

ANNUAL REPORT - ÅRSMELDING

2003

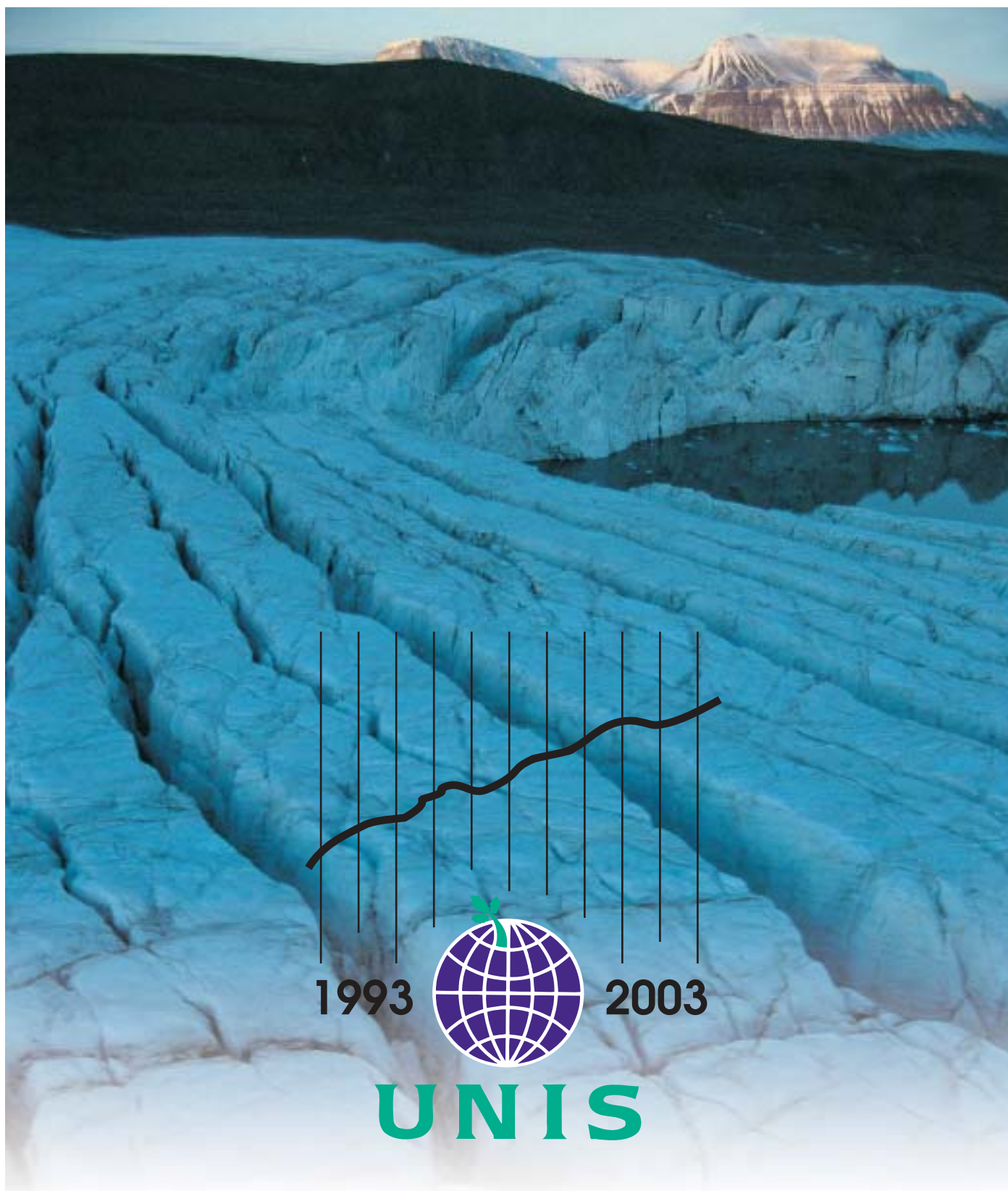




PHOTO: M. GRØNNEVET

UNIS celebrated 10 years of activity in 2003. During that time, the institution has earned a sound place in Arctic research and research-based education. The next 10 years will offer many challenges and opportunities. Further evolution of UNIS activities must be based on maintaining our characteristic quality and characteristics, combined with a capacity to meet new realities with flexible solutions.

UNIS fylte 10 år i 2003. Institusjonen har oppnådd en solid plass i arktisk forskning og forskningsbasert utdanning. De neste 10 årene vil by på store utfordringer og uante muligheter. Den videre utvikling av aktiviteten ved UNIS må baseres på vedlikehold av kvalitet og egenart, og på evne til fleksibel tilpassing til nye betingelser.

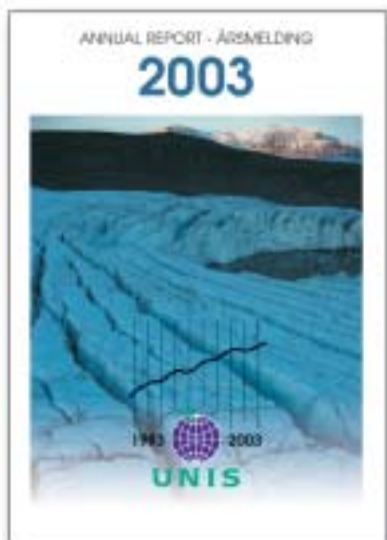


PHOTO M. SLUBOWSKA

Cover photo:

The scientific establishment at UNIS has developed a special interest in Fridtjovbreen. This glacier, lying at the mouth of Van Mijenfjord, has advanced roughly 3000 meters since UNIS was founded. Now the advance has ceased, and the glacier is starting to recede slowly. The last time the glacier went through a surge was in about 1860.

Det har knyttet seg en spesiell interesse for Fridtjovbreen i forskningsmiljøet på UNIS.

Breen, som ligger ved munningen av Van Mijenfjorden, har beveget seg ca 3000 meter på den tiden UNIS har eksistert. Nå er fremstøtet stanset opp, og brefronten har begynt å trekke seg langsomt tilbake. Forrige gang Fridtjovbreen hadde et såkalt "surge" var omkring 1860.



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Wind, precipitation and temperature in Longyearbyen in 2003

Vind, nedbør og temperatur i Longyearbyen år 2003

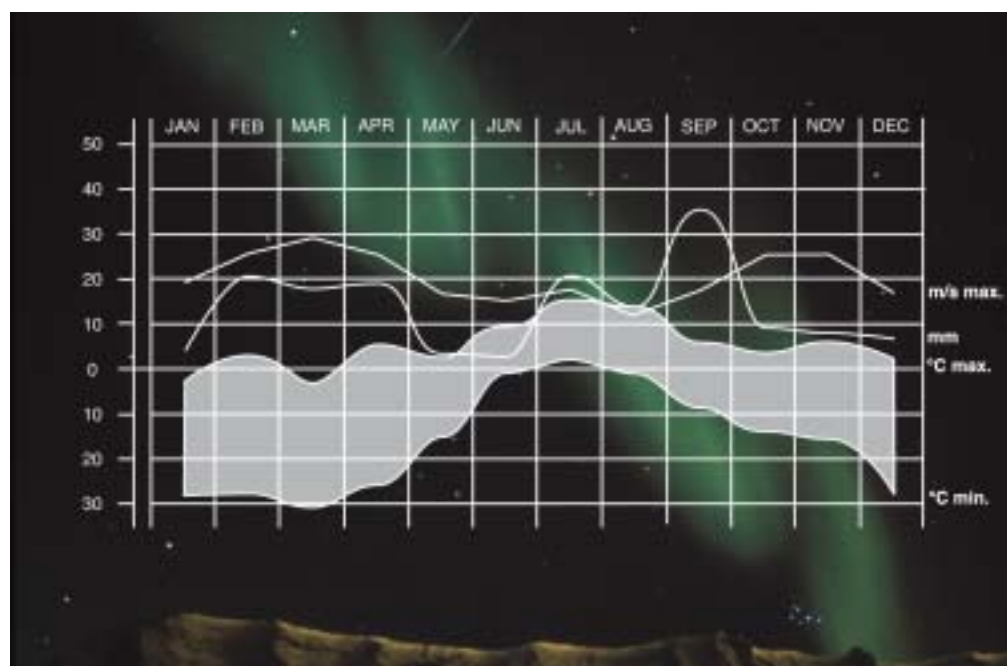


PHOTO: MATTEO OTTAVIANI

UNIS board
Academic
workgroups
UNIS staff

UNIS BOARD 2003

Director of Faculty Kjell A. Sælen,
University of Bergen (Leader)
Deputy Member:
Head of Administration Siri Jansen

Associate Professor Else Hegseth,
University of Tromsø
Deputy Member:
Professor Noralo Bjørnå

Professor Annik Myhre,
University of Oslo
Deputy Member:
Professor Dag O. Hessen

Professor Steinar Nordal,
Norwegian University of Science and Technology
Deputy Member:
Professor Berit Kjeldstad

Viva Mørk Kvello,
Longyearbyen Lokalstyres Representative
Deputy Member:
Kjell Mork

Associate professor Frank Nilsen,
UNIS, Staff Representative
Deputy Member:
Executive Officer Ingrid Vinje

Per Inge Myhre,
Student Representative
Deputy Member:
Kristine Braut

ACADEMIC WORKGROUPS
2003

Arctic Biology:

Professor Karl Arne Stokkan,
University of Tromsø
Professor Claus Bech, Norwegian
University of Science and Technology
Associate Professor Torleiv Brattegard,
University of Bergen
Professor Stein Kaartvedt,
University of Oslo
Associate Professor Ketil Eiane, UNIS
Jakob Orheim, Student representative
UNIS

Arctic Geology:

Professor Karin Andreassen,
University of Tromsø
Associate Professor Sverre Ola Johnsen,
Norwegian University of Science and
Technology
Professor Atle Austegard,
University of Bergen
Professor Jon Ove Hagen,
University of Oslo

From left: Annik Myhre, Audhild Schanche (director), Steinar Nordal, Ingibjörg S. Jónsdóttir (observer), Else Hegseth, Kjell A. Sælen, Viva Mørk Kvello, Frank Nilsen, Per Inge Myhre.

PHOTO: TOR BREKKE

Associate Professor Hanne Christiansen,
UNIS
Julie Bjørlien, Student representative
UNIS

Arctic Geophysics:

Professor Asgeir Brekke, University of Tromsø
Professor Berit Kjeldstad, Norwegian University of Science and Technology
Professor Tor Gammelsrød, University of Bergen
Professor Jan Erik Weber, University of Oslo
Associate Professor Dag Lorentzen, UNIS
Njål Gulbrandsen, Student representative
UNIS

Arctic Technology:

Associate Professor Torbjørn Eltoft, University of Tromsø
Professor Lars Olav Grande, Norwegian University of Science and Technology
Seniorforsker Anders Solheim University of Oslo
Professor Jakob J. Stamnes, University of Bergen
Associate Professor Knut Høyland, UNIS
Hallvar Fjell, Student representative
UNIS

UNIS STAFF 2003

Administration:

Study Counsellor Jan Gunnar Brattli
Office Manager Helen Fossmo Flå
Department Secretary Wenche Guldberg
Department Secretary Marianne Hatlestad
Librarian Berit Jakobsen
Study Counsellor Eystein Markusson
Director Audhild Schanche
Senior Executive Officer Ingrid Vinje

Technical staff:

IT-Engineer Gunnar Aske (until May)
Engineer Stefan Claes
Engineer Jørn Dybdahl
IT-Engineer Frank Eggenfellner (from August)
IT-Manager Heinrich Eggenfellner (from May)
Head of Safety and Logistics Fred Skancke Hansen
IT-Engineer Kristian Jaldemark (until June)
Janitor Frithjof Kildal
Cleaner Tove Kaldbekken Larsen
Chief Lab Technician Gerd Irene Sigernes

Department of Arctic Biology:

Associate Professor Jørgen Berge (from June)
Research Fellow Malin Daase
Associate Professor Ketil Eiane
Professor Ingibjörg Svala Jónsdóttir
Assistant Professor Kari Klanderud (from August)
Associate Professor Rolf Langvatn
Adjunct Professor Bjørn Gulliksen, University of Tromsø
Adjunct Associate Professor Geir Johnsen, Norwegian University of Science and Technology
Adjunct Professor Rolf Arnt Olsen, Agricultural University of Norway

Department of Arctic Geology:

Professor Ole Humlum (Adjunct Professor from October)
Professor Olafur Ingolfsson (Adjunct Professor from October)
Associate Professor Ida Lønne (until July)
Associate Professor Tine Rasmussen
Research Fellow Marta Slubowska
Adjunct Professor Arild Andresen, University of Oslo
Adjunct Professor Ron Steel, University of Wyoming, USA
Adjunct Professor Anders Solheim, Norwegian Geotechnical Institute

Department of Arctic Geophysics:

Associate Professor Dag Lorentzen
Associate Professor Frank Nilsen
Associate Professor Fred Sigernes
Associate Professor Anna Sjöblom (from August)
Research Fellow Alexei Stuliy
Adjunct Professor Asgeir Brekke, University of Tromsø
Adjunct Professor Tor Gammelsrød, University of Bergen
Adjunct Professor Yngvar Gjessing, University of Bergen
Adjunct Professor Ove Havnes, University of Tromsø
Adjunct Professor Jøran Moen, University of Oslo

Department of Arctic Technology:

Associate Professor Per Johan Brandvik
Associate Professor Knut V. Høyland
Research Fellow Per Olav Moslet
Research Fellow Svetlana Shafrova (from August)
Adjunct Associate Professor Arne Instanes, Instanes AS
Adjunct Professor Elis Holm, University of Lund, Sweden
Adjunct Professor Sveinung Løset, Norwegian University of Science and Technology
Adjunct Associate Professor Jan Gunnar Winther, The Norwegian Polar Institute

Externally financed researchers:

Research Fellow Carolin Arndt, Total
Post.doc. Lionel Camus, Norwegian Research Council
Post.doc. Elisabeth Cooper, Norwegian Research Council
Research Fellow Christiaane Hübner, Norwegian Research Council
Research Fellow Leif Egil Loe, Norwegian Research Council
Research Fellow Magne Andersen Drage, FBT
Post.doc. Angélique Prick, European Commission (until May)
Research Fellow Ragnheid Skogseth, Norwegian Research Council (until August)



Report of the directors 2003

Styrets beretning

The University Centre in Svalbard (UNIS), now known correctly as Universitetssenteret på Svalbard AS, is a Norwegian state corporation constituted as a limited company. It is a continuation of the University Courses on Svalbard, or Universitetsstudiene på Svalbard, also abbreviated UNIS, which was the name of the original non-profit foundation established by the four Norwegian universities in 1994.

The corporation's objects are to provide study offerings and engage in research based on the unique location of Svalbard in a High Arctic latitude, exploiting the special advantages this confers when it comes to accessing and utilising the Arctic wilderness as a natural laboratory and arena for observation, acquisition and analysis of data. UNIS study offerings are designed for university students and provide a supplement to the tuition that Norway's mainland universities provide, while staying within a coordinated program leading up to degrees and postgraduate studies at bachelor's, master's and doctoral level.

The portfolio of courses offered in 2003 retained the topics of previous years. Student composition was also similar, as well as the number of students. Research activity was high, as reflected in the increased external funding, influx of new projects and solid project participation, and the numbers of scientific papers.

Development of study offerings

Studies at UNIS have an international profile and all tuition is given in English.

The institution offers four major fields of study: Arctic Biology, Arctic Geology, Arctic Geophysics, and Arctic Technology. In 2003 these offerings were consolidated in each of the fields. A total of 39 subjects were taught, including a unit on the History of Svalbard. There were 19 courses at master's and doctoral level. Students at UNIS return excellent results and the course failure rate is less than 1 per cent. In the coming years the Directors intend to extend activities with a major emphasis on studies at master and doctoral levels, while maintaining the quality of the bachelor programs.

UNIS is an active member of the University of the Arctic (UArctic). Two of the institution's course combinations, AT-206+207 and AGF-213+214, are available as specialist studies for the Bachelor of Circumpolar Studies (BCS) degree. UNIS has also undertaken to assist the UArctic Field School programs.

Student body

The institution reported 279 students following tuition or working on master's degree or doctoral theses in 2003, equivalent to 119 full student years. There were 57 student years expended on bachelor level, 24 on master's and doctoral studies, and 29 on master's and doctoral theses. UNIS is proud of its large component of international students and no less than 63 per cent of our graduates are in this category. Roughly half of the international student body comes from the Scandinavian countries, and the total number of nations being represented in 2003 was 28. The female representation in this population was 46 per cent.

Research activity

The year 2003 saw 39 students working on master level at UNIS, and 25 doctoral candidates were registered. They come to UNIS on joint programs with Norwegian or international universities. Each student is allocated a tutor at UNIS in addition to his or her parent university tutor. During 2003, 16 students took their master's diploma at UNIS. Development and furtherance of research cooperation with the Norwegian universities, as indeed with other research institutes in Norway and abroad, is a UNIS priority. In 2003 UNIS faculty members co-authored 70 publications under referee schemes. UNIS researchers participate in EU projects and several projects attract funding – wholly or in part – from the Norwegian Research Council (NFR).

Other activities

The Directors hold promotion of the activities of the University Centre as a vital task. In January and February 2003 the "Svalbard Seminar", assisted by the local office of the Norwegian Polar Research Institute and the island's chief administrator, the County Governor of Svalbard, was again held at UNIS. As always, patronage was excellent. In June a large international conference on research on climate change in the Arctic, organized in collaboration between The European Commission DG Research, the Norwegian Research Council and The Norwegian Ministry of Research and Education, was arranged at UNIS. UNIS acted as Secretariat and Local Steering Committee. In September UNIS celebrated its 10-year anniversary, hosting a varied program lasting three days, during which the Norwegian Minister of Environment, Mr Børge Brende, laid the foundation stone for the new Svalbard Science Centre. UNIS attracts many professional conferences and seminars, and in 2003 six such gatherings were held, two of them with international



ILLUSTRATION: JARMUND / VIGSNÆS A.S. ARKITEKTER M. N. A. L.

Model of the Science Centre as seen from the east.

delegations. In addition, many presentations were arranged for visiting groups from Norway and abroad.

Some of the research results from the institution are communicated to the world by web-based publication series. To promote the proper communication of scientific research in the new Science Centre, UNIS is involved in the planning of the new exhibition at the Svalbard Museum.



PHOTO: AUDHILD SCHANCHE

Foundation work on Science Centre was completed in September.

Organisation

UNIS consists of four academic faculties, one Technical Department, and the Administration Department. The faculty heads and the Institute Director make up the UNIS Executive Committee. Faculty Committees for each study field meet once a year with mainland university representatives to establish guidelines for the faculties. In autumn 2003 an additional seminar, to which all Faculty Committee members were invited, was held to examine the academic development at UNIS.

Academic and technical staff

As of 1st March 2004, the scientific staff at UNIS comprised of 18 persons in full-time positions, plus 17 other individuals tenured as adjunct professors. There was a technical staff of 8 and an administrative staff of 8. UNIS also has 8 externally financed fellowships.

The gender distribution of UNIS staff is as follows:

	Women	Men	Total	Working years
Administration	6	2	8	7.0
Technical services	2	6	8	7.8
Scientific staff	6	12	18	18.0
Associate professors		17	17	3.4
External funding	5	3	8	8.0

UNIS building, housing and student dorms
The UNIS main building was completed in 1995. It contains laboratories, class rooms, a spacious Auditorium, a Library, a Canteen, 30 offices, and reading cubicles for 100 students. We are experiencing a severe shortage of laboratory and office space for staff, visiting lecturers and researchers, and research scholars. This situation will persist until UNIS can move into the new Science Centre in December 2005.

By year's end 2003, UNIS had 26 family homes and eight apartments for staff use. The institution owns twenty-five of the family homes. In view of the increasing level of research activity, the Directors are convinced that continuing allocation of funds for housing investment is vital.

The Student Union in Tromsø (TSU) is responsible for the student housing at UNIS and have undertaken the refurbishing of four old mining barracks in Nybyen. TSU can now offer 120 units for students. The Union has been planning to build a new dormitory



PHOTO: AUDHILD SCHANCHE

In connection with the General Meeting, helicopter flights were arranged to Pyramiden, the disused Russian mining community.

in Nybyen, but uncertainties regarding site choice have postponed the operation. Thankfully, the matter has now been settled. When it is completed the new building will bring the total student accommodation to 144 units.

It is absolutely vital for the proper development UNIS activities that students can find satisfactory accommodation. The Directors therefore find it important to continue the good relations with the Tromsø Student Union.

Finances

Funding for operations and investments at UNIS are provided over the budget of The Ministry of Research and Education. In 2003 these funds totalled NOK 45,400,000 (Norwegian kroner), of which NOK 40,083,550 was spent on operations. The Annual Accounts for 2003 show that 51 per cent of goods and services are purchased from the local community. The operating account for 2003 reports a deficit of NOK 1,900,084. The reasons are technical: funds from the Ministry for four research fellows which in 2001 and 2002 were allocated outside the budget, were in 2003 included in it, an adjustment which was not notified to UNIS until November 2003. After financial incomes and expenditures and allowing for extraordinary items the account shows a deficit of NOK 1,711,446. It will be covered from equity. The total assets of the institution at 31st December 2003 ran to NOK 14,974,143, of which NOK 2,709,901 represent the buildings at UNIS and NOK 342,579 represent the share capital and other equity. In 2003 the Institute Director received a salary of NOK 463,538. The Board of Directors received NOK 35,000 to the Chairman and NOK 20,000 to other Directors.



PHOTO: AUDHILD SCHANCHE

The International Climate Conference was held at UNIS as a collaboration between the Norwegian Research Council, the Ministry of Education and Research, and the EU Commission.

Going concern

The Annual Report and Accounts are presented on the assumption of a continued operation. This assumption is supported by the profit and loss prognoses for 2004 and the UNIS long-range Strategic Plan for 2001-2010.

Working environment and staff

The institution reported 88 lost workdays in 2003, or 1.89 per cent. UNIS has a contract with Longyearbyen Hospital to supply corporate medical care. No accidents resulting in major material damage or person injury have been reported in 2003.

The UNIS building is a modern one where climatic standards are high. Modern building methods, modern materials and carefully engineered features have resulted in a good indoor climate.

To our knowledge, operations at UNIS do not pollute the external environment.

Directors' activities

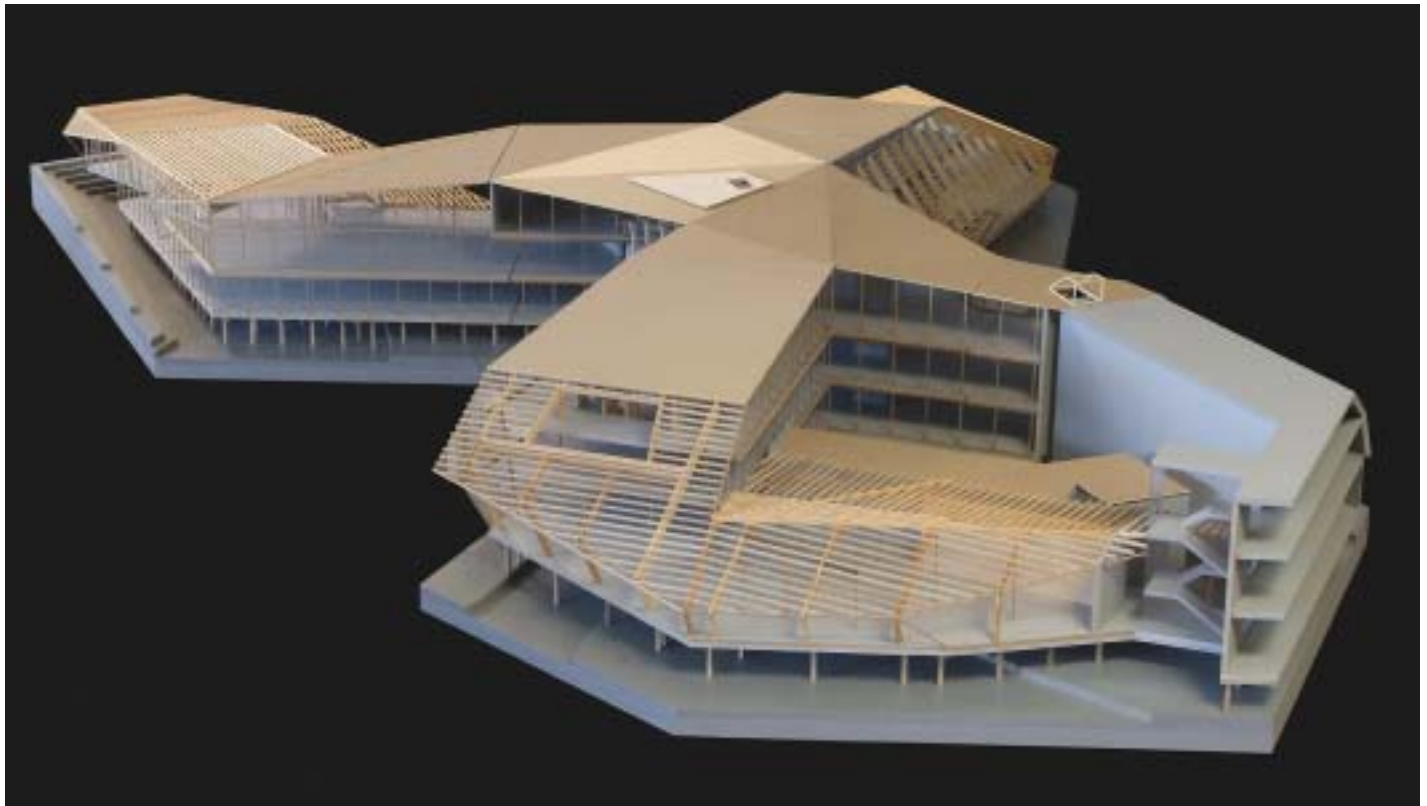
In 2003 the UNIS Directors held five Board meetings. Three of these were in Longyearbyen. The year's agenda covered 59 separate issues. Among the most important were the Development Plan 2004-2010, which defines academic priorities and staff position consequences for the period, the preparations for the 10-year anniversary program, the plans for the new building, and the budget.

General meeting

The inaugural General Meeting of the newly incorporated UNIS was held on 26th May 2003.

Looking ahead

The plans for design and furnishing of the UNIS spaces in the Science Centre have more or less reached completion. Work at the institution in the coming years will be affected by the building and commissioning of the Science Centre, the expected increase in externally funded research projects, and the consolidation and expansion of our activities in line with the plans adopted. In accordance with the Norwegian National Assembly's decision to increase levels of activity at UNIS, the Directors will engage in active and constructive dialogue with the Ministry of Research and Education to this end.



Model of the Science Centre as seen from the west.

ILLUSTRATION: JARMUND / VIGSNÆS A.S. ARKITEKTER M. N. A. L.

Universitetssenteret på Svalbard AS (UNIS) ble opprettet som statlig aksjeselskap den 29. november 2002. Selskapet avløste stiftelsen Universitetsstudiene på Svalbard (UNIS), som ble opprettet av de fire norske universitetene i 1994.

Selskapets formål er å gi studietilbud og drive forskning med utgangspunkt i Svalbards geografiske plassering i et høyarktisk område, og de spesielle fortrinn dette gir gjennom bruk av naturen som laboratorium og arena for observasjoner og innsamling og analyse av data.

Studietilbudet skal være på universitetsnivå og fremstå som et supplement til den undervisning som gis ved universitetene på fastlandet, og inngå i et ordinært studieløp som fører frem til eksamener og grader på bachelor-, master- og doktorgradsnivå.

Kurstilbudet har i 2003 vært vedlikeholdt fra foregående år. Det samme gjelder antall studenter. Forskningsaktiviteten har vært høy, noe som gjenspeiles i økte eksterne bevilgninger, initiering og deltakelse i prosjekter og antall vitenskapelige publikasjoner.

Utvikling av studietilbudet

Studietilbudet ved UNIS har en internasjonal profil, og all undervisning foregår på engelsk.

UNIS har fire studieretninger: Arktisk biologi, Arktisk geologi, Arktisk geofysikk og

Arktisk teknologi. I 2003 ble studietilbudet innen de fire studieretningene konsolidert. Det ble gitt undervisning i totalt 39 emner, inkludert et kurstilbud i Svalbards historie. 19 av kursene er på hovedfags- og doktorgradsnivå. Studentene ved UNIS oppnår gode resultater og har mindre enn en prosent stryk til eksamen. Årskursstudentene tar i gjennomsnitt 19 vekttall pr år. Frem mot 2006 ønsker UNIS å videreutvikle aktiviteten med hovedvekt på hovedfags- og doktorgradsnivå. Samtidig er det viktig at kvaliteten på studietilbudet på lavere grad vedlikeholdes.

UNIS deltar aktivt i utviklingen av The University of the Arctic (Uarctic). To kurskombinasjoner ved UNIS (AT-206+207 og AGF-213+214) kan brukes som fordypning i Bachelor of circumpolar studies (BCS). UNIS har videre tatt på seg arbeid med UArctic Field School.

Studenttall

Til sammen 279 studenter fulgte undervisning, eller arbeidet med hovedfags- og doktorgradsoppgaver i 2003. Dette tilsvarer en studentaktivitet på 119 studentårsverk. Av årsverkene var 57 på lavere grad, 34 på hovedfags og doktorgradsemner og 29 i forbindelse med hovedfags- og doktorgradsoppgaver. Ved UNIS er det et stort innslag av utenlandske studenter, og denne studentgruppen utgjorde i alt 63 % av studentmassen. Omtrent halvparten av de utenlandske studentene kom fra Norden, og i alt 28 nasjoner var representert i 2003.



PHOTO: AUDHILD SCHANCHE

The foundation for the Science Centre consists of more than 400 piles.



PHOTO: AUDHILD SCHANCHE

The General Meeting visiting Fredheim, – the old trapper lodge at Sassen.

Kvinneandelen blant studentene lå i 2003 rundt 46% for institusjonen som helhet.

Forskningsaktivitet

I 2003 var det 39 studenter som arbeidet med sin hovedfagsoppgave ved UNIS, og 25 doktorgradsstudenter var registrert ved UNIS. Dette skjer i samarbeid med et universitet i Norge eller i utlandet. Studentene får oppnevnt en veileder ved UNIS og har i tillegg en veileder ved sitt hjemmeuniversitet. I løpet av 2003 tok 16 hovedfagsstudenter sin hovedfags- eller diplomoppgave ved UNIS. Utvikling og videreføring av forskningssamarbeidet med de norske universitetene og andre norske og utenlandske forskningsinstitusjoner er en prioritert oppgave. I 2003 var UNIS-ansatte medforfatter på 70 publikasjoner med referee-ordning. Flere forskere er sentrale i EU-prosjekter og flere prosjekter er finansiert/delfinansiert av Norges forskningsråd.

Annen virksomhet

Styret ser det som viktig at det fortsatt arbeides aktivt med formidling ved UNIS. I januar/februar ble det såkalte "Svalbardseminar" arrangert i samarbeid med Norsk Polarinstitut og Sysselemannen på Svalbard. Oppslutningen var som vanlig meget god. I juli ble det avholdt en stor internasjonal konferanse om klimaforskning. Konferansen var organisert i samarbeid mellom EU-kommisjonen, Norges forskningsråd og Utdannings- og forskningsdepartementet, med UNIS som sekretariat og lokal arrangør. I september avholdt UNIS sitt 10 års jubileum med et allsidig program over tre dager, og samtidig la statsråd Børge Brende ned grunnstein for Svalbard Forskningspark. UNIS tiltrekker seg mange

faglige konferanser og seminarer, og i 2003 ble det i alt avholdt 6 slike, derav to med internasjonal deltakelse. I tillegg ble det gitt en rekke presentasjoner for gjestende grupper fra inn- og utland.

Forskningsresultater formidles bl.a. ved en nettbasert publikasjonsserie. For å bidra til en god forskningsformidling i den kommende Forskningsparken deltar UNIS i planarbeid for den nye utstillingen ved museet.

Organisering

UNIS er organisert med fire fagavdelinger, en teknisk avdeling og en administrativ avdeling. Avdelingslederne utgjør sammen med direktøren institusjonens lederteam. Fagutvalgene for hver av de fire studieretningene med representasjon fra universitetene møtes en gang i året og skal fungere som rådgivende organ for avdelingene. Høsten 2003 ble det i tillegg avholdt et seminar om den faglige utviklingen ved UNIS der alle fagutvalgsmedlemmer var invitert.

Staben

Pr. 1. mars 2004 utgjorde den vitenskapelige staben 18 personer på full tid, samt 17 med professor II/førsteamanuensis II tilknytning. Det var en teknisk stab på 8 personer og en administrativ stab på 8 personer. I tillegg har UNIS 8 eksternt finansierte stillinger.

Fordelingen mellom kjønnene er som følger:

	Kvinner	Menn	Antall personer	Årsverk
Administrasjonen	6	2	8	7
Teknisk avdeling	2	6	8	7,8
Vitenskapelig stab	6	12	18	18
Professor II		17	17	3,4
Eksternt finansierte	5	3	8	8

UNIS-bygget, boliger og studenthybler UNIS-bygget stod ferdig i 1995 og inneholder laboratorier, undervisningsrom, et stort auditorium, bibliotek, kantine, 30 kontorer samt lesesalsplasser for 100 studenter. Det er stor knapphet på laboratorier, kontorer til ansatte, gjesteforelesere, gjesteforskere og stipendiater. Denne situasjonen vil vedvare frem til UNIS kan flytte inn i Forskningsparken i desember 2005.

Ved utgangen av 2003 disponerte UNIS 26 familieboliger og 8 hybelleiligheter til sine ansatte. Av disse er 25 familieboliger eid av UNIS. Med økende forskningsaktivitet ser styret det som viktig at det fortsatt bevilges midler til investeringer i boliger.

Studentsamskipnaden i Tromsø har ansvaret for hybler til UNIS-studenter og har pusset opp fire gamle gruvearbeiderbrakker i Nybyen slik at de i dag kan tilby til sammen

120 hybler. Studentsamskipnaden i Tromsø har lenge hatt planer et nytt bygg for studenthybler i Nybyen. Uklarheter rundt tomtevalg har gjort at saken har tatt tid, men dette er nå avklart. Når det nye bygget realiseres vil den samlede boligmassen for studentene utgjøre til sammen 144 hybler. For UNIS' virksomhet er det helt avgjørende å kunne gi studentene tilfredstillende boforhold, og styret legger stor vekt på å videreføre det gode samarbeidet med Studentsamskipnaden i Tromsø.

Økonomi

Midler til drift og investeringer for UNIS bevilges over budsjettet til Utdannings- og forskningsdepartementet. I 2003 var bevilgningen på totalt kr 45 400 000, hvorav kr 40 083 550 gikk til drift. Regnskapet for 2003 viser at 51 % av varer og tjenester kjøpes lokalt. Driftsresultatet på årsregnskapet for 2003 viser et underskudd på kr 1 900 084. Underskuddet skyldes at midler fra UFD til 4 stipendiatstillinger som i 2001 og 2002 ble tildelt utenfor ramme ble lagt inn i rammen, og at UNIS fikk beskjed om denne endringen først i november 2003. Etter finansinntekter/finanskostnader samt ekstraordinære poster viser regnskapet et driftsunderskudd på kr 1 711 446. Driftsunderskuddet dekkes av annen egenkapital. Stiftelsens total kapital pr 31.12.03 var på kr 14 974 143, hvorav kr 2 709 901 utgjør institusjonens bygningsmasse og kr 342 579 utgjøres av aksjekapital og annen egenkapital. I 2003 er lønn til direktør utbetalt med kr 463 538. Styrehonorar er i 2003 utbetalt med kr 35 000 til styrets leder og kr 20 000 til styrets øvrige medlemmer.

Fortsatt drift

Årsoppgjøret er avlagt under forutsetning om fortsatt drift. Til grunn for antagelsen ligger resultatprognoser for 2004 og UNIS langsiktige strategiske plan for 2001-2010.

Arbeidsmiljø og personale

Sykefraværet var i 2003 på 88 dagsverk, dvs. 1.89%. Institusjonen har avtale med Longyearbyen Sykehus om bedriftshelsetjeneste. Det er ikke forekommet skader eller rapportert om alvorlige arbeidsuhell eller ulykker i 2003 som har resultert i store materielle skader eller personsaker.

I UNIS bygget, som ble oppført i 1995, er det stilt store krav til innemiljøet. Moderne byggemetoder, materialvalg og tekniske løsninger gir et godt inn klima.

UNIS kjenner ikke til at selskapets drift forurenser det ytre miljø.

Styrets virksomhet

I 2003 har styret for UNIS avholdt 5 møter, hvorav 3 i Longyearbyen. Det er i alt behandlet 59 saker. Viktige saker som ble behandlet i 2003 var Utviklingsplan 2004-2010, som definerer faglige prioriteringer og stillingsmessige konsekvenser for perioden, samt saker tilknyttet forberedelser til jubileumsmarkering, planer for nybygg og budsjett.

Generalforsamling

Den første generalforsamlingen for selskapet UNIS ble avholdt den 26. mai 2003.

Veien videre

Planene for utforming og innredning av UNIS's areal i Forskningsparken er på det nærmeste ferdig utformet. Arbeidet ved institusjonen de nærmeste årene vil være preget av at Forskningsparken reises og tas i bruk, av en forventet økning i eksternt finansierte forskningsprosjekter og av en konsolidering og videreutvikling av selskapets virksomhet, i tråd med vedtatte planer. I henhold til Stortingets vedtak om en økning i aktiviteten ved UNIS vil styret ha en aktiv og konstruktiv dialog med Utdannings- og forskningsdepartementet om dette.



PHOTO: AUDHILD SCHANCHE

The Norwegian Minister of Education, Kristin Clemet, opened the Climate Conference at UNIS in September.

Longyearbyen 30. mars 2004

 Kjell A. Sælen leder	 Steinar Nordal nestleder	 Annik Myhre
 Else Nøst Hegseth	 Viva Mørk Kvella	 Per Inge Myhre
 Frank Nilsen	 Rolf Langvatn Observatør	 Kristine Tjåland Braut Observatør
 Audhild Schanche Direktør		

Resultat- regnskap Balanse Noter

RESULTATREGNSKAP PR. 31.12. 2003	Note	2003	2002
Driftsinntekter og driftskostnader			
Driftstilskudd fra UFD	1	40 083 550	38 563 000
Utsatt inntektsføring av tilskudd		-135 000	
Investeringsstilskudd fra KUF, utstyr			1 383 042
Investeringsstilskudd fra KUF, boliger			2 604 447
Eksterne prosjektinntekter	0	6 829 514	5 586 909
Øvrige inntekter	2	2 072 361	2 229 484
Brutto driftsinntekter		48 850 325	50 366 882
Eksterne prosjektkostnader		6 829 514	5 586 909
Netto driftsinntekter		42 020 810	44 779 973
Lønn og sosiale kostnader	6	21 551 616	19 848 545
Avskrivninger			3 987 489
Felt- og toktkostnader		6 978 650	6 910 172
Øvrige driftskostnader	3	15 390 628	13 762 423
Sum driftskostnader		43 920 894	44 508 629
Driftsresultat		-1 900 084	271 344
Finansinntekter og finanskostnader			
Finansinntekter		267 128	432 290
Finanskostnader		78 490	46 354
Netto finansinntekter		188 638	386 035
Ordinært resultat		-1 711 446	657 379
Årsresultat		-1 711 446	657 379
Disponeringer:			
Til/ fra annen egenkapital		-1 711 446	657 379

Note 0: Regnskapsprinsipper

Årsregnskapet er satt opp i samsvar med regnskapslovens regler og er utarbeidet etter norske regnskapsstandarder og anbefalinger til god regnskapsskikk. Følgende unntaksregler for små selskaper er benyttet:

Kontantstrømoppstilling er ikke utarbeidet.

Pensjonsforpliktelse er ikke innarbeidet i balansen. Alle fast ansatte er medlemmer av Statens Pensjonskasse, 40 personer i 2003.

Selskapet er ikke skattepliktig da selskapet ikke driver ervervsvirksomhet.

Tilskudd som benyttes til finansiering av investeringer føres direkte mot investeringen i balansen som nedskrivning av anskaffelseskost. Differanse mellom utbetalt og benyttet tilskudd til investerings-formål fremkommer som ubenyttet investeringsstilskudd i balansen.

Boliger avskrives ikke.

Eksterne prosjektinntekter/prosjektkostnader

Inntektsføring på eksternt finansierte prosjekter skjer i takt med opptjeningen målt med påløpte kostnader. Midler til dekning av overhead er inntektsført under øvrige inntekter i resultatregnskapet.

BALANSE PR. 31.12. 2003	Note	2003	2002
EIENDELER			
Anleggsmidler			
Bygninger	4	2 709 901	48 779 187
Utstyr og inventar			3 521 721
Andeler Svalbardhallen	5	1	1
Sum anleggsmidler		2 709 902	52 300 909
Omløpsmidler			
Varebeholdning		84 311	68 437
Debitorer		3 364 752	1 763 906
Andre kortsiktige fordringer	7	564 956	644 802
Betalingsmidler		8 250 222	5 026 124
Sum omløpsmidler		12 264 241	7 503 269
SUM EIENDELER		14 974 143	59 804 178
GJELD OG EGENKAPITAL			
Aksjekapital		100 000	
Grunnkapital			200 000
Annen egenkapital	8	242 579	1 754 024
Sum egenkapital		342 579	1 954 024
Avsetninger for forpliktelse:			
Ubenyttet invester.tilsk.,utstyr	1	922 038	
Ubenyttet invester.tilsk.bygg	1	3 400 000	
Utsatt inntektsføring tilskudd stipendiat		135 000	
Utsatt innt.føring på invester.tilsk.,utstyr			6 443 858
Utsatt innt.føring på invester.tilsk.bygg			44 129 187
Sum avsetninger med forpliktelse		4 457 138	50 573 045
Kortsiktig gjeld:			
Leverandørgjeld		3 690 138	2 214 725
Skyldige offentlige trekk og avgifter		1 707 885	1 687 025
Annen kortsiktig gjeld	9	4 776 403	3 375 358
Sum kortsiktig gjeld		10 174 427	7 277 108
SUM GJELD OG EGENKAPITAL		14 974 143	59 804 178

Note 1: Tilskudd fra Utdannings- og forskningsdepartementet

Totalt tilskudd til drift og investering fra UFD er mottatt med 45.400.000 Derav er 1.916.450 investeringstilskudd til utstyrskjøp. Kr 3.400.000 utgjør øremerket tilskudd til nye boliger og er ført i balansen som "ubenyttet investeringstilskudd på bygninger".

Inntektsføring av driftstilskudd i årsregnskapet kan framstilles slik:	2003
Bevilget tilskudd fra UFD	42 000 000
Andel inntektsført i driftsregnskapet	40 083 550
Avsatt til investeringer	1 916 450
Tilskudd øremerket for investering i boliger fra UFD (oppstart 2004), ført som ubenyttet tilskudd pr 31.12.2003	3 400 000
Sum tilskudd til investeringsaktiviteter	5 316 450
Bruk av tilskudd til finansiering av investeringer framkommer slik:	
Aktiverte investeringer	1 916 450
Nedskrevet med investeringstilskudd	-1 916 450
Netto aktiverte investeringer	0

I tillegg er det ubenyttet investeringstilskudd fra årene 1999-2002 med til sammen kr 922 038.

Note 2: Øvrige driftsinntekter

Leieinntekter boliger	758 941
Til dekning av overhead for eksterne prosjekter	477 066
Inntekt av konsulenttjenester	229 676
Inntekter kantine	140 432
Kost, båt	142 692
Tilskudd andre instanser	134 131
Øvrige driftsinntekter	189 423
Sum	2 072 361

Note 3: Øvrige driftskostnader

Fraktkostnader	kr	459 104
Vareforbruk	kr	138 887
Kostnader vedrørende lokaler	kr	2 957 451
Fremmedtjenester	kr	1 814 831
Bibliotekkostnader	kr	1 306 716
Kontorkostnader,telefon,fax	kr	1 079 559
Drift kjøretøyer	kr	378 610
Undervisningsmateriell	kr	337 835
Reisekostnader	kr	3 863 192
Forskningstøtte og stipender	kr	1 267 471
Annonser og profilering	kr	752 279
Kontigenter og forsikring	kr	282 498
Diverse kostnader	kr	752 196
Sum øvrige driftskostnader	kr	15 390 628

Note 4: Driftsmidler

	Bygninger	Driftsløsøre	Sum
Bokført verdi 01.01.2003	2 649 901	0	2 649 901
Årets tilgang	60 000	1 916 450	1 976 450
Nedskrevet med tilskudd i 2003	0	- 1 916 450	- 1 916 450
Bokført verdi 31.12.2003	2 709 901	0	2 709 901

Note 5: Andeler Svalbardhallen (anleggsmidler)

Av velferdsmessige hensyn for ansatte og studenter er det tegnet andeler i «Svalbardhallen A/L» for kr. 50.000. Andelene er nedskrevet til kr. 1,- , da andelene ikke har noen omsetningsverdi.

Note 6: Lønn og sosiale kostnader

UNIS har i 2003 lønnet 37 fast ansatte

Faste stillinger	kr	11 422 359
Gjesteforelesere, sensorer	kr	3 062 610
Tokt-og feltgodtgjørelse	kr	777 508
Styrehonorar	kr	213 000
Sosiale kostnader	kr	5 645 383
Andre ytelser	kr	430 756
Sum	kr	21 551 616

Note 7: Andre kortsiktige fordringer:

Reiseforskudd ansatte	kr	30 495
Fordringer ansatte	kr	24 819
Lån til ansatte	kr	23 328
Forskudd leverandører	kr.	486 314
Sum andre kortsiktige fordringer	kr	564 956

Note 8: Egenkapital

	Aksjekapital	Annen egenk.
Innbetalt	100 000	
Overtatt nettoformue fra Stiftelsen		1 954 024
Årets resultat		-1 711 445
Sum	100 000	242 579

Selskapets aksjekapital består av 100 aksjer til pålydende kr 1 000, totalt kr 100.000.

Staten eier samtlige aksjer.

Note 9: Annen kortsiktig gjeld

Interimskonto lønn	kr	22 015
Påløpne feriepenger	kr	1 619 641
Eksterne prosjekter (forskuddsbetalte midler)	kr	3 072 607
Depositum studenter	kr	62 140
Sum	kr	4 776 403

Note 10: Godtgjørelser

Lønn til direktør er utbetalt med	463 538
Arbeidsgivers andel pensjon direktører	31 752
Andre ytelser direktør	4 630

Styrehonorar er utbetalt med kr. 35.000 til styrets leder og kr 20.000 til styrets øvrige medlemmer.

Det er ikke kostnadsført revisjonshonorar i 2003. Revisjonshonorar for 2003 vil bli fakturert i 2004.

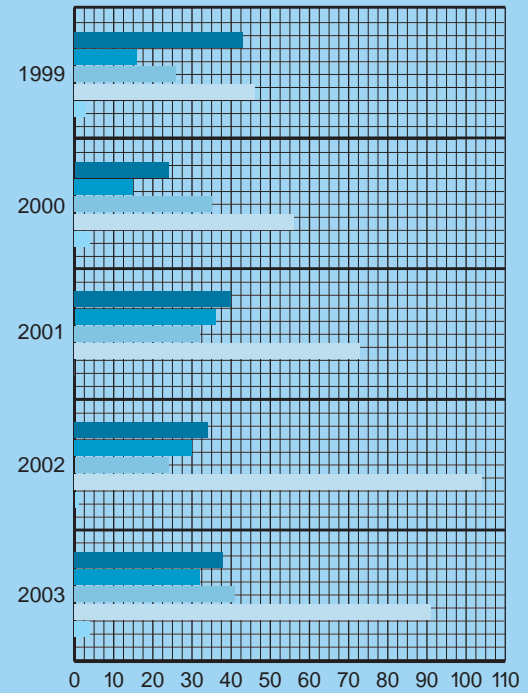
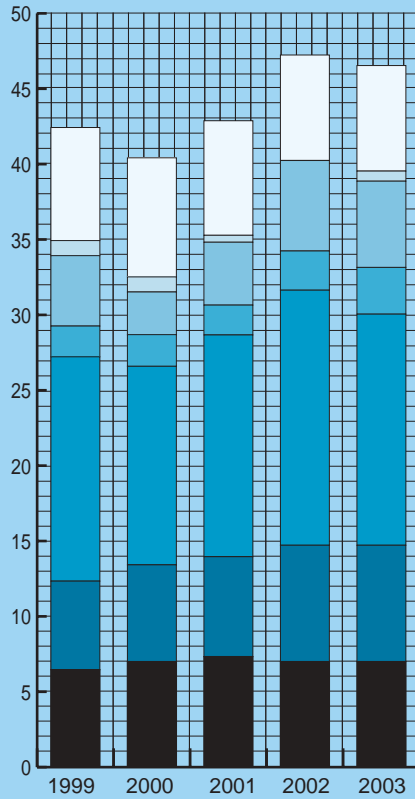
1 Workforce in man-labour years according to occupational category at UNIS 1999–2003.

Årsverk ved UNIS 1999–2003 fordelt på stillingskategori.

2 Publications etc at UNIS 1999–2003.

Publikasjoner etc. ved UNIS 1999–2003.

Statistics
Statistikk



- Administrative staff
Administrativt ansatte
- Technical staff
Teknisk ansatte
- Scientific staff
Fast vitenskapelig ansatte
- Adjunct professors
Professor II
- Research fellows
Stipendiater
- Others
Andre
- Guest lecturers
Gjesteforelesere

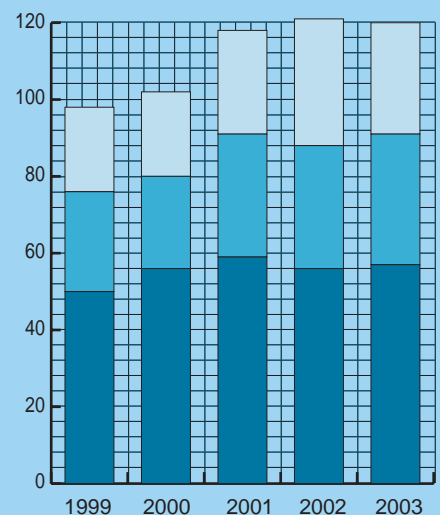
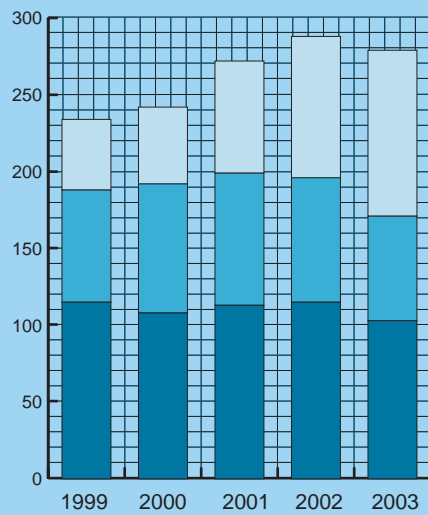
- Publications scientific staff
Publikasjoner vitenskapelig ansatte
- Publications adjuncts
Publikasjoner professor II
- In press (all categories)
Publikasjoner in press (alle)
- Presentations (all categories)
Presentasjoner (alle)
- Books (all categories)
Bøker (alle)

3 Student nationality categorised as Norwegian Nordic and non-Nordic students 1999–2003.

Totalt antall studenter ved UNIS 1999–2003 fordelt på norske, nordiske og ikke-nordiske.

4 Production in Student-labour years (1 year equals 20 Norwegian credits) categorised on teaching levels.

Produksjon av studentårsverk (ett årsverk = 20 vekttall) ved UNIS 1999–2003, fordelt på undervisningsnivå.



- Norwegian students
Norske studenter
- Nordic students
Nordiske studenter
- Non-Nordic students
Ikke-nordiske studenter

- 200-courses
200-emner
- 300-courses
300-emner
- Master/Ph.D. work
Hovedfags- og doktorgrads arbeid

Course	Course name	ECTS	semester	No. of students*
AS-101	Arctic Safety and Survival	3	spring and autumn	62
SH-201	The History of Svalbard - an Introduction	6	Spring	7
AB-201	Terrestrial arctic biology	15	autumn	16
AB-202	Marine arctic biology	15	autumn	18
AB-203	Arctic environmental management	15	spring	23
AB-204	Polar ecology and population biology	15	spring	18
AB-306A	Arctic Plant Ecology	9	spring	14
AB-311	Biotelemetric methods	9	spring	12
AB-321	Marine Benthic Fauna of Svalbard	10	autumn	13
AB-322	Flux of Matter and Energy from Sea to Land	10	spring	6
	SUM Arctic biology	98		
AG-201	The geology of Svalbard	15	autumn	10
AG-202	Arctic marine geology	15	spring	13
AG-204	The physical geography of Svalbard	15	autumn	14
AG-207	Seismic exploration	9	spring	7
AG-216	Marine Geological and Geophysical Studies: Data Acquisition and Interpretation	10	spring	11
AG-301	Arctic terrestrial and marine quaternary stratigraphy - excursion	6	autumn	12
AG-302	Geometry and Kinematics of Foreland Fold and Thrust Belts	9	spring	9
AG-303	Sequence stratigraphy: A tool for basin analysis	6	autumn	15
AG-304	Glacial and periglacial processes	9	spring	18
AG-305	Glaciology	6	spring	19
AG-308	Sedimentary facies analysis - From processes to systems tracts	9	spring	11
	SUM Arctic geology	109		
AGF-207	Space activity and Remote sensing	15	autumn	9
AGF-217	Remote sensing	10	autumn	1
AGF-210	The middle polar atmosphere	15	autumn	4
AGF-211	Air/ice/sea interaction	15	spring	16
AGF-212	Processes in snow and ice	15	spring	18
AGF-213	Polar meteorology	15	autumn	7
AGF-214	Polar oceanography	15	autumn	11
AGF-301	The upper polar atmosphere	15	spring	14
AGF-304	Radar diagnostics of space plasma	15	spring	14
AGF-311	Air/ice/sea interaction II	10	autumn	13
	SUM Arctic geophysics	145		
AT-205	Frozen ground engineering for arctic infrastructure	15	spring	6
AT-206	Arctic water resources	15	autumn	8
AT-207	Pollution in the arctic	15	autumn	19
AT-208	Thermo-mechanical properties of materials	15	spring	10
AT-307F	Arctic offshore engineering - Fieldwork	3	spring	4
AT-309	Cold regions field investigations	9	spring	6
AT-311	Fate and modelling of pollutants in the arctic	9	spring	9
AT-320	Heat and mass transfer	10	autumn	4
AT-323	Thermo-mechanics of ice and snow, and loads on structures	10	autumn	8
AT-327	Arctic offshore engineering	10	autumn	19
	SUM Arctic technology	111		

**Courses
taught 2003**

**Emner
undervist**

* Number of students that participated in the courses, students taking the exam may be lower

The then Minister of Education and Research, Gudmund Hernes, inaugurating the University Studies on Svalbard on 6th September 1993. Tore S. Jørgensen (right) was the first Director.



PHOTO: SVALBARDPOSTEN

UNIS 1993-2003 - a ten year perspective

AUDHILD SCHANCHE

10 years of UNIS

On 19th and 20th September 2002 the University Centre in Svalbard (UNIS) celebrated its ten-year anniversary as an educational and research institution in the High Arctic. A varied program for distinguished guests, local community, staff and students had been set up. The official celebration for invited guests took place on Saturday, 20th September. Most of persons who have had an influence on UNIS were present, and the guest list embraced a range of prominent representatives from the national government, partner institutions and local community.

The UNIS story

Thor Bjørn Arlov, research fellow at UNIS and editor of "*Universitetet på tundraen - UNIS 1993-2003*" (The University on the Tundra – UNIS)¹, which was launched at the anniversary, has summarised the early days of UNIS in the following words:

The history of establishing UNIS is marked by numerous players and processes that often occurred simultaneously, but not always in a coordinated manner. This could give the impression that UNIS is a result of pure coincidence, but it is rather the outcome of what we could call "happy circumstances" – the presence of many beneficial factors in the early 1990s. The first initiatives may be traced back to the second half of the 1970s and are closely connected with Olaf Rønning, professor of botany. During the 1980s the idea was developed and presented selectively to politicians and decision makers, but without concrete results. Towards the end of the decade, however, the idea became increasingly relevant due to the government's desire to create alternative jobs on Svalbard and to strengthen Norwegian polar research. A process was initiated to establish a kind of "Arctic College", involving partly univer-

sities, local and central authorities and private interests. In 1992, at a point when the process was lacking momentum, the Minister of Education and Research, Gudmund Hernes, forcefully intervened. He seized an opportunity to establish UNIS by allocating a hundred new student positions and securing a cooperation with the Ministry of Industry to finance infrastructure. At an unprecedented pace in the world of Academia UNIS was opened less than a year after the Ministry had announced its establishment.

The first building was put up in record time, and King Harald in person travelled north to unveil it. The happy circumstances that led to the foundation of UNIS have been continued by the positive effects of student results and scientific production. The first ten years are without doubt a major success, created by dedicated, diligent and competent faculty members, students and supporters.

Looking forward

To coincide with the Anniversary Celebration on 20th September, Statsbygg organised the laying of the foundation stone for the Svalbard Science Centre. Norway's current Minister of Environment, Mr Børge Brende, performed this ceremony at the completed building foundation. Not only did the Anniversary provide an opportunity to look back in time, but it also meant we could take a long look forward. Plans for the new Science Building are on schedule. When it opens, so too will new and exciting opportunities for UNIS as a key international centre for Arctic research and education.

¹ Arlov, Thor Bjørn: *Universitetet på tundraen (The University on the Tundra)*. UNIS 1993-2003. UNIS, Svalbard 1993. The book may be purchased from UNIS.

Directors and Chairmen from UNIS's ten-year history. From left: Kjell Sælen (Chairman 2000-01), Audhild Schanche (Director 2002-03), Lasse Lønnum (Director 1998-2002), Jarle Nygard (Director 1995-1998), Tore S. Jørgensen (Director 1993-1995), Jan Larsen (Chairman 1993-1999)



PHOTO: JAN GUNNAR BRATTLI

UNIS 10 år

Den 19. og 20. september 2002 feiret Universitetssenteret på Svalbard AS (UNIS) sitt 10-års jubileum. Det var lagt opp til et allsidig program for gjester, lokalbefolkning, ansatte og studenter. Den offisielle markeringen for inviterte gjester fant sted lørdag den 20. september. De fleste av de som har betydd noe for UNIS var til stede, og i tillegg en rekke representanter for nasjonale myndigheter, samarbeidsinstitusjoner og lokale samarbeidspartnere.

daværende utdannings- og forskningsminister Gudmund Hernes kraftfullt inn i den. Han grep muligheten til å etablere UNIS ved å allokere hundre nye studieplasser og sikre samarbeid med Næringsdepartementet til finansiering av infrastruktur. I et tempo uten sidestykke i den akademiske verden ble UNIS åpnet mindre enn et år etter at departementet hadde annonsert at det skulle etableres.²

Det første bygget ble reist på rekordtid, og kong Harald kom selv for å innvie det. De "lykkelige omstendigheter" som førte til at UNIS kom på plass, har vært videreført gjennom en svært positiv utvikling både når det gjelder studentresultater og vitenskapelig produksjon. De første ti årene kan uten tvil karakteriseres som en suksesshistorie, båret oppe av motiverte, dyktige og innsatsvillige ansatte, studenter og støttespillere.

Historien

Thor Bjørn Arlov, førsteamanuensis II ved UNIS og redaktør for boka "Universitetet på tundraen - UNIS 1993-2003"¹, som ble lansert under jubileet, har summert opp UNIS sin tilblivelseshistorie på følgende måte:

"Historien om UNIS sin tilblivelse er preget av en rekke aktører og prosesser som ofte virket samtidig, men ikke alltid på en koordinert måte. Dette kunne gi inntrykk av at UNIS er et resultat av rene tilfeldigheter, men det må heller sees som resultat av det vi kan kalle "lykkelige omstendigheter" – av mange heldige faktorer som var til stedet tidlig på 1990-tallet. De første initiativ kan spores tilbake til første halvdel av 1970-tallet, og er nært forbundet med Olaf Rønning, professor i botanikk. Gjennom 1980-årene ble ideen utviklet og selektivt presentert til politikere og beslutningstakere, men uten konkrete resultater. Mot slutten av tiåret ble imidlertid ideen stadig mer relevant, noe som skyldtes myndighetenes ønske om å skape alternative arbeidsplasser på Svalbard og om å styrke norsk polarforskning. En prosess mot etablering av en slags "Arktisk Høyskole", som skulle involvere universiteter, lokale og sentrale myndigheter og private interesser, ble initiert. I 1992, på et tidspunkt da prosessen manglet drivkraft, grep

Framtiden

Samtidig med jubileumsmarkeringen den 20. september arrangerte Statsbygg grunnsteinsnedleggelse for Svalbard forskningspark. Nedleggelsen ble foretatt av statsråd Børge Brende, på det da ferdige fundamentet for Forskningsparken. Ved siden av å skue tilbake på historien, pekte dermed arrangementene også framover. Planleggingen av det nye forskningsbygget er i rute. Når det står ferdig, vil det åpne nye og spennende muligheter for UNIS som et viktig internasjonalt senter for arktisk forskning og utdanning.

¹ Arlov, Thor Bjørn: *Universitetet på tundraen. UNIS 1993-2003*. UNIS, Svalbard 1993. Boka er til salgs på UNIS.

² Teksten er oversatt til norsk fra Arlovs engelske sammendrag.

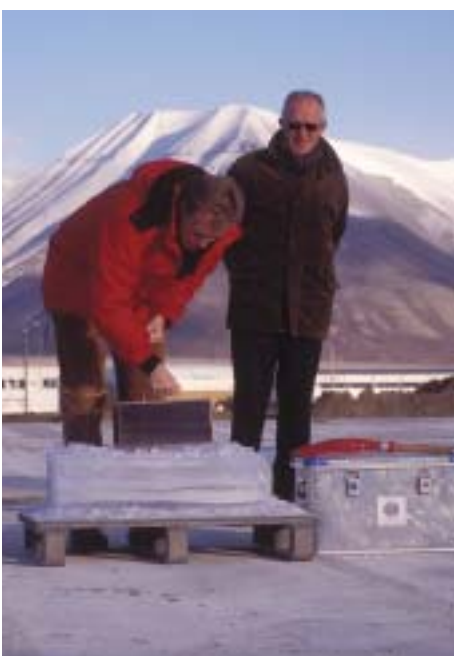


PHOTO: JAN GUNNAR BRATTLI

The foundation stone for the Science Centre is laid by Norway's Minister of Environment, Børge Brende. Managing Director of the Norwegian Directorate for Public Construction and Property (Statsbygg), Øyvind Kristoffersen, is on the right.

Student body annual report

WOJCIECH MILOCH

For some reason almost all students who have ever visited UNIS try at some stage to return to Longyearbyen. Life and education in the world's northernmost university ensure that you get not simply a fantastic scientific opportunity to pursue your field, but also enable you to spend time enjoying one of the wildest and most unusual landscapes on the planet. One student, asked why he wanted to come back to Svalbard, replied "If you spend a whole year here, you will understand why."

Student democracy

At the beginning of each term a General Meeting is held to elect the Study Council. The General Meeting is the highest organ of the Student Union and comprises all the students. The Study Council oversees the daily work of the Student Union and represents the students in the formal administration of UNIS.

The students have one representative on the UNIS Board of Directors, which is the governing body of the University. We have the right to vote on the Board, just like the other Directors. We are also represented on the Executive Committee, which handles the daily business of the University. Thanks to this representation and the comparatively compact size of the institution, students feel we have a real say in the life of UNIS.

Funding

The Student Union receives financial support from UNIS. Last year we also received some additional funding from the Student Union in Tromsø. The funds go towards maintenance and refurbishing of student cabins, sleds and touring equipment. Some of the money also goes to organise the Norwegian Course, to reimburse students unlucky enough to have incurred medical bills, fitting out the new student accommodation in Nybyen, and organising a wide variety of student activities.

Students engage in many social activities during the year. This is an outdoor birthday party in Nybyen in September.



PHOTO: NJÅL GULBRANDSEN

Activities

The Study Council organises a whole range of activities for students during the school year. Here are just a few. Each Friday we hold our Friday Gathering, a relaxing and social way to meet not only fellow students, but also teaching staff. On Wednesday we have the Wednesday Movie: when the film shown is the best of three chosen by popular ballot two days before. The Study Council also organises the Norwegian Course for a large number of non-Norwegian students.

Equipment and trips

Being in Longyearbyen you don't need to go far to experience the Arctic wilderness. Even going on a short trip outside the town, you must take adequate equipment with you. You must always be prepared for the sudden onset of bad weather. The Student Union is the place to go for assistance with outdoor activities. Here you can borrow a rifle, tent, crampons, helmets – or whatever you need for your expedition. If you prefer to hop on a snowmobile, we also rent out suitable sleds. The two Student Union cabins are popular destinations for shorter (Bjorndalen) and longer (Svea) outings. Although the surroundings look inviting you must remember that real dangers lurk out there. It is absolutely vital that expedition members look after each other and fill in the Tour Book before departure, stating destination, equipment borrowed, and expected time of return.

Social life

Student accommodation is provided on the far side of town, at the very edge of civilisation. Two glaciers mark the beginning of the inhospitable wilderness. In Nybyen itself you will find no difficulty locating a party in the evening. Students are keen defenders of the social graces and practice at every opportunity. Revelling can even sometimes be heard from within the UNIS walls. Every semester we hold an Ice-Breaker Party at the university to break the ice between the old and the new students. Students also enjoy ties with the local community and take part in social events like sports, soapbox racing, sledding competitions, charity events, etc. Students are not confined to barracks, and you are just as likely to meet your fellows dancing the tango or attending folk meets. The local sports centre, Svalbard Hall, is another favourite haunt of students in the evenings. The motto is simple: if you have even an ounce of creativity, there is something for you in Longyearbyen, the community of possibilities.

The UNIS library

BERIT JAKOBSEN

The UNIS Library is the scientific information gateway for students and faculty at UNIS. Also staff at the local office of the Norwegian Polar Research Institute rely on the Library. A total of 246 patrons were registered using our services in 2003. The Library holds books, journals and databases in Geology, Geophysics, Biology and Technology – and also runs database training and interlibrary loan (ILL) services for our members.

The Library doors opened on 202 working days for roughly 30 hours per week. For most of the year, there was one staff librarian on duty.

For a period of about six weeks in January-February, we were assisted by a trainee librarian, Kathrin L. Kvilstad. She joined us on an experience program from the Oslo University College, Faculty of Journalism, Library and Information Science. Kathrin was instructed in the use of several of our databases and helped with the introduction of new UNIS students at the Library. Her main task, however, was the long-overdue reclassification of books purchased in the early 1990s. Back then documents followed the Dewey Decimal Classification (DDC) system, but from 1995 onwards the Library has been classifying all new acquisitions according to the Universal Decimal Classification (UDC).



PHOTO: ØYVIND LEIKVIN

Kathrin L. Kvilstad enters patron no. 1000, Simon Jessen, into the BIBSYS database on the 7th of February 2003.

The Library was also deeply indebted to the long-range assistance of our consultant, Elke Lindner, who works in a part-time position from Berlin in Germany. Elke was invaluable in verifying and compiling bibliographic databases for the Annual Report 2002, the Anniversary Bibliography and the Svalbard Reindeer Bibliography. Elke enjoys remote user access to the bibliographic databases that UNIS subscribes to. As a result of her efforts, the UNIS Library succeeded in entering in the region of 1500 bibliographic records for these three bibliographical works in 2003.

In 2003, the Library took out a subscription with ScienceDirect, which offers roughly 1800 full-text journals within a wide range of subjects, with articles dating from 1997 till the present. We also signed up for 69 new full-text journals via SWETS, which will supplement some of the 132 printed journals on our shelves. UNIS also maintained several free trials of reference databases in addition to the 15 we hold on firm subscription. During the year, 1874 new documents (1317 journal issues and 557 books and reports) were entered into BIBSYS.

In 2003 we registered 2027 over-the-counter loans. In addition, quite a number of documents were circulated as unregistered copies and scans. There were 801 interlibrary loans, 110 of which came from libraries outside Norway. In the other direction, the UNIS Library supplied 41 books and 30 Xerox copies to requesting libraries. These figures are slightly below the statistics for 2002.

Since 1996 the UNIS Library has been a member of the Polar Library Colloquy, participating in these conferences which take place ever other year. At the last business meeting of the colloquy, the UNIS librarian was re-elected as a member of the Steering Committee for the period ending 2004. Since 1995 the former librarian and the present librarian have represented UNIS at meetings of the BIBSYS Council.

Arctic Biology

ELISABETH COOPER
CHRISTIAANE HÜBNER

The Department of Arctic Biology offers education and performs research in Arctic biology and ecology. According to the strategic plans of the department, we seek to build up two active research groups, one in terrestrial and one in marine ecology. Both groups have two full-time staff, and in addition three adjunct professors were employed at the department in 2003. This year we have chosen to present two of the ongoing research projects run by the terrestrial research group.

Goose Grazing and Climate Change Impacts on Svalbard's Tundra

Background

Migratory geese breed in Svalbard in summer and return to Western Europe for the winter, feeding on wetlands and agricultural fields. In recent years changes in land use, including increasing agricultural production and the implementation of protective measures have dramatically improved the birds' ability to survive the winter. This has resulted in a 30-fold increase in the barnacle goose and a 4-fold increase in the pink-footed goose populations in Svalbard over the past 40 years. Both barnacle geese and pink-footed geese have traditional stop-over sites on mainland Norway during their spring migration. Due to the increasing numbers of birds, conflicts with farmers in these areas are intensifying and the geese may be forced to alter their migration strategies. As a consequence, feeding in pre-breeding areas in Svalbard may be of increased importance for the geese to build up their body reserves, thereby increasing the impact on the vegetation in those areas. In addition, increased temperatures in the Arctic as predicted by climate change models may result in earlier snow melt allowing birds to breed earlier and produce more offspring. Warmer temperatures during summer may also affect plant productivity. At UNIS, we are studying interactions between geese and their food plants, changes in climate and the possible consequences for geese and plants in two projects, one focussed on the issue of early snow-melt at the pre-breeding area Vårsolbukta, the other concerned with pressures on the tundra due to summer grazing.

Effects of early snow melt on the interactions between vegetation and geese.

Vårsolbukta is one of the few known pre-breeding areas for geese on Svalbard. Many geese gather there at the end of May after migrating from temperate regions and before

dispersing to the breeding areas. For the geese, it is the last chance to replenish their body reserves before breeding and so feeding activity is high. This constitutes a tremendous grazing impact on the vegetation during a sensitive period for the plants. Grasses, one of the most important food types for geese, have just emerged from the snow and growth starts rapidly to utilize the short growing season effectively. There is a high concentration of nutrients in the young developing leaves and loss of those may have a significant effect on the plants' development. Geese are poor digesters and depend on high quality food with high nutrient content in order to successfully accumulate body reserves. Mosses are regarded as low quality food for geese, but their availability is almost unlimited and geese feed extensively on mosses if high quality food is scarce. If climate changes result in early snowmelt during spring, the time of peak quality of food plants may be altered and move out of phase with the timing of goose arrival.

The project in Vårsolbukta investigates effects of the timing of snowmelt on the relationship between geese and their food plants and possible consequences for the goose population dynamics and the plant community in such areas. One part of the study is to manipulate the timing of snowmelt in combination with grazing simulations. By adding and removing snow in certain areas, the timing of snowmelt can be delayed and enhanced, respectively. In these areas, three levels of grazing intensity - none, moderate, and heavy grazing - are simulated by clipping individual plants. Thus, consequences of goose feeding in relation to the timing of snowmelt can be recorded at the plant species level.

Vulnerability of Tundra Ecosystems

Arctic ecosystems are very vulnerable to overgrazing, as shown by recent experience in N.E Canada, where high numbers of snow geese caused large-scale degradation of pristine low arctic salt marshes, leading to desertification of these ecosystems. Is the tundra in Svalbard equally sensitive to overgrazing? Which ecosystem processes are most sensitive and what are the thresholds for irreversible change? In order to explore these issues, a group from UNIS is participating in a large EU funded project, 'FRAGILE': FRAgility of Arctic Goose habitat: Impacts of Land use, conservation and Elevated temperatures. We aim to assess the vulnerability of Svalbard tundra ecosystems to further increases in breeding goose populations caused by changes in European



PHOTO: ELISABETH COOPER

Carrying geese; Barnacle geese used in the experiments are carried to the plot where they graze for one or five hours.

land use and bird protection measures, in a context of future climatic change.

Mosses and grasses often dominate Arctic plant communities that are grazed by geese, and any shift in the balance between these groups would alter the carbon balance of the system. The low thermal conductivity of mosses reduces soil temperature, and their lack of roots means that, once the water table is below the soil surface, evaporation and transpiration is minimised, maintaining wet soil conditions. Both these factors reduce decomposition rates in the soil. Thus moss-dominated vegetation is likely to be a carbon sink. By contrast, grasses access soil water and their transpiration increases overall rates of evapo-transpiration, drying the soil and potentially increasing microbial activity. They also produce litter with lower amount of carbon that decomposes faster than moss tissue. Grass dominance is thus more likely to shift the system towards being a source of carbon to the atmosphere rather than a sink. Herbivory by geese can have a large effect by selective removal of plant tissue thus changing the vegetation composition and the amount and quality of the litter produced. Goose grazing has also been shown to accelerate the nitrogen cycle and in this way increase the productivity of their forage, when goose droppings and nitrogen fixation function as a source of nitrogen for the vegetation. A continued increase in the populations of geese grazing the tundra will almost certainly have significant implications

for both the carbon and nitrogen balance of the system.

Experimental Approach

We have set up experiments in Adventdalen in two vegetation types which are representative of those used by geese in Svalbard in the summer; one is wet moss-dominated vegetation with grasses and the other is a drier tundra vegetation with shrubs and flowering plants as well as grasses. We increase the temperature of the air and ground using small greenhouses, and allow captive geese to graze the experimental plots for one or five hours, to represent a 'normal' and 'greatly enhanced' grazing pressure. We measure the effect of the geese and the temperature increase by examining the plant growth and productivity, the rate of decomposition of dead leaves and mosses, and output of carbon dioxide and methane from the soil. In addition we are looking for any changes in species diversity as a result of these treatments.



PHOTO: ELISABETH COOPER

Carbon dioxide fluxes are measured to determine whether the tundra is a sink or source of carbon, and whether it changes with goose grazing and increased temperature.

Research Projects Arctic Biology 2003

Title: Population dynamics of zooplankton in the North Sea

Collaborating institutions: University of California San Diego, University of Bergen

Financing: UNIS

Duration: 1997-2003

UNIS: Ketil Eiane

Title: Distribution of zooplankton in relation to biophysical gradients associated with frontal systems

Collaborating institutions: Norwegian Polar Institute (NP)

Financing: UNIS

Duration: 2000-2003

UNIS: Ketil Eiane

Title: Zooplankton communities under differing advective influence in coastal areas on Svalbard

Collaborating institutions: Norwegian Polar Institute (NP), University of Kiel, Germany, UiTø

Financing: NP, UNIS

Duration: 2000-2003

UNIS: Ketil Eiane

Title: Sympagic communities in the perennial sea-ice zone around Svalbard

Collaborating institutions: Norwegian Polar Institute (NP), University of Kiel, Germany, UiTø

Financing: Total

Duration: 2001-2004

UNIS: Ketil Eiane and Jørgen Berge

Title: Fragility of Arctic Goose-grazed ecosystems: Impacts of Land use change, conservation policy, and Elevated temperatures (FRAGILE)

Collaborating institutions: Netherlands Institute of Ecology (NIOO, coordinator), and 12 others, including three other Norwegian partners

Financing: EU

Duration: 2002-2004

UNIS: Ingibjörg S. Jónsdóttir, Elisabeth Cooper

Title: The effect of winter conditions on arctic plant populations and vegetation

Financing: UNIS

Duration: 2002-

UNIS : Ingibjörg S. Jónsdóttir

Title: Effect of climate warming on tundra vegetation, The International Tundra Experiment, ITEX.

Collaborating institutions: Direct collaborators: Agricultural Research Institute and Icelandic Institute of Natural History, Iceland, Göteborg University, Sweden. In addition, there is a networking collaboration with all members of ITEX

Duration: 1994-

Financing: No funding at the moment. Seeking funding for continuation of the project in Iceland, Sweden and on Svalbard for studies of long term effects of warming on plant communities.

UNIS: Ingibjörg S. Jónsdóttir

Title: Population biology of clonal tundra plants: impacts of herbivores, climate and glaciation history

Collaborating institutions: University of Tromsø, Göteborg University, Swedish University of Agricultural Sciences at Balsgård, Colorado State University

Duration: 1999-

Financing: no funding at the moment. Funding sought to complete analysis of sampled material and data from Arctic Canada

UNIS: Ingibjörg S. Jónsdóttir

Title: CAT-B: The Circum-Arctic Terrestrial Biodiversity Initiative - Causes and Consequences of Changing Biodiversity in Arctic and Alpine Terrestrial Ecosystems

Collaboration: The project members so far come from Sweden, Norway, Denmark, Russia, Canada, USA and UK.

Financing: International Arctic Science Committee, IASC

Start: 2003

UNIS: Ingibjörg S. Jónsdóttir

Title: The role of plant-herbivore-parasite interactions in the regulation of Svalbard reindeer.

Collaborating institutions: Center of ecology and hydrology (CEH), Scotland, University of Oslo, Norwegian College of Veterinary medicine

Financing: UNIS, CEH

Duration: 1996-2003

UNIS: Rolf Langvatn

Title: Population biology of red deer, - environmental effects and demographic processes.

Collaborating institutions: University of Oslo (UiO)

Financing: UNIS, UiO, Norwegian Research Council, Norwegian Institute of Nature Research, Directorate for Nature Management

Duration: 2000-2004

UNIS: Rolf Langvatn

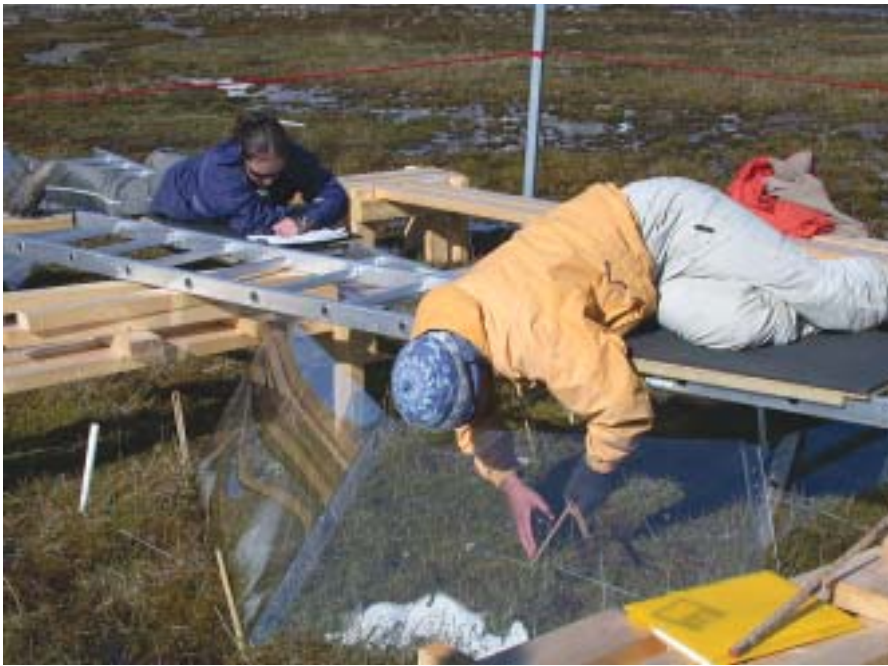


PHOTO: ELISABETH COOPER

Plant measurement; We measure the length of grass leaves throughout the summer to determine their productivity.

Title: The ecological effects of climate fluctuations and change: A multi-disciplinary and integrated approach

Collaborating institutions: University of Oslo, Norwegian Institute of Natural Research, Institute of Marine Research, University of Iowa, National Center of Atmospheric Research

Financing: Norwegian Research Council, UNIS

Duration: 2001-2004

UNIS: Rolf Langvatn, Frank Nilsen

Title: Antarctic Deep-Sea Amphipods

Collaborating institutions: University of Tromsø, AWI

Financing: UNIS

Duration: 2002-

UNIS: Jørgen Berge

Title: Amphipod associates of sea urchins

Collaborating institutions: University of Tromsø, AWI

Financing: UNIS

Duration: 2002-

UNIS: Jørgen Berge

Title: Biomarkers to monitor oil and gas industrial activities in the deep Norwegian ecosystem

Collaborating institutions: University of Tromsø, AkvaMiljø

Financing: NFR

Duration: 2002-2003

UNIS: Bjørn Gulliksen

Graduates 2003

Dr.scient

Title: Biology and ecology of marine cold-water species in the Arctic

Collaborating institutions: University of Tromsø (UiT), Total

Student: Sten R. Birkely

Supervisors: Ole J. Lønne (UNIS), Bjørn Gulliksen (UiT/UNIS)

Finnished: Spring 2003

Cand.scient.

Title: Spatial dynamics of zooplankton in an arctic fjord

Collaborating institutions: Christian Albrecht University of Kiel

Student: Daniel Vogedes

Supervisors: Ketil Eiane (UNIS), Dr. Michael Spindler (Christian Albrecht University in Kiel)

Finnished: Autumn 2003

Title: Patterns of mortality caused by starvation in a Svalbard reindeer population.

Collaborating institutions: Sveriges Landbruksuniversitet

Student: Pernilla Hansson

Supervisors: Rolf Langvatn (UNIS), Öje Danell (Sveriges Landbruksuniversitet)

Finnished: Spring 2003

Title: Population structure and tropic interactions in polar cod (*Borealis saida*) in fjord on Svalbard.

Collaborating institutions: University of Oslo

Student: May Arnberg

Supervisors: Ketil Eiane (UNIS), Stein Kaartved (UiO)

Finnished: Autumn 2003

Title: Makebeovoktning og sang hos hanner av snøspurv *Plectrophenax nivalis*, på Svalbard sett i relasjon til deres foreldreinnsats.

Collaborating institutions: Norwegian University of Science and Technology

Student: Marie Lier

Supervisors: Rolf Langvatn (UNIS), Yngve Espmark (NTNU), Arne Moksnes (NTNU)

Finnished: Spring 2003

Title: One of the best managed wilderness areas in the world- demands and reality in wilderness conservation on the arctic archipelago Svalbard

Collaborating institutions: University of Greifswald

Student: Sebastian Unger

Supervisors: Rolf Langvatn (UNIS), Konrad Ott and Michael Succow (University of Greifswald)

Finnished: Spring 2003



PHOTO: ELISABETH COOPER

The tundra heath site is the drier of the two sites we are studying in the FRAGILE project.

Title: On the structure of benthic soft-bottom macrofauna at Jan Mayen; A comparison of data retrieved by Van Veen grab samples and video recording using ROV

Collaborating institutions: Norwegian University of Science and Technology

Student: Trine Moland

Supervisors: Torleiv Brattegard (UiB), Ole Jørgen Lønne (UNIS)

Finished: Autumn 2003

Title: Goose grazing in a High Arctic ecosystem: Impact on productivity and biomass allocation of the common tundra grasses *Alopecurus borealis* and *Duportia* spp.

Collaborating institutions: Environmentla Change Institute, University of Oxford

Student: Dominique L. Chaput

Supervisors: Ingibjörg S. Jónsdóttir (UNIS), Elisabeth Cooper (UNIS), Pam Berry (University of Oxford)

Finished: Autumn 2003

Graduate students 2003

Dr. students/Ph.D.

Title: Reduction in the Arctic ice cover; sources for and pathways of ice faunal production in the Svalbard region

Collaborating institutions: University of Tromsø (UiTø), Total

Student: Carolin E. Arndt

Supervisors: Ketil Eiane (UNIS), Bjørn Gulliksen (UiT/UNIS)

Title: How soil fauna influence plant-microbial competition for N in arctic ecosystems

Collaborating institutions: Lancaster University, UK, Centre for Ecology and Hydrology (CEH), Scotland

Student: Stephen Dutton

Supervisors: Ingibjörg S. Jónsdóttir (UNIS), Richard Bardgett (Lancaster University, UK), René van der Wal (CEH)

Title: The role of mosses in high arctic vegetation: competition, facilitation, herbivory and diversity

Collaborating institutions: University of Aberdeen, Scotland, Centre for Ecology and Hydrology (CEH), Scotland

Student: Jemma L. Gornall

Supervisors: Ingibjörg S. Jónsdóttir (UNIS), Sarah J. Woodin (University of Aberdeen, Scotland) René van der Wal (CEH)

Title: Ecology of Bryozoa in Svalbard waters

Collaborating institutions: University of Gdansk, University of Tromsø (UiTø)

Student: Piotr Kuklinski

Supervisors: Bjørn Gulliksen (UiT/UNIS), Jan Marcin Weslawski (University of Gdansk, Poland)

Title: Mechanisms of density dependence in Norwegian red deer

Collaborating institutions: University of Oslo (UiO)

Student: Leif Egil Loe

Supervisors: Rolf Langvatn (UNIS), Nils Christian Stenseth (UiO), Atle Mysterud (UiO)

Title: Extent and dynamics of changes in Arctic microbial communities as a consequence of exposure to hydrocarbones.

Collaborating institutions: University of Tromsø (UiTø), Total

Student: Stian Røberg

Supervisors: Rolf Arnt Olsen (Agricultural University of Norway/UNIS), Bjarne Landfald (UiTø)

Title: Succession of organism after glacial retreat on Spitsbergen: The role of cyanobacteria and nitrogenfixation in ecosystem development.

Collaborating institutions: University of Tromsø (UiTø), University of Idaho, USA

Student: Ursel Schütte

Supervisors: Rolf Arnt Olsen (Agricultural University of Norway/UNIS), Bjørn Solheim (UiTø), Larry Forney (University of Idaho, USA)

Title: Diversity and nitrogen fixation of cyanobacterial communities in terrestrial arctic ecosystems

Collaborating institutions: University of Tromsø

Student: Matthias Zielke

Supervisors: Rolf Arnt Olsen (Agricultural University of Norway/UNIS)

Title: Plant-herbivore interactions in an Arctic pre-breeding area for geese: effects of timing and foraging intensity.

Collaborating institutions: University of Tromsø (UiTø), Norwegian Institute for Nature Research (NINA)

Student: Christiane E. Hübner

Supervisors: Ingibjörg S. Jónsdóttir (UNIS), Rolf A. Ims (UiTø)

Title: Effects of variations in ocean climate on arctic pelagic ecosystem.

Collaborating institutions: Norwegian Polar Institute, University of Bergen

Student: Malin Daase

Supervisors: Ketil Eiane (UNIS), Dag Aksens (UiB), Stig Falk-Petersen (NP), Håkon Hop (NP)

Cand.scient./Master students

Title: Analysis of succession of a rocky bottom community in Smeerenburgfjorden
Collaborating institutions: Fredrich-Schiller Universität - Jena
Student: Ulrike Bartke
Supervisors: Ole Jørgen Lønne (UNIS), Bjørn Gulliksen (UNIS), Winfried Voigt (University of Jena)

Title: Life strategies and massive blooms in *Limacina helicina*
Collaborating institutions: University of Tromsø, Norwegian Polar institute
Student: Charlotte Gannefors
Supervisors: Ketil Eiane (UNIS), Bjørn Gulliksen (UiTø), Stig-Falk Pettersen (NP)

Title: Life history and abundance (*Mertensia ovum*) in relation to lipids.
Collaborating institutions: University of Tromsø (UiTø)
Student: Marte Lundberg
Supervisors: Ketil Eiane (UNIS), Bjørn Gulliksen (UiTø), Stig Falk Pettersen (NP), Håkon Hop (NP)

Title: Zooplankton community structure in different water masses north of Spitsbergen
Collaborating institutions: University of Bergen
Student: Katharina Storemark
Supervisors: Ketil Eiane (UNIS), Torleiv Brattegård (UiB)

Title: Demography of *Laminata digitata* (Hudson) J.V.Lamouroux from two different areas in Norway (Svalbard and Hordaland)
Collaborating institutions: University of Bergen
Student: Bernt Rydland Olsen
Supervisors: Ole Jørgen Lønne (UNIS), Kjersti Sjøtun (UiB) og Tore Høisæter (UiB)

Title: Ecological amplitude in two evergreen dwarf-shrubs in Svalbard: growth and reproduction along topographic gradients.
Collaborating institutions: Högskolan på Gotland
Student: Anna Nilsson
Supervisors: Ingibjörg Jónsdóttir (UNIS), Karin Bengtsson (Högskolan på Gotland)

Title: Plant-reindeer interactions on Svalbard
Collaborating institutions: Norwegian University of Science and Technology
Student: Eirin Marie Bjørkvoll
Supervisors: Ingibjörg Jónsdóttir (UNIS), Rolf Langvatn (UNIS), Håkan Hytteborn (NTNU)

Title: Dynamics of overwintering zooplankton in an Arctic fjord
Collaborating institutions: Wageningen University
Student: Arjen Breur
Supervisors: Ketil Eiane (UNIS) and Rudi Roijackers (Wageningen)

Title: Development of digital photography as a means to estimate species composition and biomass in tundra vegetation
Collaborating institutions: Swedish University of Agricultural Science in Uppsala
Student: Gry Benediktson
Supervisors: Elisabeth Cooper and Ingibjörg S. Jónsdóttir (UNIS) and Anders Glimskär (Swedish agriculture university in Uppsala)

Title: Hatching asynchrony and egg size variation, and their impact on hatching success, nesting growth, and survival in snow buntings (*Plectrophenax nivalis*)
Collaborating institutions: Norwegian University of Science and Technology
Student: Tore Kristian Leren
Supervisors: Rolf Langvatn (UNIS), Arne Moksnes (NTNU)

Title: The interrelationship between egg size, growth, blood hemoglobin content and thermoregulatory development in the Snow-bunting (*Plectrophenax nivalis*)
Collaborating institutions: Norwegian University of Science and Technology
Student: Alexandra Nāvås
Supervisors: Rolf Langvatn (UNIS) and Claus Bech (NTNU)

Title: Ecology and productivity of dominant grass (*Alopecurus borealis* and *Dupontia* spp.) in two high arctic plant communities
Collaborating institutions: University of Genève
Student: Astrid Pahud
Supervisors: Elisabeth Cooper and Ingibjörg S. Jónsdóttir (UNIS), Pierre Spierer (University of Genève)

Title: Plant community differentiation in relation to winter conditions in the high Arctic
Student: Inger Moe
Collaborating institute: Agricultural University of Norway (NLH)
Supervisors: Ingibjörg S. Jónsdóttir (UNIS), Ørjan Totland (NLH)



PHOTO: ELISABETH COOPER

The FRAGILE project was shown on Swedish TV in September.

Arctic Geology

HANNE HVIDTFELDT CHRISTIANSEN

The Department of Arctic Geology is organised around four main areas of teaching and research: Pre-Quaternary Geology, Quaternary Geology, Marine Geology and Physical Geography. In 2003 the Department formulated a new research vision connecting these four scientific main fields. The prime focus of this vision is the recognition that Svalbard, its fjords and adjacent shelf, offer an excellent opportunity to study a wide range of landforms, processes and sediments, related to the development and infill of sedimentary basins. As a terrestrial outcrop on the Barents Shelf, we have complete 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.

In 2003 the Department offered 11 courses; five at 200 level (undergraduate) and six at the 300 level (graduate). The undergraduate courses, making up the one-year 64 ECTS study programme, were offered in their present form for the tenth year in succession. The six 300 level courses, each lasting 2-5 weeks, were offered to masters and doctoral candidates with a total of 45 ECTS. A statistical average of 12.6 students attended each course. The total output of the Department in 2003 was 1346 ECTS.

Our academic staff numbers four full-time faculty and four adjunct positions. Professor Ole Humlum, Professor Olafur Ingolfsson and Associate Professor Ida Lønne all finished their UNIS tenure periods in the summer and autumn 2003. As the new physical geographer, Associate Professor Hanne H. Christiansen, University of Oslo, started in September 2003. Both the Quaternary geologist and the Pre-Quaternary geologist positions were announced in 2003. Dr. Gary Nichols, Royal Holloway University of London, was appointed to the latter position in December 2003, and will start his professorship in mid-year 2004. At the end of 2003 we had still not appointed the new Quaternary geologist.

In the autumn 2003 two new adjunct professors were taken appointed. One, Olafur Ingolfsson of the University of Iceland, in Quaternary Geology. The other, Ole Humlum, of the University of Oslo, in Physical Geography. This is the first time that the Department has appointed adjunct professors in Quaternary Geology and Physical Geography, and reflects the increasing amount of supervision of master's students and courses being given in these subjects at UNIS. The appointment of former UNIS staff in the adjunct capacity shall help

ensure the continuity of courses and research at the Department.

In summer 2003 Dr. Angélique Prick from Belgium completed her two-year Marie Curie Fellowship funded by the European Commission. In a cooperative project with the University of Gothenburg and in collaboration with the Universities of Stockholm and Alberta, Sofia Holmgren continued working on her Ph.D. project on Late Glacial and Holocene climate and environmental variability on Svalbard. Marta Anna Slubowska, who in 2002 received a scholarship to pursue doctoral studies at UNIS, continued work on her research project in Marine Geology. Another postgraduate student, Siri Hansen from the University of Copenhagen, visited the Department for three months to attend two UNIS level 300 courses. Siri is a collaborating UNIS postgraduate working on a Ph.D. project on surging glaciers in the North Atlantic.

During the year, therefore, the Department experienced quite extensive staff changes, but gained new professional competence. However, our guest lecturers still remain a vital resource for implementation of the broad range of courses we offer. Guest lecturers are also regular partners in our ongoing scientific projects. The close contact with visiting lectures is also of great value to our students, who in this way have a close association with research conducted on Svalbard and elsewhere in the Arctic.

During 2003, staff at the Department of Geology was actively engaged in several research projects. A number of projects were continued from the previous year and several new projects were initiated, as can be seen from the list of research projects in this report, as well as from supplementary information available on the Department's UNIS website. Some examples of ongoing research at the Department are briefly outlined below.

Research in Arctic Marine Geology focuses on high-resolution marine core studies from Svalbard fjords (Storfjorden and Isfjorden), and the west and southwest shelf and slope areas. Svalbard is situated at the northernmost extent of the North Atlantic Drift derived from the Gulf Stream system, which is responsible for the relatively mild climate in northern and western Europe. Even small variations in the flow of warmer surface water are expected to have a large effect on regional climates and environments.

Palaeoceanography, palaeoclimatology and sedimentary processes of the Svalbard



PHOTO: MARTA SLUBOWSKA

Mediumfjellet (Medium Mountain), Western Spitsbergen, exhibits Permian (ca. 245-290 Ma years ago) strata and Cretaceous (65-145 Ma years ago) strata in which Tertiary thrusting and folding occurred. The opening of the North Atlantic Ocean and changes in the continental plate configuration caused that Svalbard and Greenland were pressed oblique against each other during Early Tertiary. Svalbard was exposed to high pressure from the west, which resulted in intense folding and thrusting, seen in the mountain chain along the western coast of Svalbard.

margin is investigated for the last 40,000 years to better understand the processes behind climate and environmental changes in the geological and historical past. The ice rafting, palaeocirculation and deep-water formation history of the Svalbard west slope are studied in relation to millennial scale climate change, as recorded in the Greenland ice-sheet cores. The outer Storfjorden and the Storfjorden Fan are investigated with the purpose of studying the history of brine formation in the past 20,000 years in relation to climate and oceanographical changes. Preliminary results show that brine formation occurred during deglaciation, but stopped during the Holocene Climatic Maximum. Brine formation intensified again during the Late Holocene.

The Holocene climate and paleoceanographical development are being studied as part of the Ph.D. project which Marta A. Slubowska started in 2002. High-resolution cores from the northern and western Svalbard continental shelf form the basis of the study. Results indicate high oceanographic and climatic variability throughout the Holocene interglacial and a pronounced cooling, and an increase in iceberg debris rafting and freshening of water masses during the Late Holocene.

Research on ice-wedge dynamics and palaeoenvironmental reconstruction based

on ice veins from ice-wedges was extended in 2003. A study site was instrumented in central Adventdalen for continuous thermal cracking observations by miniature shock and vibration data loggers inserted directly into the ground above the ice-wedges. Additionally, manual measurements of distances across ice-wedges and inside polygons, daily automatic digital photography of the site for snow-cover depth and distribution studies are carried out and ground thermal conditions are registered for gaining a better understanding of the processes of thermal contraction cracking. In only a few other places in the Arctic have such detailed data on ice-wedge dynamics been collected so far. Oxygen isotope analyses of ice veins from profiles across ice-wedge are being conducted in combination with ¹⁴C AMS dating of organic material also from the ice veins, to study the potential of using this combination of methods for detailed palaeoenvironmental reconstruction.

The avalanche-related research initiated in 2001 was continued, making use of frequent field investigations, daily automatic digital photography and automatic meteorological stations, to map snow-cover variations in the landscape around Longyearbyen. This project was prompted by a tragic event in February 2001, when a snow avalanche near Longyearbyen killed two persons. The



Large avalanche crossing the snowmobile track in upper Bødalen spring 2003.

PHOTO: HANNE CHRISTIANSEN

extensive mountain plateaus around Longyearbyen act as source areas for drifting snow during the winter, and this redistribution of precipitation has significance for avalanche activity and other phenomena, such as glacier mass balance. In 2003 this project was extended by establishing debris traps in avalanche fan areas above Larsbreen to quantify sediment transport by avalanches.

On a more local scale, the thickness of the snow-cover is also important for ground temperatures due to the insulating effect, thereby influencing the ground temperature and the thickness of permafrost. Also the plant cover is influenced by the thickness and duration of the snow-cover, both during winter where the snow-cover protects the ground from physical wind abrasion and low temperatures, and during the growing season where surviving snowpatches act as water reservoirs. A modelling research initiative (snow-cover, permafrost thickness, active layer, growing degree days, etc.) is carried out utilising results derived from this field-based project.

In a cooperative project between the Departments of Geology and Biology at UNIS, a lake monitoring programme was continued in 2003. The aim of the programme is to observe and quantify different physical and biological processes operating in and around Svalbard lakes, to improve the understanding of the present lake environment. Processes monitored include air, ground and water temperatures, vegetation cover and communities, productivity, snow-cover and lake ice-cover. The first year of observations in this project were collected in 2003.

An interdepartmental UNIS project between Geology and Technology on borehole temperature monitoring was initiated in 2003. An old borehole drilled in 1988 next to the Aurora Station in Adventdalen will be investigated in this project. Thermistors will be installed in the 10 m deep liquid-filled borehole in early 2004, to allow comparison with ground temperature registration from other shallow, but dry, boreholes close by.

In summer 2003 Post. Doc. Angeliq Prick completed her EU-funded intensive research programme on rock weathering in high-latitude environments started in 2001. Frost weathering of bedrock is highly important in permafrost environments. As a study topic it has occupied scientists from many research institutes for at least a century, both in the field and in the laboratory. The mechanism involved in frost shattering was initially thought to be the dilation of freezing water, but this process requires a very high saturation level in order to induce a shattering effect. New experimental results indicate that cryogenic suction is the mechanism that is most likely to be effective in the temperature and moisture conditions that occur in natural environments, as the water content levels that commonly occur in nature are far from complete saturation. Near Longyearbyen a detailed research programme on rock weathering, rock temperature and rock moisture was carried out at a site that is daily accessible on a year-round basis, making high frequency observations possible.

During the year the Department of Geology was proud to house the Secretariat of the International Permafrost Association (IPA), under the leadership of Hanne H. Christiansen. In the IPA's Council Meeting in 2003, Norway was asked to keep the International Permafrost Secretariat for the five-year period ending 2008. It was pointed out how appropriate it would be for the function to be performed at UNIS, an institution that is itself standing on permafrost.

Masters degree students at the Department of Geology studied a wide range of issues related to snow distribution in the landscape and its relation to the distribution of glaciers, permafrost, the meteorological control on avalanches, glacial geomorphology at a surge-type glacier, the dynamics of surge-type glaciers, the geomorphic impact of snowmobiles, and the thermohaline ocean circulation and its control on sedimentation in the sea. A full list of these M.Sc projects is given below.

Research Projects

Arctic Geology 2003

Title: NORD-LINK: Linking Land and Sea around the Faeroe Islands and Svalbard
Collaborating institutions: Geological Survey of Denmark and Greenland, Faroese Museum of Natural History
Financing: The Nordic Council of Ministers, program NARP (Nordic Arctic Research Programme 2003-2004)
Duration: 2002-2003
UNIS: Ole Humlum, Tine L. Rasmussen

Title: Mapping snow cover duration, avalanches and other geomorphic processes by automatic digital cameras, Longyeardalen, Svalbard
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: Monitoring surface climate and active layer temperatures in various landforms around Longyearbyen, Svalbard
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: Isotopic composition of modern precipitation in Longyearbyen, Svalbard
Collaborating institutions: Niels Bohr Institute, University of Copenhagen
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: Modeling energy balance, surface temperatures, active layer depth and permafrost thickness around Longyeardalen, Svalbard
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: Monitoring surface climate and active layer temperatures in various landforms around Longyearbyen, Svalbard
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: The climatic and palaeoclimatic significance of rock glaciers
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: Late Weichselian ice sheet dynamics in the coastal regions of western and northern Spitsbergen.
Collaborating institutions: Norwegian Agricultural University (NLH), University of Tromsø.
Financing: UNIS
Duration: 1999-2003
UNIS: Ólafur Ingólfsson

Title: Late Quaternary glacial history of Severnaya Zemlya, Arctic Russia
Collaborating institution: Göteborg University, Lund University, Institute of Arctic and Alpine Research at University of Colorado, University of Illinois at Chicago (USA)
Financing: Swedish Natural Sciences Research Council, Swedish Polar Research Secretariat, National Science Foundation (USA), UNIS
Duration: 1999-2003
UNIS: Ólafur Ingólfsson

Title: Monitoring annual changes in environmental variables (snow cover, lake-ice cover, vegetation, snow-melting, runoff and temperature (air, ground, lake-water) at two sites on V-Spitsbergen, for creating a baseline for calibrating and evaluating earlier, present and future environmental changes.
Collaborating institution: Department of Geology and Department of Biology, UNIS
Financing: UNIS
Duration: 2002-2004.
UNIS: Ólafur Ingólfsson, Ingibjörg S. Jónsdóttir

Title: Sediment transport during and after the last deglaciation and its effect on the development of a high-arctic arid landscape, Svalbard
Collaborating institutions: University of Bergen
Financing: UNIS
Duration: 1997-2003
UNIS: Ida Lønne

Title: The dynamics of marine glacier termini as read from moraine architecture
Collaborating institutions: University of Bergen
Financing: UNIS
Duration: 1999-2003
UNIS: Ida Lønne

Title: Rock weathering in high latitude environments
Collaborating institution: European Commission
Financing: European Commission (Marie Curie Fellowship)
Duration: 2001-2003
UNIS: Angélique Prick

Title: Temporal and spatial variations in circulation of deep and intermediate water masses in the North Atlantic region since 150 kyr BP.
Collaborating institution: Woods Hole Oceanographic Institution (WHOI), Aarhus University, Geological Survey of Denmark and Greenland (GEUS), Rostock University, Germany, University of Bergen.
Financing: UNIS
Duration: 1999-
UNIS: Tine L. Rasmussen



PHOTO: HANNE CHRISTIANSEN

Students studying aerial photographs.

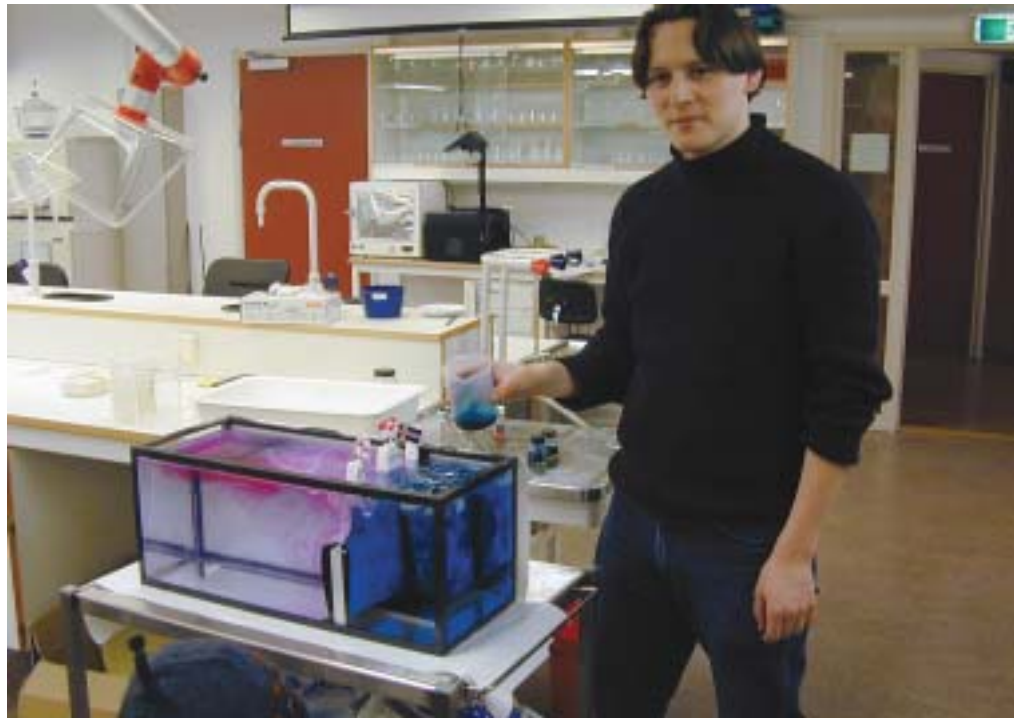


PHOTO: HANNE CHRISTIANSEN

A small-scale laboratory model demonstrating the large-scale Thermo Haline Circulation.

Title: Living (Rose Bengal stained) and fossil foraminifera from Storfjorden area, Svalbard: reconstruction of the Recent and Late Holocene history of brine formation.

Collaborating institutions: Norwegian Polar Institute

Financing: UNIS

Duration: 2002-2005

UNIS: Tine L. Rasmussen, Marta A. Slubowska

Title: Glacial history and glacial landforms, processes and sediments; Vestre and Austre Brøggerbreen, Brøggerhalvøya, Oscar II Land, Svalbard

Collaborating institutions: University of Copenhagen, Denmark

Student: Anders Schomacker

Supervisors: Ole Humlum (UNIS), Johannes Krüger (University of Copenhagen, Denmark)

Finished: Spring 2003

Title: Sea level control on turbidite accumulations, the Battfjellet formation

Collaborating institution: University of Bergen, University of Wyoming

Financing: WOLF-consortium

Duration: 1995-2003

UNIS: Ronald Steel

Graduate students 2003

Dr. students/Ph.D.

Title: Late Glacial and Holocene climate and environmental variability on Svalbard

Collaborating institutions: Göteborg University, Sweden, Stockholm University, University of Alberta, Canada

Student: Sofia Holmgren

Supervisors: Ólafur Ingólfsson (UNIS), Barbara Wohlfarth (Stockholm University)

Graduates 2003

Cand.scient

Title: Glacier dynamics at Höganessbreen, Svalbard

Collaborating institutions: University of Oslo (UiO), Store Norske Spitsbergen Grube Kompani

Student: Thomas Chareyron

Supervisors: Ole Humlum (UNIS), Jon Ove Hagen (UiO)

Finished: Spring 2003

Title: Mass balance characteristics of debris mantled glaciers

Collaborating institutions: University of St. Andrews, Scotland

Student: Lindsey Nicholson

Supervisors: Ole Humlum (UNIS), Doug Benn (University of St. Andrews, Scotland)

Title: Paleooceanography and sediment variations in relation to climate change: A marine core study from the Svalbard margin.

Collaborating institutions: Norwegian Polar Institute, University of Tromsø

Student: Marta Anna Slubowska

Supervisors: Tine Rasmussen (UNIS) and Nalan Koç (Norwegian Polar Institute)

Title: Geomorphological implications and the impact of climate changes on the dynamics of surging glaciers in the North Atlantic Regions - with examples from western Greenland and Svalbard.

Collaborating institutions: University of Copenhagen

Student: Siri Hansen

Supervisors: Ole Humlum (UNIS), Johannes Krüger (University of Copenhagen)

Cand. scient./Master students

Title: The oxygen isotope stratigraphy of Longyearbreen, Svalbard

Collaborating institutions: University of Bergen (UiB)

Student: Åse Hjetland Bringedal

Supervisors: Ole Humlum (UNIS), Atle Nesje (UiB)

Title: Lille Istids Maksimum i Van Keulenfjorden; deglasiasjonsdynamikk og sedimentasjon under tilbaketrekingen

Collaborating institutions: University of Oslo (UiO)

Student: Marit Carlsen

Supervisors: Ida Lønne (UNIS), Jon Ove Hagen (UiO)

Title: Climatic control on snow avalanches in central Spitsbergen, Svalbard

Collaborating institutions: University of Copenhagen

Student: Jonas Ellehaug Hansen

Supervisors: Ole Humlum (UNIS), Hanne H. Christiansen (University of Copenhagen)

Title: The Geomorphic impact of snowmobiles around Longyearbyen, Svalbard

Collaborating institutions: Lund University

Student: Malin Elisabeth Persson

Supervisors: Ole Humlum (UNIS), Jonas Åkerman (Lund University)

Title: Permafrost investigations in arctic and mountain environments

Collaborating institutions: University of Innsbruck

Student: Anja Fleig

Supervisors: Arne Instanes (UNIS), Ole Humlum (UNIS) and Johan Stötter (University of Innsbruck)

Title: Mapping of dominant wind directions with emphasis on the influence of wind upon orientation of glaciers and snowdriftforms.

Collaborating institutions: University of Bergen

Student: Torger Natvig Holen

Supervisors: Ole Humlum (UNIS), Atle Nesje (UiB)

Title: Periodical subduction of the Atlantic layer. A concept for climatic fluctuations on centennial to millennial scale during last glaciation?

Collaborating institutions: University of Copenhagen

Student: Simon Jessen

Supervisors: Tine Rasmussen (UNIS), Christian Christiansen (University of Copenhagen)

Title: Geological studies in the Ispallen-area with emphasis on the Todalen-Member of the Firkanten formation.

Collaborating institutions: LMU München

Student: Malte Jochmann

Supervisors: Ron Steel (UNIS), Sverre Ola Johnsen (NTNU), Bernd Lammerer (LMU München)



PHOTO: ERIK THOMSEN AND TINE L. RASMUSSEN

The planktic foraminifera Neogloboquadrina pachyderma d (right coiling form) is a warm water species. Photo shows dorsal side.



PHOTO: ERIK THOMSEN AND TINE L. RASMUSSEN

The planktic foraminifera N. pachyderma s (left coiling form) is a cold water species. Photo shows ventral side.

Arctic Geophysics

LARS R. HOLE



PHOTO: FRANK NILSEN

Ragnheid Skogseth defending her thesis at UNIS on 25th September 2003.

The Arctic Geophysics Department specialises in four fields of teaching and research: Oceanography, Meteorology, and Middle and Upper Polar Atmospherics. Hence we cover the vertical column from below the sea to the solar wind in near space. Our emphasis is on Polar geophysical phenomena with global implications, such as ocean currents, weather systems, and atmospheric radiation. Four full professorships cover the specialist fields. In 2003 there were five adjunct professors in 20 per cent positions in Meteorology, Oceanography, Middle Atmospherics, and Upper Atmospherics (two positions). Andøya Rocket Range funds the second adjunct professor in Upper Atmospherics. In 2003 Lars R. Hole replaced Yngvar Gjessing as our Meteorology associate. Anna Sjøblom functioned as associate professor in Meteorology in the autumn term while Hole took paternity leave. The Department had nine doctoral fellows and eight master's students doing their research at UNIS during the year. Three master's students completed their theses, while one doctoral fellow (Ragnheid Skogseth) held her disputation at UNIS. Our Department has been accredited as a Madam Curie Training Site by the European Commission, and three of our Ph.D students were Madam Curie fellows.

Teaching

We currently offer six undergraduate and four postgraduate courses. One postgraduate course counts for 9 ECTS whereas all other courses count for 15 ECTS credits. Courses are aimed at students with a background in Geophysics, and introduce them to processes and theories related to the Arctic environment. Fieldwork is an important element in the teaching, and students get hands-on experience in instrument operation, data collection, and analysis of field data.

Research

Our Department pursues a broad range of Arctic research. We supervise daily operations at the Auroral Station in Adventdalen. This optical research station has 25 instruments and engages 17 collaborating institutions from eight different countries. Research focus is on plasma physics processes in the ionosphere and magnetospheric boundary processes, combined with temperature measurements in the mesosphere.

The Auroral Station suffers from increased light pollution, an outdated building, and limited space to accommodate new instrumentation. A building program for the

new Auroral Station was drawn up in 2003 by the Norwegian Directorate for Public Construction and Property (Statsbygg), but funding for the construction has not yet been appropriated. A petition for construction start-up is now being evaluated by the Ministry of Education and Research. With the increasing international interest in optical ground-based research of the mesosphere, ionosphere and magnetosphere, coupled with satellite data, EISCAT radars and rocket launches, there is a unique opportunity to study important processes in the upper atmosphere, and see how these processes are coupled with energy transfer from the Sun via solar winds to the Earth. A new Auroral Station would greatly improve the infrastructure for this type of research on Svalbard.

In 2003 we hosted the 30th Annual European Meeting on Atmospheric Studies by Optical Methods, a meeting that drew 50 delegates and lasted for five days. The conference included sections on aurora, ionosphere and magnetosphere; new instrumentation; mesosphere and related phenomena; stratosphere and related phenomena, as well as a special section for the 25-year anniversary of the Auroral Station in Adventdalen. Conference proceedings are now being published.

Mesospheric temperature logs have been kept at the Auroral Station for almost 25 years, constituting one of the longest time series in the world for this type of measurement. Quality assurance on the readings, as well as analysis of the data, is carried out at UNIS. Temperature records are important both in a global context, and for our understanding of the interaction between the upper and middle atmosphere. In this connection we actively use data from the SOUSY radar located near Longyearbyen, and the LIDARs situated at the Koldewey Station in Ny-Ålesund. One MINI Dusty rocket payload is being put together in cooperation with the Auroral Observatory, University of Tromsø. The rocket will be launched as soon as rocket motors become available. In addition, a small dual channel spectrograph have been designed and tested in cooperation with the Auroral Observatory and the Fisheries Institute in Tromsø. The instrument is intended to be part of the MINI Dusty payload.

A new generation of spectral imagers has been developed at the Geophysics Department. The instruments detect spectral signatures of any target at high spectral and spatial resolution. Two of the units are used by the Fisheries Institute in Tromsø, and at

Research vessel *Lance* from the Norwegian Polar Institute is used by UNIS on scientific cruises. Here it is moored to an ice floe in the Fram Strait, May 2003. Students are at work on the ice.



PHOTO: LARS R. HOLE

the Institute of Physics in Lhasa, Tibet. The Geophysics Department has conducted several airborne campaigns in order to identify possible applications. The classification of ice, melt water, vegetation, etc., provide a few of the potential uses. A new version of these spectral imagers with a faster frame rate (25 fps) has been constructed in cooperation with Statoil for airborne classification of bedrock layers on Svalbard. Also, as a consequence, Inertial Navigation Systems are being developed. One of these systems has been successfully tested aloft. The aim is to be able to apply geometrical corrections to the data from the spectral imagers, and to map the result onto a terrain model.

The Geophysics Department has initiated a joint venture combining the efforts of the Technical University of Berlin with the Norwegian Space Agency and SVALSAT to use and operate the DLR-TUBSAT satellite. This microsatellite is designed for interactive earth observation where the target is not clearly identified in advance. Preliminary tests from SVALSAT have been performed to download data from the satellite in polar orbit and a command station has been installed at UNIS to control the attitude.

Doctoral student Magne A. Drage studies accretion and precipitation icing on structures located in complex terrain. We are collecting data from two locations: Gaustadtoppen (1800 m), a mountain in the central Norwegian highlands; and Brosviksåta (900 m), situated on the west coast of Norway. He has installed instrumentation to monitor atmospheric turbulence and ice loads on a cylindrical structure. TV cameras monitor the icing process.

The main objective of doctoral student Alexei Stuliy's work is to estimate wind speed, wind stress, thermal stability factors and

other important geophysical parameters from ERS-2 and ENVISAT satellites. During the year, Alexei Stuliy has mainly been working on data collected during a ten days experiment in September 2003. The data consists of both ground based in-situ measurements of meteorological parameters and remote sensed microwave space borne satellite imagery, i.e. vertically polarized (VV) C-band Synthetic Aperture Radar (SAR) imagery from ERS-2 and Envisat satellites. The remotely sensed data will be compared against the ground based measured in-situ data. The accuracy of remotely measured turbulent fluxes will be estimated and the impact of operational and theoretical constraints will be investigated. From 25th to 27th July, UNIS arranged an International Conference on "Climate Change Research in the Arctic – Future Challenges", with the then Minister of Education and Research in Norway, Ms Kristin Clemet, as the official host. The conference attracted eminent scientists from a variety of scientific fields as well as high-level policy makers, and resulted in valuable input to our common understanding of research challenges and the need for policy measures. Our own Frank Nilsen represented UNIS on the Scientific Steering Committee and Marianne Hatlestad acted as Conference Secretary.

The Department takes part in studies of mass exchange and variability in the North Atlantic and Arctic Oceans. Focus is on seasonal and other variations in water exchange between the Norwegian Sea, Greenland Sea, Arctic Ocean and contiguous sea areas. Øyvind Leikvin defended his master's thesis "Currents and Water Mass Fluxes between Franz Josef Land and Novaya Zemlya 1991-1992" in September.

Another project is "Polar Ocean Climate Processes (ProClim)". In order to understand

and predict large-scale ocean climate variability, one needs to take into account a number of mesoscale and small scale processes controlling how properties (such as heat, salt, momentum, nutrients, trace elements) are being transferred throughout the system. Three major regions can be distinguished in the geographical area covered by the Polar Climate Program: the continental shelf, the continental slope and deep ocean basins. The regions are reflected in the first three work packages in the project. In deep basins (1) deep convection in regions of weak vertical stratification leads to the formation of deep and intermediate waters, which are the main constituents of the Greenland-Iceland-Scotland overflows and ultimately of the North-Atlantic deep-water faction. The focus on shelves mainly concentrates on brine-enriched water (2) resulting from sea-ice formation in coastal polynyas and along topographically influenced fronts and ice edges. Interactions between shelves and deep basins are manifested in cross-slope exchanges (3) involving slope convection and cascading. Our new Post Doc in Oceanography, Dr. Ragnheid Skogseth, will mainly focus on work package 2 and use Storfjorden as a laboratory for her observations and modelling trials.

In November and December, for the first time lectures in AGF-311 *Air-Ice-Sea Interaction II* were given at UNIS. Our 13 postgraduates passed the examination with flying colours. The course objectives were based on data gathered in Skogseth's Ph.D work and the accompanying scientific cruise and data collection therefore took place in an ice-covered Storfjorden.

A project financed by the Norwegian Research Council on "*Atmosphere-Ice-Ocean Interaction Studies (AIO)*" in January 2003 was undertaken by doctoral student Karolina Widell, who could apply state-of-the-art turbulence instrumentation. The project's overall objectives are to provide a rigorous basis for selected sea-ice related aspects of climate hypotheses, by the use of controlled field experiments using the Svalbard fjords as a natural laboratory, and to improve Norwegian capabilities in sea-ice interaction research by engaging US expertise and instrumentation in joint experimentation, and lastly by the exchange of research fellows. Van Mijenfjorden and Kongsfjorden were chosen as the observation sites. In November, Anders Sirevaag defended his master's thesis on "*Turbulence and Heat Exchange Below the Ice*" using data collected in this project.

Ragnheid Skogseth defended her thesis on "*Dense Water Production Processes in Storfjorden*" on 25th September, in the process becoming the first female student to do so at UNIS. The thesis examines the processes involved in production of dense, saline and cold deep-water in Storfjorden (Svalbard). Production of deep-water is important in order to maintain the thermohaline circulation and to feed the deep oceans with oxygen. Temperature and salinity observations are used to describe seasonal changes of water masses in Storfjorden. From observations of such parameters as wind and air temperature, the sea-ice growth can be modelled each winter. Afterwards, the modelled ice production is used to estimate the resulting production of cold, saline deep-water in Storfjorden. The accompanying dense bottom gravity current across the shelf break is observed and mapped with the emphasis on transport and mixing properties. Storfjorden may supply up to 20 per cent of the deep-water contribution from coastal polynyas in the Arctic. Interannual variability is linked to regional ice-cover, ice transport and salinity profile (stability of the water column). Some connection to the large-scale atmospheric circulation in the North-Atlantic (NAO) is also found.

Research into processes in the coastal and fjordal areas of Spitsbergen has continued in 2003. During the scientific cruise in unit AGF-214 Polar Ocean Climate, measurements of temperature and salinity were conducted in three different fjord systems along Western Spitsbergen: Van Mijenfjorden, the Isfjorden system, and the Kongsfjorden system. In all these fjord systems, and especially the Isfjorden system, the water temperature was 3-4 degrees colder than in previous years. These water masses were not only colder, but also fresher than hitherto, and their salinity suggested that less Atlantic water had penetrated into Isfjorden. Ongoing research projects are trying to explain the mechanisms behind the flow of Atlantic water into the fjord systems and why it might differ from year to year. When, in August, Elin Darelius defended her master's thesis on "*Circulation and Water Mass Formation in an Arctic Fjord*", she relied on these data. Since then, Sara Mattsson has continued the study under the working title "*Why Is There No Ice on Isfjorden?*"

The institution's collaborative project with mining company Store Norske Spitsbergen Kullkompani continued in 2003. The principal interests are ice thickness distribution and historical time series of the ice-cover in Van Mijenfjorden.



PHOTO: LARS R. HOLE

Students in AGF 212 learn how to measure turbulent fluxes of heat and momentum over the drift ice in the Fram Strait, May 2003.

Research Projects Arctic Geophysics 2003

Title: Monitoring Atlantic inflow north of Svalbard

Collaborating institutions: University of Bergen (UiB)

Financing: UNIS, UiB

Duration: 1999-

UNIS: Tor Gammelsrød, Frank Nilsen

Title: Dense water production processes in Storfjorden

Collaborating institutions: University of Bergen

Financing: Norwegian Research Council

Duration: 2000-2003

UNIS: Tor Gammelsrød, Ragnheid Skogseth

Title: Atmospheric accretion and icing

Collaborating institutions: University of Bergen, Norwegian Defence Construction Service

Financing: Norwegian Defence Construction Service, Norkring, Statnet, Telenor

Duration: 2001-2004

UNIS: Yngvar Gjessing, Magne Andersen Drage

Title: Mass balance and climate on glaciers in Iceland

Collaborating institutions: University in Iceland

Financing: University in Iceland, UNIS, University of Bergen

Duration: 2000-2004

UNIS: Yngvar Gjessing, Ola Brandt, Peter Schelander, Kaisa Halkola

Title: Environmental research in Tibet

Collaborating institutions: Meteorological Bureau Lhasa, University of Bergen

Financing: Norwegian Foreign Ministry, Norwegian Agency for Development Cooperation

Duration: 1995-2006

UNIS: Yngvar Gjessing, Helen Flå

Title: Study of snow storage around buildings and deposition of ice on constructions at Melkøya.

Collaborating institutions: Barlindhaug, University of Bergen (UiB)

Financing: Barlindhaug

Duration: 2001-2002

UNIS: Yngvar Gjessing, Magne A. Drage.

Title: Protonics

Collaborating institutions: University of Alaska, Fairbanks (UAF)

Financing: UAF, UNIS

Duration: 2001-

UNIS: Dag A. Lorentzen

Title: Auroral substorm and the magnetospheric boundary layer

Collaborating institutions: University of Oslo

Financing: UNIS

Duration: 2001-

UNIS: Dag A. Lorentzen

Title: Polar airglow patch investigation

Collaborating institutions: Univ. of Alaska, Fairbanks

Financing: UNIS

Duration: 2002-

UNIS: Dag A. Lorentzen

Title: SERSIO rocket campaign

Collaborating institutions: National Aeronautics and Space Administration (NASA), UNIS, University of Oslo, EISCAT

Financing: NASA, UNIS

Duration: 2004 –

UNIS: D.A. Lorentzen, Fred Sigernes

Title: TARGIT EISCAT

Collaborating institutions: University of Oslo, UNIS, EISCAT

Financing: Norwegian Research Council

Duration: 2003 –

UNIS: D.A. Lorentzen

Title: Studies of small scale wind pattern by use of remote sensing

Collaborating institutions: University of Bergen, Technical University of Denmark

Financing: UNIS

Duration: 2002-2005

UNIS: Frank Nilsen og Yngvar Gjessing

Title: Measured and modelled tidal circulation under ice covered Van Mijenfjorden

Collaborating institutions: Institute of Marine Research

Financing: UNIS

Duration: 2001-

UNIS: Frank Nilsen

Title: Isdannelse og isvekst i Van Mijenfjorden

Financing: Store Norske Spitsbergen Kulkompani, UNIS

Duration: 2001-

UNIS: Frank Nilsen, Knut Wilhelm Høyland

Title: Is og tidevanns påvirkning på nytt kaikonsept i Longyearbyen

Financing: Svalbard Samfunnsdrift (SSD), UNIS

Duration: 2003-

UNIS: Frank Nilsen, Knut Wilhelm Høyland

Title: Why is there no ice on Isfjorden?

Financing: UNIS

Duration: 2003-

UNIS: Frank Nilsen, Sara Mattsson

Title: Long-time variation in the Svinøy section
Collaborating institutions: University of Bergen, Norsk Hydro
Financing: Norsk Hydro
Duration: 2000-2003
UNIS: Frank Nilsen

Title: Atlantic water in Spitsbergen fjords: How instability processes in the West Spitsbergen current influence fjord ecosystems
Collaborating institutions: University of Bergen, Norwegian Polar Institute
Financing: UNIS
Duration: 2001-
UNIS: Frank Nilsen

Title: Objectiv analysis applied on mapping oceanic and atmospheric scattered data
Financing: UNIS
Duration: 2001-
UNIS: Frank Nilsen, Ingo Bethke

Title: Atmosphere / Ice / Ocean interaction studies (AIO)
Collaborating institutions: University of Bergen, University of Washington, McPhee Research Company, Norwegian Polar Institute
Financing: Norwegian Research Council
Duration: 2001-2006
UNIS: Frank Nilsen, Karolina Widell

Title: The ecological effects of climate fluctuations and change: A multi-disciplinary and integrated approach
Collaborating institutions: University of Oslo, Norwegian Institute of Natural Research, Institute of Marine Research, University of Iowa, National Center of Atmospheric Research
Financing: Norwegian Research Council
Duration: 2001-
UNIS: Frank Nilsen, Rolf Langvatn

Title: Polar Ocean Climate Processes (Pro-Clim)
Collaborating institutions: The Bjerknes Centre for Climate Research
Financing: Norwegian Research Council
Duration: 2002-2006
UNIS: Frank Nilsen, Ragnheid Skogseth

Title: Monitoring of OH rotational temperatures in the mesosphere
Collaborating institutions: University of Alaska (UAF), Embry-Riddle
Financing: UAF, UNIS, Embry-Riddle, Max Planck Institute
Duration: started in 1980 -
UNIS: Fred Sigernes

Title: Imaging spectroscopy by plane
Financing: UNIS
Duration: 1998-
UNIS: Fred Sigernes

Title: Proton precipitation on the dayside
Collaborating institutions: University of Alaska (UAF)
Financing: UAF, UNIS
Duration: 1998-
UNIS: Fred Sigernes, Dag A. Lorentzen

Title: Multiplatform observatories of the polar middle and upper atmosphere at the Auroral Station (campaigns)
Collaborating institutions: The Auroral Station and its partners. See haldde.unis.no
Financing: Multiple institutions
Duration: 1993-
UNIS: Fred Sigernes, Dag A. Lorentzen

Title: Rocket-instrumentation
Collaborating institutions: University of Tromsø (UiT)
Financing: UiT, UNIS
Duration: 2000-
UNIS: Fred Sigernes

Title: Imaging spectroscopy of Spitsbergen mountain rocks
Collaborating institutions: Statoil
Financing: UNIS, Statoil
Duration: 2001-
UNIS: Fred Sigernes

Graduates 2003 Dr. scient/PhD.

Title: Dense water production processes in Storfjorden
Collaborating institutions: University of Bergen (UiB)
Student: Ragnheid Skogseth
Supervisors: Tor Gammelsrød (UiB/UNIS)

Cand.scient./Master

Title: Currents and water mass fluxes between Novaya Zemlja and Franz Josefs Land 1991-1992
Collaborating institutions: University of Bergen
Student: Øyvind Leikvin
Supervisors: Tor Gammelsrød (UNIS/UiB), Frank Nilsen (UNIS)
Finnished: Autumn 2003

Title: Water mass formation and circulation in an Arctic fjord
Collaborating institutions: University of Bergen
Student: Elin M. Darelius
Supervisors: Frank Nilsen (UNIS), Peter Haugan (UiB)
Finnished: Autumn 2003

Title: Turbulence and heat exchange under ice
Collaborating institutions: University of Bergen
Student: Anders Sirevaag
Supervisors: Frank Nilsen, UNIS, Peter Hauge, UiB
Finished: Autumn 2003

Graduate students 2003 Dr. students/Ph.D.

Title: Atmospheric accretion and icing
Collaborating institutions: University of Bergen, Norwegian Defence Construction Service
Student: Magne Andersen Drage
Supervisors: Yngvar Gjessing (UNIS/UiB)

Title of project: UV modelling and validation of UV models for Tibethian Plateau
Collaborating institutions: University of Bergen (UiB)
Student: Norsang Gelsor
Supervisors: Fred Sigernes (UNIS), Jakob Stamnes (UiB)

Title: Snow metamorphosis and distribution in Finland
Collaborating institutions: University of Helsinki
Student: Tari Oksanen
Supervisors: Yngvar Gjessing (UNIS), Matti Leppäranta (University of Helsinki)

Title: Investigation of the reconnection rate at the subsolar point using EISCAT Svalbard radars and Optical data
Collaborating institutions: University of Tromsø (UiT)
Student: Nikita Shumilov
Supervisors: Fred Sigernes (UNIS), Dag Lorentzen (UNIS), Asgeir Brekke (UiT/UNIS)

Title: Inferring ADL turbulence properties from the SAR imagery
Collaborating institutions: University of Bergen
Student: Alexei Stuliy
Supervisors: Frank Nilsen (UNIS), Yngvar Gjessing (UNIS/UiB)

Title: Optical classification of ocean colour.
Collaborating institutions: Norwegian University of Science and Technology
Student: Zsolt Volent
Supervisors: Fred Sigernes (UNIS) and Geir Johnsen (NTNU)

Title: Atmosphere/ice/ocean interaction studies
Collaborating institutions: University of Bergen
Student: Karolina Widell
Supervisors: Frank Nilsen (UNIS) and Peter Hauge (UiB)

Cand. scient./Master students

Title: Bruk av satelitt data for å besvare følgende spørsmål: Har breenes massebalanse i Tibet forandret seg?
Collaborating institutions: University of Bergen
Student: Caidong Caidong
Supervisors: Yngvar Gjessing (UNIS), Knut Barthel (UiB)

Title: Measured and Modelled Tidal Circulation under Ice Covered Van Mijenfjorden
Collaborating institutions: Göteborg University
Student: Jon Bergh
Supervisors: Frank Nilsen (UNIS), Anders Stigebrandt (Göteborg University)

Title: ESR study of the ionospheric through region
Collaborating institutions: University of Oslo
Student: Åsmund Skjæveland
Supervisors: Dag Lorentzen (UNIS), Herbert Carlson og Jøran Moen (UiO)

Title: Meteorological Factors and Snowdrift effect on glacier Accumulation
Collaborating institutions: University of Helsinki
Student: Kaisa Halkola
Supervisors: Yngvar Gjessing (UNIS) and Matti Leppäranta (University of Helsinki)

Title: Why is there no ice on the Isfjorden?
Collaborating institutions: Göteborg University
Student: Sara Mattsson
Supervisors: Frank Nilsen (UNIS) and Gøran Björk (Göteborg University)

Title: A multiinstrumental investigation (ground and space) of polar cap connection and night side reconnection
Collaborating institutions: University of Oslo
Student: Kristian Snekvik
Supervisors: Dag Lorentzen (UNIS) and Finn Sørås (UiO)

Title: Electron density measurements in the polar cusp.
Collaborating institutions: University of Oslo
Student: Johnny Grøneng Aase
Supervisors: Dag Lorentzen (UNIS) and Jøran Moen (UiO)

Title: Klassifisering av is på bakken, hav og i atmosfæren ved hjelp av fjernmåling
Collaborating institutions: University of Oslo
Student: Ivan Føre
Supervisors: Fred Sigernes (UNIS) and Jon Egill Kristjansson (UiO)



PHOTO: LARS R. HOLE

A polar bear suddenly appears to check out the quality of the field work on the AGF 211/212 cruise in the Fram Strait in May 2003.

Arctic Technology

KNUT V. HØYLAND

Teaching

The Arctic Technology Department offered in 2003 four level 200 courses (total 60 ECTS, 20 credits) and seven courses at level 300 (12 credits). One of the 300 courses was not held. This makes the course load in the Department roughly comparable with the sister Departments at UNIS. The level 200 courses combine to form a full year of study in Arctic Technology and the option to specialise for a M.Sc. or Ph.D. degree based on level 300 studies.

The faculty is relatively small by UNIS standards, with two associate professors and four adjunct professors on staff. This reflects the still young age of the Department. In 2004 we extend with a full time employee in Geotechnics. We expect to extend further with a position in Hydrology within a couple of years. This will make Arctic Technology comparable with the three other departments.

In 2003, Arctic Technology taught 36 students at level 200 and 42 at level 300. The average attendance in the lower series was 9 and the courses were completed with excellent results. Teaching of the undergraduate courses combines lectures, fieldwork and laboratory exercises.

Arctic Engineering

The Department offers a full-time program in Arctic Engineering which combines courses in *Frozen Ground Engineering* (AT-205, AT-309 and AT-310), *Arctic Water Resources* (AT-206) and *Ice Mechanics* (AT-208, AT-307 and AT-313). Students follow a unique program of lectures and fieldwork and laboratory practice. The experiments performed in our ice-laboratory, where mechanical properties of frozen ground and ice samples are tested, is only one example. Fieldwork often goes ahead despite severe climatic conditions and operating in this harsh environment gives the student valuable skills that are not directly documented on the degree certificate. We also note with great satisfaction that UNIS graduates are sought-after candidates for key positions in local industry on Svalbard and on the mainland.

Arctic Environmental Technology and Chemistry

The Department also offers a full-time program in Arctic Environmental Technology and Chemistry, focusing on pollution in the Arctic. The courses making up the program can be heavily technology-biased, but we also encourage students to include offerings from other Departments, to form an interdisciplinary Arctic Environment

program. Many students from the other Departments at UNIS also follow our courses in Environmental Technology. A new course at 300 level: AT-312 Radioactive Pollution on Svalbard, was offered for the first time in 2002 and filled to capacity.

Research

The technological challenges related to increased human activity in the northern marine environments as well as locally here on Svalbard are our main focus. The faculty staff continued to work on established research programs at UNIS and several new studies were initiated. The projects are detailed later in this section.

Key topics of interest within Environmental Technology include: The fate of oil spills in an Arctic environment and possible countermeasure 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. As the new Environment Act for Svalbard (Norwegian Public Reports NOU 1999:21) succinctly points out: an oil spill from a large cargo carrier could have a massive and detrimental impact on the fragile ecosystems of Svalbard.

The Department's research in Frozen Ground and Permafrost Engineering focuses on the effects of climate change on Arctic infrastructure and the permafrost response to environmental and industrial loads, with a special emphasis on the physical properties of oil-contaminated soils. The new Science Centre in Longyearbyen will be a pilot project and UNIS is involved in research in this connection. Unfortunately our lack of specialist staff in frozen ground and permafrost studies limits our activities, but this will change with our new employee in 2004.

The research on Ice-mechanics focuses on in-situ measurements and simulations of thermo-mechanical properties of first-year



PHOTO: KNUT V. HØYLAND

Working on an ice ridge in the Barents Sea.

sea-ice, and we are working in Van Mijenfjorden as well as in the Barents Sea. In the Van Mijenfjorden the ice cover is stable throughout the season, allowing us to perform seasonal studies without risk of losing our equipment. Close to the Svea community, we did a unique experiment in 2002, constructing a miniature ice ridge and dragging it up the beach. We measured the forces and deformations on the ice ridge and sea bed. This kind of information is important when designing pipelines in shallow Arctic waters. We also monitored the ice conditions off the new jetty at Cape Amsterdam in Svea. Strain, temperature, motion, weather and currents are all monitored. The aim is to identify how environmental factors such as wind, currents and thermal expansion of the ice induce stresses in the sheet and its resultant motion. The formation and growth of sea-ice is important to understand as the ice cover limits the shipping season for coal export. We are working together with the Geophysics Department at UNIS in a program that monitors the ice thickness and the environmental factors that affect it.

Our graduate students and doctoral candidates make important contributions to the research done by faculty staff in the Department. During the year we had 13 postgraduates working on a master's or doctor's degree. Here is a brief specification of the projects:

Modelling of the oil spills and contingency measures in the Arctic with emphasis on the Pechora Sea region, Northwest Russia
 Characterisation of acid drainage as a function of melting process from tailings deposit on permafrost in Bjørndalen, Svalbard

- Modelling permafrost temperature response to short-term (annual) and long-term (50 year) variations in meteorological data
- Temperature regime and permeability of a tailings deposit on permafrost in Bjørndalen, Svalbard
- Leakage of toxic water-solvable components from different oil types during an oil spill in an Arctic environment
- Persistent organic pollutants in lake sediments
- PCBs and pesticides in Arctic char in lakes on Svalbard and the influence of migration into the sea during summer
- Modelling of airborne persistent organic pollutants into the Arctic
- Detection of oil spill under sea-ice
- The effects of sea-ice loads on the coal export jetty at Cape Amsterdam, Svea
- Ice ridge-pipeline interaction, field experiments in the Van Mijenfjorden and numerical analysis
- Ice formation and growth in the Van Mijenfjorden (joint project with Arctic Geophysics)
- Consolidation of first-year sea-ice ridges.

Several of the master's degree projects have focused on topics important to the local communities on Svalbard and were performed in close cooperation with national and local industry. The master's degree projects were carried out under the guidance of supervisors from UNIS, the Norwegian University of Science and Technology (NTNU) in Trondheim, other universities and colleges, and industry.

Research Projects Arctic Technology 2003

Title: Pollution from mine tailings on Svalbard

Collaborating institution: Store Norske Spitsbergen Grubekompani (SNSG)

Financing: SNSG, UNIS

Duration: 1999-2003

UNIS: Per Johan Brandvik, Arne Instanes

Title: Levels and transport of polychlorinated biphenyls (PCB) in the Arctic (reindeers, Arctic char, lake sediments and seaweed)

Collaborating institution: Norwegian Institute of Air Research

Financing: UNIS

Duration: 2000-2003

UNIS: Per Johan Brandvik

Title: Level and transport of heavy metals from local industry on Svalbard (river water, tundra and seaweed)

Collaborating institution: Norwegian Geotechnical Survey (NGU)

Financing: NGU, UNIS

Duration: 2001-2003

UNIS: Per Johan Brandvik

Title: Leakage of water soluble components from oil spilled in Arctic environment

Collaborating institution: SINTEF

Financing: UNIS, SINTEF

Duration: 2000-2003

UNIS: Per Johan Brandvik

Title: Oil spill contingency for Arctic areas

Collaborating institutions: SINTEF

Financing: UNIS, SINTEF

Duration: 2000-2003

UNIS: Per Johan Brandvik

Title: Ice ridge-pipeline interaction

Collaborating institutions: Norwegian University of Science and Technology, Technical University of St. Petersburg

Financing: Norwegian Research Council, UNIS, Statoil and SNSG

Duration: 2001-2006

UNIS: Knut V. Høyland, Sveinung Løset, Pavel Liferov and Svetlana Shafrova

Title: Ice interaction with vertical pile

Collaborating institutions: Norwegian University of Science and Technology, Technical University of St. Petersburg

Financing: Norwegian Research Council, UNIS; Statoil and SNSG

Duration: 2001-2005

UNIS: Knut V. Høyland, Sveinung Løset, Per Olav Moslet

Title: Ice ridges in the Barents Sea, physico-mechanical properties

Collaborating institutions: Norwegian University of Science and Technology, Technical University of St. Petersburg

Financing: UNIS

Duration: 2001-2006

UNIS: Knut V. Høyland, Svetlana Shafrova

Title: Formation and growth of sea ice in the Van Mijen fjord

Collaborating institutions: Arctic Geophysics, UNIS

Financing: UNIS, SNSK

Duration: 2001-2004

UNIS: Knut V. Høyland and Frank Nilsen

Title: Arctic Climate Impact Assessment (ACIA)

Collaborating institution: University of Alaska Fairbanks, Moscow State University, Ecole Polytechnique, Montreal, Canada, Norwegian University of Science and Technology, Norwegian Polar Institute

Financing: Ministry of the Environment

Duration: 2000-2004

UNIS: Arne Instanes

Title: Measurements of structures in ice (STRICE)

Collaborating institutions: Norwegian University of Science and Technology, Ship model basin in Hamburg, Helsinki Technical University, Luleå Technical University, Technical Research Centre in Finland, Cambridge University and Geophysical and Glaciological environmental laboratory, Grenoble

Financing: European Union

Duration: 2001-2003

UNIS: Sveinung Løset, Knut V. Høyland

Title: ISO TP2b Ice Actions

Collaborating institutions: Norwegian University of Science and Technology

Financing: Statoil

Duration: 2003-2004

UNIS: Sveinung Løset, Knut V. Høyland

Title: ISO TP9 Ice Engineering for Operations

Collaborating institutions: Norwegian University of Science and Technology

Financing: Statoil

Duration: 2003-2004

UNIS: Sveinung Løset, Knut V. Høyland

Title: Permafrost monitoring at Longyearbyen Research Centre

Collaborating institutions: Statsbygg, Instanes Svalbard A/S, NGI

Financing: Statsbygg

Duration: 2002-2005

UNIS: Knut V. Høyland, Arne Instanes

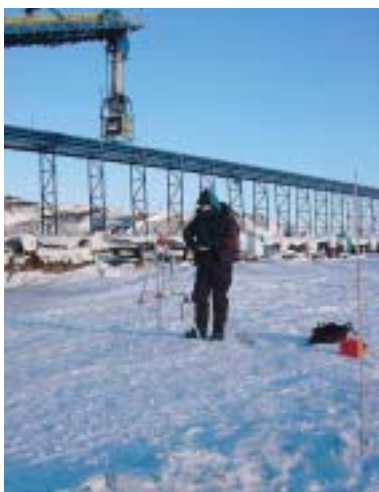


PHOTO: KNUT V. HØYLAND

Mapping the ice conditions of Cape Amsterdam in the Van Mijen fjord.



PHOTO: PETER HULSE

Burning of oilspills can be used in arctic areas to reduce the environmental impact.

Title: Ice and tide action on Longyearbyen Harbour

Collaborating institutions: Arctic Geophysics UNIS, Norwegian University of Science and Technology, Svalbard Samfunnsdrift (SSD)

Financing: SSD, UNIS

Duration: 2003-2004

UNIS: Knut V.Høyland and Frank Nilsen

Graduates 2003 Cand.scient./ Master degree

Title: Geotechnical aspects of first-year ice ridge scouring on a seabed.

Collaborating institutions: Norwegian University of Science and Technology (NTNU)

Student: Rune Nilsen

Supervisors: Knut V. Høyland (UNIS), Lars Grande (NTNU)

Finnished: Spring 2003

Title: The detection of oil under ice, using a ground-penetrating radar and the influence of ice on the costs and effectiveness of the clean-up operation.

Collaborating institutions: Technical University Eindhoven, The Netherlands

Student: Alex Paste

Supervisors: Knut V. Høyland (UNIS), Per Johan Brandvik (UNIS), G. P. J. Verbong (Technical University Eindhoven, The Netherlands)

Finnished: Spring 2003

Title: Thermal aspects of forces from first-year ridges on offshore constructions.

Collaborating institutions: St. Petersburg State Technical University, Russia (SPTU)

Student: Elena Gordienko

Supervisors: Knut Høyland (UNIS), Karl Shkhinek (SPTU)

Finnished: Spring 2003

Title: Nytt databasert vedlikeholdsprogram i Svea.

Collaborating institutions: Høyskolen i Stavanger

Student: Arne Stray

Supervisors: Knut V. Høyland (UNIS), Tore Markeset (HiS)

Finnished: Spring 2003

Title: Small scale mechanical and physical tests of first-year sea ice and ice ridges

Collaborating institutions: Norwegian University of Science and Technology (NTNU)

Student: Laila Vatne

Supervisors: Knut V. Høyland (UNIS), Sveinung Løset (NTNU/UNIS)

Finnished: Spring 2003

Graduate students 2003 Dr. students/Ph.D.

Title: Ice ridge – pipeline interaction
Collaborating institutions: Norwegian University of Science and Technology (NTNU), St. Petersburg Technical University
Student: Pavel Liferov
Supervisors: Knut V. Høyland (UNIS), Sveinung Løset (NTNU/UNIS)

Title: Ice interaction with vertical pile
Collaborating institutions: Norwegian University of Science and Technology (NTNU), St. Petersburg Technical University
Student: Per Olav Moslet
Supervisors: Knut V. Høyland (UNIS), Sveinung Løset (NTNU/UNIS)

Title: Ice ridge – pipeline interaction
Collaborating institutions: Norwegian University of Science and Technology (NTNU), St. Petersburg Technical University.
Student: Svetlana Chafrova
Supervisors: Knut V. Høyland (UNIS), Sveinung Løset (NTNU/UNIS), Karl N. Shkhinek (St. Petersburg Technical University)

Cand.scient./Master students

Title: Characterisation of acid drainage as a function of melting process from tailing deposit on permafrost in Bjørndalen, Svalbard
Collaborating institutions: Norwegian University of Science and Technology
Student: Eva Holm
Supervisors: Per Johan Brandvik (UNIS), Eiliv Steinnes (NTNU)

Title: Studying persistent organic pollution on Svalbard, focusing on PCB levels of Arctic Char in “Linnévatnet” and “Aresjøen”.
Collaborating institutions: University College of Härnösand, Sweden
Student: Lisa Strøm
Supervisors: Per Johan Brandvik (UNIS), Nils Ekelund (University College of Härnösand, Sweden)

Title: Oljeforurensing i Arktis; Karakterisering av oljenedbrytende bakterier isolert fra tundra som er fourenset med oljesøl
Collaborating institutions: University of Bergen (UiB)
Student: Irja Roiha Sunde
Supervisors: Per Johan Brandvik (UNIS), Lise Øvreås (UiB)

Title: Oljeforurensing i Arktis; Kartlegging av diversiteten og sammensetningen av bakterisamfunn i tundra som er kontaminert med oljesøl
Collaborating institutions: University of Bergen (UiB)
Student: Synnøve Yndestad
Supervisors: Per Johan Brandvik (UNIS), Lise Øvreås (UiB)

Title: Studying persistent organic pollution on Svalbard focusing on PCB levels in Arctic Charr in “Linnévannet”
Collaborating institutions: Umeå University
Student: Anna Andersson
Supervisors: Per Johan Brandvik (UNIS), Patrik Andersson (Umeå University)

Title: Estimation of ocean-ice heat flux from data in Van Mijen fjord (Analytical and numerical model.)
Collaborating institutions: Norwegian University of Science and Technology
Student: Jean-Charles Bordel
Supervisors: Knut V. Høyland (UNIS), Dag Myrhaug (NTNU)

Title: Determination of fat composition in tissue from Arctic Char from Svalbard by analysis of fatty acid methyl esters (FAME).
Collaborating institutions: Luleå University of Technology
Student: Charlotta Rylander
Supervisors: Per Johan Brandvik (UNIS), Douglas Baxter (Luleå Tekniska Universitet)

Title: Modelling of long range transport of persistent organic pollutants in to Arctic areas.
Collaborating institutions: Uppsala University, Uppsala tekniska Högskola
Student: Kristina Skoog
Supervisors: Per Johan Brandvik (UNIS), Leif Enger (Uppsala tekniska Högskola)

Title: Thermal expansion and thermal stresses in first-year sea ice.
Collaborating institutions: Norwegian University of Science and Technology
Student: Sigurd Henrik Teigen
Supervisors: Knut V. Høyland (UNIS), Johan Skule Høye NTNU)

Title: An Artificial Island in the Caspian Sea
Collaborating institutions: St. Petersburg Technical University
Student: Sergey Vernyayev
Supervisors: Knut V. Høyland (UNIS), Karl N. Shkhinek (St. Petersburg Technical University)



PHOTO: KNUT V. HØYLAND

Producing an iceridge in Svea in the Van Mijenfjord.



Scientific publications 2003

- **Scientific publications in reviewed journals by full-time faculty**
- **Scientific publications by adjunct professors**
- **Scientific publications «in press» or «accepted»**
- **Books**
- **Reports, published abstracts, etc.**
- **Popular scientific publications**
- **Presentations (oral or poster)**

Scientific publications in reviewed Journals by full-time faculty

- Barnes, D.K.A. & Kuklinski, P. (2003). High polar spatial competition: extreme hierarchies at extreme latitude. *Marine Ecology-Progress Series*. 259, 17-28.
- Beig, G., Keckhut, P., Lowe, R.P., Roble, R.G., Mlynczak, M.G., Scheer, J., Fomichev, V.I., Offermann, D., French, W.J.R., Shepherd, M.G., Semenov, A.I., Remsberg, E.E., She, C.Y., Lubken, F.J., Bremer, J., Clemesha, B.R., Stegman, J., Sigernes, F. & Fadnavis, S. (2003). Review of mesospheric temperature trends. *Reviews of Geophysics*. 41, 4, 1015. DOI: 10.1029/2002RG000121.
- Berge, J. (2003). The taxonomy of the amphipod genus *Stilipes* (Crustacea: Amphipoda: Stilipedidae), with description of one new species. *Organisms Diversity & Evolution*. 3, 4, 305.
- Berge, J. & Vader, W. (2003). Description of two new *Glorandaniotes* species (Amphipoda: Stegocephalidae). *Journal of Crustacean Biology*. 23, 3, 633-643.
- Berge, J. & Vader, W. (2003). *Metandania tordi* n.sp.: a new stegocephalid (Crustacea: Peracarida: Amphipoda) species from the Southern Ocean. *Proceedings of the Biological Society of Washington*. 116, 4, 986-995.
- Berge, J. & Vader, W. (2003). Stegocephalid (Crustacea: Amphipoda) species from Australia and New Zealand, with description of seven new species. *Records of the Australian Museum*. 55, 1, 85-112.
- Bjerke, J.W., Zielke, M. & Solheim, B. (2003). Long-term impacts of simulated climatic change on secondary metabolism, thallus structure and nitrogen fixation activity in two cyanolichens from the Arctic. *New Phytologist*. 159, 2, 361-367.
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- Cooper, E.J. & Wookey, P.A. (2003). Floral herbivory of *Dryas octopetala* by Svalbard reindeer. *Arctic, Antarctic and Alpine Research*. 35, 3, 369-376.
- d'Udekem d'Acoz, C. & Berge, J. (2003). Vestigial structures in pontoporeiid and stegocephalid amphipods (Crustacea, Amphipoda, Gammaridea). *Bulletin, Biologie*. 73, 107-114.
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- Hjort, C., Ingólfsson, Ó., Bentley, M.G. & Björck, S. (2003). The Late Pleistocene and Holocene glacial and climate history of the Antarctic Peninsula region as documented by the Land and Lake Sediment Records: a review. *Antarctic Research Series*. 79, 95-102.
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- Ingólfsson, Ó. & Lokrantz, H. (2003). Massive ground ice body of glacial origin at Yugorski Peninsula, Arctic Russia. *Permafrost and Periglacial Processes*. 14, 3, 199-215. DOI: 10.1002/ppp.455.
- Johansen, T.A., Digranes, P., van Shaack, M. & Lønne, I. (2003). Seismic mapping and modeling of near-surface sediments in polar areas. *Geophysics*. 68, 2, 566-573. DOI: 10.1190/1.1567226.
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- Loe, L.E., Mysterud, A., Langvatn, R. & Stenseth, N.C. (2003). Decelerating and sex-dependent tooth wear in Norwegian red deer. *Oecologia*. 135, 3, 346-353. DOI: 10.1007/s00442-003-1192-9.

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- Cooper, E.J. & Jónsdóttir, I.S.** (2003). Goose grazing and climate change impacts on the tundra: presentation of a new project in Adventdalen, Svalbard. 12th International Tundra Experiment Workshop, Fairbanks, Alaska, 26-29 Sept. 2003. (Talk).
- Cooper, E.J. & Roald, J.** (2003). Svalbards Flora. *Norsk polarinstitutt*. (Poster).
- Daase, M. & Eiane, K.** (2003). Can Arctic mesozooplankton community structure be predicted from physical properties of water masses? 3rd International Zooplankton Production Symposium: the role of zooplankton in global ecosystem dynamics: comparative studies from the world oceans, Gijon, Spain, 20-23 May 2003. (Poster).
- Daase, M. & Eiane, K.** (2003). Prediction of zooplankton community structure from oceanographic data in Arctic-Atlantic waters. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Poster, Talk).
- Drage, M.A.** (2003). Fonndannelse og turbulens rundt snøgjerder. Nordisk seminar om drivsnø, Bø, Norway, 8-11 May 2003. (Talk).
- Eiane, K., Breur, A.N. & Wheeler, K.** (2003). Population dynamics of marine copepods in an arctic fjord during winter. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Poster, Talk).
- Forbord, S., Valle, K.C., Hilstad, K., Evertsen, J. & **Johnsen, G.** (2003). Annual variation of pigments in marine red-, brown- and green macroalgae. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Talk).
- Gannefors, C., Falk-Petersen, S., Hop, H., **Gulliksen, B. & Eiane, K.** (2003). Life cycle, body composition and lipids of the shelled butterfly *Limacina helicina* (Gastropoda) in Kongsfjorden, Svalbard. Arctic-Alpine Ecosystems and People in a Changing Environment, Tromsø, Norway, 24 Feb. - 1 Mar. 2003. (Poster).
- Gerland, S., **Widell, K.**, Haugan, P.M., **Nilsen, F., Winther, J.G.**, Edvardsen, K., McPhee, M. & Morison, J. (2003). Atmosphere-ice-ocean interaction studies in frozen Svalbard fjords. Arctic climate feedback mechanisms, Tromsø, Norway, 17-19 Nov. 2003. (Poster).
- Gulliksen, B.** (2003). Bunnfauna og isfauna ved Svalbard. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Invited talk).
- Gulliksen, B.** (2003). Sympagic fauna (ice fauna) and benthic fauna in Arctic and Antarctic ecosystems. Arctic-Alpine Ecosystems and People in a Changing Environment, Tromsø, Norway, 24 Feb. - 1 Mar. 2003. (Talk).
- Gulliksen, B.,** Beuchel, F., Brattegard, T. & Palerud, R. (2003). The marine sublittoral fauna of Jan Mayen Island. NATO ARW Conference, Oslo, Norway, 11-15 Nov. 2003. (Talk).
- Hansen, F.S.** (2003). Bruk av satellitt data i forskning og undervisning ved UNIS: sikkerhet. Svalbardseminar, Longyearbyen, 4 Feb. 2003. (Talk).
- Hartz, E.H., Eide, E.A., **Andresen, A.**, Midtbøe, P., Hodges, K.V. & Kristiansen, S.N. (2003). East Greenland's basin models BATtered: ⁴⁰Ar/³⁹Ar geochronology and structural research of basements and basins. BAT Project, Trondheim, Norway, 30 Jan. 2003. (Talk).
- Hilstad, K., Evertsen, J., Forbord, S., Valle, K.C. & **Johnsen, G.** (2003). Annual variation in bio-optical characteristics in marine red-, brown-, and green macroalgae. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Poster, Talk).
- Humlum, O.** (2003). Danish polar research as seen from abroad. Danish Polar Research Day, Copenhagen, Denmark, 20 November 2003. (Invited talk).
- Humlum, O.** (2003). Mapping the extent of the Weichselian glaciation on the Faroe Islands. NORDLINK workshop on the Faroe Islands, Torshavn, Faroe Islands, 3-7 Jun. 2003. (Talk).
- Humlum, O.** (2003). Permafrost på Svalbard: fortid, nutid og fremtid. Møte i Selskabet for Arktisk Teknologi, København, Danmark, 19 Nov. 2003. (Invited talk).
- Humlum, O.** (2003). Svalbard climate, glaciers and permafrost. 8th International Permafrost Conference, Ny Ålesund, Spitsbergen, 28 Jul. 2003. (Invited talk).
- Humlum, O.** (2003). Svalbards kvartærgeologi. Svalbardkurset, Ny Ålesund, Spitsbergen, 28 Jul. 2003. (Invited talk).

- Hübner, C.** (2003). Plant-herbivore interactions in an Arctic pre-breeding area for geese. FRAGILE 1st Progress Workshop, Roskilde, Denmark, 25-30 Nov. 2003. (Talk).
- Hübner, C.** (2003). Plant-herbivore interactions in relation to snowmelt in the High Arctic: a PhD-project description. 12th International Tundra Experiment Workshop, Fairbanks, Alaska, 26-29 Sept. 2003. (Poster).
- Johnsen, G.** (2003). Light absorption and utilization in 13 different pigment groups of bloom forming phytoplankton. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Poster, Talk).
- Jónsdóttir, I.S.** (2003). Background and interest in CAT-B. 1st CAT-B Workshop, Uppsala, Sweden, 10-12 Nov. 2003. (Talk).
- Jónsdóttir, I.S.** (2003). Climate change impacts on high arctic plants and vegetation in Svalbard. Climate change and its impacts on terrestrial ecosystems and landscapes of the Arctic: insights, challenges and ways forward: a workshop to explore trilateral collaboration among Sweden, Norway and the USA, Abisko, Sweden, 15-16 Sept. 2003. (Talk).
- Jónsdóttir, I.S.** (2003). Effects of herbivory on arctic plants: more than one level of organisation to consider. Department Meeting on Plant-Animal Interactions in (Sub-) Arctic Ecosystems, Groningen, Netherlands, 1 Dec. 2003. (Invited lecture).
- Jónsdóttir, I.S.** (2003). Impact of geese on arctic terrestrial ecosystems. International Conference on Climate Change Research in the Arctic, Longyearbyen, 25-27 Jul. 2003. (Talk).
- Jónsdóttir, I.S., Ingólfsson, Ó. & Stenström, A.** (2003). Ice sheet history of the Eurasian North reflected in genetic variation of arctic plants. 12th International Tundra Experiment Workshop, Fairbanks, Alaska, 26-29 Sept. 2003. (Poster).
- Klanderud, K.** (2003). Impacts of climate change on plant species diversity of *Dryas* heath communities in alpine south Norway. 12th International Tundra Experiment Workshop, Fairbanks, Alaska, 26-29 Sept. 2003. (Talk).
- Kuklinski, P.** (2003). Bryozoa as potential indicators of environmental conditions: preliminary study. 2nd Euroconference on "Biodiversity of Coastal Marine Ecosystems: a Functional Approach to Coastal Marine Biodiversity", Renesse, Holland, 11-15 May 2003. (Poster).
- Loe, L.E., Bonenfant, C., Mysterud, A., Langvatn, R., Stenseth, N.C., Gaillard, J.M. & Klein, F.** (2003). Climate predictability and breeding phenology in red deer: timing and synchrony of rutting and calving in Norway and France. 4th European Congress of Mammalogy, Brno, Czech Republic, 27 Jul. - 1 Aug. 2003. (Poster).
- Lorentzen, D.A.** (2003). Instrumentering og samarbeidspartnere ved UNIS og nordlysstasjonen i Adventdalen relatert til ILWS. [International Living With a Star (ILWS) Conference], Tromsø, Norway, May 2003. (Talk).
- Lorentzen, D.A., Shumilov, N. & Moen, J.** (2003). Optical signatures of drifting polar cap patches. [Conference at the Chinese Society of Space Physics], Shanghai, China, October 2003. (Talk).
- Lorentzen, D.A. & Sigernes, F.** (2003). Bruk av satellitt data i forskning og undervisning ved UNIS: forskning, Svalbardseminar, Longyearbyen, 4 Feb. 2003. (Talk).
- Lønne, I.** (2003). Svalbard glasiert, men hvorfor så få spor etter eldre istider? : landformer og prosesser gir nye svar. Bergen, Norway, 27 Mar. 2003. (Invited talk).
- Lønne, I.** (2003). Svalbard: nøkkelen til mange klastiske avsetningssystem. Norsk Hydro, seminarserie, Bergen, Norway, 28 Mar. 2003. (Invited talk).
- Moen, J.** (2003). Er alle nordlysets hemmeligheter avdekket? The University Centre in Svalbard (UNIS) 10 years anniversary, Longyearbyen, 20 Sept. 2003. (Talk).
- Moen, J.** (2003). ICI-1: a new sounding rocket concept to observe micro-scale physics in the Cusp ionosphere. 16th ESA Symposium of European Rocket and Balloon Programmes and Related Research, Sankt Gallen, Switzerland, 2-5 Jun. 2003. (Talk).
- Moen, J.** (2003). Identification of the open-closed field line boundary by multi-instrument techniques. RAS G/MIST meeting, London, UK, 10 Oct. 2003. (Invited talk).
- Moen, J.** (2003). Studies of dayside magnetospheric boundary layers by multi-instrument techniques. [International Living With a Star (ILWS) Conference], Tromsø, Norway, 29-30 April 2003. (Talk).
- Moen, J., Lockwood, M., Oksavik, K., Carlson, H.C., van Eyken, A.P. & McCrea, I.W.** (2003). The dynamics and relationships of precipitation, temperature and convection boundaries in the dayside auroral ionosphere. Norsk fysikermøte 2003, Oslo, Norway, 9-12 Aug. 2003.
- Mysterud, A., Stenseth, N.C., Langvatn, R., Yoccoz, N.G. & Pettoirelli, N.** (2003). Life history of red deer in Norway under the influence of NAO. ClimWork: Climate Change and biodiversity, Oslo, Norway, 27-28 Mar. 2003. (Talk).
- Nicholson, L.** (2003). Modelling sub-debris ablation rate: considerations of annual thermal regime in supraglacial debris, Ngozumpa Glacier, Nepal. IGS British Branch Meeting 2003, Belfast, UK, 14-16 Sept. 2003. (Talk).



- Nicholson, L.** (2003). OSL dating of glacial deposits from debris covered glaciers, Khumbu Himal, eastern Nepal. Luminescence/ESR British meeting 2003, Aberystwyth, UK, 7-10 Sept. 2003. (Poster).
- Nicholson, L.** (2003). The thermal properties of supraglacial debris on Ngozumpa Glacier, Nepal Himalaya. BGRG/JAQR Conference: Cryospheric Systems, London, UK, 13-14 Jan. 2003. (Poster).
- Nilsen, F.** (2003). Future field work in Van Mijenfjorden. NOClim/ProClim/AIO Coastal Steamer Meeting 2003, Hurtigruten, 29 Sept. - 3 Oct. 2003. (Talk).
- Nilsen, F.** (2003). Havstrømmenes betydning for Svalbard. Svalbardseminar, Longyearbyen, 11 Feb. 2003. (Invited talk).
- Nilsen, F.** (2003). The University Centre on Svalbard (UNIS): a unique international institution for education and research in the Arctic. Japan-Norway Science and Technology Seminar: Space Science, Tokyo, Japan, 26 May 2003. (Talk).
- Nilsen, F.** (2003). Veien framover. The University Centre in Svalbard (UNIS) 10 years anniversary, Longyearbyen, 20 Sept. 2003. (Invited talk).
- Prick, A.** (2003). Cryogenic weathering and rock fall in an Arctic environment, Longyearbyen, Svalbard. Deep weathering and paleic relief in Southern Norway, Dombås, Norway, 10-15 Jun. 2003. (Talk).
- Prick, A.** (2003). Rock fall in an arctic environment (Longyearbyen, Svalbard): triggering factors and geomorphic implications. NORDLINK workshop on the Faroe Islands, Torshavn, 3-7 Jun. 2003. (Talk).
- Rasmussen, T.L.** (2003). Marine core studies from the Faroe Islands area. NORDLINK workshop on the Faroe Islands, Torshavn, Faroe Islands, 3-7 Jun. 2003. (Talk).
- Sigernes, F., Lorentzen, D.A., Shumilov, N., Moen, J., Gjessing, Y., Havnes, O., Skartveit, A., Raustein, E., Ørbæk, J.B. & Deehr, C.S.** (2003). The red sky of Svalbard: 6 december 2002. The 10th Assembly of Space Physics Committee in Shanghai, Shanghai, China, 17-21 Oct. 2003. (Invited talk).
- Skogseth, R.** (2003). Some results from the study of dense water production processes in Storfjorden. NOClim/ProClim/AIO Coastal Steamer Meeting 2003, Hurtigruten, 29 Sept. - 3 Oct. 2003. (Talk).
- Solheim, A. & Nadim, F.** (2003). International Centre for Geohazards (ICG) established at the Norwegian Geotechnical Institute in Oslo. Ocean Margin Research Conference, Paris, France, 15-17 Sept. 2003. (Poster).
- Valle, K.C., Forbord, S., Hilstad, K., Evertsen, J. & Johnsen, G.** (2003). Detection of annual variation in red-, brown- and green macroalgae using in situ video technique and fluorescence microscopy. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Poster, Talk).
- Vogedes, D., Eiane, K. & Tverberg, V.** (2003). Spatial dynamics of zooplankton in an Arctic fjord. NHF årsmøte 2003, Longyearbyen, 8-12 Oct. 2003. (Poster, Talk).
- Webb, C.E. & Lønne, I.** (2003). Geofaglige aktiviteter i tilknytning til "Furufjell". Planleggingsdag for lærere ved Manglerud skole, 1-5 kl, Oslo, Norway, 15 Sept. 2003. (Invited talk).
- Widell, K.** (2003). Om blandningsslængd i "mixed layer". Turbulens seminar, Bergen, Norway, 29 Aug. 2003.
- Widell, K.** (2003). UNIS/AIO on Van Mijenfjorden, spring 2003: measurements from the under-ice boundary layer. NOClim/ProClim/AIO Coastal Steamer Meeting 2003, Hurtigruten, 29 Sept. - 3 Oct. 2003. (Talk).
- Zielke, M., Forney, L.J. & Solheim, B.** (2003). The effect of enhanced UVB-radiation on nitrogen fixation potential and the community structure of moss-associated cyanobacteria in high arctic vegetation. Arctic-Alpine Ecosystems and People in a Changing Environment, Tromsø, Norway, 24 Feb. - 1 Mar. 2003. (Poster).
- Zielke, M., Olsen, R.A. & Solheim, B.** (2003). The effect of temperature, water content, and light intensity and quality on nitrogen fixation in high arctic tundra vegetation. SEARCH Open Science Meeting, Seattle, USA, 27-30 Oct. 2003. (Poster).

Guest lecturers

Name	Institution	Name	Institution
Alfredsen, Knut	Norwegian University of Science and Technology	Gabrielsen, Geir Wing	Norwegian Polar Institute
Alm, Göran	Stockholm University, Sweden	Gjosæter, Harald	Havforskningsinstituttet, Norway
Andresen, Steinar	University of Oslo, Norway	Goering, Douglas	University of Alaska, USA
Asplin, Lars	Havforskningsinstituttet, Norway	Grøndahl, Kirsti Kolle	Fylkesmannen i Buskerud, Norway
Austegård, Atle	University of Bergen, Norway	Grønnevet, Martin	Storm, Norway
Bakken, Vidar	Freelance, Norway	Gudmestad, Ove Tobias	Statoil, Norway
Bardgett, Richard D.	Lancaster University, UK	Guio, Patrick	University of Oslo, Norway
Benn, Doug	University of St. Andrews, UK	Hagen, Jon Ove	University of Oslo, Norway
Berggren, Anne-Lise	Geofrost Engineering A/S, Norway	Haug, Tore	Norwegian Institute of Fisheries and Aquaculture
Björk, Göran	Göteborg University, Sweden	Heinemeier, Jan	University of Aarhus, Denmark
Björnsson, Helgi	University of Iceland	Henriksen, Mona	University of Bergen, Norway
Bjørnå, Noralv	University of Tromsø, Norway	Hinzman, Larry	University of Alaska, USA
Blikra, Lars Harald	The Geological Survey of Norway	Hjøllo, Solfrid	University of Bergen, Norway
Blixt, Mårten	University of Tromsø, Norway	Hodkinson, Ian D.	Liverpool John Moores University, UK
Bløtekjær, Kjell	Norwegian University of Science and Technology	Hop, Haakon	Norwegian Polar Institute
Bogen, Jim Jens	Norwegian water resources and energy administration	Hoppe, Ulf Peter	Norwegian Defense Research Establishment
Brattgard, Torleiv	University of Bergen, Norway	Huse, Geir	University of Bergen, Norway
Broda, Grete H.	NAMMCO, Norway	Hyllestad, Robert	Post- og Teletilsynet, Norway
Brown, Jerry	The International Permafrost Association, USA	Haagensen, Per J.	Norwegian University of Science and Technology
Bruland, Oddbjørn	SINTEF, Norway	Haarpaintner, Jörg	Norwegian Meteorological Institute
Buvang, Richard	University of Tromsø, Norway	Ims, Rolf A.	University of Tromsø, Norway
Cochrane, Sabine	Norwegian Institute for Water Research	Isaksen, Ketil	University of Oslo, Norway
Dalehaug, Arvid	Norwegian University of Science and Technology	Isham, Brett	EISCAT, Norway
Dowdeswell, Julian	University of Cambridge, UK	Jaedicke, Christian	Norwegian Geotechnical Institute
Egeland, Alv	University of Oslo, Norway	Jaldemark, Kristian	Carmenta AB, Sweden
Eiken, Trond	University of Oslo, Norway	Jansson, Peter	Stockholm University, Sweden
Elberling, Bo	University of Copenhagen, Denmark	Jensen, Bjørn Munro	Norwegian University of Science and Technology
Eltoft, Torbjørn	University of Tromsø, Norway	Jeppesen, Jon W.	Freelance, Denmark
Elvebakk, Arve	University of Tromsø, Norway	Kallenborn, Roland	The Norwegian Institute for Air Research
Fevolden, Svein-Erik	University of Tromsø, Norway	Kjærnet, Torfinn	Bergmesteren for Svalbard, Norway
Finch, Ivan	Rutherford Appleton Laboratory, UK	Knutsson, Sven	Luleå University of Technology, Sweden
Finseth, Jomar	Norwegian University of Science and Technology	Kovacs, Kit	Norwegian Polar Institute
Foldvik, Arne	University of Bergen, Norway	Kuhn, Michael	University of Innsbruck, Austria
Forsberg, Carl Fredrik	Norwegian Geotechnical Institute	Kuvaas, Berit	University of Bergen, Norway
French, Hugh M.	University of Ottawa, Canada	La Hoz, Cesar	University of Tromsø, Norway
Fuglei, Eva	Norwegian Polar Institute	Laberg, Jan Sverre	University of Tromsø, Norway

Name	Institution	Name	Institution
Landvik, Jon	Agricultural University of Norway	Shkhinek, Karl	State Technical University of St. Petersburg, Russia
Lemnell, Per Arne	Televilt AB, Sweden	Siggerud, Erling I Heintz	PGS Reservoir AS, Norway
Liferov, Pavel	Norwegian University of Science and Technology	Skogseth, Ragnheid	Freelance, Norway
Lundén, Bengt	Stockholm University, Sweden	Smedman, Ann-Sofi	University of Uppsala, Sweden
Lønnum, Lasse	Norwegian Polar Institute	Sneli, Jon-Arne	Norwegian University of Science and Technology
Matsuoka, Norikazu	University of Tsukuba, Japan	Snowball, Ian	Lund University, Sweden
McPhee, Miles	McPhee Research Company, USA	Solheim, Bjørn	University of Tromsø, Norway
Mehlum, Fridtjof	University of Oslo, Norway	Sorteberg, Asgeir	University of Bergen, Norway
Mitchenko, Igor	Gupkin University of oil and gas, Russia	Steffensen, Jørgen Peder	University of Copenhagen, Denmark
Mjelde, Rolf	University of Bergen, Norway	Stenseth, Nils Chr.	University of Oslo, Norway
Morison, James	University of Washington, USA	Stette, Gunnar	Norwegian University of Science and Technology
Myrvang, Arne	Norwegian University of Science and Technology	Strømme, Anja	University of Tromsø, Norway
Mørkved, Brynjar	Post- og Teletilsynet, Norway	Sundet, Jan	Norwegian Institute of Fisheries and Aquaculture
Maattanen, Mauri	Helsinki Technical University, Finland	Sundvor, Eirik	University of Bergen, Norway
Nagy, Jenő	University of Oslo, Norway	Svenning, Martin	Norwegian Institute for Nature Research
Nemec, Wojtec	University of Bergen, Norway	Svenøe, Trond	Norwegian Polar Institute
Neuber, Roland	Alfred Wegner Institut für Polar- und meeresforschung, Germany	Sæther, Ola Magne	The Geological Survey of Norway
Nilsen, Jan Even Øie	Nansensenteret, Norway	Telebond, Turid	Svalbard Samfunnsdrift, Norway
Nordal, Inger	University of Oslo, Norway	Thorhallsdottir, Thora Ellen	University of Iceland
Nøttvedt, Arvid	Norsk Hydro, Norway	Toudal, Leif	Technical University of Denmark
Oftedal, Bjørn Terje	University of Oslo, Norway	Tverberg, Vigdis	Norwegian Polar Institute
Olsen, Lasse	Norwegian University of Science and Technology	Ulfstein, Geir	University of Oslo, Norway
Ovhed, Magnus	Forecasting Division for Northern Norway	Vader, Wim	University of Tromsø, Norway
Palerud, Rune	Norwegian Institute for Water Research	Vaskinn, Kjetil Arne	Statkraft Grøner AS, Norway
Paulsen, Jan Erik	Forecasting Division for Northern Norway	von Quillfeldt, Cecilie	Hellum Norwegian Polar Institute
Pleijel, Fredrik	Muséum national d'Historie naturelle, France	Walløe, Lars	University of Oslo, Norway
Ranebo, Ylva	Lund University Hospital, Sweden	Wastegård, Stefan	Stockholm University, Sweden
Raustein, Elmer	University of Bergen, Norway	Weber, Jan Erik	University of Oslo, Norway
Reed, Mark	SINTEF, Norway	Wiig, Øystein	University of Oslo, Norway
Reeh, Niels	Technical University of Denmark	Wookey, Philip A.	Uppsala University, Sweden
Reymert, Per Kyrre	Tromsø Museum, Norway	Zabavnikov, Vladimir	PINRO, Russia
Ruud, Bent Ole	University of Bergen, Norway	Zolotukhin, Anatoly	Statoil, Norway
Rønning, Jan Steinar	The Geological Survey of Norway	Økland, Finn	Norwegian Institute for Nature Research
Röttger, Jürgen	Max Plank Institut für Aeronomie, Germany	Øritsland, Nils A.	Norwegian Institute for Nature Research
Sand, Knut	Statkraft Grøner AS, Norway	Østerhus, Svein	University of Bergen, Norway
Sandven, Rolf	Norwegian University of Science and Technology	Aagaard, Knut	University of Washington, USA
Seim, Bjørnar	University of Tromsø, Norway	Aasen, Åge	Norwegian Meteorological Institute



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