

Annual Report 2016

Karin Persson and Malin Stenberg de Serves (ED)



Field day in Långmaren, June 2016. Photo: Sara Cousins.

Department of
Physical Geography



Stockholm
University



Department conference February 3 at Skansen, discussions in small groups with focus on different parts of our strategy.



Department Day November 9 arranged by our research unit Climate Science and Quaternary Geology.

Words from the Head of Department - a turbulent and successful year

Year 2016 was turbulent in terms of involving three different heads of department over the course of the year, while the department also worked on consolidating the new organisation launched in 2015. Karin Holmgren was the head until March 2016, followed by Jerker Jarsjö as intermediate head in a transition period, until I could come back from my position as Secretary General of The Swedish Research Council Formas and take up my assignment as department head from October 2016.

By October, our five research units, key components of the new organisation launched in 2015, were up and working well. Main goals of the research-unit establishment were to improve internal communication, increase engagement in decision-making processes, and enhance the sense of belonging for each co-worker. After nearly two years of work in the new organisation, the research units have shown that they greatly contribute to these goals. Thereby, they also greatly contribute to the good work environment needed for the department to productively and with high quality fulfilling our core tasks of research and education. Our vision for these tasks still applies as expressed in 2015:

To be a world-class academic organisation that advances understanding and learning in the natural conditions and processes of the world we live in, the impacts of society on the natural environment, and the societal responses to environmental changes and challenges.

In accordance with this vision, the department has continued and even further enhanced its excellent work with our core tasks, as well as with societal collaboration and communication of the design, progress and results of this work.

In 2016, nine PhD dissertations have been completed at the department, a record high over the last five years, as are also the external and internal grants awarded to the department and the number of department students involved in international Erasmus exchanges. In the latter number, however, there still remains considerable imbalance between many incoming but much fewer outgoing students; this imbalance is common for Stockholm University and overall in Swedish higher education, and we all need coordinated work directions and efforts for being able to achieve a better balance in this international exchange context. During 2016, the department has also continued the planned direction of systematically decreasing the total volume of its educational programmes and courses, in order to maintain and further improve both educational quality and work conditions for all educational co-workers.

Most importantly, this 2016 reflection cannot but end by fully recognizing and very gratefully thanking all department co-workers for the excellent, creative and stimulating contributions that you have provided for our common work and achievements in 2016!

Professor Gia Destouni

Words from the Head of Administration

The year 2016 started with a department conference which was aimed at discussing the proposed strategy document. The conference was held at Skansen and was attended by about 75 department employees.

Professor Georgia Destouni replaced Professor Karin Holmgren as new Head of Department in October. Associate Professor Jerker Jarsjö was intermediate Head of Department during this transition period.

In May the administrative staff participated in an excursion organized by Anders Fridfeldt. The excursion was named “Risk and crisis management – local, national and international” and took place in southern Italy. 20 members of the administrative staff participated in the excursion which focused on landscape ecology, history, geography and geology.

The purpose of the excursion was to bring more understanding regarding the core operations of both the research and education of the department to the administrative staff.

In June the department held an environmentally conscious summer lunch, as a new department policy. The lunch was vegetarian and served in form of a picnic in glass containers with the department name on the lid which everyone could take home. The picnic was held on University grounds at Stora Skuggan.

The year closed with a department Christmas lunch at Gamla Riksarkivet.

Head of Administration Sabina Pracic



Department Structure

Department Board

- Budget committee
- Technology committee
- Equality committee
- Environment committee
- Education committee

Head of Department

Georgia Destouni

Deputy head of Dept.
Regina Lindborg

- Management group
- Advisory group
- Professor council

Head of Administration

Sabina Pracic

- Economy administration
- Department administration
- Staff administration
- Study administration
- Technical support

Director of Studies

Steffen Holzkämper

Vice Director of Studies
Karin Ebert

- Subject responsible
- Program responsible
- Study administration

Director of Studies

PhD level

Helle Skånes

- Research education committee
- Subject responsible

Research Units

- Biogeography and Geomatics

Head of Unit: Sara Cousins

- Geomorphology and Glaciology

Head of Unit: Nina Kirchner

- Hydrology, Water Resources and Permafrost

Head of Unit: Jerker Jarsjö

- Climate Science and Quaternary Geology

Head of Unit: Anders Moberg

- Environment, Resource Dynamics and Management

Head of Unit: Håkan Berg

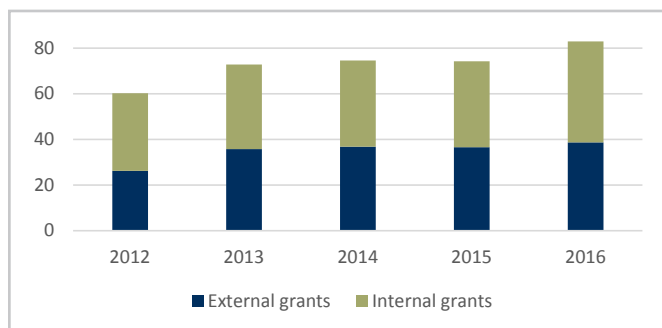
Grant Research

Grant Receiver	Funding Organisation	Project Name	Total Grant (TSEK)
Belyazid Salim	Formas	Kvantifiering av vittringshastigheter för ett uthålligt skogsbruk	700
Belyazid Salim	Statens energimynd.	Ökad processförståelse helträdsförsöken med den processbaserade ekosystemmodellen ForSAFE	457
Berg Håkan	UHR	Resebidrag	20
Cousins Sara	Naturvårdsverket	Små lövskogar – funktion för biologisk mångfald i jordbrukslandskapet	854
Cousins Sara	Formas	Funktionell konnektivitet och grön infrastruktur - FUNgreen	4679
Cousins Sara	Oscar & Lili Lamms stift.	Effekter av utdöendeskuld och funktionell konnektivitet på växters diversitet i skärgårdslandskap	2000
Dahlberg Annika	Formas	Stadsnatur för alla? Territorialiseringens möjligheter och utmaningar ur ett rättsperspektiv och där mång-funktionella gröna allmänningar gynnas	8469
Destouni Georgia	Vinnova	Water monitoring networks – iWater	235
Destouni Georgia	Nordforsk	Climate-change effects on the epidemiology of infectious diseases and the impacts on Northern societies (CLINF)	6410 (TNOK)
Destouni Georgia	Formas	Regionala och globala förändringar i vattenflöden, vattenlagring och vattenkvalitet på land	2250
Hansson Margareta	EU	Beyond EPICA - Oldest Ice (BE-OI)	3000 (EUR)
Harbor Jonathan	VR	MAGIC-DML: Geomorfologi och förändring i isolyum i Dronning Maud Land, Antarktis	3407
Holzkämper Steffen	Carl Tryggers stiftelse	Tracing soil pollution through tree rings	73
Jonason Dennis	Sv. skogssällskapet	Systematisk bevarandeplanering för maximerad natur- och kulturvårdsnytta	881
Kirchner Nina	Polarforskningssekret.	30th International Forum for Research into Ice Shelf Processes (FRISP) 2016	60
Kirchner Nina	Stiftelsen för strategisk forskning	Swedish Maritime Robotics Centre (SMaRC)	1580
Lindborg Regina	Ekhaga stiftelsen	Ground cover management in organic apple orchards in South Africa: Trade-offs between above- and belowground ecosystems service	120
Madani Kaveh	VR	Utveckla multivariata indikatorer för att detektera och övervaka klimatextremer med satellitobservationer	5876
Manzoni Stefano	Formas	Prediktiv modellering av kolomsättning i brukad skogsmark baserad på metatranskriptomiska analyser av mikrobiella egenskaper	657
Manzoni Stefano	VR	Balans mellan ekosystemtjänster och vattenanvändning för hållbar risproduktion	5344
Manzoni Stefano	VR	Uppskattning av markens koldynamik från mikrobiella celler till ekosystem för nästa generation av Earth System modeller	3555
Manzoni Stefano	Formas	Att öka produktivitet och hållbarhet i jordbruket genom ökad diversitet i odlingen: Odlingar av Salix som modellsystem	2983
Rosqvist Gunhild	Nordforsk	Resource Extraction and Sustainable Arctic Communities (REXSAC)	5000 (TNOK)
Rosqvist Gunhild	Formas	Bestämning av spridning och effekter av flygbränsleförorening efter flygplanshaveri i Oajevägge, norra Sverige	590
Skånes Helle	Naturvårdsverket	Fjärranalys i stadens tjänst	1080
Österlin Carl	Göran Gustafssons stift.	Hållbar markanvändning – Renskötsel, gruvverksamhet och vindkraft i Norrbotten och Västerbotten	17
Österlin Carl	Naturvårdsverket	Omtvistade landskap: Navigering mellan konkurrerande markanvändning och kumulativa effekter	213
Sum			46 100 TSEK

Contract Research

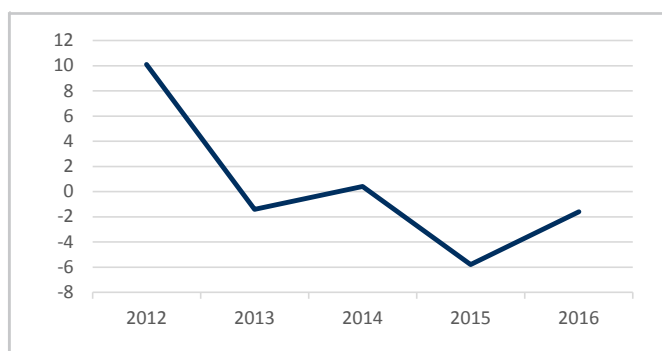
Grant Receiver	Funding Organisation	Project Name	Total Grant (TSEK)
Dahlberg Annika	Mittuniversitetet	Vägar till mångfunktionella landskap	270
Holmlund Per	Strålsäkerhetsmynd.	Betydelsen av submarina skred och roterade block öster om Forsmark	365
Jarsjö Jerker	Sweco	Miljöutredningar Hjärtevad Etapp 1	232
Sannel Britta	University of Oslo	Permafrost landscapes in transformation – from local-scale processes to the global model NorESM	100 (TNOK)
Skånes Helle	Sollentuna kommun	Framtagande av upphandlingsunderlag för en länsäckande vegetationskarta – för effektivare planering	248
Stroeven Arjen	SKB	Third Nordic Workshop on Cosmogenic Nuclide Techniques	75
Thorslund Josefin & Sandra Fischer	SHR	Samordning av världsvattendagen	65
Sum			1255 TSEK

Grants (MSEK)



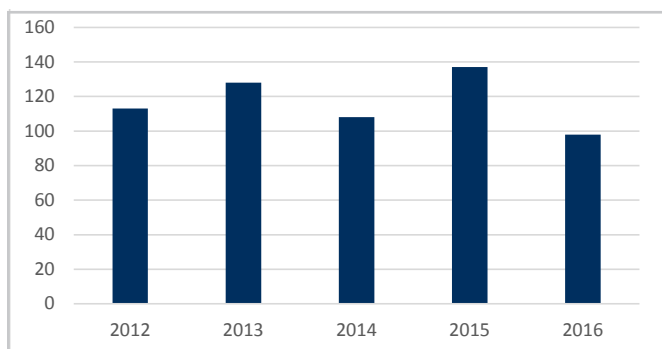
Research grants received 2012-2016

Annual economic result (MSEK)



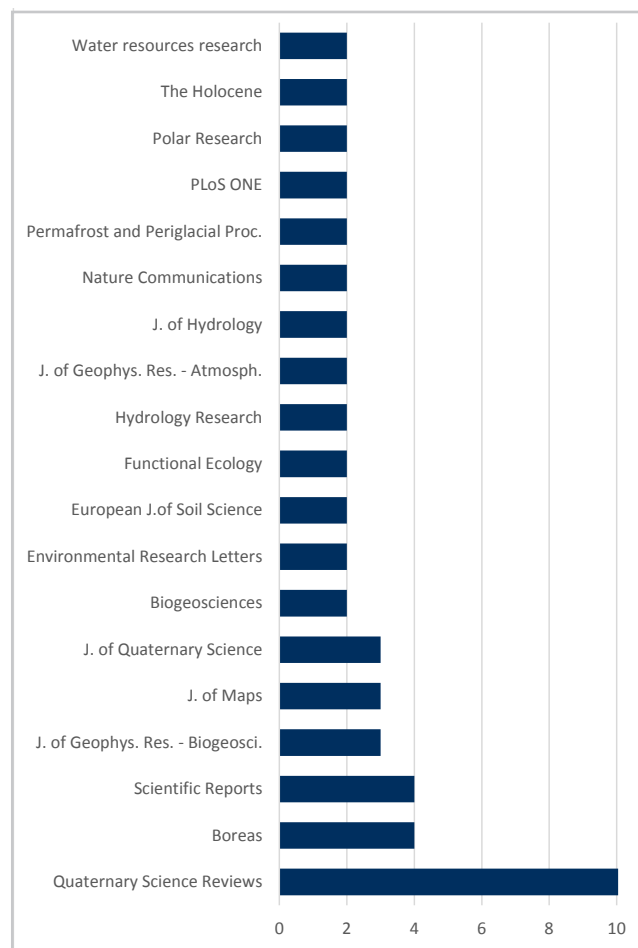
Department annual economic result 2012-2016. The peak 2012 can be explained by administrating the Bolin centre economy.

Publications (peer reviewed)



Number of peer reviewed publications 2012-2016

Published Papers Per Journal



A total of 98 publications out of which the most frequent journals are listed above. We also had one publication in Nature and one in Nature Geoscience.

QR code to all NG Publications in 2016:



Research Unit

Biogeography and Geomatics

Head of Research Unit: Sara Cousins

Biogeography is the study of the spatial distribution of plants and animals – “Life on Earth”. Our research focuses on understanding historical and present interactions of humans, plants and animals with landscapes, and their effects on biodiversity, conservation and ecosystem services. We work at multiple scales, from pastures to regions, from seeds to elephants, both in water and on land.

Geomatics is the acquisition, management and analysis of geospatial data. It includes geographical information science (GIS), Earth Observation (EO), surveying and geodesy. Our research develops methods to exploit the capabilities of geodata for a range of applications in Earth and environmental sciences. Presently our research focus is on questions related to the Arctic and sub-Arctic, including research into snow and permafrost. Both areas have become increasingly important for informing environmental policy relating to climate and land use change from the local to the international scale.

Our unit is responsible for two Master’s programs; Landscape Ecology and Geomatics with Remote Sensing and GIS, and we are engaged in all three of the department’s Bachelor level programs.

We had a field day to Långmaren in June and a 3-day research workshop in NEO, Greece, in November. Adam Kimberley started his postdoc with Sara Cousins and two new phd-students Heather Wood and Edmund Alavaisha joined us during 2016.

Jessica Lindgren and Sara Cousins both presented at the International Association of Vegetation Society meeting in Pirenopolis, Brazil

Elsa Aggemyr, Alistair Auffret, Sara Cousins, Adam Kimberley, Jan Plue and Heather Wood all presented at the 2016 Annual Meeting of the British Ecological Society in Liverpool, UK

Sara Cousins was interviewed for national radio and local newspapers regarding species changes in the Stockholm archipelago, based on the study ‘Spatial scale and specialization affect how biogeography and functional traits predict long-term patterns of community turnover’, which was also selected in the British Ecological Society’s virtual issue for UK national tree week

Sara Cousins participated in a panel discussion in Almedalen, Gotland, on “Vad ska vi med naturen till?” together with Gran Greider and Maria Wetterstrand. The panel was organised by Svenska Jägarförbundet.

Alistair Auffret started his year as a guest researcher at the University of York’s Department of Biology (UK) to learn from experts there about species responses to climate change.

Heather Wood led a bat walk in July at The Cornfield Project in Coleraine, Northern Ireland. This is a community project led by Kew Gardens through the Grow Wild initiative and aims to re-establish a wildflower meadow and to connect two divided communities.



Heather Wood (far right) and the Cornfield project. Photo: Catherine Armstrong.



Workshop in Greece with one afternoon in the field, visiting Paleocastro Peloponnesus. November 2016. Photo: Sara Cousins

Research Unit Climate Science and Quaternary Geology

Head of Research Unit: Anders Moberg

We study climate and environmental changes, under present conditions and back in time during the glacial cycles of the Quaternary period.

Modern instrumental observational data are used together with information from natural archives such as lake sediments, peat bogs, ice cores, cave deposits, tree rings, glacial sediments, and archaeological material, to study changes in climate and the environment. Our research material come from the entire world and we have ongoing projects in the Nordic countries, Europe, Africa, South America, Northern Russia, the Himalayas, Canada, Antarctica and Greenland. We also perform simulations with climate models on large computers to study the functional behaviour of the climate system under conditions different from those of today. That helps us to better interpret the information stored in the different natural archives.

Benedict Reinardy started as assistant Professor. He collaborates with University Bergen, University Oslo, Lundin Norway and Northern Arizona University as part of the successful PETROMAKS2 (Research Council of Norway) research proposal REQUE: “Reconstructing Quaternary Basin Configuration and Evolution in the Central/Northern North Sea”. He also presented a research paper on the “Late Pliocene-Pleistocene environments and glacial history of the northern North Sea” at the AGU Fall Meeting which has now also been published in Quaternary Science Reviews.

Simon Larsson started as PhD student. He will work within the project “Precise linking of Late Quaternary paleoclimate archives in the North Atlantic region”. Stefan Wastegård is the main supervisor.

A new diatom species (*Cyclotella paradistinguenda*) was described by PhD student Christos Katrantsiotis, Jan Risberg and co-workers from a sediment core from the Agios Floros fen, SW Peloponnese Greece.

Our climate modelling group led by Qiong Zhang, has run a series of “Green Sahara” experiments with the model EC-Earth. They highlight the important effect of change in Saharan vegetation and dust emission on regional and global climate. Their published results have drawn extensive attention in paleoclimate and modelling community.

PhD student Lindsey Higgins was one of five student reporters selected for the EGU 2016 General Assembly. She wrote a piece titled “Questions of Resource Sustainability in a World of Consumers” for the Energy, Resources and the Environment division blog.

PhD student Paul Krusic, co-authored an article in Nature presenting the first millennial length, multi-proxy, Northern Hemisphere hydroclimate reconstruction. Paul also made field collection trips to Greece and Bhutan, was invited to

participate in a PAGES workshop on multi-millennial hydroclimate variability over Europe in Germany, and co-organized that workshop’s follow up meeting here in Stockholm where he presented evidence of the ability to reconstruct up to 2000 years of European streamflow from tree-ring data. After analyzing the new samples from Greece, in collaboration with colleagues from the University of Mainz and the University of Arizona, he announced the discovery of Europe’s oldest known, dendrochronologically dated, living inhabitant.

Karin Helmens attended the Nordic Geological winter meeting in Helsinki and celebrated with colleagues 10 years of detailed study at Sokli (NE Finland). All sediment layers in the Sokli sequence which represent ice-free intervals, and with ages going back to the Eemian Interglacial (ca. 125,000 yr BP), have now been analyzed for multiple proxies. Parallel to this, a new 6 m-long sediment record covering the entire Holocene was obtained from a nearby lake (Kuutsjärvi) located in the Värriö Tunturis (hills), in order to get a good Holocene reference record for the Sokli studies.

The development of a new deep ice core drilling project in Antarctica, Beyond EPICA-Oldest ice, was granted support by EU (CSA) with Margareta Hansson as one of the WP leaders responsible for the synthesis work required for site selection and laying the scientific and managerial foundation for the future BEYOND EPICA – DRILLING PHASE.

Gunhild Rosqvist is co-scientific leader at the new Nordic Centre of Excellence of the Resource Extraction and Sustainable Arctic Communities, REXSAC, <https://www.rexsac.org/>. She also contributed to popular science outreach at Åttte, Svenskt Fjäll- och Samemuseum, Jokkmokk and at Almedalen, Visby.

Björn Gunnarson participated on Swedish television programme “Vetenskapens värld” where he talked about the changing climate around the year 536 AD. He also was interviewed on “Radio Jämtland” about celebrating 20-year of tree-ring research in Jämtland.

Anders Moberg was appointed the role as coordinator of the Bolin Centre Database (<http://bolin.su.se/data/>) from January 2016. This is a storage and management facility for data collected and collated at the Bolin Centre for Climate Research, and holds several datasets from our department.

Stefan Wastegård was invited to give a talk on the Tephrochronology of Northern Europe at the Bremer Geographisches Kolloquium at University of Bremen.



Coring in Värriö, NE Finland. Photo: Karin Helmens.

The new diatom species *Cyclotella paradistinguenda*. SEM image: Christos Katrantsiotis.



Sub-fossil pine extraction from Loch an Eang, Glen Affric, Scotland. Photo: Rob Wilson.

Research Unit Environment, Resource dynamics and Management

Head of Research Unit: Håkan Berg

The Environment, Resource dynamics and Management group (ERD) continued to consolidate its education and research work during 2016, through a number of discussions and workshops. ERD's mission is to contribute to a deeper understanding of the dynamic interactions between society and the environment, particularly considering the interdependencies between resource management and natural resource sustainability. ERD's aim is to consistently deliver high quality innovative research and education employing a variety of methods including interdisciplinary and transdisciplinary approaches in cooperation with societal actors and targeted towards societal and environmental needs.

In 2016, ERD have revamped a number of courses within the Masters in Environmental Planning, also offered to the Masters in Environmental and Health protection and as elective courses. We have continued to conduct and supervise master student's projects with high societal relevance and applicability through joint collaborations with governmental institutions, NGO's and companies.

Research wise, we have continued our investigations on how to transform to a circular or bio-based economy, through support from the Marie Slodowska Currie program AdaptEconII (The Adaption to a New Economic Reality). The project started in 2016 with two of the 12 PhD students (Marie and Therese) placed in the ERD research group and two PhD students co-supervised with the University of Iceland. The project focus on modelling sustainable resource management and integrated economic systems assessment.

Therese Bennich's research topic is the transition to a bio-based economy in the Nordic countries, with a focus on exploring potential transition pathways and their related impacts. Marie Schellen's research addresses the interlinkages between natural resource management and conflict risk and cooperation through computational modelling from a complex systems perspective.

The research within the project "Negotiating Pathways to Multifunctional Landscapes: A Pilot Model in the Jämtland Mountains" continues in its 2nd year, and a second stakeholder workshop has recently been organised with successful results. The project is financed by SEPA and is a cooperation with KTH and the Mid Sweden University. A 5-year FORMAS project "Accessing urban nature. Opportunities and challenges of territorialisation processes in relation to environmental justice and the promotion of multifunctional green commons" was initiated in 2016. The project is a cooperation with KTH and SRC, and already two MSc student are linked to the project, and at least one PhD student will be employed during 2017.

The FORMAS funded project on weathering rates in Swedish soils in view of a sustainable forestry was finalized in 2016. This project is complemented by a grant from Energimyndigheten, and through a Faculty funded post-doctoral fellowship.

Within the FORMAS project "Green Infrastructure for ecological sustainability and human well-being" work has focused on group modelling to identify governance and management drivers of functional green infrastructure in rural and urban areas, with case study areas in Sweden, Belarus, Latvia and Russia. This is a core part of Lucas Dawsons PhD work, who is also involved in a Swedish Institute project "Thematic partnerships in the Baltic Sea Region concerning spatial planning for green infrastructure", and in identifying direct and indirect drivers of change in the upcoming Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) assessment for Europe and Central Asia.

A participatory learning action research project, with 13 smallholder farms, held in collaboration with Örebro university, under a pilot project on agroforestry and sustainable food production from perennial system, was finished in 2016. A report on this 4- year project was published and Christina Schaffer made a poster presentation at the 3rd European Agroforestry Conference in Montpellier, France and a conference paper on "The potential of edible forest gardening in urban areas- a case study from Stockholm, Sweden".

Our project on Gender and Adaptation to Climate Change (VR) has advanced with a couple of publications and a master student working in Zanzibar, Tanzania. We have also initiated research on integrated aquaculture and agriculture (IAA) and on mangrove ecosystem services for local community livelihoods and climate changes adaptations in the Rufiji Delta, Tanzania through two new PhD students from Tanzania (Deogratias and Baraka) (Sida). Giorgos Maneas has started his PhD work focusing on improved management of the Gialova Lagoon in Greece. Nguyen Thanh Tam defended his PhD thesis "Pesticide use in rice farming and its impacts on climbing perch (*Anabas testudineus*), in the Mekong Delta of Vietnam.

Daniel Ketzer continued his PhD work on land use conflicts between biomass and power production. The Agrophotovoltaic (APV) pilot plant has been installed in the Lake Constanze region (Germany), and APV-systems has been described using System Dynamics and a Constructive Technology Assessment approach.

PhD candidate Carl Österlin has been engaged in the project Integrated natural- and cultural environmental management for the Swedish mountains. Under the auspices of the project, funded by the Swedish National Heritage Board, a variety of fieldwork has been conducted such as stakeholder modeling; Citizen Science inventories; and UAV mapping of damages to ground vegetation.

Jonathan Stoltz PhD work focus on to develop landscape indicators used in the design, planning and evaluation of salutogenic (i.e. health promoting) green environments. He has also developed a conceptual model to describe different psychological needs and their corresponding "supportive" environments.



Fieldtrip to Georgia, Caucasus, with Geography students in the spring 2016. Photo: Veronica Hohl.



View over Storulvån in the Swedish mountains, southern Jämtland. Part of the research project "Negotiating Pathways to Multifunctional Landscapes" has been to interview different stakeholders who use the mountain landscapes. Photo: Sandra Wall-Reinius.



Agrophotovoltaic (APV) pilot plant in the Lake Constanze region, Germany. Photo: Daniel Ketzer.

Research Unit Geomorphology and Glaciology

Head of Research Unit: Nina Kirchner

We study Earth surface processes and their effects on landscapes, glaciers and society. Analysis of the landscape enables us to reconstruct past environments and processes; with a particular focus on glaciated and formerly glaciated landscapes. We also conduct research on contemporary processes in glaciers and ice sheets, as well as on applied geomorphology in tropical regions.

We conduct research in all glaciated regions in the world, including Antarctica, the Arctic, North America, Northern Europe and Eurasia, and the central Asian highlands; but also in non-glacial regions such as the Mediterranean and East Africa.

Some notable events from our unit in 2016 are:

The former head of our research unit, Clas Hättestrand, was appointed Pro Vice-Chancellor at Stockholm University. Congratulations! Natacha Gribenski, Robin Blomdin and Elidio Massuanganhe defended their PhD theses successfully, congratulations to them and their supervisors Jansson, Stroeven and Westerberg!

During 2016, many interesting papers have been published by present (and former) members of the research unit. Among these are several papers from the Central Asian Paleoglaciology Project, involving research unit members Blomdin, Gribenski, Harbor, Hättestrand, Jansson, Stroeven, and former Post-Doctoral students Applegate and Heyman. These papers were published in Quaternary Science Reviews, Quaternary Geochronology and the Journal of Maps.

Several joint papers were published on Late Pleistocene stratigraphy and glacial landforms in Scotland by Hall and colleagues. The work is a part of a continuing project that aims to provide an improved understanding of the behaviour of the last British and Irish ice sheet, including its interactions with the Fennoscandian Ice Sheet in the North Sea.

Research unit members Kleman, Borgström, and Hall published, together with A. Skelton (IGV), in Zeitschrift fuer Geomorphologi, results from field studies in the Southwestern Peloponnese, Greece, focusing on landscape evolution and landform inheritance in tectonically active regions.

Data collected during the SWERUS-C3 expedition has led to two articles published in Nature Communications, dealing with massive remobilization of permafrost carbon during post-glacial warming (Lead : T. Tesi, ACES) and an Arctic Ocean ice shelf during the pen-ultimate glaciation (Lead: M. Jakobsson, IGV), and both involving Kirchner as co-author.

New field work was started during 2016 with PhD student Jennifer Newall: MAGIC-DML in Antarctica. Mapping, Measuring and Modeling Antarctic Geomorphology and Ice Change, in Dronning Maud Land is an international research collaboration funded through the national funding agencies in Sweden, Norway and the USA, with scientists from Sweden, the USA, Norway, the UK and Germany, see www.magicdml.com. PI's Stroeven and Harbor, and Hättestrand are her supervisors within our research unit. MAGIC-DML will have a follow-up field season 2017/18 to Borgmassivet.

Moreover, a 4-week marine expedition was carried out in collaboration with the University Centre in Svalbard that targeted the glacial history of the Seven Islands, and Kongsfjorden, western Svalbard. Extensive seafloor mapping was performed and buoys were deployed to collect annual time series of water temperature close to calving glacier fronts.

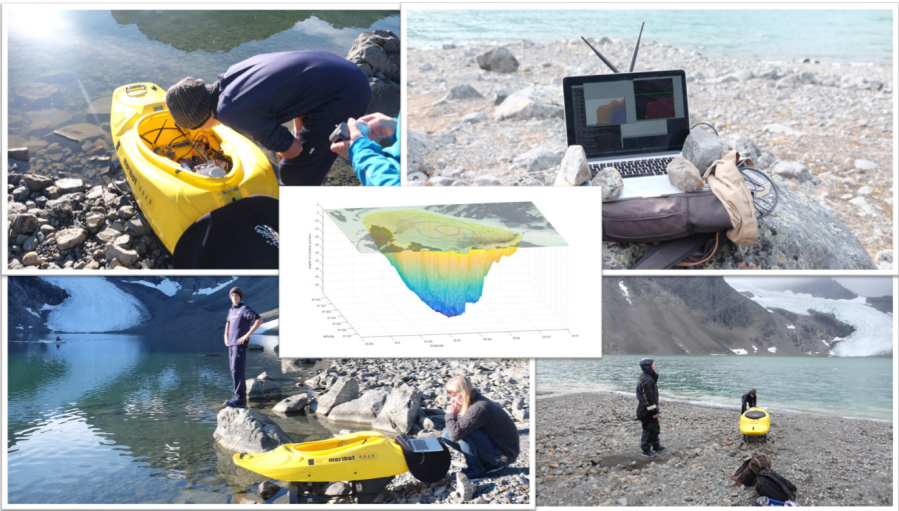
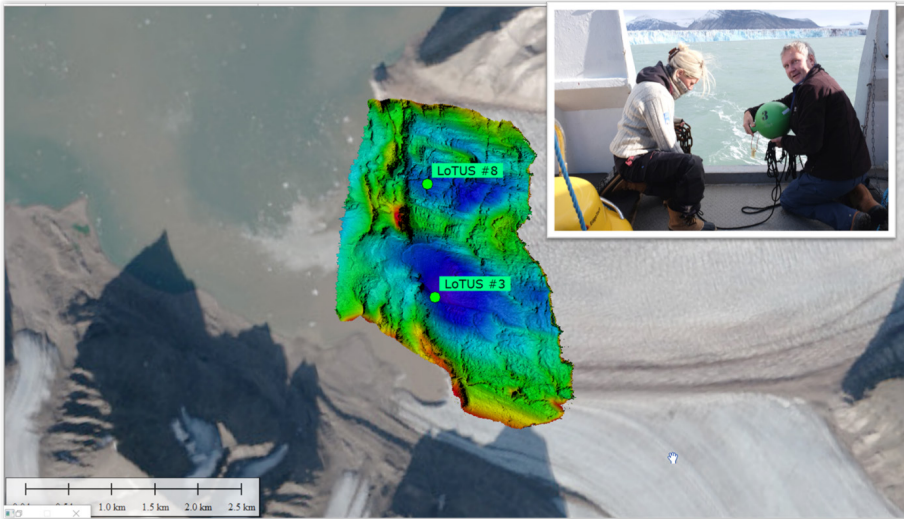
In September 2016, the bottom topography of Lake Tarfala was mapped in high resolution with an autonomous surface vessel, developed at KTH. Also, two vertical arrays of temperature sensors were deployed. This project was carried out with colleagues Rosqvist from our department, Kutteneuler from KTH, and Kirchner, and was partially funded by SITES, the Swedish Infrastructure for Ecosystem Science, www.fieldsites.se

Other projects involving field work continued from 2015, specifically the program funded by the Swedish Nuclear Waste Management company (SKB), in which the goal is to provide improved estimates of the amount of bedrock erosion achieved by the last and earlier Fennoscandian ice sheets in the region of the planned Forsmark nuclear waste repository. These estimates will inform decisions about the likely impact of future glaciations at the repository site. From our research unit, members Hall, Stroeven, Hättestrand, Goodfellow and Ebert are involved.



Wave rock, a low hillrock near Forsmark. This locality with its massive granite gneiss surface has been sampled for cosmogenic nuclides. Note that the 3rd Nordic Workshop on Cosmogenic Nuclide Techniques was held in Stockholm in June 2016, organized by Arjen Stroeven. Photo: A. Hall.

Mapping of recently exposed seafloor in front of Kronebreen, and deployment of LoTUS (Long Term Underwater Sensing) buoys in Kongsfjorden, western Svalbard. They measure water temperature, and are expected to transmit annual time series of water temperature. Picture: Maria Laidla, MSc student at NG, showing the deployment of buoy #3 by research unit member Nina Kirchner, and collaborator Noormets (UNIS).



Bathymetric mapping of LakeTarfala with KTH's autonomous surface vessel ANKA, in September 2017. Photos: Jakob Kutteneuler, Lars Kirchner, Nina Kirchner.

Research Unit Hydrology, Water Resources and Permafrost

Head of Research Unit: Jerker Jarsjö

We investigate natural processes and anthropogenic effects and their variability and change in water, land and permafrost environments. The conditions and changes of Earth's freshwater and permafrost systems affect people and ecosystems and are central in global change. We study these conditions and their changes in order to better understand and quantify them and thereby contribute to knowledge and capacity advancement needed for sustainable development.

Our research focuses on water quantity and quality, how liquid and frozen, subsurface and surface water interacts, and how water flows and carries other substances and energy with it through the landscape

– locally, regionally and globally, and from past, through present, to future times. We study the possible fate of permafrost regions considering future global warming and the total amount, landscape distribution and vertical partitioning of soil organic carbon stocks in these regions.

Some notable events, among others, in 2016:

Four students defended their Ph.D. thesis:

- Benoît Dessirier: “Numerical modeling of groundwater and air flow between compacted bentonite and fractured crystalline rock”
- Emma Johansson: “The influence of climate and permafrost on catchment hydrology”
- Matthias Siewert: “High-resolution mapping and spatial variability of soil organic carbon storage in permafrost environments”
- Lucile Verrot: “Modeling long-term variability and change of soil moisture and groundwater level - from catchment to global scale”

Seven major research projects lead by researchers from the HWP-unit were awarded in 2016 by:

- the Swedish Research Council VR: “Developing multivariate indicators for detecting and monitoring concurrent climate extremes using satellite observations” (EU-VR International Career Grant for K. Madani); “Scaling up soil carbon dynamics from microbial cells to ecosystems for next-generation Earth System models” (S. Manzoni); “Quantifying the trade-offs between ecosystem service provision and water management in rice systems”

(combined VR-Formas-SIDA; S. Manzoni, S. Lyon); “Modernizing Nepal's Groundwater Resources” (VR-Swedish Research Links; S. Lyon)

- Formas: “Improving agricultural productivity and sustainability with crop mixtures: willow plantations as a model system” (S. Manzoni)

- the EU Water Joint Programming Initiative / Formas: “LEAP - Legacies of Agricultural Pollutants: Integrated Assessment of Biophysical and Socioeconomic Controls on Water Quality in Agroecosystems” (J. Jarsjö, G. Destouni); “Agricultural Water Innovations in the Tropics” (S. Lyon)

Two Nordforsk Centres of Excellence involving HWP-researchers formed in 2016:

- CLINF - Climate-change effects on the epidemiology of infectious diseases and the impacts on Northern societies (Georgia Destouni, Zahra Kalantari, Jerker Jarsjö, Arvid Bring, Carmen Prieto, Romain Goldenberg)
- REXSAC - Resource Extraction and Sustainable Arctic Communities (Gunhild Rosqvist, Jerker Jarsjö, Arvid Bring, Carl Österlin, Sandra Fischer, Josefin Thorslund)

Georgia Destouni was elected to the Scientific Advisory Committee for Science Europe, which is an association of European Research Funding Organisations (RFO) and Research Performing Organisations (RPO), aiming to strengthen the European Research Area (ERA) through its direct engagement with key partners.

Peter Kuhry and Britta Sannel, as well as Gustaf Hugelius from the BG-unit co-authored a paper published in Nature Communications, on the circumpolar distribution and carbon storage of thermokarst landscapes.

The unit had a field excursion and social building event to Tavvavuoma and the permafrost monitoring site. The highly appreciated event was led by P. Kuhry and B. Sannel. The year was rounded off with a ceilidh dancing and dinner event, timely planned by L. Levi.



*Sampling in permafrost peatlands, northern Norway.
Photo: Sebastian Westermann.*



*Tavvavuoma field excursion – sunset at camping site.
Photo: Alexander Koutsouris.*



Participants in the Tavvavuoma field excursion. Photo: Alexander Koutsouris.

*Sampling of a wetland site in Florida
belonging to the Global Wetland
Ecohydrology Network (GWEN).
Photos: Josefin Thorslund.*



Tarfala Research Station (TRS)

TRS is located in the Kebnekaise Mountains, northern Sweden, 200 km north of the Arctic circle. Four glaciers are located in the Tarfala valley of which Storglaciären is the best studied. The mass balance data set from Storglaciären covers 70 years. The elevation of the Kebnekaise south summit, which consists of ice, was measured to be 2097.1 m in September 2016, the north summit which consists of bedrock is 2096.8 m.

Gunhild Rosqvist is the director of TRS. Researchers and students worldwide visit Tarfala to study the glaciers, rivers, landforms and ecosystems. TRS is operated by Stockholm University who runs a monitoring program together with The Swedish Infrastructure for Ecosystem Science (SITES). The program includes measurements of glacier mass balance, meteorology, hydrology, snow structure, snow chemistry, permafrost, and vegetation development. The data provides e.g. detailed records of short- and long-term effects of climate change on glaciers and on ecosystems important for reindeer herding.

New monitoring for SITES Water includes water sampling and river discharge measurement, and mapping of bathymetry of the Tarfala lake using new techniques. Sensors to measure Normalized Difference Vegetation Index (NDVI) in Laevasvagge was installed for SITES Spectral. The International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT II) infrastructure project was funded late in 2016. Through the Transnational Access work package EU scientists can apply to conduct research in Tarfala.



Kebnekaise south summit. Photo: Ninis Rosqvist.

Navarino Environmental Observatory (NEO)

NEO, a cooperation between Stockholm University, the Academy of Athens and TEMES S.A., the developer of Costa Navarino, is dedicated to research and education on the climate and the environment of the Mediterranean region. Located at Costa Navarino, NEO has developed into a dynamic hub where scientists from all over the world conduct frontline research, develop new tools and methods, as well as meet to exchange knowledge and ideas. The operation of NEO presents a good example of how the academic community and the private sector can work together to focus on issues of great importance to society and nature.

A workshop on NEO research “Achievements and future perspectives” was held at the Department of Physical Geography in November, 2016, concluding on the research conducted during the last five years and exploring opportunities for future research of high relevance to the society.

Karin Holmgren became chairperson for NEO Steering Committee, in 2016, after Stefan Nordlund, and Håkan Berg took up the position as NEO Director.

A high diversity courses and research activities has been conducting at NEO during 2016 and some environmental monitoring work has been initiated at the Gialova Lagoon.



The Physical Geography course. Photo: Giorgos Maneas.

Bolin Centre for Climate Research

The Bolin Centre is a consortium of more than 300 scientists in Sweden who conduct research and graduate education related to the Earth's climate. The Bolin Centre is a collaboration between SU's departments ACES, DEEP, IGV, MISU, NG and Zoology, together with FLOW at the Royal Institute of Technology (KTH) and the Rossby Centre at the Swedish Meteorological and Hydrological Institute (SMHI).

The Bolin Centre focuses on extending and disseminating knowledge about the Earth's natural climate system, climate variations, climate impacting processes, climate modelling, human impact on the climate and climate impacts on ecosystems, biodiversity and human conditions as well as how society can minimize negative impacts.

During 2016, the Bolin Centre expanded considerably and is now structured in eight multidisciplinary cross-departmental research areas:

- Oceansatmosphere dynamics and climate
- Clouds, aerosols, turbulence and climate
- Hydrosphere, cryosphere and climate
- Biogeochemical cycles and climate
- Historical to millennial climate variability
- Deep time climate variability
- Landscape processes and climate
- Biodiversity and climate



Bolin Centre at the American Geophysical Union (AGU) Fall Meeting in San Francisco

Infrastructure

Field stations:

Tarfala Research Station
Navarino Environmental Observatory

Other facilities:

Stockholm tree ring laboratory
Chemical laboratory
Microscope facilities
Optically stimulated luminescence (OSL) laboratory
Sediment laboratory
GIS and remote sensing cluster
Ice laboratory
Geomorphology laboratory



Pollen grain of Tilia. Photo: Ann-Marie Robertsson



An ice core from Antarctica in the ice laboratory

Education

The Department goal is to offer a high quality education, reflecting the research profile of the Department, and meeting society's needs for theoretical and practical expertise and skills within the Department fields of education.

The Department offers education at undergraduate (Bachelor's) level in Geography, Earth Sciences, Integrated Biology-Earth Science, and Enviromental Studies. In addition, a wide spectrum of graduate (Master's level) programmes and courses are given, reflecting the research profile of the Department.

Every year nearly 2000 students attend our undergraduate and graduate education.

Bachelor Programmes (180 credits)

Bachelor's Programme in Biology-Earth Sciences

Bachelor's Programme in Geography

Bachelor's Programme in Earth Sciences

Master's Programmes (120 credits)

Master's Programme in Environmental Management and Physical Planning

Master's Programme in Geomatics with Remote Sensing and GIS

Master's Programme in Glaciology and Polar Environments

Master's Programme in Hydrology, Hydrogeology and Water Resources

Master's Programme in Landscape Ecology

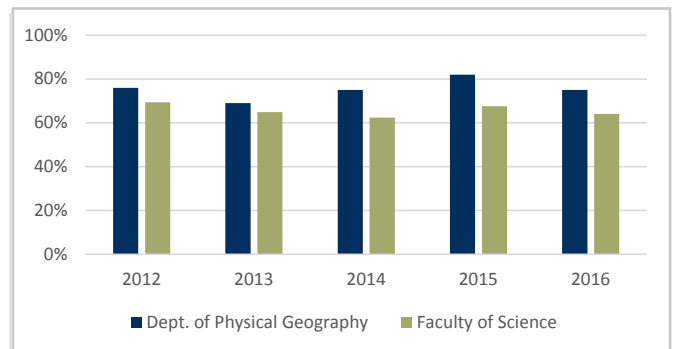


Excursion to Čievrraláhku east of Tarfala Research Station.
Photo: Britta Sannel.

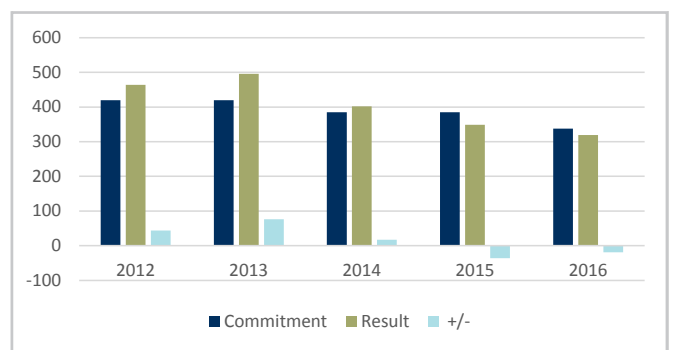


Field course in Georgia. Photo: Peter Kinlund.

Student Completion Rate in % (genomströmning)

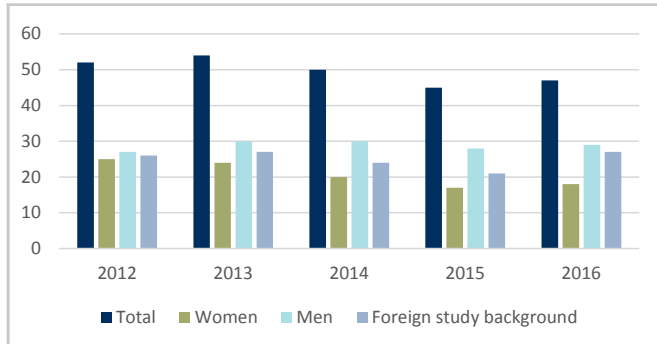


Annual Student - Number Index (HÅP)

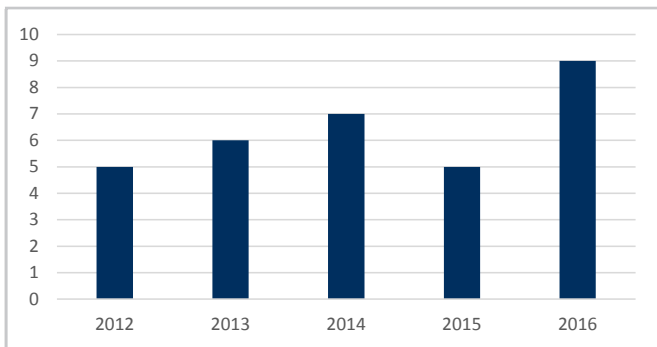


PhD education

Number of PhD Students



Dissertations during 2012 - 16



Doctoral Theses

Dessirier, B. Numerical modeling of groundwater and air flow between compacted bentonite and fractured crystalline rock.

Massuunganhe, E. Geomorphology and environmental dynamics in Save River delta, Mozambique. A cross-timescale perspective.

Mwansasu, S. Causes and Perceptions of Environmental Change in the Mangroves of Rufiji Delta, Tanzania – Implications for Sustainable Livelihood and Conservation

Tam, N. T. Pesticides use in rice farming and its impacts on climbing perch (*Anabas testudineus*) in the Mekong Delta of Vietnam

Johansson, E. The influence of climate and permafrost on catchment hydrology

Verrot, L. Modeling long-term variability and change of soil moisture and groundwater level - from catchment to global scale

Gribenski, N. Comparison of dating methods for paleoglacial reconstruction in Central Asia

Blomdin, R. Paleoglaciology of the Tian Shan and Altai Mountains, Central Asia

Siewert, M. High-resolution mapping and spatial variability of soil organic carbon storage in permafrost environments



Matthias Siewert nails his thesis



Doctoral Theses of the year

Collaboration



Collaboration between researchers and reindeer keeper. Ellen Sarri at the automatic weather station at Lihti, a site which is important for ecosystem studies and reindeer grazing. Photo: Gunhild Rosqvist.

The first "samverkanscheck"

Nina Kirchner received our first "samverkanscheck" 22 TSEK for a collaboration with Håkan Joriksson at the Grenna Museum: "Polarforskning NU – Från ett digital våningsplan till en stillhet i Arktis".

Alumni network

We wish to stay in touch with former students and researchers. Our alumni are part of the valuable network that supports us in a range of different ways: by being important ambassadors and by engaging in the development of research and education.



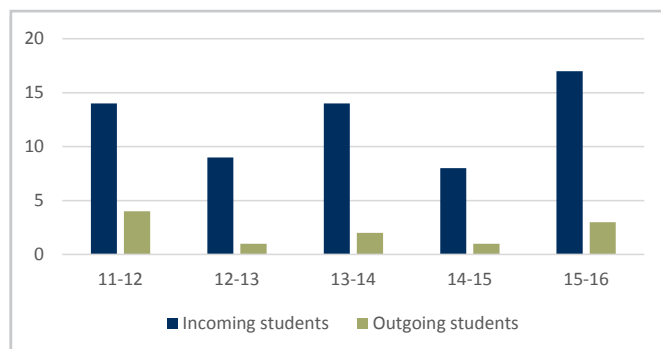
Alumni event in October 6. Susanne Ingvander and Emelie Danielsson talked about how it is to work at MSB (Swedish Civil Contingencies Agency) for a crowded De Geer lecture hall.

International Exchange

Partner Universities

Leuven and Brussels in Belgium
Grenoble in Frankrike
Bern in Switzerland
Freiburg in Germany
Aachen in Germany
Kiel, Germany
NTU, Singapore
Innsbruck in Austria
Ostrava in Czech Republic
Turku in Finland
Trondheim in Norway
Oslo in Norway

Erasmus Exchange



Awards and Prizes



Our colleague, Philip D. Jones, professor at University of East Anglia was appointed new honorary doctor at Stockholm University. Photo: Stockholm University, Clément Morin.



Daniel Ketzer winning the best presentation award with a presentation about the Agrophotovoltaic (APV) pilot plant.

Ype van der Velde with Steve Lyon as co-author got the MG Anderson Award for Outstanding Paper of the Year. Title of the paper: "Consequences of mixing assumptions for time-variable travel time distributions " published in Hydrological Processes.

Best Paper Award Winner at the International Conference on Sustainable Development - ICSD 2016, held in New York City, USA, for the article: "Connecting the resource nexus to urban basic service provision – Towards an Urban CLEW model"
Co-authors: Rebecka Engström, Mark Howells, Georgia Destouni, Vatsal Bhatt, Morgan Bazilian, Hans-Holger Rogner.

Almedalen 2016



Niila Inga, Gunhild Rosqvist, Nina Kirchner and Johan Kuylenstierna discussed climate in Almedalen July 4.

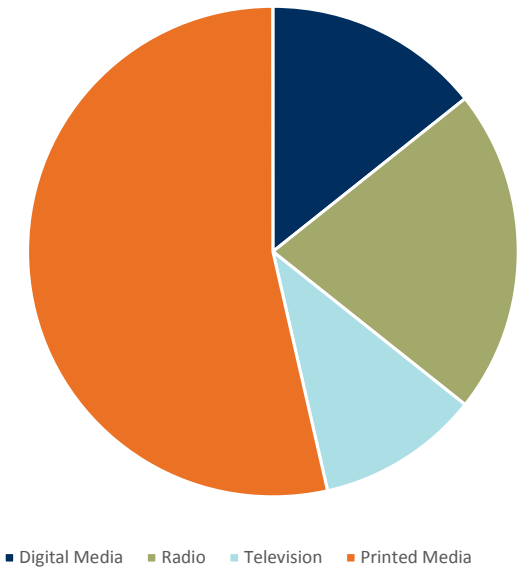
Collaboration Day in the Geoscience building



Collaboration Day in the Geoscience building November 30. Exhibition, mingle and short presentations. Georgia Destouni presented her project iWater with focus on drinking water. Ian Brown presented his project with the Eden Reforestation Projects an NGO in Madagascar.

Our Department in media

Advances in research are not just scientifically but also societally important. Through public media, we contribute to a broader than just scientific dissemination of knowledge and to the public debate. With such public communication we aim to increase understanding, interest and broaden views for the future.
Almost every week our researchers and teachers appear in public media. The diagram below shows the distribution of appearances in different kinds of media.



7. Staff 2016

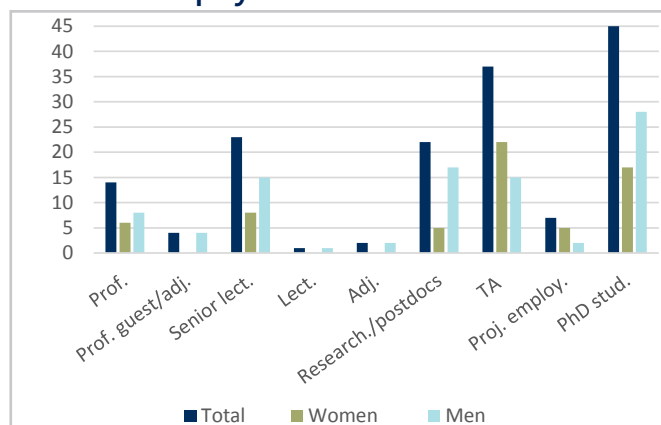
Head of Department: Professor Karin Holmgren,
Associated Professor Jerker Jarsjö, Professor Georgia Destouni

Deputy Head of Department: Associated Professor Jerker Jarsjö, Professor Regina Lindborg

Head of Administration: Sabina Pracic

The list shows number of employees during the whole calendar year 2016.

Number of Employees



Academic Staff

Professors

Cousins, Sara
Destouni, Georgia

Hall, Adrian

Hansson, Margareta

Harbor, Jonathan
Holmgren, Karin
Holmlund, Per
Hätttestrand, Clas
Jansson, Peter

Kleman, Johan
Kuhry, Peter
Kuylenstierna, Johan
Lindborg, Regina

Lyon, Steve

Näslund, Jens-Ove

Rosqvist, Gunhild

Stroeven, Arjen
Wastegård, Stefan

Prof. in Physical Geography
Prof. in Hydrology, Hydrogeology and Water Resources
Adjunct Prof. in Geomorphology
Prof. in Environmental Science with Emphasis on Physical Geography/ Quaternary Geology
Affiliate Prof.
Prof. in Physical Geography
Prof. in Glaciology
Prof. in Physical Geography
Prof. in Physical Geography, Subject Responsible for Post Graduate Studies
Prof. in Remote Sensing
Prof. in Physical Geography
Adjunct Prof. in Water Resources
Prof. in Geography with Emphasis on Natural Resource Management and Sustainability
Prof. in Quantitative Environmental Hydrology
Adjunct Prof. in Environmental Risk Assessment
Prof. in Geography, Especially Physical Geography
Prof. in Physical Geography
Prof. in Quaternary Geology

Associate Professors (Docenter)

Berg, Håkan
Brown, Ian
Dahlberg, Annika
De La Torre Castro, Maricela
Ebert, Karin
Gunnarson, Björn
Helmens Femke, Karin
Holzkämper, Steffen

Jansson, Krister
Jarsjö, Jerker
Kirchner, Nina
Moberg, Anders
Risberg, Jan
Seibert, Jan

Senior Lecturer
Senior Lecturer
Senior Lecturer
Senior Lecturer
Senior Lecturer, Vice Director of Studies
Researcher
Researcher
Senior Lecturer, Director of Undergraduate Studies
Senior Lecturer
Senior Lecturer
Senior Lecturer
Senior Lecturer
Senior Lecturer
Senior Lecturer

PhDs

Auffret, Alistair
Ballarotta, Maxime
Belyazid, Salim
Borgström, Ingmar
Bring, Arvid
Erlandsson Lampa, Martin
Frampton, Andrew
Goodfellow, Brad
Hind, Alistair
Hugelius, Carl-Gustaf
Hätttestrand, Martina
Ingvander, Susanne
Jaramillo, Fernando
Jonason, Dennis
Kalantari, Zahra
Kimberley, Adam
Li, Qiang
Madani, Kaveh
Manzoni, Stefano
Margold, Martin
Persson, Klas
Prieto, Carmen
Quin, Andrew
Reinardy, Benedict
Sannel, Britta
Schlyter, Peter
Sjöberg, Ylva
Skånes, Helle

Stadlinger, Nadja
Stjernquist, Ingrid
Westerberg, Lars-Ove
Winterdahl, Mattias
Zhang, Qiong

Researcher
Postdoctor
Senior Lecturer
Senior Lecturer
Researcher
Postdoctor
Senior Lecturer
Researcher
Researcher
Senior Lecturer
Researcher
Researcher
Postdoctor
Scientific Programmer
Researcher
Senior Lecturer
Postdoctor
Postdoctor
Scientific Programmer
Postdoctor
Assistant Professor
Senior Lecturer
Senior Lecturer
Researcher
Senior Lecturer, Director of Post Graduate Studies
Postdoctor
Senior Lecturer
Senior Lecturer
Researcher
Senior Lecturer

Other Teaching Staff

Fridfeldt, Anders, BSc

Lam, Norris

Lecturer, Director of Undergraduate Studies
MSc, Lecturer

PhD students

Aggemyr, Elsa
Alavaisha, Edmond
Bennich, Therese
Blomdin, Robin
Dawson, Lucas
Dessirier, Benoit
Ermold, Matti
Goldenberg, Romain
Gribenski, Natacha
Helanow, Christian
Higgins, Lindsey
Högberg, Charlotta
Jakobsson, Simon
Johansson, Emma
Katransiotis, Christos
Ketzer, Daniel
Koutsouris, Alexander
Krusic, Paul
Lam, Norris
Larsson, Simon
Lindgren, Amelie
Lindgren, Jessica
Maneas, Giorgos
Massuanganhe, Elidio
Mbanguka, René
Mulokozi, Deogratias
Mwansasu, Simon
Newall, Jennifer
Palmtag, Juri
Pannetier, Roman
Pietron, Jan
Plikk, Anna
Rocha, Eva
Schellens, Marie
Senkondo, William
Siewert, Matthias
Sítöe, Sandra
Stoltz, Jonathan
Than Nguyen, Tam
Thorslund, Josefin
Verrot, Lucile
Waldén, Emelie
Weiss, Niels
Wood, Heather
Österlin, Carl

Teaching assistants (amanuens)

Arnström, Jesper, BSc
Bjursäter, Stefan, MSc
Ekstedt, Karin, MSc
Hamré, Moa, MSc
Häljestig, Sofie, BSc
Vogel, Emanuel, BSc

Administrative Staff

Blåndman, Susanna, BSc, MA
Damberg, Maria, MSc
Hansson, Erik, MSc
Henriksson, Carina, MSc

Holmlund, Moa, MSc
Hörnby, Kerstin, MSc
Isdal, Maija-Liisa, BSc
Karlin, Torbjörn, MSc

Karpegård, Madeleine
Maneas, Giorgos, MSc

Persson, Karin, BSc
Pracic, Sabina, MSBA
Reuterswärd, Karin, PhLic

Richert, Linus, BSc
Schaffer, Christina, MSc
Stenberg de Serves Malin, PhD
Stolarska, Monika
Sturesson, Elisabeth, MSc
Söderman, Malin, MSc

Trygger Bergman, Sophie, MSc
Åkerblom, Lena

HR Responsible
Study and Career Counsellor
Educational Administrator
University certified Administrator,
Senior Administrative Officer
Educational Administrator
Educational Administrator
Financial Controller
Station Manager Tarfala Research
Station
Financial Controller
Station Manager Navarino
Environmental Observatory
Administrator
Head of Administration
Educational Administrator, Study
Counsellor
Analyst
Educational Administrator
Communicator
Financial Administrative Officer
Educational Administrator
Financial Administrative Officer and
Human Resources Administrator
Educational Administrator
Educational Administrator

Technical Staff

Alm, Göran, PhLic
Brotén, Bengt
Burger, Mikael
Cabrera, Yanduy
Engström, Rebecka, MSc
Eriksson, Pia, MSc
Fischer, Sandra, MSc
González, Reyes Martin, MSc
Jacobson, Rolf
Karlsson, Sven, PhLic,
Panagiotopoulou, Dimitra, MSc
Prieto, Carmen, PhD
Skantz, Johan
Spångberg, Martin
Vigouroux, Guillaume, MSc
Wennbom, Marika, MSc
Zhang, Jenson, MSc

Systems Engineer
Technician
Systems Engineer
Facilities Technician
Research Assistant
Research Assistant
Research Assistant
Research Assistant
Web Editor
Lab Technician
Research Assistant
Research Engineer
Facilities Technician
Systems Engineer
Research Assistant
Research Engineer
Research Assistant

Professors Emeriti

Christiansson, Carl
Ihse, Margareta
Lidmar-Bergström, Karna
Lundén, Bengt
Lundqvist, Jan
Karlén, Wibjörn
Ringberg, Bertil
Wastenson, Leif
Østrem, Gunnar



Contact

Visiting address: The Geoscience building (Geovetenskapens hus), Svante Arrhenius väg 8, Stockholm - Frescati

Postal Address: Stockholm University, Department of Physical Geography, SE-106 91 Stockholm



Stockholm University in Frescati. Photo: UltraCam Eagle, LMV.

Department of Physical Geography

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Stockholm University