

Annual Report 2017

Karin Persson and Malin Stenberg de Serves (ED)



Studies of geomorphic processes on sand dunes in Andalusia, Spain. The course on Geomorphic Processes, Natural Disasters and Risk Analysis. Photo: Lars-Ove Westerberg.

Department of
Physical Geography



Stockholm
University



*Department day arranged by HWP May 10.
Photo: Susanna Blåndman.*



Summer excursion to Hjälstaviken June 12.

Words from the Head of Department - An Eventful Year

In 2017, ten PhD dissertations were completed at the department, a new record high after last year's record of nine. We also continued to be successful in attracting new research grants and to recruit new PhD students after the many PhD degrees achieved during 2016-2017. Our number of peer-reviewed research publications increased to 130, from 98 the year before, with several papers in high impact journals, such as Science, Nature Climate Change, Nature Geoscience, Nature Communications, Land Degradation and Development, PNAS, Ecology Letters, Global Change Biology.

Overall, there were many notable and successful events and activities for our department in 2017, including for example:

- organising a symposium on “The future of semi-natural pastures in Sweden”, with participation from the Board of Agriculture, several County Administrative Boards, and many farmers and researchers, by the unit for Biogeography and Geomatics
- hosting the 1st PMIP4 (Paleoclimate Modelling Intercomparison Project) conference with 160 researchers from 24 countries, by the unit for Climate Science and Quaternary Geology
- hosting the 3rd FLARE (Forests and Livelihood) international meeting, together with University of Michigan and Stockholm Environment Institute, by the unit for Environment, Resource Dynamics and Management

- deploying several researchers to the Antarctic field stations “Troll” and “SANAE IV” by the unit for Geomorphology and Glaciology
- completing especially many PhD dissertations at the unit for Hydrology, Water Resources and Permafrost, ranging for example from “Overcoming data limitations in Eastern Africa”, through “Sediment transport from source to sink in the Lake Baikal basin” to “Permafrost carbon in a changing Arctic”
- appointment as Doctor of Honour at Stockholm University for Johan Kuylensstierna, Stockholm Environment Institute, and also adjunct professor at the department.

In education, we continued the systematic decrease of our total volume of programmes and courses, with the aim to improve educational quality and working conditions for our teachers. In 2017, we likely reached a level where our educational efforts should stabilise.

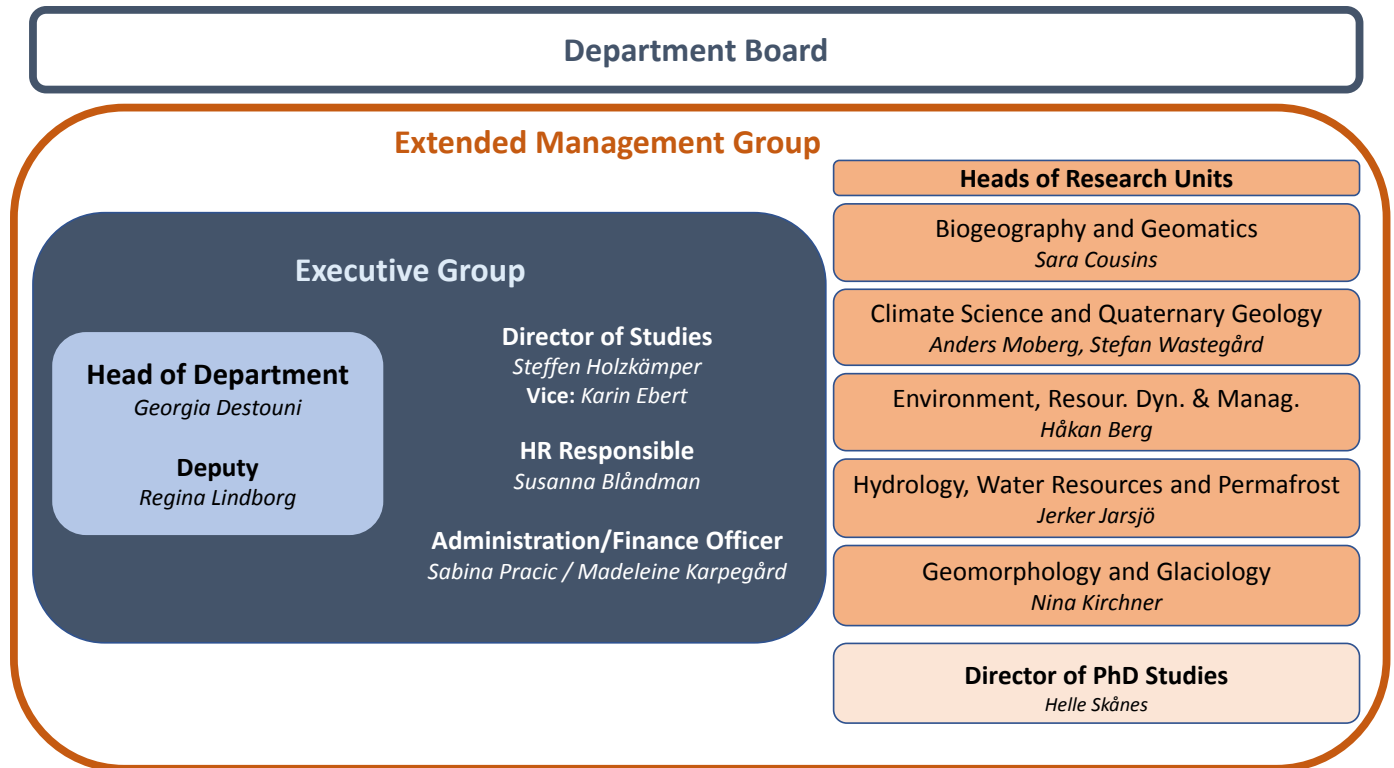
For all our great and inspiring achievements in 2017 I thank all co-workers at the department!

Professor Georgia Destouni

Department record in doctoral theses, a total of ten in 2017!



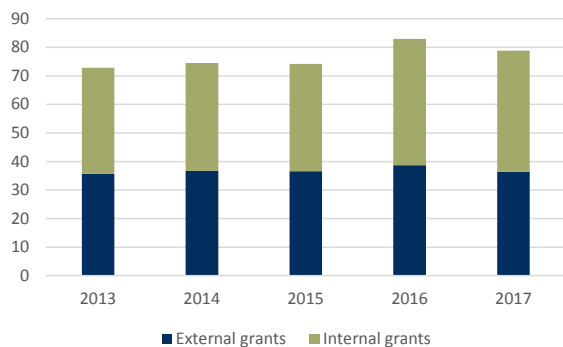
Department Structure



Grant Research

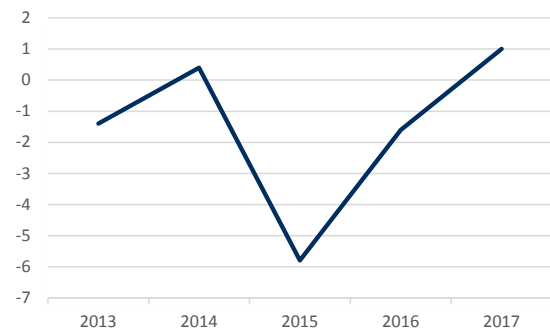
Grant Receiver	Funding Organisation	Project Name	Total Grant (TSEK)
Bring, Arvid	Formas	Den felande länken: hur påverkar klimatet mänskliga konflikter och samarbeten genom vatten?	2999
Brown, Ian	Rymdstyrelsen	Resebidrag till ISRSE-37 i Johannesburg, Sydafrika	33
Brown, Ian	Rymdstyrelsen	Retrieval of snow properties from SAR data using coupled snowpack and scattering models	3801
Brown, Ian	Folkhälsomyndigheten	Geografisk data för miljö och hälsa	75
Cousins, Sara	Kammarkollegiet	Using plant population genetics to infer functional connectivity in fragmented grassland landscapes Project Consortium	200
Fischer, Sandra	G. Gustafssons stift.	Resebidrag	50
Frampton, Andrew	KTH	Hydraulic characterisation of sparsely fractured rock considering sub-fractured and network scale heterogeneity	890
Frampton, Andrew	Formas	Hydrogeologisk transport i aktiva lagret i permafrostlandskap	3000
Frampton, Andrew	SKB	Hydraulic characterisation of sparsely fractured rock considering sub-fractured and network scale heterogeneity Initial studies	1666
Holmlund, Per	G. Gustafssons stift.	Resebidrag	50
Hugelius, Gustaf	EU	Permafrost thaw and the changing arctic coast: science for socio-economic adaptation - Nunataryuk	536
Jarsjö, Jerker	Formas	Ärva föroreningslaster från jordbruk: Integrerad bedömning av biofysik och socioekonomisk inverkan på vattenkvalitet i jordbruksekosystem	3815
Jarsjö, Jerker	Sgi	Modelleringsstöd Modflow	40
Kalantari, Zahra	KTH	Handledningssamverkan inom miljöteknik och hållbar infrastruktur	125
Kalantari, Zahra	Sthlms läns landsting	Sustainable urban-regional development and watershed planning in Stockholm region	400
Kalantari, Zahra	SEI	Scoping for Resilience and Management of Arctic Wetlands, Stage 1	264
Kirchner, Nina	G. Gustafssons stift.	Resebidrag	100
Kirchner, Nina	Formas	Havets påverkan på kalvande glaciärer: mätdata, osäkerhet och simuleringar	2996
Kirchner, Nina	STINT	ASIA Q; The Arctic Science IntegrA ion Quest	1740
Lyon, Steve	Vetenskapsrådet	Modernisera Nepals grundvattenresurser	1170
Lyon, Steve	Formas	Jordbruksvatten Innovationer i tropikerna	2444
Qiong, Zhang	STINT	Vegetation-climate interaction over Chinese Loes Plateau from past to future	573
Qiong, Zhang	Vetenskapsrådet	PMIP4 möte	193
Qiong, Zhang	Vetenskapsrådet	Simulera gröna Sahara med en jordsystemmodell	3280
Risberg, Jan	Statens historiska museer	Strandlinjeförskjutningar	537
Rosqvist, Gunhild	EU	INTERACT	177
Rosqvist, Gunhild	Vinnova	Ett verktyg för bedömning av snökvalitet baserat på ny teknik och samisk kunskap	2910
Schlyter, Peter	Vinnova	Avstressande utemiljökvaliteter i arbetsområden för ökad trivsel, samarbete och produktivitet	163
Sjöberg, Ylva	SKB	Fältarbete i Two-Boat-Lake, Kangerlussuaq, Grönland, 2017	100
Skånes, Helle	Södertälje kommun	Framtagning av biotopdatabas för Södertälje kommun	200
Sum			34527

Grants (MSEK)



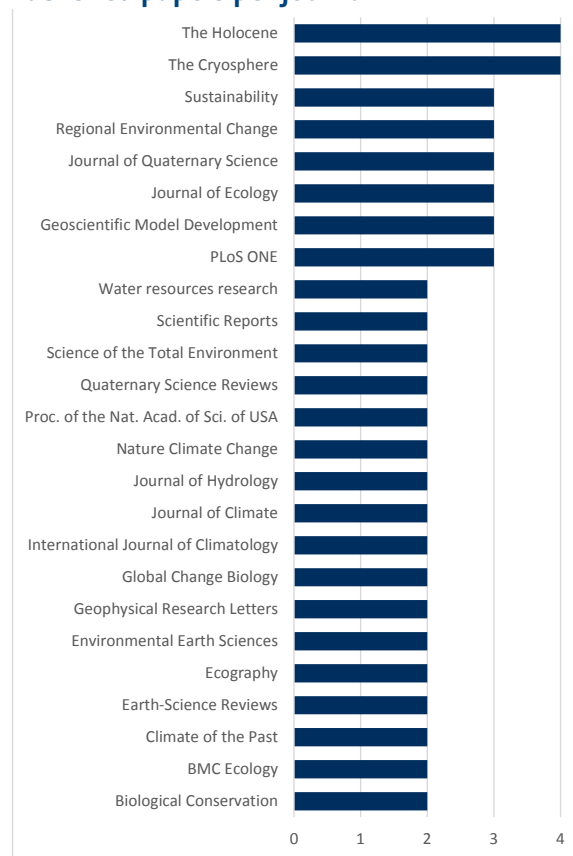
Research grants received 2013-2017.

Financial result (MSEK)



Department annual financial result 2013-2017.

Published papers per journal



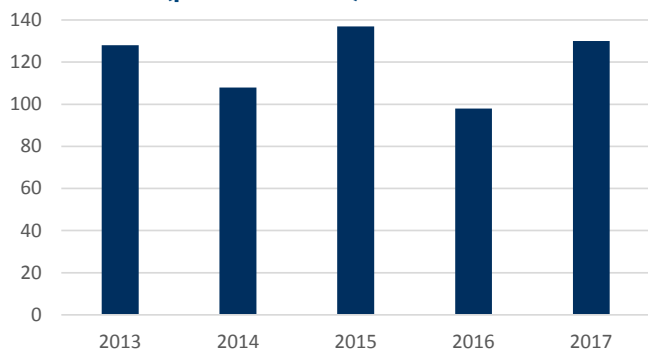
A total of 130 papers were published in peer reviewed papers 2017, out of which the most frequent journals are listed above. Statistics for 2017 reported in DiVA as of 2018-02-08.

QR code to all NG Publications in 2017:



Publications 2017

Publications (peer reviewed)



Number of peer reviewed publications 2013-2017.

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 involved in all three of the department’s Bachelor level programs.

We have three research area leaders in the Bolin Climate Research Centre; Gustaf Hugelius - Biogeochemical Cycles and Climate (RA4), Regina Lindborg - Landscape Processes and Climate (RA7), and Sara Cousins - Biodiversity and Climate (RA8).

Sara Cousins was a research fellow at the Institute of Advanced Studies, Durham University (UK). Alistair Auffret and Gustaf Hugelius returned after a year as guest researchers at University of York’s Department of Biology (UK) respectively the Earth System Science Department at Stanford University (US).

The research unit had a field day 14 of June, to Utö in the Stockholm archipelago to explore new methods and to discuss future research and collaboration.

Emelie Waldén and Simon Jakobsson organised a symposium and workshop “The future of semi-natural pastures in Sweden” with participants from several County Administrative Board representatives, the Board of Agriculture, farmers and researchers. Regina Lindborg was invited speaker. A report (in Swedish and English) summarise ideas and suggestions. In addition, the local newspaper wrote an article series about semi-natural pastures based on input from the symposium and workshop. <https://sites.google.com/view/naturbete2017>

Helle Skånes and Marianne Stoessel presented a regional biotope database mapping method at IALE SE annual

meeting and at the Swedish Cartographic Society Remote sensing and photogrammetry seminar. Meetings regarding historical photogrammetry was held with Lantmäteriet in Gävle, prototype biotope databases were delivered to Sollentuna and Ekerö municipalities, and Södertälje municipality joined as pilot in testing the method for air photo interpretation.

Emelie Waldén and Regina Lindborg participated in a workshop at KSLA discussing the future of semi-natural grasslands. Sara Cousins and Regina Lindborg were invited as experts to a field workshop on grassland restoration and management at Nynäs nature reserve by Sörmland county board. Alistair Auffret together with experts from Sörmland county board organised a workshop on mapping small remnant habitats and green infrastructure where also Sara Cousins participated. Alistair Auffret and Sara Cousins participated in a workshop on green infrastructure organised by SLU and several county boards. Regina Lindborg led a workshop in S. Africa and reported from an international collaboration comparing ecosystem services generated from fruit orchards in S. Africa and Sweden.

We presented our research at several conferences. For example the International Symposium on Remote Sensing of Environment, Pretoria, S. Africa, (Ian Brown: Dimitra Panagiotopoulou and Ian Brown), Ecology Across Borders, Ghent, Belgium (Sara Cousins: Jan Plue), who also presented at IAVS, Palermo, Italy.

An EU H2020 consortium with Gustaf Hugelius studying Arctic coastlines under environmental change was initiated. Fungreen, a project financed by Biodiversa via Formas and led by Sara Cousins, kick-offed first in Brussels with Sara Cousins and then at KU Leuven and in the field (Belgium) with Alistair Auffret, Sara Cousins, Maria Durrani, Jan Plue and Adam Kimberly, which started an intensive field campaign in Sweden, Germany and Belgium.

Simon Jakobsson and Regina Lindborg finished a 2-year project with a systematic review on management of road sides and effects of biodiversity, which was a collaboration between the EviEM consortium, stakeholders and researchers financed by MISTRA.

The EU JPI COUP consortium on permafrost-climate feedbacks, coordinated by Gustaf Hugelius, had its final meeting.

A collaboration with Vitterhetsakademin was initiated to monitor the effects on plant biodiversity after landscape restorations at Stensjö village which is owned and run by the academy.

Jessica Lindgren defended her thesis “Small remnant habitats” in December.

Alistair Auffret received a position as Associate Senior Lecturer in Landscape Ecology at SLU Ultuna after 10 years as a PhD-student and postdoc. Good luck Ali!



Field day to Utö. Photo: Emelie Walden.



Plant inventories of green infrastructures in landscapes. Photo: Adam Kimberley



Installing temperature loggers. Photo: Sara Cousins.



Stakeholder workshop in Jönköping. Photo: Simon Jakobsson.



Field site in Belgium for the Fungreen project. Photo: Sara Cousins.



Fruit orchards in South Africa. Photo: Regina Lindborg.



Stensjö by. Photo: Sara Cousins.

Research Unit Climate Science and Quaternary Geology

Head of Research Unit: Anders Moberg
Deputy: Stefan Wastegård

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.

In 2017, our colleagues Göran Alm and Jan Risberg, who both have worked here for decades, retired. Jan got his PhD in 1991 and he has been a researcher and senior lecturer. He is docent in Quaternary Geology and his research topic is diatoms and other siliceous microfossil with special focus on shore displacement studies, often in collaboration with archaeologists. Jan has been involved in research projects in Africa and Sri Lanka and has supervised students on all levels, from bachelor to PhD. Göran has worked as a systems engineer and is our photogrammetry guru. He was one of the pioneers in developing the remote sensing research and education activities at the department in the 1980s. Among his research interests are to develop animated digital visualizations of shoreline displacement, where he collaborated closely with Jan.

We also remember our dear colleague Sven Karlsson who sadly passed away in 2017, at the time when he was about to retire. Sven had been at the department since the 1990s. Sven was a skilled pollen analyst and he was responsible for laboratories at the department. He will be greatly missed by his colleagues.

Qiong Zhang obtained the docent title in Physical Geography in November. She organised a summer course on climate model simulations in June at Lanzhou University in China, co-funded by STINT, with participants from China and Sweden. Qiong also hosted the 1st PMIP4 conference in September, with 160 researchers from 24 countries.

Supported by the Chinese Scholarship Council, Dr Jianqiu Zheng from the University of Science and Technology of China visited us for one year, working on the mechanism of Arctic warming amplification during the Pliocene using our EC-Earth simulations.

Steffen Holzkämper, Martin Finné, Karin Helmens and collaborators from Helsinki University and Heidelberg University study an Eemian stalagmite from Korallgrottan, Jämtland. This year they developed an age model based on U/Th dates, and worked on stable carbon and oxygen isotope profiles covering c. 5000 years of the Eemian.

Benedict Reinardy became an associated researcher on the EU Horizon 2020 project “Strategies for Environmental Monitoring of Marine Carbon Capture and Storage (STEMM-CCS)”, which included participating on a scientific cruise to the central North Sea. He also successfully applied to participate on the International Ocean Discovery Program (IODP) Amundsen Sea West Antarctic Ice Sheet History Expedition (379).

The development of a new deep ice core drilling project in Antarctica, Beyond EPICA-Oldest ice, continues with support from EU with Margareta Hansson as one of the WP leaders. She is responsible for synthesis work for site selection and scientific and managerial foundation for the drilling phase. She is also leading the Swedish participation in the ongoing international East Greenland Ice-core Project (EGRIP).

Gunhild Rosqvist presented together with Niila Inga, a Sámi reindeer herder collaborator, results from the ‘Resource Extraction and Sustainable Arctic Communities’ project at the IX International Congress Arctic Social Science in Umeå. They also gave together a keynote lecture at the workshop ‘Tomorrow’s Arctic EIA: Nordic possibilities and perspectives to Environmental Impact Assessments in the Arctic’, Rovaniemi. Gunhild made several media appearances in 2017 including Swedish TV, radio and newspapers.

We had two PhD defences in 2017 by Lindsey Higgins and Sandra Siteo. PhD student Christos Katrantsiotis has been working on n-alkanes and their carbon and hydrogen isotopic composition on a sediment core retrieved from the Gialova lagoon, SW Peloponnese. Simon Larsson presented his first results of the project ‘Precise linking of Late Quaternary paleoclimate archives in the North Atlantic region’ at the INTIMATE open workshop and conference at Aberystwyth University in Wales, UK. This includes the first finding of the Laacher See Tephra in Sweden (photo). Paul Krusic and co-workers presented evidence for the oldest living tree in Europe: a Bosnian pine called ‘Adonis’ found in northern Greece and dated to be over 1075 years old.

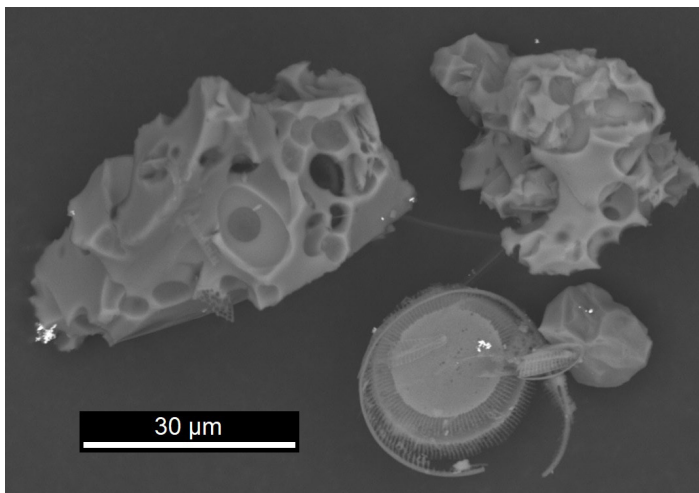
In September we made an appreciated social outing to the Viking age trading center Birka in Lake Mälaren, guided by Jan Risberg and Lena Holmquist at the Department of Archaeology and Classical Studies, Stockholm University.



Picture from our visit to Birka in September. Photo: E. Sturesson.



Some of the participants of the summer course on climate model simulations in June 2017 in Lanzhou, China. Two of our PhD students, Charlotta Högberg and Eva Rocha attended the course and can be seen in the picture (no 5 and 6 from left). Photo: Qiong Zhang.



Picture to the left. Laacher See tephra from Körslättamossen, south Sweden (pictured together with a Cyclotella distinguenda diatom).



Qiong Zhang hosted the 1st PMIP4 conference in September, with 160 researchers from 24 countries. Photo: Jenson Zhang.

Research Unit Environment, Resource dynamics and Management

Head of Research Unit: Håkan Berg

The Environment, Resource dynamics and Management Group's (ERD) 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.

The strong link to societal need are also reflected in ERD's Masters in Environmental Planning, and other elective courses. The high employability of our Master students are in this respect an indication of both the quality of our recruited students and the success of the systems analytically centred design and pedagogics of the programme. The value our external teachers in bringing other disciplinary perspectives or practical experiences to the education are from a quality perspective of fundamental importance for an applied and multi-disciplinary programme – and greatly appreciated by the students. We have continued to conduct and supervise master students projects with high societal relevance and applicability through joint collaborations with governmental institutions, NGO's and companies.

ERD had a successful retreat at the NEO research station in mid April 2017. The group had a constructive opportunity for the members to inform each other about our respective research. The ERD group was able to discuss proposals for joint projects and activities, leading to drafting of a PhD course at the initiative of the PhD candidates and assisted by Håkan Berg. The PhD course on “transdisciplinary research for sustainability” will benefit 15 PhD students and be based on a series of 10 lectures by invited experts and an eight-day workshop at NEO.

ERD has 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 our two PhD students from Tanzania (Deogratias and Baraka) (Sida) led by Håkan Berg. Deogratias finalized a field survey of 100 aquaculture farmers in seven districts of Tanzania. Giorgos Maneas continue to work on his PhD project, focusing on improved management of the Gialova Lagoon in Greece. The work in 2017 focused on monitoring of birds and water quality in the lagoon.

The Marie Curie Slodowska EU project AdaptEconII (Adaption to a New Economic Reality) ran a PhD research school at Sigtuna in November 2017 and had successful midterm review in December. After the review the 12 PhD students in the project have started to move to their partner universities.

The ERD is hosting two PhD students from the University of Iceland: Eduard Nedelciu studying “Food, population and phosphorus” and Maartje Oosdjik “assessing and modelling ocean fisheries”. Marie Schellens has moved to her partner university, University of Iceland, and Therese Bennich is visiting the University of Clermont-Auvergne. Closely related to, but separate from, the project above, Dr P. Schlyter and Dr I. Stjernquist are continuing research cooperation with Univ. of Iceland on future resource sustainability.

The research within the project “Negotiating Pathways to Multifunctional Landscapes: A Pilot Model in the Jämtland Mountains” was formally finalized at the end of 2017, although reporting and final workshops/conferences continues in 2018. A second stakeholder workshop was organised with successful results, and a film about the project is under production. The project, financed by SEPA, 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 2017. The project is a cooperation with KTH and SRC. One MSc thesis was completed in June, a research assistant was employed for 6 months, and several BSc and other student projects have been linked to the project. A PhD position was announced and the successful candidate, Max Johansson, started his employment in January 2018.

The 3rd FLARE (Forests and Livelihood) international meeting in September was organized in partnership between ERD, University of Michigan and SEI (<http://www.forestlivelihoods.org/flare-meeting-2017/>). The conference was well attended with participants from all over the world. Students from ERD's Master program provided invaluable assistance during the conference.

Research on sustainable nutrient cycles in forestry by Nadja Stadlinger, Martin Edrlandsson and Salim Belyazid has continued with support from the Faculty, Energimyndigheten and FORMAS.

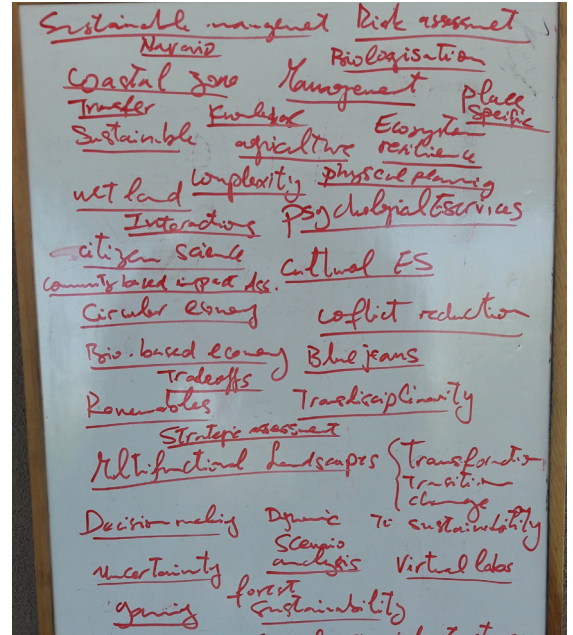
The FORMAS project “Green Infrastructure for ecological sustainability and human well-being” ended in 2017 and the two PhDs Lucas Dawson and Jonathan Stoltz are moving towards finishing their theses. Drs I. Stjernquist and P. Schlyter are finishing a group modelling sub-project within the project on co-management of green infrastructure and ecosystem services at Söderåsen, S. Sweden, together with a large number of local stakeholders.

Daniel Ketzer is in the finishing phase of his PhD work in the project APV-RESOLA on land use conflicts between biomass and agrophotovoltaic power production. Following the first citizen workshop from 2015, the second citizen workshop in November 2017 assessed changes in the citizens' perception of APV during the technology development process.

PhD candidate Carl Österlin has been involved in the project Integrated natural- and cultural environmental management for the Swedish mountains funded by the Swedish National Heritage Board, where all data collection is completed and is moving into a phase of finalizing the project.



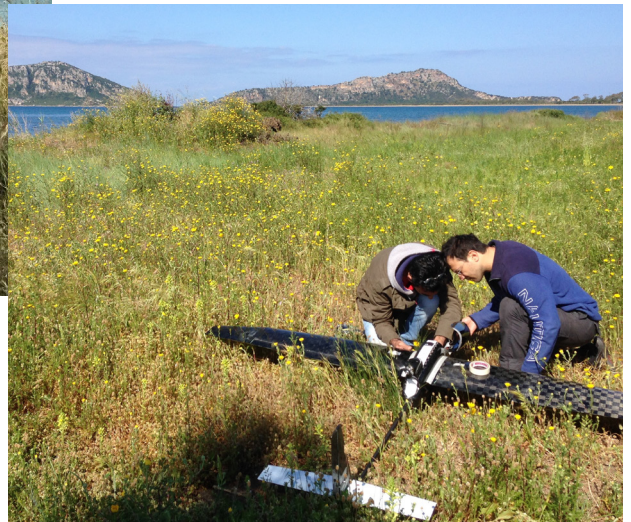
On a course excursion in Österlen.



Brainstorming from ERD's NEO workshop.



ERD's field trips during a visit to NEO.



Unmanned Aerial Vehicle mapping of Gialova Lagoon.

Research Unit Geomorphology and Glaciology

Head of Research Unit: Nina Kirchner

We study Earth surface processes and their effects on landscapes, glaciers and society, in glaciated and non-glaciated regions. Analysis of the landscape enables us to reconstruct past environments and processes, and to better understand contemporary Earth surface processes.

Some 2017 publications:

Margold and Stroven have co-authored a paper in *Science* on how the Cordilleran Ice Sheet responded to climate reversals near the Pleistocene Termination. Stroeven and Hall are also co-authors on an ice sheet modeling study of the deglaciation of the Eurasian Ice Sheet complex in *Quaternary Science Reviews*. Together with Blomdin, Harbor, K. Jansson, and Stroeven, Gribenski has furthermore highlighted the strengths of recent research within the Central Asian Paleoglaciology Project published in *Quaternary Science Reviews*.

Work by Hall and colleagues on the glaciation of north-east Scotland during the middle to late Devensian was published in *Journal of Quaternary Sciences*.

Results from an expedition to Mohnbukta/Storfjorden (Svalbard), involving former MSc students Flink and Hill, supervised by Kirchner and Noormets, have been published in *Boreas*. Kirchner was also involved a paper on dynamical regimes of a basin-covering, kilometer-thick ice shelf in the central Arctic Ocean (in *The Cryosphere*), an a newly discovered glacial trough on the East Siberian Continental Margin (in *Climate of the Past*).

Ebert and colleagues from the department have published a paper on contaminated area instability along Ångerman Älven, northern Sweden, in *Environmental Monitoring and Assessment*.

Work on coastal environments in Mozambique by Westerberg and Massuanguane resulted in publications in *Palaeogeography*, *Palaeoclimatology*, *Palaeoecology*, and *The Holocene*.

Holmlund has published the book "Frusna ögonblick" ("Frozen moments"), which collects many previously unpublished photographs of Swedish polar research between the years 1861-1980.

2017 fieldwork included:

Westerberg and Risberg carried out reconnaissance fieldwork in Mozambique in relation to a planned research collaboration with the Department of Geology, Eduardo Mondlane University, Maputo.

Within the MAGIC-DML (Mapping, Measuring, and Modeling Antarctic Geomorphology and Ice Change, in Dronning Maud Land) project led by Stroeven and Harbor, Newall, Blomdin, Harbor and Sarah Sams (Purdue University) were deployed to Antarctic field stations "Troll" and "SANAE IV" starting December 18. The first four samples were collected from Schumacher nunatak on December 31. MAGIC-DML science can be followed on a daily basis via <https://www.magicdml.com/>, Facebook, Instagram, and Twitter. MAGIC-DML continues into 2018.

A new project on Glacier-Archeology in the Swedish mountains was started involving Holmlund, the Department of Archeology at Stockholm University and Ajtte Museum in Jokkmokk, focusing on vanishing environmental archives and exposure of archeological artefacts due to climate warming in Swedish Lapland. Field-activities in the Mårma massif, Salajekna and Ålmallojekna included drone flights, aerial photography, archeological walking and GPS-surveys. In front of Ålmallojekna 1500 year old bones were found, which is promising for the future.

Fieldwork within an SKB funded research project involving Hall, Ebert, Goodfellow, Hättstrand and Stroeven included mapping of glacially-eroded bedrock surfaces in Uppland and Västergötland and an extensive sampling programme for ¹⁰Be and ²⁶Al cosmogenic nuclides.

Hall, together with colleagues from the British Geological Survey, mapped glacial roughening in Precambrian bedrock on the island of Lewis, Outer Hebrides, Scotland, to explore the links between landforms, till formation and ice dynamics.

A short field trip has been made to Kongsfjorden, western Svalbard, including Kirchner, MSc student Holmes, and participants from the high school "Marina Läroverket" in Danderyd, to retrieve an oceanographic mooring. Holmes is working with the data collected in her MSc thesis, and outreach to the public was made at "Researcher's Friday" in Stockholm, and through a you-tube movie, https://www.youtube.com/watch?v=6QjHAN5y7_g

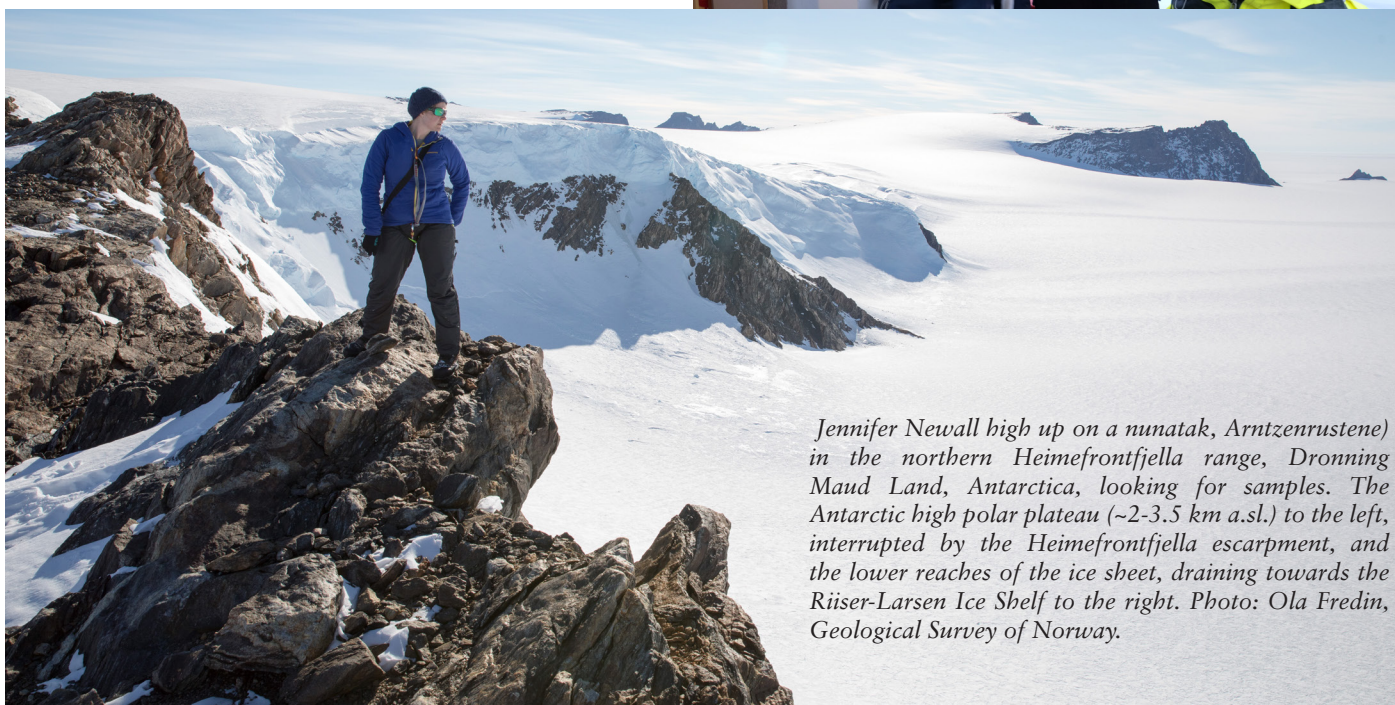


Sampling coastal dune sand for OSL-dating. Xai-Xai, Mozambique. Photo: L-O Westerberg, Sept. 2017



Cover of the book Frusna ögonblick ("Frozen Moments") by Per Holmlund and Tyrone Martinsson.

The Kongsfjorden field party has successfully retrieved the LoTUS (Long Term Underwater Sensing bottom lander) #8 and thereby, an annual time series of water temperatures close to the calving front of Kronebreen/Svalabrd. Left to right: Lars Byrén, teacher at Marina Läroverket, Danderyd, Felicity Holmes, MSc student at NG, Simon Holmgren, student at Marina Läroverket. Photo: Nina Kirchner.



Jennifer Newall high up on a nunatak, Arntzenrustene) in the northern Heimefrontfjella range, Dronning Maud Land, Antarctica, looking for samples. The Antarctic high polar plateau (~2-3.5 km a.sl.) to the left, interrupted by the Heimefrontfjella escarpment, and the lower reaches of the ice sheet, draining towards the Riiser-Larsen Ice Shelf to the right. Photo: Ola Fredin, Geological Survey of Norway.

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 processes and their changes to contribute to knowledge and capacity advancement needed for sustainable development. We also develop methods for decision support in sustainable urban development and planning, and watershed/urban modelling integration.

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 through the landscape – locally, regionally and globally, and from past, through present and future times. We study the possible fate of permafrost considering future global warming and the total amount, landscape distribution and vertical partitioning of soil organic carbon stocks in these regions. We also inform decision makers and planners on managing current and mitigating future hydrologic impacts of weather extremes.

Some notable events, among others, in 2017:

Seven students defended their PhD theses:

- Alexander Koutsouris: “Overcoming data limitations in Eastern Africa”
- Norris Lam: “Modeling rating curves from close-range remote sensing data”
- Lea Levi (guest Ph.D. student from KTH): “Data-driven analysis of water and nutrient flows”
- Jury Palmtag: “Landscape partitioning and burial processes of soil organic carbon in contrasting areas of continuous permafrost”
- Jan Pietron: “Sediment transport from source to sink in the Lake Baikal basin”
- Josefin Thorslund: “Hydrological spreading of metal pollution and wetlands as nature-based solutions”
- Niels Weiss: “Permafrost carbon in a changing Arctic”

Four new Ph.D. students: Arjun Chakrawal, Sandra Fischer, John Livsey, Guillaume Vigouroux

Funded research:

Ten major external research projects led or co-led by HWP unit researchers were awarded in 2017:

- Formas: The missing link: How does climate affect human conflict and cooperation through water? A. Bring (PI).
- Formas: Hydrogeological transport in the active layer of permafrost environments, A. Framton (PI).
- Formas, Diversified Salix plantations for mitigation of climate change, A.M. Herrmann (PI), S. Manzoni, et al.

- Formas: Regional to global changes in water flows, storage and quality on land, G. Destouni (PI).
- Vinnova: Water monitoring networks – iWater, Daniel Paska Ericsson AB (PI), G. Destouni, Z. Kalantari, et al.
- EU Erasmus+, Water Management and Climate Change in the Focus of International Master Programs, F. Reinstorf, S.W. Lyon, Y. Sjöberg et al.

- Netherlands Polar Programme, Permafrost thaw impacts on Arctic river flows, Y. van der Velde (PI), S.W. Lyon, et al.
- Three collaborative urban research projects, funded by MISTRA Urban Futures (SNOD project), Stockholm County (SLL), and Stockholm University, Z. Kalantari (PI), G. Destouni, et al.

In addition, we received five large (>1,000 kSEK) Bolin Centre-funded grants (PIs/co-PIs: A. Bring, J. Jarsjö, G. Destouni, A. Frampton, S.W. Lyon, S. Manzoni).

Notable publications (IF>9):

Kalantari et al., Destouni (2017), Land Degradation and Development 28.

Manzoni et al. (2017), Ecology Letters 20(9).

Awards:

S. Manzoni: 2017 Junior Marchi Lecturer award (Gruppo Italiano di Idraulica).

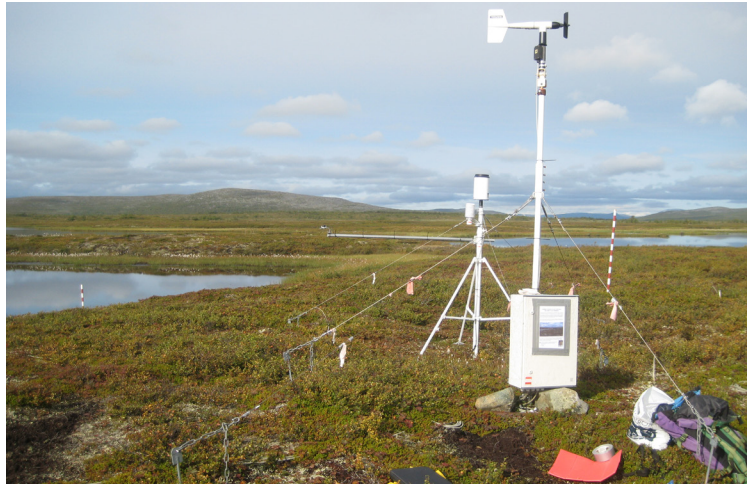
Activities:

We are involved in numerous outreach and cooperation activities bridging the gap between research and society, with a focus on kindergarten and schools, and capacity building in developing countries.

The unit had a lunch-to-lunch meeting at Lejondals Slott, where three synthesis articles in the broad area of wetland hydrology have been sketched. Work on these articles is in progress and will continue throughout 2018.



Group photo at the Lejondals slott meeting (Oct. 16-17).



Field station in Tavravuo-ma, Sweden. Photo B. Sannel.



Students learn to monitor water, Nepal. Photo: S. Lyon.



Water sampling in Nautanen, Sweden. Photo: D. Avango.



The tight relation between people and water in Kathmandu. Photo: S. Lyon.



Experimental catchment exhibiting fire damage, Boise, Idaho, USA. Photo: V. Mansanarez.

Tarfala Research Station (TRS)

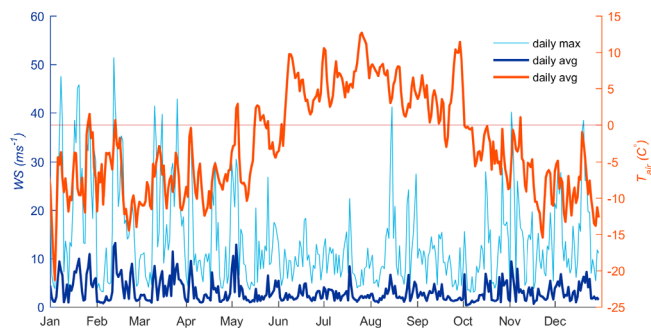
TRS is located in the Kebnekaise Mountains, northern Sweden, 200 km north of the Arctic circle. Storglaciären is the best studied glacier in the Tarfala valley with monitoring including the annual surface mass balance for the last 70 years.

Gunhild Rosqvist is the director of TRS. Researchers and students worldwide visit Tarfala to study the glaciers, streams, landforms and ecosystems. TRS is operated by Stockholm University and is a part of the monitoring programs within The Swedish Infrastructure for Ecosystem Science (SITES). This monitoring includes measurements of glacier mass balance, meteorology, hydrology, biogeochemistry of surface waters and spectral analysis of vegetation, permafrost and vegetation development. Among other the data provides detailed records of short- and long-term effects of climate change on glaciers and on ecosystems important for reindeer herding.

The net surface mass balance was positive on Storglaciären. Mårmaglaciären and Riukojietna and just below zero on Rabots glaciär. The elevation of the ice covered Kebnekaise south summit was measured 18 August, to 2098.5 msl, making it 1.7 m higher than the north summit.

The hydrology station monitoring the streamflow at the valley mouth was successfully installed on 23 May while there were still a lot of snow around the research station when it opened for the summer season on 19 June.

New for 2017 was an expansion of the vegetation monitoring in Laevasvage. This was done by aerial imagery with a multi-spectral camera mounted on a UAV. Six exciting INTERACT funded projects visited the station in the summer, the new Tarfala board was introduced to the work being done at the station, a few scientist came back to work on their projects and the Tarfala course was held in August.



Plot showing the daily air temperature and wind speed in Tarfala during 2017.

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.

In 2017, NEO hosted 7 courses, a summer school, a workshop and several fieldwork visits. A total of 209 visitors stayed 1061 nights at the NEO Research Station! In total 6 MSc thesis related to NEO have been completed and presented at Stockholm University in 2017. The follow up of the NEO workshop, “Achievements and future perspectives”, which was held at Stockholm University in November, 2016, resulted in the submission of several EU research proposals of which the EU-application COASTAL - Collaborative lAnd-Sea inTegrAtion pLatform, which was submitted to EU, Research and Innovation Action (H2020-RUR-2016-2017) has been approved. A NEO seminar entitled “Bridging between science and business” was held at the residence of the Swedish Ambassador in Greece, on April 2017. In addition, café-NEO meetings, the scientific café organized by NEO, were held in different coffee bars in Kalamata.



Värmdö Gymnasium students and teachers on top of Palaiokatro hill. Photo: Paul Strehlenert

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 climate of the earth. 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, in 2017, 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

In addition to its annual Bolin Days, seminar series, conference participation, research school activities, its expanding database and research area activities, the Bolin Centre launched its new Climate Festival in May 2017. Also, during 2017, the Bolin Centre has taken the first steps towards becoming a focal area for collaboration with the Human Science Academic Area.



Field work on the S. Hemisphere meeting elephant seals, king penguins and albatrosses. Photo: Etienne Pauthenet.

Infrastructure

Field stations:

Tarfala Research Station

Navarino Environmental Observatory (NEO)

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



Geomorphology laboratory the "Rännan". Photo: Susanna Blåndman.

Education

The Department's 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 Environmental 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 about 1200 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
Master's Programme in Physical Geography and Quaternary Geology

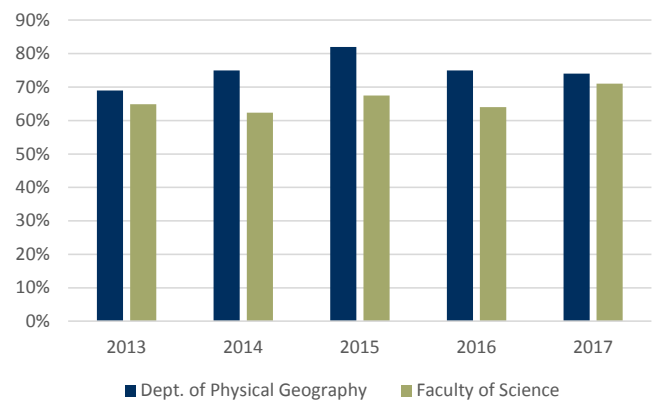


Rehearsal of mapping techniques in preparation of field work in Andalusia, Spain. The course on Geomorphic Processes, Natural Disasters and Risk Analysis. Photo: L-O Westerberg.

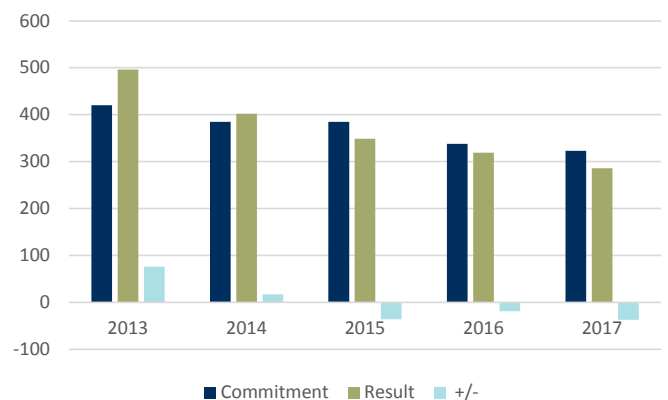


Excursion to a 'frost-weathered' plateau of Varanger Peninsula (NE Norway). Photo: Bild Karin Helmens.

Student completion rate in % (genomströmning)

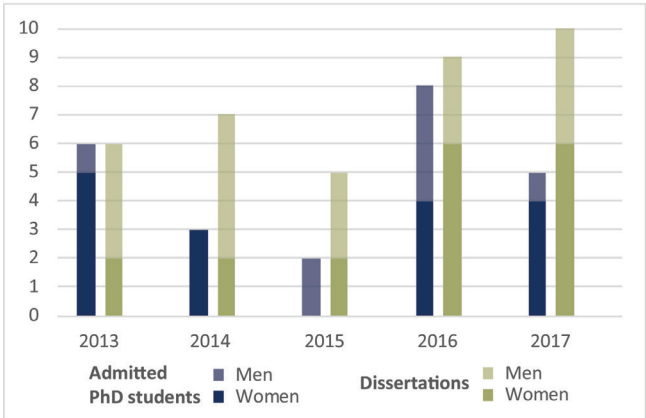


Annual Performance (HÅP)



PhD education

PhD student admissions and dissertations 2017



Doctoral theses of the year

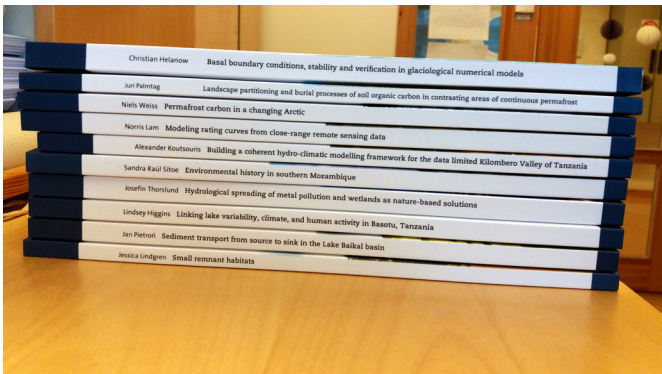
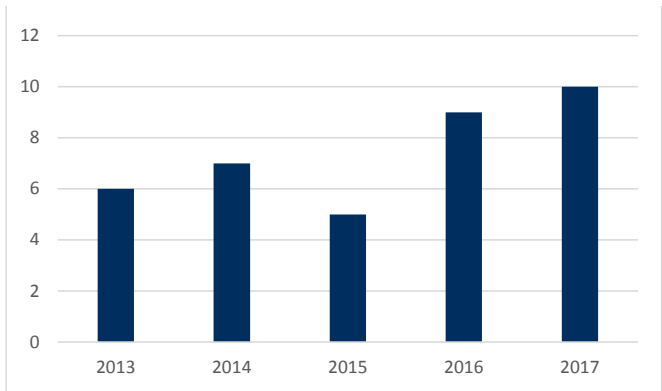


Photo: Karin Persson.

Dissertations between 2013-17



Doctoral theses

- Palmtag, J., *Landscape partitioning and burial processes of soil organic carbon in contrasting areas of continuous permafrost*
- Helanow, C., *Basal boundary conditions, stability and verification in glaciological numerical models*
- Koutsouris, A., *Building a coherent hydro-climatic modelling framework for the data limited Kilombero Valley of Tanzania*
- Lam, N., *Modeling rating curves from close-range remote sensing data: Application of laser and acoustic ranging instruments for capturing stream channel topography*
- Weiss, N., *Permafrost carbon in a changing Arctic - On periglacial landscape dynamics, organic matter characteristics, and the stability of a globally significant carbon pool*
- Pietron, J., *Sediment transport from source to sink in the Lake Baikal basin: Impacts of hydroclimatic change and mining*
- Higgins, L., *Linking lake variability, climate and human activity in Basotu, Tanzania*
- Thorslund, J., *Hydrological spreading of metal pollution and wetlands as nature-based solutions*
- Siteo, S., *Environmental history in southern Mozambique. Reconstruction of flooding events, hydroclimate and sea-level dynamics since mid-Holocene*
- Lindgren, J., *Small remnant habitats – important structures in fragmented landscapes*



Christian Helanow nails his thesis.

Collaboration

International exchange (education)

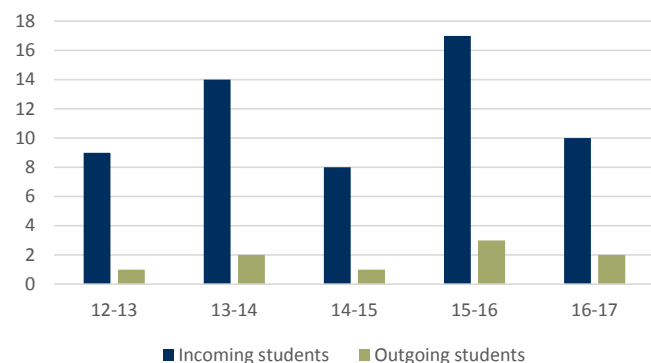
Partner Universities

Leuven, Belgium
Brussels, Belgium
Gent, Belgium
Grenoble, France
Bern, Switzerland
Freiburg, Germany
Aachen, Germany
Kiel, Germany
NTU, Singapore
Innsbruck, Austria
Ostrava, Czech Republic
Turku, Finland
Copenhagen, Denmark



International coordinators from the Faculty of Science visit Singapore. Photo: Maria Damberg.

Erasmus Exchange



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 **17 October** with about 100 visitors, a mixture of alumni, researchers and students. Three alumni told their carrier stories: Jakob Granit, Director General at the Swedish Agency for Marine and Water Management, Per Klingbjer, Executive director at Naturvetarna/Swedish Association of Professional Scientists and Minna Severin, State Geologist at SGU.

We also had an alumni event **2 May** with focus on ice around the globe both for research and skating. We had about 25 visitors.

Some Awards and Prizes

Ahlfortpriset till Robin Blomdin

On Vega day, Robin Blomdin received the Ahlfortpriset for the best dissertation in Physical Geography in 2016 from the Swedish Society for Anthropology and Geography (SSAG). In addition to a certificate, he received 40 000 SEK for this achievement.

Prize to former students

Bettina Matti, with the master thesis: "Trends in high peak flow generation across the Swedish Subarctic" and Josefin Tiedemann with the candidate work: "The water dynamics of Brunnsviken - Water flow rate and flow direction study as the possible explanation for the spread of TBT" received the prize for "Best Degree Project in Hydrology" from the Swedish Hydrological Council SHR.

Awards to employees and students at "Kartdagarna"

"Årets prestation" to Anna Berggren for her work:
Inledande försök till mätning med Europas navigeringssystem Galileo.

"Årets studentkarta" to Sofi Johansson for her map:
Tulip sightseeing in the bulb region Bollenstreek.

"Årets karta" to Ingmar Borgström for a map in the series: *Rundslingor, Snuskungens runda.*

Honorary doctor

Johan Kuylenstierna is appointed for his successful work as an inspiring, engaging, straightforward and convincing expert and communicator bridging science and policy in issues related to global sustainable development. His specialization is in international water resources issues.



Collaboration with the public

We interact with the public and schools at annual events like: Forskardagarna, Forskarfredag, Geologins dag, Bolincentrets klimatfestival and Världsvattendagen.

We are also active in many panel discussions and seminars outside the academy.

Our researchers are often invited as experts in different discussions for example about sustainability issues.

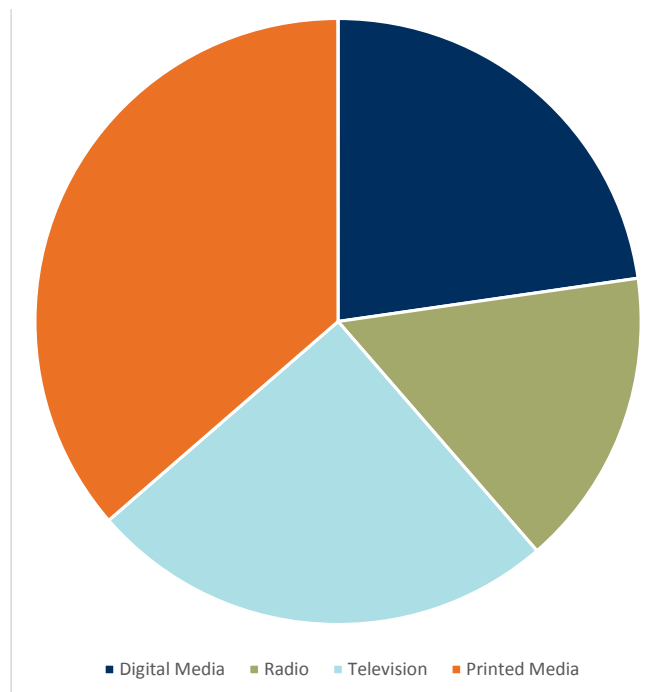


Gia Destouni at the Swedish Embassy in Washington attending the seminar "Research and Innovation Addressing Societal Challenges", Sustainable Development - From Local Choices to Global Impacts". Photo: Elisabet Idermark.

Our Department in media

Advances in research are not just for us but for the public. Through the media, we can contribute to the dissemination of knowledge and debate. With communication we can increase understanding, interest and broaden the views for the future.

Almost every week our researchers and teachers show up in media. The diagram below shows the distribution in different kinds of media in 2017.

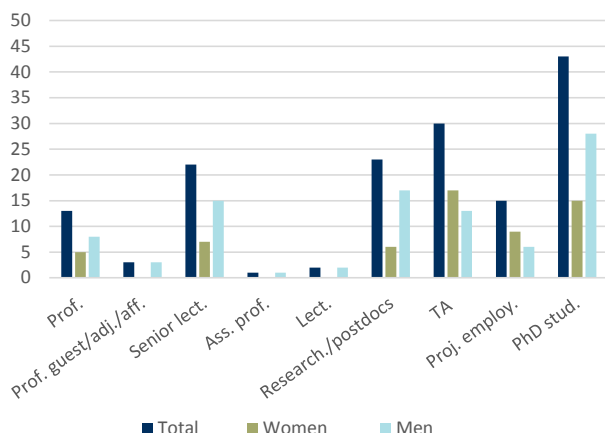


7. Staff 2017

Head of Department: Professor Gia Destouni
Deputy Head of Department: Professor Regina Lindborg
Head of Administration: Sabina Pracic

The list reflects employments during any part of the calendar year 2017.

Number of Employees



Academic Staff

Professors

Cousins, Sara
Destouni, Georgia

Hall, Adrian

Hansson, Margareta

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

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

Lyon, Steve

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 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
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
Schlyter, Peter
Seibert, Jan
Zhang, Qiong

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
Senior lecturer

PhD

Auffret, Alistair
Belyazid, Salim
Borgström, Ingmar
Bring, Arvid
Erlandsson Lampa, Martin
Fischer, Benjamin
Frampton, Andrew
Ghajarnia, Navid
Goodfellow, Brad
Hugelius, Carl-Gustaf
Hätttestrand, Martina
Jaramillo, Fernando
Jonason, Dennis
Kalantari, Zahra
Kimberley, Adam
Li, Qiang
Lam, Norris
Madani, Kaveh
Mansanarez, Valentin
Manzoni, Stefano
Margold, Martin
Munishi, Subira
Orth, Rene
Reinardy, Benedict
Sannel, Britta
Sjöberg, Ylva
Skånes, Helle

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

Stadlinger, Nadja
Tumbo, Madaka
Westerberg, Lars-Ove
Zou, Liangchao

Other Teaching Staff

Fridfeldt, Anders

Lecturer

PhD students

Aggemyr, Elsa
Alavaisha, Edmond
Bennich, Therese
Chakrawal, Arjun
Dawson, Lucas
Ermold, Matti
Fischer, Sandra
Goldenberg, Romain
Helanow, Christian
Higgins, Lindsey
Högberg, Charlotta
Jakobsson, Simon
Katransiotis, Christos
Ketzer, Daniel
Koutsouris, Alexander
Lam, Norris
Larsson, Simon
Lindgren, Amelie
Lindgren, Jessica
Livsey, John
Maneas, Giorgos
Mbanguka, René
Mulokozi, Deogratias
Mwansasu, Simon
Newall, Jennifer
Nyangoko, Baraka
Palmtag, Juri
Pannetier, Roman
Pietron, Jan
Plikk, Anna
Rocha, Eva
Schellens, Marie
Senkondo, William
Siewert, Matthias
Sitoe, Sandra
Stoltz, Jonathan
Than Nguyen, Tam
Thorslund, Josefin
Vigouroux, Guillaume
Waldén, Emelie
Weiss, Niels
Wood, Heather
Österlin, Carl

Teaching assistants (amanuens)

Arnström, Jesper, MSc
Bjursäter, Stefan, MSc
Häljestig, Sofie, BSc
Vogel, Emanuel, MSc

Administrative Staff

Blåndman, Susanna, BSc, MA
Damberg, Maria, MSc
Hansson, Erik, MSc
Holmlund, Moa, MSc
Hörnby, Kerstin, MSc
Karlin, Torbjörn, MSc

Karpegård, Madeleine
Maneas, Giorgos, MSc

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

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

Trygger, Sophie, MSc
Åkerblom, Lena

HR responsible
Study and Career Counsellor
Educational Administrator
Educational Administrator
Educational Administrator
Superintendent Tarfala Research Station
Financial Controller
Superintendent 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
Blomdin, Robin, PhD
Brotén, Bengt
Burger, Mikael
Cabrera, Yanduy
Durrani, Maria, BSc
Ekstedt, Karin, MSc
Eriksson, Pia, MSc
Gribenski, Natacha
Hovemyr, Mikael, BSc
Jacobson, Rolf
Johansson, Max, BSc
Karlsson, Sven, PhLic
Panagiotopoulou, Dimitra, MSc
Prieto, Carmen, PhD
Skantz, Johan
Soltani, Sofie, MSc
Spångberg, Martin
Stoessel, Marianne, MSc
Vigouroux, Guillaume, MSc
Wennbom, Marika, MSc
Zhang, Jenson, MSc

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

Telephone: +46 8-16 20 00 natgeo.su.se



**Stockholm
University**