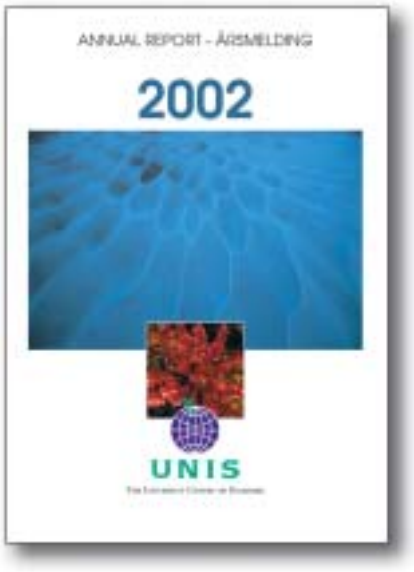
PHOTO: UNIS

The 29th of November 2002, the University Centre on Svalbard (UNIS), a state-owned limited company, replaced the former foundation The University Courses on Svalbard. The objectives of UNIS are to provide university level education in Arctic studies, to carry out high quality research, and to contribute to the development of Svalbard as an international research platform.

In the future UNIS will form the core of the Svalbard Science Centre, an international Arctic centre of expertise in research and education, which will also incorporate other professional and scientific institutions on the islands. The new 8500 sq.m main building (including existing facilities of 3200 sq.m) is due for completion in 2005. The greatly expanded volume will facilitate the continued development of education and research at UNIS.



Cover photos:

Pattern created by frost on sand.
PHOTO JAN HENRIK KOREN

Ullmyrklegg,
– one of svalbard's plants.
Pedicularis lanata ssp. dasyantha.
PHOTO UNIS

Annual Report
Årsmelding

Wind, precipitation and temperature year 2002 in Longyearbyen

Vind, nedbør og temperatur i Longyearbyen år 2002

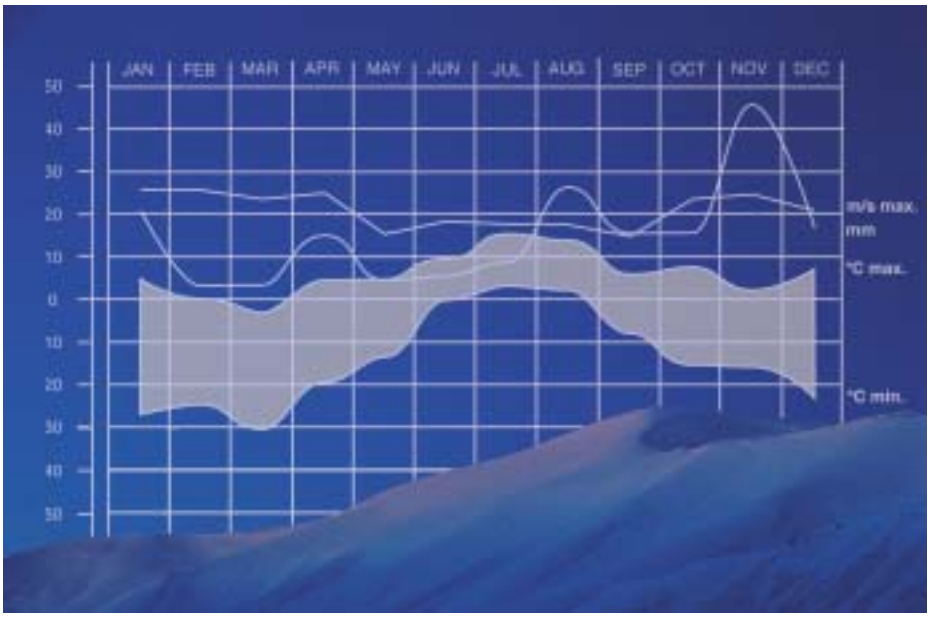


PHOTO: HENRIK RASMUSSEN

Trykt på svanemerket papir
Lisensnr. 244.024

UNIS Board 2002

PHOTO: TOR BREKKE

From left: Ole Jørgen Lønne, Åse Hjetland Bringedal, Kjell Sælen, Lasse Lønnum (former director), Viva Mørk Kvello, Steinar Nordal, Dag Hessen, Noralv Bjørnå.

PHOTO: TOR BREKKE

Audhild Schanche took over as director at UNIS the 1st of September 2002.

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

Professor Noralv Bjørnå,
University of Tromsø
Deputy Member:
Deputy Director Rigmor Bjørkli

Professor Dag Hessen,
University of Oslo
Deputy Member:
Director Toril Johansson

Professor Steinar Nordal,
Norwegian University of Science and Technology
Deputy Member:
Professor Sverre Ola Johnsen

Viva Mørk Kvello,
Longyearbyen Lokalstyres Representative
Deputy Member:
Gunhild Antonsen

Associate professor Ole Jørgen Lønne,
UNIS, Staff Representative
Deputy Member:
Head of Security and Logistics
Fred S. Hansen, UNIS

Åse Hjetland Bringedal,
Student Representative

Academic Workgroups

Academic workgroup in Arctic Biology:
Associate Professor Fredrika Norrbin, University of Tromsø
Professor Yngve Espmark, Norwegian University of Science and Technology
Associate Professor Torsten Solhøy, University of Bergen
Professor Hans Petter Leinaas, University of Oslo
Associate Professor Ketil Eiane, UNIS
Student Luis Schmidt, Student representative

Academic workgroup in Arctic Geology:
Professor Jürgen Meinert, University of Tromsø
Associate Professor Sverre Ola Johnsen, Norwegian University of Science and Technology
Professor Eirik Sundvor, University of Bergen
Professor Jon Ove Hagen, University of Oslo
Professor Ole Humlum, UNIS
Student Vaka Antonsdòttir, Student representative

Academic workgroup of Arctic Geophysics:
Professor Cesar La Hoz, University of Tromsø
Associate 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 A. Lorentzen, UNIS
Student Ulrich Hamann,
Student representative

Academic workgroup in Arctic Technology:
Associate Professor Torbjørn Eltoft, University of Tromsø
Professor Arne Myrvang, Norwegian University of Science and Technology
Professor Jakob J. Stamnes, University of Bergen
Professor Kaare Høeg, University of Oslo
Associate Professor Knut Vilhelm Høyland, UNIS
Student Bjørn Dettwiler,
Student representative

UNIS Staff 2002

Administration:
Study Counsellor Jan Gunnar Brattli
Office Manager Helen Fossmo Flå
Department Secretary Wenche Guldberg
Department Secretary Marianne Hatlestad
Librarian Berit Jakobsen
Director Lasse Lønnum (until August)
Study Counsellor Eystein Markusson
Director Audhild Schanche (from September)
Senior Executive Officer Ingrid Vinje

Technical staff:
IT-Engineer Gunnar Aske
Engineer Stefan Claes
Engineer Jørn Dybdahl
Head of Safety and Logistics Fred Skancke Hansen
IT-Engineer Kristian Jaldemnark
Janitor Frithjof Kildal
Cleaner Tove Kaldbekken Larsen
Chief Lab Technician Gerd Irene Sigernes

Department of Arctic Biology:
Research Fellow Malin Daase (from June)
Assosiate Professor Ketil Eiane
Professor Ingibjörg Svala Jónsdóttir
Associate Professor Rolf Langvatn
Associate Professor Ole Jørgen Lønne
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
Professor Olafur Ingolfsson
Associate Professor Ida Lønne
Associate Professor Tine Rasmussen
Research Fellow Marta Slubowska (from March)
Adjunct Professor Arild Andresen, University of Oslo (from April)
Adjunct Professor Ron Steel, University of Wyoming, USA
Adjunct Professor Anders Solheim, Norwegian Geotechnical Institute

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

Department of Arctic Technology:
Assosiate Professor Per Johan Brandvik
Associate Professor Knut W. Høyland
Research Fellow Per Olav Moslet (from February)
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, TotalFinaElf
Post.doc. Lionel Camus, Norwegian Research Council
Research Fellow Leif Egil Loe, Norwegian Research Council
Research Fellow Magne Andersen Drage, Norwegian Defence Construction Service
Post.doc. Angelique Prick, European Commission
Research Fellow Ragnheid Skogseth, Norwegian Research Council

Report of the Directors 2002

The University Centre on Svalbard – *Universitetssenteret på Svalbard AS (UNIS)* – received its charter as a national educational corporation on 29th November 2002. This new University Centre took the place of the former University Courses on Svalbard – *Universitetsstudiene på Svalbard (UNIS)* – an educational foundation established by the four Norwegian mainland universities in 1994.

The aims of the educational corporation are to provide a range of studies and engage in research based on the unique geographical location of Svalbard in the High Arctic, exploiting the special advantages that this offers from use of the natural environment as an outdoor laboratory and arena for scientific observations, data acquisition and analytical review. The studies aim to provide university level courses complementary to the teaching given at the mainland universities within a structured program that leads to a bachelor's, master's or doctor's degree.

The course offerings in 2002 covered a broad range and the number of students was the highest ever. Research activities in the year were also high, as is reflected in the increased external funding, initiation and participation in projects and the numbers of scientific publications produced.

Studies development

Courses at UNIS have an international profile and all tuition is given in the English language.

There are four lines of study at the University Centre: Arctic Biology, Arctic Geology, Arctic Geophysics, and Arctic Technology. The year 2002 saw consolidation within the four main lines. Tuition was given in 38 subjects. Nineteen of the courses are at postgraduate level. Our students achieve good results. The failure rate is less than 1 per cent. On average, students on full-time programs take 19 Norwegian credits per year (nominally 20 credits equals one year of study). The Directors hope to increase activity levels from now until 2006, with the main focus on master's and doctoral programs.

PHOTO: TOR BREKKE

A multicultural community. 23 nationalities were represented in 2002.

Student body

There were 288 students taking courses or working on master's or doctoral projects in 2002. The workload corresponds to 121 full student years and is the highest figure ever recorded at UNIS. There were 56 years of study at bachelor level, 32 on master's and doctoral studies, and 33 on master's and doctoral theses. UNIS is blessed with a high complement of international students, who made up 60 per cent of the student body. Roughly half of the international students come from Scandinavia, and all together 23 nationalities were represented in the year. Representation by women among the student body was roughly 50 per cent on higher and lower degrees alike.

Research activity

The year saw 53 students doing their master's thesis at UNIS and there were 21 registered doctoral candidates. They come to UNIS on programes sponsored by universities in Norway or abroad, and are assigned a tutor here in addition to their home university tutor. In 2002 there were 16 master's and diploma candidates who took their examination. The development and continuing expansion of research affiliations with the Norwegian universities and with Norwegian and international research institutes continues to be a priority focus. In 2002 UNIS staff contributed to 34 publications under a referee scheme. Several of our staff are key members of EU projects and several projects receive funding from the Norwegian Research Council.

The year also saw the assimilation of UNIS as a member of the University of the Arctic, and partnership contracts were signed with one more overseas university.

External affairs

The Directors consider it vital that work continues actively on public relations at UNIS. In 2002 a series of web-based publications of research results was established at UNIS. In January-February the so-called *Svalbard Seminar* was held jointly with the Norwegian Polar Research Institute and the Governor of Svalbard. Interest was very gratifying. During the *Research Days* in September, an *Open Day* was held with lectures, equipment demonstrations, and experiments. UNIS is the scene of many scientific conferences and seminars, and in 2002 there were eight such conventions. There were also a number of presentations given for visiting parties.

PHOTO: JAN HENRIK KOREN

The Artic light can be overwhelming

Organisation

The formal organisation of UNIS is into four Faculties supported by a Technical Department and the Administration. Faculty leaders join the Centre Director on the Executive Committee. Faculty Boards for each study line meet once a year with representation from the mainland universities and also act as the Faculty Advisory Councils.

Staff

At year's end there were 18 persons working full time on the academic staff, and another 17 associate professors and research fellows. The Technical staff comprised 7.8 positions and the Administration seven persons. The University Centre also had six externally funded positions in 2002.

The break-down of staff by gender was as follows:

	Women	Men
Administration	5	2
Technical	1.8	6
Academic	6	12
Associate professors		17
External funding	3	3

Campus and residences

The main UNIS building was completed in 1995 containing the laboratories, class-rooms, large auditorium, Library, canteen, 30 offices and reading cubicles for 100 students. There is a great dearth of lab space and offices for staff, visiting lecturers, visiting researchers, and fellows. The situation will persist until we can move into the Svalbard Science Centre in December 2005.

At year's end UNIS had 24 residences for the use of staff. With the increase in research activities at the University Centre the Directors find it imperative to continue to appropriate funding for residential investment.

The Student Union in Tromsø is in charge of residences for students at UNIS and has refurbished four old mining dormitories in Nybyen. The Union can now offer 120 units. In the near future a new building project will commence to bring the total student accommodation to 144 units.

It is absolutely vital to UNIS activities that we are able to offer the students satisfactory accommodation. The Directors are therefore keen to continue the good relations we enjoy with the Student Union in Tromsø.

Funding

Funds for operations and investments are appropriated to UNIS over the budget of the Ministry of Education and Research. In 2002 these funds totalled NOK 40 936 000 (Norwegian kroner), of which NOK 38 563 000 was committed to operations. The Annual Accounts for 2002 show that 50 per cent of goods and services are purchased from the local community. The operating account for the year reports a surplus of NOK 271 344. After allowing for financial incomes and expenses and extraordinary items the net surplus is NOK 657 379. This operating surplus will be transmitted to the free reserve. At 31st of December 2002 UNIS had a posted capital of NOK 59 804 178, of which NOK 48 779 187 represents the UNIS buildings and NOK 1 954 024 is the founding capital and free reserve. In 2002 the Institute Director received a salary of NOK 467 493. The Chairman of the Board of Directors received NOK 20 000 and the other Directors a bursary of NOK 10 000.

Going concern

The Annual Report and Accounts as presented are based on the assumption of continued operation. This assumption is based on the predicted budget surplus in 2003 and the long-range UNIS Strategy Plan for 2001-2010. The University Centre is financially in a sound position.

Working environment and staff

Sickness absence recorded in 2002 constituted 166 working days. UNIS has an arrangement with Longyearbyen Hospital to provide an institutional health service. No reportable incidents or accidents at work causing material damage or personal injury occurred in 2002.

The UNIS main building was constructed in 1995 to high environmental standards. Modern construction techniques, careful selection of materials and appropriate air-conditioning systems provide a sound internal climate.

As far as we know, there is nothing to suggest that operations at UNIS in any way pollute the external environment.

Directors' diary

During the year the UNIS Directors held four meetings, three of which were in Longyearbyen. The Directors considered 56 separate issues. Among the most important were the transition from an educational foundation to an educational corporation, the Budget, and the new building plans.

Looking forward

Work at the University Centre in coming years will concentrate heavily on design of the UNIS spaces in the Science Centre and the anticipation of expanded external funding for research projects. One very important task prior to the erection of the new premises will be to find flexible solutions for the increasing level of activities at UNIS. Under the terms of the Storting resolution to expand activities at UNIS, the Directors will engage actively in dedicated and constructive discussions with the Ministry of Education and Research on the matter.

Longyearbyen 30th of March 2003

Kjell A. Sælen *Steinar Nordal* *Åse Hjetland Bringedal*

Viva Mørk Kvello *Dag Hessen* *Noralv Bjørnå* *Ole Jørgen Lønne*

Audhild Schanche
Director

PHOTO: JAN HENRIK KOREN

Lyssettingen på Svalbard kan være overveldende.

Styrets beretning 2002

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 2002 vært stort, og antallet studenter det høyeste noensinne. Også forskningsaktiviteten har vært høy i 2002, 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 2002 ble studietilbudet innen de fire studieretningene konsolidert. Det ble gitt undervisning i totalt 38 emner. 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.

Studenttall

Til sammen 288 studenter fulgte undervisning, eller arbeidet med hovedfags- og doktorgradsoppgaver i 2002. Dette tilsvarer en studentaktivitet på 121 studentårsverk, og er det høyeste noensinne ved institusjonen. Av årsverkene var 56 på lavere grad, 32 på hovedfags

og doktorgradsemner og 33 i forbindelse med hovedfags- og doktorgradsoppgaver. Ved UNIS er det et stort innslag av utenlandske studenter, og denne studentgruppen utgjorde i alt 60 % av studentmassen. Omtrent halvparten av de utenlandske studentene kom fra Norden, og i alt 23 nasjoner var representert i 2002. Kvinneandelen blant studentene lå i 2002 rundt 50 % både for lavere og høyere grad.

Forskningsaktivitet

I 2002 var det 53 studenter som arbeidet med sin hovedfagsoppgave ved UNIS, og 21 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 2002 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 2002 var UNIS- ansatte medforfatter på 61 publikasjoner med referee-ordning. Flere forskere er sentrale i EU-prosjekter og flere prosjekter er finansiert/delfinansiert av Norges forskningsråd.

I 2002 ble UNIS opptatt som medlem av University of the Arctic, og det ble inngått samarbeidsavtaler med nok et utenlandsk universitet.

PHOTO: TOR BREKKE

UNIS has extensive contacts with researchers and scientific institutions home and abroad.

Annen virksomhet

Styret ser det som viktig at det fortsatt arbeides aktivt med formidling ved UNIS. I 2002 ble en nettbasert publikasjonsserie for forskningsresultater ved UNIS etablert. I januar/februar ble det såkalte "Svalbardseminar" arrangert i samarbeid med Norsk Polarinstitutt og Sysselmannen på Svalbard. Oppslutningen var meget god. Under Forskningsdagene i september ble det arrangert åpen dag med forelesninger, visning av utstyr og eksperimenter. UNIS tiltrekker seg mange faglige konferanser og seminarer, og i 2002 ble det i alt avholdt 8 slike. I tillegg ble det gitt en rekke presentasjoner for gjestende grupper.

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.

Staben

Ved årsskiftet 2002/2003 utgjorde den vitenskapelige staben 18 personer på full tid, samt 17 med professor II/førsteamanuensis II tilknytning. Det var en teknisk stab på 7,8 stillinger og en administrativ stab på 7 personer. I tillegg hadde UNIS 6 eksternt finansierte stillinger. Fordelingen mellom kjønnene er som følger:

	Kvinner	Menn
Administrasjonen	5	2
Teknisk avdeling	1,8	6
Vitenskapelig stab	6	12
Professor II		17
Eksternt finansierte	3	3

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 og 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 2002 disponerte UNIS 24 boliger til sine ansatte. Med økende forsknings-aktivitet 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. I løpet av 2003 vil det bli påbegynt ett nytt byggeprosjekt slik at den samlede boligmassen for studentene vil 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 2002 var bevilgningen på totalt kr 40 936 000, hvorav kr 38 563 000 gikk til drift. Regnskapet for 2002 viser at 50% av varer og tjenester kjøpes lokalt. Drifts-resultatet på årsregnskapet for 2002 viser et overskudd på kr 271 344. Etter finansinntekter/ finanskostnader samt ekstraordinære poster viser regnskapet et driftsoverskudd på kr 657 379. Driftsoverskuddet overføres til annen egenkapital. Stiftelsens totalkapital pr 31.12.02 var på kr 59 804 178 hvorav kr 48 779 187 utgjør institusjonens bygningsmasse og kr 1 954 024 utgjøres av grunnkapital og annen egenkapital. I 2002 er lønn til direktør utbetalt med kr 467 493. Styrehonorar er i 2002 utbetalt med kr 20 000 til styrets leder og kr 10 000 til styrets øvrige medlemmer.

Fortsatt drift

Årsoppgjøret er avlagt under forutsetning om fortsatt drift. Til grunn for antagelsen ligger resultatprognoser for 2003 og UNIS langsiktige strategiske plan for 2001-2010. Institusjonen er i en sunn økonomisk finansiell stilling.

Arbeidsmiljø og personale

Sykefraværet var i 2002 166 dagsverk. Institusjonen har avtale med Longyearbyen Sykehus om bedriftshelsetjeneste. Det er ikke forekommet skader eller rapportert om alvorlige arbeidsuhell eller ulykker i 2002 som har resultert i store materielle skader eller personskader.

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

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

Styrets virksomhet

I 2002 har styret for UNIS avholdt 4 møter, hvorav 3 i Longyearbyen. Det er i alt behandlet 56 saker. Viktige saker som ble behandlet i 2002 var omdannelse fra stiftelse til aksjeselskap, planene for nybygg og budsjett.

Veien videre

Arbeidet ved institusjonen de nærmeste årene vil være preget av utformingen av UNIS' areal i Forskningsparken, og en forventet økning i eksternt finansierte forskninsgprosjekter. En svært viktig utfordring frem mot realiseringen av nybygget vil være å finne fleksible løsninger for institusjonens økende aktivitet. 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.

Longyearbyen 30. mars 2003

Kjell A. Sælen | *Steinar Nordal* | *Åse Hjetland Bringedal*

Viva Mørk Kvello | *Dag Hessen* | *Noralv Bjørnå*

Ole Jørgen Lønne | *Audhild Schanche*
direktør

RESULTATREGNSKAP PR. 31.12. 2002

Tekst	Note	2002	2001
Driftsinntekter og driftskostnader			
Driftstilskudd fra KUF		38 563 000	33 708 000
Investeringstilskudd fra KUF, utstyr		1 383 042	1 260 528
Investeringstilskudd fra KUF, boliger		2 604 447	2 594 614
Eksterne prosjektinntekter		5 586 909	3 781 588
Øvrige inntekter		2 229 484	1 797 945
Brutto driftsinntekter		50 366 882	43 142 675
Eksterne prosjektkostnader		5 586 909	3 781 588
Netto driftsinntekter		44 779 973	39 361 087
Lønn og sosiale kostnader	4	19 848 545	17 620 622
Avskrivninger	3	3 987 489	3 855 142
Felt- og toktkostnader		6 910 172	6 179 194
Øvrige driftskostnader	2	13 762 423	11 921 719
Sum driftskostnader		44 508 629	39 576 677
Driftsresultat		**271 344**	**-215 590**
Finansinntekter og finanskostnader			
Finansinntekter		432 290	335 976
Finanskostnader		46 354	50 868
Netto finansinntekter		386 035	285 108
Ordinært resultat		657 379	69 518
Årsresultat		**657 379**	**69 518**
Disponeringer:			
Til/ fra annen egenkapital		657 379	69 518

NOTER TIL REGNSKAPET

Note 0: Regnskapsprinsipper

Årsregnskapet er satt opp i samsvar med regnskapslovens regler og er utarbeidet etter norske regnskapsstandarder og anbefalinger til god regnskapsskikk.

Eksterne prosjektinntekter/prosjektkostnader
Inntektsføring på ekstern finansierte prosjekter skjer i takt med kostnader på tilhørende prosjekt

Note 1: Tilskudd fra Utdannings- og forskningsdepartementet

Totalt tilskudd til drift og investering fra UFD er mottatt med 40.936.000. Derav er 2.373.000 ført i balansen som "investeringstilskudd". Tilskuddet blir inntektsført i takt med årlige avskrivninger.
Driftstilskuddet er ført etter bruttometoden som egen inntektspost i resultatoppstillinga.

BALANSE PR. 31.12. 2002

	Note	2002	2001
EIENDELER			
Anleggsmidler			
Bygninger	3	48 779 187	48 905 234
Utstyr og inventar	3	3 521 721	3 095 841
Andeler Svalbardhallen	6	1	1
Sum anleggsmidler		52 300 909	52 001 076
Omløpsmidler			
Varebeholdning		68 437	108 790
Debitorer		1 763 906	3 244 744
Andre kortsiktige fordringer	5	644 802	201 492
Betalingsmidler		5 026 124	3 854 327
Sum omløpsmidler		7 503 269	7 409 353
SUM EIENDELER		59 804 178	59 410 429
GJELD OG EGENKAPITAL			
Egenkapital			
Grunnkapital		200 000	200 000
Annen egenkapital		1 754 024	1 096 645
Sum egenkapital		1 954 024	1 296 645
Avsetninger med forpliktelse:			
Utsatt innt.føring på invester.tilsk.,utstyr		6 443 858	5 453 900
Utsatt innt.føring på invester.tilsk.bygg	3	44 129 187	47 205 234
Sum langsiktig gjeld		50 573 045	52 659 134
Kortsiktig gjeld:			
Leverandørgjeld		2 214 725	1 368 611
Skyldige offentlige trekk og avgifter		1 687 025	1 458 614
Annen kortsiktig gjeld		3 375 358	2 627 425
Sum kortsiktig gjeld		7 277 108	5 454 650
SUM GJELD OG EGENKAPITAL		59 804 178	59 410 429

Note 2: Øvrige driftskostnader		**2002**	**2001**
Fraktkostnader	kr	256 577	195 009
Vareforbruk	kr	95 616	85 195
Kostnader vedrørende lokaler	kr	2 614 429	2 053 112
Fremmedtjenester	kr	1 833 415	972 233
Bibliotekkostnader	kr	1 094 783	1 188 733
Kontorkostnader,telefon,fax	kr	881 732	932 643
Drift kjøretøyer	kr	362 534	361 054
Undervisningsmateriell	kr	1 065 345	484 201
Reisekostnader	kr	3 129 117	3 107 913
Forskningstøtte og stipender	kr	1 279 020	1 500 821
Annonser og profilering	kr	419 234	343 005
Kontigenter og forsikring	kr	233 707	290 388
Diverse kostnader	kr	496 913	407 411
Sum øvrige driftskostnader	**kr**	**13 762 423**	**11 921 583**

Note 3: Driftsmidler

Stiftelsen UNIS har i perioden 1993-1997 overtatt driftsbygning og tilsammen 20 boliger fra Svalbard Samfunnsdrift A/S (SSD). SSD var byggherre for bygningene og mottok tilskudd til oppføringen. Eiendomsretten til bygningene er overført vederlagsfritt til Stiftelsen UNIS og innført i balansen i 1997, med motpost "utsatt inntektsføring på investeringstilskudd, boliger".

Ved overtakelse av boligene er det i avtalen mellom Stiftelsen UNIS og SSD en klausul om tilbakeføring av boligene/leilighetene ved varig reduksjon av boligbehovet.

UNIS har i 2002 anskaffet to nye familieboliger og solgt en hybelleilighet.

Note 3: Avskrivninger bygninger:

Bygninger:	UNIS-bygget	4 boliger 238	5 leil	5 leil/ 6 boliger	2 leil	1 leil	1 leil	Hytte	Hytte	Hytte	2 leil	Salg	SUM
Ferdig år	aug-95	jan-94	jan-95	jan-97	des-98	jan-99	des-00	apr-98	aril-95	arpil-97	Des-02	Des-02	
Avskrivningssats	4 %	4 %	4 %	4 %	4 %	4 %	4 %	4 %	4 %	4 %	4%		
Kostpris	42 423 484	5 074 721	4 960 431	7 994 711	2 460 000	875 000	825 000	82 000	130 000	40 000	2 950 000		67 815 347
Bokf. verdi 31.12.01	31 563 072	3 450 810	3 571 511	6 395 769	2 164 800	770 000	792 000	69 972	94 900	32 400			48 905 234
Årets avskrivninger	1 696 939	202 989	198 417	319 788	98 400	35 000	33 000	3 280	5 200	1 600	9 833		2 604 447
Akkumulerte avsk. 31.12.02	12 557 351	1 826 900	1 587 338	1 918 730	393 600	140 000	66 000	15 308	40 300	9 200	9 833		18 564 560
Bokf. verdi 31.12.02	29 866 133	3 247 821	3 373 094	6 075 980	2 066 400	735 000	759 000	66 692	89 700	30 800	2 940 167	-471 600	48 779 187

Utsatt innt.føring på investeringstilskudd bygninger 31.12.01	47 205 234
Inntektsføring av investeringstilskudd boliger 2002	- 2 604 447
Salg av bolig des-02	-471 600
Utsatt innt.føring på investeringstilskudd bygninger 31.12.02	44 129 187

Utstyr og inventar

Økonomisk levetid for teknisk/vitenskapelig- og datautstyr er satt til 2 år mens inventar og kjøretøyer er sattt til 5 år. Utstyret er avskrevet etter saldometoden.

	Tekn./vit utstyr	Kjøretøy	Inventar	Datautstyr	SUM
Avskrivningssats	50 %	20%	20 %	50 %	
Kostpris 31.12.01	1 308 588	229 665	433 087	1 124 501	3 095 841
Anskaffelser 2002	570 349	211 400	385 245	641 929	1 808 923
Avskrivning 2002	626 312	58 809	109 111	588 810	1 383 042
Bokført verdi 31.12.02	1 252 625	382 257	709 221	1 177 619	3 521 721

I tillegg har Stiftelsen overtatt vederlagsfritt de driftsmidler som ble anskaffet i 1993.

Utsatt innt.føring på investeringstilskudd utstyr 31.12.01	5 453 900
Investeringstilskudd 2002	+ 2 373 000
Innteksføring av investeringstilskudd utstyr 2002	- 1 383 042
Utsatt innt.føring på investeringstilskudd utstyr 31.12.02	6 443 858

Note 4: Lønn og sosiale kostnader

UNIS har i 2002 lønnet 37 fast ansatte .

	2002	2001
Ordinære stillinger	11 245 735	10 046 744
Arbeidsgiveravgift	357 344	389 401
Arbeidsgivers andel pensjon	787 029	535 497
Andre ytelser	573 650	481 884

Note 5: Andre kortsiktige fordringer:

Reiseforskudd ansatte	.kr	191 683
Fordringer ansatte	.kr	71 527
Lån til ansatte	.kr	58 332
Forskudd leverandører	.kr.	334 210
Sum andre kortsiktige fordringer	.kr	655 752

Note 6: 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.

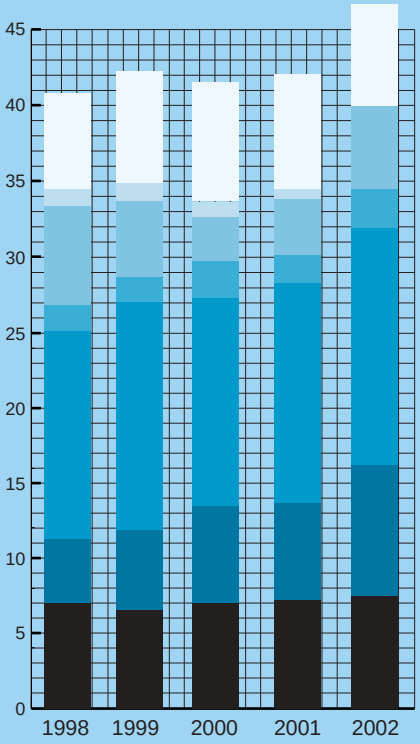
Note 7: Godtgjørelser

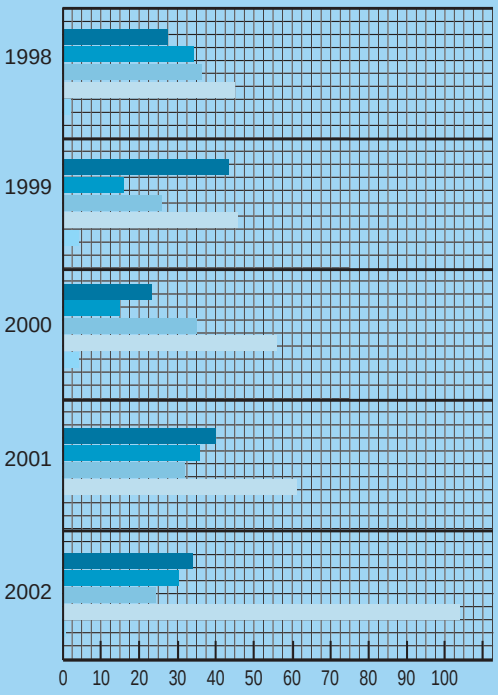
UNIS skiftet direktør 1.august i 2002.
Lønn til direktørene er utbetalt med 305 426 og 162 067
Arbeidsgivers andel pensjon direktører 20 922 og 11 101
Andre ytelser direktør 60 900
Styrehonorar er utbetalt med kr. 20.000 til styrets leder og kr 10.000 til styrets øvrige medlemmer.

Virksomheten revideres av Riksrevisjonen . Det utbetales ingen revisjonshonorar.

Longyearbyen 20.mars 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)

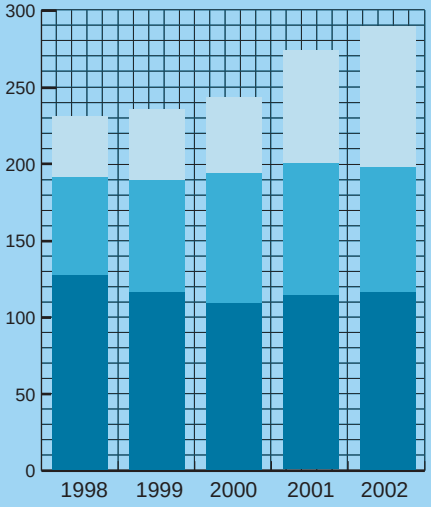
Books (all categories)
Bøker (alle)

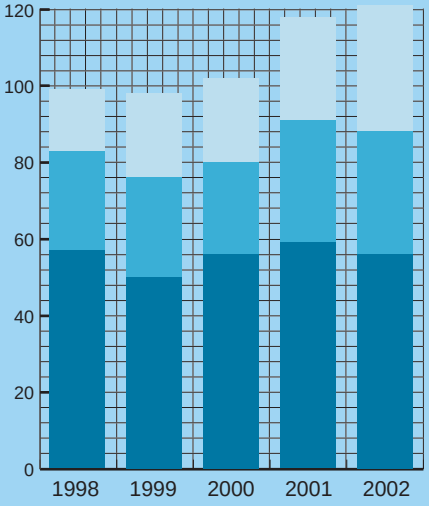
1 *Workforce in man-labour years according to occupational category at UNIS 1998–2002.*

Årsverk ved UNIS 1998–2002 fordelt på stillingskategori.

2 *Publications etc at UNIS 1998–2002.*

Publikasjoner etc. ved UNIS 1998–2002.





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

3 *Student nationality categorised as Norwegian Nordic and non-Nordic students 1998–2002.*

Totalt antall studenter ved UNIS 1998-2002 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 1998-2002, fordelt på undervisningsnivå.

Student Body Annual Report

As the Study Counsellor said when presenting UNIS: "We may be the smallest university in the world, but we have got the largest laboratory!" He was referring to all the work that a student at UNIS will be doing outdoors. The combination of such a small university with some of the best lecturers in their field, the unique Arctic "laboratory environment", and the lively city of Longyearbyen in which we live, are sure to provide a year you will not forget!

Studies

You will spend a lot of time outdoors as a student at UNIS. There you will be looking at peculiar features of the Arctic environment, taking samples of snow, ice, plants, animals, soil, measuring activity in the atmosphere, exploring the sea, and much more. All this on wilderness excursions that "normal" students can only dream of! We get around using snowmobiles, helicopters, planes, boats, cars and by foot.

Student democracy

At the beginning of every term a General Meeting is held to elect the Study Council (SC). The GM is the highest organ in the Student Union (SU), which comprises all the students. The Council oversees the daily work of the Union, including upkeep of our two cabins and touring equipment, management of funds, holding Norwegian courses for non-Scandinavian members, arranging parties, being responsible for welfare, and representing the students in the formal administration of UNIS.

The students have one representative on the UNIS Board of Directors. On the Board we have a vote, just like the other Directors. We are also represented on the Executive Committee, which handles the daily business of the University Centre. Thanks to this representation and the comparatively small size of the Institution, the voice of students at UNIS is really heard.

The Study Council also publishes a handbook for the new students, the *UNIS Student Survival Kit (USSK)*, which will tell you more about what to expect, and what to do besides studying, when you come to UNIS.

Funding

The Student Union receives financial support from UNIS and we can apply for additional funding from the Student Union in Tromsø. These funds go towards maintenance and renewal of cabins, sleds and touring essentials. Sleds are available on a modest hire basis against a deposit. Other touring gear is available at no charge to students. Some of the money also goes to covering unlucky students' medical bills, where you pay the basic fee of kr 220 and the Student Union picks up whatever is left after your private insurance.

Social calendar

So – what is there to do, apart from enjoying life as a student on top of the world? UNIS is actually closer to the North Pole than to the nearest McDonalds – a situation that many of us have learned to cherish. Although Longyearbyen will satisfy most of your civilised needs, and we do have good pizza here, it certainly helps to be able to marvel at the beauty of the surrounding mountains and mighty glaciers, and relish the eerie world of the Polar night.

If outdoor activities do not interest you, or even if they do, Longyearbyen always beckons with its rather intense night life, be it *Huset*, *Kroa* or *Puben* – even more so when compared to other cities of its size. There is also a large, active sports club based in *Svalbardhallen*.

Many former students of UNIS have never quite managed to get the experience out of their blood, and keep coming back for more. The close fellowship with staff and lecturers, the spectacular surroundings, and the incredible excursions make "the Svalbard experience" something to remember. Finally, a word of caution: life on Svalbard is addictive, spend time here, and the Polar virus will be in your blood for ever!

PHOTO: JAN HENRIK KOREN

You can't judge a man by his carriage.
This one is a lot less on the move than the UNIS students!

The UNIS Library

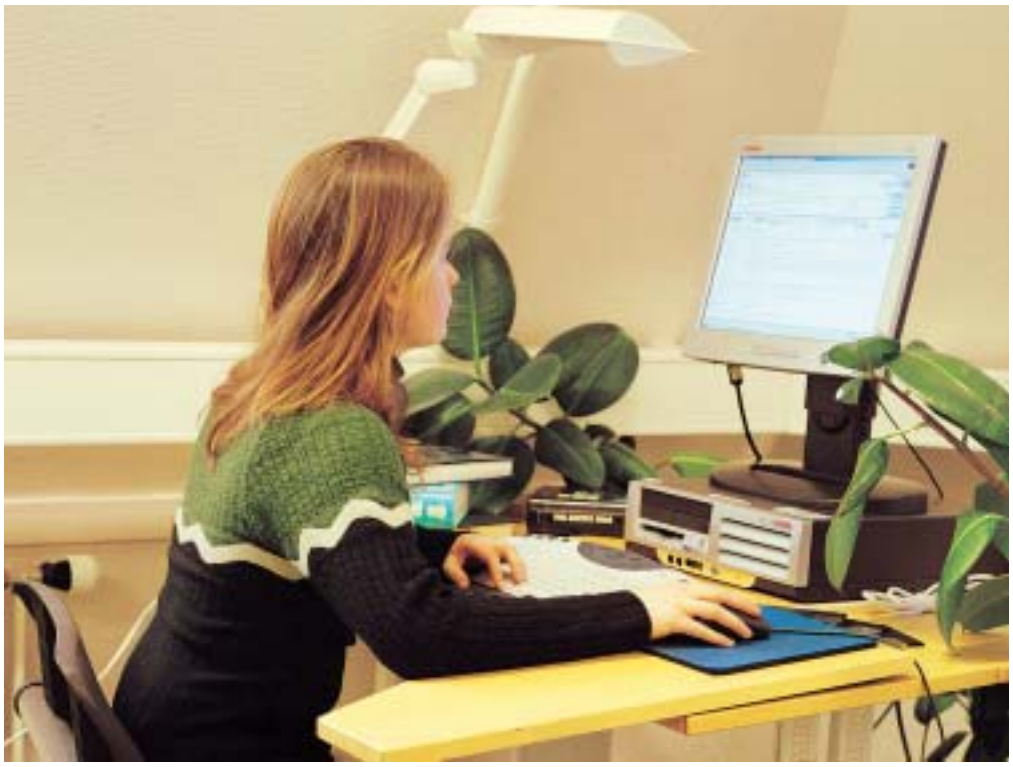


PHOTO: TOR BREKKE

The students are eager to use the library facilities.

The UNIS Library is the information gateway for students and staff at UNIS as well as staff at the Longyearbyen office of the Norwegian Polar Institute. There were 249 patrons registered using the Library in 2002, and only a handful have no connections to these institutions. The Library was open from 10 a.m. to 4 p.m, Mondays to Fridays, with one librarian on call, for a total of 204 working days. The librarian also had other duties, e.g. providing set books for students and compiling a publication list of 250 articles for the Annual Report.

In addition to BIBSYS, the library catalogue and management system, a total of eight reference databases kept scientists and students updated on their fields of study. The Library also holds an increasing quantity of books and periodicals, estimated at about 10,000 volumes in 2002. The 93 sq.m Library is not capable of holding all this literature, and shelves and cupboards elsewhere in the UNIS building are also in use. Subscriptions for 142 printed journals were held in 2002.

Over-the-counter loans totalled 2267 in 2002. In addition, a lot of books and journals are not checked out, but copied for further study. Our interlibrary loans are of great importance to most patrons, and 1031 copies and books were received in 2002, of which 69 from libraries abroad. The Library delivered a total of 202 copies or loans to other libraries or institutions, of which nine to destinations outside Norway. The Library registered 282 new entries in the BIBSYS catalogue in 2002; also 1366 journal issues were registered in the catalogue.

For some months during the autumn, faculty and students successfully tried out a free access offer for some 1500 journals via *ScienceDirect*, and we also explored a free trail offer for multiple reference databases via the *Web of Knowledge* gateway. We also had a free trial of *RefWorks*, a bibliographic management system and bibliography generator. The process of subscribing to full text journals from different publishers began in December.

Training and assistance of patrons in the use of reference databases and dealing with reference questions are very important and time-consuming duties in the Library, no less so due to the very many staff and students who come here for the first time each year.

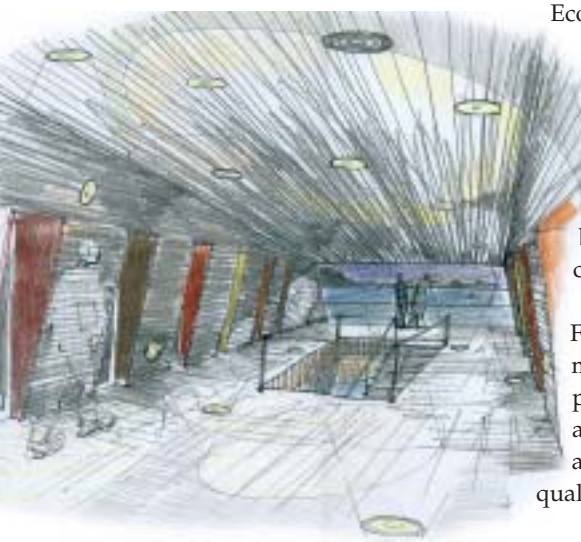
The UNIS Library has been a member of the Polar Library Colloquy since 1996 and attends the colloquies in alternate years. In the business meeting of the latest colloquy in Copenhagen, held from 17th to 21st June 2002, the UNIS librarian was re-elected onto the Steering Committee until the next meeting in 2004. Since 1995, the former and present UNIS librarians have continued to represent the University Centre at meetings of the BIBSYS Council.

Svalbard Science Park

Plans Crystallise

In December 2002, the design project for Svalbard Science Park – *Svalbard forsknings-park* – as drawn up by architects Jarmund/ Vigsnæs AS Arkitekter MNAL, was completed. The foundation work will commence in spring 2003, detail engineering will finish in autumn 2003, and the building will – if all goes well – be completed and ready for use in December 2005.

Apart from providing a new home for UNIS, the Science Park will also house the Longyearbyen office of the Norwegian Polar Institute, the Governor's Environmental and Ecological Information Office, the storage facilities of the Cultural History Collection and Svalbard Museum. Apart from solving space constraints for these various institutions, their collocation in the same building is expected to produce a significant boost to the research and scientific community on Svalbard.



For UNIS, the Svalbard Science Park will mean that the hitherto significant space problems will be resolved satisfactorily and the material conditions for research and tuition will improve significantly in quality.

Architectural design

The new building provides 8500 sq.m of floor space and will be built as an extension to the present UNIS complex. Its relation to the existing building is rather by affiliation than duplication. Holes for the foundation will be drilled and the structure will stand on steel piles frozen in place. The external roof and walls will be faced in copper, which in time will be coated in verdigris on site. The result will be a no-maintenance structure with simple and secure technical transitions between walls and windows, and between adjacent surfaces.

Internally, the common spaces will make extensive use of timber panelling, wooden floors, and glazed panels. A limited, but poignant, use of colour will endow vivacity and character, at the same time as it codes the various functionalities and departments. Offices will be simplistic, with painted gypsum board walls and linoleum floor sheet. Here colours will be stronger, but maintaining the warm character that provides a continuous theme throughout the building.

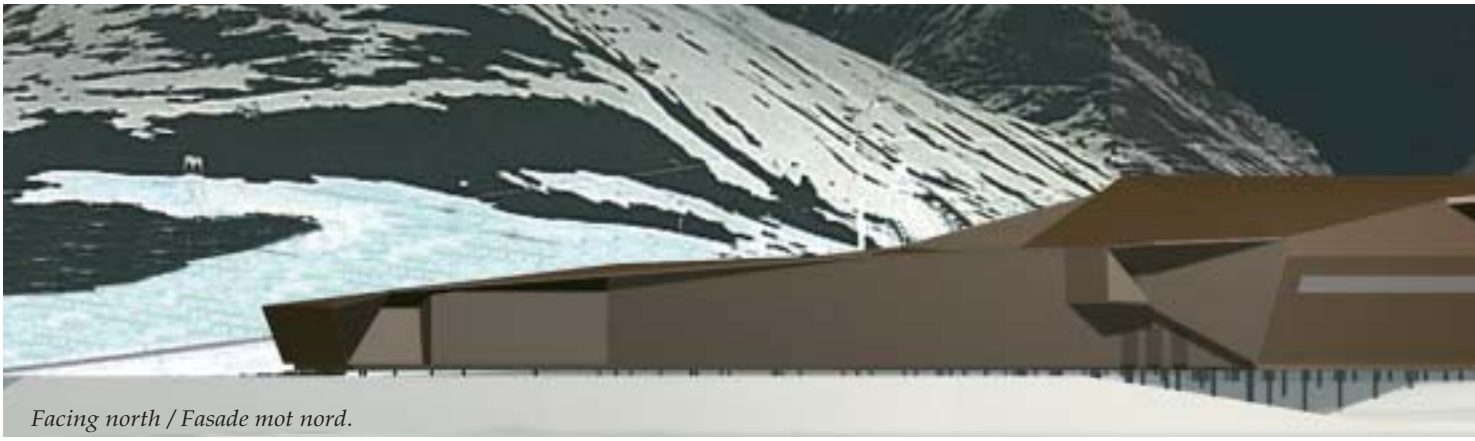
Compared to the size of other buildings in Longyearbyen, the Science Park will be large. The architectural choices made are both daring and functional. The result will be an attractive, modern and forward-looking structure that reflects both the natural and cultural elements of the Svalbard landscape.

Place and character

One straight-forward definition of the term place is that it is formed by nature, mankind and history. The physical environment contains buildings, other infrastructure and natural surroundings. Together these provide the arena for work, social life and recreation.

The UNIS building, when completed in 1995, changed the profile of Longyearbyen. The Science Park will change its face. It will represent a significant and notable statement about the essence of Longyearbyen, and a perception of what life in Longyearbyen is all about. Production of coal has been, and continues to be, a vital factor in Longyearbyen's identity. The Science Park will emphasise that also the production of Arctic knowledge is vital to the character and future-orientation of the town. Although most decisions on what the building will contain have been taken, a massive commitment will be needed to inject life and substance into the complex. For UNIS, the Svalbard Science Park will make possible continued development of Arctic research and education, in line with the University Centre's overall goal.

ILLUSTRATIONS:
JARMUND/ VIGSNÆS AS
ARKITEKTER MNAL



Facing north / Fasade mot nord.

Svalbard Forskningspark

Planene konkretiseres

I desember 2002 ble forprosjektet for Svalbard forskningspark, tegnet av Jarmund/Vigsnæs AS Arkitekter MNAL, ferdigstilt. Fundamentering igangsettes våren 2003, detaljprosjekteringen avsluttes høsten 2003 og bygget skal, dersom tidsplanen holder, stå ferdig for innflytting i desember 2005.

Foruten UNIS vil Forskningsparken romme Norsk Polarinstitutts avdeling i Longyearbyen, Sysselmannens miljøinformasjon og kulturhistoriske magasin og Svalbard Museum. Det er planlagt for å kunne huse også andre kunnskapsforetak som ønsker en base i Longyearbyen. Foruten å løse økende arealbehov for enkeltinstitusjoner, vil en slik samlokalisering av forsknings- og kunnskapsmiljøer kunne ha en stor synergieffekt.

For UNIS vil Svalbard Forskningspark bety at allerede store plassproblemer finner sin løsning, og at materielle betingelser for forskning og undervisning gjør et kvalitetssprang.

Arkitektoniske løsninger

Det nye bygget er på til sammen 8500 m^2, og vil reises i forlengelse av nåværende UNIS-bygg. Det er relatert til den eksisterende bygningen gjennom slektskap heller enn kopiering. Fundamenteringen vil være nedborede og fastfrosne stålpeler. Tak og vegger skal utvendig kles med kobber, som skal patineres på stedet. Dette vil gi et vedlikeholdsfritt bygg med enkle og sikre tekniske overganger mellom vegg og vinduer og mellom motstøtende flater.

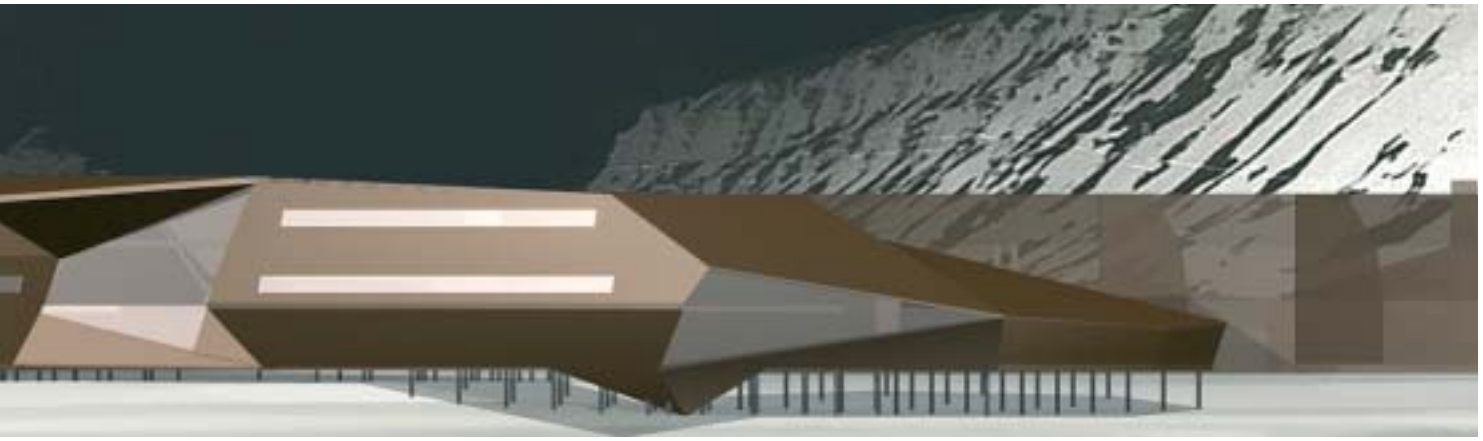
Innvendig vil det i fellesarealene være en utstrakt bruk av trepanel, tregulv og glasspartier. En begrenset, men poengtert bruk av farger vil gi liv og særpreg, samtidig som det markerer de forskjellige funksjoner og avdelinger. Kontorene blir enklere utført, med malte gipsvegger og linoleum gulvbelegg. Kontorene vil få en kraftigere fargebruk, men også her med det lune preg som vil danne en gjennomgangstone i hele bygningen.

I forhold til den øvrige bebyggelsen i Longyearbyen innebærer Forskningsparken et bygningsvolum uten sidestykke. De arkitektoniske løsninger som er valgt er både dristige og funksjonelle. Resultatet vil bli et vakkert, moderne og framtidsrettet bygg som samtidig ivaretar elementer av Svalbards særpreg, både når det gjelder landskap og bebyggelse.

Sted og karakter

En enkel definisjon på begrepet sted er at det utgjøres av mennesker, miljø og historie. Til det fysiske miljøet hører bygninger, annen infrastruktur og naturlige omgivelser. Til sammen utgjør dette arenaer for arbeidsliv, sosialt liv og fritidsaktiviteter.

UNIS-bygget, som sto ferdig i 1995, endret Longyearbyens profil. Forskningsparken vil gi preg til Longyearbyens ansikt. Den vil representere et betydelig og markant tilskudd til hva Longyearbyen fremstår som; hva livet i Longyearbyen oppfattes som å handle om. Produksjon av kull har vært og er en viktig del av Longyearbyens identitet. Forskningsparken vil gjøre det enda tydeligere enn i dag at produksjon av kunnskap har betydning for byens karakter og fremtidsberedskap. Selv om det for det meste er klart hva det nye bygget faktisk skal romme, vil det kreve et stort engasjement å gi det liv og innhold. For UNIS vil det muliggjøre en videreutvikling av arktisk forskning og utdanning i tråd med de overordnede mål selskapet skal oppfylle.



Arctic Biology

By Carolin Arndt and Malin Daase

The Department of Arctic Biology offers education and performs research in Arctic Biology and Ecology in marine and terrestrial environments. In spite of this broad range of biospheres and the relatively small size of the Department, we have a coherent and unifying research strategy. This year we have chosen to highlight research in *Arctic Pelagic and Cryo-pelagic Biospheres*.

Arctic pelagic and cryo-pelagic research at UNIS

The archipelago of Svalbard borders the northernmost tip of the Eurasian continent. This location is unique since it is the geographical meeting point of two major environmental regimes: the boreal-Atlantic system, established by the warm water stream of the West-Spitsbergen Current (a northerly branch of the North-Atlantic Current); and the Arctic Ocean, with its permanent sea-ice cover. As a consequence, the climate on sea and land varies from temperate to severe High Arctic conditions. Mild summers, painted gold by the midnight sun, are followed by freezing cold winters clothed in eternal darkness. In this Annual Report we will focus on two research projects centred on large-scale studies of pelagic and "cryo-pelagic" (sympagic, ice-embedded) ecosystems, taking advantage of the status of Svalbard as a border-area between two climatic and bio-geographic zones, the Atlantic and the Arctic.

One ongoing research project at UNIS aims to understand how the energy flow in Arctic marine pelagic ecosystems responds to variations in ocean climate. Important members of the pelagic community are tiny crustaceans, so-called copepods of the genus *Calanus*, which have been the focus of many studies on the pelagic ecosystems of the northern seas. Although similar in their morphology, the Atlantic species *C. finmarchicus* and the two Arctic species *C. glacialis*, and *C. hyperboreus* differ in size and life strategy. As an adaptation to the Polar environment, the Arctic species have longer life cycles and accumulate larger lipid stockpiles than the Atlantic species, thus offering different food qualities to the next trophic level. The distribution of these three species overlaps in the waters around Svalbard. Together they make up the bulk of biomass available to higher trophic levels. Polar cod (*Boreogadus saida*) is the dominant vertebrate planktivore in these waters. As a prey species for seals and whale it is thus an important link between zooplankton production and the top predators.

Plankton by definition drift passively with the water currents in which they live. The West-Spitsbergen Current transports, not only relatively warm water to the north of Svalbard, but also a boreal Atlantic plankton community different from that found in Arctic waters. Both the extent to which Atlantic species are expatriated to Arctic waters, and the degree to which Arctic water masses with a Polar species composition penetrate south, depend on the strength of the northbound currents.

Large-scale meteorological factors, such as the North-Atlantic Oscillation Index, affect the West-Spitsbergen Current, and inter-annual variations in the ocean climate around Svalbard are common. Due to differences in the lipid storage between Arctic and Atlantic species, changes in the distribution of those species will have an effect on the next trophic level. A more permanent change in ocean climate, as a consequence of changes in the Earth, will most likely lead to a shift towards a more boreal (Atlantic) species composition. To what degree the pelagic ecosystem, and the resident food chain will react to this, is a question of major importance to our understanding of how climate change may affect the ecosystems in the Arctic.

Ongoing intensive sampling of zooplankton and Polar cod, combined with concurrent measurements of the physical oceanography in Svalbard waters, coupled with data available from the literature or provided by the Norwegian Polar Research Institute, help us to reach a better understanding of how the pelagic system reacts to local variations in ocean climate.

Other studies

Other marine studies at the Department of Arctic Biology concentrate on small-scale processes, such as advection and population dynamics in Arctic fjords along the western coast of Svalbard

North of Svalbard, the influence of the North-Atlantic waters diminishes, and the perennial sea-ice cover becomes a significant environmental feature. Over the last three decades, ice scientists and climatologists have registered a continuing shrinking of the Polar ice pack, in extension and thickness. Little is known yet about the impact of a reduction in sea-ice cover on these "cryo-pelagic" (sympagic, ice-embedded) species, or other ice-dependent species. Sea-ice provides a "home" for a unique fauna that includes a number of crustaceans and Polar cod. All these species gain importance

PHOTO: MALIN DAASE

Using RV Lance as a platform for sampling. Distribution and abundance of pelagic orgamisms vary spatially being a finger print for different water masses.

PHOTO: MALIN DAASE

Ice-based diving for cyro-pelagic fauna at 91° North. Different ice types and under-ice structures show different species composition and densities.

as a food source for seabirds, seals, whales and the Polar bear, the further North one moves, away from the shallow coastal shores.

As far as we know, the sympagic fauna lives a predatory life or feeds on ice algae and drifting organic particles, which are entrapped in the ice during freezing, or are flushed into crevices and channels by wave action. Yet the energetic fluxes that radiate through the ice ecosystem (such as the amount of food available under the ice pack and provided by ice organisms, their metabolic turnover and transfer rate into faeces, etc.), are not well understood. The ice fauna project at UNIS includes studies on sea-ice faunal distribution and composition, reproduction and growth rates of "true ice species", as well as pathways and partition of energy and matter, being turned over in the ice-based ecosystem.

The species we term "true ice species" use the ice as a ground for reproduction, nursery and shelter, while it drifts for thousands of kilometres around the Arctic Ocean. The average life-span of drifting sea-ice ranges from three to five years. During winter the area of the ice cover doubles in size. Thus, half of the Arctic ice pack is young first-year ice that partly mingles with the old (multiyear) ice on its transpolar drift. A recent study at UNIS compiles all data available on ice fauna in the circumpolar ice cover, and looks for patterns underlying the highly scattered biomass and density values found. The study shows that ice origin and large-scale drift patterns, coupled with the history of freeze and melt events, very much determine the properties of the ice ecosystem. We now have a rough understanding of where the ice fauna originates, and how it radiates through the entire Arctic. But we do not know the fate of this fauna when the ice melts in the subarctic thawing area. Since roughly 20 per cent of the total Arctic ice volume exits every year from the Arctic Ocean into the Fram Strait between Greenland and Svalbard, we assume that there occurs a severe loss of ice-embedded biomass each year. An ongoing extensive trawling program addresses questions on the fate of the ice fauna in the Fram Strait and north of Svalbard.

These marine research projects are made possible by the funding provided from UNIS and TotalFinaElf, and the ship time logistic services of the University of Tromsø and Norwegian Polar Research Institute. The unique location of UNIS, allied with its facilities and logistics, make it attractive to young scientists – like us Ph.D. students – who can work here in an international research environment

Emner undervist 2002 / Courses taught 2002

course No	course name	credits (ECTS)	semester	No. of students
AB-201	Terrestrial arctic biology	5 (15)	autumn	16
AB-202	Marine arctic biology	5 (15)	autumn	15
AB-203	Arctic environmental management	5 (15)	spring	30
AB-204	Polar ecology and polulation biology	5 (15)	spring	18
AB-303	Light Climate and Primary Production in the Arctic	3 (9)	spring	13
AB-307	Arctic Microbiology	3 (9)	autumn	11
AB-308	Arctic freshwater ecology	3 (9)	spring	9
AB-310	Marine zooplankton and sympagic fauna of Svalbard	3 (9)	autumn	15
	SUM Arctic biology	**32 (96)**		

Research Projects

PHOTO: MALIN DAASE

Processing the ice fauna samples collected by SCUBA divers.

Title: Population dynamics of zooplankton in the North Sea
Collaborating institutions: University of California San Diego, University of Bergen
Financing: UNIS
Duration: 1997-2002
UNIS: Ketil Eiane

Title: Distribution of zooplankton in relation to biophysical gradients associated with frontal systems
Collaborating institutions: University of Kiel, Germany
Financing: UNIS
Duration: 2000-2002
UNIS: Ketil Eiane

Title: Population dynamics of Calanus spp. in environmental gradients in Arctic fjords
Collaborating institutions: University of Bergen
Financing: UNIS
Duration: 2000-2002
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
Financing: NP, UNIS
Duration: 2000-2003
UNIS: Ketil Eiane

Title: Effect of climate warming on tundra vegetation, The International Tundra Experiment, ITEX.
Collaborating institutions: Agricultural Research Institute and Icelandic Institute of Natural History, Iceland, Göteborg University, Sweden
Financing: Icelandic Science Foundation, Carl XVI Gustafs 50-års fond, UNIS
Duration: 1994-2003
UNIS: Ingibjörg S. Jónsdóttir

Title: Population ecology of clonal tundra plants: impacts of herbivores, climate and glaciation history
Collaborating institutions: University of Tromsø, Swedish University of Agricultural Sciences at Balsgård, Colorado State University
Financing: UNIS, National Science Foundation
Duration: 1999-2002
UNIS: Ingibjörg S. Jónsdóttir

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

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 11 others
Financing: European Union
Duration: 2002-2004
UNIS: Ingibjörg Jónsdóttir

Title: The effect of winter conditions on Arctic plant populations and vegetation
Financing: UNIS
Duration: 2002-
UNIS: Ingibjörg 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: 2000-2003
UNIS: Rolf Langvatn

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: Rolf Langvatn, Frank Nilsen

Title: Image analysis techniques in quantitative marine benthic ecology
Collaborating institutions: University of Tromsø
Financing: UNIS
Duration: 1997-
UNIS: Ole J. Lønne

Graduates 2002
Cand.scient.

Title: Advection of Zooplankton in an Artic Fjord (Kongsfjorden, Svalbard)
Collaborating institutions: Christian-Albrecht-University, Germany
Student: Sünnje Linnèa Basedow
Supervisors: Ketil Eiane (UNIS), Dr. Michael Spindler (Christian Albrecht University, Germany)
Finished: Spring 2002

Title: Marine soft-bed communities along environmental gradients in Kongsfjorden
Collaborating institutions: University of Oslo (UiO)
Student: Tormod Glette Hansen
Supervisors: Ole J. Lønne (UNIS), John S. Gray (UiO)
Finished: Spring 2002

Title: Population dynamics of *Calanus finmarcicus*, *Calanus glacialis* and *Calanus hyperboreus* in Arctic fjords
Collaborating institutions: University of Bergen (UiB)
Student: Gyda Arnkvern
Supervisors: Ketil Eiane (UNIS), Dag L. Aksnes (UiB)
Finished: Autumn 2002

Title: A compasison of different benthic sampling techniques (photography, video-recording and hand picking) in Isfjorden, Svalbard
Collaborating institutions: University of Tromsø (UiT)
Student: Tore Magne Hoem
Supervisors: Ole Jørgen Lønne (UNIS), Bjørn Gulliksen (UiT/UNIS)
Finished: Autumn 2002

Title: Ecological studies on echinoderms in Svalbard waters
Collaborating institutions: Christian Albrecht University, Germany
Student: Rupert H. Krapp
Supervisors: Ole Jørgen Lønne (UNIS), Dr. Michael Spindler (Christian Albrecht University, Germany)
Finished: Autumn 2002

Title: Dynamic of overwintering *Calanus* spp. in an Arctic Fjord
Collaborating institutions: University of Glasgow, Scotland
Student: Kathrina Wheeler
Supervisors: Ketil Eiane (UNIS), Dr. R.W. Furness (University of Glasgow, Scotland)
Finished: Autumn 2002

PHOTO: KETIL EIANE

Biology students on field excursion in Spring.

Graduate students 2002
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 (UiT), TotalFinaElf
Student: Carolin E. Arndt
Supervisors: Ole J. Lønne (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, Poland, University of Tromsø (UiT)
Student: Piotr Kuklinski
Supervisors: Ole J. Lønne (UNIS), 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: Biology and ecology of marine cold-water species in the Arctic
Collaborating institutions: University of Tromsø (UiT), TotalFinaElf
Student: Sten R. Birkely
Supervisors: Ole J. Lønne (UNIS), Bjørn Gulliksen (UiT/UNIS)

Title: Extent and dynamics of changes in Arctic microbial communities as a consequence of exposure to hydrocarbones.
Collaborating institutions: Univerity of Tromsø (UiT), TotalFinaElf
Student: Stian Røberg
Supervisors: Rolf Arnt Olsen (Agricultural University of Norway/UNIS), Bjarne Landfald (UiT)

PHOTO: KETIL EIANE

Silene acaulis (Fjellsmelle).

Title: Succession of organism after glacial retreat on Spitsbergen: The role of cyanobacteria and nitrogenfixation in ecosystem development.
Collaborating institutions: University of Tromsø (UiT), University of Idaho, USA
Student: Ursel Schütte
Supervisors: Rolf Arnt Olsen (Agricultural University of Norway/UNIS), Bjørn Solheim (UiT), 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)

Cand.scient.

Title: Population structure and tropic interactious in polar cod (*Borealis saida*) in fjord on Svalbard
Collaborating institutions: University of Oslo (UiO)
Student: May Arnberg
Supervisors: Ketil Eiane (UNIS), Stein Kaartved (UiO)

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

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

Title: Patterns of mortality caused by starvation in a Svalbard reindeer population
Collaborating institutions: Swedish University of Agricultural Sciences
Student: Pernilla Hansson
Supervisors: Rolf Langvatn (UNIS), Öje Danell (Swedish University of Agricultural Sciences)

Title: Makebevoktning og sang hos hanner av snøspurv Plectrophenax nivalis, på Svalbard sett i relasjon til deres foreldreinnsats
Collaborating institutions: Norwegian University of Science and Technology (NTNU)
Student: Marie Lier
Supervisors: Rolf Langvatn (UNIS), Yngve Espmark (NTNU), Arne Moksnes (NTNU)

Title: Life history and abundance (Mertensia ovum) in relation to lipids
Collaborating institutions: University of Tromsø (UiT)
Student: Marte Lundberg
Supervisors: Ketil Eiane (UNIS), Bjørn Gulliksen (UiT/UNIS)

Title: On the structure of benthic soft-bottom macrofauna at Jan Mayen; A comparison of data retrived 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)

Title: Ecological amplitude in two evergreen dwarf-shrubs in Svalbard: growth and reproduction along topographic gradients
Collaborating institutions: University College of Gotland
Student: Anna Nilsson
Supervisors: Ingibjörg Jônsdottir (UNIS), Karin Bengtsson (University College of Gotland)

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

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

Title: One of the best managed wilderness areas in the world - demands and reality in wilderness conservation on the arctic arcipelago Svalbard
Collaborating institutions: University of Greifswald
Student: Sebastian Unger
Supervisors: Rolf Langvatn (UNIS), Dr. Konrad Ott (University of Greifswald, Germany), Dr. Michael Succow (University of Greifswald, Germany)

Title: Spatial dynamics of zoolplankton in an Arctic fjord
Collaborating institutions: Christian Albrecht University, Germany
Student: Daniel Vogedes
Supervisors: Ketil Eiane (UNIS), Dr. Michael Spindler (Christian Albrecht University, Germany)

Arctic Geology

By Ole Humlum

PHOTO: OLE HUMLUM

The learning road to understanding the complex arctic nature is well represented in Svalbard. Here is one example from Ny Ålesund, NW Spitsbergen.

PHOTO: OLE HUMLUM

Ice wedge furrows in lower Adverntdal. About 1 m below the terrain surface massive ice wedges extends to a depth of 3-5 m, measuring 1-3 m across. Ice wedges are one of several surface expressions of continuous permafrost on Svalbard.

The geological research vision for the period 1999-2003 as presented in the 1998 issue of the UNIS Annual Report is still the background for both tuition and research within the Department of Geology. During 2003 a new research vision will be formulated for the years to come.

In 2002 the department offered 12 courses; four on 200-level and eight on 300-level. The 200-level courses making up the one-year (60 ECTS or 20 credits) study program were offered in their present form for the 9th time. We have continued the work towards greater consistency within the 300-level courses and a stronger theoretical profile matching ongoing research activities. The eight 300-level courses (duration from 2 to 5 weeks) offered for masters and doctoral candidates total 60 ECTS or 20 credits.

Our academic staff numbers four full-time faculty and three secondary positions. Adjunct Professor Arild Andresen (Department of Geology, University of Oslo) was appointed spring 2002, and the department thereby also work towards strengthening pre-Quaternary studies at UNIS. Dr. Angélique Prick (Belgium) continued her studies under a two-year Marie Curie Fellowship, funded by the European Commission. In co-operation with University of Göteborg and in collaboration with the Universities of Stockholm and Alberta, Sofia Holmgren in 2002 has been working on a Ph.D. project focusing on Late Glacial and Holocene climate and environmental variability on Svalbard. Marta Anna Slubowska in 2002 was appointed in a new Norwegian funded Ph.D. scholarship at UNIS, initiating a marine geology research project.

The Department thus has been able to acquire new professional competence in 2002, but guest lecturers still remain a vital resource for implementation of our extensive range of courses. Guest lecturers are also regularly partners in our ongoing scientific projects. This helps build commitment and improves the predictability and continuity of the teaching. The contact with guest lectures is also of great value to our students who in this way meet at close hand examples of research conducted on Svalbard and elsewhere in the Arctic.

During 2002, the 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 this report (list below) as well from supplementary information now available on the Internet. A few examples of ongoing research initiatives at the department are shortly outlined below.

The project that studies the climate and vegetation history of Svalbard over the past 10,000 years, based on high-resolution analyses of lake sediment cores collected from lakes in western Spitsbergen, continued during 2002. During fieldwork in May, cores were collected from the Brøgger Peninsula, south of Kongsfjorden, and one additional fieldwork season is planned for the spring of 2003. A range of tests, including analyses of diatoms, biogenic silica, chironomids, macrofossils, C/N ratios and CN content, will be applied to the sediment sequences to trace shifts in the ecosystem over time. These records will help us decipher climatic evolution and reveal the pattern and timing of early/mid Holocene warming, Neoglacial cooling, Little Ice Age changes, and temperature variability during the past 150 years.

In a cooperative project between the departments of geology and biology at UNIS, a lake monitoring programme was initiated in 2002. The aim of that program is to observe and quantify different physical and biological processes operating in and around Svalbard lakes for a better 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.

As a part of an ongoing investigation on the Late Quaternary glacial and climate history of the Russian high arctic, an expedition with UNIS participation visited the Severnaya Zemlya archipelago for fieldwork in July-August. This is one of the most remote areas in the arctic, rarely visited by scientists. The expedition was very successful, and brought home diverse data that reflect on how climate, environments and relative sea levels have developed for the past >140.000 years

The avalanche-related research initiative taken in 2001 was continued, making use frequent field investigations, automatic digital cameras and automatic meteorological stations, in order to map snow cover variations in the landscape around Longyearbyen. This project was prompted by a tragic event in February 2001, where a snow avalanche near Longyearbyen killed two persons. The extensive mountain plateaus around Longyearbyen act as source areas for drifting snow during the winter and this redistribution of precipitation have significance for avalanche activity and other phenomena such as glacier mass balance. On a more local scale the thickness of the snow

cover is also important for ground temperatures due to the insulating effect, thereby influencing upon temperature and thickness of permafrost in the region. Also the plant cover is influenced by the thickness and duration of the snow cover, both during winter where the snow cover protects from physical wind abrasion and low temperatures, and during the growing season where surviving snow patches act as water reservoirs. A modeling research initiative (snow cover, permafrost thickness, active layer, growing degree days, etc.) is carried out in co-operation with results derived from this field-based project.

EU-funded Post.Doc Angelique Prick has continued a detailed research program on rock weathering in high latitude environments initiated in 2001. Frost weathering of bedrock is highly important in permafrost environments and represents a research topic that has been studied for about a century both in the field and in laboratory at various research institutions. 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 the most likely to act in the temperature and moisture conditions characterizing natural environments, as the water contents levels that are the most common in nature are far from complete saturation. Near Longyearbyen a detailed research program on rock weathering, -temperature and – moisture now has been initiated at a site that is accessible on a daily year-round basis, making detailed observations possible.

In 2002 a new Ph.D. project was initiated by Marta Anna Slubowska, entitled: *Paleoceanography and sediment variations in relation to climate change: A marine core study from the Svalbard margin.* This Ph.D. project aims to reconstruct the timing and development of the Holocene and the Last Deglaciation on the Svalbard margin. The Svalbard archipelago was chosen for this study, because of its location in the high Arctic at the northernmost reach of the warmer West Spitsbergen Current, which forms the continuation of the North Atlantic Current. In this specific setting, even small variations in the current system are expected to have a large effect on the regional climate. Thus, the Svalbard area is ideal for monitoring past changes in the ocean circulation. For the purpose of this study cores from the western and north Svalbard margin and Storfjorden have been collected. Oceanographic proxies intended in this project, such as: ice-rafted detritus, oxygen and carbon stabile isotopes, magnetic parameters, foraminiferal faunas, spectral reflectance and radiocarbon dates are well known parameters for investigating past oceanic and climate changes.

The secretariat for the International Permafrost Association (IPA) has been housed at the department during most of 2002. The secretariat is run by Dr. Hanne Christiansen (University of Oslo), who is guest at UNIS in connection with a research project on ice wedges in nearby Adventdalen. Masters degree students at the Department of Geology studied various issues related to, e.g., active layer development, permafrost, ice wedges, the relation between rock glaciers and debris-covered glaciers, glacial geomorphology at a surge-type glacier, the dynamics of a surge-type glaciers and the geomorphic impact of snowmobiles. Please see seperate list of M.Sc. projects.

PHOTO: OLE HUMLUM

Automatic digital camera operating in Adventdalen, monitoring ice wedge cracking and snow cover variations.

PHOTO:
MARTA SLUBOWSKA

Small single-cellular marine animals, called Foraminifera, measuring only one third of centimetre in size, gives clues as to past climate changes.

Emner undervist 2002 / Courses taught 2002

course No	course name	credits (ECTS)	semester	No. of students
AG-201	The geology of Svalbard	5 (15)	autumn	9
AG-202	Arctic marine geology	5 (15)	spring	15
AG-204	The physical geography of Svalbard	5 (15)	autumn	13
AG-206	Marine Geological and Geophysical Studies: Data Acquisition and Interpretation	2 (6)	spring	9
AG-207	Seismic exploration	3 (9)	spring	11
AG-301	Arctic terrestrial and marine quaternary stratigraphy - excursion	2 (6)	autumn	21
AG-303	Sequence stratigraphy: A tool for basin analysis	2 (6)	autumn	14
AG-304	Glacial and periglacial processes	3 (9)	spring	20
AG-305	Glaciology	2 (6)	spring	20
AG-306	The quaternary climate history of the arctic	3 (9)	autumn	10
AG-308	Sedimentary facies analysis - From processes to systems tracts	3 (9)	spring	13
AG-309	Quarternary climate records and climate models	2 (6)	autumn	11
	SUM Arctic geology	**37 (111)**		

Research Projects

PHOTO: OLE HUMLUM

Scientist studying crevasse fill on lower Larsbree near Longyearbyen.

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, Denmark, University of Copenhagen, Denmark
Financing: UNIS
Duration: 1999-2005
UNIS: Ole Humlum

Title: Modelling 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, University of Tromsø.
Financing: UNIS
Duration: 1999-2003
UNIS: Ólafur Ingólfsson

Title: Holocene glacial and climate history of Alexander Island, Antarctica
Collaborating institution: Göteborg University,Sweden, Lund University, Sweden
Financing: Swedish Natural Sciences Research Council
Duration: 1999-2002
UNIS: Ólafur Ingólfsson

Title: Late Quaternary glacial history of Severnaya Zemlya, Arctic Russia
Collaborating institution: Göteborg University,Sweden, Lund University, Sweden, 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 Denmark, Geological Survey of Denmark and Greenland (GEUS), Rostock University, Germany, University of Bergen
Financing: UNIS
Duration: 1999-
UNIS: Tine L. Rasmussen

Title: LAMSCAN: Detecting Rapid Environmental Changes through Studies of Annually Laminated Sediments in Northern Scandinavia and the Faeroe Islands: Linkages to the North Atlantic Ocean
Collaborating institution: Lund University, Sweden, Stockholm University, Sweden, Norwegian Polar Institute.
Financing: The Nordic Counsil of Ministers, program NARP (Nordic Arctic Research Programme 1999-2002)
Duration: 1999-2002
UNIS: Tine L. Rasmussen

Title: Linking land and sea at the Faeroe Islands: Mapping and understanding north Atlantic changes (LINK)
Collaborating institutions: University of Lund, Sweden, University of Copenhagen, Denmark, Geological Survey of Denmark and Greenland, Faroese Museum of Natural History, University of St.Andrews, Scotland
Financing: Danish Natural Science Research Council
Duration: 1999-2002
UNIS: Tine L. Rasmussen, Ole Humlum

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: Sea level control on turbidite accumulations, the Battfjellet formation
Collaborating institution: University of Bergen, University of Wyoming, USA
Financing: WOLF-consortium
Duration: 1995-2003
UNIS: Ronald Steel

Graduates 2002
Cand.scient

Title: Palaeoclimatic indicators for central Spitsbergen, Svalbard. Exemplified by studies of ice wedges and their host sediments
Collaborating institutions: University of Copenhagen, Denmark
Student: Jon Willaing Jeppesen
Supervisors: Ole Humlum (UNIS), Hanne H. Christiansen (University of Copenhagen, Denmark)
Finished: Spring 2002

PHOTO: OLE HUMLUM

Calving Kronebreen at the head of Kongsfjorden, NW Spitsbergen. Frequent crevasses testifies to the high flow velocity. The glacier measures about 4 km across.

Title: Geomorphic analysis of Ugledalen rock glacier, central Spitsbergen, Svalbard
Collaborating institutions: University of Copenhagen, Denmark
Student: Sisse Korsgaard
Supervisors: Ole Humlum (UNIS), Hanne H. Christiansen (University of Copenhagen, Denmark)
Finished: Spring 2002

Title: Impact of meteorological factors and local conditions on active layer depth and temperature, Adventdalen area in Central Spitsbergen, Svalbard
Collaborating institutions: University of Copenhagen, Denmark
Student: Mette Oht
Supervisors: Ole Humlum (UNIS), Hanne H. Christiansen (University of Copenhagen, Denmark)
Finished: Spring 2002

Title: Sorted Circles and Ice-wedge Polygons on Spitsbergen, Svalbard
Collaborating institutions: University of Stockholm, Sweden
Student: Alexandra Björk
Supervisors: Ole Humlum (UNIS), Maj-Liz Nordberg (University of Stockholm, Sweden) Göran Alm (University of Stockholm, Sweden)
Finished: Autumn 2002

Graduate Students 2002
Ph.D.

Title: Late Glacial and Holocene climate and environmental variability on Svalbard
Collaborating institutions: University of Gothenburg, Sweden, University of Stockholm, Sweden, University of Alberta, Canada
Student: Sofia Holmgren
Supervisors: Ólafur Ingólfsson (UNIS), Barbara Wohlfarth (University of Stockholm, Sweden)

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: Paleoceanography 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), Nalan Koç (Norwegian Polar Institute)

Cand. scient.

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 tilbaketrekningen
Collaborating institutions: University of Oslo (UiO)
Student: Marit Carlsen
Supervisors: Ida Lønne (UNIS), Jon Ove Hagen (UiO)

Title: Glacier dynamics at Höganesbreen, Svalbard
Collaborating institutions: University of Oslo (UiO), Store Norske Spitsbergen Mine Company
Student: Thomas Chareyron
Supervisors: Ole Humlum (UNIS), Jon Ove Hagen (UiO)

Title: Climatic control on snow avalanches in central Spitsbergen, Svalbard
Collaborating institutions: University of Copenhagen, Denmark
Student: Jonas Ellehauge Hansen
Supervisors: Ole Humlum (UNIS), Hanne H. Christiansen (University of Copenhagen, Denmark)

Title: The Geomorphic impact of snowmobiles around Longyearbyen, Svalbard
Collaborating institutions: Lund University, Sweden
Student: Malin Elisabeth Persson
Supervisors: Ole Humlum (UNIS), Jonas Åkerman (Lund University, Sweden)

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)

Arctic Geophysics

BY DAG A. LORENTZEN

The Arctic Geophysics Department specialises in four fields of teaching and research: Oceanography, Meteorology, and Middle and Upper Polar Atmospherics. Together they cover the vertical column from below the sea to the solar wind in near space. The emphasis is on Polar geophysical phenomena with global implications, such as ocean currents, weather systems, and atmospheric radiation. The Department has four full professorships covering the specialist fields. In 2002 there were four adjunct professors in 20 per cent positions in Oceanography, Middle Atmospherics, and Upper Atmospherics (two positions). Andøya Rocket Range funds the second adjunct professor in Upper Atmospherics. There were no alterations in the faculty of the Geophysics Department in 2002. The Department had 7 Ph.D. fellows and 10 master's students doing their research at UNIS during this year. Three of the Ph.D. students were Madam Curie fellows. The Department has been accredited as a Madam Curie Training Site by the European Commission.

Teaching

The Geophysics Department currently offers six undergraduate and four graduate courses. All courses except one count as 15 ECTS credits, the exception being a graduate course for 9 ECTS credits. The courses are aimed at students with a geophysics background, and introduce them to processes and theories related to the Arctic environment. Fieldwork is an important element in the majority of the courses given, and the students get hands-on experience in instrument operation, data collection, and analysis of field data.

Research

The Arctic Geophysics Department at UNIS engages in a broad range of Arctic research. The Department is in charge of the daily operations of the optical Auroral Research Station in Adventdalen. This station draws on 25 instruments and 17 collaborating institutions in eight different countries. The Auroral Station serves as a platform for research and teaching in *Middle and Upper Polar Atmospherics*. The focus of the research is on plasma physics processes in the ionosphere and magnetosphere boundary processes, combined with temperature measurements in the mesosphere. The Station is actively involved in research campaigns in collaboration with the EISCAT radar, and in 2002 we participated in a NASA cusp rocket experiment.

During 2002 another important focus has been on working towards building a new Auroral Station. The current location has increasingly experienced problems with light pollution from Longyearbyen. In addition, the building is outdated, and has not enough available space to accommodate the escalating demand for new instrument arrays. The Norwegian Ministry of Education and Research invited ideas for a building program for the replacement station and the document is still evolving. However, the funding for the construction of the building has not yet been awarded.

Apart from doing routine measurements of the magnetosphere-ionosphere system using both optical and non-optical instrumentation, the Geophysics Department initiated a new project for the determination of energy transfer of the solar wind plasma to the Earth's magnetosphere-ionosphere system in 2001. The project, named PROTONICS, was continued in fall 2002, using two low-intensity, high-sensitivity spectrometers – one located near Longyearbyen and another located in Ny-Ålesund – measuring hydrogen Doppler profiles in the Aurora. The main object of the project is to establish links between the ionospheric signatures of auroral hydrogen emissions in the dayside Aurora, and the spatial and temporal variations of the reconnection process at the dayside magnetosphere boundary. The solar wind plasma feeds the Earth's magnetosphere and ionosphere with energetic particles, which in turn cause anomalies in the ionospheric plasma densities. As the process can disrupt important commercial and military satellite systems, it is therefore vital to fully understand the entry mechanisms of this energetic plasma. We were successful in getting simultaneous data from both of the locations, and we are now working on analysing the data.

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. The Geophysics Department does the quality assurance on the readings, as well as analysis of the data. The 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 located at the Koldewey Station in Ny-Ålesund.

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

On the 6'th of December 2002 an extraordinary event occured in the sky as viewed from Longyearbyen (78N 15E), Svalbard, Norway. The South - East sky was suddenly at approximately 07:30 UT lit up in a deep red color. The light increased in both intensity and spread across the sky, and at approximately 10:00 UT the illumination was even observed from zenith. The event died out at about 12:30 UT. The event is belived to be caused as a result of high altitude clouds formation. These stratospheric or mesospheric clouds are produced due very low temperatures in the upper atmosphere. The image show the clouds as they where illuminated by the sun. The sun was at this point in time about 10 degrees below the horizon.

PHOTO: HENRIK RASMUSSEN

spatial resolution. Two of the units are now deployed by the Fishery Institute in Tromsø, and at 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., provides a few of the potential uses. A new version of these spectral imagers with a faster frame rate (30 fps) has been constructed with Statoil's help for airborne classification of bedrock strata on Svalbard. Also, as a consequence, Inertial Navigation Systems have been developed. One of these systems has completed successful airborne tests. The aim is to be able to geometrically correct our spectral images, and to map the result onto a terrain model.

During the year, Alexei Stuliy has been working on the data collected during the *Hakon Mosby* scientific experiment. The data consist of in-situ and remotely sensed space-borne active microwave and passive IR imagery from the ENVISAT satellite. The main objective is an estimation of the wind stress on the ocean surface as well as other marine atmospheric boundary layer parameters, by implementing the SAR similarity theory that has been recently developed at the John Hopkins Applied Physics Laboratory. After running the model, the results will be compared against available in-situ measurements.

In the project designated *Environmental Research in Tibet*, three new instruments designed to record atmospheric, global and diffuse global radiation were installed on the roof of the Institute of Physics, University of Tibet, in Lhasa, at 30 N and 3,700 metres altitude. Two five-channel instruments for UV radiation and an imaging spectrometer were already deployed at the site. This instrumentation is similar to the package operated at UNIS. One of the objects in the Tibetan project is comparison with analogous data from Svalbard at 78 N.

Ms Gylsang Drunma has used models that have been developed in Norway to define transmission of solar radiation and atmospheric radiation in Tibet. She has compared the results of the model with data from the Radiation Research Station that she runs in Lhasa. Her conclusion is that the "Norwegian Model" can also be used in Tibet. The results will be published in her master's thesis to be presented in May 2003.

Mr Wang Lha is applying a numerical climate model to the study of possible climate changes in Tibet due to an increase in greenhouse effects. He will complete his master's thesis in May 2003.

Mr Caidong has applied satellite data to the study of changes in mass balance in glaciers in Northern Tibet. He found that during the last 20 years, the mass balance has been negative. Most probably, this is due to a climatic change that took place some 100 years ago. The glaciers are still not in equilibrium with the present climate.

One of our postgraduates, Magne A. Drage, is devoting his Ph.D. to problems related to accretion and precipitation icing on structures located in complex terrain. We are collecting data from two locations:

Warmer and saltier water in the West Spitsbergen fjords
During the scientific cruise in AGF214 "Polar Oceanography" measurements of temperature and salinity were conducted in three different fjord systems along West Spitsbergen; Van Mijenfjorden, Isfjorden system and Kongsfjorden system

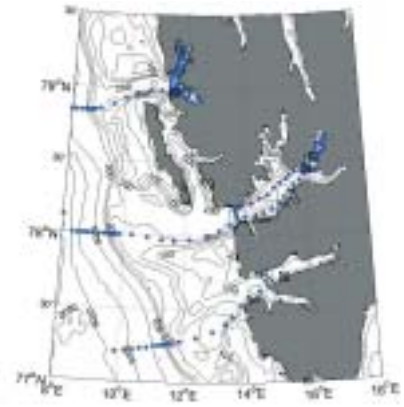


Figure 1.
In all these fjord systems, and especially the Isfjorden system, the water temperature was 2-3 degrees warmer than previous years.

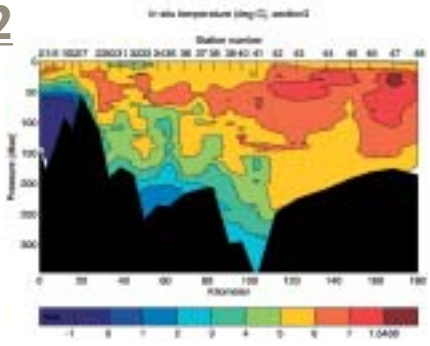


Figure 2
Shows the temperature in the water column from the shelf areas (right) and all the way into Billefjorden in front of the Nordenskiöld glacier (left). Station number 42 is at Kapp Linné and station number 27 is at the mouth of Billefjorden. The different temperatures are coded with colors. These water masses were not only warmer, but also saltier than previous years and the salinity indicated that there was Atlantic water in Isfjorden. This resulted in a higher population of salmon, cod and saithe in Isfjorden that had followed the warm and saline Atlantic water in the West Spitsbergen Current onto the shelf areas and further into the fjord systems. Ongoing research projects are trying to explain the mechanisms behind the inflow of Atlantic water into the fjord systems and why it differs from year to year.

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. From January to April 2002 he monitored frost deposition on super-cooled cylinders in order to estimate ice loads on frost-exposed pipelines at the Snøhvit (Snow White) Petroleum Terminal on Melkøya

The Geophysics Department takes part in studies of variability and water exchange 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.

The Geophysics Department is also involved in the project *Dense Water Production Processes in Storfjorden*. The main objectives here relate to modelling: first, of the ice and dense water formation process; then of outflow and entrainment; and finally of the general circulation in the fjord – to study its seasonal exchange with the surroundings and the effects on the exchange of the processes themselves. Global climate modellers consider these very same processes on a larger scale to be crucial to the response of the atmosphere-ice-ocean system to external perturbations. The present project aims to shed light on the working of the ice-ocean system by developing and testing representations of dense water formation and outflow from a basin where observations provide useful parameters for system behaviour. The project will use available hydrographical and sea-ice data from extensive surveys, in combination with conceptual descriptions from earlier investigations, in order to quantitatively model formation and outflow of dense water from a marginal sea. The study area is Storfjorden, which due to its limited size offers a suitable test bed for model representation of crucial climate processes.

Research into processes in the coastal and fjord areas of Spitsbergen has continued in 2002. During the scientific cruise segment of course *AGF-214 Polar Oceanography*, measurements of temperature and salinity were conducted in three different fjord systems along West-Spitsbergen: Van Mijenfjorden, Isfjorden, and Kongsfjorden. In all these fjord systems, and especially the Isfjorden system, the water temperature was 2-3 degrees warmer than in previous years. These water masses were not only warmer, but also saltier than before, and the salinity indicated that there was Atlantic water in Isfjorden. As a result, a higher population of salmon, cod and saithe was found in Isfjorden, which had followed the warm and saline Atlantic water in the West-Spitsbergen Current into the shelf areas and thence into the fjord systems. Ongoing research is trying to explain the mechanisms behind the inflow of Atlantic water into the fjord systems, and why it differs from year to year. Cand. scient. student Elin Darelius is now using these data for her master's thesis.

An extended field program in winter 2002 was conducted in Van Mijenfjorden and Kongsfjorden to support the *Joint US-Norwegian Studies of Ice-Ocean Interaction in Frozen Fjords*. Experiments were performed during a period of strong freezing. Sub-ice turbulence was studied with the help of an advanced ROV, and a program on ice physics was conducted. This collaboration resulted in the new project *Atmosphere-Ice-Ocean Interaction Studies (AIO)* financed by the Norwegian Research Council, state-of-the-art turbulence instrumentation, and a new Ph.D. student at UNIS, Karolina Widell.

A long-running collaborative project, whose main objectives are ice thickness distribution and historical time series of the ice cover in Van Mijenfjorden, continued with *Store Norske Spitsbergen Kulkompani* in 2002.

Emner undervist 2002 / Courses taught 2002

course No	course name	credits (ECTS)	semester	No. of students
AGF-207	Space activity and Remote sensing	5 (15)	autumn	3
AGF-207B	Remote sensing	3 (9)	autumn	3
AGF-210	The middle polar atmosphere	5 (15)	autumn	8
AGF-211	Air/ice/sea interaction	5 (15)	spring	13
AGF-212	Processes in snow and ice	5 (15)	spring	18
AGF-213	Polar meteorology	5 (15)	autumn	4
AGF-214	Polar oceanography	5 (15)	autumn	4
AGF-301	The upper polar atmosphere	5 (15)	spring	7
AGF-304	Radar diagnostics of space plasma	5 (15)	spring	7
AGF-330	Remote sensing and advanced spectroscopy	5 (15)	spring	6
	SUM Arctic geophysics	**45 (135)**		

Research Projects

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 accreation 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: Snow metamorphosis and distribution in Finland
Collaborating institutions: University of Helsinki, Finland
Financing: University of Helsinki, Finland
Duration: 2001-2004
UNIS: Yngvar Gjessing, Tari Oksanen

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 magntospheric bundary layer
Collaborating institutions: University of Oslo
Financing: UNIS
Duration: 2001-
UNIS: Dag A. Lorentzen

Title: Polar airglow patch investigation
Collaborating institutions: University of Alaska, Fairbanks
Financing: UNIS
Duration: 2002-
UNIS: Dag A. Lorentzen

Title: Cusp rocket campaign, 2002.
Collaborating institutions: National Aeronautics and Space Administration (NASA), UNIS, University of Oslo
Financing: NASA, UNIS
Duration: 2002
UNIS: Dag A. Lorentzen

Title: Studies of temporary and spatial variations in particle precipitation and current systems in the polar cleft region
Collaborating institutions: University of Bergen, University of Oslo
Financing: Norwegian Research Council
Duration: 2000-2003
UNIS: Jøran Moen, Kjellmar Oksavik

Title: Studies of small scale wind pattern by use of remote sensing
Collaborating institutions: University of Bergen, Denmarks Technical University
Financing: UNIS
Duration: 2002-2005
UNIS: Frank Nilsen, 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: Long-time variation in the Svinøy section
Collaborating institutions: University of Bergen, Norsk Hydro
Financing: Norsk Hydro
Duration: 2000-
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

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 (ProClim)
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 2002
Cand.scient.

Title: On the relation between magnetosheath like particle precipitation and elevated electron temperature observed by EISCAT
Collaborating institutions: University of Oslo (UiO)
Student: Carl Petter Nielsen
Supervisors: Jøran Moen (UiO/UNIS), Espen Trondsen (UiO)
Finished: Spring 2002

Title: Connection between space weather and cosmic radiation in aircraft
Collaborating institutions: Lund University, Sweden
Student: Bjarte Gees Solheim
Supervisors: Dag Lorentzen (UNIS), Jøran Moen (UiO/UNIS), Carl-Erik Magnusson (Lund University, Sweden)
Finished: Spring 2002

Title: Diagnostics and notification of the expansion phase of magnetic substorm
Collaborating institutions: University of Oslo (UiO)
Student: June Lunde
Supervisors: Dag Lorentzen (UNIS), Jøran Moen (UiO/UNIS)
Finished: Autumn 2002

Title: Sea ice transport through the Fram Strait
Collaborating institutions: University of Bergen (UiB)
Student: Karolina Widell
Supervisors: Tor Gammelsrød (UiB/UNIS), Astrid Marie Nerbø Dahl (UiB)
Finished: Autumn 2002

Graduate Students 2002
Ph.D.

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

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, Finland
Student: Tari Oksanen
Supervisors: Yngvar Gjessing (UNIS)

Title: Studies of temporary and spatial variations in particle precipitation and current systems in the polar cleft region
Collaborating institutions: University of Bergen, University of Oslo (UiO)
Student: Kjellmar Oksavik
Supervisors: Jøran Moen (UiO/UNIS)

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

Cand.scient.

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

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

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

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

Title: Turbulence and heat exchange under ice
Collaborating institutions: University of Bergen (UiB)
Student: Anders Sirevaag
Supervisors: Frank Nilsen (UNIS), Peter Haugan (UiB)

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

Arctic Technology

BY KNUT V. HØYLAND

Teaching

The Arctic Technology Department expanded its courses in 2002 to offer four level 200 courses (total 60 ECTS, 20 credits) and seven courses at level 300 (12 credits). 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 an 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. When fully established in a few years' time it is intended that Arctic Technology will have doubled its staff to roughly the level of the other Departments.

In 2002, Arctic Technology taught 37 students at level 200 and 53 at level 300. The average attendance in the lower series was 9.25 and all courses went ahead as planned 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 counter-

PHOTO: HANNE MORKEMO

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

PHOTO: MORTEN BERGE VAKSDAL

Glaciers are an important water resource in Arctic areas.

measure 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 are 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 Park 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.

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

Emner undervist 2002 / Courses taught 2002

course No	course name	credits (ECTS)	semester	No. of students
AT-205	Frozen ground engineering for arctic infrastructure	5 (15)	spring	6
AT-206	Arctic water resources	5 (15)	autumn	4
AT-207	Pollution in the arctic	5 (15)	autumn	18
AT-208	Thermo-mechanical properties of materials	5 (15)	spring	10
AT-307	Arctic offshore engineering	3 (9)	autumn	15
AT-307F	Arctic offshore engineering - Fieldwork	1 (3)	spring	10
AT-309	Cold regions field investigations	3 (9)	spring	10
AT-311	Fate and modelling of pollutants in the arctic	3 (9)	spring	10
AT-312	Radioactivity in an arctic environment	3 (9)	autumn	7
AT-313	Thermo-mechanics of ice and snow, and loads on structures	3 (9)	autumn	6
	SUM Arctic technology	**36 (108)**		

Research Projects

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 polychlorinatedbiphenyls (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 soluable 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 Technology and Science, Technical University of St. Petersburg
Financing: Norwegian Research Council, UNIS, Statoil and SNSG
Duration: 2001-2003
UNIS: Knut V. Høyland, Sveinung Løset, Pavel Liferov

Title: Ice interaction with vertical pile
Collaborating institutions: Norwegian University of Technology and Science, Technical University of St. Petersburg
Financing: Norwegian Research Council, UNIS; Statoil and SNSG
Duration: 2001-2003
UNIS: Knut V. Høyland, Sveinung Løset, Per Olav Moslet

Title: Consolidation of ice ridges
Collaborating institutions: Norwegian University of Technology and Science, St. Petersburg Technical University
Financing: UNIS
Duration: 2001-2004
UNIS: Knut V. Høyland

Title: Formation and growth of sea ice in the Van Mijen fjord
Collaborating institutions: Department of Geophysics, UNIS
Financing: UNIS, SNSK
Duration: 2001-2004
UNIS: Knut V. Høyland, Frank Nilsen

Title: Permafrost response to industrial and environmental load
Collaborating institution: Norwegian Geotechnical Institute (NGI)
Financing: Norwegian Research Council, NGI
Duration: 1999-2003
UNIS: Arne Instanes

Title: Arctic oil spills on Russian permafrost soils
Collaborating institution: Norwegian Geotechnical Institute (NGI), Moscow State University, Earth Cryospher Institute, Moscow
Financing: Program for research and higher education, co-operation programme for Eastern Europe, NGI
Duration: 1998-2002
UNIS: Arne Instanes

Title: Arctic Climate Impact Assessment (ACIA)
Collaborating institution: University of Alaska Fairbanks, Moscow State University, Ecole Polytechnique, Montreal, Canada, Norwegian University of Technology and Science, 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 Technology and Science, 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

Graduates 2002
Cand.scient.

Title: Bruk av georadar for søk etter objekter i snø, med vekt på mennesker tatt av snøskred
Collaborating institutions: University College of Stavanger
Student: Jon Tømmerås Selvik
Supervisors: Arne Instanes (UNIS), Ove Njå (University College of Stavanger)
Finished: Autumn 2002

Title: Temperature regime and permeability of a tailing deposit on permafrost, Spitsbergen
Collaborating institutions: Uppsala University, School of Engineering
Student: Helen Eva Sundström
Supervisors: Arne Instanes (UNIS), Nicholas Jarvis (Uppsala University, School of Engineering)
Finished: Autumn 2002

Graduate Students 2002
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)

Cand.scient.

Title: Loads on stuctures exerted by sea ice in Arctic regions
Collaborating institutions: TU Bergsakademie Freiberg, Germany
Student: Rüdiger Biedorf
Supervisors: Knut Høyland (UNIS), Heinz Gloth (TU Bergsakademie Freiberg, Germany)

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: Geotechnical aspects of ice ridge seabed interaction
Collaborating institutions: Norwegian University of Science and Technology (NTNU)
Student: Rune Nilsen
Supervisors: Knut V. Høyland (UNIS), Lars Grande (NTNU)

Title: Detection of oil under sea ice using a ground penetrating radar and the expression of ecological damage caused by an oil spill
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)

Title: Heat transfer in sea ice
Collaborating institutions: St. Petersburg State Technical University, Russia (SPTU)
Student: Elena Vladimirovna Rudakova
Supervisors: **Knut Høyland (UNIS), Karl Shkhinek (SPTU)**

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: 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)

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)

Scientific publications 2002

- 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)

Guest lecturers

UNIS

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Scientific publications

in reviewed Journals by full-time faculty

Albon, S.D., **Stien, A.**, Irvine, R.J., **Langvatn, R.**, Ropstad, E. & Halvorsen, O. (2002). The role of parasites in the dynamics of a reindeer population. *Proceedings of the Royal Society of London Series B-Biological Sciences.* 269, 1500, 1625-1632.

Beuchel, F. & **Lønne, O.J.** (2002). Population dynamics of the sympagic amphipods *Gammarus wilkitzkii* and *Apherusa glacialis* in sea ice north of Svalbard. *Polar Biology.* 25, 4, 241-250. DOI: 10.1007/S00300-001-0329-8.

Birkely*, S.R., Nielsen, O.G. & **Gulliksen, B.** (2002 online). Temporal variations and anatomical distributions of fatty acids in the bivalve *Mya truncata*, L. 1758, from Isfjorden, Spitsbergen. *Polar Biology.* 26, 83-92. DOI: 10.1007/S00300-002-0450-3.

Camus, L., Jones, M.B., Børseth, J.F., Grøsvik, B.E., Regoli, F. & Depledge, M.H. (2002). Total oxyradical scavenging capacity and cell membrane stability of haemocytes of the Arctic scallop, *Chlamys islandicus*, following benzo(a)pyrene exposure. *Marine Environmental Research.* 54, 3-5, 425-430.

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Fetzer, I., **Lønne, O.J.** & Pearson, T. (2002). The distribution of juvenile benthic invertebrates in an arctic glacial fjord. *Polar Biology.* 25, 4, 303-315. DOI: 10.1007/S00300-001-0345-8.

Forman, S.L., **Ingólfsson, Ó.**, Gataullin, V., Manley, W. & Lokrantz, H. (2002). Late Quaternary stratigraphy, glacial limits, and paleoenvironments of the Marresale area, western Yamal Peninsula, Russia. *Quaternary Research.* 57, 3, 355-370.

Hall, K., Thorn, C.E., Matsuoka, N. & **Prick, A.** (2002). Weathering in cold regions: some thoughts and perspectives. *Progress in Physical Geography.* 26, 4, 577-603.

Hop, H., Pearson, T., Hegseth, E.N., Kovacs, K.M., Wiencke, C., Kwasniewski, S., **Eiane, K.**, Mehlum, F., **Gulliksen, B.**, Wlodarska-Kowalezuk, M., Lydersen, C., Weslawski, J.M., Cochrane, S., Gabrielsen, G.W., Leakey, R.J.G., **Lønne, O.J.**, Zajaczkowski, M., Falk-Petersen, S., Kendall, M., Wangberg, S.A., Bischof, K., Voronkov, A.Y., Kovaltchouk, N.A., Wiktor, J., Poltermann, M., di Prisco, G., Papucci, C. & Gerland, S. (2002). The marine ecosystem of Kongsfjorden, Svalbard. *Polar Research.* 21, 1, 167-208.

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by adjunct professors

Borgå, K., **Gulliksen, B.**, Gabrielsen, G.W. & Skaare, J.U. (2002). Size-related bioaccumulation and between-year variation of organochlorines in ice-associated amphipods from the Arctic Ocean. *Chemosphere.* 46, 9-10, 1383-1392.

Borgå, K., Poltermann, A., Polder, A., Pavlova, O., **Gulliksen, B.**, Gabrielsen, G.W. & Skaare, J.U. (2002). Influence of diet and sea ice drift on organochlorine bioaccumulation in Arctic ice-associated amphipods. *Environmental Pollution.* 117, 1, 47-60. DOI: 10.1016/S0269-7491(01)00160-9.

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Guest lecturers

Name	Institution
Aagaard, Knut	University of Washington, USA
Aasen, Åge	Norwegian Meteorological Institute
Abrahamsen, Povl	University of Bergen, Norway
Aksnes, Dag L.	University of Bergen, Norway
Alm, Göran	Stockholm University, Sweden
Andresen, Arild	University of Oslo, Norway
Andresen, Steinar	Fridtjof Nansens Institute, Norway
Arlov, Thor Bjørn	Norwegian University of Science and Technology
Astakhov, Valery	Institute for Remote Sensing Methods in Geology, Russia
Austegaard, Atle	University of Bergen, Norway
Ballantyne, Colin C.	University of St. Andrews, Scotland
Bardgett, Richard D.	Lancaster University, UK
Berggren, Anne-Lise	Geofrost Engineering A/S, Norway
Beuchel, Frank	University of Tromsø, Norway
Bjørnsson, Helgi	University of Iceland, Iceland
Bjørnå, Noralv	University of Tromsø, Norway
Bogen, Jim Jens	Norwegian water resorces and energy administration
Borgstrøm, Reidar	Agricultural University of Norway
Broda, Grete H.	NAMMCO, Norway
	Rolf L
Bruland, Oddbjørn	Norwegian University of Science and Technology
Buvang, Richard	University of Tromsø, Norway
Böcher, Jens	Zoological Museum, Copenhagen, Denmark
Børsheim, Yngve	Norwegian University of Science and Technology
Carrasco, Ane	Norwegian Polar Institute
Chauton, Matilde S.	Norwegian University of Science and Technology
Cooper, Elisabeth	Norwegian Polar Institute
Derocher, Andrew E.	Norwegian Polar Institute
Digranes, Per	University of Bergen, Norway
Ditlefsen, May Kristin	SINTEF, Norway
Dokken, Trond	University of Bergen, Norway
Dowdeswell, Julian	University of Cambridge, UK
Egeland, Alv	University of Oslo, Norway
Eiken, Trond	University of Oslo, Norway
Elberling, Bo	University of Copenhagen, Denmark
Eltoft, Torbjørn	University of Tromsø, Norway
Eriksson, Mats	Lund University Hospital, Sweden
van Eyken, Tony	EISCAT
Falk-Petersen, Stig	Norwegian Polar Institute
Fevolden, Svein-Erik	University of Tromsø, Norway
Finch, Ivan	Rutherford Appleton Laboratory, UK
Finseth, Jomar	Norwegian University of Science and Technology
Foldvik, Arne	University of Bergen, Norway
Fowler, Scott	Monaco, Elis Holm ?
French, Hugh M.	University of Ottawa, Canada
Fuglei, Eva	Norwegian Polar Institute
Funder, Svend	University of Copenhagen, Denmark
Gabrielsen, Geir Wing	Norwegian Polar Institute
Gerding, Michael	Alfred Wegner Institute, Germany
Gjevik, Bjørn	University of Oslo, Norway
Goering, Douglas	University of Alaska, USA
Gudmestad, Ove Tobias	Statoil
Guio, Patrick	University of Oslo, Norway
Haagensen, Per J.	Norwegian University of Science and Technology
Hagen, Jon Ove	University of Oslo, Norway
Hagen, Oddvar	Region Hospital in Tromsø, Norway
Hamre, Johannes	Institute of Marine Research, Bergen, Norway
Hanssen-Bauer, Inger	The Norwegian Meteorological Institute
Haug, Tore	Norwegian Institute of Fisheries and Aquaculture
Haugan, Peter M.	University of Bergen, Norway
Heia, Karsten	University of Tromsø, Norway
Hessen, Dag O.	University of Oslo, Norway
Hjøllo, Solfrid	University of Bergen, Norway
Holmgren, Sofia	University of Gothenburg, Sweden
Hop, Haakon	Norwegian Polar Institute
Hoppe, Ulf Peter	Norwegian Defense Research Establishment
Houmark-Nilsen, Michael	University of Copenhagen, Denmark
Huse, Geir	University of Bergen, Norway
Høgda, Kjell A.	NORUT IT
Haagensli, Jørgen	Norwegian Polar Institute
Ims , Rolf A.	University of Tromsø, Norway
Isaksen, Ketil	University of Oslo, Norway
Isham, Brett	EISCAT
Jaedicke, Christian	University of Bergen, Norway
Jansen, Eystein	University of Bergen, Norway
Jansson, Peter	Stockholm University, Sweden
Jensen , Bjørn Munro	Norwegian University of Science and Technology
Johansen, Bjørn Fossli	Norwegian Polar Institute
Johansen, Bror	SINTEF, Norway
Johnsen, Geir	Norwegian University of Science and Technology
Kallenborn, Roland	The Norwegian Institute for Air Research
Kangas, Tor-Villy	University of Bergen, Norway
Killingtveit, Ånund	Norwegian University of Science and Technology

Name	Institution
Klemetsen, Anders	University of Tromsø, Norway
Knudsen, Niels Tvis	University of Aarhus, Denmark
Knutsson, Sven	Luleå University of Technology, Sweden
Kovacs, Kit	Norwegian Polar Institute
Kuhn, Michael	University of Innsbruck, Austria
Kuvaas, Berit	Statoil
Kwasniewski, Slawek	Polish Academy of Sciences, Poland
La Hoz, Cesar	University of Tromsø, Norway
Laberg, Jan Sverre	University of Tromsø, Norway
Landvik, Jon	Agricultural University of Norway
Leppäranta, Matti	University of Helsinki, Finland
Liferov, Pavel	Norwegian University of Science and Technology
Lundén, Bengt	Stockholm University, Sweden
Løvhaug, Unni Pia	University of Tromsø, Norway
Maattanen, Mauri	Helsinki Technical University, Finland
Malaize, Bruno	University of Bordeaux, France
Mangerud, Jan	University of Bergen, Norway
McPhee, Miles	McPhee Research Company, Washington State, USA
Mehlum, Fridtjof	University of Oslo, Norway
Michchenko, Igor T.	Russian State Oil and Gas University, Russia
Myrvang, Arne	Norwegian University of Science and Technology
Nagy, Jenö	University of Oslo, Norway
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Nesje, Atle	University of Bergen, Norway
Nilsen, Jan Even Øie	University of Bergen, Norway
Norem, Harald	Norwegian University of Science and Technology
Nystuen, Johan Petter	University of Oslo, Norway
Nøst, Ole Anders	Norwegian Polar Institute
Olsen, Svein	University of Tromsø, Norway
Pagel, Gajus	Technical University of Berlin, Germany
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Prèzelin, Barbara B.	University of California, USA
von Quillfeldt, Cecilie Hellum,	Norwegian Polar Institute,
Rahmstorf, Stefan	Potsdam Institute for Climate Impact Research, Germany
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Raustein, Elmer	University of Bergen, Norway
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Reed, Mark	SINTEF, Norway
Reeh, Niels	Technical University of Denmark, Denmark
Renner, Udo	Technical University of Berlin, Germany
Reymert, Per Kyrre	Svalbard Science Forum
Roettger, Jürgen	Max Plank Institut für Aeronomie, Germany
Roos, Per	Risø Nat. Lak. Nuk. DDenmark
Rønning , Jan Steinar	Norwegian Geotechnical Institute
Sand, Knut	Statkraft Grøner AS, Norway
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Shumilov, Nikita	University of Tromsø, Norway
Snowball, Ian	Lund University, Sweden
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Wolfe, Alexander P.	University of Alberta, Canada
Zolotukhin, Anatoly	Statoil
Øritsland, Nils A.	Norwegian Institute for Natural Research
Østerhus, Svein	University of Bergen, Norway
Øveraas, Lise	University of Bergen, Norway