Department of Physical Geography
and Quaternary Geology
Stockholm University

Arjen P. Stroeven (ed.)

Annual Report
2003
1. Introduction

The Department of Physical Geography and the Department of Quaternary Research joined forces to create the Department of Physical Geography and Quaternary Geology on January 1, 2001. The merger was motivated because of a clear common interest between some fields in Physical Geography and some in Quaternary Geology. Physical Geography is about the landscape of today, landforms, climate, and the vegetation cover, and its changes (past, present and future) by natural processes and human impact. Quaternary Geologists are concerned with climatic and environmental changes during the Quaternary period. The two fields clearly overlap one another. Analysis of spatial patterns is characterising the geographical approach, while Quaternary Geology utilises the Quaternary stratigraphic record. The questions that we address in teaching and research emphasise the need for interdisciplinary and multidisciplinary approaches. Basic research is oriented towards furthering our understanding of short- and long-term processes and interactions that lead to landscape development and environmental and climatic changes. Past and present systems behaviour and interactions are modelled for predictions of future likely trends. Education and research at the department have expanded over the past decades. We currently have a growing competence of staff and students, and exciting new research avenues are being explored.

In addition to the traditional research focus in geomorphology, glaciology, polar research, terrestrial Quaternary stratigraphy, glacial geology and paleoclimatic and palaeoenvironmental changes, the fields of remote sensing, geographic information systems and cartography, supported by the rapid development of computer techniques, have taken an advanced position in the research profile of the department. The fields of ecological geography, tropical geography are also relatively new research strongholds. The Department of Physical Geography and Quaternary Geology and the Department of Human Geography jointly conduct the interdisciplinary research in tropical geography. The fields of hydrology and water resources were firmly established last year by the move of a strong research group from the Royal Institute of Technology (KTH) to our department.

All geoscience institutions are located in the Geosciences building at the campus of Stockholm University in Frescati since the fall of 1996. We have all the facilities of a modern housing, laboratories, and equipment to conduct increasingly successful scientific studies and offer stimulating and advanced education to prospective students.

Arjen Stroeven
professor
Physical Geography

Barbara Wohlfarth
professor
Quaternary Geology

Karin Holmgren
docent
Head of the Department
History

Although geography at Stockholm University was established as a subject in its own right in 1912, it was not until 1929 that the first professor, Hans W:son Ahlmann, was appointed. He held this position until 1950. Gunnar Hoppe was appointed professor in 1954, one year before the division between Physical Geography and Human Geography commenced. Professor Hoppe retired in 1980 and was succeeded by Gunnar Østrem, Wibjörn Karlén, and, in 2003, by Peter Kuhry.

Hans W:son Ahlmann had a particular interest in Arctic research and glaciology. He led several expeditions to the Arctic and also initiated the establishment of a glaciological research station in the Swedish mountains, the Tarfala Research Station. Valter Schytt, appointed professor of glaciology between 1970 and 1985, continued the tradition of Arctic research by organising several expeditions to Svalbard and adjacent areas and to the Antarctic. Per Holmlund succeeded him in 1999.

Most of Gunnar Hoppe's scientific work concerned the deglaciation history of the Fennoscandian ice sheet. He pioneered the incorporation and interpretation of aerial photographs in geomorphological research, and he initiated and led a geomorphological survey mapping of the Swedish high mountains. His strong interest in remote sensing led to the creation of a professorship in remote sensing at the Department of Physical Geography in 1980, a position held by Leif Wastenson until 2001. Johan Kleman succeeded him.

As long as geology has been a subject at Stockholm University, Quaternary Geology has had a strong position. Two early professors of Geology, Gerard De Geer (1897 – 1924) and Lennart von Post (1929 – 1950) had an international reputation in Quaternary geology, De Geer mainly for his invention of the clay-varve dating method and von Post as the father of pollen analysis. In 1956 von Post's successor, Ivar Hessland, created an assistant professorship, the first holder of which was Carl-Gösta Wenner who gave the Department a new direction towards applied geology. However, it was not until 1962 that Quaternary geology became an independent subject of examination and in 1963 a department of its own. At Wenner's retirement in 1980 Jan Lundqvist succeeded him to become the first full professor of Quaternary Geology at Stockholm University. Lundqvist retired in 1993 and was succeeded by Bertil Ringberg, and, in 2002, by Barbara Wohlfarth.

Research directions of the other professorships are in tropical geography (Carl Christiansson), hydrology (Georgia Destouni), ecological geography (Margareta Ihse), geomorphology (Karna Lidmar-Bergström), and paleoglaciology (Arjen Stroeven). Together with the aforementioned professorships at the Department, we successfully straddle both traditional and current directions in physical geography and Quaternary geology.
2. Current Research

2.1. Geomorphology

**Glacial Geomorphology and Palaeoglaciology**

The focus of our research is the landform record created by former ice sheets. We use regional and ice-sheet scale patterns to infer glaciological parameters, particularly basal thermal regime and flow pattern. Target areas are those that have been covered by former ice sheets in Fennoscandia and North America. Crosscutting relationships between landform systems and their correlation to stratigraphical data allow the establishment of a reconstruction of glacial evolution through time. The geographical distribution pattern and the detailed morphology of specific landforms yield important clues to the formation mechanisms, environment, and the time of formation. The recent application of cosmogenic nuclide techniques allows a further precision on the timing of specific glacial events to be determined. These studies also help constrain the long-term erosive impact of past ice sheets. Hence, key elements employed within our research strategy are the geographical approach, which is based on a comprehensive mapping in aerial and satellite photographs, the development and continuous improvement of inversion models for the reconstruction of palaeo-ice sheet behaviour from geomorphological data, and the application of cosmogenic nuclide techniques to study the long-term evolution of glacial landscapes and the total impact of glacial erosion on the current landscape.

The following important topics are addressed:

- Evolution of the Fennoscandian ice sheet through the last glacial cycle
- Landform record of the Quebec-Labrador sector of the Laurentide ice sheet
- The evolution of the Laurentide ice sheet during the last glacial cycle
- Landforms as indicators of ice sheet basal thermal patterns
- Glacial and long-term geomorphic evolution of the ice-overridden mountain ranges in Fennoscandia and Antarctica.

**Long-term landform evolution around the North Atlantic**

Research is focused on the relationship between landforms and Cainozoic uplift around the North Atlantic. It is performed in co-operation with geophysicists working with the thermal evolution of the bedrock and geologists working with the surrounding sedimentary basins. The work has hitherto mainly been performed within Fennoscandia. Much effort has been devoted to map re-exposed surface topography in the basement and to localize remnants of old weathering mantles (saprolites). The focus has lately widened to include the relation between stepped surfaces, valley incision and Cainozoic uplift within the Northern and Southern Scandes. The work has led to the identification of three domes within Fennoscandia of different heights viz. the Northern Scandes (2100 m), the Southern Scandes (2500 m) and the South Swedish Dome (400 m) and conclusions on their different uplift histories. A Neogene uplift of the Southern Scandes is also relevant to the relation between uplift, glaciation and valley development.

Another theme for the group, performed in co-operation with Göteborg and Karlstad Universities, is a study of the impact of deep weathering in relation to glacial erosion on the present relief on different palaeosurfaces. This is of importance for understanding the erosive capacity of glaciers over different types of substratum.

Present research focuses on the following subjects:

- Landforms and Cainozoic uplift around the North Atlantic
- The differentiation between glacial and fluvial erosion during the Neogene and Quaternary
- Glacial erosion in relation to inherited relief of different palaeosurfaces.
Bedrock outcrops, tors, on upland surfaces in the northern Swedish Mountains. These uplands normally have a distinctly non-glacial, relict, appearance, which has been corroborated by cosmogenic nuclide studies. The upper panel is a panorama from uplands between lakes Torneträsk and Rautas, and the lower panel from uplands south of lake Paitasjärvi. Photographs by A. Stroeven.

Reviewed articles


Other publications

Staff affiliations
Johan Kleman, Professor (see also 2.4)
Karna Lidmar-Bergström, Professor
Arjen Stroeven, Professor (see also 2.7)

Gunmar Hoppe, Professor emeritus

Clas Hättestrand, Docent
Jens-Ove Näslund, Docent (see also 2.2)
Bo Strömberg, Docent (retired)

Ingmar Borgström, PhD
Krister Jansson, PhD (Post-doc at University of Wales)
Ann-Cathrine Ulfstedt, PhD

Postgraduate students:
Johan Bonow, PhLic
Hernán De Angelis (see also 2.4)
Karin Ebert
Ola Fredin, PhLic
2.2. Glaciology

Tarfala Research Station
The glaciological studies carried out at Tarfala are focused on Storglaciären, and the most important programme is the mass balance study, which now has been running for 54 consecutive years. Additionally, the mass balance of 6 other glaciers and the glacier front positions of 20 glaciers are studied. The mass balance measurements include surveys on an annual basis. Direct climatic information is received from 6 weather stations run by the Department as a complement to the network of climate stations operated by the Swedish Meteorological and Hydrological Institute (SMHI). In order to understand the coupling between climate-induced mass changes and geometry changes in glacier extent and thickness, ice dynamic studies are performed. Ice velocity measurements are also used to increase the understanding of how glacier movement relates to changes in the hydrological regime. An extensive hydrological programme has been run both in the Tarfala valley and on the glaciers since the early sixties. At present the research efforts are focused on firm hydrology. Over the past decade radar application has been an important part of most glaciological programmes run by the group.

Antarctic research
The programmes outlined by the SCAR Global Change programme GLOCHANT, and the European Programme for ice coring in Antarctica (EPICA) govern the Antarctic projects. The GLOCHANT programmes concern present day climate development (ITASE), the mass balance of the continental ice sheet (ISMASS) and the Quaternary development of the ice sheet (ANTIME). Our efforts in these programmes are focused on firm coring, ice velocity measurements, and on radar soundings to map ice thickness and snow stratigraphy. During the winter 1997/98 we performed EPICA pre-site surveys within the SWEDARP initiative in Dronning Maud Land. Three 100-130 m long ice cores were sampled at two sites, one on the Polar Plateau and one near the coast.

Glacier modelling
We have three different ice numerical modelling programmes running; the modelling of valley glaciers, past Scandinavian ice sheets, and the present ice sheet in East Antarctica. These programmes are run in collaboration with ETH in Zurich, University of Maine, Geological Survey of Sweden, and the EPICA-community.

Research headlines for the Glaciology group
- Glacier mass balance
- Ice velocity measurements
- Ice temperature
- Snow and ice cores
- Glacial hydrology
- Glacier and landscape
- Remote sensing of snow and ice
The Riukojietna ice cap in northern Sweden is located on the border between Sweden and Norway and is the only ice cap-type glacier in Sweden. This photograph was taken on June 30, 2003, and shows the extremely negative mass balance experienced by glaciers in northern Scandinavia during 2003. The negative balance was the effect of a combination of low winter accumulation followed by a warm summer. Photograph by P. Jansson.

Reviewed articles


Other publications


Staff affiliations
Per Holmlund, Professor

Gunnar Østrem, Professor emeritus

Margareta Hansson, Docent
Regine Hock, Docent (see also 2.8)
Peter Jansson, Docent
Jens-Ove Näslund, Docent (see also 2.1)

Ian Brown, PhD (see also 2.4)
Cecilia Richardson-Näslund, PhD
Thomas Schneider, PhD

Postgraduate students:
Mattias de Woul, MSc (see also 2.8)
Maria Johansson
Ulf Jonsell
Per Klingbjer, PhLic
Rickard Pettersson
2.3. Climatology

The climate research group includes 5 staff members and seven postgraduate students and several undergraduate students engaged in term projects. Many projects involve collaborative research with scientists from other Swedish and foreign Universities. Our objectives are to document climate variability and derive quantitative information about past changes in climate using new high precision geochemical analysis on natural climate archives such as lake sediments, peat, trees and cave deposits.

**Long instrumental records and temperature reconstructions**

Previously unexplored temperature data obtained between 1802 and 1860 in northern Sweden has been combined with the temperature series from the synoptic station in Haparanda (from 1859 and onwards), to create a complete composite record for the period 1802 to 2002. A new timescale-dependent method for temperature reconstruction, utilising both high and low resolution temperature proxy data, over the past two millennia has been developed in collaboration with scientists at MISU and at the Hydrometeorological Research Centre of Russia.

**Lacustrine sediments**

We use high precision multi-proxy geochemical, physical and biostratigraphical analyses of lake sediments, to derived information about past changes in temperature and hydrological conditions. Centennial-millennial scale climate change during the last 2500 and 5000 years on Gotland and northern Lapland respectively, has been determined using oxygen, carbon and nitrogen isotopes in biogenic silica (diatoms), authigenic carbonate and organic material. Participation in the *Scottish Antarctic Scotia Expedition -2003* resulted in 40 m of lake sediments from South Georgia that will be jointly analyzed by scientists at INK and at different UK universities. The scientific aims of the expedition were to investigate environmental changes at South Georgia since the last glacial maximum. Sediment from the Empakaai Crater in northern Tanzania has been used to derive information about past changes in vegetation dynamics during the Pleistocene-Holocene transition.

**Speleothems**

Stable isotope, trace element and growth laminae analysis of well-dated speleothems permit reconstructions in temperature, precipitation and sometimes of vegetation. We carry out stalagmite based climate projects in Africa, Sweden and Romania. Data obtained from stalagmites from South Africa and Tanzania show regional climatic changes in the Late Pleistocene and Holocene.

**Dendrochronology**

In lower latitudes the potentials of dendrochronology are not yet fully explored. One PhD project investigates the potentials of carbon, oxygen and hydrogen isotope ratios in tropical tree cellulose, to provide records of changes in temperature, humidity and water sources in South Africa.

**Peatlands and soils**

The role of northern peatlands and soils in global terrestrial carbon cycle was introduced through the appointment of Peter Kurhy as professor in Physical Geography. Holocene peat accumulation in Canada and Russia is studied in relation to climate-, fire- and permafrost dynamics. Studies of Arctic and Arctic-Alpine ecosystems at the catchment level focus on such topics as environmental feedbacks to global warming and the consequences of global warming for sustainable development in the Arctic.
Reviewed articles
2. Holmgren, K., Lee-Thorp, J.A., Cooper, G.J., Lundblad, K., Partridge, T.C., Scott, L.,
   Sithaldeen, R., Talma, A.S. and Tyson, P.D. 2003: Persistent millennial-scale climatic
   variability over the past 25,000 years in southern Africa. Quaternary Science Reviews, 22:
   2311-2326.
   Scandinavian Mountains related to climate change. Arctic Antarctic and Alpine Research, 34:
   440-449.
4. Linderholm, H.W., Solberg, B.O. and Lindholm, M. 2003: Tree-ring records from central
   Fennoscandia: the relationship between tree growth and climate along a west-east
5. Rosqvist, G. and Schuber, P. 2003: Millennial-scale climate changes on South Georgia,
   Holocene lake sediment variability, northern Swedish Lapland. Journal of Quaternary Science,
   18: 757-767.
   interpretation of the Wonderkrater spring sediments and vegetation change in the
   savanna biome, Limpopo Province, South Africa. South Africa Journal of Science, 99: 484-
   488.
Other publications


Staff affiliations

Wibjörn Karlén, Professor
Peter Kuhry, Professor
Karin Holmgren, Docent (see also 2.6)
Stig Jonsson, Docent (retired)
Gunhild Rosqvist, Docent

Postgraduate students:
Håkan Grudd, PhLic
Christina Jonsson
Katarina Lundblad
Elin Norström
Lena Rubensdotter, PhLic
Maria Ryner
Hanna Sundqvist, PhLic
2.4. Remote Sensing/Geographical Information Systems

The research group undertakes basic and applied research in remote sensing and GIS using a variety of techniques and platforms covering diverse geographical regions. Our main research interests are:

- The use of remote sensing in mapping the glaciogenic landforms of former ice sheets
- The application of GIS and database technologies in palaeo-ice sheet reconstruction
- Geodesy, co-ordinate systems and global positioning
- Thermography and remote sensing of geological features
- Land degradation monitoring and vegetation change detection
- Classification methods for upland environments
- GIS and database integration in the digital version of the National Atlas of Sweden
- Knowledge-based digitisation of thematic maps
- Algal bloom and cyanobacteria monitoring in the Baltic Sea
- Optical modelling of water leaving radiance
- SAR backscatter analysis over snow and ice masses
- Interferometric observations of surface deformation and glacier velocity
- Airborne radiometry, aerial photography interpretation and photogrammetry

The group undertakes core research and also provides remote sensing support for other researchers. In particular we are involved in projects within ecological geography, glaciology, geomorphology and marine monitoring. International contacts are important to our work and we have established connections to researchers and institutions in Europe, Africa and North America. In the years to come we will focus on improved integration of remote sensing techniques in research applications in a variety of additional disciplines and the propagation of research and innovation into teaching. Our umbrella theme is the analysis, interpretation and representation of earth surface phenomena, climate, and environmental change at different temporal scales.

Reviewed articles


**Other publications**


**Staff affiliations**

Johan Kleman, Professor (see also 2.1)
Bertil Häkansson, Consulting professor

Leif Wastenson, Professor emeritus

Wolter Arnb erg, Docent
Bengt Lundén, Docent

Ola Hall, PhD
Susanne Kratzer, PhD
Maj-Liz Nordberg, PhD
Helle Skånes, PhD (see also 2.5)

**Postgraduate students:**
Hernán De Angelis (see also 2.1)
Marcus Liljeberg
Ove Rud
Per Syrén, PhLic
2.5. Ecological Geography

Current research
Research within ecological geography deals with the development and use of methods for analysing, visualising, and monitoring distribution and dynamics of vegetation/biotopes in space and time. Our primary focus is the Nordic region. The subject builds on transdisciplinary work mainly between the fields of physical geography, ecology, and human geography. Our goal is to improve knowledge of the ecological infrastructure in the landscape and its importance for biodiversity, ecosystem function, and sustainable nature resource management. We use applications within remote sensing and GIS on an array of sources ranging from aerial photographs and satellite imagery to historical maps and field data spanning the past 350 years.

The research focus during 2003 has been on the ecological content of the Swedish landscape, especially vegetation and biotopes in the mountains, the boreal forests, the hemiboreal forests of high natural value, suburban forests, and on the agricultural landscape.

- Establish criteria and indices for key biotopes in boreal forests by studies of spectral and textural features in CIR aerial photographs
- Develop methods for evaluating bird rich areas from habitat mapping
- Develop methods for inventory and monitoring of agricultural landscape, its structure and values for biodiversity, with special regard to grasslands
- Analyse the changes and dynamics of the mountain ecosystem during the last 20 years using CIR aerial photos and high resolution satellites, like Ikonos, and during historic time, 50 – 300 years ago, in part to develop change detection methods for monitoring
- Monitor the agricultural landscape with special focus of changes of importance for biodiversity – the LiM-project

The various studies have resulted in a comprehensive knowledge of the ecosystems and biotopes spatial distribution and temporal changes of importance for biodiversity. The results have been of importance for nature conservation and environmental monitoring in Sweden, and have been applied. The work implies collaboration with several authorities on local, regional and national levels. The study of key biotopes in forests has lead to a handbook for interpretation with stereogram in CIR aerial photos (under publication together with the Swedish forest company Stora Enso). In the collaboration with Swedish Environmental Protection Agency in the LiM (Landscape monitoring) project the research group has been overall responsible for the CIR aerial change interpretation and GIS handling, and for interpretation of about half of the total twenty test areas all over Sweden.

In collaboration with Swedish Environmental Protection Agency and Tyresta National Park we have produced a vegetation map of the National Park, including development of classification system, data collection by CIR aerial photograph interpretation, evaluation of accuracy by field control and cartographic work.

In collaboration with the regional planning office we have mapped, and presented in digital form, the distribution of old forests of high recreation value in the larger Stockholm area, by CIR aerial photography.

During the year we have taken part in an international research school with lectures on cultural landscape and data collection of biological values, (Darwin, Australia).
Old forest has a potentially high biodiversity value, because it contains elements such as dead trees and fallen trunks. These components are often biotopes for fungi, lichen, mosses, and several wood-living insects. Such forests are of high interest, not only for biodiversity assessments, but also for recreation purposes. We have mapped these forests using colour infrared aerial photos in all the semi-urban areas of Stockholm, to underpin regional planning decisions on recreational planning in the green belts of Stockholm. Photograph by M. Ihse.

Reviewed articles

Other publications

Staff affiliations
Margareta Ihse, Professor
Katarina Löfvenhaft, PhD (Post doc in South Africa)
Helle Skånes, PhD (see also 2.4)
Lars-Gunnar Brävander, PhLic

Postgraduate students:
Anna Allard, PhLic
Maria Bergström
Bo Eknert, PhLic
Merit Kindström
2.6. Tropical Geography

The tropical geography research group forms part of the Environment and Development Studies Unit (EDSU), run jointly by the Departments of Physical Geography & Quaternary Geology and Human Geography at Stockholm University. Since 2001, this has continued as part of the PLATINA research environment. At present more than 25 senior researchers and PhD students associated to EDSU/PLATINA are engaged in projects in the tropics, particularly in Africa.

The PLATINA research environment aims at developing landscape history research in eastern and southern Africa, through strengthening collaboration between scholars at both departments. The core theme of this research environment is the diverse ways in which African lands have been used throughout history, including the interactions between human, environmental and climatic factors shaping the landscape. The theme is explored through a series of multidisciplinary workshops. The aim is to build a consolidated base for interdisciplinary landscape history research. The research environment is concerned with issues, such as increased scientific understanding regarding land use, soil and water conservation and climate change; capacity building; integration of social and natural sciences and North-South collaboration.

Several studies deal with processes in the landscape in a long as well as a short perspective, exemplified by climate variations and changes in vegetation, soils and landforms. Furthermore, small scale agriculture in the study areas, in particular its structure, development and sustainability, is in focus of our research. Our studies also document how people adapt to the specific environmental conditions and how they are affected by environmental change. The various studies have resulted in a comprehensive knowledge of how natural resources are understood and utilised by local people, the causes behind deterioration of land and water resources and the effects seen in the landscape.

Tropical studies are executed in collaboration with researchers from universities in several countries. A number of the studies form part of collaboration between the Geography Departments at Stockholm University and the universities in Dar es Salaam in Tanzania, Gaborone in Botswana, Durban and Cape Town in South Africa, the Desert Research Foundation of Namibia in Windhoek, Namibia and the Wondo Genet College of Forestry in Ethiopia. Three African students were registered for the PhD programme in 2003.

Investigation of a soil profile in a fossil beach ridge in Engaruka Basin, northern Tanzania. Research on environmental history in northern Tanzania during the last 1000 years is carried out in relation to archaeological studies of the fossil land use system at Engaruka. Photograph by L.-O. Westerberg.
Reviewed articles


Other publications


Staff affiliations

Carl Christiansson, Professor
Karin Holmgren, Docent (see also 2.3)
Peter Schlyter, PhD
Lars-Ove Westerberg, PhD

Postgraduate students:
Anders Fahlén, PhLic
Gessesse Gebreegziabher
Patrik Klintenberg
Reuben Sebego
2.7. Quaternary Geology

Research within Quaternary Geology at Stockholm University is focused upon the study of biological, chemical and physical processes and changes during the younger part of the Quaternary time period. The overall aim is to gain an understanding of the temporal and spatial variability and underlying causes of past climatic and environmental changes. We employ predominantly continental stratigraphies, such as lake sediments, peat bogs, glacial sediments and archaeological deposits. A multi-disciplinary approach, combined with high-resolution correlations to other archives, facilitates detailed palaeoenvironmental and palaeoclimatic reconstructions on local and regional scales. The variety of individual research projects within Quaternary Geology can be summarized under the following main research topics:

- Stratigraphy and chronology of Swedish Weichselian and pre-Weichselian glacial, interstadial and interglacial sequences; vegetation and climate development during the Weichselian
- Palaeoenvironmental and palaeoclimatic reconstructions during the Late Glacial and/or Holocene based on lake and/or peat stratigraphies (ongoing studies in Sweden, Romania, Russia, Svalbard, Faeroe Islands, western Canada, Sri Lanka)
- Geoarchaeological investigations (ongoing studies in Sweden and Mozambique)
- High-resolution correlation of land-ice-marine records using tephrochronology
- Long-term glacial landscape changes using cosmogenic isotope techniques

The Swedish varve chronology or Swedish Time Scale has been the subject of intensive research for many years, and most of the older varve diagram measurements are now also available in a database. Over the past years, the group has developed strong expertise in tephrochronology, which is an ideal tool to synchronise diverse palaeoclimatic archives, such as marine sediments, lacustrine sediments, and ice cores.

Quaternary Geology has national research networks with universities and research groups at Lund, Uppsala, Göteborg and Umeå, and international collaboration with universities and research groups in Denmark, Norway, Svalbard, Iceland, Finland, Russia, Romania, Estonia, Lithuania, Latvia, UK, France, Holland, Switzerland, Canada, USA, Australia, Sri Lanka and Mozambique. Based on this extensive network, we frequently accommodate guest researchers and students from abroad. We also regard it as an important mission to further higher education and research in Eastern Europe, by offering students the possibility to participate in undergraduate and graduate courses and researchers to use our facilities. Currently we are engaged in a scientific student and staff exchange program with Simon Fraser University in Canada. Participation in several European research networks, such as INTIMATE (INTegration of Ice core, MArine and TErrrestrial deposits) and LAMSCAN (Detecting rapid environmental changes by studies of annually LAMinated lake sediments in northern SCANdinavia: Linkages to the North Atlantic Ocean circulation) are just a few examples.

Research funding has been obtained, among others, from the Swedish Research Council, the Swedish Institute, The Royal Swedish Academy of Sciences, The Swedish Foundation for International Cooperation in Research and Higher Education, the Nordic Council of Ministers, and the National Science Foundation in the USA.
Quarry at Klyftamon, in the Billingen drainage area. The Baltic Ice Lake catastrophically lowered when the ice sheet retreated beyond the northern tip of Billingen, thus scouring the landscape by fluvial (sub-marine) erosion. Pockets of sediments survived, however, such as in this quarry. Photograph by A. Stroeven.

Reviewed articles
6. Heimdahl, J., Karlsson, P. and Menander, H. 2003: Arkeologiskt och geologiskt samarbete i fält, erfarenheter från den arkeologiska undersökningen i kv Konstantinopel,


Other publications


Staff affiliations

Årjen Stroeven, Professor (see also 2.1)
Barbara Wohlfarth, Professor

Jan Lundqvist, Professor emeritus
Urve Miller, Professor emeritus
Bertil Ringberg, Professor emeritus
Jan Risberg, Docent  
Ann-Marie Robertsson, Docent  
Stefan Wastegård, Docent  
Helena Alexanderson, PhD  
Lars Erik Brunnberg, PhD  
Siwan Davies, PhD  
Jan Kristiansson, PhD  
Per Westman, PhD

Postgraduate students:  
Anders Borgmark, PhLic  
Amélie Darracq (see also 2.8)  
Angelica Feurdean, MSc  
Jens Heimdahl, PhLic  
Martina Hättestrand  
Gull Olli, PhLic  
Gun Pettersson, PhLic  
Rathnasirit T. Premathilake, PhLic  
Yoshihiro Shibuo, MSc (see also 2.8)  
Daniel Veres, MSc
2.8. Hydrology and water resources

The research group in hydrology and water resources was established in 2003, by the introduction of a new guest professorship in hydrology. The group now includes three senior research staff members and four PhD students, and works in close collaboration with the engineering hydrology and hydrogeochemistry research group at the Royal Institute of Technology (KTH), including additional three associated PhD students.

A main research aim is to combine hydrological and biogeochemical process investigations and modelling with analysis of human and engineered system impacts on natural waters and identification of environmentally and socio-economically sustainable scenarios for water management. Current main research areas include:

Main research areas
- GIS-based hydrologic modelling;
- Groundwater-seawater interactions;
- Glacier hydrology (see also 2.2)
- Reactive solute transport and coupled physical-biogeochemical processes in different hydrological systems, including coupled subsurface and surface water in entire catchments;
- The role and handling of hydrological pollutant transport, and associated prediction uncertainty, in environmental risk analysis, economic optimisation of pollutant abatement measures, and integrated water resource management.

Application problem examples
- Environmental impact of mining waste and mined ground; Coastal nutrient and pollutant transport from catchments; Potential surface hydrological impact of nuclear waste repositories; Modelling glacier runoff and its response to future climate change; Integrated water resource management policy.

Study site examples
- Swedish: Norrström basin, Dalälven basin, Forsmark catchment, Tarfala research station.
- International: Aral Sea region, Neman River basin, Daugava River basin, Neckartalaue industrial area in Stuttgart.

Reviewed articles
Other publications

Staff affiliations
Georgia Destouni, Professor
Regine Hock, Docent (see also 2.2)
Jerker Jarsjö, PhD

Postgraduate students:
Amelie Darracq, MSc (see also 2.7)
Fredrik Hannerz, MSc
Yoshihiro Shibuo, MSc (see also 2.7)
Mattias de Woul, MSc (see also 2.2)

Associated PhD students at KTH
Carmen Prieto, MSc
Georg Lindgren, MSc
Christian Baresel, MSc
3. Education

3.1 Undergraduate Programme

The most important goal of the undergraduate programme at the Department of Physical Geography & Quaternary Geology is to offer a high quality education, reflecting the research profile of the Department, and to meet society's need for sound theoretical competence. The education also encompasses advanced courses in physical geography and Quaternary geology. The undergraduate education is characterised by a comprehensive view, its breadth, and a scientific approach. The Department carries out undergraduate education in Geography, Earth Sciences, Biology-Earth Sciences, and in Environmental Sciences. Every year around 1500 students attend our undergraduate education programme.

Geography education is planned in accordance with the structure of the Geography programme and it includes courses ranging from 20 credits to 100 credits (one credit is roughly the equivalent of one week of full-time study):

- Geography 20 credits: basic course in geography
- Geography 21-40 credits: intermediate course in geography
- Geography 41-60 credits: advanced course in geography
- Geography 61-80 credits: specialised course in geography
- Geography 81-100 credits: specialised course in geography

The departments of Physical Geography & Quaternary Geology and Human Geography collaborate within the geography education. Every year 400-600 students attend the Geography programme. They study geography either as stand-alone courses outside the Geography programme or as a part of their theoretical education within the teachers' training programme at the Stockholm Institute of Education. Seen over a period of ten years, the influx of students has increased. One reason for this increase is probably the elevated interest in, and need for knowledge, in the field of geography. Another reason is the return of geography as an independent subject at senior high-school level.

Courses in the Earth Science programme are carried out in collaboration with the Department of Geology and Geochemistry. The courses can be taken within the Earth Science programme or as stand-alone courses outside the programme. The Earth Science programme encompasses 160 credits but final degrees are either 120 or 160 credits. Within the Earth Science programme, the first 80 credits consist of compulsory courses where students learn the basics of Earth evolution, geology, geomorphology, soils, hydrology, meteorology, climatology, remote sensing and Geographical Information Systems (GIS). For the remaining 40 or 80 credits of the programme, the students can specialise within the earth science spectrum. The Department offers advanced courses in historical geomorphology, glaciology and glacial geomorphology, climatology, palaeoclimatology, palaeoecology, Scandinavian Quaternary geology, risk assessment in geosciences, hydrology, GIS for earth scientists, cartography and map production, remote sensing, geographic analysis and visualisation in GIS, ecological geography, and natural resources, environment, and land use in the tropics. The programme provides the prospective geoscientist with an overall breadth to be used in working with, for example, nature and environmental control, geoscientific examinations, planning, and research.
The Biology-Earth Science programme encompasses 160 credits but final degrees are either 120 or 160 credits. The programme is carried out in collaboration with the Department of Biology. The programme starts with a basic education of 110 credits consisting of 40 credits of earth sciences, 60 credits of biology and 10 credits of environmental conservation. The distinctive feature of the programme is the integration between earth science and biology. Earth sciences include geology, Quaternary geology, climatology, geomorphology, cartography, aerial photograph interpretation and GIS, hydrology, and environmental and nature control. After the basic education the student has the option to do a 10 credits degree projekt towards a 120 credits degree. If the students wish to opt for a 160 credits degree, they can either take the Environment and Health Protection course of 40 credits or other advanced courses.

The Master programme in Environment and Health Protection accepts students with 120 credits in Biology, Chemistry, Earth Sciences or Biology-Earth Sciences. The programme consists of four sections of 10 credits each, Environment Studies and Health Protection, Environment Technology, Law and Planning, and a degree project in Environment and Health Protection.

"The Science communication course” of 20 credits is a specialised course, which offers a generally deepened understanding of the role that scientific research plays in society and the problems attached to it, and offers a practice in the style of scientific writing.

The Department of Physical Geography & Quaternary Geology offers an Environmental Science programme of 50 credits. The following courses of 10 credits each are included: 1. Environmental Conservation, basic course, encompasses different aspects of the environment such as air-, land-, and water management, environmental control, and environmental legislation. 2. International conservation, with a global emphasis on environmental conservation issues. This course provides an excursion of one week to a European country. 3. Environmental Conservation, intermediate course, with an emphasis on Sweden. 4. Energy and environment, intermediate course. 5. Environmental Conservation Project, advanced course, requires that students provide environmental knowledge to a large project covering the whole course. The objective is to define an environmental impact assessment (MKB) for a current environmental project on the basis of each student's work.

Advanced and intermediate summer courses:

"The Tarfala course” of 5 credits is a glaciology field course held at the Tarfala Research Station, northern Sweden. The field-based part of the course introduces different methods of measurement and analysis and the study of glacial or periglacial landscapes and processes.

"The Abisko course” of 5 credits emphasises the Scandinavian mountains in respect of bedrock geology, as well as Quaternary geology, geomorphic processes and geologic and geomorphologic evolution.
3.2. Postgraduate Programme

The postgraduate education program at the Department of Physical Geography and Quaternary Geology, Stockholm University, includes courses, seminars, excursions and the writing and defence of a Licentiate and a Doctoral thesis. Students can choose to either graduate in “Geography with emphasis on Physical Geography” or in “Quaternary Geology”. Postgraduate students are expected to participate in an annual “symposium” within the Department where they present their progress (research and education) and plans for the coming year(s). The success of our postgraduate programme is reflected in the amount and quality of Doctoral theses produced (see section 4 in this report for a list of recent theses). Below, we will tabulate currently enrolled students and their projects within each examination subject.

Geography with emphasis on Physical Geography:

Anna Allard
Monitoring vegetation changes in Swedish mountains by remote sensing methods

Maria Bergström
The use of natural resources in a Swedish parish- comparison between historical periods from Neolithicum to recent time

Johan Bonow
Palaeosurfaces and palaeovalleys on North Atlantic glaciated passive margins -reference forms for conclusions on uplift and erosion

Hernán De Angelis
Paleo-ice stream dynamics and evolution in the northwestern Laurentide Ice Sheet

Mattias de Woul
Modelling of glacier mass balance - Sensitivity and response to predicted future climate changes

Karin Ebert
Cenozoic landscape development in northern Fennoscandia. Geomorphologic interpretation within a GIS-framework

Bo Eknert
Changing biotopes in the agricultural landscape and the effects of the bird fauna

Anders Fahlén
Resource management in mountainous ecosystems in Southeast Asia

Ola Fredin
Mountain centred ice sheets in Fennoscandia

Gessesse Gebreeziabher
Environmental Change during the Last Century: the Case of Awassa Watershed, Southern Ethiopia

Håkan Grudd
Tree rings and Holocene climate changes in northern Sweden

Fredrik Hannerz
Dynamic GIS based modelling of catchment solute transport, an information perspective approach

Maria Johansson
Snow mapping in mountainous areas by the use of remote sensing microwave techniques
Ulf Jonsell  
_Sulphate in the climate system over glacial cycles_  

Christina Jonsson  
_Stable isotopes in lake sediments from Lappland_  

Merit Kindström  
_Biodiversity and landscape ecological planning in the boreal forest in Sweden_  

Per Klingbjer  
_Glacier and climate in northern Sweden during the last 200 years_  

Patrick Klintenberg  
_Analysing environmental change in arid and semi-arid Namibia using environmental indicators_  

Marcus Liljeberg  
_Remote sensing in industrial affected coastal water_  

Katarina Lundblad  
_Geochemical studies of stalagmites and coral skeletons in Tanzania_  

Elin Norström  
_Reconstruction of past climate variability in South Africa through studies of trees and pollen_  

Rickard Pettersson  
_Temperature distribution in polythermal glaciers and its implications on glacier system_  

Lena Rubensdotter  
_The effect of different geomorphological processes on lake sedimentation, and their implications for Holocene palaeoclimatic reconstructions_  

Maria Ryner  
_Climate and environmental change in northern Tanzania_  

Reuben Sebego  
_An investigation on the causes of the spatial distribution of the mopane tree in eastern Botswana_  

Hanna Sundqvist  
_Environmental factors affecting speleothem growth, recorded from Swedish speleothems_  

**Quaternary Geology:**  

Anders Borgmark  
_Climate variations in Sweden during the Holocene, variations in peat decomposition as a climatic archive_  

Amélie Darracq  
_Coupled modelling of reactive solute transport and geochemical reactions in subsurface and surface water systems_  

Angelica Feurdean  
_Palaeoenvironment and palaeoclimate in northwestern Romania during the past 15,000 years_  

Jens Heimdal  
_Plant macrofossils and lithostratigraphy as tools in tracing the urban archaeological, alluvial environment in two Swedish towns_
Martina Hättestrand
*Vegetation and climate in N Sweden during Weichselian Interstadials, as compared with early Holocene and recent pollen floras*

Gull Olli
*Biogenic silica and phosphorous accumulation in sediments as indicators of eutrophication in a bay of Lake Mälaren*

Gun Pettersson
*Fe-rich soils in southern Sweden, their formation and application for iron production during the Viking Age and Medieval time*

Rathnasirit T. Premathilake
*Late Quaternary climate change and human impact on the Horton Plains, central Sri Lanka*

Yoshihiro Shibuo
*GIS-based hydrological modelling -coupling groundwater-surface water*

Daniel Veres
*Terrestrial response to Dansgaard-Oeschger cycles and Heinrich events during OIS 2 and 3*

**List of examinations for 2003**

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anna Allard</td>
<td>6 Jun 2003</td>
<td>PhD, Physical Geography</td>
</tr>
<tr>
<td>R.T. Premathilake</td>
<td>4 Jun 2003</td>
<td>PhD, Quaternary Geology</td>
</tr>
<tr>
<td>Jens Heimdahl</td>
<td>23 Jan 2003</td>
<td>PhLic, Quaternary Geology</td>
</tr>
<tr>
<td>Hanna Sundqvist</td>
<td>17 Sep 2003</td>
<td>PhLic, Physical Geography</td>
</tr>
</tbody>
</table>
4. Dissertations

The Department of Physical Geography, Stockholm University,

MALIN M. STENBERG, 2000. Spatial variability and temporal changes in snow chemistry,
Dronning Maud Land, Antarctica. Dissertation No. 15. Fakultetsopponent: Prof. Jon-Ove
Hagen

No. 16. Fakultetsopponent: Prof. Peter Fisher

The Department of Physical Geography and Quaternary Geology, Stockholm University
Thesis in Geography with emphasis on Physical Geography (2001-2002)

of the past and consequences for the future. Dissertation No. 17. Fakultetsopponent:
Dr. Roy Haines-Young

CECILIA RICHARDSON-NÄSLUND, 2001. Spatial distribution of snow in Antarctica and other
glacier studies using ground-penetrating radar. Dissertation No. 18. Fakultetsopponent:
Prof. Robert W. Jacobel

No. 19. Fakultetsopponent: Prof. Andrew Fountain

HANS W. LINDERHOLM, 2001. Temporal and spatial couplings between tree-ring variability and
climate in Scandinavia. Dissertation No. 20. Fakultetsopponent: Dr. Astrid Ogilvie

MARIANNE I. LAGERKLINT, 2001. Marine multi-proxy records of late Quaternary climate change
from the Atlantic Ocean. Dissertation No. 21. Fakultetsopponent: Dr. Lloyd H. Burckle

22. Fakultetsopponent: Prof. William Adams

ANDERS CLARHÅLL, 2002. Glacial Erosion Zonation - Perspectives on Topography, Landforms,
Processes and Time. Dissertation No. 23. Fakultetsopponent: Dr. Chris Clark

Dissertation No. 24. Fakultetsopponent: Dr. Andrée Bolduc

BJÖRN E. GUNNARSON, 2002. Holocene climate and environmental fluctuations from subfossil
pines in central Sweden. Dissertation No. 25. Fakultetsopponent: Prof. Mike G. L.
Baillie

KATARINA. LÖFVENHAFT, 2002. Spatial and temporal perspectives on biodiversity for physical
Fakultetsopponent: Prof. Jan Bengtsson

ANNA ALLARD, 2003: Vegetation changes in mountainous areas - A monitoring methodology
based on aerial photographs, high-resolution satellite images, and field investigations.
Dissertation No. 27. Fakultetsopponent: Doc. Timo Helle

LAIMDOTA KALNINA, 2001. Middle and Late Pleistocene environmental changes recorded in the Latvian part of the Baltic Sea basin. Dissertation No. 9.


5. Conferences and Seminars

**January**

Skånes:  
*BioHab workshop I in Madrid, Spain and Lisbon, Portugal*

**February**

Bonow:  
*Neogene uplift, erosion and redeposition in West Greenland, GEUS Köpenhamn, Project meeting*

Hock:  
*MAGICS/IASC workshop, Sakopane, Poland*

**March**

Bonow, Lidmar-Bergström & Stroeven:  
*Landform evolution along the northern passive continental margin- the relative importance of tectonics and climate, Stockholm University, Sweden*

Brunnberg:  
*Third International Limnogeology Congress, Tucson, Arizona, U.S.A.*

Ihse:  
*Vegetationskartering över Tyresta Nationalpark- Tyresta National Park’s seminarium 17 March, Tyresta, Sweden*

Ihse:  
*Linné symposium, Royal Academy of Science, 24 March, Stockholm*

Ihse & Johansson:  
*Biohab European Workshop- habitat review and definition, Roskilde (Tune), Danmark*

P. Jansson:  
*World Water Forum 3, Kyoto, Japan*

**April**

Destouni, Hansson, Stroeven & Wohlfarth:  
*EGS/EUG/AGU conference, Nice, France*

Fredin:  
*33rd Annual Arctic Workshop, Tromso, Norway*

Holmgren & Wastegård:  
*Holocene dating methods, chronology and age modelling, HOLIVAR workshop, Zeist, the Netherlands*

Holmlund:  
*Arctic Science Summit Week, Kiruna, Sweden*

Ihse:  
*Vindkraft i landskapet i medvind och motvind, Royal Academy of Forestry and Agriculture, Stockholm, Sweden*

Jarsjö:  
*The Aral Sea Basin Conference, Bukhara, Uzbekistan*

**May**

Christiansson:  
*Geography Undergraduate Education Planning and Policy Conference, Stockholm*

Destouni & Jarsjö:  
*International Liège Colloquium on Ocean Dynamics, ‘Dying and Dead Seas’, Liège, Belgium*

Eknert, Ihse, Schlyter & Skånes:  
*IALE Sweden annual meeting, Hallands Väderö/Hovs Hallar, Sweden*

Näslund:  
*Working Group on Coastline and Neotectonics, Göteborg, Sweden*
June


Holmgren: *Naturvetenskap och arkeologi. Krøperupsymposium*, Krøperup stiftelsen, Arlöv, Sweden

M. Hätttestrand & Robertsson: *Nordic Arctic Research Program (NARP)*, Iceland

K. Jansson: *CANQUA - CGRC 2003*, Halifax, Canada

Lidmar-Bergström: *Landforms and uplift in South Norway. Interdisciplinary excursion. Arranged by Karna Lidmar-Bergström, Stockholm, Elen Roaldset, Oslo and Jan Sulebak, Bergen. 22 participants (7 PhD students and 15 senior researchers) from Geology, Geophysics and Physical Geography in Sweden, Norway and Denmark.*

Wastegård: *NORDLINK workshop*, Tórshavn, Faroe Islands

July

Davies, C. Hätttestrand, Kleman, Lundqvist, Rosqvist & Wastegård: *XVIth INQUA Congress Reno*, U.S.A.

Ihse & Skånes: *IALE Summer School in Darwin, Australia*

Ihse, Löfvenhaft & Skånes: *IALE World Congress in Darwin, Australia*

Klintenberg: *7th International Rangelands Congress*, Durban, South Africa

Löfvenhaft: *International Workshop on Urban Ecology*, Melbourne, Australia

August

Darracq & Hannerz: *7th International Specialised Conference on Diffuse Pollution and Basin Management*, Dublin, Ireland

Holmlund: *International Symposium on Antarctic Glaciology*, Milan, Italy

Kratzer: *Baltic Sea Science Congress*, Helsinki, Finland

Nordberg: *IGU-COMLAND CONFERENCE*, Reykjavik, Iceland

Rosqvist: *9th International paleolimnology symposium*, Espoo, Finland

September

Bonow & Lidmar-Bergström: *Nordic Society for Clay Research, Nässjö, Sweden, Annual meeting*

Christiansson: *NCCR Site Meeting, Swiss National Science Foundation, Bishkek, Kyrgyzstan*

Christiansson: *SNSF Review Panel Evaluation and Monitoring Meeting, Samarkand, Uzbekistan*

Holmgren: *IGBP national meeting, Uppsala, Sweden*

Holmgren & Öberg: *World System History and Global Environmental Change. International Conference, Land, Sweden*

Holmlund: *Climate change and its impacts on terrestrial ecosystems and landscapes of the Arctic: insights, challenges and ways forward, KVA, Abisko, Sweden*
Ihse: Ecosystem services in European agriculture in theory and practice - Royal Academy of Forestry and Agriculture Bertebos international conference, Falkenberg
Ihse: Sustainable agricultural landscape, Royal Academy of Sciences, Stockholm, Sweden
Ihse & Johansson: BioHab workshop III and ECOLAND meeting, Vienna, Austria

October
Bonow: Neogen landhævning i Vestgrønland - tolkning baseret på analyse af geomorfologi og fissionsspor, Madpakke-seminarieserien vid Geocentret, Köpenhavn
Christiansson: Centrum för biologisk mångfald, Naturvårdskonferens. Jönköping
Christiansson: Conference on Development Cooperation with Namibia. Sida, Stockholm
Davies, Klingbjør & Rosqvist: MUSCAD workshop, “Climate variations in Sweden during the past 2000 years”, Uppsala University, Sweden
Hansson: EPICA Workshop, San Feliu de Guixols, Spain
Hansson & Jonsell: “Polar Regions and Quaternary Climate” EURESCO conference, San Feliu de Guixols, Spain
Hansson & Jonsell: NGRIP Workshop and Conference, Copenhagen, Denmark
Heimdahl: 5:e Nordiska stratigrafimötet, Lund, Sweden
Hock & Holmlund: Climate, Water and Energy, Minister council of the Nordic Countries, Reykjavik, Iceland
M. Hättestrand: POLLANDCAL workshop, Bergen, Norway

November
M. Hättestrand & Robertsson: Nordic Arctic Research Program (NARP) workshop, Sandhamn, Sweden
Johansson: BioHab workshop IV in Wageningen, the Netherlands
Stroeven: GSA Annual, Seattle, U.S.A.

December
Klintenberg: Land Degradation Assessment in Drylands (LADA) Regional workshop on land degradation assessment, Dakar, Senegal
6. Financial Support

<table>
<thead>
<tr>
<th>RESEARCH GRANT RECEIVER</th>
<th>FUNDING AUTHORITY</th>
<th>PROJECT</th>
<th>AMOUNT FOR 2003</th>
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<tbody>
<tr>
<td>Arnberg Metria</td>
<td></td>
<td>RESE - Agreement pertains to publication of a special issue of the Royal Swedish Academy of Sciences environmental journal Ambio on the subject of: Remote Sensing for the Environment.</td>
<td>400 000</td>
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<td>Brown C-Core, CA</td>
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<td>&quot;Northern View&quot; Project - Global Monitoring for Environment and Security program.</td>
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<td>Christiansson UDSM</td>
<td></td>
<td>Man-Land Interrelations in Semi-Arid Tanzania.</td>
<td>112 625</td>
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<td>Destouni FORMAS</td>
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<td>Modelling solute transport in catchments - integrating soil ground and surface water.</td>
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<tr>
<td>Destouni FORMAS</td>
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<td>Modellering av reaktiv transport i naturliga, heterogena grund-, mark- och ytvatten: La SAR-PHREEQC-metoden. (Garanterat t.o.m. 2004).</td>
<td>624 000</td>
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<td>Destouni VR</td>
<td></td>
<td>Modelling submarine groundwater discharge.</td>
<td>330 849</td>
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<td>Hansson NFR</td>
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<td>Ice core studies within EPICA of glacial-interglacial variations in climate and atmospheric composition. (Extension of Junior research position).</td>
<td>496 816</td>
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<td>Hansson EU</td>
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<td>EVK2-CT-2000-00077 - EPICA III.</td>
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<td>Hansson VR</td>
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<td>Djupiskärneanalyser av klimatvariationer över istidscykler. (Garanterat t.o.m. 2004).</td>
<td>325 000</td>
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<td>Hock VR</td>
<td></td>
<td>Framtid klimatförändringars påverkan på glaciarers avsmältning och avrinning. (Garanterat t.o.m. 2005).</td>
<td>605 800</td>
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<tr>
<td>Hock VR</td>
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<td>Framtid klimatförändringars påverkan på glaciarers avsmältning och avrinning. Projektbidrag.</td>
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<tr>
<td>Holmgren VR</td>
<td></td>
<td>Klimatets variationer i tid och rum. (Garanterat t.o.m. 2004).</td>
<td>650 000</td>
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<td>Holmgren SIDA</td>
<td></td>
<td>Reconstruction of past climate variability in Southern Africa through analyses of trees and pollen. (Garanterat t.o.m. 2004).</td>
<td>450 000</td>
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<td>Holmlund VR</td>
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<td>Klimatets växlingar och dess påverkan på glaciarer och permafrost i norra Sverige. (Garanterat t.o.m. 2004).</td>
<td>202 800</td>
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<td>Håkansson RS</td>
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<td>Calibration/Validation activities of ENVISAT/MERIS sea products.</td>
<td>557 700</td>
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<td>Hättestrand VR</td>
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<td>Senkvartär nedsliningshistoria i norra Fennoskandia och Kolahalvön. (Garanterat t.o.m. 2004).</td>
<td>156 000</td>
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<td>Ihse/RS</td>
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<td>ENVISAT-AO-PROJEKT: Synergi of ENVISAT ASAR &amp; MERIS Data for landscape classification.</td>
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<td>Ihse NV</td>
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<td>Tryckning av vegetationskarta Tyresta Nationalpark.</td>
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<td>Slutkontroller och rättningar av digitaliserade referensområden i samarbete med LMV/Metria.</td>
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<td>Jansson, P. VR</td>
<td></td>
<td>Variationer i kalla ytskiktets tjocklek och dess effekt på polyterma glaciarers dynamik. (Garanterat t.o.m. 2004). (Garanterat för 2000-2001)</td>
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<td>Jansson, P. SKB</td>
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<td>Framtagning av paleogeohydrologisk databas som skall användas vid analyser av subglacial hydraulik enligt offert av 2003-10-22.</td>
<td>185 000</td>
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<td>Jarsjö MISTRA</td>
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<td>Mistra-projektet MIMI.</td>
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<td>Using PCRaster for GIS-based modelling of surface water hydrology in the Forsmark area.</td>
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<td>Karlén</td>
<td>NFR</td>
<td>Holocene changes in the climate.</td>
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<td>RAÄ</td>
<td>Pollenanalytisk arbete (030601–040630).</td>
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<td>Pollenanalytisk arbete/prospektering - Fägelsta.</td>
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<td>Kleman</td>
<td>VR</td>
<td>Paleo-istrommars rums-tidsfordelning och sedimenttransportdynamik - istrommar med oceankontakt i den Laurentiska inlandsisen. (Garanterat t.o.m. 2005).</td>
<td>351 520</td>
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<td>Kratzer</td>
<td>RS</td>
<td>Deltagande i workshop &quot;Remote Sensing and bio-optical modelling of the Baltic sea&quot; i Helsingfors 2003-08-28–29.</td>
<td>6 000</td>
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<tr>
<td>Lidmar-Bergström/ Näslund/ Olmo</td>
<td>NFR</td>
<td>Palaeorelief, saprolites and uplift/denudation of cratons.</td>
<td>184 408</td>
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<td>Löfvenhaft</td>
<td>FORMAS</td>
<td>Verktyg för att bedöma påverkan på biotopresiliens i fysisk planering. Ex från Stockholm, Sverige. Bidrag till internat, workshop och IALE världskongress.</td>
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<td>Näslund/ P. Jansson</td>
<td>SKB</td>
<td>Inlandsisars bottenförhållanden och hydrologi. (Garanterat 2004-2006).</td>
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<td>Risberg</td>
<td>Granholms Stiftelse</td>
<td>Nordic diatomist meeting.</td>
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<td>Förstudie av marina sedimentprover.</td>
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<td>Visuell dokumentation av två sedimentkärnor fr Simpevarpsområdet mm.</td>
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<td>Schlyter</td>
<td>Skånes Luftvårdsförbund</td>
<td>Statistisk och spetisk analys av luftföroreningarnas inverkan på skogen i Skåne.</td>
<td>119 200</td>
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<td>Skånes</td>
<td>FORMAS</td>
<td>Landskapets &quot;minne&quot; som nyckel till förståelsen av människans inverkan på biotoper och potentiell biodiversitet. Utveckling av integrerad fjärranalysmetodik. (Garanterat t.o.m. 2004).</td>
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<td>Skånes</td>
<td>FORMAS</td>
<td>Markanvändningstistoriskas profiler - verktyg att hantera människans påverkan på biotopresiliens. Bidrag till IALE världskongress 2003 och vetenskaplig artikel.</td>
<td>45 000</td>
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<td>Skånes</td>
<td>NMD (NMR)</td>
<td>Workshop kring harmonisering av nordisk habitatklassificering i EU perspektiv - Workshop on harmonisation of Nordic habitat classifications in an EU perspective.</td>
<td>100 000</td>
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<td>Stroeven</td>
<td>VR</td>
<td>En simulering av den Skandinaviska inlandsisen under en nedisningscykel med hjälp av kosmogena radionuklider och en numerisk inlandsismodell.</td>
<td>390 000</td>
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<td>Wastegård</td>
<td>NFR</td>
<td>Tephrochronology and climate variation around the north Atlantic during the Late Weichselian and the Holocene.</td>
<td>123 662</td>
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<td><strong>Research Grant Receiver</strong></td>
<td><strong>Funding Authority</strong></td>
<td><strong>Project</strong></td>
<td><strong>Amount for 2003</strong></td>
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<td>Wastenson</td>
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<td>OAERRE - Oceanographic Applications to Eutrophication in Regions of Restricted Exchange.</td>
<td>441,092</td>
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<td>Wohlfarth</td>
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<td>Datering o paleoklimatisk analys av kortvariga klimatförändringar under de sista 2000 åren.</td>
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<td>Wohlfarth</td>
<td>STINT</td>
<td>Samarbete m John Clague, Earth Sciences, Simon Fraser Univ, Canada.</td>
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<td>Skånes/Ihse</td>
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<td>BIOHAB (Biodiversity and Habitats).</td>
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<td>569,000</td>
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<td>Gotland</td>
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<td>224,068</td>
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<td>Westman/Säarkin</td>
<td>Lärandets galleria</td>
<td>Utveckling av geografisk IT med inriktning mot distansutbildn i GIS o GIS-tillämpningar inom marksanering.</td>
<td>75,000</td>
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<td><strong>Total</strong></td>
<td><strong>Approved research grants 2003</strong></td>
</tr>
</tbody>
</table>
7. Staff (31 December 2003)

Department Chairperson/Head: Professor Johan Kleman
Vice Chairperson: Associate professor Karin Holmgren

**PROFESSORS**

Christiansson, Carl  
professor of Physical Geography,  
particularly Tropical Soil Conservation

Destouni, Georgia  
guest professor, professor of Hydrology

Holmlund, Per  
professor of Glaciology

Ihse, Margareta  
professor of Ecological Geography

Karlen, Wibjönn  
professor of Physical Geography, director of  
postgraduate studies (until Jun 31)

Kleman, Johan  
professor of Remote Sensing

Kuhry, Peter  
professor of Physical Geography

Lidmar-Bergström, Karna  
professor of Physical Geography

Stroeven, Arjen Peter  
professor of Physical Geography, director of  
postgraduate studies (since Jul 1)

Wohlfarth, Barbara  
professor of Quaternary Geology

**ACADEMIC STAFF**

**Associate Professors (PhD, Docenter)**

Arnberg, Wolter  
Senior lecturer

Hansson, Margareta  
Senior lecturer

Hock, Regine  
Research associate

Holmgren, Karin  
Senior lecturer

Hättestrand, Clas  
Senior lecturer, also research associate

Jansson, Peter  
Senior lecturer

Lundén, Bengt  
Senior lecturer, also professor at Oslo University

Näslund, Jens-Ove  
Senior lecturer

Risberg, Jan  
Senior lecturer

Robertsson, Ann-Marie  
Senior lecturer

Rosqvist, Gunhild  
Senior lecturer

Wastegård, Stefan  
Research associate

**PhD**

Alexanderson, Helena  
Research associate

Borgström, Ingmar  
Senior lecturer, director of undergraduate studies

Brown, Ian  
Research associate

Brunnberg, Lars-Erik  
Senior lecturer

Jarsjö, Jerker  
Researcher

Kratzer, Susanne  
Researcher

Kristansson, Jan  
Senior lecturer

Nordberg, Maj-Liz  
Senior lecturer

Richardson-Näslund, Cecilia  
Research associate

Schlyter, Peter  
Senior lecturer

Schneider, Thomas  
Senior lecturer
Schuler, Thomas researcher
Skånes, Helle research associate
Ulfstedt, Ann-Cathrine senior lecturer
Westerberg, Lars-Ove senior lecturer

PhLic, MSc, BSc
Bråvander, Lars-Gunnar MSc, senior lecturer
Delteus, Åke BSc, lecturer
Eknert, Bo BSc, lecturer
Fridfeldt, Anders BSc, lecturer
Nordström, Anders PhLic, senior lecturer
Perhans, Karl-Erik BSc, lecturer
Sannel, Britta BSc, lecturer
Yrgård, Anders PhLic, lecturer

Postgraduate students (PhLic, MSc, BSc)
Bergström, Maria
Bonow, Johan
Borgmark, Anders
Darracq, Amélie
De Angelis, Hernán
de Woul, Mattias
Ebert, Karin
Feurdean, Angelica
Fredin, Ola
Gebreeziabher, Gessesse
Hannerz, Fredrik
Heimdal, Jens
Hättestrand, Martina
Jonsson, Ulf
Jonsell, Ulf
Kindström, Merit
Klingbjer, Per
Klintenberg, Patrik
Liljeberg, Markus
Lundblad, Katarina
Norström, Elin
Pettersson, Gun
Pettersson, Rickard
Rubensdotter, Lena
Ryner, Maria
Shibuo, Yoshihiro
Sundqvist, Hanna
Veres, Daniel

Teaching assistants
Hansson, Erik MSc
Lundin, Paula BSc
Sahlin, Eva MSc
ADMINISTRATIVE STAFF

Berggren, Berit          senior administrative officer
Envall, Berit           financial executive
Geltner, Petra          BSc, personnel executive
Hammar, Camilla         MSc, personnel executive
Henkow, Månika          higher administrative officer
Henriksson, Carina      university-certified administrator, senior administrative officer
Hultblad, Gertrud       university-certified administrator, senior administrative officer
Jatéus, Elisabeth       higher administrative officer
Lenngren, Maria         MSc, study advisor
Persdotter, Eva         higher administrative officer
Schuber, Pernilla       MSc, study advisor
Sturessson, Elisabeth   higher administrative officer
Wahlgren-Brännström, Lis PhLic, head of administration and technical service
Åkerblom, Lena          higher administrative officer

TECHNICAL STAFF

Alm, Göran              PhLic, systems engineer
Beskow, Andreas         MSc, systems technician
Brotén, Bengt           technician
Cabrera, Yanduy         caretaker
Evertson, Joakim        MSc, research assistant
Granell, Håkan          supervisor of office services
Hohl, Veronica          BSc, research assistant
Hörnby, Kerstin        research technician
Jacobson, Rolf          IT-manager
Jansson, Torunn         BSc, research assistant
Johansson, Eva-Marie    MSc, research engineer
Johansson, Viktoria    research assistant
Karlsson, Ann           laboratory assistant
Karlsson, Sven          PhLic, research assistant
Kleman, David           research assistant
Mahmoud, Nagham        research assistant
Matton, Anna           cook (Tarfala research station)
Nyman, Mart             research assistant
Omar, Athman            research assistant
Romero, Ivan            research engineer
Runborg, Siv            BSc, research assistant
Svanered, Ola           BSc, systems engineer
Walter, Ola T.          supervisor of security
Wegner, Anna           research assistant
Willis, Karin           BSc, research assistant
Winarve, Karin         cook (Tarfala research station)
**PROFESSORS EMERITI**

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
</tr>
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<tbody>
<tr>
<td>Hoppe, Gunnar</td>
<td>DSc</td>
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<tr>
<td>Lundqvist, Jan</td>
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<td>Miller, Urve</td>
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<td>Ringberg, Bertil</td>
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<td>Wastenson, Leif</td>
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<tr>
<td>Østrem, Gunnar</td>
<td>DSc</td>
</tr>
<tr>
<td>Postadress/Mailing address</td>
<td>Besöksadress/Visiting address</td>
</tr>
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<td>----------------------------</td>
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</tr>
<tr>
<td>Stockholms universitet</td>
<td>Svante Arrheniusv. 8c</td>
</tr>
<tr>
<td>106 91 Stockholm</td>
<td></td>
</tr>
</tbody>
</table>