Annual Report UNIS 2000

Årsmelding UNIS 2000

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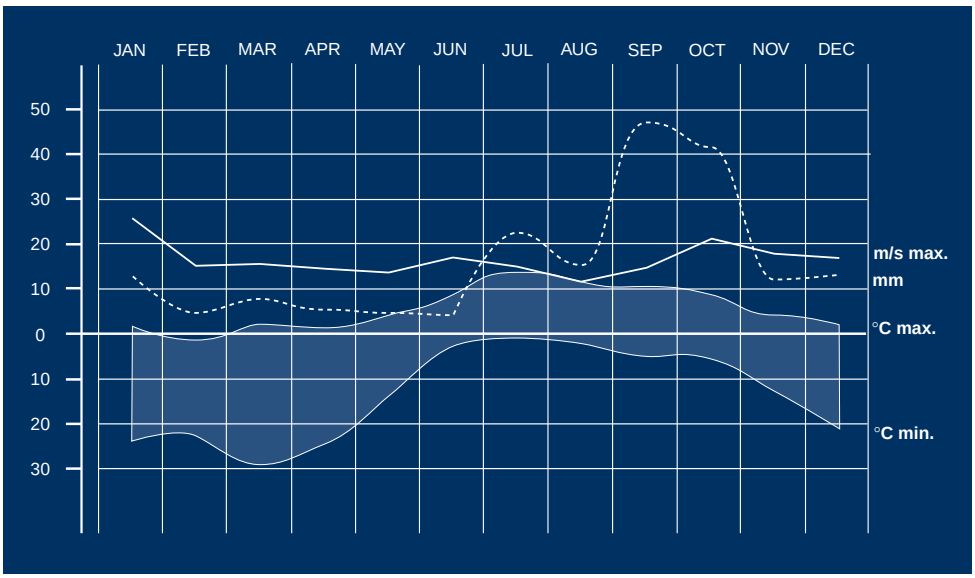
Wind, precipitation and temperature year 2000 in Longyearbyen



Vind, nedbør og temperatur i Longyearbyen år 2000

Trykt på svanemerket papir
Lisensnr. 244.024

UNIS Board 2000

From left: Trond Dokken, Martin Berg, Dag Hessen, Kjell Sælen, Viva Mørk Kvello, Noralv Bjørnå, Lasse Lønnum (director), Steinar Nordal.

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: Associate Professor Sverre Ola Johnsen

Director Viva Mørk Kvello, Svalbardrådets Representative
Deputy Member: Executive officer Jan Ove Scheie

Associate professor Ole Jørgen Lønne, UNIS, Staff Representative
Deputy Member: Associate Professor Trond Dokken

Martin Dahl Grønnevet, Student Representative
Deputy Member: Martin Berg (autumn term)

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 Ole Jørgen Lønne, UNIS
Student Ingemar Langemar, 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
Associate Professor Ida Lønne, UNIS
Student Sophus Aarnæs, Student representative

Academic workgroup of Arctic Geophysics:
Professor Cesar La Hoz, University of Tromsø
Associate Professor Berit Kjeldstad Løvseth, Norwegian University of Science and Technology
Professor Tor Gammelsrød, University of Bergen
Professor Jan Erik Weber, University of Oslo
Professor Yngvar Gjessing, UNIS
Student Sara Mattsson, Student representative

Academic workgroup in Arctic Technology:
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 Arne Instanes, UNIS
Student Mikko Elo, Student representative

UNIS Staff 2000

Administration:
Department Secretary Kari Brandvik (until July)
Study Counsellor Jan Gunnar Brattli
Department Secretary Wenche Guldberg (from August)
Office Manager Helen Fossmo Flå
Librarian Berit Jakobsen
Department Secretary Gerd Stenseth Lønne (until December)
Director Lasse Lønnum
Study Counsellor Eystein Markusson
Senior Executive Officer Ingrid Vinje

Technical staff:
Chief Lab Technician Gerd Irene Andersen
IT-Engineer Gunnar Aske
Engineer Jørn Dybdahl
Head of Safety and Logistics Fred Skancke Hansen
Janitor Frithjof Kildal
Cleaner Tove Kaldbakken Larsen
Engineer Knut Sandaker

Department of Arctic Biology:
Assosiate Professor Ketil Eiane
Professor Ingibjörg Svala Jonsdottir (from September)
Associate Professor Rolf Langvatn
Associate professor Ole Jørgen Lønne
Associate Professor Sigmund Spjelkavik (until December)
Adjunct Professor Bjørn Gulliksen, University of Tromsø
Adjunct Professor Rolf Arnt Olsen, Agricultural University of Norway

Department of Arctic Geology:
Professor Ole Humlum
Professor Olafur Ingolfsson (from August)
Professor Jon Landvik (until July)
Associate Professor Ida Lønne
Associate Professor Trond Dokken
Adjunct Professor Jenö Nagy, University of Oslo
Adjunct Professor Ron Steel, University of Wyoming, USA
Adjunct Associate Professor
Tor Arne Johansen, University of Bergen

Department of Arctic Geophysics:
Professor Tor Gammelsrød
Professor Yngvar Gjessing
Professor Jøran Moen (Adjunct Professor, University of Oslo, from June)
Associate Professor Fred Sigernes
Adjunct Professor Asgeir Brekke
Adjunct Professor Arne Foldvik
Adjunct Professor Ove Havnes

Department of Arctic Technology:
Assosiate Professor Per Johan Brandvik
Associate Professor Arne Instanes
Adjunct Professor Ånund Killingtveit, Norwegian University of Science and Technology
Adjunct Professor Sveinung Løset, Norwegian University of Science and Technology

Externally financed researchers:
Research Fellow Hans Olav Hygen, NFR-financed
Research Fellow Christian Jaedicke, NFR-financed
Research Fellow Sönke Maus (until June)
Post doc. Vigdis Tverberg, EU-financed (until June)
Research Fellow Matthias Zielke

Others:
Civil Recruit Øyvind Hamre, Alternative Initial Service (until November)

Report of the Directors 2000

The University Courses on Svalbard - UNIS - was established in the form of a beneficial foundation on 18th January 1994 by the four Norwegian universities which are thus the founders. The year 2000 is the seventh full year of operation of the Institution. In 2000 the range of courses offered was large and the number of students exceeded for the first time the nominal goal of 100 student years. Research activity during the year was also heavy and this is reflected in the larger external grants and volume of scientific papers.

Development of studies offered

UNIS has four lines of study: Arctic Biology, Arctic Geology, Arctic Geophysics, and Arctic Technology. In 2000 the studies on offer in these four lines were consolidated rather than expanded. Where in 1999 tuition was offered in 35 topics, in 2000 the same total number of topics was offered, with 16 at masters and doctoral level. Two topics were not offered due to budget constraints. Students at UNIS have a good academic record compared with other university students, with less than 1 per cent failing their examination, and the average student completes more than the 20 Norwegian credits that nominally represent one year of study.

UNIS intends to increase activities at masters and doctoral level.

Student body

A total of 242 students attended tuition or worked on masters or doctoral projects at UNIS in 2000. This represents 102 study years and is the highest figure ever achieved here. The total was made up of 56 study years for a first degree, 24 by people pursuing a masters or doctorate program, and 22 by people writing their masters or doctoral project. UNIS has a large complement of international students who made up, all together, some 55 per cent of the student body. More than half the international students came from other Scandinavian countries, and no less than 21 nationalities were represented overall.

Research activities

In 2000 there were 45 students at UNIS working on their masters project. In such cases the project is done in conjunction with another university at home or abroad. Students are appointed a tutor at UNIS in addition to the tutor at their home place of learning. During 2000 there were 19 masters students who did their thesis or diploma project with us. One doctorate was disputed during the year. Continuation of research affiliations with the Norwegian universities and other national and international research institutions is a prime focus at UNIS. In 2000 UNIS staff made contributions to 24 refereed publications. Researchers at UNIS are key players in EU projects as «NoClim» and «Marie Curie Training Site», and also projects supported by the Norwegian Research Council. Yet the level of externally funded projects remains - the Board feels - too low, and our efforts to secure such funding must be reinforced. In the years ahead further expansion of research activities at UNIS will be a main priority. The NRC has launched Arctic Research as one of its main commitments in the coming years. It is only natural that UNIS, jointly with the four Norwegian universities and other institutions such as the Norwegian Polar Research Institute, constitute the core environment for much of this research, and we will work actively to this end. Research at UNIS has shown very positive development, as indeed has been documented by the positive national assessments obtained in Biology and Physics under the auspices of the NRC.

Other activities

The Board finds it imperative that we continue to work actively to popularise Arctic studies. Again in 2000 the Institution held its so-called «Svalbard Seminar» in association with the Norwegian Polar Research Institute Svalbard and the Governor of Svalbard. This took place in January-February. The turn-out was excellent with between 80-120 in the audience on each occasion. During the Research Days in September UNIS held an Open Day with lectures, demonstration of equipment, and experiments. Also the research vessel Jan Mayen was open to visitors.

UNIS attracts many professional conferences and workshops. In 2000 four such events were held.

Organisation

UNIS is organised with four academic departments, a technical support department, and an administrative support department. The department managers and the UNIS Director together make up the Institution's Executive Committee.

PHOTO:TOR BREKKE

Presentation of thesis in the auditorium at UNIS.

Disputas i "Møysalen" på UNIS.

PHOTO:JONAS HERTL

The UNIS students are an active bunch! Everyone is keen to get out in Svalbard's unique natural environment and sports activities are highly popular.

Aktivitetsnivået blant UNIS-studentene er høyt! Samtlige studenter benytter seg av Svalbards unike natur, noe som innebærer stor grad av sportslig utfoldelse.

The faculty committees on each of the four lines of study meet four times a year with representatives from the founding universities and act as the reference body for each department.

Academic and other staff

No new positions were formed in UNIS in 2000. At year-end the academic staff counted 14 persons full-time, plus 11 adjunct professors. The technical staff counted 6.3 persons, and the administrative staff seven persons.

UNIS buildings

The UNIS main building was completed in 1995 containing the laboratories, class rooms, large auditorium, library, canteen, 30 offices, and study cubicles for 100 students. Our experience with the building to date is good but we lack the necessary space for preparations for field activities. There is also a great dearth of offices for visiting lecturers, visiting researchers, and study cubicles for our students. It takes considerable ingenuity to find room for all our planned activities in the space available.

At the end of the year UNIS had 24 residential units for staff. As research activities are stepped up the Board feels it vital that funds be appropriated for residential investment.

The Student Union at Tromsø is responsible for the student housing at UNIS and has redecorated three old mining dormitories in Nybyen to bring the total units now available to 96. During 2001 one more dormitory will be renovated to bring the total number of student accommodations to 120 by the end of the year.

It is crucial for the continuation of our activities that UNIS can offer satisfactory living quarters for students. The Board will therefore continue to support and welcome the close and fruitful relations we enjoy with the Tromsø Student Union.

Economy

Funds for operation and investment at UNIS are appropriated over the Ministry of Church, Education and Research budget. In 2000 the total amount was kr 34,400,000, of which 31,340,000 was for operation. The accounts for the year show that 46 per cent of goods and services are obtained locally. The operating loss in the annual accounts is kr 643,509. After financial income and financial expenditure, and after extraordinary items, the accounts show a loss of kr 247,526. The loss will be covered from the free reserve. At year-end the Institution's capital stood at kr 52,726,975, of which kr 51,499,848 represents the UNIS buildings and kr 1,227,127 is our basic capital and free reserves. In the year the Director received a salary of kr 416,204. The Board Chairman received kr 20,000 and the other Directors kr 10,000.

Board activities

In the year the UNIS Directors held four meetings, two of them in Longyearbyen. A total of 51 issues were addressed. Among the important issues dealt with in 2000 were realignment of activities, the budget, building plans, the Storting Report on Svalbard, and preparations for a new Strategy Plan.

Prospects ahead

During 2001 the Board will adopt a new Strategy Plan extending to 2010. Work at the Institution in coming years will depend greatly on the solution for the UNIS acreage in the Science Park. In line with the Storting resolution to increase activities at UNIS the Board will pursue an active and constructive dialogue with the Ministry. The Board feels that the number of students should be increased to 150 in the short term. The number of new student residences must be upgraded in step with this expansion. A significant hurdle until the new building is built will be finding flexible solutions for the expanding activities conducted here.

Looking south at the Longyear Glacier.
Mot Longyearbreen i sør.

Looking north at Hjortfjellet.
Mot Hjortfjellet i nord.

The «Grand Boulevard» of Longyearbyen.
Hovedgaten i Longyearbyen.

PHOTO: TOR BREKKE

The site of the future Science Centre, with mighty Hjortfjellet providing the backdrop.

Området hvor Forskningsparken skal bygges. UNIS´s mektige nabo, Hjortfjellet, ruver i bakgrunnen.

Styrets beretning 2000

PHOTO: ELKE LINDNER

De mest innbitte entusiaster blant studentene benytter også den arktiske sommeren til badeliv!

The hardiest of the UNIS student body can't wait to test the summer water at this expansive Arctic beach.

Universitetsstudiene på Svalbard (UNIS) ble etablert som en stiftelse 18.januar 1994 med de fire norske universitetene som stiftere. 2000 er sjuende hele driftsår for stiftelsen. Kurstilbudet har i 2000 vært stort og antallet studenter ligger for første gang over måltallet på 100 studentårsverk. Forskningsaktiviteten har også i 2000 vært høy noe som også gjenspeiles i økte eksterne bevilgninger og antallet vitenskapelige publikasjoner.

Utvikling av studietilbudet

UNIS har fire studieretninger: Arktisk biologi, Arktisk geologi, Arktisk geofysikk og Arktisk teknologi. I 2000 er studietilbudet innen de fire studieretningene konsolidert og i liten grad utvidet. Som i 1999 ble det i 2000 gitt undervisning i 35 emner, hvorav 16 er på hovedfags- og doktorgradsnivå. I 2000 ble to emner ikke igangsatt på grunn av budsjettsitusjonen. Studentene ved UNIS oppnår gode resultater sammenliknet med universitetene, har mindre enn en prosent stryk til eksamen og tar i gjennomsnitt over 20 vekttall pr år.
På sikt ønsker UNIS å øke aktiviteten på hovedfags- og doktorgradsnivå.

Studenttall

Tilsammen 242 studenter fulgte undervisning, eller arbeidet med hovedfags- og doktorgradsoppgaver ved UNIS i 2000. Dette tilsvarer en studentaktivitet på 102 studentårsverk og er det høyeste noensinne ved institusjonen. Av dette var 56 årsverk på lavere grad, 24 på hovedfags- og doktorgradsemner og 22 årsverk i forbindelse med hovedfags- og doktorgradsoppgaver. Ved UNIS er det et stort innslag av utenlandske studenter og denne studentgruppen utgjorde i alt 55 % av studentmassen. Over halvparten av de utenlandske studentene kom fra Norden, og i alt 21 nasjoner var representert i 2000.

Forskningsaktivitet

I 2000 var det 45 studenter som arbeidet med sin hovedfagsoppgave 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 2000

tok 19 hovedfagsstudenter sin hovedfags- eller diplomoppgave. Det ble avlagt 1 doktorgrad ved UNIS i 2000. Videreføring av forskningssamarbeidet med de norske universitetene og andre norske og utenlandske forskningsinstitusjoner er en prioritert oppgave ved UNIS. I 2000 var UNIS ansatte medforfattere på 24 publikasjoner med referee-ordning. Forskere ved UNIS er sentrale i EU-prosjekter som «NoClim» og «Marie Curie Training Site», og prosjekter støttet av Norges forskningsråd. Andelen med eksternt finansierte prosjekter er etter styrets mening for lav, og innsatsen for å skaffe slik finansiering må forsterkes. I årene framover vil videre utvikling av forskningsaktiviteten ved UNIS bli gitt en hovedprioritet. Norges forskningsråd har lansert polarforskning som en hovedsatsing i årene framover. Det vil være naturlig at UNIS, i nettverk med de 4 norske universitetene og institusjoner som Norsk Polarinstitutt, utgjør et kjernemiljø for mye av denne forskningen, og institusjonen vil arbeide aktivt for dette. Forskningen ved UNIS har hatt en meget positiv utvikling noe som dokumenteres gjennom de positive nasjonale evalueringene i biologi og fysikk som ble gjennomført i regi av Norges forskningsråd.

PHOTO: TOR BREKKE

The comfortable and spacious canteen at UNIS, – suitable for conference lunches and at festive occasions.

Kantinen er god å ha ved faglige konferanser og seminarer.

Annen virksomhet

Styret ser det som viktig at det fortsatt arbeides aktivt med formidling ved UNIS. Også i 2000 ble det i januar/februar arrangert såkalte «Svalbardseminar» i samarbeid med Norsk Polarinstitutt Svalbard og Sysselmannen på Svalbard. Oppslutningen var meget god med mellom 80 og 120 tilhørere hver gang. Under Forskningsdagene i september arrangerte UNIS åpen dag med forelesninger, visning av utstyr og eksperimenter. I tillegg var det visning på forskningsfartøyet F/F Jan Mayen.
UNIS tiltrekker seg mange faglige konferanser og seminarer og i 2000 ble det i alt avholdt fire slike.

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

Det ble ikke opprettet nye stillinger ved UNIS i 2000. Ved årsskiftet 2000/2001 utgjorde den vitenskapelige staben 14 personer på full tid, samt 11 med professor II tilknyning. Det var en teknisk stab på 6,3 stillinger og en administrativ stab på 7 personer.

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. Erfaringene med bygget er gode men det mangler nødvendige arealer til forberedelser til feltaktivitet. Videre er det stor knapphet på kontorer til gjesteforelesere, gjesteforskere og lesesalplasser til studentene. Det er en stor utfording å få plass til planlagt aktivitet innenfor institusjonens areal.

Ved utgangen av 2000 disponerte UNIS 24 boliger til sine ansatte. Med økende forskningsaktivitet ser styret det som viktig at det fortsatt bevilges midler til investeringer i boliger. Studentsamskipnaden i Tromsø har ansvaret for hybler til UNIS-studenter og har pusset opp tre gamle gruvearbeiderbrakker i Nybyen slik at de i dag kan tilby tilsammen 96 hybler. I løpet av 2001 vil ytterligere en brakke bli renovert slik at den samlede boligmassen for studentene vil innen utgangen av året utgjøre tilsammen 120 hybler.
For UNIS' virksomhet er det helt avgjørende å kunne gi studentene tilfredstillende boforhold, og styret legger vekt på at institusjonen har et tett og godt samarbeid med Studentsamskipnaden i Tromsø.

PHOTO: SYNNØVE HAGA

Studentene i Nybyen inviterte Kronprins Haakon til lunsj under HKH´s besøk i Longyearbyen i mai 2000.

Nybyen students invited HRH Crown Prince Haakon to lunch during his tour of Longyarbyen in May 2000.

Økonomi

Midler til drift og investeringer for UNIS bevilges over budsjettet til Kirke-, utdannings- og forskningsdepartementet. I 2000 var bevilgningen på totalt kr 34 400 000, hvorav kr 31 340 000 gikk til drift. Regnskapet for 2000 viser at 46 % av varer og tjenster kjøpes lokalt. Driftsresultatet på årsregnskapet for 2000 viser et underskudd på kr 643 509. Etter finansinntekter og finanskostnader viser regnskapet et underskudd på kr 247 526. Underskuddet dekkes av disposisjonsfondet. Stiftelsens egenkapital pr 31.12.00 var på kr 52 726 975 hvorav 51 499 848 utgjør institusjonens bygningsmasse og kr 1 227 127 utgjøres av grunnkapital og disposisjonsfond. I 2000 er lønn til direktør utbetalt med kr 416 204. Styrehonorar er i 2000 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 år 2001 og UNIS langsiktige strategiske planer for årene fremover. Institusjonen er i en sunn økonomisk finansiell stilling.

Arbeidsmiljø og personale

UNIS sykefravær i 2000 var 26 dager. Institusjonen har avtale med Longyearbyen Sykehus om bedriftshelsetjeneste. Der er ikke forekommet eller rapportert om alvorlige arbeidsuhell eller ulykker i 2000 som har resultert i store materielle skader eller personskader.

I UNIS bygninger som alle er oppført etter 1993 er det stillt store krav til innemiljøet. Modene byggemetoder, materialvalg og tekniske løsninger gir et godt inneklima.

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

Styrets virksomhet

I 2000 har styret for UNIS avholdt 4 møter, hvorav to i Longyearbyen. Det er i alt behandlet 51 saker. Viktige saker som ble behandlet i 2000 var omdanning av virksomheten, budsjett, planene for nybygg, Stortingsmeldingen om Svalbard og forberedelsene til ny strategiplan.

Veien videre

Styret vil i løpet av 2001 vedta en nye strategiplan som strekker seg frem mot 2010. Arbeidet ved institusjonen de nærmeste årene vil være preget av utformingen av UNIS' areal i Forskningsparken. I henhold til Stortingets vedtak om en økning i aktiviteten ved UNIS vil styret ha en aktiv og konstruktiv dialog med KUF om dette. Tallet på studentårsverk bør etter styrets mening på kort sikt økes til 150 og på noe lengre sikt økes ytterligere. Antallet nye studentboliger må økes i takt med dette. En viktig utfordring frem mot realiseringen av nybygget vil være å finne fleksible løsninger for institusjonens økende aktivitet.

Longyearbyen 30. mars 2001

Kjell A. Sælen
styrets leder

Steinar Nordal
nesteleder

Martin Berg

Noraly Bjørnå

Trond Dokken

Dag O. Hessen

Viva Mørk Kvello

Lasse Lønnum
direktør

RESULTATREGNSKAP PR. 31.12. 2000

	Note	1999	2000
Driftsinntekter og driftskostnader			
Driftstilskudd fra KUF		30 010 000	31 340 000
Investeringstilskudd fra KUF, utstyr		914 232	1 801 340
Investeringstilskudd fra KUF, boliger		2 561 614	2 561 613
Eksterne prosjektinntekter		740 462	2 058 914
Øvrige inntekter		1 122 563	1 264 041
Brutto driftsinntekter		**35 348 871**	**39 025 908**
Eksterne prosjektkostnader		740 462	2 058 914
Netto driftsinntekter		34 608 409	36 966 994
Lønn og sosiale kostnader	4	14 345 291	15 168 174
Avskrivninger	3	3 475 846	4 362 953
Felt- og toktkostnader		4 914 010	5 619 632
Øvrige driftskostnader	2	11 492 581	12 459 744
Sum driftskostnader		34 227 728	37 610 503
Driftsresultat		380 681	-643 509
Finansinntekter og finanskostnader			
Finansinntekter		293 044	449 669
Finanskostnader		58 364	53 686
Netto finansinntekter		234 680	395 983
Resultat før ekstraordinære poster		**615 361**	**-247 526**
Årets over-/underskudd		615 361	-247 526
Disponeringer:			
Til/ fra annen egenkapital		615 361	-247 526

NOTER TIL

NOTE 1 • Regnskapsprinsipper

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

Tilskudd fra Kirke-, utdannings- og forskningsdepartementet

Totalt tilskudd til drift og investering fra KUF er mottatt med 34.400.000. Derav er 3.060.000 ført i balansen som "investeringstilskudd". Tilskuddet blir inntektsført i takt med årlige avskrivninger. Driftstilskuddet er ført etter bruttometoden som egen inntektspost i resultatoppstillinga.

Eksterne prosjektinntekter /prosjektkostnader

Inntektsføring på ekstern finansierte prosjekter skjer i takt med kostnader på tilhørende prosjekt.

NOTE 2 • Øvrige driftskostnader

		2000	1999
Fraktkostnader	kr	218 184	165 219
Vareforbruk	kr	114 204	124 214
Kostnader vedr. lokaler	kr	2 299 479	2 275 511
Fremmedtjenester	kr	1 571 025	1 448 931
Bibliotekkostnader	kr	1 017 488	950 347
Kontorkost., tlf., fax	kr	945 765	807 005
Drift kjøretøyer	kr	328 655	223 453
Undervisningsmateriell	kr	755 316	554 312
Reisekostnader	kr	2 780 990	3 558 878
Forskningst.og stip.	kr	1 403 799	272 966
Annonser/profilering	kr	413 781	590 204
Kontigenter/forsikring	kr	166 739	287 866
Diverse kostnader	kr	444 310	233 675
Sum øvrige driftskost.	**kr**	**12 459 744**	**11 492 581**

NOTE 3 • Driftsmidler

Stiftelsen UNIS har i perioden 1993-1997 overtatt driftsbygning og tilsammen 20 boliger fra Svalbard Samfunnsdrift A/S. Svalbard Samfunnsdrift A/S 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 Svalbard Samfunnsdrift A/S en klausul om tilbakeføring av boligene/leilighetene ved varig reduksjon av boligbehovet.

Økning i boligmassen i 2000 er en bolig til ansatt.

NOTE 3

Avskrivninger bygninger 2000:

	UNIS-bygget	4 bol. 238	5 leil.	5 leil./6 bol.	2 leil.	1 leil.	1 leil.	Hytte	Hytte	Hytte	SUM
Ferdig år	aug-95	jan-94	jan-95	jan-97	des-98	jan-99	des-00	apr-98	apr-95	apr-97	
Avskrivningssats	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	64 865 347
Årlig avskr.	1 696 939	202 989	198 417	319 788	98 400	35 000	33 000	3 280	5 200	1600	
Akk. avskr.31.12.99	7 466 533	1 217 933	992 086	959 365	98 400	35 000		5 468	24 700	4 400	10 803 885
Bokf. ver. 31.12.99	34 956 951	3 856 787	3 968 345	7 035 346	2 361 600	840 000		76 532	105 300	35 600	53 236 462
Bolig anskaffet 2000							825 000				
Årets avskr.	1 696 939	202 989	198 417	319 788	98 400	35 000	0	3 280	5 200	1 600	2 561 614
Akkum. avskr.31.12.00	9 163 473	1 420 922	1 190 504	1 279 153	196 800	70 000	0	8 748	29 900	6 000	13 365 499
Bokført ver.31.12.00	33 260 012	3 653 799	3 769 928	6 715 557	2 263 200	805 000	825 000	73 252	100 100	34 000	51 499 848

REGNSKAPET

Utsatt innt.føring på investerings-tilskudd bygninger 31.12.99	52 361 461
Inntektsføring av investerings-tilskudd boliger 2000 -	-2 561 613
Utsatt innt.føring på investerings-tilskudd bygninger 31.12.00	49 799 848

Utstyr og inventar

	Tekn./vit utstyr	Kjøretøy	Inventar	Datautstyr	SUM
Levetid	2 år	5 år	5 år	2 år	
Avskr.sats	50 %	20%	20 %	50 %	
Kostpris -99	498 232	0	106 596	389 351	994 179
Anskaf. -00	1 514 980	358 852	268 691	906 461	3 048 984
Avskriv. -00	1 504 838	71 770	101 706	1 037 257	2 715 572
Bokf. v. -00	1 006 606	287 082	300 229	647 906	2 241 823

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

Utsatt innt.føring på investeringstilskudd utstyr 31.12.99	1 195 768
Investeringstilskudd 2000	+ 3 060 000
Innteksføring av investeringstil skudd utstyr 2000	- 1 801 340
Utsatt innt.føring på investerings tilskudd utstyr 31.12.00	2 454 428

Note 4 • Lønn og sosiale kostnader

UNIS har i 2000 lønnet 33 fast ansatte .

	2000	1999
Ordinære stillinger	9 309 009	8 680 022
Arbeidsgiveravgift	273 987	265 407
Arbeidsgivers andel pensjon	534 453	484 722

Note5 • Andre kortsiktige fordringer:

Reiseforskudd ansatte	kr	171 741
Fordringer ansatte	kr	26.156
Lån ansatte	kr	23 522
Forskudd leverandører	kr	28.670
Sum andre kortsiktige fordringer	kr	250 089

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.

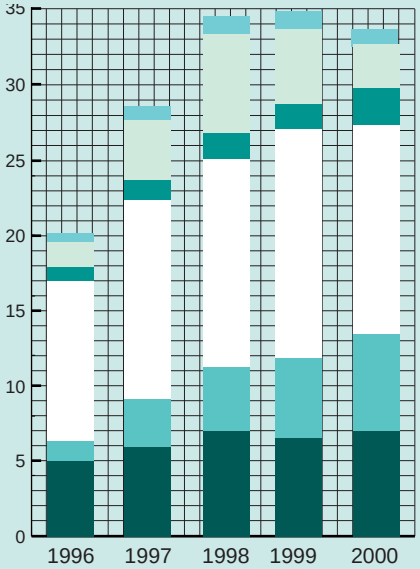
Note 7 • Godtgjørelser

Lønn til direktøren er utbetalt med kr. 416 204
Styrehonorar er utbetalt med kr. 20.000 til styrets leder og kr 10.000 til styrets øvrige medlemmer.

	Note	1999	2000
Eiendeler			
Anleggsmidler			
Andeler Svalbardhallen	6	1	1
Bygninger	3	53 236 461	51 499 848
Utstyr og inventar	3	994 179	2 241 823
Sum anleggsmidler		**54 230 641**	**53 741 672**
Omløpsmidler			
Varebeholdning		133 125	103 143
Debitorer		626 950	554 958
Andre kortsiktige fordringer	5	620 870	250 089
Betalingsmidler		4 509 883	5 098 752
Sum omløpsmidler		**5 890 827**	**6 006 942**
Sum eiendeler		**60 121 468**	**59 748 613**
Gjeld og egenkapital			
Egenkapital			
Grunnkapital		200 000	200 000
Annen egenkapital		1 274 653	1 027 127
Sum egenkapital		**1 474 653**	**1 227 127**
Langsiktig gjeld:			
Utsatt innt.føring på invester.tilsk.,utstyr		1 195 768	2 454 428
Utsatt innt.føring på invester.tilsk.bygg	3	52 361 461	49 799 848
Sum langsiktig gjeld		**53 557 229**	**52 254 276**
Kortsiktig gjeld:			
Leverandørgjeld		1 908 392	3 767 646
Skyldige offentlige trekk og avgifter		1 785 608	1 179 912
Annen kortsiktig gjeld		1 395 586	1 319 653
Sum kortsiktig gjeld		**5 089 586**	**6 267 210**
Sum gjeld og egenkapital		**60 121 468**	**59 748 613**

Statistics
Statistikk

- *Workforce in man-labour years according to occupational category at UNIS 1996–2000.*
- *Årsverk ved UNIS 1996–2000 fordelt på stillingskategori.*



Administrative staff
Administrativt ansatte

Technical staff
Teknisk ansatte

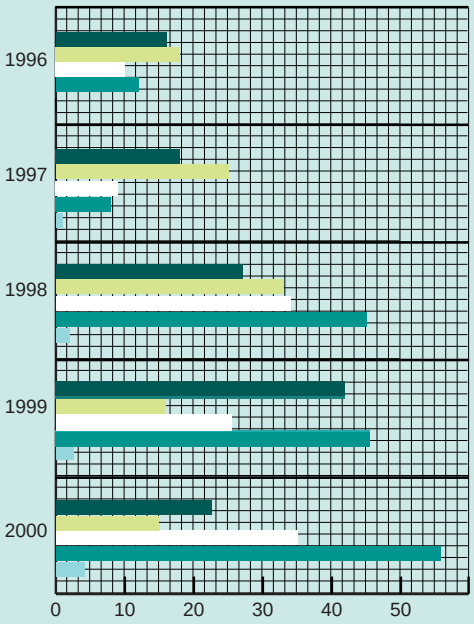
Scientific staff
Fast vitenskapelig ansatte

Adjunct professors
Professor II

Research fellows
Stipendiater

Others
Andre

- *Publications etc at UNIS 1996–2000.*
- *Publikasjoner etc. ved UNIS 1996–2000.*



Publications scientific staff
Publikasjoner vitenskapelig ansatte

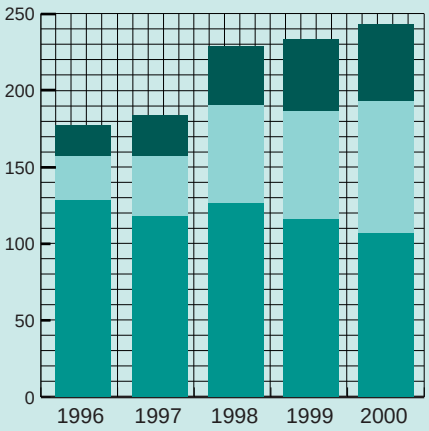
Publications adjuncts
Publikasjoner professor II

In press (all categories)
Publikasjoner in press (alle)

Presentations (all categories)
Presentasjoner (alle)

Books (all categories)
Bøker (alle)

- *Student nationality categorised as Norwegian Nordic and non-Nordic students 1996–2000.*
- *Totalt antall studenter ved unis 1996-2000 fordelt på norske, nordiske og ikke-nordiske.*

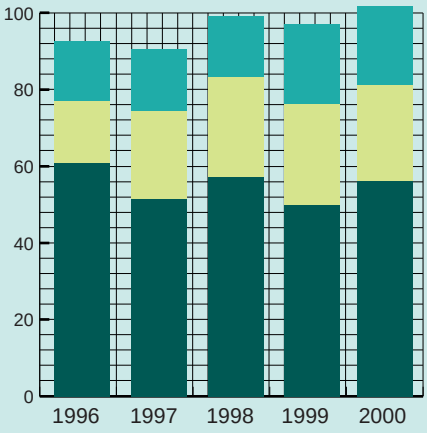


Norwegian students
Norske studenter

Nordic students
Nordiske studenter

Non-Nordic students
Ikke-nordiske studenter

- *Production in Student-labour years (1 year equals 20 Norwegian credits) categorised on teaching levels.*
- *Produksjon av studentårsverk (ett årsverk = 20 vekttall) ved UNIS 1996-2000, fordelt på undervisningsnivå.*



200-courses
200-emner

300-courses
300-emner

Master/Ph.D. work
Hovedfags- og doktorgrads arbeid

Courses

Emner undervist 2000 / Courses taught 2000

Course No.	Course name	Credits (ECTS)	Semester	No. of students
AS-101	Arctic Safety and Survival	1 (3)	spring and autumn	88
AB-201	Terrestrial arctic biology	5 (15)	spring and autumn	13
AB-202	Marine arcticbiology	5 (15)	spring and autumn	17
AB-203	Arctic environmental management	5 (15)	spring	25
AB-204	Polar ecology and polulation biology	5 (15)	spring	20
AB-303	Light Climate and Primary Production in the Arctic	3 (9)	spring	6
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 waters	3 (9)	autumn	15
SUM Arctic biology		**32 (96)**		
AG-201	The geology of Svalbard	5 (15)	autumn	15
AG-202	Arctic marine geology	5 (15)	spring	13
AG-204	The physical geography of Svalbard	5 (15)	autumn	16
AG-205	Seismic exploration	5 (15)	spring	16
AG-301	Arctic terrestrial and marine quaternary stratigraphy - excursion	2 (6)	autumn	15
AG-303	Sequence stratigraphy:A tool for basin analysis	2 (6)	autumn	17
AG-304	Glacial and periglacial processes	3 (9)	spring	20
AG-305	Glaciology	2 (6)	spring	17
AG-306	The quaternary climate history of the arctic	3 (9)	autumn	7
AG-308	Sedimentary facies analysis - From processes to systems tracts	3 (9)	spring	10
AG-309	Quarternary climate records and climate models	2 (6)	autumn	12
SUM Arctic geology		**37 (111)**		
AGF-207	Space activity and remote sensing	5 (15)	autumn	9
AGF-210	The middle polar atmosphere	5 (15)	autumn	6
AGF-211	Air/ice/sea interaction	5 (15)	spring	18
AGF-212	Processes in snow and ice	5 (15)	spring	14
AGF-213	Polar meteorology	5 (15)	autumn	12
AGF-214	Polar oceanography	5 (15)	autumn	7
AGF-301	The upper polar atmosphere	5 (15)	spring	5
AGF-304	Radar diagnostics of space plasma	5 (15)	spring	4
AGF-330	Remote sensing and advanced spectroscopy	5 (15)	spring	4
SUM Arctic geophysics		**45 (135)**		
AT-204	Thermo-mechanical properties of materials	3 (9)	spring	6
AT-205	Frozen ground engineering for arctic infrastructure	5 (15)	spring	5
AT-206	Arctic water resources	5 (15)	autumn	8
AT-207	Pollution in the arctic	5 (15)	autumn	10
AT-307	Arctic offshore engineering	3 (9)	autumn	25
AT-308	Geotechnical investigations using ground	2 (6)	spring	12
SUM Arctic technology		**23 (69)**		

Health, safety and environment activities at UNIS

Helse, miljø og sikkerhetsarbeid ved UNIS

UNIS, since it was founded in 1993, has focused heavily on Arctic Survival and Safety during field expeditions by staff and students. The steady expansion of these activities has resulted, today, in a mandatory safety course for all students and staff at UNIS. The safety training has several levels and is adjusted to suit the activity that each student group will be engaged in. The Arctic Safety and Survival course lasts 60 hours, with equal attention to theory and practical exercises. Students successfully completing the course gain the specified number of credits.

Considering the location of UNIS in the High Arctic our field trips are among the most important and most resource-intensive activities we conduct. Because of this a sharp focus on training students and staff to master the challenges that we meet on Svalbard is both right and prudent.

Safety in the field however is only one of the many health, safety and environment aspects addressed in our HSE work. UNIS has grown into an institution whose size and range of activities demand a more systematic approach to all aspects of HSE. Accordingly a Working Environment Committee has been established here, whose task is to organise this work. The WEC will also publish an HSE Manual with guidelines and information.

HSE work at UNIS generally comes under three main headings:

- Preventive HSE work
  Here we will need to make a methodical risk assessment of each sub-activity conducted at the Institution. Other key aspects are an analysis of the working environment and development of action plans.
- Resolution of day-to-day problems
  Situations and problems that need an immediate solution are dealt with here.

UNIS har siden starten i 1993 prioritert sikkerhet ved feltarbeid for ansatte og studenter. En gradvis utvikling av dette arbeidet har i dag resultert i obligatorisk sikkerhetsutdanning for alle studenter og ansatte ved UNIS. Sikkerhetsutdanningen er nivådelt og tilpasset den aktivitet de forskjellige studentgrupper skal foreta. Sikkerhetsutdanningen strekker seg over 60 timer fordelt likt på teori og praktisk øving. Ved bestått praktisk og teoretisk prøve blir studentene kreditert et vekttall.

Gitt den plasseringen UNIS har i et høyarktisk område vil feltarbeid være en av de viktigste og mest ressurskrevende oppgavene UNIS driver. Det er på bakgrunn av dette riktig og naturlig at fokus på trening av studenter og ansatte til å mestre de utfordringene som møter en på Svalbard er gitt høy prioritet.

Sikkerhet i forbindelse med feltarbeid er imidlertid bare en del av de totale oppgavene som dekkes av begrepet helse, miljø og sikkerhet (HMS). UNIS har blitt en institusjon med størrelse og aktivitetsspenn som gjør det påkrevet med et mer systematisk arbeid for å ivareta alle sider innenfor dette området. Som et ledd i dette er det etablert et Arbeidsmiljøutvalg (AMU) ved UNIS som skal bidra til å systematiserer dette arbeidet. AMU skal forestå utarbeidelsen av en HMS håndbok der alt relevant stoff skal samles.

Arbeidet innenfor HMS ved UNIS vil i hovedsak kunne klassifiseres i tre hovedområder som er

- Forebyggende HMS arbeide
  Innenfor dette området vil det være påkrevd med en mer systematisk risikoanalyse av den enkelte delaktivitet institusjonen bedriver. Vider vil kartlegging av arbeidsmiljø for øvrig og utarbeiding av handlingsplaner være sentralt.
- Løsning av enkeltproblemer i den daglige driften.

Laboratory work demands special precautions and procedures for safety's sake.

Laboratoriearbeid krever spesielle forholdsregler og rutiner for å ivareta sikkerheten.

PHOTO: TOR BREKKE

- Integrated HSE work
  This is largely a matter of how individuals can promote health, safety and environment in their daily work.

Much of the work on HSE only applies to staff at UNIS, whilst other areas, especially safety aspects of field trips, will necessarily involve students.

UNIS has already established routines and rules for many of the tasks that come under the HSE heading. But we still need to organise the routines into a system and create useful templates for risk assessment, among other things. An example of the product of such an assessment is the Arctic Survival and Safety course at UNIS, which covers many topics: use of a rifle and pyrotechnics for bear protection, communications, navigation, first-aid, and use of emergency systems. Tuition is also given on how to move around on Svalbard, with the focus on life-critical local phenomena such as sea-ice, glaciers, snow science, and avalanche risk. The Course concludes with a day's exercise on a snowmobile or rubber dinghy.

We find it important that HSE work is integrated in the Institution's daily life. It is vital that all staff and students are familiar with the regulations and, we hope, find them a positive factor and support rather than a constraint. In connection with planning and realisation of the new Science Park, HSE is an integral part of the process and the WEC is an active player.

One of the important challenges peculiar to UNIS, besides our geographical location, is the relatively high turn-over of staff, combined with the extensive use of visiting lecturers who are also expected to give guidance and tuition in the field. This situation demands sound information, good routines, and close attention to health and safety.

UNIS intends by its increasing commitment to health, safety and the environment to make the Institution an even better and safer workplace and study venue for staff and students.

Bruk av redningsdrakt i småbåt er påkrevet og dette krever opplæring.

Rescue suits are mandatory in small craft and this takes training.

PHOTO:TOR BREKKE

- Integrert HMS arbeide.
  Dreier seg i stor grad om hvordan den enkelte medarbeider kan ivareta helse, miljø og sikkerhet i sitt daglige arbeid.

Mye av arbeidet innenfor HMS omfatter kun ansatte ved UNIS, mens andre sentrale deler som f.eks. sikkerhetsrisiko ved feltarbeid også vil omfatte studentene.

UNIS har allerede etablert rutiner og regler for mange av oppgavene som faller inn under begrepet HMS. Det gjenstår imidlertid å samle disse rutinene, systematisere arbeidet samt lage gode maler for bl.a. risikovurdering. Et eksempel på hva en slik vurderingen kan munne ut i er sikkerhetsutdanningen ved UNIS. Denne inneholder bl.a. bruk av skytevåpen og pyrotekniske hjelpemidler som isbjørnbeskyttelse, samband, navigasjon, førstehjelp og bruk av nødutstyr. Det undervises også i ferdsel på Svalbard der det fokuseres på viktige faktorer som sjøis, isbreer, snø og snøskred. Sikkerhetskurset avsluttes med en dag trening på snøscooter eller gummibåt.

Vi ser det som viktig at HMS arbeidet skal være en del av institusjonens daglige oppgaver slik at alle ansatte og studenter er kjent med regelverket og ikke minst ser dette som en positiv hjelp og støtte og ikke som begrensinger i det daglige arbeidet.

I forbindelse av planlegging og realisering av den nye Forskningsparken er HMS en integrert del av arbeidet der AMU utvalget deltar aktivt.

En av de hovedutfordringene, som er spesiell for UNIS i tillegg til den geografiske plasseringen, er den relativt høye utskiftingen av ansatte samt den utstrakte bruken av gjesteforelesere som også driver veiledning og undervisning i felt. Dette fordrer god informasjon, gode rutiner og tett oppfølging i HMS arbeidet.

UNIS ønsker med økt satsingen innenfor Helse, Miljø og Sikkerhet å gjøre institusjonen til en enda bedre og sikrere arbeidsplass og studiested for sine studenter og ansatte.

Students and staff learn how to use firearms to ward off polar bears.

Studenter og ansatte må lære seg å bruke skytevåpen for å beskytte seg mot isbjørn.

PHOTO: EYSTEIN MARKUSSON

The UNIS Library

The UNIS Library is the gateway to information for faculty and students at UNIS as well as scientists at the Norwegian Polar Institute in Longyearbyen. The exact number of visitors to the library is unknown, but a total of 238 registered patrons used the library's lending services more than once in 2000, which is a slight increase over the 211 lenders in 1999. The total number of faculty, students and staff at UNIS and the Norwegian Polar Institute is about 300.

The Library is generally open from 10 a.m to 4 p.m each working day. One librarian works in the Library. As the librarian is also responsible for set books, some filing services and publication lists for annual reports, library assistance is not always available. The Library was also unattended due to vacation, meetings, etc for 45 working days in the year. The result was some reduction of service level offered, and a significant decrease in Interlibrary Loans.

In 2000 lending over the counter totalled 1662 loans, which is slightly less than in 1999, when 1861 publications were borrowed.

The level of interlibrary loans of articles and books etc decreased to 990 in 2000, down from the 1551 registered in 1999. Libraries outside Norway provided 91 documents in 2000, a decrease compared to the 120 documents in 1999. Yet the interlibrary loan figures still compare favourably with much larger institutions, as the self-supply rate in the UNIS Library is very low.

The Library lent 219 books and articles to other libraries in 2000, which is an increase over the 173 outgoing loans in 1999. Regular subscriptions are held for 141 periodicals, as well as ten newspapers. The total number of catalogued documents/items has increased from 414/10 in 1999 to 482/42 in 2000.

Due to the high turnover of patrons, one important task at the Library is to brief and assist new lenders. Alas this commitment goes unregistered. Handling queries about references is another unregistered task.

For more detailed figures, see the Library's web site: www.unis.no/library/ under «About the UNIS Library».

The UNIS Library has been a member of the Polar Libraries Colloquy since 1996, and in June 2000 the UNIS librarian was elected as a member of the Steering Committee of the Polar Libraries Colloquy for a two-year term (June 2000 - June 2002). The librarian has represented UNIS on the BIBSYS Council since 1995.

PHOTO: TOR BREKKE

«Stretching» for knowledge.

The UNIS Library with its 93 square meters is undersized. Our shelf space does not permit us to stock the ideal selection of books to support UNIS activities, and this situation will continue to apply for some years to come. We therefore remain very dependent on the document delivery services from other libraries in Norway and our colleagues in the circumpolar world.

The Students Annual Report

Being a student at UNIS is not only a unique experience academically; we get to experience life in the Arctic by actually living there for an extended period of time. Thus we enjoy the best of both worlds: a small, satisfyingly intensive study environment with lecturers at the top of their field, and a taste of life in Longyearbyen, surrounded by glaciers and mountains, but with enough "civilization" to appeal to most city-dwellers. As students we have incredible opportunities to go out and see the areas around Longyearbyen and most of Spitzbergen. The students who accept this challenge are also an exceptional bunch: in 2000, students from 20 countries, as remote as Tibet, Australia, and Japan, took courses at UNIS.

Studies

Although UNIS is a Norwegian institution, all classes are held in English, due to the international background of the student body and faculty. First we learn the theory, then we go out and see everything in practice on field work and excursions.

The Student Democracy

The Student Council is elected at a meeting held each semester where all students can vote. There is a president and a vice-president (who takes over after one semester), a representative on the UNIS Board, a treasurer, a representative for each of the four faculties, a representative for the graduate students, and a representative on the computer services council. In addition representatives who are responsible for the students' outdoor equipment and cabins may attend Council meetings, but do not have a vote.

At least one General Meeting is held every semester; additional meetings are held as deemed necessary by the Council. In 2000, four General Meetings and six Student Council meetings were held.

The Council discusses topics of concern to the students, regarding student life in general, housing, academic issues, and relations with the administration. The Council president represents the students at the monthly executive team meetings, together with the heads of the departments, a representative of the staff, and the Director of UNIS. The students have a representative on the UNIS Board of Directors, and are thus involved in all the larger decisions about UNIS, and the department representatives attend their faculty workgroups. So students have quite a say in the decision making, and we feel that the administration and faculty are very receptive to student input.

We also publish a handbook for new students, called USSK (Unis Student Survival Kit), and the revisions to this work are a never-ending task.

Economy

The Student Council gets its budget from UNIS and the Student Union in Tromsø. We also raise money at fund-raiser events. The money is spent on student welfare: we pay for students' medical bills, maintaining and outfitting the cabins, and repairing and supplementing the outdoor equipment.

Social activities

Students are involved in many community activities in Longyearbyen: the local choir, the Red Cross Auxiliary Corps, as volunteers at the Jazz Festival, the sports club (Svalbard Turn), and countless other interests and happenings. Last year we also hosted a lunch buffet for the town to celebrate Norway's National Day.

Students are very involved in the various sports teams fielded by Svalbard Turn. During a series of sporting competitions with Barentsburg, UNIS students played an important role in bringing exceptional victories to Longyearbyen. The students' sports prowess was also demonstrated at the *Quadralon* contest in August: one student came in second in the individual category, while another UNIS team secured a resounding last place, which was not so bad considering that their kayaker had never held a paddle before.

Many students go out on trips either by foot, on skis, or on snowmobiles in the spring. As soon as the sun returns, and until it sets many months later, the call of nature is answered by virtually every student to go out and see new mountains, ancient glaciers, and unspoiled valleys. Any student who has been to UNIS returns with life-long memories of the people and places of the far north.

All seasons have their charm. Students exploring nearby surroundings in the lovely colours of autumn.

PHOTO: JORIEN ELISABETH VONK

Arctic pelagic food web structure

A key feature of high latitude ecosystems is the ability to tune responses so that functionality is maintained under highly seasonal environments. In the marine pelagial of Svalbard waters this is reflected by the spatial and temporal variability of primary production events. The main temporal peak in algal blooming appears as sea ice retreats in spring and the water column becomes thermally stratified. To optimize their energy intake, the grazers of Arctic pelagic systems must tune their life cycles so that their most intensive growth periods coincide with the temporal niche of high food availability.

In Svalbard waters the main energy carriers bridging primary production and higher trophic levels are dominant zooplankton grazers: *Calanus finmarchicus* and *C. glacialis*. These copepods are important prey items for most higher order consumers in the pelagial. The two species are morphologically similar, yet differ in their life cycle, generation gap, size, and energy content. They are also associated with water masses of differing origin. *C. finmarchicus* is primarily an Atlantic species, transported into Svalbard waters by the West-Spitsbergen current. While lower in energy content than the Barents Sea species *C. glacialis*, *C. finmarchicus* is capable of faster population growth due to a much shorter generation gap, and commonly predominates numerically in samples taken in Svalbard waters.

To build an understanding of the energy turnover in Arctic pelagic ecosystems UNIS has focused on a study of the balance of these two species. Recent findings suggest that the coastal waters of Spitsbergen may provide an interesting opportunity for this study as local polar-like habitats in the sill fjords of western and northern Spitsbergen can hold large populations of *C. glacialis* while other systems are dominated by *C. finmarchicus*. Further studies will focus on the relative importance of biological and physical mechanisms for shaping this spatial variability in distribution and abundance.

Other striking features of Arctic pelagic ecosystems are blooms of pteropods and ctenophores. Such massive blooms can occur on short temporal scales and are highly spatially variable. The processes behind these events are not fully understood, but they are assumed to affect the structure of pelagic food webs greatly during – and possibly after – blooming events. In cooperation with the Norwegian Polar Research Institute and the University of Tromsø, projects aimed at

Pelagiske næringsnett i Arktis

Et særtrekk ved økosystemer ved høye breddegrader er deres evne til å tåle store sesongmessige miljøvariasjoner. I den marine pelagialen i områdene rundt Svalbard reflekteres dette først og fremst ved stor romlig og tidsmessig variasjon i primærproduksjon. Hovedoppblomstringen av algebiomasse finner sted etter at isen har trukket seg tilbake og vannsøylen, som følge av økt innstråling, blir vertikalt lagdelt. For å optimalisere sitt energiinntak må arktiske pelagiske gressere derfor tilpasse livssyklusen sin slik at de utviklingsstadier som er mest sensitive for vekstvilkår overlapper med denne tidsmessig begrensede perioden med stor tilgang på mat.

I havområdene rundt Svalbard er hovedbæreren av energi mellom primærproduksjonen og høyere trofiske nivåer fullstendig dominert av herbivore dyreplankton; først og fremst to arter av copepoder: *Calanus finmarchicus og C. glacialis*. Disse artene er viktige byttedyr for de fleste høyere konsumenter i pelagialen. Begge arter er morfologisk svært like, men deres livssyklus, generasjonstid, størrelse og energiinnhold er markert forskjellig. Artene assosieres også med vannmasser av forskjellig opprinnelse. *C. finmarchicus* er først og fremst en Atlantisk art som transporteres inn i Svalbard-området av Vestspitsbergenstrømmen. Med sitt lave energi innhold i forhold til Barentshavsarten *C. glacialis, er C. finmarchicus* relativt sett av noe lavere kvalitet for de fleste konsumenter. På den annen side er den i stand til å oppnå langt høyere vekstrater fordi den normalt har en mye kortere generasjonstid og vanligvis vil *C. finmarchicus* dominere i antall i dyreplanktonprøver tatt i områdene rundt Svalbard. Som energibærer kan det derfor hende at denne arten er av størst betydning.

For å bidra til å utvide forståelsen av energifluksen i arktiske pelagiske økosystem har UNIS startet studier som fokuserer på ballansen av disse to dominerende copepod artene. Nylige studier indikerer at Svalbards kystnære farvann byr på unike muligheter for slike studier. I bassengvannet i terskelfjordene på Nord- og Vest-Spitsbergen er temperaturene stabile og svært lave. Dette gir opphav til lokale polarlignende habitater hvor *C. glacialis* forekommer i større mengder enn ellers. Videre studier fokuseres på betydningen av fysiske og biologiske mekanismer for å opprettholde slike romlige variasjoner i forekomster, samt betydningen disse variasjonene har for økosystemsstrukturen.

Andre slående trekk ved arktiske pelagiske økosystem er de massive oppblomstringene av pelagiske snegler (pteropoder) og ribbe-

PHOTO: BJØRN GULLIKSEN

Observation and under water photographing in multi year ice.

Observasjon og undervannsfotografering i flerårsis.

gaining insight into the ecology of such blooms are now underway.

UNIS is today a center for collaborating scientists focusing attention on the Arctic pelagic systems from the Norwegian Polar Institute, University of Bergen, University of Oslo, University of Tromsø, and the Institute for Polar Ecology at Kiel. Ongoing projects involve studies of community differences over environmental gradients associated with frontal systems north of Svalbard, sill fjords on the western coast of Spitsbergen, and spatial and temporal variability of open fjords (Kongsfjorden). In addition more process-oriented studies have been initiated focusing on the fate of energy. They investigate the ecology of key pelagic planktivores in Arctic systems.

maneter (ctenophorer). Slike massive oppblomstringer oppstår gjerne i svært begrensede tidsperioder og med atskillig geografisk variasjon i forekomst. Prosessene som fører til slike hendelser er ikke fullstendig forstått, men en må anta at effektene er merkbare for struktur og energiflyt i det pelagiale næringsnettet både under og etter oppblomstringene. I samarbeid med Universitetet i Tromsø og Norsk Polarinstitutt er det startet opp prosjekter for å bidra til å belyse økologien bak slike masseoppblomstringer.

UNIS er i dag et senter for samarbeidende institusjoner som arbeider med marin pelagisk økologi: Norsk Polarinstitutt, Universitetet i Bergen, Universitetet i Oslo, Universitetet i Tromsø, og institutt for polarøkologi i Kiel/Tyskland. Pågående prosjekter omfatter: studier av samfunnsforskjeller over miljøgradienter skapt av frontsystemer nord for Svalbard, samt i fjorder på vestkysten av Spitsbergen og romlige og tidsmessige variasjoner i Svalbards kystnære områder. I tillegg er det startet opp mer prosessorienterte studier av energiflyt i arktiske vannmasser.

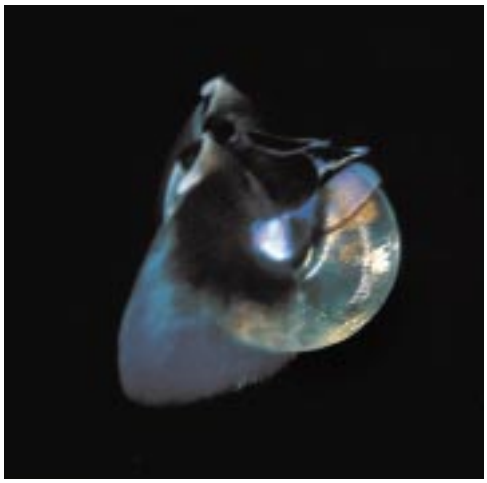


PHOTO: ERLING SVENSEN

Pteropod (vingesnegl);
(Limacina helicina).

PHOTO: BJØRN GULLIKSEN

Rocky bottom biotope in Kongsfjorden dominated by seaanemones
(Hormathia nodosa) *and bryozoans.*

Hardbunnsbiotop i Kongsfjorden dominert av sjøanemoner
(Hormathia nodosa) *og mosdyr.*

Research Projects

Title: Terrestrial trophic dynamics in the Canadian Arctic.
Collaborating Institutions: University of British Columbia, Vancouver Canada, Swedish University of Agricultural Sciences at Umeå and Uppsala, Stockholm University, Göteborg University, Lund University, University of Joensuu Finland, , University of Tromsø, University of Bergen, McGill University, Canada.
Financing: Swedish Polar Research Secretariat, UNIS, various others
Duration: 1999-2001
UNIS: Ingibjörg S. Jónsdóttir

Title: Population ecology of clonal tundra plants: impact of herbivores, climate and glaciation history.
Collaborating institutions: University of Tromsø, Swedish University of Agricultural Sciences at Balsgård, University of Bergen, University of Wyoming USA.
Financing: Swedish Polar Research Secretariat, UNIS
Duration: 1999-2002
UNIS: Ingibjörg S. Jónsdóttir

Title: Effect of climate warming on tundra vegetation, The International Tundra Experiment – ITEX
Collaborating Institutions: Agricultural Research Institute, Iceland, Göteborg University
Financing: Icelandic Science Foundation, Agricultural Res. Inst., Stiftelsen Konung Carl XVI Gustafs 50-årsfond, UNIS.
Duration: 1994-2003
UNIS: Ingibjörg S. Jónsdóttir

Title: Adaptive models for zooplankton behaviour
Collaborating institutions: CNR-Roma
Financing: UNIS
Duration: 1999-2000
UNIS: Ketil Eiane

Title: Dynamics of Calanus populations under differing predation regimes
Collaborating institutions: SIO-UCSD, St. Andrews University, University of Bergen
Financing: UNIS, SIO-UCSD, University of Bergen
Duration: 1997-2000
UNIS: Ketil Eiane

Title: Population dynamics of zooplankton in the North Sea
Collaborating institutions: SIO-UCSD, University of Bergen
Financing: UNIS
Duration: 1997-2000
UNIS: Ketil Eiane

Title: Distribution of zooplankton in relation to biophysical gradients associated with frontal systems.
Collaborating institutions: IPÖ/Germany
Financing: UNIS
Duration: 2000-2001
UNIS: Ketil Eiane

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

Title: Zooplankton communities under differing advective influence in coastal areas on Svalbard
Collaborating institutions: NP/Norway
Financing: UNIS/NP
Duration: 2000-2002
UNIS: Ketil Eiane

Title: Arctic fjords. An ecosystem approach.
Collaborating institutions: University of Cape Town
Financing: UNIS, UCT
Duration: 2001
UNIS: Ole Jørgen Lønne

Title: Image analysis techniques in quantitative marine benthic ecology
Collaborating institutions: University of Tromsø
Financing: UNIS
Duration: 1997-2001
UNIS: Ole Jørgen Lønne

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: 1996-2002
UNIS: Rolf Langvatn

Title: Population biology of red deer,
- environmental effects and demographic processes.
Collaborating institutions: University of Oslo
Financing: UNIS/UiO/NFR
Duration: 2000-2003
UNIS: Rolf Langvatn

Title: Diversity and nitrogen fixation of cyanobacterial communities in terrestrial Arctic ecosystems
Collaboartion institutions: University of Tromsø
Financing: UNIS, University of Tromsø
Duaration: 2000-2004
UNIS: Rolf A. Olsen, Matthias Zielke

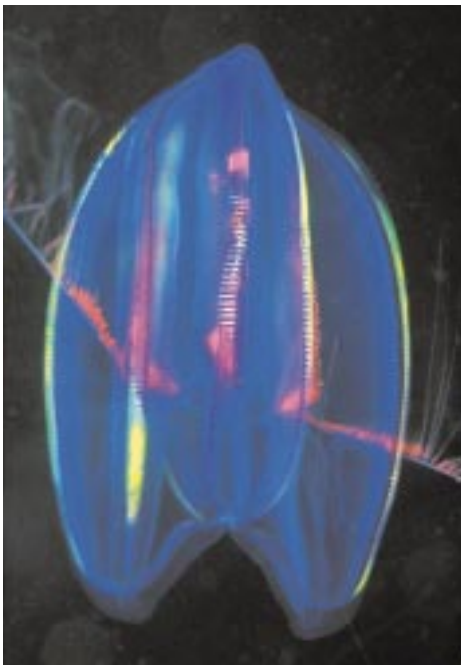


PHOTO: ERLING SVENSEN

Ctenophora (ribbemanet);
Mertencia ovum.

Cand. scient. graduates 2000

Title: The effect of cadmium pollution on an arctic population of *Mya truncata* (Bivalvia): A study of metal turnover and stress response
Collaborating institutions: University of Stockholm
Student: Beatrice Crona
Supervisors: Ole Jørgen Lønne, UNIS, Michael Tedengren, Stockhom University
Finished: Spring 2000

Title: The incidence of infectious nematod larvae in reindeer stomachs - intestines in an annual cycle
Collaborating institutions: University of Oslo
Student: Glenn Roar Berge
Supervisors: Rolf Langvatn, UNIS, Odd Halvorsen, UiO
Finished: Spring 2000

Title: Population structure of the autochthonous sympagic amphipods Gammarus wilkitzkii and Apherusa glacialis in selected categories of sea-ice.
Collaborating institutions: University of Berlin
Student: Frank Beuchel
Supervisors: Ole Jørgen Lønne, UNIS, Peter Götz, Freie Universität Berlin
Finished: Spring 2000

Title: Forage selection of vascular plants in different spatial and temporal scales by Svalbard reindeer (*Rangifer tarandus platyrhynchus* Vrolik).
Collaborating institutions: University of Oslo
Student: Yvonne Halle
Supervisors: Rolf Langvatn, UNIS, Christina Skarpe, NINA, Ivar Mysterud, UiO
Finished: Spring 2000

Title: Systematic structure, reproductive systems and evolution of Arctic Potentilla
Collaborating institutions: University of Oslo
Student: Elin Hamre
Supervisors: Sigmund Spjelkavik, UNIS, Inger Nordal, UiO, Reidar Elven, UiO
Finished: Autumn 2000

Title: Possible hybride origins of *Poa hartzii* and *Poa arctica* ssp. *Caespitans* in Svalbard (Poaceae) investigated by morphology and isoenzymes
Collaborating institutions: University of Oslo
Student: Jørild Haugen
Supervisors: Sigmund Spjelkavik, UNIS, Reidar Elven, UiO, Inger Nordal, Liv Borgen UiO
Finished: Autumn 2000

Title: A test of the hybrid origin of *Puccinellia vacillans* (Poaceae) in Svalbard, by use of enzymatic, morphological and cytological data
Collaborating institutions: University of Oslo
Student: Nanna Winger Steen
Supervisors: Sigmund Spjelkavik, UNIS, Reidar Elven, UiO, Inger Nordal, Liv Borgen UiO
Finished: Autumn 2000

Cand. scient. students 2000

Title: Variations in *Draba arctica* s.sl.on Svalbard
Collaborating institutions: University of Oslo
Student: Bård Andersen
Supervisors: Sigmund Spjelkavik, UNIS, Reidar Elven, UiO, Inger Nordal, Liv Borgen UiO

Title: PCB levels in white whales from Svalbard
Collaborating institutions: Norwegian University of Science and Technology
Student: Gro Andersen
Supervisors: Kit Kovacs, NP, Christian Lydersen, NP, Bjørn Munroe Jensen, NTNU

Title: Diet analysis of harbour seals in the Prins Karls Forland area of Svalbard
Collaborating institutions: University of Copenhagen
Student: Signe May Andersen
Supervisors: Kit Kovacs, NP, Per Rosenkilde, University of Copenhagen

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

Title: Snøspurvens (Plectrophenax nivalis) reproduksjonsbiologi på Svalbard. Delprosjekt 2: Hannlig variasjon i fjærdrakt og reproduktiv suksess
Collaborating institutions: NTNU
Student: Morten Ingebrigtsen
Supervisors: Yngve Espmark, NTNU Arne Moksnes, NTNU, Rolf Langvatn, 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: NTNU
Student: Trine Moland
Supervisors: Torleiv Brattegard, UiB, Ole Jørgen Lønne, UNIS

Title: Effekt av tetthetsavhengig ressursbegrensning på Svalbardreinens (*Rangiferei tarandus platyrhynchus*) demografi
Collaborating institutions: NTNU
Student: Snorre Henriksen
Supervisors: Bernt-Erik Sæter, NTNU, Ronny Aanes, NP, Rolf Langvatn, UNIS

Title: Effect of day length on spatial and temporal patterns of behaviour og Svalbard reindeer (*Rangiferei tarandus platyrhynchus)*
Collaborating institutions: Fredrich-Schiller University - Jena
Student: Elke Lindner
Supervisors: Rolf Langvatn, UNIS, Stefan Halle, Jena

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

Title: Distribution of zooplankton in relation to biophysical gradient associated with frontal systems
Student: Malin Daase
Supervisors: Ketil Eiane, UNIS, Michael Spindler, Christian Albrecht University in Kiel

Title: Food-preferences of sympagic amphipods from arctic ice
Collaborating institutions: Univ. i Hamburg
Student: Caroline Arndt
Supervisors: Ole Jørgen Lønne, UNIS, Angelika Brandt., Univ. i Hamburg

Title: A comparison of different benthic techniques (underwater photographs, video-recording and handpicking) in Isfjorden, Svalbard
Collaborating institutions: University of Tromsø
Student: Tor Magne Hoem
Supervisors: Ole Jørgen Lønne, UNIS, Bjørn Gulliksen, UiT

Title: Mate guarding and song activity in males of snow buntling (plectophenax nivalis) on Svalbard in relation to their parental investment.
Collaborating institutions: NTNU
Student: Marie Lier
Supervisors: Rolf Langvatn, UNIS, Yngve Espmark, NTNU, Arne Moksnes, NTNU

PHOTO: ESPEN VANG

Marine biology students get hands-on experience while doing identifying work on live organisms.

Marinbiologstudenter får praktisk erfaring under identifikasjons-arbeid.

Arctic Geology

Arktisk Geologi

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. In total, the department offers 12 courses: four at the 200 level and eight at the 300 level. The 200-level courses making up the one-year study program (60 ECTS, or 20 Norwegian credits) were offered in their present form for the seventh time. We have continued to work towards greater consistency in the 300-level courses and to strengthen a theoretical profile matching ongoing research activities. Eight 300-level courses, of 2-5 weeks duration, are now offered for masters and doctoral candidates totalling 54 ECTS (18 credits). New in 2000 was *AG-309 Quaternary Climate Records and Climate Models*. The overall focus of this course is to understand past changes in the Earth system by comparing coupled Earth-Atmosphere models with palaeodata of various types.

Our academic staff numbers four full-time faculty and three secondary positions. A vacant position in Geology was filled during the autumn by professor Olafur Ingólfsson, who specialises in Quaternary Geology.

The Department has wide professional competence, but guest lecturers remain a vital resource for implementation of our extensive range of courses. The guest lecturers are also regular partners in our ongoing scientific projects. This helps build commitment and improves the predictability and continuity of the teaching, and is also of great value to students who meet at close hand examples of the research conducted on Svalbard and elsewhere in the Arctic.

The staff at the Department of Geology were actively engaged in several research projects during 2000. A number of projects were continued from the previous year and several new projects were initiated during the year, as can be seen from the list in this report as well as from supplementary information now available on the Internet. A few examples of ongoing research initiatives at the Department are outlined briefly below.

One research project makes use of automatic digital cameras to investigate snow cover variations in the landscape around Longyearbyen. The extensive mountain plateaus around Longyearbyen act as source areas for drifting snow during the winter. This redistribution of precipitation has regional significance for many phenomena such as avalanche activity and glacier mass balance. On a more local scale, however, the

Den geologiske forskningsvisjonen for perioden 1999-2003 slik den er presentert i 1998-utgaven av UNIS Årsrapport danner fremdeles bakgrunnen for såvel undervisning som forskning ved geologiavdelingen. Alt i alt tilbyr avdelingen 12 kurs: fire på 200-nivået og åtte på 300-nivået. Kursene på 200-nivået som utgjør det ettårige (60 ECT eller 20 vekttall) studiet, ble tilbudt i sin nåværende form for sjuende gang. Vi arbeider fortsatt for å oppnå større konsistens i kursene på 300-nivået samt å styrke en teoretisk profil som matcher pågående forskningsvirksomhet. Åtte kurs på 300-nivået (2-5 uker) blir nå tilbudt hovedfags- og doktorgradskandidater og med i alt 54 ECT eller 18 vekttall. Nytt i 2000 var *AG-309 Quaternary Climate Records and Climate Models*. Dette kurset fokuserer hovedsakelig på å forstå tidligere forandringer i jordens system ved å sammenligne koplede jord-atmosfære-modeller med palaeodata av ulike typer.

Vår akademiske stab teller fire heltidsansatte og tre sekundære stillinger. En ledig stilling i geologi ble besatt i løpet av høsten med professor Olafur Ingólfsson, som spesialiserer seg på kvartær geologi.

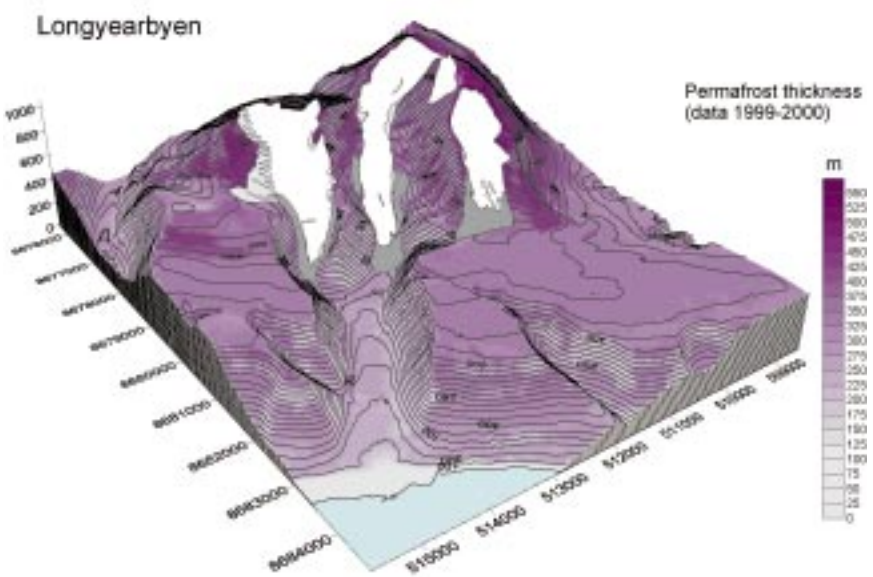
Avdelingen har bred faglig kompetanse, men gjesteforelesere er fremdeles en viktig ressurs for gjennomføring av vårt omfattende kurstilbud. Gjesteforeleserne er også ofte med på våre løpende vitenskapelige prosjekter. Dette bidrar til å utvikle engasjement og gir bedre forutsigbarhet og kontinuitet i forskningen, og er også av stor verdi for studenter som på nært hold møter eksempler på den forskning som blir utført på Svalbard og andre steder i Arktis.

Staben i geologiavdelingen var aktivt engasjert i flere forskningsprosjekter i 2000. En rekke prosjekter ble videreført fra året før, og flere nye prosjekter ble igangsatt i løpet av året, som man kan se av oversikten i denne rapporten samt ut fra tilleggsinformasjon som nå er tilgjengelig på internett. Noen få eksempler på pågående forskningsprosjekter i avdelingen er kort beskrevet nedenfor.

I ett av forskningsprosjektene benyttes automatiske digitale kameraer for å undersøke variasjoner i snødekket i landskapet rundt Longyearbyen. De store fjellplatåene rundt Longyearbyen fungerer som kildeområder for snødriv om vinteren. Denne omfordelingen av nedbør har regional betydning for mange fenomener som for eksempel skredaktivitet og massebalanse i breene. I en mer lokal målestokk er imidlertid snødekkets tykkelse viktig for bakketemperaturen på grunn av den isolerende virkningen, noe som dermed

Breinosa (782 m asl.) and the glacier Foxfonna seen from the north, across Adventdalen. The Little Ice Age maximum extent of the glacier is marked with a 20-30 m high ice-cored moraine in the central part of the picture, while a debris-covered outletglacier still slowly advances in the valley seen in the lower right part of the picture.

Breinosa (782 m.o.h) og isbreen Foxfonna sett nordfra, over Adventdalen. Breens maksimale utstrekning i den lille istid er markert med en 20-30 meter høy morene med iskjerne i midten av bilde, mens en sedimentdekket dalbre fremdeles beveger seg langsomt fremover i dalen man ser i nederste høyre del av bildet.



Calculated stble permafrost thickness in the area around Longyearbyen, based on one year of metorological observations 1999. 08.20 – 2000.08.19 The 3D models is seen looking southwest, with Longyerbyen and UNIS located in the lower part of the valley, near the bottom corner. April 2000.

Beregnet stabil permafrosttykkelse i området rundt Longyearbyen, basert på meteorologiske observasjoner 20.02.1999-19.08.2000. Den tredimensjonale modellen er sett mot sørvest, og Longyearbyen (og UNIS) ligger i nedre del av dalen som strekker seg mot det nederste hjørnet. April 2000.

Examples of imagery of lower Longyeardalen and Adventdalen valleys, as recorded by one of the automatic digital cmeras. Viewed loking east.

Eksempler på bilder fra nedre Longyeardalen og Adventdalen registrert av ett av de automatiske digitale kameraene. Sett mot øst.

thickness of the snow cover is important for ground temperatures due to the insulating effect, thereby influencing temperature and thickness of permafrost in the region. Also the vegetation cover is influenced by the thickness and duration of the snow cover, both during winter when the snow cover protects from physical wind abrasion and low temperatures, and during the growing season when surviving snow patches act as water reservoirs. A modelling research initiative (snow cover, permafrost thickness, active layer, growing degree days, etc.) is being carried out which relies closely on results derived from this field-based project.

Based on a series of case studies of the moraines of temperate glaciers in Norway, an allostratigraphic model is suggested as a conceptual guide for the field analysis of ice-contact deposits based on outcrop sections as well as seismic or ground-penetrating radar profiles. Allostratigraphic mapping of the internal facies architecture of marine moraines reveals the development history of ice-contact sedimentary systems. The new method for a high-resolution analysis of the dynamic stratigraphy of moraines provides important information on the ice-front behaviour, glacier dynamics, and regional climatic conditions.

A third research initiative addresses the climatic, palaeoclimatic and geomorphic significance of rock glaciers, which are widespread on Svalbard. Active rock glaciers are present in many cold-climate mountain regions and are often seen as characteristic of continental environments and as important agents in many cold-climate high-relief regions. It is the aim of this project to contribute towards our knowledge of the typical rock glacier climate by collecting geomorphological and meteorological observations from sites with active rock glaciers on Svalbard. The palaeoclimatic

påvirker temperaturen og tykkelsen på permafrosten i regionen. Dessuten er plantedekket påvirket av snødekkets tykkelse og varighet, både om vinteren når snødekket beskytter mot fysisk vindabrasjon og lav temperatur, og i vekstsesongen når snøflekker som blir liggende fungerer som vannreservoarer. Et modelleringsforskningsprosjekt (snødekke, permafrosttykkelse, aktivt lag, vekstgraddager osv.) blir utført i nært samarbeid med resultater fra dette feltbaserte prosjektet.

På grunnlag av en rekke case-studier av morener fra tempererte isbreer i Norge, foreslås en allostratigrafisk modell som en konseptuell veiledning for feltanalysen av iskontaktavleiringer basert på utløperseksjoner samt seismiske eller bakkepenetrerende radarprofiler. Allostratigrafisk kartlegging av marine moreners interne faciesarkitektur avslører utviklingshistorien til iskontaktsedimentære systemer. Den nye metoden for en høyoppløsningsanalyse av den dynamiske stratigrafien av morener gir viktig informasjon om isfrontens atferd, bredynamikk og regionale klimaforhold.

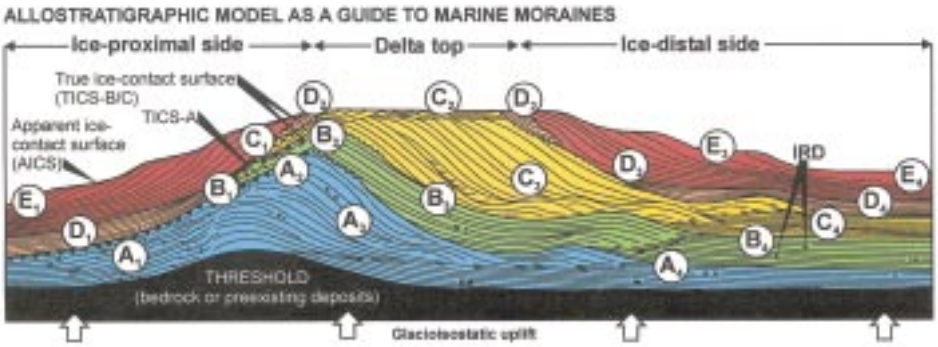
Et tredje forskningsprosjekt tar for seg den klimatiske, palaeoklimatiske og geomorfogiske betydningen av steinbreer, som er utbredt på Svalbard. Aktive steinbreer finnes i mange fjellområder med kaldt klima og betraktes ofte som karakteristiske for kontinentale miljøer og som viktige agenter i mange områder med kaldt klima og høye relieffer. Målet med dette prosjektet er å bidra til kunnskap om det typiske steinbreklimaet ved å samle geomorfologiske og meteorologiske observasjoner fra steder med aktive steinbreer på Svalbard. Den palaeoklimatiske betydningen av steinbreer undersøkes ved hjelp av C14-datering og oksygenisotopanalyse på isprøver fra isemner i enkelte steinbreer. Dessuten blir oksygenisotopstratigrafien fra iskiler benyttet som et middel til å skaffe palaeoklimatisk informasjon om tids-

significance of rock glaciers is investigated by means of 14C-dating and oxygen isotope analysis on ice samples from ice bodies within the individual rock glaciers. Also oxygen isotope stratigraphy from ice wedges is being exploited as a means of obtaining palaeo-climatic information on the timing of permafrost establishment at low altitudes.

UNIS is a partner in the EU project "Permafrost and climate in Europe: Climate change, mountain permafrost degradation and geotechnical hazard" (PACE). In connection with this international research initiative, UNIS has established a meteorological station at Janssonhaugen in upper Adventdalen, where one of the PACE permafrost boreholes is located. It provides information on modern meteorology at the borehole site.

punktet for permafrostens etablering i lavlandet.

UNIS er en samarbeidspartner i EU-prosjektet "Permafrost and climate in Europe: Climate change, Mountain permafrost degradation and geotechnical hazard – PACE ("Permafrost og klima i Europa: Klimaendring, nedbryting av permafrosten i fjellet og geoteknisk fare – PACE)". I tilknytning til dette internasjonale forskningsprosjektet har UNIS opprettet en meteorologisk stasjon på Janssonhaugen i øvre Adventdalen hvor et av PACE-borehullene i permafrosten ligger, for å skaffe informasjon om moderne meteorologi på borestedet.



An allostratigraphic model suggested for field analysis of ice-contact deposits in a marine environment.

En allostratigrafisk modell som foreslås for feltanalyse av iskontaktavleiringer i et marint miljø.

Research Projects

Title: Norwegian Ocean Climate Project (NOClim)
Collaborating institution: University og Bergen, University of Tromsø, Norwegian Meteorological Institute, Nansen Environmental and Remote Sensing Centre, Norwegian Polar Institute
Financing: Norwegian Science Foundation
Duration: 2000-2003
UNIS: Trond Dokken

Title: International Marine Global Change Study (IMAGES)
Collaborating institution: Several nations
Financing: Norwegian Science Foundation financing the Norwegian membership
Duration: 2000
UNIS: Trond Dokken

Title: Rapid climatic changes detected from the sedimentary record in the Nordic Seas and the North Atlantic
Collaborating institutions: Laboratoire des Sciences du Climat de l'Environment, CNRS/CEA, Gif sur Yvette, France; Dept. of Geology, Univ. of Bergen
Financing: The Research Council of Norway
Duration: 1999-2000
UNIS: Trond Dokken

Title: Brine generation and deep water formation in the Barents Sea (Storfjorden and adjacent slope) – present and past
Collaborating institutions: Dept. of Geophysics, University of Bergen, Dept. of Geology,University of Bergen.
Financing: UNIS, University of Bergen
Duration: 1999-2002
UNIS: Trond Dokken

Title: Mapping snow cover duration, avalanches and other geomorphic processes by automatic digital cameras, Longyeardalen, Svalbard
Financing: UNIS
Duration: 1999-2002
UNIS: Ole Humlum

Title: Monitoring surface climate and active layer temperatures in various landforms around Longyearbyen, Svalbard
Financing: UNIS
Duration: 1999-2002
UNIS: Ole Humlum

Title: Isotopic composition of modern precipitation in Longyearbyen, Svalbard
Collaborating institutions: Niels Bohr Institute, University of Copenhagen
Financing: UNIS
Duration: 1999-2002
UNIS: Ole Humlum

Title: Permafrost and climate in Europe: Climate change, Mountain permafrost degradation and geotechnical hazard (PACE)
Collaborating institutions: Geographical Institute, University of Oslo; Federal Institute of Technology, Zürich
Financing: EU, UNIS
Duration: 1998-2000
UNIS: Ole Humlum

Title: Modelling energy balance, surface temperatures, active layer depth and permafrost thickness around Longyeardalen, Svalbard
Financing: UNIS
Duration: 1999-2002
UNIS: Ole Humlum

Title: Monitoring surface climate and active layer temperatures in various landforms around Longyearbyen, Svalbard
Financing: UNIS
Duration: 1999-2002
UNIS: Ole Humlum

Title: The climatic and palaeoclimatic significance of rock glaciers
Financing: UNIS
Duration: 1999-2002
UNIS: Ole Humlum

Title: Holocene geomorphic activity in coastal Greenland at glacier equilibrium line altitudes
Collaborating institutions: University of Copenhagen, Arctic Station (Greenland)
Financing: Danish Natural Science Research Council
Duration: 1999-2002
UNIS: Ole Humlum

Title: Linking land and sea at the faroe islands: Mapping and understanding north atlantic changes (LINK)
Collaborating institutions: University of Lund, University of Copenhagen, 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: Ole Humlum

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

Title: Late Quaternary glaciations of the Kara Sea area, Yamal and Yugorski Peninsulas, western Siberia.
Collaborating institution: Göteborg University (Sweden), University of Illinois at Chicago (USA), Earth Cryosphere Institute (Russia).
Financing: Swedish Natural Sciences Research Council
Duration: 1998-2002
UNIS: Ólafur Ingólfsson

Title: Reconstructing late Pleistocene history of Arctic coastal zone, based on origin of massive ground ice.
Collaborating institution: Earth Cryosphere Institute, Moscow, Russia.
Financing: Swedish Natural Sciences Research Council
Duration: 1998-2001
UNIS: Ólafur Ingólfsson

Title: Late Quaternary glacial history of the Barents Sea ice sheet.
Collaborating institution: Göteborg University (Sweden), Norwegian Acricultural University (Ås), University of Illinois at Chicago (USA).
Financing: Swedish Natural Sciences Research Council, UNIS
Duration: 2000-2003
UNIS: Ólafur Ingólfsson

Title: Late Quaternary glacial history of Severnaya Zemlya, Arctic Russia
Collaborating institution: Göteborg University, Lund University (Sweden), Institute of Arctic and Alpine Research, University of Illinois at Chicago (USA)
Financing: Swedish Natural Sciences Research Council, Swedish Polar Research Secretariat, National Science Foundation (USA), UNIS
Duration: 1999-2002
UNIS: Ólafur Ingólfsson

Title: Hans Tavsen ice cap project. Glacier and climate change research, North Greenland
Collaborating institutions: Geological Survey of Denmark and Greenland, University of Copenhagen, University of Lund, University of Iceland
Financing Nordic Council of Ministers Environmental Research Programme
Duration: 1993-2000
UNIS: Jon Landvik

Title: Deflation and related sediment transport in Adventdalen, Svalbard
Financing: UNIS
Duration: 1997-2000
UNIS: Jon Landvik

Title: Past climates of the Norwegian region (NORPAST)
Collaborating institutions: Norwegian Polar Institute, Washington State Univer- sity, University of Iceland, Geological Survey of

PHOTO: ENDRE GJERMUNDSEN

Masters degree students at the Department of Geology worked on a range of issues related to active layer development, permafrost, ice wedges, relations between rock glaciers and debriscovered glaciers, glacial geomorpho.ogy at a surge-type glacier,englacial drainage systems in polythermal glaciers, and the dynamics of a surge-type glacier.

Hovedfagsstudenter ved geologiavdelingen har jobbet med ulike spørsmål knyttet til utviklingen av aktive lag, permafrost, iskiler, forholdet mellom steinbreer og sedimentdekkede dalbreer, bre-geomorfologi på en surgende isbre, englasiale dreneringssystemer i polytermiske isbreer og dynamikken i en surgende isbre.

Norway, University of Bergen, University of Tromsø, Norwegian Meteorological Institute.
Financing: The Norwegian Research Council, UNIS
Duration: 1999-2002
UNIS: Jon Landvik

Title: Pollution and rapid climatic changes in the Arctic as recorded by lake sedimen- tary archives (POLARCLIM).
Collaborating institutions: University of Bergen, University of Umeå, University of Helsinki, University of Copenhagen.
Financing: Nordic Council of Ministers: Nordic Arctic Research Programme (NARP).
Duration: 1999-2001
UNIS: Jon Landvik

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

Cand. scient. graduates 2000

Title: Indre strukturer i utvalgte steinbreer på Svalbard
Collaborating institutions: University of Oslo
Student: Morgan Wåle
Supervisors: Knut Sand, UNIS, Johan Ludvig Sollid, UiO
Finished: Spring 2000

Title: The sedimentation pattern of last deglaciation and postglacial phase in a high-Arctic valley: Endalen, Spitsbergen
Collaborating institutions: University of Bergen
Student: Stian Soltvedt
Supervisors: Ida Lønne, UNIS, Wojtek Nemec, UiB
Finished: Spring 2000

Title: Abrupte nedkjølinger under siste deglasiasjon i de nordiske hav
Collaborating institutions: University of Tromsø
Student: Trond Henrik Lie-Andreassen
Supervisors: Morten Hald, UiTø, Trond Dokken, UNIS
Finished: Autumn 2000

Cand. scient. students 2000

Title: Stratigraphy and sedimentary environments during the Jurassic-Cretaceous transition on Spitsbergen, based upon foraminifer
Collaborating institutions: University of Oslo.
Student: Birgitte Brattebø
Supervisors: Jenø Nagy

Title: Utvikling av dreneringskanaler på en subpolar bre, Drønbreen, Svalbard
Collaborating institutions: University of Bergen
Student: Odd Harald Hansen
Supervisors: Stein-Erik Lauritsen, UiB, Jon Ove Hagen, UiO, Ole Humlum, UNIS

Title: Mapping of quarternary geology at the glacier front of Drønbreen
Collaborating institutions: University of Bergen
Student: Martin Berg
Supervisors: Ole Humlum, UNIS, Atle Nesje, UiB

Title: Ice wedges as a palaeoclimatic indicator in Adventdalen, Svalbard
Collaborating institutions: University of Copenhagen
Student: Jon Willaing Jeppesen
Supervisors: Ole Humlum, UNIS, Hanne H. Christiansen, University of Copenhagen)

Title: Ugledalen rock glacier response on Holocene climatic variations, Svalbard
Collaborating institutions: University of Copenhagen
Student: Sisse Korsgaard
Supervisors: Ole Humlum, UNIS, Hanne H. Christiansen, University of Copenhagen

Title: Influence of the snowpack on vegetation and active layer thickness, Adventdalen, Svalbard
Collaborating institutions: University of Copenhagen
Student: Mette Oht
Supervisors: Ole Humlum, UNIS, Hanne H. Christiansen, University of Copenhagen

Title: Bredynamikk og surge på Bjuvbreen, Kjellstrømdalen, Svalbard
Collaborating institutions: UiO
Student: Sofia Anna Åsberg
Supervisors: Ole Humlum, UNIS, Jon Ove Hagen, UiO

Arctic Geophysics

Arktisk Geofysikk

Teaching

Arctic Geophysics considers four main fields: Oceanography, Meteorology, Middle Atmosphere (Mesosphere) and Upper Atmosphere (Stratosphere).
The teaching spans over a huge vertical range from the depths of the ocean through the entire atmospheric column to the solar winds of outer space. The emphasis is on geophysical phenomena in polar regions with implications for global currents in the ocean and atmosphere and for radiation processes in the atmosphere. These issues are all pertinent in connection with the concerns people have regarding the environment and climatic change.
Geophysics currently offers ten different courses. The faculty remained unchanged except for the position in upper atmosphere studies: Jøran Moen was offered a full time professorship at the University of Oslo and is now an associate professor at UNIS. The Department graduated four masters students and supported three doctoral dissertations.

Research

UNIS is an active participant in Northern Lights research on Svalbard, not least as we are responsible for day-to-day operation and maintenance of the **Aurora Station** in Adventdalen. This station offers a platform for research and teaching activities. The main focus is on plasma processes in the polar cleft based on multi-instrumental observation techniques (radar, optical, geomagnetic, rocket and satellite measurements). The Geophysics Department has been actively involved in several rocket and radar campaigns. We are also deeply involved in operations and use of the EISCAT radar located close to Mine 7 in Adventdalen.

UNIS is busy doing quality assurance on the measurements and continuing readings of temperature in the upper parts of the middle atmosphere (mesosphere), in association with the Geophysical Institute in Fairbanks, Alaska. These readings commenced at the Aurora Station in 1978 and are held to be extremely important for our understanding of the ways the upper and middle atmosphere interact. In this connection we actively use data from the SOUSY radar at the base of Mine 7.

In recent years a new generation of spectral imagers has been developed at UNIS. These instruments detect spectral signatures of any target at high spectral and spatial resolution. Two of the units are now deployed by the Fishery Institute in Tromsø and the Institute of Physics in Lhasa, Tibet. UNIS has conducted several airborne campaigns to identify possible applications. The classi-

Undervisning

Arktisk geofysikk har fire hovedretninger: oceanografi, meteorologi, midtre og øvre atmosfære.

Undervisningen strekker seg over et vertikalt område fra havets dyp, gjennom hele atmosfæresøylen til solvindene i det ytre rom. Det legges vekt på geofysiske fenomener i polarområdene med konsekvenser for globale havstrømmer og luftstrømmer samt strålingsprosesser i atmosfæren. Alle disse temaene er aktuelle i forbindelse med spørsmål om miljø- og klimaforandringer.

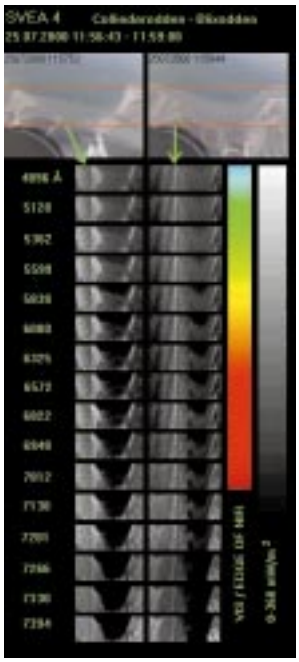
Geofysikk tilbyr for tiden ti ulike kurs. Staben er uendret med unntak av stillingen som gjelder den øvre atmosfæren. Jøran Moen ble tilbudt en heltids professorstilling ved Universitetet i Oslo. Han er nå professor II ved UNIS. Avdelingen har i 2000 uteksaminert 4 hovedfagsstudenter og støttet 3 doktorgrader.

Forskning

UNIS er en aktiv deltaker i nordlysforskningen på Svalbard, ikke minst fordi vi er ansvarlig for daglig drift og vedlikehold av **Nordlysstasjonen** i Adventdalen. Stasjonen er en plattform for såvel forsknings- som undervisningsvirksomhet. Den ser hovedsakelig på plasmaprosesser i polarkløften basert på multi-instrumentelle observasjonsmetoder (radar-, optiske, geomagnetiske, rakett- og satellittmålinger). Geofysikkavdelingen har vært aktivt engasjert i flere rakett- og radarmålinger. Vi er også dypt involvert i drift og bruk av EISCAT-radaren som ligger ved gruve 7 i Adventdalen.

UNIS er opptatt av å kvalitetssikre målingene, og videreføre temperaturmålinger i øvre og midtre del av atmosfæren (mesosfæren), i samarbeid med Geofysisk Institutt i Fairbanks, Alaska. Disse målingene tok til ved Nordlysstasjonen i 1978 og anses for å være svært viktige for vår forståelse av samspillet mellom øvre og midtre atmosfære. I denne forbindelse bruker vi aktivt data fra SOUSY-radaren ved foten av gruve 7-fjellet.

De siste årene er det utviklet en ny generasjon bildespektrografer ved UNIS. Disse instrumentene oppdager spektralsignaturene til ethvert mål med høy spektral og romlig oppløsning. To av disse instrumentene er nå i bruk ved Fiskeriforskning i Tromsø og ved Fysikkinstituttet i Lhasa, Tibet. UNIS har gjennomført flere flymålinger for å finne frem til mulige anvendelser. Klassifiseringen av is, smeltevann, vegetasjon osv. er bare noen av de mange mulige anvendelsene.



Example of images obtained by a spectral imager airborn.

Eksempel på data med avbildene spektrograf fra fly.

fication of ice, melt water, vegetation etc are just a few of the potential uses.
At the Aurora Station another task is to develop techniques for monitoring stratospheric ozone in the long winter night using starlight from Vega in particular. The goal is to implement measurements during periods when the sun and moon have set, not simply when they are up. The instrument, a star spectrograph, has been upgraded with a new detector, which enabled us to sample stellar radiation much faster than previously. As a result, we now derive the ozone levels directly without any form of extended star tracking.

In the project designated "Environmental Research in Tibet", two new and improved instruments to record UV radiation and visible radiation in five different channels and a new imaging spectrometer were installed on the roof of the Institute of Physics, University of Tibet. Two Tibetian students started their studies for a masters degree in Atmospheric Physics at UNIS. They will use the data that we collect in Lhasa in their work for their masters thesis. Calibration of the Tibetan instruments has been conducted using instruments from UNIS. Our aim is to build and secure long time series in order to detect possible trends in the stratospheric ozone concentration for comparison with the corresponding UV dose at ground level at both sites. An associated experiment was also initiated to study the protective properties of clothing under the extreme UV doses experienced in Tibet.

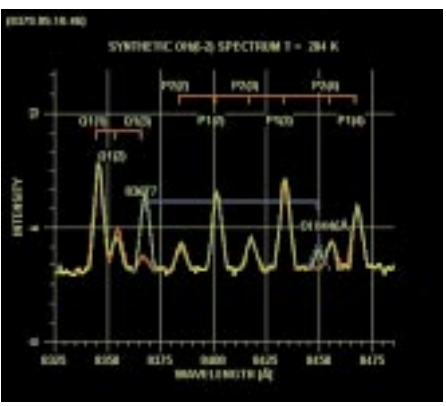
Two doctoral candidates worked on issues related to snow drift and drift formation around buildings and snow accumulation in relation to topographical features. This was the last season of field work. One of the students, Thomas Thiis, defended his doctoral thesis in October. Another doctoral candidate is working on questions of sound propagation in the atmosphere under different atmospheric conditions. He has now finished his project and the degree dissertation will be held at UNIS in March 2001.

Three master of science students have studied climatic changes and variations of mass balance on glaciers in Iceland over the past 100 years, based on distribution of ash-layers in glaciers and on variations in the pattern of atmospheric circulation. This is part of a partnership program with the University of Iceland and Meteorological Institute of Iceland.

UNIS is a contributing partner in the EU project known as VEINS: «Variability of Exchange in the Nordic Seas». It looks at the

The airglow spectrum with synthetic fit to obtain the temperature.

Natthimmel-lys spekter med syntetisk tilpasning som funksjon av temperatur.



Ved Nordlysstasjonen er en annen oppgave å utvikle metoder for å overvåke ozonnivået i stratosfæren gjennom den lange vinternatten, spesielt ved bruk av stjernelys fra Vega. Målet er å gjennomføre målinger til andre tidspunkter etter at solen og månen har gått ned, ikke bare når de er oppe. Instrumentet, en stjernespektrograf, er oppgradert med en ny detektor, som setter oss i stand til å ta prøver av stjernestrålingen mye raskere enn før. Som følge av dette avleder vi nå ozonnivåene direkte uten noen form for utvidet stjernesporing.

I prosjektet kalt "Miljøforskning i Tibet" ble to nye og bedre instrumenter som skal registrere UV-stråling og synlig stråling i 5 ulike kanaler og et nytt bildespektrometer installert på taket til Fysikkinstituttet ved Tibet University. To tibetanske studenter begynte sine hovedfagsstudier i atmosfærisk fysikk ved UNIS. De vil bruke dataene vi samlet inn i Lhasa i sitt arbeid med hovedfagsoppgaven. Kalibrering av de tibetanske instrumentene er gjennomført ved bruk av instrumenter fra UNIS. Målet vårt er å utvikle og sikre lange tidsserier for å finne mulige trender i ozonkonsentrasjonen i stratosfæren og sammenligne den med tilsvarende UV-dose på bakkenivå på de to stedene. Som en bieffekt er det satt i gang et eksperiment for å studere klærs beskyttende egenskaper mot ekstremt høye UV-doser i Tibet.

To doktorgradstudenter har jobbet med spørsmål knyttet til snødriv og snøfonndannelse rundt bygninger og snøakkumulering i forhold til topografiske trekk. Dette var siste sesong med feltarbeid. En av studentene, Thomas Thiis, forsvarte sin doktoravhandling i oktober. En doktorgradstudent arbeider med lydforplantning i atmosfæren under ulike atmosfæriske forhold. Han har nå avsluttet dette prosjektet, og doktordisputasen vil finne sted ved UNIS i mars 2001.

Tre cand.scient-studenter har studert klimaforandringer og variasjoner i massebalanse på isbreene i Island de siste 100 år, basert på fordelingen av askelag i isbreer og på variasjoner i mønsteret i den atmosfæriske sirkulasjonen, som er en del av samarbeidet med Universitetet i Island og Meteorologisk Institutt i Island.

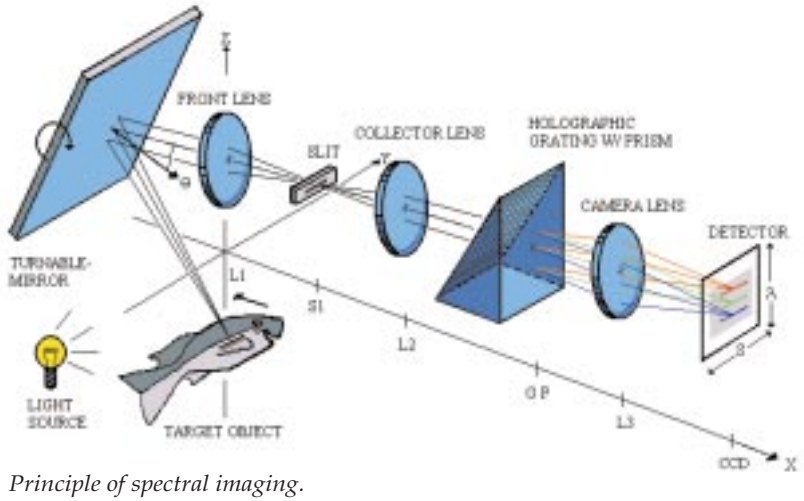
UNIS er en av deltakerne i EU-prosjektet som kalles VEINS (står for "Variability of Exchange in the Nordic Seas"). Prosjektet tar for seg sesongmessige og andre variasjoner i vannutvekslingen mellom Norskehavet, Grønlandshavet, Polhavet og tilstøtende havområder.

seasonal and other variations in water exchange between the Norwegian Sea, Greenland Sea, Arctic Ocean and contiguous sea areas.

UNIS also takes part in research into freezing processes in sea ice. This project is based in Storfjorden and also includes distance measurement techniques and modelling. Research into processes in the coastal and fjord areas on Spitsbergen has continued in 2000 with participation on excursions by our partner institutions and in connection with our own teaching excursions.

UNIS deltar også i forskning omkring frysesprosesser i sjøis. Dette prosjektet er basert i Storfjorden og omfatter også avstandsmålemetoder og -modellering.

Forskningsprosessene i kyst- og fjordområdene på Spitsbergen er videreført i 2000 hvor samarbeidspartnere har deltatt på ekskursjoner og i forbindelse med våre egne undervisningsekskursjoner.



Principle of spectral imaging.

Hovedprinsippet for spektral avbildning.

Research Projects

Title: Environmental research in Tibet
Collaborating institutions: Meteorological Bureau Lhasa, University of Bergen
Financing: Norwegian Foreigh Ministry, NORAD
Duration: 1995-2003
UNIS: Yngvar Gjessing

Title: Sound propagation in the atmosphere
Collaborating institutions: Norwegian Defence Construction Service, University of Bergen, Norwegian University of Science and Technology
Financing: Norwegian Defence Construction Service, UNIS
Duration: 1995-2001
UNIS: Yngvar Gjessing, Hans Olav Hygen

Title: Study of snowdrifts and snow storage around buildings and constructions
Collaborating institutions: University of Bergen
Financing: Narvik College, University of Bergen, UNIS
Duration: 1997-2001
UNIS: Yngvar Gjessing, Thomas Thiis

Title: Snowdrift and snow accumulation in complex landscapes
Collaborating institutions: University of Bergen, Norwegian University of Science and Technology
Financing: UNIS
Duration: 1998-2001
UNIS: Yngvar Gjessing, Christian Jeadicke

Title: Air-ice-sea interaction in the West Spitsbergen Current
Collaborating institutions: University of Bergen
Financing: Norwegian Research Council
Duration: 1998-2001
UNIS: Peter M. Haugan

Title: Variability of Exchanges in the Northern Seas (VEINS)
Collaborating institutions: University of Hamburg, Germany and 19 European Institutions
Financing: EU MAST programme
Duration: 1997-2000
UNIS: Peter M. Haugan, Tor Gammelsrød, Vigdis Tverberg

Title: A national project for studying solar wind-magnetosphere coupling in the polar cusp region
Collaborating institutions: University of Oslo, University of Tromsø
Financing: Norwegian Research Council, UNIS
Duration: 1997-2001
UNIS: Jøran Moen and Fred Sigernes

Title: ESR-studies of atmospheric dynamics in the polar cleft region
Collaborating institutions: US Air Force Research Laboratory, EISCAT, Rutherford Appleton Laboratory

Financing: Norwegian Research Council, UNIS
Duration: 1999-2000
UNIS: Jøran Moen

Title: Studies of the upper polar atmosphere
Financing: UNIS
Duration: 1999-
UNIS: Jøran Moen

Title: Star-pointing spectrometer for Monitoring Ozone and related Constituents of the Stratosphere during polar night (StarMOCS)
Collaborating institutions: NILU Kjeller, Auroral Station at the University of Tromsø
Financing: UNIS
Duration: 1996-
UNIS: Fred Sigernes

Title: Monitoring of OH rotational temperatures in the mesosphere
Collaborating institutions: University of Alaska, Embry-Riddle
Financing: UAF, UNIS, Embry-Riddle, Max Planck Institute
Duration: 1997-
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: 1999-
UNIS: Fred Sigernes

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

Cand. scient. graduates 2000

Title: Velocity fields and ice flux on Drønbreen, Svalbard
Collaborating institutions: University of Bergen
Student: Martin Dahl Grønnevet
Supervisors: Yngvar Gjessing, UNIS, Trainn Sigurdsson, Sensors and Software Sverige, Jan Erik Paulsen, DNMI Tromsø
Finished: Spring 2000

Title: The influence of dust/aerosols in the Earth's lower and middle atmosphere
Collaborating institutions: University of Bergen, University of Tromsø
Student: Trude Eidhammer
Supervisors: Yngvar Gjessing, UNIS, Ove Havnes, UNIS/UiTø
Finished: Spring 2000

Title: An analysis of passive microwave data in Storfjorden compared to thin ice/ polynya modelling
Collaborating institutions: Chalmers, Gøteborg
Student: Cecilia Bennet
Supervisors: Tor Gammelsrød, UNIS, Jan Askne, Chalmers University of Technology
Finished: Spring 2000

Title: Processes in the Arctic snow pack, and formation of bottom ice
Collaborating institutions: University of Oslo
Student: Jonas Johnsen
Supervisors: Knut Sand, SINTEF and Nils Roar Sælthun, UiO
Finished: Autumn 2000

Title: Termohaline sesongvariasjon i Van Mijenfjorden
Collaborating institutions: University of Bergen
Student: Tor-Villy Kangas
Supervisors: Peter Haugan, UNIS and Harald Svendsen UiB
Finished: Autumn 2000

Title: Measurements and evaluation of OH-airglow spectra
Collaborating institutions: University of Bergen
Student: Kristian Pagh Nielsen
Supervisors: Yngvar Gjessing, UNIS/UiB, Fred Sigernes, UNIS
Finished: Autumn 2000

Title: Stellar absorption spectroscopy during the polar night on Svalbard
Collaborating institutions: University of Bergen
Student: Ine-Therese Pedersen
Supervisorse: Fred Sigernes, UNIS, Birgit Heese, University of Munic, Elmer Raustein, UiB
Finished: Autumn 2000

Cand. scient students

Title: Atmospheric temperature retrieval from LIDAR measurements in the stratosphere and lower mesosphere on Svalbard.
Collaborating institutions: Alfred-Wegener-Institut, Germany; NTNU
Student: Astrid Marie Nerbø Dahl
Student Supervisors: Birgit Heese, University of Munic, Roland Neuber, AWI, Berit Kjeldstad, NTNU.

Title: Mapping of ashlayer in Myrdalsjøkul, Iceland, as a measurement for massbalance and icedynamics – with comparison to an icecore taken at Lomonosovfonna –99.
Collaborating institutions: University of Bergen
Student: Ola Brandt
Supervisors: Yngvar Gjessing, UNIS

Title: Comparison of ice classification done by plane and satellite
Collaborating institutions: Danmarks Tekniske Universitet
Student: Mikael Lüthje
Supervisors: Fred Sigernes, UNIS, Leif Toudal Pedersen, Danmarks Tekniske Universitet

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

Title: Monitoring sea ice fluxes through Fram Strait
Collaborating institutions: University of Bergen
Student: Karolina Widell
Supervisors: Tor Gammelsrød, UNIS

PHOTO: JAN GUNNAR BRATTLI

Aurora borealis above EISCAT Svalbard Radar's two incoherent scattering radars on top of the «Gruve 7» mountain.

Nordlys over EISCAT Svalbard Radars to inkohorente spredningsradare på toppen av Gruve 7 fjellet.

Arctic Technology

Arktisk Teknologi

PHOTO: P.J.BRANDVIK

Students using snow radar to study ice and snow properties.

Studentene bruker snøradar for å studere egenskaper ved snø og is.

Teaching

This was the first full year with an expanded staff at the Department, with two associate professors and two adjunct professors. The new position within Arctic Environmental Technology is part of the Department strategy to offer new courses and perform research within Arctic Environmental Technology and Chemistry. The Department is still in an establishment phase and the strategy is to become, within a few years, a full Department comparable in size with the other faculties at UNIS.

The Department had 33 students on 200 and 300 level courses and nine masters students during the year. The courses at 200 level, *AT-204 Thermo-mechanical Properties of Materials*, *AT-205 Frozen Ground Engineering*, *AT-206 Arctic Water Resources* and the new course *AT-207 Pollution in the Arctic* had an average 7,5 students and were held as scheduled with excellent results. The teaching in these subjects is a combination of lectures, field work and laboratory practicals. The work performed in our Ice Laboratory, where mechanical properties of frozen ground and ice samples are tested, is only one example. The field work is often performed under severe climatic conditions and operating in this harsh environment gives the student valuable survival skills which are not directly documented on the degree certificate. It is also very gratifying that our candidates are recruited to central positions in local industry on Svalbard and on the mainland.

Students taking our level 200 course in *Pollution in the Arctic* in recent years have come from different backgrounds, sometimes lacking the necessary technological foundation. From autumn semester 2000 a multidisciplinary 200 course with the same name was offered as part of a study in Arctic Environmental Technology. Twelve students from different departments at UNIS participated in the new offering. A new 300 course entitled *AT-311 Fate and Modelling of Pollutants in the Arctic* is scheduled for the spring semester 2001. The students can thus combine environment related courses with other relevant programs from other departments, for a one-year study in Arctic Environmental Technology and Chemistry. The Department intends to expand the latter in terms of lectures and associated research. Accordingly a position as adjunct professor within this field will be advertised spring 2001.

Our 300 level courses *AT-307 Arctic Offshore Engineering* and *AT-308 Geotechnical Investigations Using Ground-Penetrating Radar* attracted an average 17,5 students and were held

Undervisning

Dette var det første hele året med utvidet stab i avdelingen, med to førsteamanuenser og to professorer II. Den nye stillingen innen arktisk miljøteknologi er en del av avdelingens strategi med å tilby nye kurs og drive forskning innen arktisk miljøteknologi/ kjemi. Avdelingen er fremdeles i etableringsfasen, og strategien er at vi i løpet av noen få år skal bli en fullstendig avdeling som i størrelse kan sammenlignes med andre avdelinger ved UNIS.

Avdelingen hadde i 2000 33 studenter på kurs både på 200 og 300-nivå, samt 9 hovedfagsstudenter. Kursene på 200-nivået, nemlig *AT-204 Thermo-mechanical Properties of Materials, AT-205 Frozen Ground Engineering, AT-206 Arctic Water Resources* og det nye kurset *AT-207 Pollution in the Arctic* hadde gjennomsnittlig 7,5 studenter og ble gjennomført etter planen med utmerkede resultater. Undervisningen i disse fagene er en kombinasjon av forelesninger, feltarbeid og laboratoriearbeid. Arbeidet som er utført i vårt islaboratorium, hvor de mekaniske egenskapene ved prøver av frossen jord og is blir testet, er bare ett eksempel. Feltarbeidet kan utføres under vanskelige klimatiske forhold, og arbeid i dette tøffe miljøet gir studentene verdifull kompetanse som ikke er direkte dokumentert på vitnemålet. Det er også en glede for oss å se at våre kandidater blir rekruttert til sentrale stillinger i den lokale industrien på Svalbard og på fastlandet.

Studenter som de siste årene har deltatt i vårt 200-kurs i *arktisk forurensing*, har hatt en variert bakgrunn, og noen av disse studentene har manglet nødvendig teknisk kunnskap. Fra høstsemesteret 2000 ble det holdt et tverrfaglig 200-kurs med samme navn som en del av et studium i arktisk miljøteknologi. Tolv studenter fra ulike avdelinger ved UNIS deltok på det nye kurset. Et nytt 300-kurs kalt *AT-311 Fate and Modelling of Pollutant in the Arctic* er planlagt for vårsemesteret 2001. Studentene kan da kombinere miljørelaterte kurs med andre relevante kurs, også fra andre avdelinger, til et ettårig studium i arktisk miljøteknologi/ kjemi. Det er avdelingens strategi å ekspandere innen arktisk miljøteknologi/ kjemi både når det gjelder forelesninger og forskning. En av professor II-stillingene vil bli utlyst innen dette området i løpet av våren 2001.

Kursene på 300-nivået, *AT-307 Arctic Offshore Engineering* og *AT-308 Geotechnical Investigations Using Ground Penetrating Radar* hadde gjennomsnittlig 17,5 studenter og ble gjennomført med utstrakt deltakelse

with extensive assistance from faculty staff and external lecturers. Although the 300 level courses seek to integrate research work performed by faculty staff, external scientists are often employed to augment our small staff.

Last autumn *AT-307 Arctic Offshore Engineering* attracted many students from the University of Natural Science and Technology (NTNU) in Trondheim and UNIS. The combination of lectures and field work gives an unique background for the students who later take part in oil company activities in Arctic areas in Norway and abroad, notably in Northwest Russia. It is an intensive, two-week course, with tuition being provided in cooperation with Statoil. Next year this course will be offered in two different versions, with and without field work. The field work, mostly ice-mechanics, will be performed during the spring semester.

AT-308 Geotechnical Investigations Using Ground-Penetrating Radar was given in cooperation with personnel from the University of Tromsø. The course provides a thorough theoretical and practical foundation for using ground-penetrating radar as a tool in geotechnical investigations in Arctic areas. Next year this course will be extended to include other geotechnical field methods and the use of differential GPS.

AT-310 Heat and Mass Transfer was offered for the first time this year, but was unfortunately cancelled due to the low enrolment figure. This course is an advanced program based on two of our 200 courses and offers skills and knowledge important to candidates working within Arctic Engineering. The Department will intensify our work to recruit students to this course.

With the changes scheduled for 2001 the courses offered at 200 level will form a complete one-year study in Arctic Technology. The courses offered at 300 level can be taken in conjunction with graduate studies as a part of a masters or doctorate degree.

Research

Our two new members of staff continued already established research effort at UNIS as well as initiating new lines of study. The focus of research in Arctic Environmental Technology includes: fate of oil spills in an Arctic environment and possible countermeasure techniques, persistent organic pollutants, and spread and effects of pollution from local mining industry. Research within frozen ground and

fra såvel egne ansatte som gjesteforelesere. Intensjonen med kursene på 300-nivået er å få til en nær integrering med forskningen som de ansatte utfører, men eksterne forskere er benyttet i teknologiavdelingen på grunn av stabens beskjedne størrelse.

AT-307 Arctic Offshore Engineering hadde i fjor høst mange studenter fra såvel NTNU som UNIS. Kombinasjonen mellom forelesninger og feltarbeid gir en unik bakgrunn for studentene som senere deltar i oljeselskapenes virksomhet i arktiske områder både i Norge og i utlandet, f.eks. i det nordvestlige Russland. Dette er et intensivt toukers kurs hvor undervisningen blir gitt i samarbeid med Statoil. Neste år vil dette kurset bli tilbudt i to ulike utgaver, med og uten feltarbeid. Feltarbeidet (for det meste ismekanikk) vil bli utført i løpet av vårsemesteret.

AT-308 Geotechnical Investigations Using Ground Penetrating Radar ble holdt i samarbeid med personell fra Universitetet i Tromsø. Kurset gir en grundig teoretisk og praktisk innføring i bruk av bakkepenetrerende radar som verktøy i forbindelse med geotekniske undersøkelser i arktiske områder. Neste år vil dette kurset bli utvidet til også å omfatte andre geotekniske feltmetoder og bruk av differensiell GPS.

AT-310 Heat and Mass Transfer ble tilbudt for første gang i år, men ble dessverre avlyst fordi for få studenter hadde meldt seg på. Dette kurset er et avansert kurs basert på to av våre 200-kurs og gir kompetanse og kunnskap som er viktig for kandidater som arbeider med arktisk teknikk. Avdelingen vil intensivere arbeidet med å rekruttere studenter til dette kurset.

Kursene som tilbys på 200-nivået vil, med endringene som ble gjennomført i 2000 (og endringene som skal gjennomføres i 2001), utgjøre et fullstendig ettårig studium på 200-nivå innen arktisk teknologi. Kursene som tilbys på 300-nivået kan benyttes til høyere studier som en del av et hovedfag eller en doktorgrad.

Forskning

De to nye medlemmene av staben har både videreført allerede etablert forskning ved UNIS og brakt med seg og satt i gang ny forskningsvirksomhet. Forskningen innen arktisk miljøteknologi fokuserer på: skjebnen til oljesøl i et arktisk miljø og mulige mottiltak, vedvarende organiske forurensingsstoffer samt spredning og virkning av forurensing fra lokal gruveindustri. Forskning innen frossen jord- og permafrostteknikk fokuserer på hvilke virkninger klima-

permafrost engineering focuses on effects of climate change on Arctic infrastructure and permafrost response to environmental and industrial loads, with special emphasis on physical properties of oil polluted soil. Further descriptions of three of these projects are given at the end of this chapter.

Graduate and doctoral students are an important part of our research and the work is performed as an integrated part of the research done by staff. Nine graduate students are currently working on their master degrees at the Department. Their projects look at:

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Testing of oil recovery in ice.

Testing av utstyr for opptak av olje i is.

- Modelling of the oil spills and contingency measures in the Arctic with emphasis on the Pechora Sea region, Northwest Russia
- Characterisation of acid seepage as a function of melting process on tailings deposit on permafrost in Bjørndalen, Svalbard
- Modelling permafrost temperature response to short-term (annual) and long-term (50 year) variations in meteorological data
- Winter water balance for Isdammen, Svalbard
- Temperature regime and permeability of a tailings deposit on permafrost in Bjørndalen, Svalbard
- Field investigations and numerical modelling of snow cover in the De Geer valley, Svalbard
- Leakage of toxic water-solvable components from different oil types during an oil spill in an Arctic environment
- Studying persistent airborne pollutants by sampling and analysis at the Longyear glacier
- The effects of sea-ice loads on coal export jetty at Cape Amsterdam, Svea.

Several of the master degree projects have focused on topics important to the local communities on Svalbard and they were performed in close cooperation with national and local industry. The masters projects were done under the purview of supervisors from UNIS, NTNU, other universities and colleges, and the industry.

Project: Oil spill contingency in Arctic areas
Oil spilled in an Arctic environment such as the waters surrounding Svalbard has a significantly different behaviour than oil spills in more temperate waters, such as the North Sea. This change in behaviour (spreading, evaporative loss, emulsification, dispersion etc) has important consequences for the planning of an operational oil spill contingency.

There are several possible sources for oil spills in the waters around Svalbard: fishing

endringer har på arktisk infrastruktur og permafrostens respons på miljø- og industribelastninger, med særlig vekt på de fysiske egenskapene til oljeforurenset jordsmonn. En nærmere beskrivelse av tre av disse prosjektene er gitt i slutten av dette kapitlet.

Hovedfags- og doktorgradstudentene er en viktig del av forskningen vår, og deres arbeid blir utført som en integrert del av forskningen som staben utfører. Ni studenter arbeider for øyeblikket med hovedfaget sitt ved vår avdeling. Prosjektene deres ligger innenfor:

- Modellering av oljesøl og beredskapstiltak i Arktis med vekt på Pechorasjø-området i det nordvestlige Russland.
- Karakterisering av sur avrenning som en funksjon av smelteprosessen fra gruvedeponier på permafrosten i Bjørndalen på Svalbard.
- Modellering av permafrostens temperaturrespons på kortsiktige (årlige) og langsiktige (50 år lange) variasjoner i meteorologiske data.
- Vannbalansen om vinteren for Isdammen på Svalbard.
- Temperaturregime og permeabilitet for gruvedeponier på permafrosten i Bjørndalen på Svalbard.
- Feltundersøkelser og numerisk modellering av snødekket i De Geerdalen på Svalbard.
- Lekkasje av giftige, vannløselige komponenter fra ulike oljetyper ved oljesøl i et arktisk miljø.
- Studier av luftbårne, vedvarende forurensing ved prøvetaking og analyse fra Longyear-isbreen.
- Virkningene av sjøis som belaster kulleksportkaien i Kapp Amsterdam, Svea.

Flere av hovedfagsprosjektene fokuserer på emner som er viktige for lokalmiljøet på Svalbard og er gjennomført i nært samarbeid med såvel nasjonal som lokal industri. Hovedfagsprosjektene er gjennomført med veiledere fra UNIS, NTNU, andre universiteter/ høgskoler og næringslivet.

Prosjekt: Oljevernberedskap i arktiske områder
Oljesøl i et arktisk miljø som farvannet rundt Svalbard oppfører seg på en vesentlig annerledes måte enn oljesøl i mer tempererte miljøer, f.eks. i Nordsjøen. Denne atferdsendringen (spredning, fordampningstap, emulgering, dispergering osv.) har viktige konsekvenser for planleggingen av en operasjonell oljevernberedskap.

Det er flere mulige kilder til oljesøl i farvannet rundt Svalbard, f.eks. fiske- og fraktfart-

and cargo vessels, tourist ships, and leakage from shore-based oil storage farms. As the new Svalbard Environment Act (NOU 1999:21) points out, an accidental oil spill from a large cargo ship could have a severe impact on the fragile Arctic environment around Svalbard.

UNIS has joined forces with SINTEF Applied Chemistry to perform a project for Store Norske Spitsbergen Kullkompani to analyse different oil spill scenarios related to coal transportation in the Van Mijen fjord. This project looks at: weathering properties of different bunker fuels, evaluation of recovery equipment and strategies, and full-scale testing of oil spill contingency systems. This project continues in 2001.

Project: Modelling permafrost temperature response to short-term (annual) and long-term (50 year) variations in meteorological data
The main objective of this research is to gain a better understanding of the physical processes determining permafrost temperatures and possible short-term and long-term changes in temperature at depth.

The study is important for the design of infrastructure on permafrost, since a possible global air temperature rise may affect the stability of existing structures and the design of future structures.

Permafrost temperature data during 1977-2000 from the Norwegian Geotechnical Institute (NGI) Permafrost Research Station at Sveagruva on Svalbard have been analysed and collated. Temperature trends in the period have been established. Based on the field observations, a thermodynamic numerical model has been developed, capable of simulating permafrost temperature response to annual and long-term variations in meteorological data. Long-term here means climate change and variability. The project will continue in 2001.

øyer, turistskip og lekkasje fra oljelagringsanlegg på land. Den nye Svalbardmiljøloven (NOU 1999:21) påpeker at et tilfeldig oljesøl fra et større fraktfartøy kan få store miljøkonsekvenser for det sårbare arktiske miljøet på Svalbard.

UNIS sammen med SINTEFs avdeling for anvendt kjemi gjennomfører et prosjekt for Store Norske Spitsbergen Kullkompani (SNSK) for å analysere ulike oljesølscenarier knyttet til kulltransport i van Mijenfjorden. Dette prosjektet omfatter: ulike bunkersoljers forvitringsegenskaper, vurdering av lenseutstyr/ lensestrategier og fullskalatesting av oljevernberedskapsutstyr. Dette prosjektet fortsetter i 2001.

Prosjekt: Modellering av permafrostens temperaturrespons på kortsiktige (årlige) og langsiktige (50 år lange) variasjoner i meteorologiske data
Hovedmålet med forskningen er å få en bedre forståelse for de fysiske prosessene som bestemmer permafrosttemperaturene og mulige kortsiktige og langsiktige endringer i temperaturen i dypet.

Dette er viktig for utformingen av infrastruktur på permafrost, ettersom en mulig global økning i lufttemperaturen kan påvirke stabiliteten av eksisterende bygg og anlegg og utformingen av nye konstruksjoner.

Permafrosttemperaturdata 1977-2000 fra Norges Geotekniske Institutts (NGIs) permafrostforskningsstasjon ved Sveagruva på Svalbard er analysert og systematisert. Temperaturtrendene i denne perioden er fastlagt. Basert på feltobservasjoner er det utviklet en termodynamisk numerisk modell. Modellen kan simulere permafrostens temperaturrespons på årlige og langsiktige variasjoner (klimavariabilitet/ klimaendring) i meteorologiske data. Prosjektet vil fortsette i 2001.

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Students sampling an experimental oil spill.

Prøvetaking av eksperimentelt oljesøl på strand.

Research Projects

Title: Pollution from mine tailings on Svalbard
Collaborating institution: SNSK
Financing: SNSK, UNIS
Duration: 1999-2002
UNIS: Per Johan Brandvik, Arne Instanes, Sigmund Spjelkavik

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

Title: Arctic oil spills on Russian permafrost soils
Collaborating institution: Norwegian Geotechnical Institute, Moscow State University, Earth Cryospher Institute, Moscow
Financing: Program for research and higher education, co-operation programme for Eastern Europe, Norwegian Geotechnical Institute
Duration: 1998-2000
UNIS: Arne Instanes

Title: Permafrost and climate in Europe (PACE)
Collaborating institution: Geographical Institute, University in Oslo, Norwegian Geotechnical Institute, EU-partners
Financing: EU 4th framework programme, UNIS, NGI
Duration: 1997-2000
UNIS: Arne Instanes, Ole Humlum

Title: Leakage of water soluable components from oil spilled in Arctic environment
Collaborating institution: SINTEF
Financing: UNIS, SINTEF
Duration: 2000-2002
UNIS: Per Johan Brandvik

Title: Resistant organic pollutants on Svalbard – sampling and analysis of ice samples from glaciers on Svalbard.
Collaborating institutions: NILU
Financing: UNIS, NILU
Duration: 2000-2001
UNIS: Per Johan Brandvik, Ole Humlum

Title: Oil spill contingency for Arctic areas
Collaborating institutions: SINTEF Kjemi
Financing: UNIS, SINTEF Kjemi
Duration: 2000-2001
UNIS: Per Johan Brandvik

Title: LOLEIF-Validation of low level ice forces
Collaborating institutions: NTNU, HSVA, HUT, VTT, Luleå University
Financing: EU/MAST II, 5 oil companies, UNIS
Duration: 1997-2000
UNIS: Sveinung Løset

PHOTO: P.J.BRANDVIK

Students from four different nations studying the mechanical properties of sea ice.

Studenter fra fire forskjellige nasjoner studerer mekaniske egenskaper ved sjøis.

Cand. scient graduates 2000

Title: Winter water balance for Isdammen, Svalbard
Collaborating institutions: HiStavanger
Student: Klaus Klungeland
Supervisors: Ånund Killingtveit, UNIS
Finished: Autumn 2000

Title: Modelling permafrost temperature response to variations in meteorological data
Collaborating institutions: Universitè de Marne-la-Vallè
Student: Fabrice Caline
Supervisors: Arne Instanes, UNIS, Bruno Sportisse, Universitè de Marne-la-Vallè
Finished: Autumn 2000

Cand. scient students

Title: Oil Pollution in the Barents Sea
Collaborating institutions: NTNU
Student: Armen Guirguidov
Supervisors: Sveinung Løseth, UNIS/NTNU, Truls Mølmann, UNIS

Title: Mapping of Ice Ridges in the Tempel Fjord and in the Van Mijen Fjord on Svalbard the Winter 1998
Collaborating institutions: NTNU
Student: Guro Kjestveit
Supervisors: Sveinung Løseth, UNIS/NTNU, Truls Mølmann, UNIS

Title: Oil Production Structures for Varandey More
Collaborating institutions: NTNU
Student: Elena Kurneva
Supervisors: Sveinung Løseth, UNIS/NTNU, Truls Mølmann, UNIS

Title: Conceptual design of Arctic offshore on-/offloading facilities in the Pechora Sea region, with focus on minimisation of possible environmental damage
Collaborating institutions: NTNU, St. Petersburg State Technical University, UNIS
Student: Victoria Broje
Supervisors: Per Johan Brandvik, UNIS, Sveinung Løset, Karl Shiknek

Title: Design, fabrication and installation of modularized platform for the Pechora Sea
Collaborating institutions: Statoil, St. Petersburg State Technical University
Student: Svetlana Chafrova
Supervisors: Ove Gudmestad

Title: Temperature regime and permeability of a tailing deposit on permafrost in Bjørndalen, Spitsbergen
Collaborating institutions: Uppsala Universitet
Student: Helen Eva Sundström
Supervisors: Arne Instanes, UNIS, Nicholas Jarvis, Uppsala Universitet

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

Title: The effects of ice interacting with coal pier at Kapp Amsterdam
Collaborating institutions: NTNU
Student: Per Olav Moslett
Supervisors: Sveinung Løseth

Title: Studying airborne pollution by sampling and analysis from the Longyear glacier
Collaborating institutions: Åbo Akademi
Student: Pia Carolina Norrgård
Supervisors: Per Johan Brandvik, UNIS, Carl Ehlers, Åbo Akademi

Title: Distribution of snow modelling and verification in a high arctic catchment
Collaborating institutions: Free University Amsterdam
Student: Jorien Vonk
Supervisors: Ånund Killingtvedt/Arne Instanes, UNIS, Hank Lingeman, Free University Amsterdam

Scientific publication
in reviewed journals
by full-time faculty

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Humlum, O. (2000). Grønland i Nordatlanten. 8-9. *In*: Atlas over Grønland. Copenhagen : Royal Danish Geographical Society.

Humlum, O. (2000). Grønland : en geografisk oversigt. 10-11. *In*: Atlas over Grønland. Copenhagen : Royal Danish Geographical Society.

Humlum, O. & Christiansen, H.H. (2000). Færøernes naturforhold og landskapsutvikling. 241-258. *In*: Almanak, Skriv- og Rejse-Kalender. University of Copenhagen.

Humlum, O. & Nielsen, N. (2000). Diskofjord, en vestgrønlandsk fjorddal. 90-91. *In*: Atlas over Grønland. Copenhagen : Royal Danish Geographical Society.

Meisingset, E. & **Langvatn, R.** (2000). Variasjon i vekt og reproduksjon hos hjort i Norge. *Hjorteviltet: fagtidsskrift om elg, hjort og rådyr*. 10, 52-56.

Nielsen, N., **Humlum, O.** & Nielsen, K. (2000). Eqip Sermia, en udløbsgletscher i Vestgrønland. 118-121. *In*: Atlas over Grønland. Copenhagen : Royal Danish Geographical Society.

Presentations (oral or poster)

Albon, S.A., Halvorsen, O., **Langvatn, R.** & Ropstad, E. Do parasites regulate Svalbard reindeer? 51st AAAS Arctic Science Conference, Whitehorse, Canada, 21-24 September.

Aschan, M., **Gulliksen, B.**, Vader, W. & Jaklin, G.S. A springboard to the Arctic Sea : a century of marine and fishery science in Tromsø, Norway. ICES Symposium on 100 years of science under ICES, Helsinki, Finland, 1-4 August.

Bartke, U., **Gulliksen, B.** & **Lønne, O.J.** Image analysis : a method for analysis of underwater photographs of Megabenthos. Årsmøte i Norske havforskeres forening, Oslo, 8-10 November. (Poster / abstract).

Beuchel, F. & **Lønne, O.J.** Population structure and growth of the autochthonous sympagic amphipods *Gammarus wilkitzkii* and *Apherusa glacialis* in selected categories of sea ice north of Svalbard. Årsmøte i Norske havforskeres forening, Oslo, 8-10 November. (Poster / abstract).

Borgå, K., **Gulliksen, B.**, Gabrielsen, G.W. & Skaare, J.U. Size-related bioaccumulation of organochlorines in Arctic sea-ice-amphipods. Dioxin 2000: 20th International Symposium on Halongenated Environmental Organic Pollutants & POPs. Monterey, California, 13-17 August. (Poster).

Brandvik, P.J. Monitoring and tracking of oil in ice : is it possible to predict drifting and spreading of an oil slick in broken ice? International Oil & Ice Workshop, Anchorage, USA, 5-7 April. (Invited presentation).

Bruland, O., Sand, K. & **Killingtveit, Å.** HBV model applied to calculate freshwater discharge to Kongsfjorden. Kongsfjord Ecosystem Workshop 2000, Longyearbyen, Svalbard, 31 October–5 November. (Lecture.)

Chuvilin, E., Naletova, N.S., Milyaeva, E.C., Kozlova, E.V. & **Instanes, A.** Factors affecting spreadability and transportation of oil in regions of frozen ground. The 2nd International Conference on Contaminants in Freezing Ground, Cambridge, United Kingdom, 2-5 July.

D'Hertefeldt, T., **Jónsdóttir, I.S.** & Falkengren-Grerup, U. Morphological plasticity and integration in two *Carex* species adapted to different environments. Clone~2000 : Current Progress and Developments in Clonal Plant Research, International Workshop, Obergurgl, Austria, 20-25 August.

Dokken, T. Foredrag om endringer i Golfstrømmen i et geologisk perspektiv. Golfstrømseminar i Vesterålen, Hurtigrutens Hus, Stokmarknes, 17 January. (Lecture).

Dokken, T., Kissel, C., Voelker, A., Rasmussen, T., Sarnthein, M. & Jansen, E. (2000). The Nordic Seas : responding to - or trigger of climatic changes. SCOR-IMAGES meeting, Trins, Austria, 16-19 February. (Abstract, poster and talk).

Falk-Petersen, S., Sargent, J.R., Scott, C.L., Dahl, T.M., Kwasniewski, S., **Gulliksen, B.**, Hop, H. & Millar, R.M. Lipid biomarkers and trophic linkages between the Arctic Ctenophores and Calanoid Copepods in Svalbard waters. ASLO Symposium, Copenhagen, 5-9 June.

Grechishchev, S., **Instanes, A.**, Sheshin, J.B., Pavlov, A.V. & Grechishcheva, O.B. Laboratory investigations of the freezing point of oil polluted soil. The 2nd International Conference on Contaminants in Freezing Ground, Cambridge, United Kingdom, 2-5 July.

Grechishchev, S., Sheshin, J.B., Pavlov, A.V., Grechishcheva, O.B. & **Instanes, A.** Thermo-kinetic characterisation and condition of oil pollution in soils subjected to annual freeze-thaw. International Conference «Rhythm of natural processes in the earth cryosphere», Puchino, Moscow-region, Russia, 12-15 May.

Humlum, O. Climatic controls on the distribution of rock glaciers and debris-covered glaciers : observations from Greenland and Svalbard. Workshop on debris covered glaciers and rock glaciers, University of Washington, Seattle, 15 September. (Lecture).

Humlum, O. The effect of supraglacial debris on glaciers in permafrost areas. British Cryostratigraphy Research Group, Periglacial Workshop, University of St.Andrews, Scotland, 6 September. (Lecture).

Humlum, O. Environmental changes on the Faroe Islands since the Late Weichselian : some preliminary results of the LINK project. Faroe Scientific Society, Tórshavn, Faroe Islands, 26 October. (Invited lecture).

Humlum, O. Mapping Holocene climatic variations in the North Atlantic Region by means of geomorphology. Geomorphological and environmental research group, Department of Geography, University of Bonn, Germany, 14 November. (Invited lecture).

Humlum, O. UNIS (The University Courses on Svalbard) : a university centre in the High Arctic. Geomorphological and environmental research group, Department of Geography, University of Bonn, Germany, 14 November. (Invited lecture).

Ingólfsson, Ó. Constrains on the glacial and climatic history of the Antarctic Peninsula region since LGM. ANTIME workshop : glaciation of the Weddell Sea Basin, Abisko, Sweden, 16-19 September. (Keynote lecture).

Instanes, A. Cold regions engineering : challenges of the next century. Ground Freezing 2000 : frost action in soils, Louvain-La-Neuve, Belgium, 11-13 September. (Invited lecture).

Jaedicke, C. Snow drift losses from an Arctic catchment on Spitsbergen : an additional process in the water balance. American Geophysical Union: fall meeting, San Francisco, 15-19 December.

Jaedicke, C. Snow drift modelling on Spitsbergen. Annual meeting of the International Glaciological Society, Nordic branch, Tallin, Estonia, October.

Jaedicke, C. & Thiis, T.K. Acoustic snow drift measurements : experiences and results from the FLOWCAPTT instrument. International Symposium on snow, avalanches and impact of the forest cover, Innsbrück, 22-26 May.

Jónsdóttir, I.S. The International Tundra Experiment (ITEX). CAFF/AMAP Workshop on a Circumpolar Biodiversity Monitoring Program, Reykjavik, Iceland, 7-9 February.

Khitun, O., **Jónsdóttir, I.S**. & Stenström, A. Effect of simulated climate change on resource concentration in arctic sedge, *Carex bigelowii* : from Decade to Millennium : the 10th ITEX meeting, Abisko, Sweden, 22-25 September.

Killingtveit, Å. GIS og flomsonekartlegging : automatisk kobling mellom digital terrengmodell i ARCVIEW og hydraulisk modell (HEC-RAS). GIS i Vassdrag, NTNU, Trondheim, 12-13 January. (Lecture / Poster).

Killingtveit, Å. Nytt fra NTNU. ENFO Vårseminar Vassdragsteknisk forum, Clarion Oslo Airport Hotel, Gardermoen, 30 May. (Lecture / Poster).

Killingtveit, Å. Tilsigsprognoser : lang sikt. NITO Fagkurs Hydrologi for kraftverksdrift og krafthandel, Rica Hell Hotell, Trondheim, 8-9 February. (Lecture / Poster).

Killingtveit, Å. Tilsigsprognoser : kort sikt. NITO Fagkurs Hydrologi for kraftverksdrift og kraft-handel, Rica Hell Hotell, Trondheim, 8-9 February. (Lecture / Poster).

Killingtveit, Å. & Røhr, P.C. Water management in Pangani River, Tanzania : background, global and regional trends. NTNU - Arena for Utviklingsforsk-ning: Development in Africa : Research Challenges, NTNU, Trondheim, 18 August. (Lecture / Poster).

Lønne, I. The dynamics of marine glacier termini read from moraine architecture. 30th Arctic Work-shop, INSTAAR, University of Colorado, Boulder, USA, 16-18 March. (Lecture).

Lønne, I. Fra istid til global oppvarming : Svalbard-landskapet forandrer seg! Seminar at UNIS, 10 February. (Lecture).

Lønne, I. Hvordan fjell og daler blir til. 3. kl Longyearbyen skole, 6-7 June. (Lecture).

Lønne, I. Landskapet på Svalbard. Guide- og turlederopplæringen på Svalbard. Longyearbyen, June. (Lecture).

Lønne, I. Svalbards geologi. Planleggingsdag for lærere ved Longyearbyen skole, 22 August. (Lecture & excursion).

Lønne, I., Nemec, W. & Blikra, L.H. The Kregnes moraine in Gauldalen : anatomy of a Younger Dryas proglacial delta in a palaeofjord. 30th Arctic Work-shop, INSTAAR, University of Colorado, Boulder, USA, 16-18 March. (Lecture).

Lønne, I., Nemec, W., Blikra, L.H. & Lauritsen, T. Sedimentary architecture of a wave-modified ice-contact delta : ground penetrating radar study of the Younger Dryas Mona moraine in southern Norway. 30th Arctic Workshop, INSTAAR, University of Colorado, Boulder, USA, 16-18 March. (Lecture).

Nielsen, K.P., Deehr, C.S., Raustein, E., **Gjessing, Y.** & **Sigernes, F.** An observation of a mesospheric planetary wave over Svalbard in relation to a major stratospheric warming. EGS XXV General Assembly, ST-10, Nice, France, 25-29 April. (Poster).

Nielsen, K.P., Deehr, C.S., Raustein, E., **Gjessing, Y.** & **Sigernes, F.** An observation of a mesospheric planetary wave over Svalbard in relation to a major stratospheric warming. IAGA workshop, Prague, Czech Republic, 25-28 July. (Oral presentation).

Moen, J. Cusp/cleft activities observed by ground-based optics and HF coherent radar. Geophysical Center of WDC-D, Beijing, 14 April. (Invited).

Moen, J. Cusp/cleft activities observed by ground-based optics and HF coherent radar. Polar Research Institute of China, Shanghai, 11 April. (Invited).

Moen, J. On the relationship between optical cusp aurora and coherent HF radar backscatter. National Institute of Polar Research, Tokyo, 10 February. (Invited).

Moen, J. Studies of the polar cusp and cap by multi-instrument techniques : unresolved problems and future opportunities. Symposium on Space Research in the Polar Region in the next 25 years, The Norwegian Academy of Science, Oslo, 21 September. (Invited).

Moen, J. Transient cusp auroral dynamics and ionospheric flow dynamics. Geophysical Center of WDC-D, Beijing, 11 April. (Invited).

Moen, J. Transient cusp auroral dynamics and ionospheric flow dynamics. Polar Research Institute of China, Shanghai, 11 April. (Invited).

Moen, J., Carlson, H.C., Milan, S.E., Shumilov, N., Lybekk, B., Sandholt, P.E. & Lester, M. Dayside auroral activities and coherent radar backscatter. EGS XXV General Assembly, Nice, 25-29 April. (Invited).

Oksavik, K. Romvær, hva er det? Fysikermøtet 2000, Tromsø, 16-18 June. (Lecture).

Oksavik, K. Space Weather in the Arctic. XV International Conference for Physics Students, Zadar, Croatia, 4-11 August. (Lecture).

Oksavik, K., Søraas, F., **Moen, J.** & Burke, W.J. Optical and particle signatures of magnetospheric boundary layers near magnetic noon : satellite and ground-based observations. First S-RAMP Conference, Sapporo, Japan, 2-6 October. (Poster).

Richardsen, S.R, Grahl-Nielsen, O., **Gulliksen, B.** & **Lønne, O.J.** Fatty acid composition in the bivalve *Mya truncata* from Isfjorden, Svalbard. Årsmøte i Norske havforskeres forening, Oslo, 8-10 November. (Poster/abstract).

Rike, A.G., Børresen, M. & **Instanes, A.** Response of cold adapted microbial population in a permafrost environment to hydrocarbon contaminants. The 2nd International Conference on Contaminants in Freezing Ground, Cambridge, United Kingdom, 2-5 July.

Søraas, F., Aarsnes, K. & **Oksavik, K.** Low altitude observations of precipitation electrons and protons. First S-RAMP Conference, Sapporo, Japan, 2-6 October. (Poster).

Søraas, F., Aarsnes, K. & **Oksavik, K.** Ring current estimated from low altitude observations. First S-RAMP Conference, Sapporo, Japan, 2-6 October. (Lecture).

Tverberg, V., Lipizer, M. & Schauer, U. Changes in the deep water in the Fram Strait based on TS-characteristics. EGS XXV General Assembly, Nice, 25-29 April 2000. (Poster).

Zielke, M., Schütte, U. & Solheim, B. Cyanobacterial symbioses. European Science Foundation : Cyanofix : summer school and workshop on cyanobacterial symbioses, their evolution and the creation of new cyanobacterial symbioses, Ballyvaughan, Co. Clare, Ireland, 27 August-3 September. (Abstract).

Guest lecturers

Name	Institution
Alm, Göran	Stockholm University, Sweden
Amlien, Jostein	University of Oslo
Andresen, Arild	University of Oslo
Andresen, Steinar	Fridtjof Nansens Institute
Arlov, Thor Bjørn	Norwegian University of Science and Technology
Asplin, Lars	Institute of Marine Research, Bergen
Astakhov, Valery sing	Institute for Remote Sen-Methods in Geology, Russland
Ballantyne, Collin C.	University of St. Andrews, Scotland
Berggren, Anne-Lise	Geofrost Engineering A/S
Bjørnsson, Helgi	University of Iceland
Bjørnå, Noralv	Tromsø Geophysical Observatory
Bløtkjær, Kjell	Norwgian University of Science and Technology
Bogen, Jim	Norwegien water resorces and energy administration
Brigham-Grette, Julie	University of Massachusetts, USA
Bruland, Oddbjørn	SINTEF
Buskqvist, Nils O.	Trondhjem Biologiske Stasjon
Camus, Lionel	Akvamiljø AS
Crawford, Robert M. M.	University of St. Andrews
Dahle, Trine	University of Oslo
de Lange, Tor	University of Bergen
Derocher, Andrew E.	Norwegian Polar Institute
Digranes, Per	University of Bergen
Dowdeswell, Julian	University of Bristol, UK
Egeland, Alv	University of Oslo
Eiken, Trond	University of Oslo
Eltoft, Torbjørn	University of Tromsø
Elvebakk, Arve	University of Tromsø
Falck, Eva	University of Bergen
Falk-Petersen, Stig	Norwegian Polar Institute
Finnseth, Jarle	Norwegian University of Science and Technology
Flatberg, Kjell Ivar	Norwegian University of Science and Technology
Flaate, Kaare	Veidirektoratet
French, Hugh M.	University of Ottawa, Canada
Funder, Svend	University of Copenhagen, Denmark
Furevik, Tore	University of Bergen
Gabrielsen, Geir Wing	Norwegian Polar Institute

Name	Institution
Gao, Dengyi	Institute for atmospheric science, Bejing
Gidskehaug, Arne	University of Bergen
Gjertz, Ian	Norwegian Polar Institute
Gjevik, Bjørn	University of Oslo
Goering, Douglas	Norwegian geotechnical Institute
Gualteri, Lyn	University of Island
Gudmestad, Ove T.	Statoil
Guio, Patrick	University of Oslo
Hagen, Jon Ove	University of Oslo
Hagen, Oddvar	Region hospital in Tromsø
Hagfors, Tor	Max-Planck Instiut für Aeronomi, Germay
Hald, Morten	University of Tromsø
Haldorsen, Sylvi	Agricultural University of Norway
Hamre, Johannes	Institute of Marine Research, Bergen
Hansen , Alfred	University of Tromsø
Hansen, Edmond	Norwegian Polar Institute
Hansen, Louise	The University of Copenhagen, Denmark
Hauan, Marit Anne	University of Tromsø
Haug, Tore	Norsk instiutt for fiskeri- og havbruksforskning
Haugan , Peter M.	University of Bergen
Heia, Karsten	University of Tromsø
Helland-Hansen, William	University of Bergen
Hoflandsdal, Endre	Svalbard samfunnsdrift
Holm, Elis	Lund University Hospital, Sweden
Holmlund, Per	University of Stockholm
Holtet, Jan A.	University of Oslo
Hop, Håkon	Norwegian Polar Institute
Hoppe, Ulf Peter	FFI
Huse, Geir	University of Bergen
Hyllestad, Robert	Post og teletilsynet
Høgda, Kjell A.	NORUT IT
Ingòlfsson, Òlafur	University of Göteborg
Isaksen, Ketil	University of Oslo
Iversen, Steinar	University of Tromsø
Jansen, Eystein	University of Bergen
Jansson, Peter	Stockholm University, Sweden
Johansen, Bror	SINTEF
Johansen, Torunn B.	Trondhjem Biologiske Stasjon
Johnsen, Sverre Ola	Norwegian University of

Name	Institution
	Science and Technology
Johnsen, Geir	Trondhjem Biologiske Stasjon
Jørgensen, Lis Lindahl	University of Tromsø
Kallenborn, Roland	Norwegian Institute for Air Research (NILU)
Kangas, Tor-Villy	University of Bergen
Kjelstad, Berit	Norwegian University of Science and Technology
Kjærnet, Torfinn	Bergmesteren for Svalbard
Klemetsen, Anders	University of Tromsø
Knutsson, Sven	Luleå Tekniska Universitet
Kovacs, Kit	Norwegian Polar Institute
Kristoffersen, Steinar	Norwegian University of Science and Technology
Kuvaas, Berit	Statoil
Kwasniewski, Slawek	Polish Academy of Sciences, Poland
La Hoz, Cesar	University of Tromsø
Laberg, Jan Sverre	University of Tromsø
Landvik, Jon	Agricultural University of Norway
Larsen, Jan Otto	Norwegian University of Science and Technology
Larsson, Conny	University of Uppsala, Sweden
Lauritzen, Stein Erik	University of Bergen
Leibman, Marina	Earth Crysophere Institute, Russia
Lein, Berit	Direktoratet for Natur forvaltning
Leinaas, Hans Petter	University of Oslo
Leitl, Bernd	University of Hamburg, Germany
Leppäranta, Matti	University of Helsinki, Finland
Lockwood, Mike	Rutherford Appleton Laboratory, UK
Lorentzen, Dag Arne	College of Narvik
Lundén, Bengt	Stockholm University, Stockholm
Lydersen, Christian	Norwegian Polar Institute
Malaize, Bruno	University of Bordeaux, France
Manely, William	University of Colorado, USA
McCrea, Ian	Rutherford Appleton Laboraty, UK
McKibben, Bruce	University of Bergen
McPhee, Miles	Research Company, Naches, Washington State, USA

Name	Institution
Mehlum, Fridtjof	Norwegian Polar Institute
Mellere, Donatella	University of Padova, Italy
Mienert, Jürgen	University of Tromsø
Miller, Gifford	University of Colorado, USA
Mjelde, Rolf	University of Bergen
Moe, Geir	Norwegian University of Science and Technology
Myrvang, Arne	Norwegian University of Science and Technology
Möller, Per	Lund University, Sweden
Mølmann, Truls	Barlindhaug Consult AS
Nemec, Wojtek	University of Bergen
Nemec, Wojtek	University of Bergen
Nesje, Atle	University of Bergen
Nilsen, Frank	University of Bergen
Nilssen, Einar	Norwegian College of Fishery Science
Nygrén, Tuomo	University of Oulu, Finalnd
Nygrèn, Tuomo	Univeristy of Oulu, Finland
Nøst, Ole Anders	Norwegian Polar Institute
Paulsen, Jan Erik	Forecasting Divition for Northern Norway
Presterud, Pål	Norwegian Polar Institute
Ramstad, Svein	SINTEF
Rasmussen, Erik	University of Copenhagen, Denmark
Raustein, Elmer	University of Bergen
Reeh, Niels	Technical University of Denmark
Reiertsen, Lars-Otto	AMAP, Oslo
Reiten, Ivar	The Coast Guard
Respovs, Dusan	University of Ljublijana, Slovenia
Reymert, Per Kyrre	Svalbard Science Forum
Roettger, Jürgen	Max Plank Institut für Aeronomie, Germay
Sakshaug, Egil	Norwegian University of Science and Technology
Sand, Knut	SINTEF
Schnell, Øyvind A.	University of Bergen
Shkinek, Karl	State Technical University of St Petersburg, Russia
Siggerud, Erling	PGS Reservoir AS
Sigurdsson, Thrainn	Sensors+Software, Sweden
Skuterud, Lavrans	Norwegian Radiation Protection Authority
Smith, R.W	University of Fairbanks, USA

Name	Institution
Solheim, Bjørn	University of Tromsø
Solheim, Anders	Norwegian Geotechnical Institute
Solheim, Inger	NORUT IT
Solhøy, Torstein	University of Bergen
Sorteberg, Asgeir	Norwegian Metrologiacal Institute
Spielhagen, Robert	Alfred Wegner Institute, Germany
Stenström, Anna	University of Göteborg, Sweden
Stette, Gunnar	Norwegian University of Science and Technology
Stocker, Thomas	University of Bern, Switzerland
Sundet, Jan	Fiskeriforskning
Sundvor, Eirik	Universitetet i Bergen
Svendsen, Harald	University of Bergen
Svendsen, Einar	Institute of Marine Research, Bergen
Svenning, Martin	Foundation for Nature Research and Cultural Heritage Reserach (NINA)
Svenøe, Trond	University of Tromsø
Sæltun, Nils Roar	University of Oslo
Sæther. Ola Magne	Geological Survey of Norway
Sørensen, Rune	Norwegian School of Management BI
Søraas, Finn	University of Bergen
Telebond, Turid	Svalbard Samfunnsdrift
Thiede, Jörn	GEOMAR, Germay
Thorolfsson, Sveinn	Norwegian University of Science and Technology
Thrane, Eivind V.	FFI
Tverberg, Vigdis	Nowegian Polar Institute
Ulfstein, Geir	University of Oslo
Vaskinn, Kjetil	SINTEF
Vatne, Geir	Norwegian University of Science and Technology
Vik, Johannes	Bergmesteren på Svalbard
von Quillfeldt, Cecilie	Norwegian Polar Institute
Walløe, Lars	University of Oslo
Weber, Jan Erik	University of Oslo
Weslawski, Jan Marcin	Polish Academy of Sciences
Wiig, Øystein	University of Oslo
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Zabavnikov, Vladimir	Polar Research Inst. of Marine Fisheries and Oceanography,Murmansk
Zolotukhin, Anatoly	State Technical University of St. Petersburg, Russia
Øritsland, Nils A.	Geological Survey of Norway
Østerhus, Svein	University of Bergen
Øvstedal, Dag Olav	University of Bergen
Øydgard, Ola	Longyearbyen Hospital
Årseth, Inge	University of Bergen