



Rapid Changes in the Arctic

Results book of the Nordic Arctic Research Programme
(NARP)

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TemaNord 2006:568

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ISBN 92-893-1384-6

Print: Ekspresen Tryk & Kopicenter

Editors: Tuija Siira and Satu Tähtinen

Cover photo: Kari Strand. Ilulissat, Greenland.

Copies: 220

Printed on environmentally friendly paper

This publication can be ordered on www.norden.org/order. Other Nordic publications are available at www.norden.org/publications

Printed in Denmark

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Nordic co-operation

Nordic co-operation, one of the oldest and most wide-ranging regional partnerships in the world, involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland. Co-operation reinforces the sense of Nordic community while respecting national differences and similarities, makes it possible to uphold Nordic interests in the world at large and promotes positive relations between neighbouring peoples.

Co-operation was formalised in 1952 when *the Nordic Council* was set up as a forum for parliamentarians and governments. The Helsinki Treaty of 1962 has formed the framework for Nordic partnership ever since. The *Nordic Council of Ministers* was set up in 1971 as the formal forum for co-operation between the governments of the Nordic countries and the political leadership of the autonomous areas, i.e. the Faroe Islands, Greenland and Åland.

Contents

| | |
|---|----|
| Preface..... | 7 |
| Summary | 9 |
| 1. Introduction | 11 |
| 2. Scientific Significance..... | 13 |
| 3. Overview of the projects..... | 15 |
| 3.1 Research on land, sea and climate | 15 |
| 3.2 Adaptation of organisms has economic consequences | 22 |
| 3.3 Opportunities for human life in the north | 30 |
| 4. Organized Workshops | 39 |
| 5. Symposium Series | 45 |
| 5.1 1st symposium: The Arctic on Thinner Ice, Oulu, 2001..... | 45 |
| 5.2 2nd symposium: The Arctic in the Anthropocene: The North Atlantic Arctic in Focus, Akureyri, 2002..... | 46 |
| 5.3 3rd symposium (connected to the International Conference): Arctic – Alpine Ecosystems and People in a changing Environment, Tromsø, 2003 | 47 |
| 6. Statistics | 49 |
| Calls for proposals..... | 49 |
| Networking workshops | 49 |
| Publications..... | 50 |
| Students..... | 50 |
| Gender distribution..... | 51 |
| 7. Programme Management..... | 53 |
| 8. Publications | 57 |
| 8.1 Natural processes – land, sea and atmosphere..... | 57 |
| 8.2 Biological diversity and environmental threats in the Arctic..... | 72 |
| 8.3 Living conditions of the inhabitants of the Arctic | 82 |
| Sammanfattning..... | 89 |
| Tiivistelmä..... | 91 |

Preface

The natural processes that shape the Nordic arctic and subarctic regions, and especially those in the northern Atlantic Ocean, are globally important. In the northern Atlantic, warm southern ocean currents are replaced by currents from the cold Polar region. This process has a notable impact on both regional and global climate. The prevailing climate conditions, in turn, significantly contribute to the biological resources of, and even more widely, to people's possibilities of maintaining favourable living conditions in the northern regions. Arctic plants and animals live in extreme conditions, and even minor changes in these conditions may affect their ability to survive. Short-term climatic changes that take place within a generation are mostly governed by changes in ocean currents.

However, our knowledge of these processes continues to be inadequate. There is a call for international research on the living conditions of people in the North in terms of the goals of sustainable development. The level of public interest in arctic matters is high, and the Nordic countries should therefore assume increasing responsibility for arctic research, especially in Europe.

The Nordic Council of Ministers established the Nordic Arctic Research Programme (NARP) for the years 1999–2003 to promote Nordic networking of research closely relevant to all the above-mentioned objectives, and to increase the mobility of young researchers within the Nordic countries. Many Nordic research groups had good contacts with non-Nordic groups, but this programme focused especially on the benefits potentially obtainable from Nordic synergies. Encouraging research groups from Greenland, the Faroe Islands and Iceland to integrate with the Nordic networks was particularly important.

The programme's board consisted of representatives from all the Nordic countries, the Faroe Islands and Greenland. The coordinating secretariat of the programme led by Dr. Kari Strand was located at the Thule Institute at the University of Oulu. The programme was a significant resource for Nordic research in the Arctic, and it provided a particularly good opportunity for Nordic cooperation and research networking. Outstanding work on a variety of arctic issues has been done through the programme's 63 projects.

It has become clear during the course of the Nordic Arctic Research Programme that there is an urgent need for multidisciplinary scientific arctic studies also in the future. Especially the trends and amplitudes of environmental changes in the Arctic are still poorly recorded, and our understanding of them is incomplete. We should pay special scientific attention to the rapidly changing socio-economic conditions in the Arctic.

There is a growing interest in arctic studies even outside the Arctic, for example in Japan and Germany. The advanced scientific infrastructure of the Nordic countries should be utilized more effectively in arctic studies. European collaboration within EU framework programmes and through the ESF should be further encouraged. This would guarantee funding for larger and more focused research projects. Modern Nordic arctic research is a significant part of contemporary international research on themes ranging from global change, through sustainable exploitation of natural resources, to the living conditions of northern populations.

This NARP results publication is based on research that has been carried out by many Nordic organizations ranging from universities to state research institutes. The Nordic Arctic Research Programme (NARP) acknowledges longstanding financial support from the Nordic Councils of Ministers. The research and network projects also received substantial support from their many home and partner institutions. We thank these institutions for accomplishing all the achievements required by the programme. Especially warm regards go to the Nordic laboratories that hosted young students during their study visits and to the Universities of Oulu, Akureyri and Tromsø, which hosted three international NARP symposiums in 2001, 2002 and 2003, respectively.

We would like to thank the Secretariat of the Nordic Council of Ministers for excellent cooperation during the programme. Our special compliments go to Senior Adviser Kate Runeberg from the Department of Education, Research and ICT for all her advice and guidance. Research Coordinator Morten Bennum's help was also much appreciated in the implementation phase of the programme and in establishing the secretariat at the Thule Institute, University of Oulu.

The demanding secretarial work of the programme was done efficiently at the Thule Institute. We want to thank Liisa Puijola for economic administration, Kirsi Kallio, Pirjo Taskinen and Tuija Siira for all other secretarial work, Hannele Heikkilä-Tuomaala for graphic design, and Satu Tähtinen for editing and helping in the technical production of this volume.

We also thank the programme's board members, Dorete Bloch, Niels Einarsson, Alf Håkon Hoel, Caroline Leck, Bente Aagaard Lomstein and Gert Mulvad, for their longstanding commitment and cooperation during the NARP. Finally, we wish to express our thanks to the many colleagues and individuals who have given advice during the initiation of the NARP.

Matti Saarnisto, professor
Chairman, Nordic Arctic Research Programme

Kari Strand, docent
Secretary, Nordic Arctic Research Programme

Summary

The aim of the Nordic Arctic Research Programme (NARP) – Rapid Changes in the Arctic was to enhance Nordic competence and research cooperation in three areas of priority: Natural processes – land, sea and atmosphere, Biological diversity and environmental threats in the Arctic, and Living conditions of the inhabitants of the Arctic. The NARP was established by the Nordic Council of Ministers for the years 1999–2003 and it was finalized in 2004. The annual budget was 6.2 million DKK, amounting to a total of 31 million DKK. The programme provided a particularly good opportunity for Nordic cooperation and networking of research. The secretariat of the programme worked at the Thule Institute at the University of Oulu.

This publication introduces the programme and recognizes the importance of the work of the coordinators and partners in 63 funded projects focusing equally on the above-mentioned three areas of priority. It consists of the final results, a list of the projects' activities and publications, and conclusive comments of the NARP. The work on a variety of arctic issues within the programme has been significant. Networking and mobility between several research groups has particularly been supported during the Nordic Arctic Research Programme. A large number of young students have greatly benefited from their study visits to Nordic laboratories, and there is an urgent need to find funding for further collaboration. Also, cooperation with researchers from the Faroe Islands, Greenland and Iceland has increased during the programme.

During the course of the Nordic Arctic Research Programme it has become clear that there will be a great demand for multidisciplinary scientific arctic studies in the future. Especially the trends and amplitudes of environmental change in the arctic region are still poorly recorded, and many feedback processes of change are not fully understood. The rapidly changing socio-economic conditions in the Arctic require further scientific attention. More scientists, and especially young talented people, should be involved in arctic science in the future.

1. Introduction

The Nordic Arctic Research Programme (NARP) was established by the Nordic Council of Ministers for the years 1999–2003. The programme was a significant resource for Nordic research in the Arctic, as the annual budget of the programme was 6.2 million DKK, amounting to 31 million DKK in total. Hence, it provided a particularly good opportunity for Nordic cooperation and research networking. Dr. Kari Strand from the Thule Institute at the University of Oulu led the coordinating secretariat of the programme. The programme's board consisted of representatives from all the Nordic countries, the Faroe Islands and Greenland.

The programme comprised 63 projects that did consequential work on a variety of arctic issues. Active networks were established within the programme, and many young students benefited from their study visits to Nordic laboratories. In addition, the programme provided great opportunities to improve cooperation with researchers from the Faroe Islands, Greenland and Iceland.

The programme made it clear that there will be a major need for multidisciplinary scientific arctic studies in the future. In particular, the poorly recorded and only partially understood trends and amplitudes of environmental changes in the Arctic will need further attention. Special scientific attention should also be paid to the rapidly changing socio-economic conditions in the Arctic, with particular emphasis on conditions in the Russian Arctic.

This publication presents the main goals and the statistical side of the NARP projects, with a list of publications produced with NARP support. The highlights of selected NARP projects are described in a separate brochure. Together these publications comprise a record of the NARP's achievements and recognize the common need for further coordinated Nordic arctic research. These publications are available on request from the Thule Institute, University of Oulu, as well as on a CD-ROM that includes PDF versions of these publications and the final version of the NARP website.

Highly diversified projects with varying support periods were included in the NARP. Some projects were active throughout the whole NARP life span, while some projects, e.g. those set up for organizing a conference, were supported only for one year. The following pages introduce the project divided into three themes: Natural processes – land, sea and atmosphere, Biological diversity and environmental threats in the Arctic, and Living conditions of the inhabitants of the Arctic.

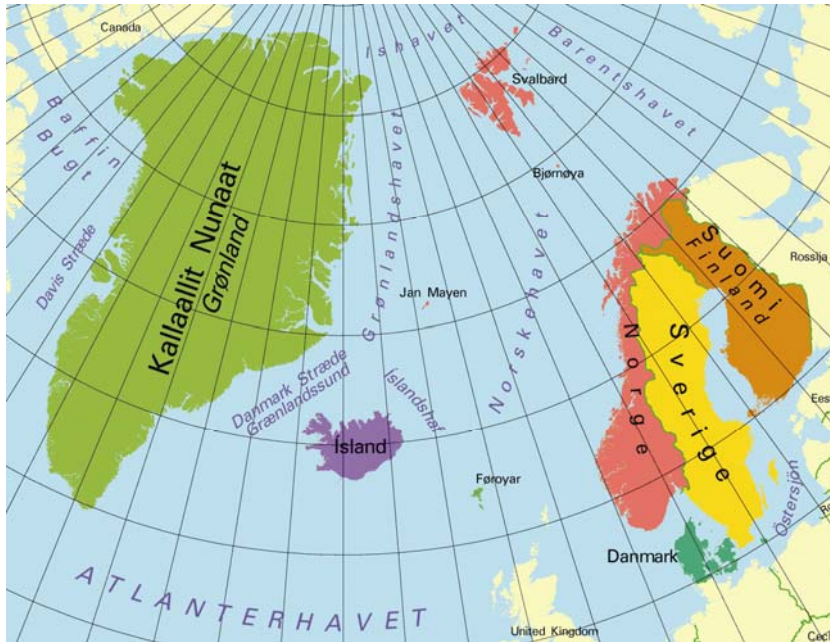


Figure 1. The “Nordic region” concept includes five nations, Denmark, Norway, Sweden, Iceland and Finland. Denmark’s two autonomous regions, Greenland and the Faroe Islands, are also part of the concept. In the Nordic Arctic Research Programme it was especially important to encourage research groups from Greenland, the Faroe Islands, and Iceland to integrate with the Nordic research networks.

2. Scientific Significance

Today arctic research concerns global environmental issues such as climatic change, biodiversity and threats to the sensitive northern environment, as well as sustainable development.

The NARP projects have provided guidelines on how to react in the right way and how to maintain control if there are possible rapid changes in the Arctic with consequences for living conditions in the Arctic and the North. The projects have also promoted sustainable development by making better known the factors that control rapid changes in the Arctic.

The projects have provided vital information to policymakers. That information helps them to make decisions directed toward preventing unfavourable environmental changes in the North. The ultimate aim in modern arctic research is to reduce the uncertainties in calculated regional and global climate forcing.

The natural processes that shape the arctic and subarctic regions, and especially the northern Atlantic Ocean, are important even globally. In the northern Atlantic, warm ocean currents are replaced by currents coming from the cold polar regions. This process has a notable impact on both regional and global climate. The prevalent climate conditions, in turn, significantly contribute to the biological resources of, and even more widely, to people's possibilities of maintaining favourable living conditions in the northern regions. Arctic plants and animals live in extreme conditions, and even minor changes in these conditions may affect their ability to survive. Short-term climatic changes that take place within a generation are mostly governed by changes in ocean currents.

Our knowledge of these processes continues to be inadequate. Arctic research on the living conditions of humans in view of the goals of sustainable development needs to be international. Attention should especially be paid to the hazards implicit in the northern environment and the impacts of increased UV radiation and greenhouse gases. It is anticipated that the results of the programme will have considerable significance for decision-making in environmental issues. The projects have given unique results on changes in the Arctic that are likely to take place due to anticipated multiple environmental changes in the North and at the global scale.

Many critical arctic issues are circumpolar, hence international by nature, and are best addressed through international cooperation in which Nordic arctic research is an essential part. The NARP has significantly promoted Nordic cooperation in arctic matters. Important issues in the future include topics such as science and understanding rapid natural and social change in the Arctic, environmental change and resource management, global change, human adaptations and management issues in the

Arctic, and research, policy and the role of scientific assessments. The level of public interest in arctic matters is high, and the Nordic countries should therefore assume increasing responsibility for arctic research, especially in Europe.

3. Overview of the projects

The scientific results of the Nordic Arctic Research Programme are presented in a variety of ways. Here we present the research results provided by project coordinators throughout the programme. The aim is to capture the essence of the exciting work done in the NARP projects and in the NARP as a whole. All the projects are presented in an extensive table showing the projects' aims and main results. The programme has included 63 projects focusing on three distinct themes: 1) Natural processes and the interaction between land, sea and atmosphere (22 projects), 2) Biodiversity and environmental hazards in the arctic regions (22 projects), and 3) Living conditions of the arctic population (19 projects).

3.1 Research on land, sea and climate

The first theme, Natural processes and the interaction between land, sea and atmosphere, was explored in projects that focused on ocean currents in the northern Atlantic, the changes that have taken place in them, and climatic signals detectable in the Spitzbergen glaciers, to name a few. Many Nordic countries already had a notable international capacity in this field of research, but the possibility to obtain support by networking within the NARP programme was most welcome.

Research was done on the distribution of arctic surface waters over the northern marine areas and their contribution to climate fluctuations. One of the projects focused on the flow conditions of Atlantic waters by monitoring water level fluctuations off the Norwegian and Barents coasts. Ancient layers of sedimentation on lake and sea bottoms were also studied in order to be able to predict future processes of change. In this context e.g. Ian Snowball from the University of Lund coordinated a project where the connections between laminar lake sediments and climate change in northern Scandinavia were explored by a network of researchers and research laboratories.

One important high arctic project, which was coordinated by Erik Swietlick from the University of Lund, was carried out by a network of researchers studying the transmission of air-borne aerosol particles over the Arctic Ocean and their significance from the viewpoint of climate. Paul Wassmann from the University of Tromsø was one of the coordinators of large annual meetings that addressed themes such as the carbon cycle, the exploitation of biogenic resources, the consequences of global changes on the northern regions, and the capacity of these regions for sustainable production.

Table 1. Overview of the projects within theme A, Natural processes – land, sea and atmosphere.

| Theme A: Natural processes - land, sea and atmosphere | |
|--|--|
| Project name, duration, granted funds (DKK), organized workshops and project (or related) web page(s) | Coordinator, number of project partners and project description |
| <p>Pollution and rapid climatic changes in the Arctic 1999–2003</p> <p>Funds granted: 1 270 000</p> <p>Organized workshops 2/2000 2/2001 2/2003</p> <p>QPALCLIM Marie Curie Training Site : www.uib.no/bot/mcts/qpalclim QPALEN Marie Curie Training Site: www.uib.no/bot/mcts/qpalen NORPEC Norwegian Research Council Strategic University project: www.zoo.uib.no/systematikk/norpec/index.html</p> | <p>H.J.B. Birks (Botanical Institute, University of Bergen) 9 project partners</p> <p>POLARCLIM aimed to expand Nordic expertise in the detection and assessment of rapid climatic changes and temporal trends of the spread of pollution in the Arctic by a) establishing a network of 10 scientists and 15 doctoral and other graduate students and post docs in 4 Nordic countries and Svalbard, plus an affiliation of 10 scientific advisors and consultants dedicated to the analysis of rapid climatic change and pollution in the Arctic; b) improving training and mobility of young researchers via travel grants and training grants to learn specialized skills in laboratories from a different Nordic country; c) organizing 4 focused workshops on topics in Arctic Palaeoecology and d) launching for teaching purposes a small pilot field research project in the Lyngen Alps in north Norway involving geological, palaeoecological, and chemical approaches.</p> |
| <p>Regional Earth System Modelling Network for the Arctic (RESMoNA) 2001–2003</p> <p>Funds granted: 400 000</p> <p>Organized workshops 1/2003</p> <p>http://www.dmi.dk/f+u/klima/resmona/index.html</p> | <p>Jens H. Christensen (Danish Meteorological Institute (DMI), Copenhagen) 4 project partners.</p> <p>This project network intended to co-ordinate efforts within the Nordic countries to improve the quality of climate change and other regional model simulations for the Arctic as well as for the Nordic countries. This involves improving existing atmospheric regional climate models (RCMs) for the Nordic regions as well as for the Arctic. Furthermore, it is the intention to enhance the ongoing development of a regional modelling system with components of the entire climate system.</p> |
| <p>Long-term variations in atmospheric circulation and climate in the Arctic 1999–2003</p> <p>Funds granted: 450 000</p> <p>Organized workshops 1/2002 2/2003</p> | <p>Eirik Forland (Norwegian Meteorological Institute (DNMI), Oslo) 3 project partners.</p> <p>The four main aims of the project were a) establish high-quality climate data set for the Nordic Arctic; b) work out an atlas for illustrating climatology and recent (~100 years) climate variations in the Nordic Arctic; c) study the contribution to the climate variations in the Nordic Arctic caused by changes in the atmospheric circulation (i.e. linked to the NAO-index) and changes in air mass characteristics induced by changes in seas surface temperatures, sea ice etc and d) publish a survey of changes in the static stability in the lower part of the troposphere in the Nordic Arctic during the last 50 years.</p> |

| Theme A: Natural processes - land, sea and atmosphere | |
|--|---|
| <p>Sensitive records of climate change at the Arctic fringe 1999–2003</p> <p>Funds granted: 270 000</p> <p>Organized workshops 1/1999 1/2000 http://www.ngdc.noaa.gov/paleo/pmp/pmp.html http://www.ibp.vxu.se/forskn/pollandcal/ http://thule oulu.fi/projects/nap.htm http://www.kv.geo.uu.se/ingua/boutique.htm</p> | <p>Sheila Hicks (Department of Geology, University of Oulu) 11 project partners.</p> <p>Project aims were a) the quantification, in pollen terms, of northern timberlines, their climatic (and anthropogenic) control, their significance as landscape features and their spatial location at key time windows in the past, with a view to understanding possible future changes and b) the standardized collection of basic data (relative to the above aim) and the development of the necessary research skills.</p> |
| <p>Linking land and sea around Faroe Islands and Svalbard (NORDLINK) 2003</p> <p>Funds granted: 80 000</p> <p>http://thule oulu.fi/narp/Projects/Propics/northatl.htm</p> | <p>Ole Humlum (University Courses on Svalbard, Longyearbyen) 4 project partners.</p> <p>The purpose of the proposed project was to study the timing and interactions between Late Weichselian and Holocene climatic change in the central sector of the North Atlantic, in vicinity of the maximum polar pack ice limit, such as registered by terrestrial and marine records. The region of interest was the Faroe Islands and Svalbard, including the surrounding shelf and slopes. The project consisted of individual research themes, which were coupled together in an overall synthesis, thereby emphasizing the mapping, monitoring and modelling research approach of the project.</p> |
| <p>Nordic network on permafrost engineering and environment 2000</p> <p>Funds granted: 300 000</p> <p>Organized workshops 1/2000</p> <p>IBR: http://www.unife.it/inter_lab/iceland.htm IPA: http://www.geodata.soton.ac.uk/ipa/ Luleå: http://www.sm.luth.se/ NGI: http://www.ngi.no/ NTNU: http://www.bygg.ntnu.no/geo/indexuk.htm UNIS: http://www.unis.no/ VTT: http://www.vtt.fi/</p> | <p>Arne Instanes (Norwegian Geotechnical Institute, Oslo) 7 project partners.</p> <p>The objective of the Nordic Network on Permafrost Engineering and Environment was to increase the synergy of Nordic research groups and research organizations, and to strengthen the scientific permafrost community in Nordic countries. The research network formed a basis for common applications to e.g. international research organizations and funding resources.</p> |
| <p>Investigating rapid climate change using Svalbard ice cores 1999–2003</p> <p>Funds granted: 270 000</p> <p>Organized workshops 1/1999 2/2000 2/2002 1/2003</p> | <p>Elisabeth Isaksson (Norwegian Polar Institute, Tromsø) 7 project partners.</p> <p>This project focused around the different climatic and environmental parameters using ice core records collected from Svalbard. Project aimed to investigate the relation between the ice core data, climatic parameters (air temperature, sea ice extent, SST) and large-scale climatic indices (e.g. Arctic Oscillation index). The anticipation was that the results will provide an indication of the important climatic forcing in this part of the Arctic.</p> |

| Theme A: Natural processes - land, sea and atmosphere | |
|---|---|
| <p>Workshop on Arctic feedbacks to global change 2000</p> <p>Funds granted: 120 000</p> | <p>Peter Kuhry (Arctic Centre, University of Lapland, Rovaniemi) 5 project partners.</p> <p>Project aims were to co-sponsor an international meeting that assessed the state-of-the-art concerning our understanding of processes in the Arctic that represent a feedback to Global Change. The meeting was held October 25–27, 2001 at the Arctic Centre, Rovaniemi, Finland. Many processes in the Arctic represent an important feedback to Global Change (greenhouse gas balance, ocean currents, sea level, albedo, etc). The meeting aim was not exclusively focus on feedbacks from Arctic environments (Arctic Ocean, icecaps, terrestrial and freshwater ecosystems, etc): it also evaluated the public perception of the risks of Global Change to Arctic communities, which in itself is a feedback to Global Change through the implementation (or lack of) of though environmental standards in the region related to greenhouse gas emissions and industrial pollution.</p> |
| <p>Study of Atlantic water inflow to the Nordic seas using motionally induced voltages measured from a transatlantic telephone cable 1999–2001</p> <p>Funds granted: 300 000</p> | <p>Peter Lundberg (University of Stockholm) 4 project partners.</p> <p>The inflow of Atlantic water into the Nordic seas is a process which is of critical importance, not only for the Arctic environment but also for the well-being of the Nordic community. The western/northern branch of the inflow crosses the Canadian Trans-Atlantic cable (CANTAT) branch line to the Faroes, hereby making possible an observational system for monitoring the transport based on direct measurements of the motionally induced voltages caused by electrically conducting sea-water moving in the earth's magnetic field. The measured voltages was recorded on a sampling computer located in the Faroes, where after the results (in batch form) was transmitted to the network-members.</p> |
| <p>Simulation of decadal-scale variability in the North Atlantic and Arctic oceans 2001–2003</p> <p>Funds granted: 235 000</p> <p>http://www.nrsc.no/~kjetil/index.html</p> | <p>Kjetil Lygre (Nansen Environmental and Remote Sensing Center (NERSC), Bergen) 2 project partners.</p> <p>The project aimed at identifying generation and maintenance mechanisms for oceanic variability in the North Atlantic and Arctic Oceans. This was done by analyzing existing and planned integrations of ocean/ice/atmosphere models of different complexity. Tasks were a) local analysis of convective regions; b) POP analysis to characterize propagating patterns and c) identification of circulation regimes by non-linear methods (clustering).</p> |
| <p>Monitoring the flow of Atlantic water through the Norwegian and Barents Seas using coastal water level data 1999–2001</p> <p>Funds granted: 450 000</p> | <p>Thomas A. McClimans (SINTEF Civil and Environmental Engineering, Trondheim) 4 project partners.</p> <p>The project aimed to improve the understanding of climate variability in the area and with the transport time scales, the outcome will be helpful for predicting climate variability one year in advance. Due to the close relation between climate variability and fish population parameters, the project should also results in more reliable advice for the development of fish stocks.</p> |

| Theme A: Natural processes - land, sea and atmosphere | |
|---|---|
| <p>Dispersal of radioactive 129I to and within the Arctic: atmosphere-land-sea interactions on regional and global scales 2001–2003</p> <p>Funds granted: 250 000</p> | <p>Markus Meili (Institute of Applied Environmental Research (ITM), Stockholm University) 3 project partners</p> <p>The dispersal of iodine is of concern because of anthropogenic releases of radioactive isotopes, both short-lived ($I-131$, 8 days) and long-lived ($I-129$, 16 million years). Of particular relevance for Nordic and Arctic environments is the fate of radionuclides released from the nuclear-fuel reprocessing installations at Sellafield (GB) and La Hague (F). These are known to have contaminated large marine and coastal areas, especially around the North Sea and Baltic Sea but also in the Eurasian and Canadian Arctic.</p> <p>Project aimed at integrating marine, atmospheric, and continental transport processes, initially by compiling and comparing Nordic and Arctic iodine isotope concentrations and ratios along the hydrological cycle including rain and snow, vegetation and soils, river runoff and lake waters, sea water and seaweed.</p> |
| <p>Rapid oceanographic changes in the Arctic: causes and effects 1999–2001</p> <p>Funds granted: 300 000</p> <p>Organized workshops 1/2000 1/2001</p> | <p>Jürgen Mienert & Tore Vorren (Department of Geology, University of Tromsø) 4 project partners.</p> <p>The main objectives were: a) to document sea surface changes (SST) during the so-called "Medieval Climatic Optimum (Ad 900–1350) and the "Little Ice Age" (1350–1850) and the expansion of sea ice; b) to document decadal and intensity variability in East Greenland, the Irminger and the Norwegian current systems; c) to determine the climatic signals in high latitude fjords of the early Holocene warming, the Holocene climatic optimum and the Neoglaciation: and these signals relationship to the atmospheric climate and to open ocean condition; d) to investigate the possibility of using paleoceanographic data from East-Greenland and the Barents Sea for estimating freshwater fluxes such as from the East-Greenland Current (EGC) and cold water cascades from the Barents Sea, and e) to detect and determine the frequency of Tsunamis in the Nordic Seas and their impact on the environment as a very rapid change.</p> |
| <p>Interannual to decadal climate changes in the Atlantic Arctic (ATLANTARC) 1999–2003</p> <p>Funds granted: 562 000</p> <p>Organized workshops 1/1999 1/2003</p> <p>www.esaresearch.org www.vedur.is www.frs.fo</p> | <p>Martin Miles (Environmental Systems Analysis (ESA Research) and Bjerknes Centre for Climate Research, Bergen) 2 project partners.</p> <p>The overall research objective of ATLANTARC was to improve our understanding of interannual-to-decadal scale changes in the ocean-climate system around the Atlantic Arctic, through an integrated, state-of-the-art analysis of existing observational data e.g. set of spatially-dispersed time series of meteorological, oceanographic and sea ice data from measurements and historical sources. One of the aims was to identify changes in the observed variability and changes in co-variability or linkages between different variables. Finally efforts were made to explain these findings in terms of forcings both internal and external to the coupled ocean-ice-atmosphere system.</p> |

| Theme A: Natural processes - land, sea and atmosphere | |
|---|---|
| <p>The impact of snow and ice on rapid changes in the Arctic 2002–2003</p> <p>Funds granted: 200 000</p> <p>http://www.urova.fi/home/hkunta/jmoore/johnpage.htm</p> | <p>John Moore (Arctic Centre, University of Lapland, Rovaniemi) 5 project partners.</p> <p>Research aims included bringing together glaciologists, climatologists, hydrologists, environmental scientists and atmospheric scientist and post-graduate students in a series of annual workshops. Project funded short visits of scientist to other laboratories to enable publication and joint research efforts. Out of these visits came joint publications and applications to other funding agencies such as EC and national funding agencies.</p> <p>Educational aims included teaching beyond that available in typical graduate schools within the multi-disciplinary nature of snow and ice research and global change demands. Project used a series of annual meeting to bring together young scientists working in Nordic laboratories together and offer them the opportunity to present their work in a friendly and informal atmosphere as a preparation for more formal scientific symposia that they will attend later in their careers. Project also arranged a significant number of research courses.</p> |
| <p>The Impact of Natural Climatic Variability on Oceanic Conditions and Productivity in Icelandic and Faroese Waters 1999–2001</p> <p>Funds granted: 240 000</p> <p>http://www.hafro.is http://www.nrsc.no/qcricber/index.html</p> | <p>Jon Olafsson (University of Iceland and Marine Research Institute, Reykjavik) 4 project partners.</p> <p>The scientific objectives of the project were to a) assess the linkages between indices of atmospheric circulation variations and hydrographic conditions in Icelandic and Faroese waters; b) quantify the effects of variable Atlantic water inflow on the productivity of the Iceland Sea and evaluate similarities in Faroese waters, and c) give guidelines to the forecasting of the effects of the natural variability, and of possible climate changes, on regional oceanic productivity and fisheries.</p> |
| <p>Nordic Arctic Research Network for oceanography, marine meteorology and sea ice 2001–2002</p> <p>Funds granted: 300 000</p> <p>http://www.nrsc.no</p> | <p>Stein Sandven (Nansen Environmental and remote Sensing Center (NERSC), Bergen) 6 project partners.</p> |
| <p>Detecting rapid environmental changes through studies of annually laminated lake sediments in northern Scandinavia: linkages to the North Atlantic Ocean circulation 1999–2003</p> <p>Funds granted: 588 000</p> <p>Organized workshops 1/1999 1/2001 1/2002</p> | <p>Ian Snowball (Department of Quaternary Geology, University of Lund) 4 project partners.</p> <p>Project constituted a network linking several Nordic research groups. Major aims of the project were to develop links between different geo-science centers working with high-resolution archives of Holocene environmental change. Such archives include not only varved lake sediments located in arctic and sub-arctic regions of Scandinavia, but also high resolution marine sediments and terrestrial sequences located in the vicinity of (and on) the Faroe Islands. The project aimed to a) locate varved lake sediments and recover cores; b) subject the recovered cores to rapid high resolution analyses and c) compare the data with high-resolution marine sediment records from the North Atlantic Ocean and the available Greenland ice-core data.</p> |

| Theme A: Natural processes - land, sea and atmosphere | |
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| <p>Climatic Variability and effects of Arctic Water Distribution in the Northern Seas 1999–2001</p> <p>Funds granted: 600 000</p> <p>Organized workshops 1/2000</p> | <p>Einar Svendsen (Institute of Marine Research, Bergen) 8 project partners.</p> <p>The principal object of the project was to determine causes and effects of rapid changes in the distribution of Arctic water in relation to ocean circulation, biology and transport of contaminants in the Northern Seas (including the Arctic Ocean). The project used a combination of several historical observations (hydrographic stations, air pressure and wind from the hindcast archive) together with numerical ocean modelling. The numerical modelling work was done with the NORwegian ECological Model System (NORWECOM) which is operative at the Institute of Marine Research, Bergen.</p> |
| <p>Sources of particles over the remote Arctic Ocean and their climatic impact 1999–2003</p> <p>Funds granted: 1 650 000</p> <p>Organized workshops 1/2001 1/2002 3/2003</p> <p>http://www.misu.su.se/</p> | <p>Erik Swietlicki (Department of Physics, University of Lund) 4 project partners.</p> <p>The purpose of the project was to establish and maintain the interdisciplinary scientific network needed to achieve the objectives of the Atmospheric Program of the forthcoming Arctic Ocean Expedition 2001 (AOE-2001). The overall objective of that program was to elucidate the biological, chemical, physical and meteorological processes that control the influence of airborne particles on climate change in the Arctic region as well as on a global scale. During AOE-2001, measurements performed in the Arctic region at a time of the year when natural particle production processes dominate. The effect of airborne particles on cloud formation and evolution (the so called indirect effect), was a main study focus.</p> |
| <p>Biological source identification of cloud condensation nuclei across the Arctic Ocean 2002–2003</p> <p>Funds granted: 224 000</p> <p>Organized workshops 1/2002</p> | <p>Lars Tranvik (Department of Limnology, University of Uppsala) 4 project partners.</p> <p>The main focus of the group was on the regional biological origin of cloud condensation nuclei (CCN). Earlier expedition results have shown that the amount of particles in the atmospheric boundary layer across the Arctic Ocean varies swiftly and by great numbers. The relationship between ice algal presence and the occurrence of atmospheric CCN is weak. The most likely source of biological CCN precursors is the open lead water. The project partners investigated the relationships between biological activity in the ice and open lead water and the occurrence of atmospheric CCN precursors. Bacterial activity and population density, planktonic grazing, biogenic gas production, and sea to air transfer of particles were studied in view of atmospheric settings.</p> |
| <p>Climatic change, carbon flux and living resources in the Nordic Seas 1999–2003</p> <p>Funds granted: 900 000</p> | <p>Paul Wassman (The Norwegian College of Fishery Science, University of Tromsø) 17 project partners.</p> <p>The purpose of the project was to establish and maintain the co-operation of a scientific network to illuminate the following, interdisciplinary questions such as "What is the impact of climate change on natural systems in terms of carbon sequestration, plankton production, vertical export of biogenic matter as well as renewable resources?", "What are the consequences of global change for the dominant</p> |

| Theme A: Natural processes - land, sea and atmosphere | |
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| | ing species and the general function of marine ecosystem?", "What means "sustainable development" in the Nordic Sea region and what are the consequences of global change for sustainable development?", "What is the role of the marginal ice zone and increased fresh-water run-off for the overall functioning of the arctic environments in view of global warming?" and finally, "Are there significant feed backs from the Nordic Sea region on the global system?". |
| Placing climate change, carbon flux and living resources in the Nordic Seas into a pan-arctic perspective 1999–2001 Funds granted: 220 000 Workshop organized 1/2000 Continued as a student training project "Subduction of Atlantic water and climate variability in the Barents sea: its significance for atmospheric CO2 removal and advection of plankton into the Arctic Ocean" 2002–2003 Funds granted: 350 000 | Paul Wassman (The Norwegian College of Fishery Science, University of Tromsø) The purpose of the project was to establish and maintain the co-operation of a scientific network to illuminate the following, interdisciplinary questions a) what is the impact of climate change on natural systems in terms of carbon sequestration, plankton production, vertical export of biogenic matter as well as renewable resources; b) what are the consequences of global change for the dominating species and the general function of marine ecosystem; c) what means "sustainable development" in the Nordic Sea region and what are the consequences of global change for sustainable development; d) what is the role of the marginal ice zone and increased fresh-water run-off for the over-all functioning of the arctic environments in view of global warming and e) are there significant feed backs from the Nordic Sea region on the global system? |

3.2 Adaptation of organisms has economic consequences

The projects concentrating on the second main theme of the programme explored the adaptation of arctic plants and animals to short-term environmental changes. Even in the short run, such research contributed to agriculture, hunting and tourism. For example, the project team headed by Martin Holmstrup concentrated on soil micro-organisms. The loss and possible restoration of the biodiversity of large predators, such as the wolf, wolverine and lynx, was studied by a team of researchers under the leadership of professor Hans Ellegren from the University of Uppsala.

Inger Nordal, professor of biology from the University of Oslo, coordinated research on the genetic adaptation of arctic plant species and their ability to respond to short-term climate change. Docent Kari Laine from the University of Oulu coordinated a very large-scale project on birch exposed to changes caused by man and the restorability of subarctic birch forests. The network included altogether 20 researchers from all the Nordic countries.

For example, Philippe Grandjean, professor of environmental medicine from the University of Odense, brought together researchers from Denmark, Sweden and the Faroe Islands to work on a pilot project dealing with the pollution of marine animals used for human nutrition. Al-

though certain environmental toxins are no longer discharged into nature, high concentrations of mercury and organohalogen compounds have been recorded in whale fat and in some birds used for human nutrition.

Table 2. Overview of the projects within theme B, Biological diversity and environmental threats in the Arctic.

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| Project name, duration, granted funds (DKK), organized workshops and project (or related) web page(s) | Coordinator, number of project partners and project description |
| <p>Effects of climate change on recruitment of Greenland halibut 1999–2001</p> <p>Funds granted: 300 000</p> <p>Organized workshops 1/2000</p> <p>http://www.dfu.min.dk Greenland Institute of Natural Resources: http://www.natur.gl/forside/dk.forside.asp Survey for juvenile Greenland halibut: http://www.dsf.gl/Direktorat/forskning/forskningspul/Frsk_fremme/rapport/jesperb/indhold.htm</p> | <p>Jesper Boje (Greenland Institute of Natural Resources, Copenhagen) 3 project partners.</p> <p>The workshop was held in December 2000 with participants contributing to natural science and management oriented science for this species from main nations: Canada, Spain, Greenland, Iceland, Faroe Islands and Norway. The workshop aimed to share and compile information on Greenland halibut with respect to ongoing research activities, laboratory strategies on research and monitoring, perception of biology and stock dynamics, and future needs. The background for collecting all this information is a basic need to compile data and knowledge in order to be able to analyze consequences of the ongoing rapid climate changes in the arctic. This aspect is especially relevant for Greenland halibut as a central element of a simple and fragile arctic ecosystem and as a principal fishery resource.</p> |
| <p>Carbon stocks and turnover rates in the Nordic Arctic regions (C-Nordic) 2002–2003</p> <p>Funds granted: 400 000</p> | <p>Torben R. Christensen (Department of Ecology, University of Lund) 10 project partners.</p> <p>With C-Nordic we proposed to establish a network between research institutions in Iceland, Denmark, Sweden and Finland, all concerned with various aspects of carbon cycling in the North. We used in C-Nordic this network to explore current research activities within the area of carbon cycling in northern terrestrial ecosystems and integrate them together with new activities to provide a co-ordinated truly Nordic research effort in an area of great political importance. The integrated data and information fed into the development of a regional model of carbon cycling in the Nordic arctic regions, which will form a natural extension on established national and European consortia.</p> |
| <p>Short and long-term fluctuations in animal populations at lake Myvatn 1999–2002</p> <p>Funds granted: 247 660</p> <p>Organized workshops 1/1999 1/2001</p> | <p>Arni Einarsson (Institute of Biology, University of Iceland, Reykjavik) 15 project partners.</p> <p>An immense dataset of the variability of the Lake Myvatn ecosystem, North Iceland, has been collected over the last 25 years. This unique long-term record of plants and animals make this lake a useful model for assessing climatic and human impact on a subarctic ecosystem. The time period is long enough to cover the variability associated with population dynamics of the animals (the life-span of ducks and fish is up to 10 years) and to allow comparison with climatic variables.</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| <p>Animal biodiversity in arctic and subarctic. Conservation genetics of large carnivores 1999–2003</p> <p>Funds granted: 1 142 000</p> | <p>Hans Ellegren (Department of Evolutionary Biology, University of Uppsala) 3 project partners.</p> <p>In arctic and sub-arctic species generally live in extreme habitats and are thus sensitive to rapid changes in the environment and to human impact. Several of the large carnivore species have suffered from population declines and loss of genetic variability in modern times, facts which now make them vulnerable to extinction. This project concerned on network building, coordination and support of on-going Nordic state-of-the-art research on conservation genetics of wolves, wolverines and lynxes, the key predators in Arctic and Sub-Arctic. With this action project anticipated Nordic research being strengthened, including possibilities for student training, and proper actions being taken to preserve viable and sustainable carnivore populations in Arctic and Sub-Arctic.</p> |
| <p>The bioproduction and energy transfer on the Nordic seas, the role of key zooplankters in relation to rapid climate change 2002–2003</p> <p>Funds granted: 392 000</p> <p>Organized workshops 1/2002</p> | <p>Stig Falk-Petersen (Norwegian Polar Institute, Tromsø) 4 project partners.</p> <p>This project aimed to exchange knowledge and enhance competence building among social scientists, marine biologists and physical oceanographers. The network involved students and young scientists as well as senior scientists. The project was relevant for all the main topics under NARP: a) management of natural resources and sustainable development; b) response of Arctic plants and animals to rapid change, and c) linkage of the oceanic currents between the North Atlantic and the Polar Sea.</p> |
| <p>Changing patterns of biomagnified pollutants in the northern marine environment 1999–2001</p> <p>Funds granted: 769 000</p> <p>http://www.miljokemi.su.se</p> | <p>Philippe Grandjean (University of Odense) 2 project partners.</p> <p>Several lipophilic and persistent pollutants are involved in long-range transportation and result in biomagnification in the marine environment, with high concentrations occurring in the blubber of toothed whales. While this pattern is known for several compounds that have now been banned or restricted, other chemicals recently introduced in industry may share the same properties. Northern populations, who eat traditional diet including whale meat and blubber, may be at particular risk of exposure to some or all of these chemicals. The project interviewed pregnant women in the Faroe Islands about their dietary habits, and collected serum from all women who agree to participate. Concentrations of 'new' pollutants was determined and compared to those of 'traditional' contaminants. Also, project determined relevant hydroxylated metabolites of polychlorinated biphenyls. In addition, mercury was measured in whole blood. The results were compared with data obtained from clinical examinations of the children in connection with a separate project.</p> |
| <p>Beneficial soils organisms in northern regions of the Nordic countries 2002–2003</p> <p>Funds granted: 223 000</p> | <p>Gudmundur Halldorsson (Icelandic Forestry Research, Mogilsa, Kjalarnesi, Reykjavik) 4 project partners.</p> <p>Beneficial soil biota represents a vital component of</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| <p>http://thule.oulu.fi/narp/assets/pdfs/aberd_ha.pdf</p> | <p>vegetated terrestrial ecosystems, facilitating nutrient cycling and plant uptake, and directly influencing plant productivity and health. Establishment of specific plant species into habitats previously lacking these target species is therefore significantly influenced by the presence and diversity of local soil biota.</p> <p>In this project we mapped key groups of beneficial soil micro-organisms at the front zone of birch habitats and studied the interaction of these groups with birch seedlings and root herbivores.</p> |
| <p>Retention and export organic material in Northern Norwegian fjords regulation through krill 2001</p> <p>Funds granted: 50 000</p> <p>http://www.polar.se</p> | <p>Elina Halttunen (Norwegian College of Fishery Science, University of Tromsø) 1 project partner.</p> <p>The aim of the project was to understand the regulating factors of the vertical flux and thus gain better knowledge of the carbon cycles in water ecosystems. This research aimed to answer a central marine biological question, how and how much does zooplankton control the pelagic carbon cycle. In other words, how does zooplankton affect the export and retention of organic material in the water column and how does it regulate the coupling of the pelagic and the benthos. More specifically, the aim was to quantify the effect of krill on the carbon flux by investigating the production and retention of its faecal pellets.</p> |
| <p>Effects of climate change on soil animals in the Arctic population ecological, ecophysiological and ecotoxicological approaches 1999–2003</p> <p>Funds granted: 699 400</p> <p>Organized workshop 1/2001 1/2003</p> | <p>Martin Holmstrup (National Environmental Research Institute, Department of Terrestrial Ecology, Silkeborg) 7 project partners.</p> <p>Projects point of interest were a) functional significance of terrestrial invertebrates in the Arctic; b) desiccation tolerance and wind dispersal; c) effects of freeze-thaw events; d) synergism between climatic and toxic stress and e) genetic diversity.</p> |
| <p>Cross-system analysis of the variation in biological structure and dynamics of North Atlantic lakes related to variations and changes in climate and land use (NORLAKE) 1999–2003</p> <p>Funds granted: 1 080 000</p> <p>Organized workshops 1/1999 1/2001</p> | <p>Erik Jeppesen (National Environmental Research Institute, Silkeborg) 5 project partners.</p> <p>The primary objective was to elucidate how variation and changes in climate and land use influence biological communities, trophic interactions and biodiversity of North Atlantic lakes – on a short-term and a long-term scale. Project expected to establish conceptual and empirical models for forecasting the effects of climatic changes on arctic lake ecosystems. The approach included comparative cross-system analyses of data from ~300 North Atlantic lakes covering a wide temperature gradient. Within this gradient the annual mean temperature ranges from -16.4 °C to +8.6 °C and the seasonal variation from 25.4 to 6.7 °C. The gradient covered ice-free to permanently ice-covered lakes and comprises lakes located in catchment areas with different bedrock, soil types and anthropogenic impact, e.g. input of domestic sewage, fertilization, sheep farming, damming for water power.</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| <p>Multiple environmental changes, effects on arctic organisms and ecosystem processes 1999–2001</p> <p>Funds granted: 600 000</p> | <p>Sven Jonasson (University of Copenhagen, Botanical Institute, Department of Plant Ecology) 5 project partners.</p> <p>The research aimed at investigating biological effects of warming, changed water availability and increased plant nutrient availability in the Arctic in an attempt to strengthen the knowledge of how predicted multiple environmental changes will affect arctic biota and ecosystems. The main research objectives were a) identifying changes in biomass and resource acquisition in arctic biota over time-spans of years to a decade of environmental change and their implications for ecosystem carbon balance; b) examining the effects of environmental changes on plant tissue secondary compounds and how the levels of the substances are related to changes in plant nutrient levels and carbon allocation; c) examining direct effects of environmental changes, and indirect effects by species replacements, on litter quality, decomposability and nutrient mineralization and how these changes feed back on the invertebrate fauna and the decomposers; d) examining to what extent climatic changes will affect the nitrogen (N) cycle and how the presumed effects will feed back on primary production, organic matter turnover and the ecosystem C balance; d) establishing and maintain pilot experiments on the effects of a decrease or increase in summer precipitation and plant production, plant and microbial C and N content, invertebrate fauna and ecosystem C balance.</p> |
| <p>Reforestation of northern barren lands: combating stress impacts 2002–2003</p> <p>Funds granted: 160 000</p> | <p>Mikhail Kozlov (University of Turku) 4 project partners.</p> <p>The project covered coastal areas in the northernmost part of Scandinavia (Finnmark and Tromsø counties in Northern Norway) and deforested or eroded areas in Iceland and in the Kola Peninsula, Russia, and aimed at a) exploration of physiological and morphological adaptations of dominant native woody plants (primarily mountain birch and different willow species) to extreme environmental conditions of open habitats, in particular partitioning genetic adaptations and phenotypic responses; b) identification of factors delaying or preventing re-establishment of woody plants in secondary open (barren) habitats near the tree-line, with special attention paid to direct and indirect effects of wind; c) search for plant genotypes resistant to stressful environmental conditions of barren habitats and propagation of these resistant plants for the subsequent use in reforestation programs and d) development of practicable and ecologically friendly measures to improve seedling establishment in barren lands.</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| <p>Human impact and sustainable utilization of subarctic birch forests in a changing environment. 1999–2003</p> <p>Funds granted: 780 000</p> <p>Organized workshops 1/1999 1/2001 1/2002</p> | <p>Kari Laine (University of Oulu, Botanical Gardens) 7 project partners.</p> <p>The aim of the project was to establish a Nordic research network focusing on responses of the subarctic birch ecotone to rapid changes in climate and land use practices. It was used to prepare and maintain a joint Nordic project about sustainable utilization of the subarctic birch forests in a changing environment, called 'Human interaction on the mountain birch ecosystem; implications for sustainable utilization' (HIBEKO). The project focused on a) testing out birch ecotypes that are suitable for restoration on forests; b) investigate the potential for sustainable use of birch and the birch forest ecosystem; c) study the interaction between birch and its most important domestic and wild herbivores in order to estimate the optimal grazing pressure according to long-term productivity modelling and d) study the human interactions.</p> |
| <p>Abrupt climate change and impact on cod (ACCIC) 2002–2003</p> <p>Funds granted: 304 000</p> <p>Organized workshop 1/2003</p> | <p>Harald Loeng (Institute of Marine Research, Bergen) 2 project partners.</p> <p>It is important to understand the processes behind climate variability and climate change and especially the impact on the marine ecosystem. The main objective of the project was to understand and quantify the role of the part of the thermohaline circulation (THC) that originates in the Nordic Seas and its implications for the dynamics of the cod stocks in the area. More specifically the project focused at a) describing, understanding, and quantifying the state and variability of marine climate, and developing methods for prediction of regional climate, and b) quantifying the direct and indirect impact of climate on recruitment, growth and distribution of commercial fish stocks through e.g. establishing quantitative relations between variability in climate and population parameters of fish and establishing quantitative relations between climate variability and plankton biomass and distribution.</p> |
| <p>Rapid transport of pollutants in drift ice to melt-down regions near Atlantic inflows 2002–2003</p> <p>Funds granted: 224 000</p> | <p>Thomas A. McClimans (SINTEF Fisheries and Aquaculture, Trondheim) 4 project partners.</p> <p>The main objective of this project was to expand the MAIA (Monitoring the Atlantic Inflow toward the Arctic) efforts to focus more on the questions of biodiversity and living conditions in the northern regions. More specifically, the transport routes and speeds of pollutant-laden ice to the region, and the rate of melt-down at the fronts were analyzed in search of more efficient monitoring strategies.</p> |
| <p>Global climate change effects on arctic terrestrial vertebrates: a long-term, pan-arctic shorebird monitoring program 2002–2003</p> <p>Funds granted: 168 000</p> <p>Organized workshop 1/2003</p> | <p>Hans Meltofte (National Environmental Research Institute, Department of Arctic Environment, Roskilde) 3 project partners.</p> <p>Tundra-breeding Arctic shorebirds are likely to be good indicators of Global Climate Change (GCC) since aspects of their ecology, such as egg-laying dates, are directly influenced by climatic variables. There is relatively little data available on breeding phenology and ecology of Arctic shorebirds, particularly with regard to GCC effects. Thus, in this Nordic collaborative project, we aimed a) operating a Pan-</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| <p>http://biobasis.dmu.dk</p> | <p>Arctic shorebird researcher network (PASRN), encouraging collaboration between Nordic Arctic shorebird researchers and programs, common proposal-writing, mobility and recruitment of researchers and students, and initiation of research projects; b) conducting a small, 5-day workshop for selected researchers in the network who conduct, or have conducted, long-term studies of breeding Arctic shorebirds, to establish common monitoring methodology, and to study the effects of GCC on breeding Arctic shorebirds based on synthesis of previously collected data; c) producing common manuscripts on the effects GCC may have had, and are likely to have, on breeding Arctic shorebirds and d) establishing a long-term, Pan-Arctic monitoring program of breeding shorebirds.</p> |
| <p>Importance of biodiversity of bacteria and phytoplankton in the Disco Bay, Western Greenland, for energy and nutrient cycling 2001–2002</p> <p>Funds granted: 245 000</p> | <p>Torkel Gissel Nielsen (Ministry of Environment and Energy, National Environmental Research Institute, Department of Marine Ecology, Roskilde) 11 project partners.</p> <p>The primary objective of the project was to study the bacterial response (biomass, biodiversity and production) to the Spring-Summer transition in order to provide new information on the functional diversity of the bacterial communities in the vulnerable arctic ecosystem. The scope of the project was changed also to include the role of zooplankton grazing on bacterial dynamics and diversity.</p> |
| <p>The capability of Arctic plant species to respond to rapid environmental changes 1999–2003</p> <p>Funds granted: 984 000</p> | <p>Inger Nordal (University of Oslo) 2 project partners.</p> <p>The response to rapid changes in Arctic plant species is dependent on the degree of genetic variation and the capacity of dispersal. Species most affected by rapid changes will often be at the margins of their distribution. It is from marginal population that colonization of new areas will take place or it is in such populations adaptations to new conditions will be most demanding. The species was studied in 5 areas: West Greenland, East Greenland, Iceland, Svalbard and Scandinavian mountains. The pattern of genetic variation, within and among populations, was studied by isoenzyme and DNA methods. This provided us with information of the genetic background for adaptations to environmental changes. Breeding systems of plant species in populations with marginal positions was compared to more central positioned populations. The ability of individual plants to cope with rapid changes in climate regimes was studied experimentally. Demographic parameters essential for population dynamics and survival was analyzed: age distribution, seed set, and the pattern of recruitment from seeds.</p> |
| <p>Consequences of global climate change on links between arctic plant biochemistry and plant parasites and herbivores 2001</p> <p>Funds granted: 114 380</p> | <p>Annika Nordin (Department of Forest Genetics and Plant Physiology, Swedish University of Agricultural Sciences, Umeå) 2 project partners.</p> <p>The research in this project studied how plant biochemistry is affected by global change, and how this in turn can impact plant community ecology. Global climate change is predicted to increase atmospheric concentrations of carbon dioxide and</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| | <p>temperature. High latitude regions are expected to warm the most. Plant biochemistry plays a key role in ecosystem nitrogen and carbon cycling, and is therefore an important determinant of ecosystem structure and function. Changes in the biochemical quality of plant tissues can change the susceptibility of plants to parasitic fungi as well as insect and mammalian herbivores, which can result in drastic alterations in plant community structure.</p> <p>The results improved our view over the biological consequences of climate change in the arctic.</p> |
| <p>Ecophysiological responses to oceanic temperature changes in boreo-arctic marine fishes 2001–2003</p> <p>Funds granted: 600 000</p> <p>http://www.mbl.ku.dk/JFSteffensen http://www.mbl.ku.dk/JFSteffensen/narp.htm</p> | <p>John Fleng Steffensen (The Marine Biological Laboratory, University of Copenhagen, Helsingør)</p> <p>4 project partners.</p> <p>The project focused on the ecophysiology and genetics of different cod (gadoid) species in the Arctic area with the following projects, all dealing with different aspects of adaptation to the extreme environment and the ability to cope with rapid changes. The project fulfilled the goals of the programme on three of the four accounts, namely a) network building and workshops; b) training and mobility of researchers, and c) including pilot studies in Norway, Iceland, Greenland and Denmark.</p> |
| <p>Macroparasites in Semi domesticated reindeer of Fennoscandia – parasite population dynamics, control options and environmental impact implications. 2001–2003</p> <p>Funds granted: 651 845</p> | <p>Peter Waller (National Veterinary Institute, Uppsala)</p> <p>4 project partners.</p> <p>It is widely recognized amongst those who are knowledgeable about the reindeer husbandry of Fennoscandia that both internal parasites (gastro intestinal and pulmonary nematodes) and external parasites (larval stages of oestrid flies) are of major importance. However, it is also well known that detailed quantitative, epidemiological knowledge and economic significance of these parasites is seriously lacking. Recognition of the importance of parasites is illustrated by the fact that more than 80 % of the semi-domesticated reindeer of Finland are treated every year with antiparasiticides. Similar statistics are likely to be the case for Norwegian and Swedish reindeer populations. In the move towards achieving sustainability of semi-domesticated reindeer industry of Fennoscandia, the importance of parasites to their production and also the impact on the environment of chemical control methods, need to be comprehensively investigated. Towards this objective a research consortium has been developed between researchers in Finland, Norway and Sweden.</p> |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| <p>Production, food-web dynamics and biological origin of compounds involved in aerosol formation. 2001</p> <p>Funds granted: 200 000</p> | <p>Paul Wassman (Norwegian Collage of Fishery Science, University of Tromsø) 16 project partners.</p> <p>The network "Climate change, carbon flux and living resources in the Nordic Seas" focused on the arctic areas of the Nordic region (Greenland, Icelandic Sea, Norwegian Sea, Greenland Sea, Fram Strait, the central Barents Sea, north Norwegian shelf, coastal areas of Spitsbergen, Polar Ocean). It gathered Nordic scientists with general expertise in arctic oceanography and experience for this geographic area. The network gathered a wide spectra of Nordic oceanographers covering the fields of physical, chemical and biological oceanography, plankton, fish, shrimps, carbon sequestration, carbon flux, microbiology, ice biota, modelling and systems ecology.</p> <p>The network main objectives were a) improving the collective oceanographic knowledge from the Nordic Seas; b) interpreting this knowledge with regard to rapid climate change in the Arctic; c) evaluate these changes with regard to ecosystem function and natural resources, and d) transfer the knowledge to research students.</p> |

3.3 Opportunities for human life in the north

The third main theme of the programme, Living conditions of the arctic population, was divided into two subthemes: sustainable maintenance and exploitation of natural resources and opportunities for human life and well-being in the north. It was hoped that the open discussions in the research organizations and symposia will orient decision-making and result in beneficial environmental policies. When used correctly, arctic resources will guarantee general well-being in the northern conditions. This was considered a real opportunity for expert projects in environmental technology. The executive board of the programme especially wanted to underline the significance of this aspect.

Among the projects that received funding, social sciences were represented by the network project coordinated by professor Nils Aarsæther, which was also part of a larger UNESCO project titled MOST (Management of Social Transformation). It aimed to elucidate the trends of social change particularly in the circumpolar area. The Nordic Arctic Research Programme also allocated ample funding for setting up a research network focusing on the living conditions of the Inuit and Saami people as well as the indigenous people in the Chukotka and Kola areas. This work was coordinated by Thomas Andersen from the Greenland Statistical Centre.

Thanks to the funding from the research programme, Icelandic forest researchers were able to arrange an international symposium in Akureyri in the summer of 2000 to discuss such topics as reforestation of rural

areas and the ecologic and socio-economic questions of forest protection. Within the NARP framework, Peter Kuhry was able to organize a three-day symposium at the Arctic Centre on the overall theme of how the arctic environment with its own processes will respond to global change.

The work of Dr. Thomas Stensgard in Greenland concerning the evaluation of a one-year telemedicine project was directly related to human health. The AMAP programme for surveying the arctic regions involved a project coordinated by Jon Odland. The project focused on the development of the birth rate among different population sectors in the arctic and subarctic areas as well as the impacts of nutrition on this development. This project was active in the Barents region in Russia. Within the NARP framework, Juhani Leppäluoto, professor of physiology in Oulu, was able to compile a Nordic network of cold research specialists and postgraduate students with the NARP.

Table 3. Overview of the projects within theme C, Living conditions of the inhabitants of the Arctic.

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| Project name, duration, granted funds (DKK) and project (or related) web page(s) | Coordinator, number of project partners and project description |
| Management of social transformation (MOST), a circumpolar coping processes project (CCPP) 1999–2002 Funds granted: 450 000 Organized workshops 1/1999 http://www.unesco.org/most | Nils Aarsæther (Faculty of Social Sciences, University of Tromsø) 3 project partners. MOST CCPP was a nine-country social scientific cooperation effort aimed at producing and disseminating new knowledge on the situation facing people living in localities in the Northern areas. The participants were doctoral students and senior researchers from Denmark, Norway, Iceland, Canada, Finland, Sweden, Greenland, Faroe Islands, and Russia. Responding to an initiative from UNESCO's MOST program, the research project was organized on an axis Tromsø - Roskilde in 1996, with a steering committee of social scientists from the nine countries, with Jørgen Ole Bærenholdt from Roskilde as coordinator, and with a secretariat set up at the University of Tromsø. |
| Survey of living conditions in the Arctic: Inuit, Saami and the indigenous peoples in Chukotka and the Kola Peninsula. 1999–2002 Funds granted: 1 384 000 | Thomas Andersen (Statistics Greenland, Nuuk) 1 project partner. The Inuit and Saami populations in Inuvialuit, Nunavut, Nunavik, Labrador, Greenland, Alaska, Chukotka, Norway, Sweden, Finland and the Kola Peninsula now mix traditional activities with paid work. As a result, they are adapting traditional lifestyles. These adaptations have not always been successful. It is important to be able to document the present level and any future changes of the conditions of life in these areas. The expected outcome of the project were a) the development of a new research design for comparative investigations of the living conditions; b) making a dynamic social analysis of the causal relations between different individual resources and between individual well-being and different political, economic, cultural and technological settings; c) mapping of the living conditions among the Inuit and Saami in |

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| | Greenland, Inuvialuit, Nunavut, Nunavik, Labrador, Alaska, Chukotka, Sweden, Norway, Finland and the Kola Peninsula; d) establishing an improved basis for decision-making in relation to policy planning and implementation; e) establishing an interdisciplinary network of researchers and research institutions and f) involving both indigenous and non-indigenous postdocs, PhD candidates and undergraduates in the SliCA project. |
| <p>Atmospheric Transport Pathways, Vulnerability and possible Accidental Consequences from the Nuclear Risk Sites in the European Arctic 2001–2003</p> <p>Funds granted: 510 000</p> <p>Organized workshops 2/2003</p> <p>http://www.dmi.dk/f+u/luft/eng/arctic-risk/main.html</p> | <p>Alexander Baklanov (Danish Meteorological Institute (DMI), Copenhagen) 5 project partners.</p> <p>The project main purpose was to establish and maintain the interdisciplinary scientific network needed to achieve the nuclear risk and vulnerability studies for the Nordic countries region. This included the following issues a) the examination of the existing atmospheric transport patterns for selected nuclear risk sites, the contribution of the precipitation factor, and the probability of the rapid transport; b) the estimation of the possible impact and consequences in terms of radioactive deposition, and environmental contamination, in different Euro-Arctic regions from hypothetical accidents at different sites in the northern areas; c) the evaluation of the vulnerability to a radioactive deposition concerning its persistence in the ecosystems and d) the estimation of the risk and socio-economical consequences for different geographical areas and population groups of the Nordic countries. The project results can be used in the event of an accident to estimate the probability of the radionuclide transport from the NRSS.</p> |
| <p>Strengthening of Greenlandic health research and Nordic cooperation in Arctic health 2000–2001</p> <p>Funds granted: 400 000</p> <p>Organized workshops 1/2000 2/2002</p> | <p>Peter Bjerregaard (DICE, Copenhagen) 2 project partners.</p> <p>The purpose of the project was to strengthen health research in Greenland and in particular to enhance the co-operation among circumpolar health researchers in Greenland, the Nordic countries and Canada/Alaska. This was done by arranging two international workshops in Greenland. In September, 2000, a workshop was convened on cardiovascular disease and diabetes in the circumpolar area. Participants included researchers from Denmark, Alaska, New Orleans, Winnipeg and Québec who already co-operated with Greenlandic researchers in this field. In 2001, a second workshop on acculturation and health in aboriginal communities was arranged.</p> |
| <p>Dissemination of results from Northern Research Forum. 2001</p> <p>Funds granted: 100 000</p> | <p>Thorleifur S. Björnsson & Jon Haukur Ingimundarson (Northern Research Forum (NRF), University of Akureyri, Solborg) 8 project partners.</p> <p>The Northern Research Forum (NRF) is an ongoing activity of the University of the Arctic whose purpose is to promote dialogue among members of the research community and a wide range of other northern stakeholders. The Forum provides a setting for policy-relevant discussion on the role of research in addressing issues of sustainable development, community viability, peace and security, social and environmental policy, and the impacts of global change. The NRF convenes a congress every second year, rotating among the different</p> |

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| NRF home page: http://www.nrf.is | northern countries. Through exchanges of ideas and perspectives and discussions of the findings of multidisciplinary research, the Forum explores connections between northern neighbors, nurtures a sense of the North as a shared region, and stimulates the growth of a circumpolar community. In this way, the NRF enhances sustainable communities, democratic processes, and stability in the northern regions. |
| Work forum; life assessment (LCA). 2001–2003 Funds granted: 200 000 Organized workshops 1/2001 1/2002 1/2003 | Helga Eyjolfssdottir (The Icelandic Fisheries Laboratories, Reykjavik) 5 project partners. Nations in the arctic area are heavily dependent on fisheries. It is therefore important to obtain facts about the environmental impact of fish and fish products. LCA points out the environmental hot-spots of the production chain. The objective of this project was to establish a work forum for scientists who are working on LCA in fisheries and fish production. That was to providing opportunity for participants to meet and learn from each other experience, motivate cooperation and coherence on this field within the Nordic countries and to promote the development and practical use of LCA. |
| Forestry beyond timberline: ecological and socio-economic factors affecting forestry in the context of rural development in the North Atlantic region. 1999–2000 Funds granted: 160 000 Organized workshop 1/2000 | Thröstur Eysteinnsson (Iceland Forest Service, Egilsstaðir) 8 project partners. The Forestry Beyond the Timberline workshop was held in Akureyri, Iceland on June 27–30, 2000. The northern and northwestern periphery of Europe is known for its fisheries, scenic beauty and rather sparse human populations. Forestry in this region is not usually counted as one of its main attributes. Nevertheless, considerable forestry activities are being carried out, activities such as protection of the mountain birch woodlands of northern Scandinavia, protection of forest remnants in Iceland, Scotland and Ireland and afforestation with a variety of goals in northern and coastal Norway and all the Atlantic islands, including Greenland. Research and extension play very important roles in all these endeavors. Afforestation and forestry are increasingly important factors in rural development in this region and protection of natural forests and forest remnants are important both from the standpoint of nature conservation and tourism development. |
| The effects of Reindeer Husbandry and Nature conservation on the strict nature reserve Malla 2002–2003 Funds granted: 80 000 Organized workshop 1/2003 http://www.sunare.helsinki.fi/eng/reindeer/sutinen/index.htm | Mikko Jokinen (Finnish Forest Institute, Kolari) 5 project partners. The aim of the research project was to study the multiple effects of nature conservation and reindeer husbandry in Malla strict nature reserve and its immediate surroundings. Malla park was established in 1916 and reindeer husbandry has been forbidden in the area since 1981. However, Malla and the Kilpisjärvi region is part of the reindeer Samis' old grazing ground, and reindeer husbandry has continued more or less actively in Malla also in the 20th century, although primarily outside the floristically richest areas on Pikku-Malla. The project had two themes: a) ecological: Under this theme the aim was to study the changes that current reindeer husbandry is likely to cause to the natural state of Malla and, above all, to rare and endangered species and b) sociocultural: Under this theme the |

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| | social and ecological conditions that current reindeer husbandry and Saami culture have to confront was studied. |
| Socio-economic and environmental impact of tourism development in the Arctic and Sub-Arctic with special reference to the Nordic countries. 2002 Funds granted: 184 000 | Ivar Jonsson (Anna Karlsdottir) (Bifrost business School, Borgarnes) 7 project partners The workshop was pre-course arrangement in connection with the CAES PhD-course "The Role of Tourism in Northern Development" in 2003 in Iceland. The aim of the pre-course workshop was to introduce a number of topics, related to the theme that will be subject to deepened studies during the following CAES course. A further aim was to look specifically at the impact of tourism in the West Nordic countries in the light of comparative examples from other circumpolar areas. |
| Land surface erosion in Iceland: Land Degradation in Iceland with Special Emphasis on Detection and Quantification of Natural and Anthropogenic Processes (LANDIS). 2001–2003 Funds granted: 150 000 http://www.utu.fi/~jukkay | Jukka Käyhkö (Department of Geography, University of Turku) 6 project partners. LANDIS allows a new, innovative, interdisciplinary approach to the complex land degradation problem by combining remotely sensed data with detailed field investigations, feeding material to spatial database for sophisticated GIS analyses. The objective of the LANDIS research project was to quantify the significance of various environmental parameters in the land degradation process in the Ódáðahraun study area, north-eastern Iceland. The key methods that were used in the project by researchers included a) mapping the land cover and vegetation with the aid of remotely sensed data; b) sedimentology and sedimentary processes related to aeolian deposits c) investigation of available written records with regard to settlement history and environmental history of the area; d) spatial database building and subsequent GIS analyses; e) vegetation and climate history through pollen and plant macrofossil analyses; f) jökulhlaup sedimentology and g) present day aeolian processes. |
| Network group for sustainable harvest of large ungulates in Greenland 2001–2003 Funds granted: 335 000 Organized workshops 1/2002 1/2003 http://www.natur.gl | Arild Landa (Greenland Institute of Natural Resources, Nuuk) 3 project partners. Harvesting caribou (<i>Rangifer tarandus groenlandicus</i>) and muskoxen (<i>Ovibos moschatus</i>) is both economically and culturally important to the inhabitants of Greenland. However, there is at present much uncertainty about the status and ecology of both caribou and muskoxen in Greenland. Furthermore there is a need to establish long range management plans Greenland Institute of Natural Resources (GN) is responsible for providing scientifically sound management advice to the Greenlandic government. There is a need to increase GN's competence in establishing effective research, monitoring and management techniques. The main goals of the network building were increased scientific competence at Greenland Institute of Natural Resources, establishing of a network group which was mutually beneficiary in future research, and establishing of monitoring programs for caribou and muskoxen. |

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| <p>Network for scientists studying living conditions of the inhabitants of arctic and related areas and establishment on a PhD school in Arctic Health. 2001–2002</p> <p>Funds granted: 570 000</p> <p>Organized workshops 1/1999 1/2002</p> <p>http://cc oulu.fi/~fysiowww/index.html http://www.occuphealth.fi Cold Work Action Program http://www.sintef.no/ http://arctichealth oulu.fi www.niwl.se/tema/klimat/climate.htm</p> | <p>Juhani Leppäluoto (Department of Physiology, University of Oulu) 6 project partners.</p> <p>The project focused on the factors that predispose to cold related diseases and other harmful effects, as well as on the applicable preventive measures. Low population density and long distances between the Nordic countries give rise to a definite need for co-operation. The aim of the project was to establish a network between research institutes covering all the Nordic countries. Within the network information about the effects of climatic conditions on human welfare, health and performance were distributed. The main objectives of interest were to improve living and working safety in cold environments and to find cold-related risk factors and build preventive measures against them.</p> |
| <p>Life of the Norse in SW Greenland 985–1500 AD: influence of environmental change on sustainability and farming conditions 2001–2002</p> <p>Funds granted: 151 000</p> | <p>Naja Mikkelsen (Geological Survey of Denmark and Greenland, Copenhagen) 7 project partners.</p> <p>The aim of the research project was to investigate – using the geological record – the sustainability, living and farming conditions for the Norse culture in South West Greenland. Special emphasis was placed on the study of the possible impact on the landscape of their land use for grazing and agriculture under the marginal and changing conditions in Greenland. The general aim of the research project was to investigate changes in the environment for the Norse colonization of Greenland covering the period AD 985 to 1500 and relate these environmental changes to variations in the climatic conditions and effects of human activities.</p> |
| <p>Oppbygning av kunnskap om drivsnø i Norden 2003</p> <p>Funds granted: 200 000</p> <p>Organized workshop 1/2003</p> <p>http://thule oulu.fi/narp/assets/pdfs/inv_snow.pdf</p> | <p>Harald Norem (Institutt for veg- og jernbanebygging, NTNU, Trondheim) 1 project partner.</p> <p>“Nordisk seminar om drivsnø” in Bø in Telemark, Norway, 8–11. May 2003.</p> |
| <p>Human pregnancy outcome and dietary patterns in arctic and subarctic areas of the Nordic and Barents regions. 1999</p> <p>Funds granted: 200 000</p> | <p>Jon Oyvind Odland (Institute of Community Medicine, Tromsø) 9 project partners.</p> <p>Under the auspices of the Arctic Monitoring and Assessment Programme (AMAP) a circumpolar network of experienced colleagues has been established with special interest in environmental impacts on pregnancy outcome in arctic and subarctic areas. The cooperation between Russian and Norwegian experts has resulted in a permanent network able to provide information and human biological material from key areas in arctic Norway and Russia. Newborn body mass index (BMI) is recognized as a valuable tool in assessing the nutritional status of the baby throughout pregnancy and the first period of life, while other factors (e.g., genetic) might be more dominant in birth weight assessment. The BMI differences between the Sami, Norwegian and Russian babies were observed. The main objective of this project was to establish close cooperation between the different</p> |

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| | scientific groups, and to coordinate activities in more comprehensive scientific studies of dietary and environmental influences on pregnancy outcome in arctic and subarctic areas. |
| <p>Development of methodologies in connection with the evaluation of socioeconomic and environmental consequences of mineral and energy industries in the Arctic and Subarctic 2001–2002</p> <p>Funds granted: 266 000</p> <p>Organized workshop 1/2001</p> | <p>Rasmus Ole Rasmussen (NORS – North Atlantic Regional Studies, Roskilde University)</p> <p>3 project partners.</p> <p>From May 8 to May 12, 2002 a very successful workshop was held at Kola Science Centre, Apatity, Russia. A total of 50 participants from the circumpolar world, and with scientists from the major research centers with a Northern focus, met for four days to discuss issues of common interest. The purpose of the workshop was to look into the consequences of mining activities and energy production in the Circumpolar North, with a special focus on methodologies in the evaluation of long and short term socio-economic and environmental consequences of the activities. Based on comparative analyses of experiences from regions with different environmental, social, economic and political situations, the goal has been to point towards a set of general recommendations regarding the preparation of future booms in mining and energy industries in the Arctic, as well as suggestions regarding appropriate environmental precautions and political interventions. It has been the intention with the workshop to cross the scientific boundaries – both between countries and between disciplines: in short term to create a broader understanding, and a network between scientists, but also to point towards common goals and methodologies that may support the long term process towards a sustainable development in the Arctic!</p> |
| <p>Network for crisis centers in the Barents region 2001–2003</p> <p>Funds granted: 250 000</p> <p>Organized workshop 1/2003</p> <p>http://www.wedu oulu.fi/kti/NCRB/ http://www.wedu oulu.fi/kti/WMI/ http://www.pomorsu.ru/Departments/Crisis_centre/index.htm/</p> | <p>Aino Saarinen (Department of Education, University of Oulu)</p> <p>13 project partners.</p> <p>In most general terms, the research network aimed to introduce new perspectives into the research on gender, citizenship, and democracy through a woman-friendly prism of double democratization, interrelatedness of political and social developments and problematisation of the public/private division, which are important for women's sexual-reproductive rights and problems and issues related to violence against women and trafficking in women.</p> |
| <p>Telemedicine in Greenland – An analysis of the period of implementation and the first years of operation. 1999–2003</p> <p>Funds granted: 170 000</p> <p>2003 with support for the 12th International Congress on Circumpolar Health. Funds granted: 160 000</p> <p>Organized workshop 1/2003</p> | <p>Thomas Stensgard (Primary Health Care Clinic, Nuuk)</p> <p>3 project partners.</p> <p>Telemedicine is the use of information technology for electronic transmission of information, pictures, sound and other health-related data necessary for procedures relevant to diagnosis and treatment. The Ministry of Health has commissioned the work plan after which the implementation starts. The project presented a number of practical problems where organization and technology must be made operational. Furthermore, it was the aim of the group working on the project that results are registered and analyzed currently throughout the period in order to ensure that the experience gained will</p> |

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| | support the continued use of telemedicine in Greenland and also be published to the benefit of others. |
| <p>Social exclusion among men and women born in northern Finland and the Nordic Dimension 2002–2003</p> <p>Funds granted: 120 000</p> <p>Organized workshop 1/2002</p> | <p>Anja Taanila (Department of Public Health Science and General Practice, University of Oulu) 2 project partners.</p> <p>The aim of this study was to analyze social exclusion, regional variations of exclusion and accessibility to social benefits and services in the Northern Finland birth cohort of 1966. Dimensions of social exclusion studied were exclusion from production, consumption and social community. The role of individual's health and disabilities in social exclusion process was studied by assessing the pathways since pregnancy through childhood to adult age. The operationalization of exclusion was based on theoretical definitions of exclusion, theories of wellbeing, previous studies on related fields and the data available.</p> |

4. Organized Workshops

The following pages introduce the programme's organized workshops, network meetings and seminars grouped under the three themes of the programme: Natural processes – land, sea and atmosphere, Biological diversity and environmental threats in the Arctic, and Living conditions of the inhabitants of the Arctic. A total of 68 gatherings were organized during the span of the programme – some of them in the form of field workshops. These workshops were considered very important in supporting networking and mobility between several research groups. These network meetings were also significant in cultivating cooperation between the researchers from the Faroe Islands, Greenland and Iceland.

Table 4. Workshops organized within theme A, Natural processes – land, sea and atmosphere.

| Theme A: Natural processes – land, sea and atmosphere | |
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| Year | Workshop information |
| 1999 | Workshop organized within project "Sensitive records of climate change at the Arctic fringe" (Coordinator Sheila Hicks). |
| 1999 | Workshop for 10 people within project "Investigating rapid climate change using Svalbard ice cores" (coordinator Elisabeth Isaksson) took place in Tromsø 29 September–1 October. |
| 1999 | Workshop/Meeting within project "Interannual-to-decadal climate changes in the Atlantic Arctic (ATLANTARC)" (Coordinator Martin Miles) in Reykjavik served to enhance Nordic cooperation, with participation from each partner as well as several other institutes and university departments in Reykjavik. The meeting also served to focus and better define the project's scientific goals, data and methodology. |
| 1999 | Workshop organized within project "Detecting rapid environmental changes through studies of annually laminated lake sediments in northern Scandinavia: linkages to the North Atlantic Ocean circulation" (coordinator Ian Snowball). |
| 2000 | Two research workshops organized within project "Pollution and rapid climatic changes in the Arctic" (coordinator John Birks) on the use of chironomids for reconstructing climatic change in arctic areas (Bergen, Abisko). |
| 2000 | Workshop/field excursion within project "Sensitive records of climate change at the Arctic fringe" (Coordinator Sheila Hicks) took place 8–13 July and was attended by 8 people representing 5 of the project partners. Participants met in Finland at Rovaniemi and traveled north to Kevo, taking the opportunity to visit many of the Finnish research areas on the way. |
| 2000 | Workshop organized within project "Nordic network on permafrost engineering and environment" (coordinator Arne Instanes) |
| 2000 | Two workshops organized within project "Investigating rapid climate change using Svalbard ice cores" (coordinator Elisabeth Isaksson). First workshop for 20 people took place in Uppsala June 19–20. Second workshop for 10 people took place in Tallinn October 26 th . |
| 2000 | NARP workshop within project "Rapid oceanographic changes in the Arctic: causes and effects" (coordinators Jürgen Mienert and Tore Vorren) took place with 35 participants from 13 th –14 th April at the DMI in Copenhagen. The workshop achieved the specific goals of selecting high resolution ocean-sediment records for rapid climatic change studies in high latitudes, their link to land climate, and northward directed warm Atlantic waters that impact the Arctic. |
| 2000 | A Nordic workshop within project "Climatic Variability and effects of Arctic Water Distribution in the Northern Seas" (coordinator Einar Svendsen) was arranged in October t where participants from all the Nordic countries were invited. |
| 2000 | Workshop organized within project "Placing climate change, carbon flux and living resources in the Nordic Seas into a pan-arctic perspective" (coordinator Paul Wassmann). |

| Theme A: Natural processes – land, sea and atmosphere | |
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| 2001 | Two workshops organized within project "Pollution and rapid climatic changes in the Arctic" (coordinator John Birks). |
| 2001 | A workshop called "CHANGES IN CLIMATE AND ENVIRONMENT AT HIGH LATITUDES" within project "Rapid oceanographic changes in the Arctic: causes and effects" (coordinators Jürgen Mienert and Tore Vorren) in Tromsø from 31st October to 2nd November. It was under the auspices of NARP and attracted more than 100 participants from both sides of the Atlantic to discuss important project topics such as rapid oceanographic, climate and environmental changes. This workshop allowed presenting our work in context with the international activity, therefore providing an excellent platform for joint research in the future. |
| 2001 | Field workshop organized within project "Detecting rapid environmental changes through studies of annually laminated lake sediments in northern Scandinavia: linkages to the North Atlantic Ocean circulation" (coordinator Ian Snowball) in Faeroe Islands, 11–17 June 2001. |
| 2001 | Pre-campaign workshop of the AOE-2001 Atmospheric Research Program within project "Sources of particles over the remote Arctic Ocean and their climatic impact" (coordinator Erik Swietlicki) was held 7 May 2001 at Stockholm University. The purpose of the workshop was to finalize the plans for the upcoming campaign in the summer of 2001. |
| 2002 | A project meeting within project "Long-term variations in atmospheric circulation and climate in the Arctic" (coordinator Erik Forland) with participants from all Nordic countries was arranged in Oslo 24–25 June 2002. |
| 2002 | Two workshops organized within project "Investigating rapid climate change using Svalbard ice cores" (coordinator Elisabeth Isaksson). First workshop for 10 people took place in Longyearbyen in April. Second workshop for 14 people took place in Oslo Nov 6–7 th . |
| 2002 | Field-workshop within project "Detecting rapid environmental changes through studies of annually laminated lake sediments in northern Scandinavia: linkages to the North Atlantic Ocean circulation" (coordinator Ian Snowball) was held in Iceland. |
| 2002 | A first post-campaign workshop within project "Sources of particles over the remote Arctic Ocean and their climatic impact" (coordinator Erik Swietlicki) took place 21 st –23 rd April 2002, at Stockholm University, Sweden. |
| 2002 | Workshop organized within project "Biological source identification of cloud condensation nuclei across the Arctic Ocean" (coordinator Lars Tranvik). |
| 2003 | The workshop on "Land-Ocean Links in Holocene Palaeoclimatology" in Bergen (May 2003) within project "Pollution and rapid climatic changes in the Arctic" (coordinator John Birks) organized by Carin Andersson Dahl and Heikki Seppä. 38 people attended this workshop and a brief report about it was published in the Norwegian climatic journal Cicerone. Second workshop on "Arctic Environmental Change" in Copenhagen (May 2003) organized by John Anderson and Rich Bindler. 30 people attended the workshop and questions of pollution by Pb, Hb, and persistent organic pollutants and of modern limnological processes in Arctic lakes were discussed. |
| 2003 | Two workshops organized within project "Regional Earth System Modelling Network for the Arctic (RESMoNA)" (coordinator Jens H. Christensen). The first one on circumpolar carbon cycling was held as planned in Skogar, Iceland in June. The second on peatland carbon stocks and fluxes was hosted in Lund in October 2003. |
| 2003 | Two project workshops organized within project "Long-term variations in atmospheric circulation and climate in the Arctic" (coordinator Erik Forland). First in Gothenburg 1–2. September where main focus was on climate scenarios. Minutes and extracts of presentations at the meeting are available on: http://www.gvc.gu.se/ngeo/deliang/narp.htm . The second was held in Reykjavik 23–24. October where main focus was on climate variability and climate indices illustrating living conditions in the Arctic. |
| 2003 | Workshop for 10 people within project "Investigating rapid climate change using Svalbard ice cores" (coordinator Elisabeth Isaksson) took place in Utrecht, The Netherlands in October. |
| 2003 | The Final Meeting within project "Interannual-to-decadal climate changes in the Atlantic Arctic (ATLANTARC)" (Coordinator Martin Miles) was held in October 2003 in Torshavn. |
| 2003 | Three workshops within project "Sources of particles over the remote Arctic Ocean and their climatic impact" (coordinator Erik Swietlicki). A second post-campaign workshop, 27–31 Jan 2003, at Stockholm University, Sweden, all participants. An atmospheric vertical profiles post-campaign sub-group workshop, 14–18 July 2003, at Stockholm University, Sweden. A biology sub-group post-campaign workshop, 1–5 Dec 2003, at Uppsala, Sweden. |
| Total | 35 |

Table 5. Workshops organized within theme B, Biological diversity and environmental threats in the Arctic.

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| Year | Workshop information |
| 1999 | Workshop organized within project "Short and long-term fluctuations in animal populations at lake Myvatn" (coordinator Arni Einarsson). |
| 1999 | Workshop within project "Cross-system analysis of the variation in biological structure and dynamics of North Atlantic lakes related to variations and changes in climate and land use (NORLAKE)" (coordinator Erik Jeppesen) was held in Reykholt from 29 September to 4 October. 25 scientists from Denmark, Iceland, The Faroe Islands, Norway and Sweden participated. At the workshop the activities of each group was presented and speeches were held by invited guests. The extent and structure of the joint database on Arctic lakes comprising data from ca. 200 Greenland, Canadian, Icelandic, Faroese and northern Norway/Svalbard were discussed. |
| 1999 | Workshop organized within project "Human impact and sustainable utilization of subarctic birch forests in a changing environment" (coordinator Kari Laine). |
| 2000 | Workshop within project "Effects of climate change on recruitment of Greenland halibut" (coordinator Jesper Boje) was held 28.–30. November 2000 with 12 participants from Canada, Greenland, Iceland, Spain, Faroe Islands and Norway. Workshop aimed at a national summary of research into early life stages and reproductive biology of Greenland halibut with special emphasis on rapid changes in climate in order to clarify needs for future investigations. This includes the abilities (economic and manpower) of the national laboratories in the North Atlantic involved to expand their activities on the species as well as an outline of possibilities to co-ordinate presently running investigations on the resource. |
| 2001 | The TWIN Symposium on "Cold Aquatic Environment" within project "Short and long-term fluctuations in animal populations at lake Myvatn" (coordinator Arni Einarsson) was held in the Myvatn area, Iceland 13–17 May 2001. 85 persons (including 20 students) from 11 countries contributed with presentations. The 2001 symposium/workshop was held to bring together scientists involved in research and monitoring of the Lake Myvatn and a sizeable multinational audience with emphasis on a healthy mixture of mature and young scientists. |
| 2001 | Workshop within project "Effects of climate change on soil animals in the Arctic population ecological, ecophysiological and ecotoxicological approaches" (coordinator Martin Holmstrup) was held in Aarhus (Denmark), in combination with the 9 th Nordic Soil Zoology Symposium. |
| 2001 | Workshop within project "Cross-system analysis of the variation in biological structure and dynamics of North Atlantic lakes related to variations and changes in climate and land use (NORLAKE)" (coordinator Erik Jeppesen) was held in Herdla, Norway, October 2001, at which was discussed the results on the Faroese lakes and the future work on the joint database. |
| 2001 | HIBECO workshop organized within project "Human impact and sustainable utilization of subarctic birch forests in a changing environment" (coordinator Kari Laine). The workshop took place in the community center of Utsjoki, near Kevo Research Station, 6 th October, 2001. At the workshop local representatives of the Sami population were invited. Three of them were also invited to take part in a panel discussion about "Present and Future Sustainable Use of Mountain Birch Forests" with two HIBECO researchers, after four oral presentations by HIBECO participants. The panel discussion was very interesting and informative, in particular regarding traditional Sami use and management of the birch forests. The workshop was also a good opportunity for scientists to meet representatives of the local population in the Utsjoki community and exchange opinions and information. Maria Sofia Aikio, who is a resident of Utsjoki community and participant of the HIBECO project, was in charge of the meeting. |
| 2002 | The annual workshop within project "The bioproduction and energy transfer on the Nordic seas, the role of key zooplankters in relation to rapid climate change" (coordinator Stig Falk-Petersen) was hosted by the Island Institute of Marine Research and held at the marine station Sangerdi outside Reykjavik. The workshop was very successful with more than 20 enthusiastic talks and discussions. One of the questions raised was: "what are the sensible predictions that can be made about the state of marine ecosystems in The Nordic Seas under expected climate change". A first attempt to develop a conceptual model to this question was made and discussed. |
| 2002 | Workshop organized within project "Human impact and sustainable utilization of subarctic birch forests in a changing environment" (coordinator Kari Laine). |

| Theme B: Biological diversity and environmental threats in the Arctic | |
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| 2003 | The final workshop within project "Effects of climate change on soil animals in the Arctic population ecological, ecophysiological and ecotoxicological approaches" (coordinator Martin Holmstrup) was held in connection with the NARP meeting in Tromsø, January 2003. |
| 2003 | Workshop organized within project "Abrupt climate change and impact on cod (ACCIC)" (coordinator Harald Loeng). |
| 2003 | Workshop within project "Global climate change effects on arctic terrestrial vertebrates: a long-term, pan-arctic shorebird monitoring program" (coordinator Hans Meltofte) took place in Denmark during 2–7 December 2003 with about 25 participants from 11 countries. |
| Total | 13 |

Table 6. Workshops organized within theme C, Living conditions of the inhabitants of the Arctic.

| Theme C: Living conditions of the inhabitants of the Arctic | |
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| Year | Workshop information |
| 1999 | Workshop organized within project "Management of social transformation (MOST), a circumpolar coping processes project (CCPP)" (coordinator Nils Aarsaether). |
| 1999 | A Nordic Kastelli-symposium "Living and Working in the North which enhances co-operation between Nordic scientists and development work professionals" organized within project "Network for scientists studying living conditions of the inhabitants of arctic and related areas and establishment on a PhD school in Arctic Health" (coordinator Juhani Leppäluoto). Further, the symposium began the Nordic training for doctoral students. The number of the participants (senior scientists, doctoral students and development professionals) was 32. The participants came from Finland, Sweden, Norway and Russia. Network-project meetings arranged within project stimulate co-operation between existing scientific institutes. |
| 2000 | An international workshop within project "Strengthening of Greenlandic health research and Nordic cooperation in Arctic health" (coordinator Peter Bjerregaard) was held in August 2000, on cardiovascular disease and diabetes among Arctic aboriginal peoples. 23 researchers from Greenland, Denmark, Faroe Islands, Canada and Alaska participated. |
| 2000 | Within project "Forestry beyond timberline: ecological and socio-economic factors affecting forestry in the context of rural development in the North Atlantic region" (coordinator Thröstur Eysteinnsson), "The Forestry Beyond the Timberline" -workshop was held in Akureyri, Iceland on June 27th – 30th, 2000. It was attended by 54 participants from 13 countries. A total of 27 papers and 10 posters were presented. The workshop was held in conjunction with a workshop of the Nordic birch ecology group (NSSE). |
| 2001 | Workshop within project "Work forum; life assessment (LCA)" (coordinator Helga Eyjolfssdotir) was held in Gothenburg, Sweden, February 2001. Project report from the first workshop, Project report Rf, 02-02. January 2002. |
| 2001 | Workshop within project "Development of methodologies in connection with the evaluation of socioeconomic and environmental consequences of mineral and energy industries in the Arctic and Subarctic" (coordinator Rasmus Ole Rasmussen) was held in Apatitc in September 2001, in conjunction with the CASS PhD-course. The workshop led to two important things. First to the establishing of major themes for the 2002 conference and outlining of the general structure of the conference, and second to establishing a list of suggested major contributors to the conference. Finally the structure of the further planning and development activities were taken care of. |
| 2002 | Two international meetings within project "Strengthening of Greenlandic health research and Nordic cooperation in Arctic health" (coordinator Peter Bjerregaard) in Montreal, Canada, with participants from Alaska, Canada, Greenland and Denmark. |
| 2002 | Workshop within project "Work forum; life assessment (LCA)" (coordinator Helga Eyjolfssdotir) was held in Reykjavik in March 2002 together with another network project that also deals with LCA but in a more practical way. The object of the workshop was: obstacles, assessment and streamlining possibilities. We invited some scientists from the University of Iceland and from Canada. The scientist from the University of Iceland gave us more theoretical information about what obstacles we were most likely to come across and the scientist from Canada has performed a numerous LCA case studies, which we discussed how could be used and in what way. The results are written in project report: 15-02. |
| 2002 | Network meeting/workshop "Monitoring large herbivore effects on vegetation in Greenland" organized within project "Network group for sustainable harvest of large ungulates in Greenland" (coordinator Arild Landa) was held during 21st–24th of February 2002. |
| 2002 | The third Kastelli Symposium, organized within project "Network for scientists studying living conditions of the inhabitants of arctic and related areas and establishment on a PhD school in Arctic Health" (coordinator Juhani Leppäluoto), was held in Oulu November 2002 |

| Theme C: Living conditions of the inhabitants of the Arctic | |
|---|---|
| | in order to improve contacts between scientist studying living conditions of the inhabitants of the circumpolar areas. The programme contained expert lectures, student presentations and workshops. Ca. 100 students and teachers participated to the symposium. From the participants four were from Sweden, one from Norway, two from Germany and three from Russia. |
| 2002 | Within project "Social exclusion among men and women born in northern Finland and the Nordic Dimension" (coordinator Anja Taanila) the 2nd Conference on Epidemiological Longitudinal Studies in Europe, 12–14 June 2002, Oulu, Finland was organized. |
| 2003 | Two workshops within project "Atmospheric Transport Pathways, Vulnerability and possible Accidental Consequences from the Nuclear Risk Sites in the European Arctic" (coordinator Alexander Baklanov) were organized at DMI, Copenhagen, Denmark in 2003 (May 6 th and December 16 th). |
| 2003 | A workshop within project "Work forum; life assessment (LCA)" (coordinator Helga Eyjofsdottir) was held in Trondheim, Norway in November 2003. The aims of the workshop were: assessment and environmental impact, practical use of the LCA results and model for other LCA studies in fisheries. Scientists from the Nordic countries were invited to present among other issues: biological effects in LCA, practical experiences in use of LCA towards the industry, combining LCA with traceability. |
| 2003 | Closing seminar within project "The effects of Reindeer Husbandry and Nature conservation on the strict nature reserve Malla" (coordinator Mikko Jokinen) was held at Kilpisjärvi, October 21st. Complementing expert network and research on the main issue (effects of reindeer herding and conservation on Malla nature reserve and similar natural areas). |
| 2003 | Network meeting (workshop) on "The human dimension – local interests in monitoring and management of caribou and muskoxen" organized within project "Network group for sustainable harvest of large ungulates in Greenland" (coordinator Arild Landa) during 5th and 6th of November 2003. |
| 2003 | Nordic seminar on drifting snow within project "Oppbygning av kunnskap om drivsnø i Norden" (coordinator Harald Norem) was held in Bø in Telemark, 8.–11. May 2003. The Nordic seminar gave the participants a very good overview of recent and current research activities within the Nordic countries. A main objective of the seminar was to present the most recent PhD studies on drifting snow that have been finished recently. The seminar also showed the wide importance of this topic for the human life in the Nordic countries, dealing with drifting snow in relation to living areas, design of houses, design and operation of roads and snow avalanche protection. |
| 2003 | Femina Borealis 10th anniversary workshop organized within project "Network for crisis centers in the Barents region" (coordinator Aino Saarinen) was arranged at Umeå in conjunction with Values in Education across Boundaries conference, 28–29 October, 2003. |
| 2003 | The congress organized within project "Telemedicine in Greenland – An analysis of the period of implementation and the first years of operation" (coordinator Thomas Stensgaard) took place Sept. 10–14 2003. There were 350 participants from all the arctic countries and with more than 200 oral presentations and 45 posters. During the 4 days scientific results of considerable value were presented, old networks were consolidated and new networks were established. The little more than 100 participants from Greenland took part in the network building. It was also getting clarified, that the arctic countries share a lot of medical issues. |
| Total | 20 |

5. Symposium Series

The Universities of Oulu, Akureyri and Tromsø hosted three international NARP symposiums in 2001, 2002 and 2003, respectively. They were international gatherings with key participants from the NARP projects. The participants reviewed the state of our knowledge of rapid changes in natural and social systems and pondered how this is likely to affect livelihoods in the Nordic Arctic.

The symposiums invited natural and social environmental scientists from the Nordic countries to meet and present recent research results and to exchange information about their research and monitoring activities. The symposiums were multidisciplinary in scope and created new links and understanding across disciplinary boundaries and among Nordic researchers and research infrastructures. The symposium proceedings were published as peer-reviewed, international publications. The overall aim of these symposiums during the span of the Nordic Arctic Research Programme was to be forums for researchers, decision-makers, and also for students seeking to update their knowledge on current Arctic research.

The first NARP symposium, “The Arctic on Thinner Ice” held in 2001 at the University of Oulu, was attended by more than 100 researchers. The second NARP symposium, “The Arctic in the Anthropocene: The North Atlantic Arctic in Focus” held at the University of Akureyri, brought together a multi-disciplinary group of 50 scientists concerned with human-environmental relations, history and cultural viability in the North Atlantic Arctic. The group presented and discussed its research findings and threw light on the future of the region.

The third NARP symposium was a larger European-level conference, “Arctic – Alpine Ecosystems and People in a Changing Environment” held at the University of Tromsø, with nearly 200 participants. The theme of the symposium involved contemporary environmental problems in the fields of climate change and ecosystem response, long-range transport of pollutants, and ozone/UV radiation and biological effects in marine and terrestrial environments.

5.1 1st symposium: The Arctic on Thinner Ice, Oulu, 2001

The symposium was attended by more than 100 arctic and northern researchers and decision-makers, who evaluated the condition of the arctic and circumpolar area and challenges arising in the future. The symposium

aimed to promote Nordic cooperation in arctic matters and an exchange of information concerning the changes taking place in the Arctic and their effects on the local population. Topics of the symposium

A – Natural processes – land, sea and atmosphere

- Climate, ocean currents and sea ice effects on the northern regions
- History of our climate and environment

B – Biological diversity and environmental threats in the Arctic

- Plant response
- Animal response

C – Living conditions of arctic inhabitants

- Sustainability, social change and well-being

5.2 2nd symposium: The Arctic in the Anthropocene: The North Atlantic Arctic in Focus, Akureyri, 2002

Human beings have entered the “Anthropocene”, a period in which major changes in the global biosphere are the result of human actions and the complex interactions of natural human systems. The Arctic is greatly affected by these rapid social and biophysical changes. There is an urgent need to know what they consist of and what adaptive mechanisms societies in the north possess and what determines their reactions.

The Arctic as a region is connected to the rest of the world through various processes, and research will increasingly need to confront these global interrelations in order for us to better understand the predicament and prospects of the Arctic and the vulnerability or adaptability of its societies.

This symposium brought together a multi-disciplinary group of scientists concerned with human-environmental relations, history and cultural viability in the North Atlantic Arctic, to present and discuss their research findings and to shed light on the future of the region. The conference proceedings were published in a peer-reviewed, international publication.

The conference was organized by the Stefansson Arctic Institute in cooperation with the NARP Secretariat and Programme Board. It was held at the University of Akureyri’s Sólborg campus.

Tentative topics of the symposium:

- Human adaptability and response to global processes: case studies from the North Atlantic Arctic.
- History in our genes: the population of northern regions in the light of genetic research, anthropology and archaeology.
- A window to the present and future: the lessons of historical human ecology.

- Arctic social science, information dissemination and human dimension assessment projects in the north.
- Complex problems and simple solutions: is there a need for more cooperation between social and natural sciences?
- Endangered cultures of the maritime North Atlantic: reluctant victims and alternative visions.
- Rapid environmental change: how much, where and with what consequences?
- Impacts of global change: improving our socio-economic knowledge.

5.3 3rd symposium (connected to the International Conference): Arctic – Alpine Ecosystems and People in a changing Environment, Tromsø, 2003

The conference addressed the broad field of “Environmental Change research in Northern Europe, Arctic and Alpine areas”. This involves contemporary environmental problems in the fields of climate change and ecosystem response, long-range transport of pollutants, and ozone/UV – radiation and biological effects in marine and terrestrial environments. The main idea was to identify the challenges in Arctic-Alpine Environmental Research along the main transport routes from Europe to the Arctic. The conference invited the marine, terrestrial and atmospheric environmental change research communities of Europe to meet and present recent research results and to exchange information about their research and monitoring activities with nearly 200 participants. The conference was multidisciplinary in scope, both in science and space, and it created new links and understanding across disciplinary boundaries and among European researchers and research infrastructures.

The EURO CONFERENCE was supported by the European Commission under grant HPCF-CT-2002-00238. The conference served as the final conference of the European Network for Arctic-Alpine Multidisciplinary Environmental Research (ENVINET), the final conference of the Nordic Arctic Research Programme (NARP), the last user meeting of the Ny-Ålesund Large Scale Facility, the first conference of the Arctic Seas Consortium, and the final workshop of the EU’s UVAC project.

Scientific sessions and topics

- Long-Range Transport of Pollutants (LRTP)
- Effects of climate variability on the Arctic Seas Ecosystem
- Effects of climate variability on terrestrial systems
- UV radiation and biological effects
- Socio-economic effects on environmental change
- Integrating sessions on the effects of environmental change

6. Statistics

This chapter concentrates on the number of proposals and the success of accepted proposals in receiving funding. The amount of workshops and the number of publications within the three themes of the programme are presented with illustrative graphs. The number of students and the gender distribution are also demonstrated with graphs.

Calls for proposals

The NARP had three calls for proposals in 1999, 2000 and 2001. The first call for proposals received altogether 147 proposals and the success rate (see Table 1) was 21.1%. In the second call for proposals in 2000 the NARP Secretariat received 50 proposals and the success rate was 58.0%. In the final call for proposals in 2001 the numbers were 38 and 63.1%.

Table 1. Summary of the three calls for proposals and the amount of funded projects.

| | Total amount for proposals received | Success rate for funded projects/ proposals received, % | Total amount of funding requested, million DKK | Total amount of funding granted, million DKK | Success rate for receiving funding, % | Number of projects under the three themes, A/B/C |
|---|-------------------------------------|---|--|--|---------------------------------------|--|
| First call for proposals, years 1998–1999 | 147 | 21.1 | 190 | 14.5 | 7.6 | 15/9/7 |
| Second call for proposals year 2000 | 50 | 58.0 | 36 | 8 | 22.2 | 8/10/11 |
| Third call for proposals, year 2001 | 38 | 63.1 | 17 | 4.9 | 28.8 | 8/10/6 |

Networking workshops

Economic support was provided for workshop organizing: it was important to analyze and define what research is needed in the project. Workshops also made it possible to prepare for larger research projects. Networking workshops were eagerly organized throughout the whole existence of the NARP. General information about the workshops is briefly described in the previous chapter. In the following figure the workshops are divided according to the three themes of the programme.

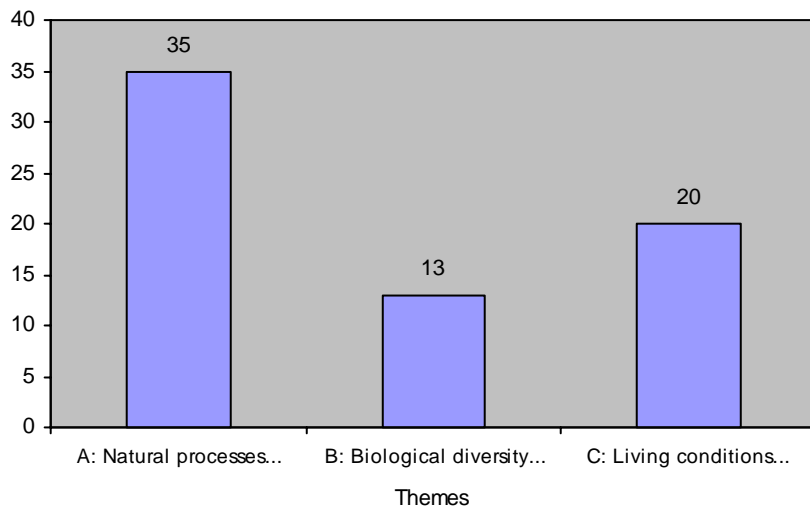


Figure 2. Networking workshops in 1999–2003. Overview of the NARP performance of networking workshops under the three themes of the programme.

Publications

Publication activity was brisk during the NARP projects. Altogether 567 publications from all the themes are recorded in the following figure.

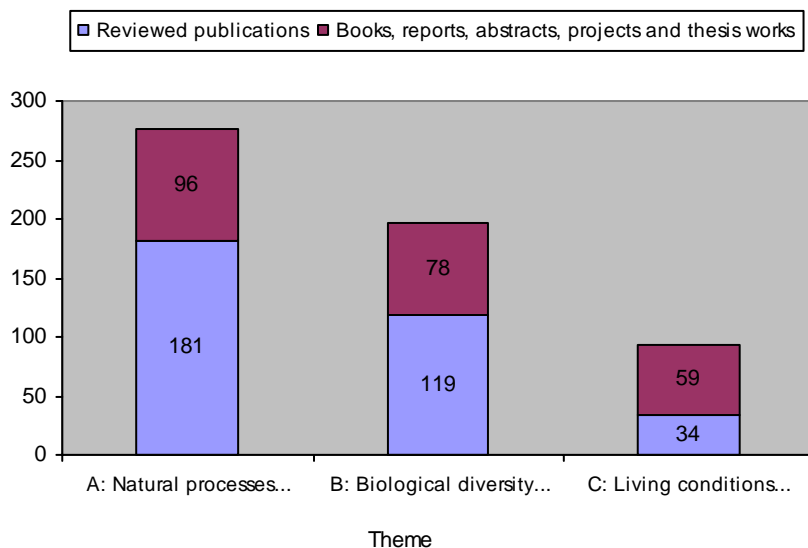


Figure 3. Publications. Overview of the total number of NARP-related publications produced by the projects of the programme.

Students

The NARP supported goals within the training and mobility of researchers. The aims were to stimulate young scientists to choose an arctic re-

search career and to do research in some other Nordic country than their home country. Both Master's and PhD students participated in the project activities, yet the amount of PhDs was greater in each theme (see Figure 4).

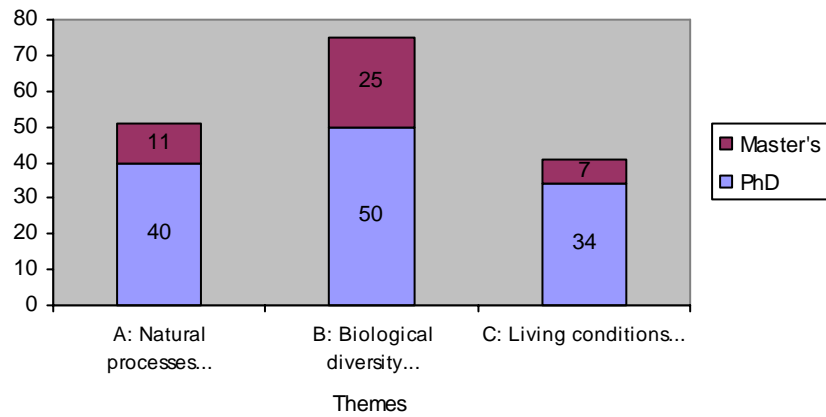


Figure 4. Students in the projects. Overview of numbers of students under the three themes of the programme.

Gender distribution

The gender distribution among the project coordinators is presented in Figure 5. It should be noted that some coordinators had more than one project, and these were not necessarily included in the same theme. Therefore, the number of coordinators in the following figure does not correspond to the actual number of coordinators.

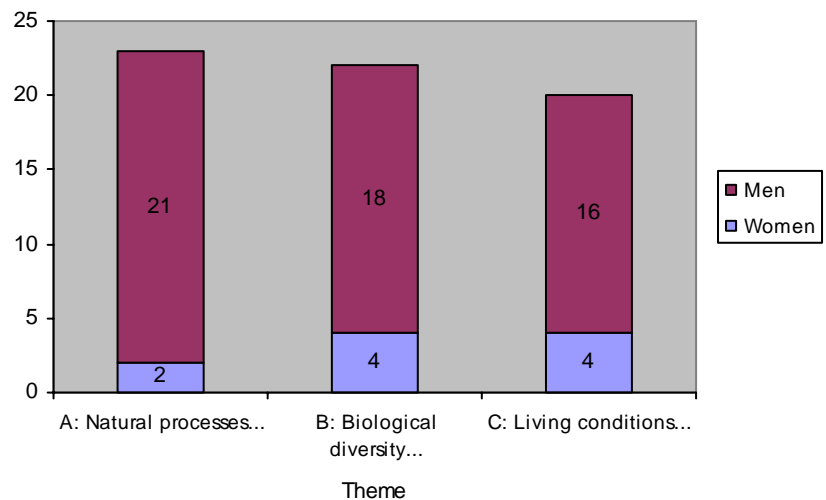


Figure 5. Gender distribution. Overview of the gender distribution among the NARP project coordinators.

7. Programme Management

Programme board

The programme was managed by a programme board with representatives from the five Nordic countries, the Faroe Islands and Greenland.



Figure 6. Board members at their 9th meeting in Torshavn, Faroe Island. From left to right: Matti Saarnisto, Niels Einarsson, Caroline Leck, Dorote Bloch and Gert Mulvad. Board members Bente Aagaard Lomstein and Alf Håkon Hoel were not present. Photographer Kari Strand.

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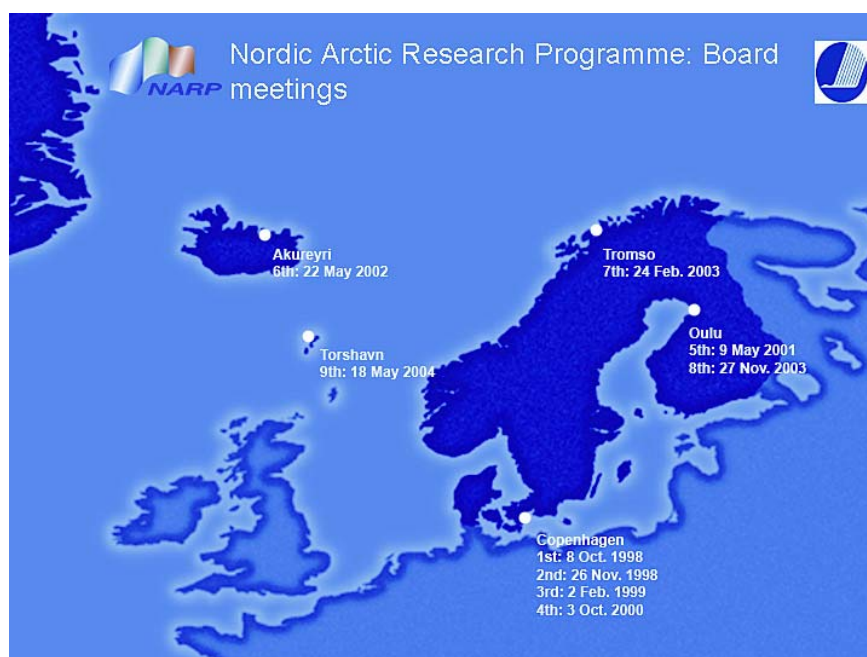


Figure 7. Locations and dates of the NARP board meetings.

Programme secretariat

The coordination and general administration of the arctic programme were carried out by the programme secretariat under the supervision of the programme board. The secretariat was located at the Thule Institute at the University of Oulu.

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Secretarial work at the Thule Institute:

Secretary Liisa Puijola (financial administration)

Publication secretary Kirsti Kallio (reporting issues)

Planning officer Pirjo Taskinen (web-related issues)

Publication secretary Hannele Heikkilä-Tuomaala (graphic design)

Researcher Tuija Siira (assistance)

8. Publications

8.1 Natural processes – land, sea and atmosphere

Reviewed publications

- Aldahan, A., Possnert, G. & Vintersved, I. 2001. Atmospheric interactions at northern high latitudes from weekly Be-isotopes in surface air. *Applied Radiation and Isotopes* 54, 345–53.
- Alfimov, V., Aldahan, A., Possnert, G., Kekli, A. & Meili, M., 2004. Radioactive ¹²⁹I along a transect from the North Atlantic to the Baltic Sea. *Nucl. Instrum. Methods Phys. Res. Sect. B* 223–224, 446–450.
- Anderson, L. G., Drange, H., Chierichi, M., Fransson, A., Johannessen, T., Skjelvan, I. & Rey, F. 2000. Seasonal and annual variability in the upper Greenland Sea based on measurements and a box model. *Tellus* 52B, 1013–1024.
- Appleby, P.G., 2004. Environmental change and atmospheric contamination on Svalbard: sediment chronology. *Journal of Paleolimnology* 31, 433–443.
- Arashkevich, E., Wassmann, P., Pasternak, A. & Wexels Riser, C., 2002. Seasonal and spatial variation in abundance, composition, and development of zooplankton community in the Barents Sea. *J. Mar. Systems* 38, 125–145.
- Battarbee, R.W., Grytnes, J.-A., Thompson, R., Appleby, P.G., Catalan, J., Korhola, A., Birks, H.J.B., Heegaard, E. & Lami, A., 2002. Comparing palaeolimnological and instrumental evidence of climate change for remote mountain lakes over the last 200 years. *Journal of Paleolimnology* 28, 161–179
- Battarbee, R.W., Thompson, R., Catalan, J., Grytnes, J.-A. & Birks, H.J.B. 2002. Climate variability and ecosystem dynamics of remote alpine and arctic lakes; the MOLAR project. *Journal of Paleolimnology* 28, 1–6.
- Benestad, R.E., 2004. Tentative probabilistic temperature scenarios for northern Europe. *Tellus* 56A, 89–101.
- Benestad, R.E., 2003a. What can present climate models tell us about climate change? *Climatic Change* 59, 311–331.
- Benestad, R.E., Førland, E.J. & Hanssen-Bauer, I., 2002(a). Empirically downscaled temperature scenarios for Svalbard. *Atmospheric Science Letters*, (doi.10.1006/asle.2002.005, September 18).
- Benestad, R.E., 2002a. Empirically downscaled multi-model ensemble temperature and precipitation scenarios for Norway, *Journal of Climate* Vol. 15:21, 3008–3027.
- Benestad 2002c. Empirically downscaled temperature scenarios for northern Europe based on a multi-model ensemble. *Clim. Res.* 21 (2), 105–125.
- Betts-Piper, A.M., Zeeb, B.A. & Smol, J.P., 2004. Distribution and autecology of chrysophyte cysts from high arctic Svalbard lakes: preliminary evidence of recent environmental change. *Journal of Paleolimnology* 31, 467–481.
- Bigler, C. & Hall, R.I., 2002. Diatoms as indicators of climatic and limnological changes in Swedish Lapland: a 100-lake calibration set and its validation for palaeoecological reconstructions. *Journal of Paleolimnology* 27, 97–115.
- Bigler, C. & Hall, R.I., 2003. Diatoms as quantitative indicators of July temperature: a validation attempt at century-scale with meteorological data from northern Sweden. *Palaeogeography, Palaeoclimatology, Palaeoecology* 189, 147–160.
- Bigler, C., Larocque, I., Peglar, S.M., Birks, H.J.B. & Hall, R.I., 2002. Quantitative multi-proxy assessment of long-term patterns of Holocene environmental change from a small lake near Abisko, northern Sweden. *The Holocene* 12, 481–495.
- Bigler, C. et al., 2003. Holocene environmental change at Lake Njulla (999 m a.s.l.), northern Sweden: a comparison

- with four small nearby lakes along an altitudinal gradient. *Journal of Paleolimnology* 29, 13–29.
- Bindler, R., et al., 2001. A whole-basin study of sediment accumulation using stable lead isotope and flyash particles in an acidified lake, Sweden. *Limnology and Oceanography* 46, 178–188.
- Bindler, R., et al., 2002. Pre-industrial atmospheric pollution: was it important for the pH of acid-sensitive Swedish lakes? *Ambio* 31, 460–465.
- Birks, C.J.A. & Koc, N., 2002. A high-resolution diatom record of late-Quaternary sea-surface temperatures and oceanographic conditions from the eastern Norwegian Sea. *Boreas* 31, 323–344.
- Birks, H.H., 2003. The importance of plant macrofossils in the reconstruction of Lateglacial vegetation and climate: examples from Scotland, western Norway, and Minnesota, USA. *Quaternary Science Review* 22, 453–473.
- Birks, H.H. & Birks, H.J.B., 2000. Future uses of pollen analysis must include plant macrofossils. *Journal of Biogeography* 27, 31–35.
- Birks, H.J.B., 2003. Quantitative palaeoenvironmental reconstructions from Holocene biological data. In A.W. Mackay et al. (Eds.) *Global Change in the Holocene*. Arnold, London, pp. 107–123.
- Birks, H.J.B., 2000. Maximum likelihood environmental calibration and the computer program WACALIB – a correction. *Journal of Paleolimnology* 25, 375–392.
- Birks, H.H. & Birks, H.J.B., 2003. Reconstructing Holocene climates from pollen and plant macrofossils. In A.W. Mackay et al. (Eds.) *Global Change in the Holocene*. Arnold, London, pp. 342–357.
- Birks, H.J.B., Jones, V.J. & Rose, N.L., 2004a. Recent environmental change and atmospheric contamination on Svalbard as recorded in lake sediments – an introduction. *Journal of Paleolimnology* 31, 403–410.
- Birks, H.J.B., Jones, V.J. & Rose, N.L., 2004b. Recent environmental change and atmospheric contamination on Svalbard as recorded in lake sediments – synthesis and conclusions. *Journal of Paleolimnology* 31, 531–546.
- Birks, H.J.B., Monteith, D.J., Rose, N.L., Jones, V.J. & Peglar, S.M., 2004. Recent environmental change and atmospheric contamination on Svalbard, as recorded in lake sediments – modern limnology, vegetation, and pollen deposition. *Journal of Paleolimnology* 31, 411–431.
- Bjune, A., Nesje, A., Birks, H.J.B., Andersson, D.C., Seppä, H. & Janssen, E., 2003. Mer pålitelige rekonstruksjoner av fortidens klima. *Cicerone* 4/2003, 27–28.
- Blindheim, J., Borovkov, V., Hansen, B., Malmberg, S.A., Turrel W.R. & Østerhus, S., 2000. Upper layer cooling and freshening in the Norwegian Sea in relation to atmospheric forcing. *Deep Sea Research I* 47, 655–680.
- Borenäs, K., Lake, I. & Lundberg, P., 2001. On the Intermediate Water Masses of the Faroe–Bank Channel Overflow. *Journal of Physical Oceanography* 31, 1904–1914.
- Boyle, J.F., Rose, N.L., Appleby, P.G. & Birks, H.J.B., 2004. Recent environmental change and human impact in Svalbard: the lake-sediment geochemical record. *Journal of Paleolimnology* 31, 515–530.
- Briem, J. & Jónsson, S., 2001. Nýjar aðferðir við mælingar hafstrauma (New methods for measuring ocean currents). *Hafrannsóknir* 56, 23–26.
- Brooks, S.J. & Birks, H.J.B., 2000. Chironomid-inferred late-glacial air temperatures at Whitrig Bog, southeast Scotland. *Journal of Quaternary Science* 15, 759–764.
- Brooks, S.J. & Birks, H.J.B., 2001. Chironomid-inferred from Lateglacial and Holocene sites in north-west Europe: progress and problems. *Quaternary Science Reviews* 20, 1723–1741.
- Brooks, S.M. & Birks, H.J.B., 2004. The dynamics of Chironomidae (Insecta: Diptera) assemblages in response to environmental change during the past 700 years in Svalbard. *Journal of Paleolimnology* 31, 483–498.
- Brostrom, G. & Drange, H., 2000. On the mathematical formulation of the marine plankton system. *Sarsia* 85, 211–225.
- Buraglio, N., Aldahan, A., Possnert, G. & Vintersved, I., 2001. ¹²⁹I from the nuclear reprocessing facilities traced in precipitation and runoff in northern Europe. *Environmental Science & Technology* 35, 1579–1586.
- Buraglio, N., Aldahan, A. & Possnert, G., 2001. ¹²⁹I in lakes of the Chernobyl

- fallout region and its environmental implications. *Applied Radiation and Isotopes* 55, 715–720.
- Buraglio, N., Aldahan, A. & Possnert, G., 2000. Analytical techniques and applications of ^{129}I in natural water. *Nuclear Instruments & Methods in Physics Research Section B – Beam Interactions With Materials and Atoms* 172, 518–523.
- Buraglio, N., Aldahan, A. & Possnert, G., 2000. ^{129}I measurements at the Uppsala tandem accelerator. *Nuclear Instruments & Methods in Physics Research Section B – Beam Interactions With Materials and Atoms* 161, 240–244.
- Carmillet, V., Brankart, J.M., Brasseur, P., Drange, H., Evensen G. & Verron, J., 2001. A Singular Evolutive Extended Kalman filter to assimilate ocean color data in a coupled physical-biochemical model of the North Atlantic. *Ocean Modelling* 3, 167–192.
- Chierici, M., Drange, H., Anderson, L.G., & Johannessen, T., 1999. Inorganic carbon fluxes through the boundaries of the Greenland Sea Basin based on in situ observations and water transport estimates. *J. Mar. Systems* 22, 295–309.
- Christensen, et al. 2001. A synthesis of regional climate change simulations – A Scandinavian perspective. *GRL* 28, 1003–1006.
- Coppola, L., Roy-Barman, M., Wassmann, P. & Jeandell, C., 2002. Calibration of sediment traps and particulate organic carbon export using ^{234}Th in the Barents Sea. *Mar. Chem.* 80, 11–26.
- Dretvik, L.D. & Miles, M.W., 2003 (submitted). Narrow-band climate oscillations around the northern North Atlantic region. *International Journal of Climatology* (Submitted), 2003.
- Furevik, T., Bentsen, M., Drange, H., Johannessen, J. & Korabely A., 2001. Temporal and spatial variability of the seasurface salinity in the Nordic Seas. *J. Geophys. Res.* (in press).
- Førland, E.J. & Hanssen-Bauer, I., 2003. Climate Variations in the Norwegian Arctic: overview and novel analyses. *Polar Research* 22(2), 113–124.
- Førland, E.J., Agersten, S., Alexandersson, H., Drebs, A., Hanssen-Bauer, I., Heino, R., Jónsson, T., Kern-Hansen, C., Nordli, P.Ø., Svensson, P., Tuomenvirta, H., Tveito O.E., Vaarby Laursen, E., Halldor & Jørgensen, P., 2003b (in prep.). Final Report: Variations in Climatic Constraints on Living Conditions in the Nordic Arctic, 1900–2050. met.no series (In prep).
- Førland, E.J., Hanssen-Bauer, I., Jónsson, T., Kern-Hansen, C., Nordli, C.Ø., Tveito O.E. & Vaarby Laursen, E., 2002. Twentieth Century Variations in Temperature and Precipitation in the Nordic Arctic. *Polar Record* 38 (206), 203–210.
- Gascard, J.C., Raisbeck, G., Sequeira, S., Yiou F. & Mork, K.A., 2004. The Norwegian Atlantic Current in the Lofoten basin inferred from hydrological and tracer data (^{129}I) and its interaction with the Norwegian Coastal Current. *Geophys. Res. Lett.* 31, L01308, doi:10.1029/2003GL018303
- Granoszewski, W. & Robertsson, A.M., 1999. Weichselian interstadial pollen stratigraphy from Härjedalen, central Sweden. *Grana* 38, 243–249.
- Gunnarson, B., Borgmark, A. & Wastegård, S., 2003. Holocene Hydrological Fluctuations in Sweden -inferred from ancient trees and peat stratigraphy. *Boreas* 32, 347–360.
- Hallsdóttir, M., 1999. Birch pollen abundance in Reykjavík, Iceland. *Grana* 38, 368–373.
- Hammarlund, D., Barnekow, L., Birks, H.J.B., Buchardt, B. & Edwards, T.W.D., 2002. Holocene changes in atmospheric circulation recorded in the oxygen-isotope stratigraphy of lacustrine carbonates from northern Scandinavia. *The Holocene* 12, 355–367.
- Hannon, G.E. & Bradshaw, R., 2000. Holocene vegetation dynamics and impact of human settlement on the Faroe Islands. *Quaternary Research* 54, 404–413.
- Hannon, G.E., Bradshaw, R.H.W. & Wastegård, S., 2003. Rapid vegetation change during the early Holocene on the Faroe Islands detected in terrestrial and aquatic ecosystems. *Journal of Quaternary Science* 18, 615–619.
- Hansen B., Turrell W. R. & Østerhus S., 2001. Decreasing overflow from the Nordic seas into the Atlantic Ocean through the Faroe Bank Channel since 1950. *Nature* 411, 927–930.
- Hansen, B., Østerhus, S., Kristiansen, R. & Larsen, K.M.H., 1999. The Iceland-Faroe inflow of Atlantic water to the

- Nordic Seas. ICES CM 1999/L:21, 14 pp.
- Hansen, B. & Østerhus, S., 2000. North Atlantic – Nordic Seas exchanges. *Progress in Oceanography* 45, 109–208.
- Hanssen-Bauer, I., 2002. Temperature and Precipitation in Svalbard 1912–2050. Measurements and scenarios. *Polar Record* 38 (206), 225–232.
- Hanssen-Bauer I., 2003. Klimavariasjoner i Arktis - Sammenhenger og gåter. (Climate variations in the Arctic – connections and mysteries). *Cicerone* 1-2003, 19–21.
- Hastie, G.D., Swift, R., Gordon, J.C.D., Slessor, G. & Turrell, W., 2002. The Density and Distribution of Sperm Whales in The Faroe Shetland Channel. *J. Cetacean Resource Management* 1, 3–24.
- Hátún, H. & McClimans, T.A., 2003. Monitoring the Faroe Current using altimetry and coastal sea-level data. *Cont. Shelf Res.* 23, 859–868.
- Hatun, H. & McClimans, T. A., 2003. Monitoring the Faroe Current using altimetry and coastal sea-level data. *Continental Shelf Research* 23, 859–868.
- Heikkilä, M. & Seppä, H., 2003. A 11,000 yr palaeotemperature reconstruction from the southern boreal zone in Finland. *Quaternary Science Reviews* 22, 541–554.
- Heiri, O., Birks, H.J.B., Brooks, S.J., Velle, G. & Willassen, E. 2003. Effects of within-lake variability of fossil assemblages on quantitative chironomid-inferred temperature reconstructions. *Palaeogeography, Palaeoclimatology, Palaeoecology* 199, 95–106.
- Hicks, S., 2001. The use of annual arboreal pollen deposition values for delimiting tree-lines in the landscape and exploring models of pollen dispersal. *Rev. Palaeobotan. Palynol.* 117, 1–29.
- Hicks, S., 1999. The relationship between climate and annual pollen deposition at northern tree-lines. *Chemosphere-Global Change Science* 1, 403–416.
- Hicks, S. & Hyvärinen, H., 1999. Pollen influx values measured in different sedimentary environments and their palaeoecological implications. *Grana* 38, 228–242.
- Hicks, S, Tinsley, H., Huusko, A., Jensen, C, Hättestrand, M., Gerasimides, A. & Kvavadze, E., 2001. Some comments on spatial variation in arboreal pollen deposition: first records from the Pollen Monitoring Programme (PMP). *Rev. Palaeobotan. Palynol.* 117, 183–197.
- Holst, J.C., Couperus, B., Hammer, C., Jacobsen, J.A., Jákupsstovu, H.I., Krysov, A., Melle, W., Mork, K.A., Tangen, Ø., Vilhjálmsson H. & Smith, L., 2000. Report on surveys of the distribution, abundance and migrations of the Norwegian spring spawning herring, other pelagic fish and the environment of the Norwegian Sea and adjacent waters in late winter, spring and summer of 2000. CM 2000/D:03 Ref. ACFM.
- Hou, X.L., Dahlgaard, H., Nielsen, S.P. & Kucera, J., 2002. Level and origin of Iodine-129 in the Baltic Sea. *Journal of Environmental Radioactivity* 61, 331–343.
- Hou, X.L., Malencheko, A.F., Kucera, J., Dahlgaard, H. & Nielsen, S.P., 2003. Iodine-129 in thyroid and urine in Ukraine and Denmark. *The Science of the Total Environment* 302, 63–73.
- Hou, X.L., Fogh, C.L., Kucera, J., Andersson, K.G., Dahlgaard, H. & Nielsen, S.P., 2003. Iodine-129 and Caesium-137 in Chernobyl contaminated soil and their chemical fractionation. *The Science of the Total Environment* 308, 97–109.
- Hou, X.L., Dahlgaard, H. & Nielsen, S.P., 2001. Chemical speciation analysis of 129I in seawater and a preliminary investigation to use it as a tracer for geochemical cycle study of stable iodine. *Marine Chemistry* 74, 145–155.
- Hou, X.L., Dahlgaard, H. & Nielsen, S.P., 2000. Iodine-129 time series in Danish, Norwegian and northwest Greenland coast and the Baltic Sea by seaweed. *Estuarine, Coastal and Shelf Science* 51, 571–584.
- Hou, X.L., Dahlgaard, H., Rietz, B., Jacobsen, U. & Nielsen, S.P., 2000. Pre-separation neutron activation analysis of seawater, urine and milk for iodide and iodate. *Journal of Radioanalytical and Nuclear Chemistry* 244, 87–91.
- Ikävalko, J., Ehn, J., Forsström, L., Kaartokallio, H. & Spilling, K., 2003. Sea ice - water processes and interactions in the SW coast of Finland. *Rep. Ser. Geophysics* 46, 187–188.
- Ikävalko, J. 2001. Life within sea ice. In CAFF (Conservation of Arctic Flora and fauna) 2001. *Arctic Flora and Fauna: Status and Conservation*. Edita, Helsinki, 190–191.

- Isaksson, E., Hermanson, M., Hicks, S., Igarashi, M., Kamiyama, K., Moore, J., Motoyama, H., Muir, D., Pohjola, V., Vaikmäe, R., van de Wal, R.S.W. & Watanabe, O., 2003. Ice cores from Svalbard – useful archives of past climate and pollution history. *Physics and Chemistry of the Earth* 28, 1217–1228.
- Isaksson, E., Pohjola, V., Jauhiainen, T., Moore, J., Pinglot, J-F., Vaikmäe, R., van de Wal, R.S.W., Hagen, J-O., Ivask, J., Karlöf, L., Martma, T., Meijer, H.A.J., Mulvaney, R., Thomassen, M.P.A. & Van den Broeke, M., 2001. A new ice core record from Lomonosovfonna, Svalbard: viewing the data between 1920–1997 in relation to present climate and environmental conditions. *Journal of Glaciology* 47 (157), 335–345.
- Jakobsen, P.K., Ribergaard, M. Quadfasel, D., Smith, T. & Hughes, C.W., 2003. The near surface circulation in the northern North Atlantic as inferred from Lagrangian drifters: Variability from the mesoscale to interannual. *J. Geophys. Res.* 108 (C8), 3251, doi:10.1029/2002JC001554, 2003.
- Jauhiainen T., Moore, J.C., Perämäki, P., Derome, J. & Derome, K., 1999. Simple procedure for ion chromatographic determination of anions and cations at trace levels in ice core samples. *Analytica Chimica Acta* 389, 21–29.
- Jensen, C., Kunzendorf, H. & Vorren, K.D., 2002. Pollen deposition rates in peat and lake sediments from the *Pinus sylvestris* L. forest-line ecotone in northern Norway. Review. *Palaeobotan. Paly-nol.* 121, 113–132.
- Jones, V.J. & Birks, H.J.B., 2004. Lake-sediment records of recent environmental change on Svalbard: results of diatom analysis. *Journal of Paleolimnology* 31, 445–466.
- Jonsson, T. & Miles, M.W. Anomalies in the seasonal cycle of sea-level pressure in Iceland and the North Atlantic Oscillation. *Geophysical Research Letters* 28, 4231–4234.
- Karlsson, J., Jonsson, A., Meili, M. & Jansson, M., 2003. Control of zooplankton dependence on allochthonous organic carbon in humic and clear-water lakes in northern Sweden. *Limnology & Oceanography* 48, 269–276.
- Kekli, A., Aldahan, A., Meili, M., Possnert, G., Buraglio, N. & Stepanauskas, R., 2003. 129I in Swedish rivers: distribution and sources. *The Science of the Total Environment* 309, 161–172.
- Kekonen, T., Moore, J., Mulvaney, R., Isaksson, E., Pohjola, V. & van de Wal, R.S.W., 2002. A 800 year record of nitrate from the Lomonosovfonna ice core, Svalbard. *Annals of Glaciology* 35, 261–265.
- Klanderud, K. & Birks, H.J.B., 2003. Recent increases in species richness and shifts in altitudinal distribution of Norwegian mountain plants. *The Holocene* 13, 1–6.
- Kohler, J., Nordli, Ø., Isaksson, E., Pohjola, V. & Martma, T., (submitted). Multi-proxy extension of the winter temperature record from Svalbard. To be submitted to *JGR* in early 2004.
- Korhola, A., 1999. Distribution patterns of Cladocera in subarctic Fennoscandian lakes and their potential in environmental reconstruction. *Ecography* 22, 357–373.
- Korhola, A., Vasko, K., Toivonen, H.T.T. & Olander, H., 2002. Holocene temperature changes in northern Fennoscandia reconstructed from chironomids using Bayesian modelling. *Quaternary Science Reviews* 21, 1841–1860.
- Korhola, A., Weckström, J. & Blom, T., 2002. Relationships between lake and land-cover features along latitudinal ecotones in arctic Fennoscandia. *Arch. Hydrobiologie Supplement* 139/2, 203–235.
- Korhola, A., et al., 2000. A quantitative Holocene climatic record from diatoms in northern Fennoscandia. *Quaternary Research* 54, 284–294.
- Korhola, A., et al., 2001. Chironomids, temperature and numerical methods: Reply to Seppälä. *The Holocene* 11, 615–622.
- Korhola, A., Vasko, K., Toivonen, H.T.T. & Olander, H., 2002. Holocene temperature changes in northern Fennoscandia reconstructed from chironomids using Bayesian modelling. *Quaternary Science Reviews* 21, 1841–1860.
- Koulikov, A.O. & Meili, M., 2003. Modelling the dynamics of fish contamination by Chernobyl radiocaesium: an analytical solution based on potassium mass balance. *Journal of Environmental Radioactivity* 66, 309–326.
- Larocque, I., 2001. How many chironomid head capsules are enough? A statistical

- approach to determine sample size for paleoclimatic reconstructions. *Palaeogeography, Palaeoclimatology, Palaeoecology* 172, 133–142.
- Larocque, I. & Hall, R.I., 2003. Chironomids as quantitative indicators of mean July air temperature: validation by comparison with century-long meteorological records from northern Sweden. *Journal of Paleolimnology* 29, 475–493.
- Larocque, I., et al., 2001. Chironomids as indicators of climate change: a 100-lake training set from a subarctic region of northern Sweden (Lapland). *Journal of Paleolimnology* 26, 307–322.
- Larsen, E., Hald, M. & Birks, H.J.B., 2003. Tar temperaturen på fortiden. *Cicerone* 4/2003, 18–23.
- Larsen, K. M. H., Hansen, B., Svendsen, H. & Simonsen, K., 2002. The front on the Faroe shelf. *Int. Coun. Explor. Sea CM 2002/P:10*, Copenhagen, 2002.
- Laursen, E.V., 2003. Metadata, selected climatological and synoptic stations, 1750–1996. DMI Technical Report No. 03-24. Copenhagen 2003.
- Laursen, E.V., 2003. DMI monthly climate data, 1873–2002, contribution to Nordic Arctic Research Programme (NARP). DMI Technical Report No. 03-25. Copenhagen 2003.
- Levermann, N., Galatius, A., Ehlm, G., Rysgaard, S. & Born, E.W., 2003. Feeding behaviour of free-ranging walrus with notes on apparent dextrality of flipper use. *BMC Ecology* 2003, 3:9.
- Lygre, K. & Schmith, T., 2001. Principal Oscillation Patterns in an experiment with the ECHO-G coupled model. NERSC Special report no. 71.
- Malmberg, S.Aa., Mortensen, J., & Valdimarsson, H., 1999. Decadal-Scale climate and hydro-biological variations in Icelandic waters in relation to large scale ocean-atmospheric conditions in the northern North Atlantic. *ICES CM 1999/L:13*.
- McClimans, T.A., 2002. Monitoring the Atlantic inflow toward the Arctic using the coastal water level data (MAIA). *Ice and Climate news* 2, 8–10.
- McClimans, T.A., Johannessen, B.O. & Jensen, T., 1999. Monitoring a shelf edge current using bottom pressures or coastal sea level data. *Cont. Shelf Res.* 19, 1265–1283.
- Mork, K.A. & Asplin, L., 1999. Temperature and salinity fluctuations in the Norwegian Sea in relation to wind. *ICES CM 1999/L:03*
- Mork, K.A. & Blindheim, J., 2000. Variations in the Atlantic inflow to the Nordic Seas, 1955–1996. *Deep Sea Research I* 47, 1035–1057.
- Moros, M., Kuijpers, A., Snowball, I., Lassen, S., Bäckström, D., Gingele, F. & McManus, J., 2002. Were Glacial Iceberg surges in the North Atlantic triggered by global climatic warming? *Marine Geology* 192, 393–417.
- O'Dwyer, J., Isaksson, E., Vinje, T., Jauhiainen, T., Moore, J., Pohjola, V., Vaikmäe, R. & van de Wal, R., 2000. Methanesulfonic acid from a Svalbard ice core as an indicator of ocean climate. *Geophysical Research Letters* 27(8), 1159–1162.
- Ojala, A. & Saarinen, T., 2002. Palaeosecular variation of the Earth's magnetic field during the last 10,000 years based on the annually laminated sediment of Lake Nautajärvi, Central Finland. *The Holocene* 12, 391–400.
- Ojala, A. E. K., Saarinen, T. & Salonen, V-P., 2000. Preconditions for the formation of annually laminated lake sediments in southern and central Finland. *Boreal Environments Research* 5, 243–255.
- Ojala, A. & Tiljander, M., 2003. Testing the fidelity of sediment chronology: comparison of varve and palaeomagnetic results from Holocene lake sediments from central Finland. *Quaternary Science Reviews* 22, 1787–1803.
- Ólafsson, J., 1999. Connections between oceanic conditions off N-Iceland, Lake Mývatn temperature, regional wind direction variability and the North Atlantic Oscillation. *Rit Fiskideildar* 16, 41–57.
- Olli, K., Wexels Riser, C., Wassmann, P., Ratkova, T., Arashkevich, E. & Pasternak, A., 2002. Seasonal variation in vertical export of biogenic matter in the marginal ice zone and the central Barents Sea. *J. mar. Systems* 38, 189–204.
- Oughton, D., 2003. Protection of the environment from ionising radiation: ethical issues. *Journal of Environmental Radioactivity* 66, 3–18.
- Pasternak, A., Arashkevich, E., Wexels Riser, C., Reigstad, M. & Wassmann, P., 2002. Calanus spp. grazing affects egg production and vertical carbon flux in the marginal ice zone and open Barents Sea. *J. mar. Systems* 38, 147–163.

- Pedersen, S.A., Simonsen, C.S. & Storm, L., 2002. Northern shrimp (*Pandalus borealis*) recruitment in West Greenland waters. Part I. Distribution of *Pandalus* shrimp larvae in relation to hydrography and plankton. *Journal of Northwest Atlantic Fishery Science* 30, 19–46.
- Pedersen, S.A. & Storm, L., 2002. Northern shrimp (*Pandalus borealis*) recruitment in West Greenland waters. Part II. Lipid classes and fatty acids in *Pandalus* shrimp larvae: implications for survival expectations and trophic relationships. *Journal of Northwest Atlantic Fishery Science* 30, 47–60.
- Pinglot, F., Vaikmae, R., Kamiyama, K., Igarashi, M., Fritzsche, D., Wilhelms, F., Koerner, R., Henderson, M., Isaksson, E., Winther, J.-G., van de Wal, R.S.W., Fournier, M., Bouisset, P. & Meijer, H., 2003. Ice cores from Arctic subpolar glaciers: Chronology and post depositional processes deduced from radioactivity measurements. *Journal of Glaciology* 49(164), 149–158.
- Pinglot, J.-F., Pourchet, M., Lefauconnier, B., Hagen, J.O., Isaksson, E., Vaikmäe, R. & Kamiyama, K., 1999. Investigations of temporal change of the accumulation in Svalbard glaciers deduced from nuclear tests and Chernobyl reference layers. *Polar Research* 18(2), 315–321.
- Pohjola, V., Moore, J., Isaksson, E., Jauhainen, T., van de Wal, R.S.W., Martma, T., Meijer, H.A.J. & Vaikmäe, R., 2002. Preservation of climatic signals in an ice field affected by periodical melt: a qualitative and quantitative study of the upper 36 m of an ice core from the summit of Lomonosovfonna, Svalbard. *Journal of Geophysical Research* 107 (D4).
- Pohjola, V., Martma, T., Meijer, H.A.J., Moore, J., Isaksson, E., Vaikmäe, R. & van de Wal, R.S.W., 2002. Reconstruction of three centuries of annual accumulation rates based on the record of stable isotopes of water from Lomonosovfonna, Svalbard. *Annals of Glaciology* 35, 57–62.
- Pälli, A., Kohler, J., Isaksson, E., Moore, J., Pinglot, J.-F., Pohjola, V. & Samuelsson, H., 2002. Resolving the spatial variability of snow using ground penetrating radar and shallow ice cores. *Journal of Glaciology*, 48(16), 417–424.
- Racca, J.M.J., Wild, M.D., Birks, H.J.B. & Prairie, Y.T., 2003. Separating wheat from chaff: diatom taxon selection using an artificial neural network algorithm. *Journal of Paleolimnology* 29, 123–133.
- Rasmussen, T.L., Thomsen, A., Kuijpers, A. & Wastegård, A., 2003. Late warming and early cooling of the sea surface in the Nordic seas during MIS 5e (Eemian Interglacial). *Quaternary Science Reviews* 22, 809–821.
- Ratkova, T. & Wassmann, P., 2002. Seasonal variation and spatial distribution of phyto- and protozooplankton in the western Barents Sea. *J. mar. Systems* 38, 47–75.
- Reigstad, M., Wexels Riser, C., Øygarden, S., Wassmann, P. & Rey, F., 2002. Variation in hydrography, nutrients and suspended biomass in the marginal ice zone and the central Barents Sea. *J. mar. Systems* 38, 9–29.
- Renberg, I., et al., 2002. Stable lead isotopes and lake sediments – a useful combination for the study of atmospheric lead pollution history. *Science of the Total Environment* 292, 45–54.
- Renberg, I., et al., 2001. Using the historical atmospheric lead deposition as a chronological marker in sediment deposits in Europe. *The Holocene* 11, 511–516.
- Renberg, I., et al., 2000. Atmospheric lead pollution history during four millennia (2000 BC to 2000 AD) in Sweden. *Ambio* 29, 150–156.
- Ribergaard, M.H., Ådlandsvik, B., Pedersen, S.A. & Kliem, N., 2004. Modelling the ocean circulation on the West Greenland shelf with special emphasis on northern shrimp recruitment. *Continental Shelf Research* 24, 1505–1519.
- Rose, N.L., Rose, C.L., Boyle, J.F. & Appleby, P.G., 2004. Lake-sediment evidence for local and remote sources of atmospherically deposited pollutants on Svalbard. *Journal of Paleolimnology* 31, 499–513.
- Rosén, P., et al., 2001. Holocene climate change as reconstructed from diatoms, chironomids, pollen and near-infrared spectroscopy at an alpine lake (Sjuodji-jahre) in northern Sweden. *The Holocene* 11, 551–562.
- Rummukainen, M., Räisänen, J., Bjørge, D., Christensen, J. H., Christensen, O. B., Iversen, T., Jylhä, K., Ólafsson, H., & Tuomenvirta, H., 2003. Regional climate scenarios for use in Nordic water resources studies. *Nordic Hydrology* 34, 399–412.

- Räsänen, S., 2001. Tracing and interpreting fine-scale human impact in northern Fennoscandia with the aid of modern pollen analogues. *Vegetation History and Archaeobotany* 10, 211–218.
- Saarinen, T., Tiljander, M., Snowball, I. & Vuorela, I., 1999. Rapid environmental changes in Lake Korttajärvi (central Finland) based on the physical parameters of varved sediments deposited over the last 1000 years. *Terra Nostra* 10, 76–77.
- Saarnisto, M., Ojala, A.E.K., Alenius, T., Forsström, P.-L., Kauppila, T., Lunkka, J.P., Mäkilä, M., Pajunen, H., Saarinen, T., Sallasmaa, O. & Tiljander, M., 2003. Modelling past global change – forecasting the future. In Käyhkö, J. & Talve, L. (eds.), *Understanding the global system, the Finnish perspective*, pp. 13–26.
- Salbu, B., Krekling, T., Lind, O.C., Oughton, D.H., Drakopoulos, M., Simionovici, A., Snigireva, A., Weitkamp, T., Adams, F., Janssens, K. & Kashparov, V.A., 2001. High energy X-ray microscopy for characterisation of fuel particles. *Nuclear Instruments & Methods in Physics Research Section a-Accelerators Spectrometers Detectors and Associated Equipment* 467, 1249–1252.
- Sejr, M.K., Jensen, K.T. & Rysgaard, S., 2002. Annual growth bands in the bivalve *Hiatella arctica* validated by a mark-recapture study in NE Greenland. *Polar Biology* 25, 794–796.
- Sejr, M.K., Sand, M.K., Jensen, K.T., Christensen, P.B., Petersen, J.K. & Rysgaard, S., 2002. Growth and production of *Hiatella arctica* (Bivalvia) in high-arctic Young Sound, Northeast Greenland. *Marine Ecology Progress Series* 244, 163–169.
- Seppä, H. & Birks, H.J.B., 2002. Holocene climate reconstructions from the Fennoscandian tree-line area based on pollen data from Toskaljärvi. *Quaternary Research* 57, 191–199.
- Seppä, H. & Birks, H.J.B., 2001. July mean temperature and annual precipitation trends during the Holocene in the Fennoscandian tree-line area: pollen-based climate reconstructions. *The Holocene* 11, 527–539.
- Seppä, H., Birks, H.J.B., Odland, A., Poska, A. & Veski, S., 2004. A modern pollen-climate calibration set from northern Europe: developing and testing a tool for palaeoclimatological reconstructions. *Journal of Biogeography* 31, 251–267.
- Seppä, H., Birks, H.H. & Birks, H.J.B., 2002. Rapid climatic changes during the Greenland stadial 1 (Younger Dryas) to early Holocene transition on the Norwegian Barents Sea coast. *Boreas* 31, 215–225.
- Seppä, H., Nyman, M., Korhola, A. & Weckström, J., 2002. Changes of treelines and alpine vegetation in relation to post-glacial climate dynamics in northern Fennoscandia based on pollen and chironomid records. *Journal of Quaternary Science* 17, 287–301.
- Skaugen, T.E. & Tveito, O.E., 2004. Growing season and degree-days scenario in Norway for the period 2021–2050. *Climate Research* 26, 221–232.
- Snowball, I.F. & Sandgren, P., 2002. Geomagnetic field variations in northern Sweden during the Holocene quantified from varved lake sediments and their implications for cosmogenic nuclide production rates. *The Holocene* 12, 517–530.
- Snowball, I.F. & Moros, M., 2001. Sawtooth pattern of North Atlantic current speed during Dansgaard-Oeschger cycles revealed by the magnetic grain size of Reykjanes Ridge sediments at 59°N. *Paleoceanography* 18, No. 2, 1026, doi:10.1029/2001/PA000732.
- Snowball, I. & Zillén, L., 1999. Annually laminated (varved) lake sediments in northern and central Sweden: a comparison of proxy-environmental indicators and independent chronologies. *Terra Nostra* 10, 88–92.
- Snowball, I., Zillén, L. & Gaillard, M.J., 2002. Rapid early Holocene climate change in northern Sweden based on studies of two varved lake sediment sequences. *The Holocene* 12, 7–17.
- Snowball, I.F., Zillén, L. & Sandgren, P., 2002. Biogenic magnetite in Swedish varved lake sediments and its potential as a biomarker of environmental change. *Quaternary International* 18, 13–19.
- Snowball, I.F., Zillén, L. & Sandgren, P., 2002. Biogenic magnetite in Swedish varved lake sediments and its potential as a biomarker of environmental change. *Quaternary International* 88, 13–19.
- Snowball, I.F., Sandgren, P. & Petterson, G., 1999. The mineral magnetic properties of an annually laminated Holocene

- lake sediment sequence in northern Sweden. *The Holocene* 9, 353–362.
- Sorvari, S., Korhola, A. & Thompson, R., 2002. Lake diatom response to recent Arctic warming in Finnish Lapland. *Global Change Biology* 8, 171–181.
- Strandberg, W.J.F., Oughton, D.H. & Salbu, B., 2002. Potential remobilisation of ¹³⁷Cs, ⁶⁰Co, ⁹⁹Tc and ⁹⁰Sr from contaminated Mayak sediments in river and estuary environments. *Environmental Science & Technology* 36, 2330–2337.
- Strandberg, W.J.F., Oughton, D.H. & Salbu, B., 2002. Remobilisation of ¹⁰⁹Cd, ⁶⁵Zn and ⁵⁴Mn from freshwater-labelled river sediments when mixed with seawater. *Environment International* 28, 185–195.
- Storm, L. & Pedersen, S.A., 2003. Development and drift of northern shrimp larvae (*Pandalus borealis*) at West Greenland. *Marine Biology* 143, 1083–1093.
- Sundbom, M., Meili, M., Andersson, E., Östlund, M. & Broberg, A., 2003. Long-term dynamics of Chernobyl ¹³⁷Cs in freshwater fish – quantifying the effect of body size and trophic level. *Journal of Applied Ecology* 40, 228–240.
- Tiljander, M., Ojala, A., Saarinen, T. & Snowball, I.F., 2002. Documentation of the physical properties of annually laminated (varved) sediments at a sub-annual resolution and their environmental interpretation. *Quaternary International* 88, 5–12.
- Toivonen, H.T.T., et al., 2001. Applying Bayesian statistics to organism-based environmental reconstruction. *Ecological Applications* 11, 618–630.
- Vasko, K., Toivonen, H.T.T. & Korhola, A., 2000. A Bayesian multinomial Gaussian response model for organism-based environmental reconstruction. *J. Paleolimnology* 24, 243–250.
- Vehviläinen, J., Isaksson, E., & Moore, J., 2002. The record of polyaromatic hydrocarbons (PAH) in an ice core from Svalbard. *Annals of Glaciology* 35, 257–260.
- Verity, P.G., Wassmann, P., Frischer, M.E., Howard-Jones, M.H. & Allen, A.E., 2002. Grazing of primary production by microzooplankton in the Barents Sea during early summer. *J. mar. Systems* 38, 109–123.
- Wal, v.d. R.S.W., Mulvaney, R., Isaksson, E., Moore, J., Pohjola, V., & Thomassen, M.P.A., 2002. Historical temperature reconstructions from temperature measurements in a medium-length bore hole on the Lomonosovfonna plateau, Svalbard. *Annals of Glaciology* 35, 371–378.
- Wastegård, S., 2002. Early to Middle Holocene silicic tephra horizons from the Katla volcanic system, Iceland: new results from the Faroe Islands. *Journal of Quaternary Science* 17, 723–730.
- Wassmann, P., 2002. Seasonal C-cycling variability in the open and ice-covered waters of the Barents Sea: an introduction. *J. mar. Systems* 38, 1–7.
- Wassmann, P., 2001. Vernal export and retention of biogenic matter in the north-eastern North Atlantic and adjacent Arctic Ocean: the role of the Norwegian Atlantic Current and topography. *Mem. Natl. Inst. Polar Res., Spec. Issue* 54, 377–392.
- Wassmann, P., Olli, K., Wexels Riser, C. & Svendsen, C., 2003. Ecosystem function, biodiversity and vertical flux regulation in the twilight zone. In G. Wefer, F. Lamy & F. Mantoura (Eds.), *Marine Science Frontiers for Europe*, Springer Verlag, pp. 279–287.
- Wassmann, P., Bauernfeind, E., Fortier, M., Fukuchi, M., Hargrave, B., Honjo, S., Moran, B., Noji, Th., Nöthig, E.-M., Peinert, R., Sasaki, H. & Shevchenko, V., 2003. Particulate organic carbon flux to the sea floor. In R. Stein & R. M. Macdonald (eds.), *The Organic Carbon Cycle in the Arctic Ocean*. Springer-Verlag Heidelberg-Berlin-New York, pp. 101–138.
- Wastegård, S. & Rasmussen, T.L., 2001. New tephra horizons from Oxygen Isotope Stage 5 in the North Atlantic: correlation potential for terrestrial, marine and ice-core archives. *Quaternary Science Reviews* 20, 1587–1593.
- Wastegård, S., Hall, V.A., Hannon, G.E., van den Bogaard, Ch., Pilcher, J.R., Sigurgeirsson, M.A. & Hermanns-Auðardóttir, M., 2003. Rhyolitic tephra horizons in North-western Europe and Iceland from the 700–800s AD; a potential alternative for dating first human impact. *The Holocene* 13, 277–283.
- Wastegård, S., Björck, Grauert, M. & Hannon, G., 2001. The Mjávötn Tephra and the Holocene tephra horizons from the Faroe Islands: a potential link between the Icelandic source region, the

- Nordic Seas and the European continent. *The Holocene* 11, 101–109.
- Weckström, J. & Korhola, A., 2001. Patterns in the distribution, composition and diversity of diatom assemblages in relation to ecoclimatic factors in Arctic Lapland. *Journal of Biogeography* 28, 31–45.
- Wexels Riser, C., Wassmann, P., Olli, K., Pasternak, A. & Arashkevich, E., 2002. Seasonal variation in production, retention and export of zooplankton faecal pellets in the marginal ice zone and the central Barents Sea. *J. mar. Systems* 38, 175–188.
- Zillén, L.M., Wastegård, S. & Snowball, I.F., 2002. Calendar year ages of three mid-Holocene tephra layers identified in varved lake sediments in west central Sweden. *Quaternary Science Reviews* 21, 1583–1591.

Books, reports, abstracts, proceedings and major theses

- Aldahan, A., Possnert, G., Buraglio, N., Meili, M. & Kekli, A., 2000. 129I isotope in precipitation over Sweden. Poster presentation and abstract, 6th International Conference on Acidic Deposition (Acid Rain 2000): Looking back to the past and thinking of the future. Tsukuba, Japan, Dec.10–16. (<http://icsweb.ics-inc.co.jp/acidrain2000/3rd/psa-3.html>). Abstract (P3-9) in Abstract Book, Kluwer Acad. Publ., p. 68.
- Alfimov, V., Aldahan, A., Possnert, G., Meili, M. & Kekli, A., 2002. Iodine-129 in seawater along a transect from the North Atlantic to the Baltic Sea. Poster presentation and abstract, 9th International Conference on Accelerator Mass Spectrometry (AMS-9), Nagoya, Japan, September 9–13. (<http://www.nendai.nagoya-u.ac.jp/AMS-9>).
- Alfimov, V., Aldahan, A., Possnert, G., Meili, M. & Kekli, A., 2002. Iodine-129 in seawater along a transect from the North Atlantic to the Baltic Sea. Poster presentation and Abstract, 9th International Conference on Accelerator Mass Spectrometry (AMS-9), Nagoya, Japan, Sep. 9–13. (<http://www.nendai.nagoya-u.ac.jp/AMS-9>)
- AOE-2001 Atmospheric Program Science and Implementation Plan (www.fysik.lu.se/~eriksw/aoe2001/si_plan.htm)
- Arctic feedbacks to Global Change, International Symposium. Proceedings. Arctic Centre, Rovaniemi, Finland October 25–27, 2001.
- Benestad, R.E., 2003. Past and future trends in the occurrence of wet and dry periods. *Met.no-Report 02/03 KLIMA*, pp. 28.
- Benestad, R.E. & Tveito, 2002. A survey of possible teleconnections affecting Fennoscandia. *Met.no-KLIMA*, 11/02, 28pp.
- Benestad, R.E., et al. 2002. Associations between the sea-ice and the local climate on Svalbard. *Met.no-Klima*, 07/02, 13pp.
- Bigler, C., 2001. Diatoms as indicators of Holocene climate and environmental change in Northern Sweden. Doctoral thesis, Umeå University.
- Bindler, R., 2001. Quantifying pollution inputs of Pb and Hg in the environment: a paleoecological approach. Doctoral thesis, Umeå University.
- Birks, H.H. 2001. Plant Macrofossils. In J.P. Smol, et al. (eds.) *Tracking Environmental Change using Lake Sediments Volume 3. Terrestrial, Algal, and Siliceous Indicators*. Kluwer, Dordrecht, pp. 49–74.
- Birks, H.H. & Birks, H.J.B., 2003. Reconstructing Holocene climates from pollen and plant macrofossils. In A.W. Mackay et al. (eds.) *Global Change in the Holocene*. Arnold, London (in press).
- Birks, H.J.B., 2003. Quantitative palaeoenvironmental reconstructions from Holocene biological data. In A.W. Mackay et al. (eds.) *Global Change in the Holocene*. Arnold, London.
- Birks, H.J.B., 2002. Knut Fægri 1909–2001. Review of Palaeobotany and Palynology 121, 157–161.
- Blindheim, J., 1999. Wind generated fluctuations in water mass structure in the Nordic Seas. *ICES, CM 1999/L*, 24.
- Chatwin, P.G., Turrell, W. R., Miller, P. I., Slessor, G., Hughes, S. & Gillibrand, P.A., 2001. Mesoscale variability in the Faroe-Shetland Channel during FRV Scotia cruise 16 (5–19 October) 2000.

- Marine Laboratory, Aberdeen Report No 02/01.
- Førland, E.J. & Hanssen-Bauer, I., 2003. Climate variations and implications for precipitation types in the Norwegian Arctic. met.no report 24/02 KLIMA, 21pp.
- Fristed, T. Induced-voltage transport measurements in the Faroe region. Working paper, Stockholm University.
- Gaussett, M. & Turrell, W.R., 2001. Deep Sound Scattering Layers in the Faroe Shetland Channel. FRS Marine Laboratory, Aberdeen Report No 17/01.
- Gascard, J.C., Sequeira, S., Rouault, C., Loeng, H., Mork, K.A., Raisbeck, G. & Yiou, F., 2003. Norwegian coastal current influencing the Atlantic water inflow toward the Arctic. Abstract to EGS-AGU-EUG Joint Assembly, Nice, April 2003.
- Groisman, Ya. P., Sun, B., Vose, R.S., Lawrimore, J.H., Whitfield, P.H., Førland, E., Hanssen-Bauer, I., Serreze, M.C., Razuvaev, V.N. & Alekseev, G.V., 2003. Contemporary climate changes in high latitudes of the Northern Hemisphere: Daily time resolution. WMO/TD - 1172, [WMO Proc. of the International Symposium on Climate Change, Beijing, China, 31 March–3 April, 2003], World Meteorol. Organ. Publ. # 1172, 51–55.
- Hansen, B., Turrell, W. R. & Østerhus, S., 2001. Faroe Bank Channel overflow has decreased since 1950. European Geophysical Society, 26th General Assembly. Nice, France.
- Hansen, B., Turrell, W. R. & Østerhus, S., 2001. A weakened overflow from the Norwegian Sea since 1950. ICES-Symposium: Hydrobiological Variability in the ICES Area, 1990–1999. Edinburgh, Scotland, UK.
- Hansen, B., Østerhus, J. & Mortensen, J., 2003. The Iceland-Faroe inflow of Atlantic water to the Nordic Seas. Abstract to EGS-AGU-EUG Joint Assembly, Nice, April 2003.
- Hastie, G. D., Swift, R., Gordon, J. C. D., Heath, M. R., Slessor, G. & Turrell, W. R., 2002. The density and distribution of sperm whales in the Faroe Shetland channel. Studying the distribution and behaviour of cetaceans in the northeast Atlantic using passive acoustic techniques. Report for the Atlantic Frontier Environmental Network. University of Aberdeen, 2002.
- Hatun, H., 2000. On the accuracy of computing slope current transports from current meter arrays. Master's thesis, NTNU, Trondheim.
- Hatun, H. & Hansen, B., 2001. EOF-analysis used to calculate water-mass fluxes. Paper at ICES Annual Science Conference, Oslo, Norway, 26–29 September, 2001.
- Hatun, H., McClimans, T.A., Hansen, B. & Østerhus, S., 2001. On the flow of Atlantic water to the north of the Faroes. Abstract at European Geophysical Society, XXVI General Assembly, Nice, France, 25–30 March 2001.
- Hicks, S., 2003. Towards better temporal, spatial and ecological resolution in palaeoecological reconstructions: the role of pollen monitoring. In S.Tonkov (Ed.) Aspects of Palynology and Palaeoecology. Festschrift in honour of Elissaveta Bozilova, Pensoft, Sofia-Moscow, pp. 43–60.
- Hou, X.L., Fogh, C.L., Kucera, J., Anderson, K.G., Dahlgaard, H. & Nielsen S.P., 2002. Iodine-129 and cesium-137 in Chernobyl contaminated soil. Abstract, Int. Conf. On Radioactivity in the Environment. Monaco, Sep. 2–5. (<http://www.elsevier.nl/homepage/sag/jer2002>, <http://www.iur-uir.com/activities/conferences>).
- Ikävalko, J., Kaartokallio, H., Karell, K. & Roine, T., 2002. Baltic Sea ice biota. Proceedings of the Baltic Sea Ice Climate Symposium, Norrköping May 22–24, 2002.
- Ingvaldsen, R., 2001. Results from current meter moorings in MAIA. Programsampling for Klima-Fisk, IMR. Bergen 10 October 2001.
- Ingvaldsen, R., 2000. Exchange of water masses between the Barents Sea and the Norwegian Sea. Møte i Bjerknessamarbeidet: Klimaprosesser og sirkulasjon i havet, Fløyen, Bergen, 16–17 November 2000.
- Ingvaldsen, R., Loeng, H., Ådlandsvik, B. & Ottersen, G., 2003. The Barents Sea climate during the 1990s. In Hydrobiological Variability in the ICES Area, 1990–1999. (Edinburgh, 2001). ICES Edinburgh Symposium, ICES Journal of Marine Science 219.
- Isaksson, E., O'Dwyer, J., Pohjola, V., Moore, J., Jauhiainen, T., Pinglot, J-F.,

- Vaikmäe, R., Martma, T., Ivask, I., van de Wal, R., Meijer, H., Mulvaney, R. & Vinje, T., 2000. A new ice core record from Lomonosovfonna, Svalbard: viewing the data between 1920–1997 in relation to present climate and environmental conditions. CAPE 2000, Sea Ice in the Climate System, The Record of the North Atlantic Arctic, Iceland, 2–6 June, 2000.
- Isaksson, E., O'Dwyer, J., Vinje, T., Jauhiainen, T., Moore, J., Pohjola, V., Vaikmäe, R. & van de Wal, R., 1999. MSA from a Svalbard ice core in relation to air temperature, sea ice and SST variability. American Geophysical Union Fall Meeting in San Francisco, December 13–17, 1999. *Eos* 80, Nov 16 1999/supplement, 335.
- Isaksson, E. van de Wal, R., Thomassen, M., Pohjola, V., Moore, J., Jauhiainen, T., Vaikmäe, R., Ivask, J., Martma, T., Pinglot, J-F., Meijer, H., & Mulvaney, R. 1998. An Ice Core Record From Svalbard With Seasonal Signals Preserved. American Geophysical Union Fall Meeting in San Francisco, December 6–10, 1998. *Eos* 79. Nov 10 1998/supplement, 278.
- Isaksson, E., Kohler, J., Igarashi, M., Motoyama, K., Martma, T., Meijer, H., Kekonen, T., Moore, J., Mulvaney, R., Pohjola, V., 2001. Svalbard Climate Variability During the Past 200 Years as Recorded in two Ice Cores. American Geophysical Union Fall Meeting in San Francisco, December 10–14, 2001. *Eos* 82, Nov 20. 2001/supplement.
- Jakobsson, et al. Variability of sea ice off the coasts of Iceland in the latter half of the 20th century (1965–2001). IMO published report.
- Jørgensen, P.V. & Laursen, E.V., 2003. DMI monthly climate data collection 1860–2002, Denmark, Faroe Island and Greenland. An update of: NACD, REWARD, NORDKLIM and NARP datasets. Version 1. DMI Technical Report No. 03-26. Copenhagen 2003.
- Jørgensen, P.V., 2002. Nordic Climate Data Collection 2001. An update of: NACD, REWARD, NORDKLIM and NARP datasets, 1873–2000. Version 0. DMI Technical Report 01-20. Copenhagen 2002.
- Kekli, A., Meili, M., Aldahan, A., Possnert, G. & Buraglio, N., 2002. High levels of 129I in rivers of south Sweden. In E. Ilus, (ed.) Proceedings of the 8th Nordic Seminar on Radioecology, 25–28 February 2001, Rovaniemi, Finland. Nordic Nuclear Safety Research (NKS), Roskilde, Denmark, Report NKS-70, p. 194. (ISBN 87-7893-126-6, www.nks.org/english/Publications/Publications.htm)
- Kekli, A., Aldahan, A., Possnert, G., Meili, M. & Stepanoukas, R., 2002. Radioactive 129I in freshwater around the Baltic Sea. Poster and Abstract, Second National IGBP-PAGES Meeting. Stockholm, March 14–16. (<http://www.igbp.kva.se>).
- Kekli, A., Meili, M., Aldahan, A., Possnert, G. & Buraglio, N., 2001. High levels of 129I in rivers of south Sweden. Poster presentation and abstracts, 8th Nordic Radioecology Seminar, Rovaniemi, Finland, Feb. 25–28.
- Korhola, A. & Rautio, M., 2001. Cladocera and other branchiopod crustaceans. In J.P. Smol et al. (Eds.) Tracking Environmental Change using Lake Sediments Volume 4. Zoological Indicators. Kluwer, Dordrecht, pp. 5–41.
- Korhola, A. & Smol, J.P., 2001. Ebridians. In J.P. Smol et al. (Eds.) Tracking Environmental Change using Lake Sediments Volume 3. Terrestrial, Algal, and Siliceous Indicators. Kluwer, Dordrecht, pp. 225–234.
- Larsen, K.M.H., 2003. The Front on the Faroe Shelf. Master's Thesis, University of Bergen.
- Lind, O.C., Oughton, D.H., Salbu, B., Skipperud, L., Sickle, M.A., Brown J.E., Fifield, L.K. & Tims, S., 2002. Speciation of Pu in the Ob And Yenisey estuaries. In P. Strand, P. Børretzen, & T. Jølle (Eds.) Proceedings from the International Conference on Radioactivity on the Environment, 1–5 September 2002 in Monaco. International Union of Radioecology, Norwegian Radiation Protection Authority, Østerås, Norway, pp. 430–433.
- Lindquist, K., 2002. Sensitivity of Barents Sea sea ice to the North Atlantic water and wind using SSM/I satellite data. MINI-conference on long term variability of the Barents Sea Region in Toulouse, France 18–19 April 2002.
- Mackay, A., Battarbee, R.W., Birks, H.J.B. & Oldfield, F. (Eds.), 2003. Global change in the Holocene. Arnold, London, 528 pp.

- Martma, T., Vaikmäe, R., Pohjola, V., Ivask, J., Isaksson, E., Moore, J., Meijer, H.A.J., 2002. An ice core record from Lomonsovfonna, Svalbard: viewing the isotopic data in relation to climate and environmental conditions. European Society for Isotope Research, VI Isotope Workshop, Abstracts. Tallinn. 66–67.
- McClimans, T.A., 2001. Monitoring the Atlantic inflow toward the Arctic using coastal sea-level measurements. The Arctic on Thinner Ice (NARP Symposium). Oulu, Finland, 10–11 May 2001.
- McClimans, T.A., 2001. Executive Summary of MAIA. Earth Observation Workshop: RTD activities to Ocean Studies, Brussels, 12–13 September 2001.
- McClimans, T.A. & Vefsnmo, S., 2003. Monitoring the low-frequency variability of a slope current using coastal water level and satellite altimetry – a struggle for accuracy. Abstract to EGS-AGU-EUG Joint Assembly, Nice, April 2003.
- Meili, M. & Sundbom, M., 2000. Interactions between zooplankton community structure and food quality in Arctic lakes. In: E. Grönlund (Ed.) *Polarforskningssekretariats årsbok 1999*, Swedish Polar Research Secretariat, Stockholm, pp. 164 – 166. (ISSN 1402-2613, ISBN 91-972261-9-X) (<http://www.polar.se/litteratur/publikationer.html#arsbok>, <http://www.polar.se/supplement/suppl.2000.pdf>)
- Meili, M., Buraglio, N., Aldahan, A., Possnert, G. & Kekli, A., 2002. Origin and fate of 129I in Swedish lakes and soils. In E. Ilus (ed.), *Proceedings of the 8th Nordic Seminar on Radioecology*, 25–28 February 2001, Rovaniemi, Finland. Nordic Nuclear Safety Research (NKS), Roskilde, Denmark, Report NKS-70, p. 90. (ISBN 87-7893-126-6, www.nks.org/english/Publications/Publications.htm)
- Meili, M., Aldahan, A. & Possnert, G., 2002. 129I in Arctic freshwaters: local or global sources? In P. Strand, T. Jølle, & Å. Sand, (Eds.) *Environmental Radioactivity in the Arctic and Antarctic*, Norwegian Radiation Protection Authority, Østerås, Norway, p. 62. (ISBN 82-90362-13-7).
- Meili, M., Aldahan, A. & Possnert, G., 2002. Origin and fate of 129I in the European hydrosphere. In P. Strand, P. Børretzen, & T. Jølle (Eds.) *Proceedings from the International Conference on Radioactivity in the Environment* International Union of Radioecology, Norwegian Radiation Protection Authority, Østerås, Norway. p. 643. (http://www.iur-uir.org/Activities/Conferences/Monaco2002/Session7_terrestrial.pdf)
- Meili, M., Aldahan, A., Hou, X.L., Oughton, D.H. & Possnert, G., 2002. Radioactive iodine (I-129) in the North Atlantic region: regional and global atmosphere-land-sea interactions. Abstract, Second NARP Symposium (Nordic Arctic Research Programme): The Arctic in the Anthropocene: The North Atlantic Arctic in Focus. Akureyri, Iceland, May 23–25. (<http://www.svs.is/NARP/Symposium%20Akureyri.htm>).
- Meili, M., Aldahan, A. & Possnert, G., 2002. 129I in Arctic freshwaters: local or global sources? Abstract, 5th International Conference on Environmental Radioactivity in the Arctic and Antarctic. St. Petersburg, Russia, June 16–20. (<http://www.iur-uir.com/Activities/Conferences>)
- Meili, M., Aldahan, A. & Possnert, G., 2002. Origin and fate of 129I in the European hydrosphere. *Int. Conf. On Radioactivity in the Environment*. Monaco, Sep. 2–5. (<http://www.elsevier.nl/homepage/sag/jer2002>, <http://www.iur-uir.com/activities/conferences>).
- Meili, M., Buraglio, N., Aldahan, A., Possnert, G. & Kekli, A., 2001. Origin and fate of 129I in Swedish lakes and soils. 8th Nordic Radioecology Seminar, Rovaniemi, Finland, Feb. 25–28.
- Meili, M., Aldahan, A., Hou, X.L., Oughton, D.H. & Possnert, G., 2001. I-129 in the Arctic: regional and global atmosphere-land-sea interactions. First NARP-Symposium (Nordic Arctic Research Programme): The Arctic on Thinner Ice. Oulu, Finland, May 10–11. (<http://thule oulu.fi/narp>)
- Melle, W., Mork, K.A., Holst, J.C. & Rey, F., 2000. The Norwegian Sea: Hydrography, plankton and herring feeding. Status report April 2000. Working document to ICES Northern Pelagic and Blue Whiting Working Group.
- Miles, M. W. & Jakobsson, T., 2003. Iceland-Greenland sea-ice variability in

- the framework of the North Atlantic, Arctic and Barents oscillations. Proc., AMS Conference on Polar Meteorology and Oceanography, Boston, USA, 16–20 May 2003 (Abstract), 2003b.
- Miles, M.W. & Dretvik, L. An analysis of the time scales of climate and sea ice variability in the Atlantic Arctic. EOS, Transactions, American Geophysical Union 51, Special Supplement (ISSN 0096-3941).
- Mitchell, P.I., Vintro, L.L., Smith, K., Sickel, M., Gerland, S., Brown, J.E., Oughton, D.H. & Lind, O.C., 2002. Size fractionation of plutonium in Arctic waters and implications for its mobility. In P. Strand, T. Jølle & Å. Sand (Eds.) Environmental Radioactivity in the Arctic and Antarctic, Norwegian Radiation Protection Authority, Østerås, Norway, p. 39–42. (ISBN 82-90362-13-7).
- Moore, J., Kekonen, T., Jevrejeva, S., Isaksson, E., Pohjola, V. & Mulvaney, R., 2001. Sea ice in the Baltic and Barents Seas in Relation to Large-Scale Atmospheric Circulation Patterns and Oceanic Productivity. In American Geophysical Union Fall Meeting in San Francisco, December 10–14, 2001, Eos Vol. 82 (49), Nov 20, 2001/supplement.
- Mork, K.A. & Blindheim, J., 2001. Heat loss of the Norwegian Atlantic Current toward the Arctic. ICES Edinburgh Symposium, ICES Journal of Marine Science.
- Nilsson, L. & McClimans, T.A., 2001. The variability of the west Spitsbergen current, the coastal water and the sea levels at Ny Ålesund. Abstract at European Geophysical Society, XXVI General Assembly, Nice, France, March 2001.
- Nilsson, L., 2000. Seasonal variability of coastal water masses at Ny-Ålesund, Svalbard. Student project. Department of Oceanography, Göteborg University, Sweden. ISSN 1400-3821, June 2000.
- Olafsson J. & Drange, H., 2000. Relations of Hydrographic Variability in the Iceland Sea to NAO and Indicators of Regional Meteorological Conditions. The AGU Chapman Conference: The North Atlantic Oscillation, 28 Nov. –1 Dec. 2000, Vigo, Spain.
- Olafsson, J., Olafsdottir, S.R. & Takahashi, T., 2003. Time series observations of inorganic carbon and nutrients in the Irminger and Iceland Seas. EGS – AGU – EUG Joint Assembly, Nice, France, April 2003. Abstract EAE03-A-14234.
- Oughton, D.H., 2002. Radiation protection in the 21st century: Ethical, philosophical and environmental issues. Int. Conf. On Radioactivity in the Environment. Monaco, Sep. 2–5. (<http://www.elsevier.nl/homepage/sag/jer2002>, <http://www.iuruir.com/activities/conferences>).
- Oughton, D., Day, P. & Fifield, K., 2001. Plutonium measurement using accelerator mass spectrometry: methodology and applications. In Kudo, A. (Ed.) Pu in the Environment, vol. 1, Radioactivity in the Environment, pp.47–62. (ISBN 0-08-043425-8).
- Pedersen, S.A., Ribergaard, M.H. & Simonsen, C.S., 2003. Micro- and mesozooplankton in Southwest Greenland waters – June 1999, May and July 2000. Greenland Institute of Natural resources, Technical Report no.53. 59 pp.
- Pohjola, V., Isaksson, E., Martma, T., Meijer, Moore, J., Vaikmäe, R., van de Wal, R., 2000. The d18O and dD Record of the Upper 60 m from the Lomonosovfonna Summit ice core, Svalbard, and its Climatological Significance. American Geophysical Union Fall Meeting in San Francisco, December 15–19, 2000. In Eos 81 (48), 2000/supplement, p. 402.
- Pohjola, V., Isaksson, E., Moore, J., Vaikmäe, R., van de Wal, R., Calanca, P., Samuelsson, H. Sedlacek, J., 1999. Reconstruction of Svalbard climate variability over the last half millenia using melt layer information from the Lomonosovfonna summit ice core. American Geophysical Union Fall Meeting in San Francisco, December 13–17, 1999. In Eos 80 (46), Nov 16 1999/supplement, p. 321.
- Robjant, M., Mitchelson-Jacob, E. G., Sherwin, T. J. & Turrell, W. R., 2002. Influence of mesoscale circulation on biological production in the Faroe-Shetland Channel. Challenger Centenary Conference : Marine Science 2002. University of Plymouth, 2002.
- Rosén, P. et al., 2001. Holocene climate history in northern Sweden reconstructed from diatom, chironomid and pollen records and near-infrared spectroscopy of lake sediments. Doctoral thesis, Umeå University.
- Rowan, E., 2002. Determination of sea ice sensitivity to warm currents through

- Barents Sea using SSM/I and SAR imagery. 22nd EARSeL Symposium & General Assembly in Prague, Czech Republic, 4–6 June 2002.
- Sejr, M.K., 2002. Functional importance of macrozoobenthos in Young Sound, NE Greenland. PhD thesis, Department of Marine Ecology, University of Aarhus.
- Senneset, K., 2000. International Workshop on permafrost Engineering. Workshop proceeding. Workshop in Longyearbyen, Svalbard, 18. – 21.6.2000.
- Sherwin, T. J., Williams, M., & Turrell, W. R., 2001. Mesoscale variability in the Faroe-Shetland Channel; Evidence of a sub-polar front. European Geophysical Society, 26th General Assembly. Nice, France.
- Skipperud, L., Brown, J.E., Fifield, L.K., Lind, O.C., Oughton, D.H. & Sickel, M., 2002. Plutonium in the Ob and Yenisey estuaries. In Strand, P., Jølle, T. & Sand, Å. (eds.) Environmental Radioactivity in the Arctic and Antarctic. Norwegian Radiation Protection Authority, Østerås, Norway, pp. 297–300. (ISBN 82-90362-13-7).
- Smol, J.P., Birks, H.J.B. & Last, W.M. (Eds.), 2001. Tracking Environmental Change using Lake Sediments: Terrestrial, Algal, and Siliceous Indicators. Kluwer Academic Publishers, Dordrecht, 371 pp.
- Smol, J.P. Birks. H.J.B. & Last, W.M. (Eds.), 2001. Tracking Environmental Change using Lake Sediments: Zoological Indicators. Kluwer Academic Publishers, Dordrecht, 217 pp.
- Snowball, I.F., Zillén, L. & Saarinen, T. 1999. Palaeoenvironmental significance of varved lake sediments in Fennoscandia and their contribution to PAGES related programs. PAGES Newsletter 7, 14–15.
- Tuomenvirta, H., 2002: Climate variations in Finland during the 20th century. In: S. Tuhkanen and M. Oja (Eds.) CLIC, Climate Change and Variability in Northern Europe, Turku, Finland, June 6–8th, 2001. Publicationes Instituti Geographici Universitatis Turkuensis 165, p. 76.
- Turrell, W.R., 2001. Long term monitoring of inflow to the Nordic Seas. Marine Laboratory Aberdeen. United Kingdom Report. Arctic Ocean Sciences Board, 20th Meeting. Iqaluit, Canada.
- Turrell, W.R., 2001. User requirements for operational oceanography – fisheries and ecosystems. The Future of Operational Oceanography. IACMST/UKMIC Workshop, London. 2001.
- Turrell, W.R., 2001. Scotland's climate and the impact of the Atlantic. Scotland's Climate and Climate Change. Aberdeen Council Climate Change Action Group. Aberdeen, Scotland. 2001.
- Turrell, W.R. & Holliday, N.P., 2002. The Annual ICES Ocean Climate Status Summary 2000/2001. ICES Cooperative Research Report, No. 245. Copenhagen, Denmark: International Council for the Exploration of the Sea; 2002.
- Turrell, W.R., Hansen, B. & Østerhus, S., 2001. Hydrographic Variability During the Decade of the 1990s in the Northeast Atlantic and southern Norwegian Sea. ICES-Symposium: Hydrobiological Variability in the ICES Area, 1990–1999. Edinburgh, Scotland, UK.
- Williams, M.O., Sherwin, T. J. & Turrell, W.R., 2002. Mesoscale dynamics in the Faroe Shetland Channel. Challenger Centenary Conference: Marine Science 2002; University of Plymouth.
- Zuur, A.F., Buckett, B.E. & Turrell, W.R. 2001. Decadal variability of Atlantic/Arctic water mass characteristics using multivariate time series analysis. Joint IAPSO/IABO Assembly 2001: An Ocean Odyssey. Session: Decadal Variability and Predictability. IC01-24. Mar del Plata, Argentina; 2001.8.2 Biological diversity and environmental threats in the Arctic

8.2 Biological diversity and environmental threats in the Arctic

Reviewed publications

- Anderson, N.J., Bennike, O., Christoffersen, K., Jeppesen, E., Markager, S., Miller G. & Renberg, I., 1999. Limnological and palaeolimnological studies of lakes in South-western Greenland. *Geology of Greenland Survey Bulletin* 183, 68–73.
- Asplund, L., Athanasiadou, M., Sjödin, A., Bergman, Å. & Börjeson, H., 1999. Organohalogen substances in muscle, egg and blood from healthy Baltic salmon (*Salmo salar*) and Baltic salmon that produced offspring with the M74 syndrome. *Ambio* 28, 67–76.
- Bertilsson, S., Hansson, L.-A. Granéli W. & Philibert, A., 2003. Size-selective herbivory on pelagic microorganisms in Arctic freshwaters. *J. Plankton Res.* 25, 621–631.
- Brettum, P., 2002. Phytoplankton species composition and biovolume in five Faroese lakes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 39–46.
- Brochmann, C., Gabrielsen, T.M., Nordal, I., Landvik, J.Y. & Elven, R., 2003. Glacial survival or tabula rasa? The history of North Atlantic biota revisited. *Taxon* 52, 417–450.
- Bundy, J., Ramløv, H. & Holmstrup, M., 2003. Multivariate metabolic profiling of freeze-tolerant and freeze-intolerant earthworms exposed to frost using ¹H nuclear magnetic resonance spectroscopy. *CryoLetters* 24, 347–358.
- Christensen, T. R., Panikov, N., Mastepanov, M., Joabsson, A., Öquist, M., Sommerkorn, M., Reynaud, S., & Svensson, B., 2003. Biotic controls on CO₂ and CH₄ exchange in wetlands – a closed environment study. *Biogeochemistry* 64, 337–354.
- Christensen, T. R., Joabsson, A., Ström, L., Panikov, N., Mastepanov, M., Öquist, M., Svensson, B.H., Nykänen, H., Martikainen, P., & Oskarsson, H., 2003. Factors controlling large scale variations in methane emissions from wetlands. *Geophysical Research Letters* 30, 1414.
- Christiansen, J.S., 2002. Temperature selection at high latitudes; autecologic studies with Arctic fish and Kamchatka crab. *Comp. Biochem. Physiol.* 132/A Suppl. 1.
- Christoffersen, K., 2002. Previous studies of freshwater biota in Faroese lakes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 7–13.
- Christoffersen, K., 2001. Predation on *Daphnia pulex* by *Lepidurus arcticus*. *Hydrobiologia* 442, 223–229.
- Christoffersen, K., Jeppesen, E., Enckell, P.E. & Bloch, D., 2002. Five Faroese Lakes – Physio-chemical and Biological Aspects. *Annales Societatis Scientiarum Færoensis Supplementum XXXVI* 2002.
- Christoffersen, K., Pálsson, C., Kritzberg, E. & Graneli, W., 2002. Abundance and biomass of microbial communities in relation to phyto and bacterioplankton production in five Faroese lakes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 59–69.
- Coulson, S.J., Hodkinson, I.D. & Webb, N.R., 2003. Aerial dispersal of invertebrates over a high Arctic glacier foreland: Mitre Lovenbreen, Svalbard. *Polar Biology* 26, 530–537.
- Coulson, S.J., Hodkinson, I.D., Webb, N.R. & Harrison, J.A., 2002. Survival of terrestrial soil-dwelling arthropods on and in seawater: implications for transoceanic dispersal. *Functional Ecology* 16, 353–356.
- Einarson, A., Gardarsson, A., Gislason, G.M. & Ives, A.R., 2002. Consumer-resource interactions and cyclic population dynamics of *Tanytarsus gracilentus* (Diptera: Chironomidae). *Journal of Animal Ecology* 71, 832–845.
- Einarsson, Á. & Gardarsson, A. 2004. Moulting diving ducks and their food supply. *Aquatic Ecology* 38, 297–307.
- Einarsson, Á. & Örnólfssdóttir, E.B., 2004. Long-term changes in benthic Cladocera populations in Lake Myvatn, Iceland. *Aquatic Ecology* 38, 253–262.

- Ellegren, H., 1999. Inbreeding and relatedness in Scandinavian grey Wolves *Canis lupus*. *Hereditas* 130, 239–244.
- Enevoldsen, L.T., Heiner, I., DeVries, A.L. & Steffensen, J.F., 2003. Antifreeze agents in marine teleost from the Disko Bay area. *Polar Biology* 26, 365–370.
- Flagstad, Ø., Walker, C.W., Vilà, C., Sundqvist, A.K., Fernholm, B., Hufthammar, A.K., Wiig, Ø., Kojola, I. & Ellegren, H., 2003. Two centuries of the Scandinavian wolf population: patterns of genetic variability and migration during an era of publication decline. *Molecular Ecology* 12, 869–880.
- Flagstad, Ø., Hedmark, E., Landa, A., Brøseth, H., Persson, J., Andersen, R., Segerström, P. & Ellegren, H., 2004. Colonization history and non-invasive monitoring of a re-established wolverine population. *Conservation Biology* 18, 676–688.
- Fängström, B., Athanassiadis, I., Athanassiadou, M., Grandjean, P., Weihe, P. & Bergman Å., 2001. Hydroxylated PCB metabolites in non-hatched Faroe Island fulmar eggs. *Organohalogen Compounds* 49, 112–115.
- Fängström, B., Athanassiadou, M., Bergman, Å., Grandjean, P. & Weihe, P., 2000. Levels of PCBs and hydroxylated PCB metabolites in blood from pregnant Faroe Island women. *Organohalogen Compounds* 48, 21–24.
- Gardarsson, A. & Einarsson, A., 2002. The food relations of the waterbirds of Lake Myvatn, Iceland. *Verh. Internat. Verein. Limnol.* 28, 754–763.
- Gardarsson, A., Einarsson, A. & Thorstensen, S., 2002. Long-term trends in the number of Whooper Swans molting at Lake Myvatn, Iceland, 1974–2000. *Waterbirds* 25 (Spec. Pub. 1), 49–52.
- Gardarsson, A. & Einarsson, Á., 2004. Resource limitation of diving ducks at Myvatn: Food limits production. *Aquatic Ecology* 38, 285–295.
- Gardarsson, A., Einarsson, Á., Gíslason, G.M., Hrafnisdóttir, Th., Ingvason, H.R., Jónsson, E. & Ólafsson, J.S., 2004. Aquatic Ecology: Population fluctuations of chironomid and simuliid Diptera at Myvatn in 1977–1996. *Aquatic Ecology* 38, 209–217.
- Gíslason, G.M. & Steingrímsson, S.Ó., 2004. Seasonal and spatial variation in the diet of brown trout (*Salmo trutta* L.) in the subarctic River Laxá, North-East Iceland. *Aquatic Ecology* 38, 263–270.
- Graglia, E., Jonasson, S., Michelsen, A., Schmidt, I.K., Havström, M. & Gustavsson, L., 2001. Effects of environmental perturbations on abundance of subarctic plants after three, seven and ten years of treatments. *Ecography* 24, 5–12.
- Guldahl, A.S., Borgen, L. & Nordal, I., 2001. Variation in the *Festuca brachyphylla* (Poaceae) complex in Svalbard, elucidated by chromosome numbers and isozymes. *Botanical Journal of the Linnean Society* 137, 107–126.
- Halldórsson, G., Sverrisson, H., Eyjólfsson G.G., & Oddsdóttir, E.S., 2000. Ectomycorrhizae Reduce Damage to Russian larch by *Otiorhynchus* larvae. *Scandinavian Journal of Forest Research* 15, 354–358.
- Hansson, L-A., 2000. Induced pigmentation in zooplankton: a trade-off between threats from predation and ultraviolet radiation. *Proc. R. Soc. Lond. B.* 267, 2327–2331.
- Hansson, L-A., & Tranvik, L., 2003. Food webs in sub-Antarctic lakes: a stable isotope approach. *Polar Biol.* 26, 783–788.
- Harding, R., Kuhry, P., Christensen, T.R., Sykes, M.T. & Dankers, R., 2002. Climate feedbacks at the taiga/tundra interface. *Ambio Special report no. 12*, 47–55.
- Hedmark, E., Flagstad, Ø., Segerström, P., Persson, J., Landa, A. & Ellegren, H., 2004. DNA-based individual and sex identification from wolverine (*Gulo gulo*) faeces and urine. *Conservation Genetics* 5, 405–410.
- Hedrick, P., Fredrickson, R. & Ellegren, H., 2001. Evaluation of d2, a microsatellite measure of inbreeding and outbreeding, in wolves with a known pedigree. *Evolution* 55, 1256–1260.
- Hellborg, L., Walker, C.W., Rueness, E.K., Stacy, J.E., Kojola, I., Valdmann, H., Vilà, C., Zimmermann, B., Jakobsen, K.S. & Ellegren, H., 2002. Differentiation and levels of genetic variation in northern European lynx (*Lynx lynx*) populations revealed by microsatellites and mitochondrial DNA analysis. *Conservation Genetics* 3, 97–111.
- Hilligsøe, H. & Holmstrup, M., 2003. Effects of starvation and body mass on drought tolerance in the soil collembolan *Folsomia candida*. *J. Insect Physiol.* 49, 99–104.

- Hodkinson, I.D., 2003. Metabolic cold-adaptation in arthropods: a smaller scale perspective. *Functional Ecology* 17, 562–567.
- Hodkinson, I.D., Coulson, S. J. & Webb, N.R., 2003. Community assembly along proglacial chronosequences in the high Arctic: vegetation and soil development in north-west Svalbard. *Journal of Ecology* 91, 651–663.
- Hodkinson, I.D., Webb, N.R. & Coulson, S.J. 2002. Primary community assembly on land – the missing stages: why are the heterotrophic organisms always there first? *Journal of Ecology* 90, 569–577.
- Holmstrup, M., 2003. Overwintering adaptations in earthworms: The 7th international symposium on earthworm ecology, Cardiff, Wales, 2002. *Pedobiologia* 47, 504–510.
- Holmstrup, M. & Loeschcke, V., 2003. Genetic variation in desiccation tolerance of *Dendrobaena octaedra* cocoons originating from different climatic regions. *Soil Biol. Biochem.* 35, 119–124.
- Holmstrup, M., Hedlund, K. & Boriss, H., 2002. Drought acclimation and lipid composition in *Folsomia candida*: Implications for cold shock, heat shock and acute desiccation stress. *J. Insect Physiol.* 48, 961–970.
- Holmstrup, M., Bayley, M., Sjurssen, H., Højer, R., Bossen, S. & Friis, K., 2000. Interactions between environmental pollution and cold tolerance of soil invertebrates: a neglected field of research. *CryoLetters* 21, 309–314.
- Højer, R., Bayley, M., Damgaard, C.F. & Holmstrup, M. 2001. Stress synergy between drought and a common environmental contaminant: Studies with the collembolan, *Folsomia candida*. *Global Change Biology* 7, 484–492.
- Illeris, L., Christensen, T.R. & Mastepanov, M., 2004. Moisture effects on temperature sensitivity of CO₂ exchange in a subarctic heath ecosystem. *Biogeochemistry* 70, 317–332.
- Illeris, L., Michelsen, A., & Jonasson, S., 2003. Soil plus root respiration and microbial biomass following water, nitrogen, and phosphorus application at a dry high arctic semi desert. *Biogeochemistry* 65, 15–29.
- Ims, R.A., Leinaas, H.P. & Coulson, S., 2004. Spatial and temporal variation in patch occupancy and population density in a model system of an Arctic Collembola species assemblage. *Oikos* 105, 89–100.
- Ingvason, H.R., Ólafsson, J.S. & Gardarson, A., 2004. Food selection of *Tanytarsus gracilentus* larvae (Diptera: Chironomidae): an analysis of instars and cohorts. *Aquatic Ecology* 38, 231–237.
- Jensen, J.P., Landkildehus, F., Søndergaard, M., Jeppesen, E., & Christoffersen, K., 2002. Water chemistry of five lakes at the Faroe Islands. *Ann. Soc. Sci. Færoensis Suppl.* 36, 34–38.
- Jeppesen, E., Jensen, J.P., Jensen, C., Faafeng, B., Brettum, P., Hessen, D., Søndergaard, M., Lauridsen, T. & Christoffersen, K., 2003. The impact of nutrient state and lake depth on top-down control in the pelagic zone of lakes: study of 466 lakes from the temperate zone to the Arctic. *Ecosystems* 6, 313–325.
- Jeppesen, E., Jensen, J.P. & Søndergaard, M., 2002. Climatic warming and regime shifts in lake food webs – some comments. *Limnol. Oceanogr.* 48, 1346–1349.
- Jeppesen, E., Leavitt, P. & De Meester, L., 2001. Incorporating functional ecology in palaeolimnology: using pelagic and benthic cladoceran remains to reconstruct anthropogenic impact. *Trends Ecol. Evol.* 16: 191–198.
- Jeppesen, E., Jensen, J.P., Lauridsen, T.L., Amsinck, S.L., Christoffersen, K. & Mitchell, S.F., 2003. Sub-fossils in the surface sediment as proxies for community structure and dynamics of zooplankton in lakes: a study of 150 lakes from Denmark, New Zealand, the Faroe Islands and Greenland. *Hydrobiologia* 491, 312–330.
- Jeppesen, E., Jensen, J.P., Amsinck, S., Landkildehus, F., Lauridsen, T. & Mitchell, S.F., 2002. Reconstructing the historical development in planktivorous fish abundance in lakes from size of *Daphnia ephippia* in the sediment. *J. Paleolimnol.* 27, 133–143.
- Jeppesen, E., Christoffersen, K., Malmquist, H., Faafeng, B. & Hansson, L.-A., 2002. Ecology of five Faroese Lakes: summary and synthesis. *Ann. Soc. Sci. Færoensis Suppl.* 36, 126–139.
- Jeppesen, E., Landkildehus, F., Lauridsen, T.L., Jensen, J.P., Bjerring, R., Søndergaard, M. & Amsinck, S.L., 2002. Food web interactions in five Faroese lakes

- using stable isotopes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 114–125.
- Jeppesen, E., Jensen, J.P., Amsinck, S., Landkildehus, F., Lauridsen, T. & Mitchell, S.F., 2002. Reconstructing the historical development in planktivorous fish abundance in lakes from size of *Daphnia ephippia* in the sediment. *J. Paleolimnol.* 27, 133–143.
- Jeppesen, E., Christoffersen, K., Landkildehus, F., Lauridsen, T. & Amsinck, S., 2001. Fish and crustaceans in north-east Greenland lakes with special emphasis on interactions between Arctic charr (*Salvelinus alpinus*), *Lepidurus arcticus* and benthic chydorids. *Hydrobiologia* 442, 329–337.
- Jordan, A.D., Møller, P.R. & Nielsen, J.G., 2003. Revision of the arctic cod genus *Arctogadus* Dryagin, 1932 (Teleostei: Gadidae). *Journal of Fish Biology* 62, 1339–1352.
- Jordan, A.D., Jungersen, M. & Steffensen, J.F., 2001. Oxygen consumption of East Siberian cod: no support for the metabolic cold adaptation theory. *J. Fish. Biol.* 59, 818–823.
- Kjaran, S.P., Hólm, S.L. & Myer, E.M., 2004. Lake circulation and sediment transport in Lake Myvatn. *Aquatic Ecology* 38, 145–162.
- Kozlov, M. & Zvereva, E. 2004. Reproduction of mountain birch along a strong pollution gradient near Monchegorsk, Northwestern Russia. *Environmental Pollution* 132, 443–451.
- Kærsgaard, C.W., Holmstrup, M., Malthe, M., Bayley, M., 2004. The importance of cuticular permeability, osmolyte production and body size for the desiccation resistance of nine species of Collembola. *J. Insect Physiol.* 50, 5–15.
- Landkildehus, F., E. Jeppesen, J.P. Jensen, J.P. & S. Dali, S., 2002. A study of five Faroese lakes: lake characteristics. *Ann. Soc. Sci. Færoensis Suppl.* 36, 28–33.
- Lauridsen, T., Jeppesen, E., Landkildehus, F., Christoffersen, K. & Søndergaard, M., 2001. Horizontal distribution of cladocerans in arctic Greenland lakes. *Hydrobiologia* 442, 107–116.
- Lauridsen, T. & Hansson, L-A., 2002. The zooplankton community of five Faroese lakes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 70–78.
- Madsen, T.V. & Bagger, J., 2000. High inorganic carbon extraction capacity of submerged macrophytes from softwater Faroese lakes. *Fróðskaparrit* 47, 169–179.
- Malmquist, H.J. 2001. Freshwater Life and the Kárahnjúka Hydropower Project. *Glettingur* 11, 48–53.
- Malmquist, H., Ingimarsson, F., Jóhannsdóttir, E.E., Gíslason, D. & Snorrason, S., 2002. Biology of Brown trout, *Salmo trutta*, and Arctic charr, *Salvelinus alpinus*, in four Faroese lakes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 97–115.
- Malmquist, H., Ingimarsson, F., Jóhannsdóttir, E.E., Ólafsson, J.S. & Gíslason, G.M., 2002. Zoobenthos in the littoral and profundal zones of four Faroese lakes. *Ann. Soc. Sci. Færoensis Suppl.* 36, 81–95.
- Malmquist, H.J., Antonsson, Th., Guðbergsson, G., Skúlason, S. & Snorrason, S.S., 2000. Biodiversity of macro-invertebrates on rocky substrate in the surf zone of Icelandic lakes. *Verh. Internat. Verein. Limnol.* 27, 121–127.
- Mortensen, L., 2002. The geology and physical geography of some lake in the Faroe Islands. *Ann. Soc. Sci. Færoensis Suppl.* 36, 14–27.
- Møller E.F., Thor, P. & Nielsen, T.G., 2003. Production of DOC by *Calanus finmarchicus*, *C. glacialis* and *C. hyperboreus* through sloppy feeding and leakage from fecal pellets. *Mar Ecol. Prog Ser.* 262, 185–191.
- Møller, P.R., Jordan, A.D., Gravlund, P. & Steffensen, J.F., 2002. Phylogenetic position of the cryopelagic coldfish genus *Arctogadus* Drjagin, 1932 based on partial mitochondrial cytochrome b sequences. *Polar Biology* 25, 342–349.
- Nylehn, J, Hamre, E. & Nordal, I., 2003. Facultative apomixis and hybridization in arctic *Potentilla* section *Nivea*. *Botanical Journal of the Linnean Society* 142, 373–381.
- Olsrud, M., & Christensen, T. R., 2004. Carbon cycling in subarctic tundra; seasonal variation in ecosystem partitioning based on in situ ¹⁴C pulse-labelling. *Soil Biology and Biochemistry* 36, 245–253.
- Olsrud M, Melillo, J., Christensen T.R., Michelsen A, Wallander H & Olsson P.A., 2004. Response of ericoid mycorrhizal colonisation and functioning to global change factors. *New Phytologist* 162, 459–469.
- Pedersen, P.G. & Holmstrup, M., 2003. Freeze or dehydrate: Only two options for the survival of subzero temperatures

- in the arctic enchytraeid *Fridericia ratzeli*. *Journal of Comparative Physiology B* 173, 601–609.
- Petersen, M.F. & Steffensen, J.F., 2003. Preferred temperature of juvenile Atlantic cod (*Gadus morhua*) with different haemoglobin-I genotypes during normoxia and moderate hypoxia. *J. Exp. Biol.* 206(2), 359–364.
- Philipp, M., 2002. Genetic variation in *Armeria maritima* in Iceland. *Polar Record* 38, 219–224.
- Philipp, M. & Siegismund, H. R., 2003. What can morphology and isoenzymes tell us about the history of the *Dryas integrifolia*-*octopetala* complex. *Molecular Ecology* 12, 2231–2242.
- Quested, H.M., Press, M.C., Callaghan, T.V. & Cornelissen, J.H.C. 2002. Can the hemiparasitic plant *Bartsia alpina* influence decomposition in subarctic communities? A microcosm study. *Oecologia* 130, 88–95.
- Quested, H.M., Cornelissen, J.H.C., Press, M.C., Callaghan, T.V., Aerts, R., Trosien, F., Riemann, P., Gwynn-Jones, D., Kondratchuk, A. & Jonasson S. 2003. Litter decomposition of sub-arctic plant species with differing nitrogen economies: a potential functional role for hemiparasites. *Ecology* 84, 3209–3221.
- Rasmussen, L.M. & Holmstrup, M. 2002. Geographic variation of freeze-tolerance in the earthworm *Dendrobaena octaedra*. *J. Comp. Physiol. B* 172, 691–698.
- Rasmussen, E.B., Salhaug, M.B. & Boje J., 1999. The suitability of vertebral counts in stock delineation studies of Greenland halibut, *Reinhardtius hippoglossoides* (Walbaum) in West Greenland. *ICES J. Mar. Sci.* 56, 75–83.
- Riget, F., Jeppesen, E., Landkildehus, F., Geertz-Hansen, P., Christoffersen, K. & Sparholt, H. 2000. Landlocked arctic char (*Salvelinus alpinus*) population structure and lake morphometry in Greenland – is there a connection? *Polar Biology* 23, 550–558.
- Runess, E.K., Jorde, P.E., Hellborg, L., Stenseth, N.C., Ellegren, H. & Jacobsen, K.S., 2003. Cryptic population structure in a large, mobile mammalian predator: the Scandinavian lynx. *Molecular Ecology* 12, 2623–2633.
- Runess, E.K., Stenseth, N.C., O'Donoghue, M., Boutin, S., Ellegren, H. & Jakobsen, K.S., 2003. The phylogeography of the Canadian lynx: coinciding genetic and ecological spatial structuring. *Nature* 425, 69–72.
- Røed, K. H., Fevolden, S.-E., Christiansen, J. S. & Midthjell, L., 2003. Isolation and characterization of DNA microsatellites for capelin *Mallotus villosus* population genetics studies. *Mar Ecol Prog Ser.* 262, 299–303.
- Seddon, J.M. & Ellegren, H., 2002. MHC class II genes in European wolves: a comparison with dogs. *Immunogenetics* 54, 590–600.
- Simonsen, C.S. & Boje, J., 1999. An assessment of the Greenland halibut stock component in NAFO Division 1A inshore. NAFO SCR Doc. 99/48, Ser. No. N4107.
- Sinclair, B.J. & Sjørnsen, H., 2001. Terrestrial invertebrate abundance across a habitat transect in Keble Valley, Ross Island, Antarctica. *Pedobiologia* 45, 134–145.
- Sinclair, B.J. & Sjørnsen, H., 2001. Cold tolerance of the Antarctic springtail *Gomphiocephalus hodgsoni* (Collembola: Hyogastruridae). *Antarctic Science* 13, 271–279.
- Sjørnsen, H., Bayley, M. & Holmstrup, M., 2001. Enhanced drought tolerance of a soil-dwelling springtail by pre-acclimation to a mild desiccation stress. *Journal of Insect Physiology* 47, 1021–1027.
- Sjørnsen, H., Sverdrup, L. & Krogh, P., 2001. Effects of polycyclic aromatic compounds on the drought tolerance of *Folsomia fimetaria* (Collembola, Isotomidae). *Environmental Toxicology and Chemistry* 20, 2899–2902.
- Sjørnsen, H. & Sinclair, B.J., 2002. On the cold hardiness of *Stereotydeus mollis* (Acari: Prostigmata) from Ross Island, Antarctica. *Pedobiologia* 46, 188–195.
- Sjørnsen, H. & Holmstrup, M., 2004. Cold and drought stress in combination with pyrene exposure: Studies with *Protaphorura armata* (Collembola: Onychiuridae). *Ecotoxicology and Environmental Safety* 57, 145–152.
- Sjödin, A., Hagmar, L., Klasson-Wehler, E., Björk, J. & Bergman, Å., 2000. Influence of the consumption of fatty Baltic Sea fish on plasma levels of halogenated environmental contaminants in Latvian and Swedish Men. *Environ. Health Perspect.* 108, 1035–1041.
- Skúlason, Sk., Snorrason, S.S. & Jónsson, B., 1999. Sympatric morphs, populations

- and speciations in freshwater fish with emphasis on Arctic charr. In Magurran, A.E. & Robert, R.M. (eds.) *Evolution of Biological Diversity*. Oxford, Oxford University Press, pp. 71–92.
- Steffensen, J. F., 2002. Metabolic cold adaptation: Fact or artefact? *Artefact! Comp. Biochem. Physiol.* 132, 789–795.
- Steingrímsson, S.Ó., Gíslason, G.M. & Guðbergsson, G., 2002. Body size, diet and growth of landlocked brown trout, *Salmo trutta*, in the subarctic River Laxá, North-east Iceland. *Environmental Biology of Fishes* 63, 417–426.
- Ström, L., Ekberg, A., Mastepanov, M. & Christensen, T.R., 2003. The effect of vascular plants on carbon turnover and methane emissions from a tundra wetland. *Global Change Biology* 9, 1185–1192.
- Sundqvist, A.K., Ellegren, H., Olivier, M. & Vilà, C., 2001. Y chromosome haplotyping in Scandinavian wolves (*Canis lupus*) based on microsatellite markers. *Molecular Ecology* 10, 1959–1966.
- Søvik, G. & Leinaas, H.P., 2003. Adult survival and reproduction in an arctic mite, *Ameronothrus lineatus* (Acari, Oribatida): effects of temperature and winter cold. *Canadian Journal of Zoology* 81, 1579–1588.
- Søvik, G. & Leinaas, H.P., 2003. Experimental field studies on development and survival in the arctic mite, *Ameronothrus lineatus* (Acari, Oribatida) on a cyanobacteria surface in the High Arctic. *Polar Biology* 26, 500–508.
- Søvik, G. & Leinaas, H.P., 2002. Variation in extraction efficiency between juvenile and adult mites: *Ameronothrus lineatus* (Oribatida, Acari) in a Macfadyen high-gradient canister extractor. *Pedobiologia* 46, 34–41.
- Søvik, G., Leinaas, H.P., Ims, R.A. & Solhøy, T., 2003. Population dynamics and life history of the oribatid mite *Ameronothrus lineatus* (Thorell 1871) (Oribatida, Acari) on the high arctic archipelago of Svalbard; a field study. *Pedobiologia* 47, 257–271.
- Thorarinsson, T.L. & Einarsson, Á., 2004. Dispersion of the Horned Grebe *Podiceps auritus* (L.) (Aves) on Lake Myvatn, Iceland, in late summer. *Aquatic Ecology* 38, 309–315.
- Thorbergsdóttir, I.M., Gíslason, S.R., Ingvason, H.R. & Einarsson, Á., 2004. Benthic oxygen flux in the highly productive subarctic Lake Mývatn, Iceland: in situ benthic flux chamber study. *Aquatic Ecology* 38, 177–189.
- Vilà, C., Sundqvist, A.K., Flagstad, Ø., Seddon, J.M., Björnerfeldt, S., Kojola, I., Sand, H., Wabakken, P. & Ellegren, H., 2003. Rescue of a severely bottlenecked wolf (*Canis lupus*) population by a single immigrant. *Proceedings of the Royal Society of London Series B* 270, 91–98.
- Vilà, C., Walker, C., Sundqvist, A.K., Flagstad, Ø., Andersone, Z., Casulli, A., Kojola, I., Valdmann, H., Halverson, J. & Ellegren, H., 2003. Combined use of maternal, paternal and bi-parental genetic markers for the identification of wolf-dog hybrids. *Heredity* 90, 17–24.
- Vilà, C., Amorim, I.R., Leonard, J.A., Posada, D., Castroviejo, J., Petrucci-Fonseca, F., Crandall, K.A., Ellegren, H. & Wayne, R.K., 1999. Mitochondrial DNA phylogeography and population history of the grey wolf *Canis lupus*. *Molecular Ecology* 8, 2089–2103.
- Walker, C.W., Vilà, C., Landa, A., Lindén, M. & Ellegren, H., 2001. Genetic variation and structure in Scandinavian wolverine (*Gulo gulo*) populations. *Molecular Ecology* 10, 53–62.
- Woll, A.K., Boje, J., Hjörleifsson, E. & Gundersen, A.C., 2000. Greenland halibut in East Greenland waters. Recruitment studies and mapping of nursery grounds. *TemaNord* 2000: 585.
- Wrona, F., Prowse, T., Reist, J., Beamish, R., Gibson, J.J., Hobbie, J., Jeppesen, E., King, J., Korhola, A., Macdonald, R., Power, M., Skvortsov, V., Koeck, G., Vincent, W. & Levesque, L., 2003. Impacts of climate change and UV radiation on freshwater arctic ecosystems. In *Freshwater Arctic Ecosystems*. ACIA Scientific report.
- Örnólfsdóttir, E.B. & Einarsson, Á., 2003. Spatial and temporal variation of benthic Cladocera (Crustacea) studied with activity traps in Lake Myvatn, Iceland. *Aquatic Ecology* 38, 239–257.

Books, reports, abstracts, proceedings and major theses

- Albert, O.T., Boje, J., Bowering, W.R., Brodie, B., Gundersen, A., Hjörleifson, E., Høines, Á., Junquera, S., Jørgensen, O.A., Reinert, J., Simonsen, C.S. &

- Treble, M., 2002. Greenland halibut – Biology and population dynamics. State of the art and identification of research needs. Based on a Nordic Workshop. Editor Boje, J. 2002. TemaNord 2002: 543.
- Arboe, N.H., 1999. Predator-prey interactions in the pelagic zone of shallow lakes. In Rasch, M. (ed.), Zackenberg Ecological Research Operations, 4th Annual Report 1998. Danish Polar Centre, pp. 46–47.
- Bennike, O., Brodersen, K.P., Jeppesen E. & Walker, I.R., 2003. Invertebrates and high-latitude palaeolimnology. In R. Pienitz, M. Douglas & J. Smol (eds.) Long-term changes in Arctic and Antarctic lakes. Kluwer, 20 pp.
- Boje, J., 1999. Validering af småmaskede gællegarn til juvenile hellefisk. Garntogt med Adolf Jensen september 1999. Togtrapport fra Grønlands Naturinstitut. Internal report from Greenland Institute of Natural Resources.
- Boje, J., Jørgensen, O.A. & Simonsen, C.S., 2002. Greenland halibut in Greenland waters and activities on the species by the Greenland Institute of Natural Resources.
- Bowering, W.R. & Brodie, W.B.: Distribution and abundance, biology and fishery of Greenland halibut (*Reinhardtius hippoglossoides*, Walbaum) in NAFO Subarea 2 and Divisions 3KLMNO.
- Christensen, T.R., Lloyd, D., Svensson, B., Martikainen, P., Harding, R., Oskarsson, H., Friberg, T., Søgaard, H. & Panikov, N., 2002. Biogenic controls on trace gas fluxes in northern wetlands. IGBP-Global Change NewsLetter, 51.
- Christiansen, J.S. & Kannevorff, P., 2002. Capelin and other small fish off West Greenland: What are they good for? Abstract presented at the workshop “Ecosystem West Greenland”, Nuuk, November 2001. Inussuk-Arctic Research Journal 1.
- Christoffersen, K., 1999. Vejledning for prøvetagningsprogram for søer i Morænebakkerne, Zackenberg (BioBasis). Notat til DMU Arktisk Miljø. 10 p.
- Christoffersen, K. & Jeppesen, E., 2003. Lakes. In Caning, K. & M. Rasch (eds.) Zackenberg Ecological Research Operations, 8th Annual Report, 2000. Copenhagen, Danish Polar Center, Ministry of Research and Information Technology: pp. 50–52.
- Christoffersen, K. & Jeppesen, E., 2003. Strong impact of ice cover duration on shallow lake ecosystems in North-East Greenland – a five-year study. Case study in “North-East Greenland lakes”: ACIA-report 2003.
- Christoffersen, K. & Jeppesen, E. 2002. Isdækkets varighed har stor indflydelse på livet i søerne. DMU Temarapport 41, 79–84.
- Christoffersen, K. & Jeppesen, E., 2001. Lake monitoring. In Caning, K. & M. Rasch (Eds.) Zackenberg Ecological Research Operations, 6th Annual Report, 2000. Copenhagen, Danish Polar Center, Ministry of Research and Information Technology: pp. 45–46.
- Christoffersen, K. & Jeppesen, E., 2001. Søerne stærkt påvirket af isdækkets længde. Kap. 12 i Temahæfte, Danmarks Miljøundersøgelser.
- Christoffersen, K., Arboe, N.H., Landkildehus, F., Jeppesen, E. & Søndergaard, M., 1999. Studies of *Lepidurus arcticus*. In Rasch, M. (ed.), Zackenberg Ecological Research Operations, 4th Annual Report 1998. Danish Polar Centre, pp. 45–46.
- Garðarsson, A., Einarsson, A., Jónsson, E., Gíslason, G.M., Ingvason, H.R., Ólafsson J.S. & Hrafnisdóttir, Th. 2000. Stofnviðvitölur mýflugna í Mývatnssveit í tuttugu ár, 1977–1996.
- Gardarsson, A. & Einarsson, Á. Proceedings of the Wetlands International Seaduck Meeting: Population regulation in breeding common scoter at Myvatn, Iceland: a long-term study.
- Garðarsson, A. & Einarsson, Á. 2000. Monitoring waterfowl at Myvatn, Iceland. Bls. 3-20 í F.A.
- Gíslason, S.R., Eiríksdóttir, E.S. & Ólafsson, J.S., 2001. Efnasamsetning setvatns í kílilgúr á botni Mývatns. Náttúrurannsóknastöð við Mývatn, fjölrit 6. Chemical composition of interstitial water in the Lake Myvatn sediment.
- Einarsson, Á. & Jensdóttir, M., 2002. Kúluskítur. Náttúrufræðingurinn, 71, 34–39.
- Eithun, A., 2003. Reproduction, genetic variation and responses to temperature increase in populations of *Honkenya peploides*. MSc. Thesis, University of Oslo.

- Friberg, T., Oechel, W.C., Groendahl, L., Gudmundsson, J., Harazono, Y., Martikainen, P. & Oskarsson, H., 2003. Circumpolar carbon stocks and current annual flux estimates. Workshop report, C-Nordic NARP meeting on "Current and future status of C storage and ecosystem-atmosphere exchange in the circumpolar North" Skogar, Iceland.
- Fängström, B., 2000. Analysis of organohalogen contaminants in human serum from Faroe Islands women. Diploma work.
- Halldorsson, G., 2002. Beneficial soil organisms in northern regions of the Nordic countries. Project report.
- Halttunen, E., 2002. The role of krill in vertical carbon export. Master's thesis. University of Helsinki, Department of Ecology and Systematics, Division of Hydrobiology.
- Hansen, K., 2003. Arctic seed banks - with a comparison of genetic structure above and below surface in *Saxifraga tricuspidata*. MSc. Thesis, University of Oslo.
- Hjörleifsson, E., Boje, J., Woll, A.K. & Gundersen, A.C., 1999. Greenland halibut in East Greenland waters. Recruitment studies and survey on the nursery grounds. Part 1: The Westnordic stock of Greenland halibut. Report from More Research.
- Holmstrup, M. & Bayley, M., 1999. Effects of climate change on soil animals in the Arctic – population ecological, ecophysiological and ecotoxicological approaches. Nordic workshop on soil fauna research in the Arctic, Silkeborg 19–20 November 1999.
- Hrabok, J.T., 2003. Macroparasites of Reindeer. In *Fennoscandia: Parasite Population Dynamics, Control Options, and Environmental Impact Implications*. Abstract-Oral Presentation: NorFa PhD course: Sustainable Control of Nematode Parasites in Ruminants, 30 March–5 April 2003, Tällberg, Sweden.
- Hrabok, J.T. & Waller P.J., 2003. Macroparasites of reindeer in Fennoscandia: parasite population dynamics, control options and environmental impact implications. Proceedings WAAVP Conference, New Orleans, USA 10–14 August 2003. p. 119.
- Hrabok, J.T. & Waller P.J., 2003. Macroparasites of reindeer in Fennoscandia: parasite population dynamics, control options and environmental impact implications. Proceedings Arctic Ungulate Conference. Saariselkä, Finland. 24–28 August 2003. Rangifer Report No. 7 p. 60.
- Hrabok, J.T. & Waller P.J., 2003. Macroparasites of reindeer in Fennoscandia: parasite population dynamics, control options and environmental impact implications. Proceedings CAES Workshop "Reindeer 2005", Saariselkä, Finland. 28–29 August 2003. p. 13.
- Hrabok, J.T. & Waller P.J., 2003. Macroparasites of reindeer in Fennoscandia: parasite population dynamics, control options and environmental impact implications. Proceedings 2nd International Workshop on Arctic Parasitology. Rovaniemi, Finland. 1–3 September 2003.
- Hrabok, J.T., 2003. The circle of life: Seasonal population dynamics of nematode parasites of reindeer in the host and pasture. 7th Student Conference on Northern Studies. University of Edmonton Alberta, Canada. 24–27 October 2003.
- Hrabok, J.T. & Oksanen, A., 2003. Poron loiset fennoskandiassa: loisten populaatiodynamiikka, torjuntamahdollisuudet ja ympäristövaikutukset. Abstract-Oral Presentation (In Finnish): Poropäivät 24–25 April 2003, Hopialampi, Finland.
- Illeris, L., 2001. Control of carbon cycling in dry arctic ecosystems. Ph.D. thesis, Botanical Institute, Faculty of Science, Copenhagen University.
- Ingvason, H.R., 2002. Fæðuvistfræði slæðumýs (*Tanytarsus gracilentus*) í Mývatni. MS. ritgerð. Food ecology of the midge *Tanytarsus gracilentus* in Lake Myvatn. Msc. thesis University of Iceland.
- Jeppesen, E., Christoffersen, K., Landkildehus, F., Arboe, N., Rigel, F. & Søndergaard, M., 1999. Lake Investigations at Zackenberg, 1998. In Rasch, M. (ed.) Zackenberg Ecological Research Operations, 4th Annual Report 1998. Danish Polar Centre, Copenhagen, pp. 43–44
- Jónsson, I.R. & Malmquist, H.J., 2001. Research on Arctic charr (*Salvelinus alpinus*) and the invertebrate food base in lake Þríhyrningsvatn, a mountain lake in NE Iceland. 11 p. Freshwater Fisheries Institute Inform. Paper No. VMSTR/0100.

- Jónsson, G.St., Malmquist, H.J., Snorrason, S.S. & K. Einarsson, K. 1999. Hydrogeological determinants of nutrient availability in Icelandic lakes. Abstract: Proceedings of the Northern Research Basins – 12th Internat. Symp. & Workshop. Reykjavík August 23–27, 1999.
- Jordan, A.D. 2002. Eksistens ved nulpunktet. *Naturens Verden* 11/12/2002.
- Juul-Pedersen, T. & Nielsen, T.G. 2002. Vandloppers rolle i sedimentationen af organisk materiale under forårsopblomstringen i Disko bugten, Vestgrønland. 12. Danske Havforsker møde, Aarhus Universitet 9–11 januar.
- Leinaas, H.P., 2002. UV-tolerance, pigmentation and life forms in high arctic Collembola. In Hessen D.O. (ed.) *UV radiation and Arctic Ecosystems*. Springer Verlag.
- Leplar, C.G., 2002. Reproductive ecology and response to raised temperatures in *Saxifraga hirculus* populations in Iceland and Svalbard. M.Sc. thesis, Univ. of Iceland.
- Malmquist, H.J., Guðbergsson, G., Jónsson, I.R., Ólafsson, J.S., Ingimarsson, F., Jóhannsdóttir, E.E., Magnúsdóttir, R. Þ., Sigurðardóttir, S.G., Stefánsson, S.M., Hansen, Í. & Snorrason, S.S., 2001. Freshwater Ecosystems and the Kárahnjúka Hydropower Project: Environmental Impact Assessment. 254 p., No. LV-2001/025. Icelandic Institute of Natural History and National Power Company.
- Malmquist, H.J., 2002. Urriðinn forðum í Efra-Sogi. In P.M. Jónason & P. Hersteinsson, (eds.) *Þingvallavatn. Undraheimur í mótun*. pp. 224–236. Mál & Menning, Reykjavík. 303 p.
- Malmquist, H.J. & Sturlaugsson, J., 2002. Urriði í Þingvallavatni. In P.M. Jónason & P. Hersteinsson (eds.), *Þingvallavatn. Undraheimur í mótun*. pp. 197–202. Mál & Menning, Reykjavík. 303 pp.
- Malmquist, H.J., Jóhannsdóttir, E.E. & Ingimarsson, F., 2001. Contrasting crustacean communities in two adjacent, shallow lakes in the highlands NE of Iceland. pp. 49. In *Twin Symp. Cold Aquatic Environm. Abstracts*. Publ. by Nordic Benthological Soc. & Mývatn Research Station, 58 p.
- Monrad, D., 2003. Arktiske frøbanker og træk af *Papaver radicatum*'s levevis. MSc. Thesis, University of Copenhagen.
- Møller, E.F., Nielsen, T.G., Juul-Pedersen, T., Thor, P., Tiselius, P., Michel, C., Selander, E. & Kroer, N., 2002. The role of marine copepods for conservation of carbon in versus export from the photic zone during a spring bloom in Disko Bay, Western Greenland. *Ocean Science Meeting* 11–15 February Honolulu, Hawaii.
- Møller, E.F. & Nielsen, T.G., 2002. Betydning af protozooplankton og små vandlopper for kulstofomsætningen i Grønlandshavet. 12. Danske Havforsker møde, Aarhus Universitet 9–11 januar.
- Nielsen, C., Wolsted, C., Harding, S., Oddsdóttir, E.S., Halldórsson, G., Leivsson, T., Sen, R. & Eilenberg, J., 2003. Occurrence of Hyphomycete fungi from natural birch habitats and eroded land in sub-arctic Iceland and Faroe Islands. 36th Annual Meeting, Society for Invertebrate Pathology, Burlington, Vermont, USA, July 26–July 30.
- Nielsen, T.G., 2002. Implementing the microbial food web in the arctic pelagic ecosystem: a case study from Disko Bay, Western Greenland, Port Erin Marine Laboratory, University of Liverpool. Isle of Man 2 December.
- Nordal, I & Razzhivin, V.Y., 1999. The species Concept in the High North – A Panarctic Flora Initiative. *Det Norske Videnskaps-Akademi. I. Matematisk Naturvitenskapelig Klasse, Skrifter, Ny Serie* 38, 418 pp.
- Oddsdóttir, E. & Nielsen, C., 2001. Integrated use of beneficial soil microorganisms – introduction of a research project. Conference for Nordic Council for Forest Reproductive Material, Akureyri, Iceland, 1/9, 2001.
- Oddsdóttir, E.S., Halldórsson, G., Nielsen, C., Eilenberg, J., Harding, S., Leivsson T. & Sen, R., 2003a. Identification of ectomycorrhiza forming fungi and impact on birch and pine seedling growth in Icelandic soil. Poster presentation, Forest Genetic resources: their use and conservation, Nordic Group for the Management of Genetic Resources of Trees. Húsavík, Iceland, August 27–29, 2003.
- Oddsdóttir, E.S., Nielsen, C., Eilenberg, J., Harding, S., Leivsson T. & Halldórsson, G., 2003b. Interactions between Otiorhynchus larvae and beneficial microorganisms in soils from Iceland and Faroe

- Islands. In 4th International Workshop on Otiiorhynchinae and related root weevils. May 11–14, 2003 Wageningen, the Netherlands. Wageningen, Praktijkonderzoek, Plant & Omgeving BV.
- Oddsottir, E.S., Halldorsson, G., Nielsen, C., Eilenberg, J., Harding, S., Leivsson T. & Sen, R., 2003c. Identification of ectomycorrhiza forming fungi and impact on birch and pine seedling growth in Icelandic soil. In The Fourth International Conference on Mycorrhizae. ICOM4- August 10–15, 2003, Montreal Canada.
- Oddsottir, E., Halldorsson, G. & Sen, R., 2002. Identification of ectomycorrhiza forming fungi and impacts on birch seedlings growth in Icelandic soil. In J. Saari and R. Sen (Eds.), Abstracts of the 8th New Phytologist Symposium, Impacts of Soil Microbes on Plant Population Dynamics and Productivity. June 9–14 2002 Helsinki, Finland.
- Persson, A. H., 2001. Seasonal changes and effects of long term manipulations simulating climatic change on the synthesis of phenolic compounds in plants at a fellfield in Swedish Lapland. M.Sc. thesis, Botanical Institute, Copenhagen University.
- Petersen, M.F. & Steffensen, J.F., 2003. Global opvarming truer torsken (Global warming threatens cod). Jyllands Posten, April 13 2003, scientific appendix.
- Rauff, L., 2003. Kvælstoffiksering- og denitrifikationsprocessers rolle i kvælstofkredsløbet i to subarktiske økosystemer. M.Sc. thesis, Københavns Universitet, Botanisk Institut.
- Riget, F., Jeppesen, E., Landkildehus, F., Gertz-Hansen, P. & Christoffersen, K., 1999. Arctic Char in Lakes at Zackenberg. In Rasch, M. (ed.) Zackenberg Ecological Research Operations, 4th Annual Report 1998. Danish Polar Centre, pp. 44–45.
- Schierup, H., Christoffersen, K., Vadeboncoeur, Y., Landkildehus, F., Lauridsen, T.L., Jensen, J.P., Amsinck, S.L. & Jeppesen, E., 2000. Freshwater studies. In Caning, K. & M. Rasch (eds). Zackenberg Ecological Research Operations, 5th Annual Report, 1999. Copenhagen, Danish Polar Center, Ministry of Research and Information Technology, pp. 52–55.
- Siegismund, H.R. & Philipp, M., 1999. The genus *Dryas* on Svalbard: morphological and genetic evidence for a single species, *Dryas octopetala* L. Det Norske Videnskaps-Akademi. I. Matematisk Naturvitenskapelig Klasse, Skrifter, Ny serie 38, 269–280.
- Skúlason, S., Malmquist, H.J. & Snorrason, S.S., 2002. Þróun fiska í Þingvallavatni. In P.M. Jónason & P. Hersteinsson (Eds.), Þingvallavatn. Undraheimur í mótun. pp. 207–211. Mál & Menning, Reykjavík. 303 p.
- Snorrason, S.S., Malmquist, H.J. & Skúlason, S., 2002. Bleikjan. In Jónason, P.M. & Hersteinsson, P. (eds.) Þingvallavatn. Undraheimur í mótun. Mál & Menning, Reykjavík, pp. 179–196.
- Snorrason, S.S., Ólafsson, J.S. & Garðarsson, A., 2000. Estimating fecundity, egg-laying and larval survival of chironomids in a shallow, subarctic lake. pp. 355–361. In O. Hoffrichter (ed.), Late 20th Century Research on chironomids: an Anthology from the 13th International Symposium on Chironomidae. Shaker Verlag, Aachen.
- Thor, P. Møller, E.F. & Nielsen, T.G., 2002. DOC flux mediated by grazing of large calanoid copepods in the pelagic of the Disko bay, Western Greenland. Ocean Science Meeting, June 10–14 Victoria.
- Thórarinnsson, Þ.L., 2002. Svæðanotkun flórgoða *Podiceps auritus*. MS ritgerð, Háskóli Íslands, 2002. 78 bls. The dispersion of Horned Grebes. Msc. thesis, University of Iceland.
- Thorbergsdóttir, I.M., 2002. Exchange of solutes across the sediment-water interface in the shallow eutrophic Lake Mývatn, Iceland. Msc thesis, University of Iceland.
- TWIN Symposium on Cold Aquatic Environment. Nordic Benthological Society, Myvatn Research station. Symposium abstracts, Lake Myvatn, Iceland 13–16 May 2001.
- Waller, P.J., 2003. Domestication of ruminant livestock and the impact of nematode parasites: possible consequences for the reindeer industry. Proceedings Arctic Ungulate Conference. Saariselkä, Finland. 24–28 August 2003. Rangifer Report No.7, 59.
- Waller P.J. 2002., Reindeer (*Rangifer tarandus*) and yak (*Bos (Poehagus) grunniens*): disparate animal species – similar environment, management and parasite problems? In Yak Production in

- Central Asian Highlands. Proc. 3rd International Congress on Yak. Lhasa, P.R. China. 4–9 September 2000, pp. 429–438.
- Waller, P. J. 2002. Parasite diseases in reindeer: impact of domestication. In *The Arctic in the Anthropocene: the North Atlantic Arctic in Focus*. Proc. 2nd Nordic Arctic Research Programme Symposium. Akureyri Iceland. 23–25 May 2002.
- Waller, P.J., Oksanen, A., Nieminen, M. & Halvorsen, O., 2001. Macroparasites in Semi domesticated Reindeer of Fennoscandia – Parasite Population Dynamics, Control Options and Environmental Impact Implications. Programme and Abstracts 11th Nordic Conference on Reindeer Research, Kaamanen 18–20 June 2001. Rangifer Report No.5, 32.
- Wielgolaski, F.E. (Ed.), 2004. *Plant Ecology, Herbivory and Human Impact in Northern Mountain Birch Forests*. Springer-Verlag, Heidelberg.
- Wielgolaski, F.E. (Ed), 2001. *Nordic Mountain Birch Ecosystems. Man and the Biosphere series, Unesco, vol. 27*.

8.3 Living conditions of the inhabitants of the Arctic

Reviewed publications

- Alho, P., 2003. Land Cover Characteristics in NE Iceland with Special Reference to Jökulhlaup Geomorphology. *Geografiska Annaler ser. B* 85, 213–227.
- Alho, P. & Käyhkö, J., 2003. Hydraulinen tulvamallinnus paikkatietomenetelmien avulla Möðrudalur, Koillis-Islandi. *Terra* 115, 139–148.
- Andersen, T., Kruse, J. & Poppel, B., 2002. Essay on SLICA. Arctic – Journal of the Arctic Institute of North America 55, 12.
- Andersen, T. & Poppel, B., 2002. Living Conditions in the Arctic. *Social Indicators Research* 58, 191–216.
- Baklanov, A., Mahura, A. & Sørensen, J.H., 2003. Methodology for Prediction and Estimation of Consequences of Possible Atmospheric Releases of Hazardous Matter: Kursk Submarine Study. *Atmospheric Chemistry and Physics Discussions* 3, 1–42.
- Baklanov, A., Mahura, A., Sørensen, J.H., Rigina, O. & Bergman, R., 2002. Methodology for Risk Analysis based on Atmospheric Dispersion Modelling from Nuclear Risk Sites. Danish Meteorological Institute Scientific Report Fal 2002, 87p.
- Baklanov, A. & Mahura, A., 2001. Atmospheric Transport Pathways, Vulnerability and Possible Accidental Consequences from Nuclear Risk Sites: Methodology for Probabilistic Atmospheric Studies. Danish Meteorological Institute, Scientific Report 01-09.
- Bärenholdt, J.O. & Aarsæther, N., 2002. Coping Strategies, Social Capital and Space. *European Urban and Regional Studies* 9(2), 151–165.
- Dotterud, L.K., Odland, J.O. & Falk, E.S., 2001. Atopic diseases among schoolchildren in Nikel, Russia, an Arctic area with heavy air pollution. *Acta Derm Venereol.* 81, 198–201.
- Duhaime G., Usher P., Searles E. & Myers H. 2004. Social Cohesion and Living Conditions in the Canadian Arctic. *Social Indicators Research* 66, 295–318.
- Haraldsdottir, S.V., Olafsson, H., Durand, Y., Giraud, G. & Merindol, L., 2003. A system for prediction of avalanche hazard in the windy climate of Iceland. In P.M.B. Föhn (ed). *Proceedings of International Symposium on Snow and Avalanches, Annals of Glaciology* 38.
- Jensen, K.G., Kuijpers, A., Koç, N. & Heinemeier, J., 2004. Diatom evidence of hydrographic changes and ice conditions in Igaliku Fjord, South Greenland, during the past 1500 years. *The Holocene* 14, 152–164.
- Käyhkö, J., Alho, P., Hendriks, H.P.M., Rossi, M.J., 2002. Geomorphology of the Ódáðahraun semi-desert, NE Iceland; a Landsat TM-based land cover mapping. *Jökull* 51, 1–16.
- Laitinen, J., Ek, E. & Sovio, U., 2002. Stress-related eating and drinking behavior and body mass index and predictors of this behavior. *Prev. Med.* 34, 29–39.
- Laitinen, J., Power, C., Ek, E., Sovio, U. & Järvelin M-R., 2002. Unemployment and obesity among young adults in a northern Finland 1966 birth cohort. *Int. J. Obesity* 26, 1329–1338.

- Lassen, S.J., Kuijpers, A., Kunzendorf, H., Hoffmann-Wieck, G., Mikkelsen, N. & Konradi, P., 2004. Late Holocene Atlantic bottom water variability in Igaliku Fjord, South Greenland, reconstructed from foraminifera faunas. *The Holocene* 14, 165–171.
- Mahura, A. & Baklanov, A., 2004. Probabilistic Indicators of Atmospheric Transport for Regional Monitoring and Emergency Preparedness Systems. *Environment International* 29, 1063–1069.
- Mahura, A. & Baklanov, A. 2002. Probabilistic Analysis of Atmospheric Transport Patterns from Nuclear Risk Sites in Euro-Arctic Region. Danish Meteorological Institute Scientific Report Fal 2002, 45.
- Mahura, A., Baklanov, A. & Sørensen, J.H., 2003. Methodology for Evaluation of Possible Consequences of Accidental Atmospheric Releases of Hazardous Matter. *Radiation Protection Dosimetry* 103, 131–139.
- Mahura, A., Baklanov, A. & Havskov Sørensen, J., 2003. Methodology for evaluation of possible consequences of accidental atmospheric releases of hazardous matter. *Radiation Protection Dosimetry* 103, 131–139.
- Mikkelsen, N., Kuijpers, A., Lassen, S. & Vedel, J., 2001. Marine and terrestrial investigations in the Norse Eastern Settlement, South Greenland. *Geology of Greenland Bulletin* 189, 65–69.
- Mikkelsen, N., Hoffmann-Wieck, G. & Sveinbjørnsdottir, A., 2002. Climate variability and disappearance of the Norse from South Greenland. *Mitteilungen Pollichia* 88, 77–80.
- Odland, J.O., Nieboer, E., Romanova, N., Hofoss D. & Thomassen, Y., 2003. Intercommunity and temporal variation of eleven essential and five toxic elements in human placentas from deliveries in thirteen arctic and sub-arctic areas of Russia and Norway. *J. Environ. Monit.* 5, 1–10.
- Odland, J.O., Nieboer, E., Romanova, N., Thomassen, Y., Hofoss, D. & Lund, E., 2001. Factor analysis of essential and toxic elements in human placentas from deliveries in arctic and subarctic areas of Russia and Norway. *J. Environ. Monit.* 3, 177–184.
- Odland, J.O., Sergejeva, I.V., Ivaneev, M.D., Jensen, I.P. & Stray-Pedersen, B. 2001. Seropositivity of cytomegalovirus, parvovirus and rubella in pregnant women and recurrent aborters in Leningrad County, Russia. *Acta Obstet. Gynecol. Scand.* 80, 1025–1029.
- Odland, J.Ø., Hansen, J.C. & Burkow, I.C., 2002. The importance of diet on exposure and effects of persistent organic pollutants on human health in the Arctic. NILU 2002. OR 46/2002, O-99088.
- Odland, J.Ø., Hansen, J.C., Deutch, B. & Burkow, I.C., 2003. The importance of diet on exposure and effects of persistent organic pollutants on human health in the Arctic. *Acta Pædiatrica* 92, 1255–1266.
- Olofsson, J. & Oksanen, L., 2002. Role of litter decomposition for the increased primary production in areas heavily grazed by reindeer, a litter bag experiment. *Oikos* 96, 507–515.
- Olofsson, J., Moen, J. & Oksanen, L., 2002. Effects of herbivory on competition intensity and species diversity in two arctic-alpine tundra communities with different productivity. *Oikos* 96, 265–272.
- Polder, A., Odland, J.O., Tkachev, A., Foreid, S., Savinova, T.N. & Skaare, J.U., 2003. Geographic variation of chlorinated pesticides, toxaphenes and PCBs in human milk from sub-arctic and arctic locations in Russia. *Sci. Total Environ.* 306, 179–195.
- Sandanger, T.M., Odland, J.O., Tkachev, A. & Burkow, I.C., 2003. Persistent organic pollutants in plasma of delivering women from Arkhangelsk. *Sci. Total Environ.* 306, 171–178.
- Selnes, A., Odland, J.O., Bolle, R., Holt, J., Dotterud, L.K. & Lund, E., 2001. Asthma and allergy in Russian and Norwegian schoolchildren: results from two questionnaire-based studies in the Kola Peninsula, Russia, and northern Norway. *Allergy* 56, 344–348.
- Tammelin, T., Näyhä, S., Rintamäki, H., Zitting, P., 2002. Occupational physical activity is related to physical fitness in young workers. *Med. Sci. Sport Exer.* 34, 158–165.
- Tammelin, T., Näyhä, S., Laitinen, J., Rintamäki, H. & Järvelin, M-R., 2003. Physical activity and social status in adolescence as predictors of physical inactivity in adulthood. *Preventive Medicine* 37, 375–381.

Books, reports, abstracts, proceedings and major theses

- Aarsæther, N. & Bærenholdt, J.O., 2001. The Reflexive North. NCM series NORD 2001:10.
- Andersen, T., 2003 Living Conditions in the Arctic – How to Measure Living Conditions and Individual Well-being among Inuit and Saami Peoples in the Arctic (in press).
- Andersen, T., 1999. Political Information in Greenland – Political Perception, Knowledge and Interest in the Greenlandic Constituency. Statistics Greenland, Nuuk.
- Andersen, T., 1999. Living Conditions Research and Sustainable Development. Arctic Journal of Research 1999:2, Nuuk.
- Andersen, T. & Tonsgaard, O., 2002. Voting power in Greenland, In G. Winther (ed.) Democracy and Power in Greenland. The Danish Power Investigation, Copenhagen.
- Andersen, T. & Jensen, J., 1998. Ethnical and Demographic Aspects of the Circumpolar Living Conditions Project. In T. Greiffenberg (Ed.) Development in the Arctic. Danish Polar Centre Publications no. 5, Copenhagen 1998.
- Baklanov, A., Rigina, O. & Mahura, A., 2002. Nuclear Risk and Vulnerability in the Arctic: New Method for Multidisciplinary Assessments. In P. Strand, T. Jølle, & Å. Sand (Eds.) Proceedings of the 5th International Conference on Environmental Radioactivity in the Arctic & Antarctic. St. Petersburg, Russia, 16–20 June 2002. Norwegian Radiation Protection Agency, 397–400.
- Baklanov, A., Mahura, A., Sørensen, J.H. & Rigina, O., 2003. Methodology for Risk Analysis Based on Atmospheric Dispersion Modelling from Nuclear Risk Sites. EAE03-A-10955. EGS-AGU-EUG Joint Assembly, Nice, France, 6–11 April 2003. Geophysical Research Abstracts 5, 2003.
- Baklanov, A., Mahura, A., Sørensen, J.H., Rigina, O. & Bergman, R., 2003. Methodology for Risk Analysis based on Atmospheric Trajectory and Dispersion Modelling from Nuclear Risk Sites in Euro-Arctic Region. Proceedings of the 3rd NARP Symposium & Arctic-Alpine Ecosystems and People in a Changing Environment International Conference, Tromsø, Norway, 24 Feb – 1 Mar 2003.
- Baklanov, A., Mahura, A., Rigina, O. & Sørensen, J.H., 2002. Nuclear Risk and Vulnerability: Approach for Multidisciplinary Assessments. In by P. Strand, P. Børretzen & T. Jølle (Eds.) Proceedings of the International Conference on Radioactivity in the Environment, Principality of Monaco, 2–5 September 2002. Norwegian Radiation Protection Agency, 87–92.
- Baklanov, A., Mahura, A., Sørensen, J.H., Rigina, O. & Bergman, R. Methodology for Risk Analysis based on Atmospheric Dispersion Modelling from Nuclear Risk. <http://www.dmi.dk/f+u/publikation/vidrap/2002/Sr02-16.pdf>
- Bjørndal, C. & Aarsæther, N. (Eds), 2000. Northern Futures – young voices. Paris, UNESCO MOST secretariat.
- Björnsson, T.S., Ingimundarsson, J.H. & Ólafsdóttir, L. (Eds.) 2001. North Meets North – proceedings of the First Northern Research Forum. Akureyri and Bessastaðir, 4.–6. 2000.
- Boudreau, D.A., Scheer, W.D., Mulvad, G., Pedersen, H.S. & Newman III, W.P., 2002. International Workshop on Cardiovascular Disease and Diabetes among Indigenous Peoples in the Circumpolar North – Project Meeting Report, August 31–September 1, 2000. International Journal of Circumpolar Health 2002, 61, 70–80.
- Brynjólfur, J. 2001. Proceedings of the Forestry Beyond the Timberline workshop and the Nordic Sub-alpine Sub-arctic Ecology group meeting. Skógræktarrítið, Journal of the Icelandic Forestry Association, 1. tbl.
- Bærenholdt, J.O. & Aarsæther, N. (eds.) 2002. Transforming the Local. NORD 2001:25.
- Ek, E., Laitinen J., Tammelin T., Remes J., Raatikka V-P. & Kujala V., 2003. Nuorten aikuisten työssä jaksaminen. Työssä jaksamisen ohjelma 2003, Työministeriö. ISBN 951-735-743-5.
- Ek, E., 2001. Assessment of coping flexibility of young adults in a population based study – the flex-method revised.

- The 3rd European Conference of the European Academy of Occupational Health Psychology, 24–27 October 2001, Barcelona, Spain
- Eyjólfsdóttir, H., Yngvadóttir, E., Mattson, B. & Ziegler, F., 2002. Project report from the second workshop. Project report Rf, 15–02. September 2002.
- Eyjólfsdóttir, H. & Mattson, B. 2002. Project report from the first workshop. Project report Rf, 02–02. January 2002.
- Hansen, J.C., Gilman, A., Klopov, V. & Odland, J.O. (Eds.), 2003. AMAP Assessment 2002: Human Health in the Arctic. Arctic Monitoring and Assessment Programme (AMAP). Oslo, Norway, xiv + 137 pp.
- Heikkinen, H., 2002. Sopeutumisen mallit – Poronhoidon adaptaatio jälkitekolliseen toimintaympäristöön Suomen läntisellä poronhoitoalueella 1980 – 2000. SKS. Hakapaino, 369 pp.
- Heikkinen, H. & Jokinen, M. 2002. Effects of Reindeer Herding and Conservation to the Strict Nature reserve Malla. In S. Kankaanpää, L. Muller-Wille, P. Susiluoto & M-L. Sutinen (Eds.) Northern Timberline Forests – Socio-economic Issues and Concerns. Metsäntutkimuslaitoksen tiedonantoja 862. Metla/Kolari, Gummerus.
- Helle, T., 2002. Luonnollista vai ihmistoimintaa: poron laidunnusvaikutukset luonnonsuojelu ja erämaa-alueilla. In J. Saarinen (Ed.) Erämaapolitiikka; pohjoiset erämaat arjen, hallinnan ja tutkimuksen kohteena. Metsäntutkimuslaitoksen tiedonantoja 827, 57–65.
- Jokinen, M., 2003. Lappilaisen luonnonkäytön pelisäännöt. In I. Massa & H. Snellman (Eds.) Lappi – maat, kansat, kulttuurit. Suomalaisen kirjallisuuden seura., 16–17.
- Jokinen, M. (Ed.), 2002. Erämaata etsimässä – Kirjoituskilpailu Lapin luonnonkäytöstä. Metsäntutkimuslaitoksen tiedonantoja 867, 2002.
- Laitinen, J., Ek, E. & Järvelin, M-R., 2001. Unemployment and obesity among young adults. *Int. J. Obesity and metabolic disorders* 25(2), 022. 11th European Congress on Obesity 30.5. – 2.6.2001, Vienna, Austria.
- Landa, A. (Ed.), 2002. Monitoring large herbivore effects on vegetation in Greenland – Workshop report. Greenland Institute of Natural Resources, Technical Report No 47, 33 pp.
- Landa, A. Bath, A. & Lyberth, B. (eds.). The human dimension – User interests, research and management of caribou and muskoxen. Workshop report.
- Linnell, J.D.C., Rosing, M., Cuyler, C., Ferguson, M. & Landa, A., (In press). Setting and achieving management goals for caribou in western Greenland. Outcome from a workshop held in Nuuk, May 2nd–7th, 2001. Greenland Institute of Natural Resources. Technical report.
- Mahura, A., 2002. Atmospheric Dispersion Modelling from Nuclear Risk Sites in Euro-Arctic Region. Danish Meteorological Institute's Research Seminar, November 2002, Copenhagen.
- Mahura, A. & Baklanov, A., 2003. Evaluation of Source-Receptor Relationship for Atmospheric Pollutants using Probability Field Analysis, EAF03-A-13136. EGS-AGU-EUG Joint Assembly, Nice, France, 6–11 April 2003. *Geophysical Research Abstracts* 5, 2003.
- Mahura, A. & Baklanov, A., 2003. Nuclear Risk Sites Possible impact Indicators Based on Trajectory modelling. Proceedings of the 3rd NARP Symposium & Arctic-Alpine Ecosystems and People in a Changing Environment International Conference, Tromso, Norway, 24 Feb–1 Mar 2003.
- Mahura, A. & Baklanov, A., 2002. Probabilistic Analysis of Atmospheric Transport Patterns from Nuclear Risk Sites in Euro-Arctic Region. <http://www.dmi.dk/f+u/publikation/vidrap/2002/Sr02-15.pdf>
- Mahura, A., Baklanov, A. & Sørensen, J.H., 2003. Temporal Variability of Dry and Wet Deposition Patterns during Atmospheric Transport from Potential Radioactive Pollution Sources in Euro-Arctic Region, EAE03-A-13352. EGS-AGU-EUG Joint Assembly, Nice, France, 6–11 April 2003. *Geophysical Research Abstracts* 5, 2003.
- Mahura, A., Baklanov, A. & Sørensen, J.H., 2003. Nuclear Risk Sites Possible Impact Indicators Based on Atmospheric Dispersion Modelling. Proceedings of the 3rd NARP Symposium & Arctic-Alpine Ecosystems and People in a Changing Environment International Conference, Tromso, Norway, 24 Feb–1 Mar 2003.
- Mahura, A., Baklanov, A., Sørensen, J.H. & Compton, K., 2003. Statistical Indicators of Air Pollution Removal by Pre-

- precipitation During Atmospheric Transport, EAE03-A-13290. EGS-AGU-EUG Joint Assembly, Nice, France, 6–11 April 2003. Geophysical Research Abstracts 5, 2003.
- Mahura, A., Baklanov, A., Rigina, O. & Parker, F.L., 2002. Statistical Analysis of Atmospheric Transport from the Nuclear Risk Sites in the Arctic Region. In P. Strand, T. Jølle, & Å. Sand (Eds.) Proceedings of the 5th International Conference on Environmental Radioactivity in the Arctic & Antarctic. St. Petersburg, Russia, 16–20 June 2002. Norwegian Radiation Protection Agency, 119–123.
- Mikkelsen, N. & Kuijpers A., 2002. The Norse in Greenland. Grønlands vejr og klima i fortid, nutid og fremtid. Abstract in the Workshop at the Meteorological institute.
- Mikkelsen, N. & Kuijpers, A., 2001. Natural Climate Variations in a geological perspective. In A.M. Jørgensen, J. Fenger & K. Halsnæs (Eds), Climate Change Research. Danish Climate Centre, 23–36.
- Mikkelsen, N. & Kuijpers A., 2001. Nordboernes livsgrundlag i sydvest Grønland. Geological Survey of Denmark and Greenland Yearly report, 61–71.
- Mikkelsen, N., Jensen, K. & Kuijpers, A., 2001. Late Holocene climate fluctuations in south Greenland and disappearance of the Norse culture. Abstract in 6th conference on Polar Meteorology and Oceanography, San Diego, May 2001.
- Oltedal, S., 2002. How do a Russian and a Norwegian Battered Woman Create Meaningful Stories? Taking Wing. Conference Report. Conference on Gender Equality and Women in the Arctic, 3–6 August 2002, Saariselkä, Inari Finland. Ministry of Social Affairs and Health 2002:12.
- Proceedings of Workshop on Persistent Organic Pollutants (POPs) in the Arctic: Human Health and Environmental Concerns. Rovaniemi 18.–20.1.2000. AMAP Report 2000:1.
- Poppel, B. & Andersen, T., 1997. Fisker og fangeres levevilkår. Signalement af en fisker/fanger og en fisker-/fangerhusholdning belyst ud fra Grønlands Statistiks Levevilkårsundersøgelse 1994. Kalaalimernit, Arktisk Forskningsjournal 1997:1.
- Pölkki, S., 2002. Asiantuntijoiden näkemyksiä luonnontilaisuudesta tunturialueella. Pro gradu -tutkielma. Helsingin yliopisto.
- Rasmussen, O.R. & Koroleva, N., 2003. Environmental and socio-economic consequences of large scale resource extraction in the Arctic. KLUWER Academic Publishers.
- Rigina, O., Baklanov, A. & Mahura, A., 2003. Nuclear Risk and Vulnerability Assessments based on GIS. Integration of Atmospheric Trajectory and Dispersion Modelling Results. Proceedings of the 3rd NARP Symposium & Arctic-Alpine Ecosystems and People in a Changing Environment International Conference, Tromsø, Norway, 24 Feb–1 Mar 2003.
- Saarinen, A. (Ed.), 2001. Crisis Centres and Violence against Women. Report of the NCRB Research Seminar, University of Oulu, November 2001. Femina Borealis, 200 pp.
- Saarinen, A. & Liapounova, O. 2002. Building a Trans-Regional East-West Community for Crisis Centres for Women in the Barents Region. Taking Wing. Conference Report. Conference on Gender Equality and Women in the Arctic, 3–6 August 2002, Saariselkä, Inari Finland. Ministry of Social Affairs and Health 2002:12.
- Saarinen, A., Liapounova, O. & Drachova, I. (Eds.), 2003. NCRB – A Network of Crisis Centres for Women in the Russian Barents Region (and in the Barents region as a whole). Report of the Nordic-NW Russian Development Project, 1999–2002. Gender researches: methodology and practice, Volume 5. Centre for Women's Studies and Gender Research, Pomor State University, Arkhangelsk 2003, 200 pp.
- Saarinen, A., Liapounova, O., Novikova, M. & Sunnari, V. (eds.), 2002. Crisis centres and violence against women: Abstracts of reports (23–27 November 2001, Oulu-Rovaniemi, Finland). Pomor State University, Centre of gender researchers & Oulu University, Volume 1, Arkhangelsk, 170 p.
- Skaptadottir, U.D., Mørkøre, J. & Riabova, L., 2001. Coping under stress in fisheries communities. UNESCO, Paris December 2001.
- Tammelin T., Näyhä S., Rintamäki H. & Zitting P., 2001. Heavy physical work is

- related to good physical fitness in young adults. MSSE 2001 Annual Meeting. *Med. Sci. Sport Exer.* 33, 564.
- Tammelin, T., Näyhä, S., Rintamäki, H., Laitinen, J. & Järvelin, M-R., 2002. Nuorten työikäisten inaktiivisuustauustalla perhe ja työtilanne sekä nuoruusiän vähäinen liikunta. X liikuntalääketieteen päivät 11.–12.10.2001 Helsinki, Finland. The 2nd Conference on Epidemiological Studies in Europe, 12–14 June 2002, Oulu, Finland. *Journal of Circumpolar Health* 61: suppl. 1, 1–92.
- The Forestry Beyond the Timberline workshop & NSSE Mountain birch Workshops. Workshop proceedings. Akureyri, Iceland on June 27–30, 2000.
- Usher, P.J., Duhaime, G. & Searles, E., 2002. The Household as an Economic Unit in Arctic Aboriginal Communities, and its Measurement by means of a Comprehensive Survey. Kluwer Academic Publishers, Dordrecht/Boston/London, 1–28.
- Vehkakoski K., Zitting P., Laitinen, J., Hartikainen A-L., Sorri M., Joukamaa M., Isohanni M., Moilanen I., Näyhä S., Järvelin M-R., 2001. Elämäntilanne, työllisyys ja terveys. Pohjois-Suomessa vuonna 1966 syntyneiden hyvinvointi- ja terveystutkimusohjelman kuntaraportti. Sosiaali- ja terveysministeriön julkaisuja 2001:16, Helsinki.
- Yukina, I., Saarinen, A. & Kudriashova, E. (eds.), 2003. Women's Strategies and Politics in Transition. Dialogue across the East-West Divide. Gender research: methodology and practice, Volume 4. Centre for Women's Studies and Gender Research, Pomor State University, Arkhangelsk 2003, 188.

Sammanfattning

Syftet med forskningsprogrammet Nordic Arctic Research Programme (NARP) var att främja nordiskt samarbete och stärka kunnskap och kompetens inom arktisk forskning. Kärnan i programmet utgjordes av tre teman med fokus på snabba förändringar. Dessa teman var 1) naturprocesser och samverkan mellan jord, hav och atmosfär, 2) biologisk mångfald i det arktiska området och 3) arktiska folkgruppers levnadsvillkor.

NARP programmet, initierat av Nordiska ministerrådet, löpte mellan 1999 och 2004 och slutfördes år 2004. Med en årlig budget på 6,2 miljoner danska kronor, uppgick den totala budgeten till 31 miljoner kronor. Sekretariatet var beläget vid Oulu (Uleåborg) universitet hos Thule institutet.

Den här publikationen beskriver programmet samt vetenskapliga insatserna inom de sammanlagd 63 olika projekt som ingick i det. Utöver information om dessa projekts forskningsresultat och publicerade artiklar presenteras också hela programmets samlade resultat samt slutsatser som dragits angående det.

Arbetet utfört inom ramen för programmet har varit mångsidigt och haft en positiv inverkan på arktisk forskning i allmänhet. NARP har satsat speciellt på bildande av nätverk och samarbete mellan olika forskningsgrupper. Studerande i synnerhet har dragit stor nytta av sina besök på nordiska forskningscentra, och finansieringen av denna typ av samarbete borde fortsättas också i framtiden. Särskilt starkt har NARP programmet stimulerat och ökat samarbetet mellan forskare från Färöarna, Grönland och Island.

Under programmets gång blev det uppenbart att det finns ett stort behov för arktisk forskning som är både mångvetenskaplig och tvärvetenskaplig. Fortfarande är våra kunskaper om ritningen och omfattningen av miljöförändringar i det arktiska området begränsade, och mer vetenskaplig uppmärksamhet borde ägnas åt snabba förändringar i områdets socioekonomiska förhållanden. Allt fler forskare – unga, begåvade forskarstuderande i spetsen – borde ta en aktiv roll i arktisk forskning.

Tiivistelmä

Nordic Arctic Research Programme (NARP) -tutkimusohjelman tarkoituksena on ollut lisätä pohjoismaista tutkimusyhteistyötä ja vahvistaa Pohjoismaiden osaamista ja kilpailukykyä arktisiin alueisiin kohdistuvassa tutkimuksessa. Ohjelmassa oli kolme arktisten alueiden kannalta keskeistä teemaa, joiden puitteissa nopeita muutoksia tutkittiin. Teemat olivat 1) luonnonprosessit ja maa-meri-ilmakehä-vuorovaikutus, 2) arktisen alueen biodiversiteetti ja ympäristöuhat ja 3) väestön elinolosuhteet arktisilla alueilla.

Pohjoismaiden ministerineuvosto perusti NARP-ohjelman vuosiksi 1999–2003, ja ohjelma saatiin päätökseen vuonna 2004. Ohjelman vuosibudjetti oli 6,2 miljoonaa Tanskan kruunua ja kokonaisbudjetti 31 miljoonaa kruunua. Ohjelman sihteeristö toimi Oulun yliopiston Thule-instituutissa.

Tässä julkaisussa esitellään tutkimusohjelman 63 projektin tutkimusta ja tuloksia. Julkaisu sisältää ohjelman lopputulokset, tietoja projektien toiminnasta ja tuotetuista tieteellisistä julkaisuista. Julkaisussa esitetään lisäksi johtopäätöksiä tutkimusohjelmasta.

Ohjelman aikana on tehty merkittävää työtä monimuotoisista arktisista aiheista. NARP on tukenut erityisesti verkostoitumista sekä yhteistyötä eri tutkijaryhmien välillä. Lukuisat opiskelijat ovat hyötäneet suuresti ohjelman aikana toteutetuista vierailuista pohjoismaisiin tutkimuslaboratorioihin, ja tällaiselle erittäin tarpeelliseksi koetulle yhteistyölle toivotaan jatkossakin löytyvän rahoitusta. Ohjelma on myös kannustanut ja lisännyt färsaarelaisten, grönlantilaisten ja islantilaisien tutkijoiden pohjoismaista yhteistyötä.

Ohjelman kuluessa todettiin, että tarve monitieteiselle ja tieteidenväliselle arktiselle tutkimukselle on suuri. Erityisesti arktisten alueiden ympäristömuutoksen kehityssuunnasta ja laajuudesta on edelleen vain vähän näyttöä, ja muutoksia ymmärretään huonosti. Tieteellistä erityishuomiota pitäisi kiinnittää myös arktisten alueiden sosio-ekonomisten olojen nopeaan muutokseen. Yhä useampien tieteentekijöiden ja erityisesti nuorten lahjakkaiden tutkijoiden tulisi tulevaisuudessa ottaa osaa arktisen tieteen tekemiseen.