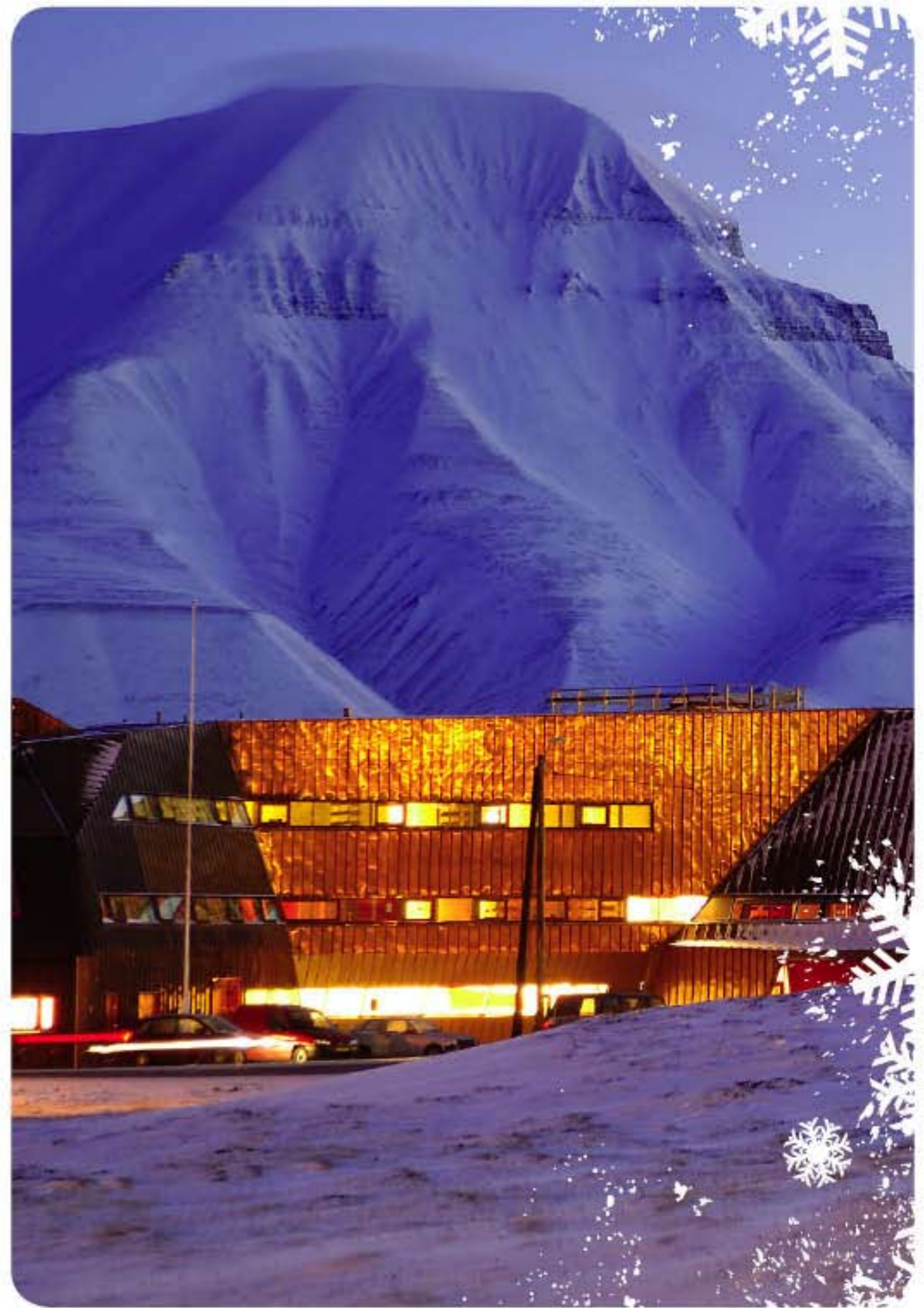
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Finkensteller	Heinz	German Aerospace Center
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Gabrielsen	Roy	University of Oslo, Norway
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The Svalbard Science Centre on an October day, with the Hiorthfjell hovering in the background.

Photo: Nils Petter Dale

UNIS annual report 2006

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