Chinstrap penguin, Balleny Islands, Antarctica

Cover photograph: Sabrina Island and the Monolith, Balleny Islands, Antarctica
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  Friends of the Scott Polar Research Institute
  SPRI Centenary Campaign
Director’s Introduction

Although much of the Polar fieldwork and Centenary fundraising activity of the Institute has been on hold since the beginning of the pandemic in March 2020, research and teaching at SPRI has moved forward with publications in the form of books and papers in international journals, undergraduate provision through video-recorded lectures, and via the information and outreach services of our Polar Library, Archive and Museum. The Institute’s centenary exhibition, A Century of Polar Research, was scheduled to open at Easter 2020; however, the arrival of COVID-19 forced some delay. The exhibition was installed ready for visitors who were eventually able to visit in limited numbers from October. Some of the highlights were shown in an ‘online exhibition’ to coincide with the Institute’s official 100th birthday on 26 November 2020 – the exact centenary of confirmation in Cambridge’s official record, the University Reporter, of the establishment of the Scott Polar Research Institute.

The diversity of SPRI’s activities has stood us in good stead over the difficult months of 2020 and reflects the mission of the Institute in research, education and the projection of the Arctic and Antarctic to wider communities. After the closure of the whole University of Cambridge towards the end of March, the Institute was able to reopen in a limited way to our staff and students in August, although COVID distancing restrictions meant only small numbers of staff were present at any one time through the remainder of the year. The beginning of the academic year, and the arrival of our new cohort of doctoral and M.Phil. students in October, saw some limited face-to-face teaching in a socially distanced large lecture theatre, but this was gradually curtailed to be replaced by Zoom meetings later in the term.

Academic recognition has come to a number of SPRI staff and students during the year. Dr Richard Powell was promoted to a Readership in Arctic Studies, demonstrating the sustained and strong academic contributions of our senior staff. Work on Richard’s major European Research Council grant was showcased in a workshop at SPRI in January on the topic ‘Knowledge formations and colonial encounters in the Arctic’ with over 60 international delegates in attendance. Our vibrant post-doctoral community has also been recognised internationally. Dr Christine Batchelor received the Outstanding Early Career Scientist Award from the Cryospheric Sciences Division of the European Geosciences Union (EGU) and Dr Nanna Kaalund was awarded a two-year post-doctoral fellowship from the Carlsberg Foundation for the project ‘Economizing science and national identities: the Royal Greenland Trading Department and the making of modern Denmark and Greenland’. SPRI research student Becky Dell was selected for a highly competitive two-year European Space Agency Fellowship and fellow Ph.D. student Morgan Seag has received a fellowship from the Scientific Committee on Antarctic Research to develop an interdisciplinary framework for understanding gender inequality in international Antarctic research. A paper drawing on field research during the Weddell Sea Expedition 2019, titled ‘Delicate seafloor landforms reveal past Antarctic ice-shelf retreat of kilometres per year’, highlighting the potential instability of the Antarctic Ice Sheet, was also published in the international journal Science in 2020.

Prior to the pandemic, a number of events had been planned to celebrate the Institute’s foundation a century ago and the initiation of our 2020 Centenary Fundraising Campaign in support of new academic, museum and archive posts, together with studentships and polar fieldwork. In late 2019 the formal launch of the Centenary Campaign took place after dinner in the splendid William Kent Room at The Ritz in the presence of our campaign Patron, HSH Prince Albert II of Monaco. Indeed, the Prince Albert II of Monaco Foundation agreed to support a three-year Research Fellowship on ice-shelf change which has begun during the centenary year. The SPRI Centenary has also been marked by the issue of two sets of commemorative postage stamps by the governments of the British Antarctic Territory and of South Georgia and the South Sandwich Islands, with the former set including images of the Institute’s façade and the bust of Captain Scott above the entrance doors. I should also say that we hope centenary events, including a Gala Dinner in Cambridge and a series of talks in New York, that have not taken place due to the pandemic will happen in due course. We will not give up – the Centenary of the Institute should be celebrated in some style!

In February-March 2020, the Friends of SPRI Centenary Voyage to the Ross Sea took place; it was a pleasure for me to be aboard Oceanwide Expeditions’ vessel Ortelius with so many members of our Friends organisation. We were able to visit Captain Scott’s Cape Evans hut, accompanied by Scott’s granddaughter Dafila, and also helicoptered into the Dry Valleys and observed the freezing of the sea-surface in McMurdo Sound at the end of the Antarctic summer. The voyage, including a very successful auction and support from Steppes Travel, raised over £65,000 for the Friends’ campaign to endow a Centenary M.Phil. Studentship in the Institute.

Utilisation of the SPRI Picture Library’s collection has also continued with the publication jointly with Belgian partners Salto-Ulbeek of Captain Scott’s Antarctic Photographs, 1911, a fine-art book of platinum-palladium prints and associated diary text. The first of the limited edition of 15 of these books was displayed at the Centenary Campaign
launch at The Ritz. In addition, we are working with Salto-Ulbeek and the Royal Geographical Society to produce a platinum print portfolio of Frank Hurley's iconic images of Shackleton's *Endurance* expedition, in a similar large format to our earlier Ponting portfolio. The Polar Library and Archive also continued to provide ‘remote’ services to external users during the pandemic, and there was time to undertake a variety of cataloguing tasks and professional training. Among our Library and Museum staff, Frankie Marsh completed her Master's in Library and Information Studies and Mia Surridge began her Associateship of the Museums Association course.

As ever it is a pleasure to thank the very dedicated staff of the Institute for their work over the year, and to acknowledge the commitment of our Friends’ organisation together with material, financial and in-kind support from many generous benefactors to the SPRI. Sadly, two SPRI Emeritus Associates, Dr Ian Stone (editor of the *Polar Record* from 2006-2016), and Dr Simon Ommanney (long-time Secretary General of the International Glaciological Society), passed away in 2020 – both will be missed.

This will be the last SPRI Review that I edit. I am retiring from the Directorship of the Institute at Easter 2021 after almost 20 years in the post, although I shall remain as Professor of Physical Geography and a member of SPRI during a period of sabbatical leave prior to retirement from the University of Cambridge at the end of 2022. I have very much enjoyed the challenges of being the Director of the Scott Polar Research Institute. It has been a privilege to have undertaken research in the Arctic and Antarctic and their surrounding seas on a regular basis and to have been able to work with a series of very able research students and post-docs over this period. A key continuing role for the SPRI is to train the brightest and best to take forward our understanding of polar environmental change; the Centenary Fundraising Campaign is an important contribution to this. I also value the collections of the Institute greatly – our wonderful Library, Archive, Museum and Picture Library. One particular benefit of being Director is the opportunity to get to know these collections and, indeed, to show visitors the breadth, depth and quality of our holdings. Wider outreach through SPRI’s contributions to the centenaries of the ‘Heroic Age’ expeditions has also been memorable through, for example, services of celebration and remembrance in St Paul’s Cathedral and Westminster Abbey. It has been a fulfilling twenty years as Director - as has been my whole career spent in Cambridge, Bristol and Aberystwyth universities. I have been able to work throughout on issues concerning the Arctic and Antarctic and will continue to do so into the future.

Professor Julian Dowdeswell
Institute Staff

Senior Academic Staff

Professor Julian Dowdeswell  Director and Professor of Physical Geography
Dr Neil Arnold  University Senior Lecturer
Dr Michael Bravo  University Senior Lecturer
Dr Poul Christoffersen  University Reader
Dr Richard Powell  University Reader
Dr Gareth Rees  University Senior Lecturer
Dr Ian Willis  University Reader

Teaching Staff

Dr Samantha Saville  Teaching Associate

Researchers

Dr Christine Batchelor  Research Associate
Dr Marion Bougamont  Research Associate
Dr Johanne Bruin  Research Associate
Dr Frazer Christie  Research Associate
Mrs Evelyn Dowdeswell  Research Associate
Dr Nanna Luders Kaalund  Research Associate
Dr Peter Martin  Research Associate
Dr Aleksandr Montelli  Research Associate
Dr Charlotte Schoonman  Research Associate
Dr Nikolas Sellheim  Editor, Polar Record
Mr Jack Tomaney  Research Associate
Dr John Woitkowitz  Research Associate
Dr Tun Jan Young  Research Associate

Library, Archive and Museum Staff

Rosie Amos  Education and Outreach Assistant (job share)
Naomi Boneham  Archives Manager
Naomi Chapman  Education and Outreach Assistant (job share)
Charlotte Connelly  Museum Curator
Julie Godden  Library Assistant (until August 2020)
Henrietta Hammant  Collections Project Coordinator (until Sept. 2020)
Laura Ibbett  Archives Collection Assistant
Peter Lund  Librarian
Frances Marsh  Senior Library Assistant
Lucy Martin  Picture Library Manager
Alexander Partridge  Collections Coordinator
Dr Eleanor Peers  Arctic Information Specialist
Mia Surridge  Collections Assistant

Support Staff

Grahame Adley  Cleaner
Joanna Carruthers  Personal Assistant to the Director
Helen Carter  Receptionist
Fiona Craig  Institute Administrator (until August 2020)
Hannah Dennis  Saturday Visitor Services Assistant
Jenny Dunstall  ERC Project Coordinator
Emily Higgins  Shop Administrator
Martin Lucas-Smith  Web Manager
Aziz Marufov  Cleaner
Adam Priestley  Saturday Visitor Services Assistant
Maria Pearman  Senior Accounts Clerk
Celene Pickard  Executive Secretary to the Friends of SPRI
SPRI Committee of Management
Prof. N. Peake, Chair
Prof. J. A. Dowdeswell, Sec.
Prof. B. Vira
Prof. E. Harper
Prof. D. A. Hodell
Prof. S. Schaffer
Prof. A. W. Woods

Chair of the Council of the School of Physical Sciences
Director, Scott Polar Research Institute
Head, Department of Geography
Department of Earth Sciences
Department of History and Philosophy of Science
Department of Earth Sciences, BP Institute

SPRI Advisory Committee
Prof. R. Harrison, Chair
Prof. J. A. Dowdeswell, Sec.
Prof. Dame J. Francis
Rear Admiral P. Sparkes
Ms J. Rumble, OBE
The Hon. Ms Janice Charette
Dr A. M. Greenaway
Dr J. Craig
Professor E. A. Wolff
Professor H. A. Viles

Head, Department of Earth Sciences
Director, Scott Polar Research Institute
Director, British Antarctic Survey
UK Hydrographer and Deputy Chief Executive
Head of the Polar Regions Department, FCDO
High Commissioner for Canada
General Board nominee
General Board nominee
Department of Earth Sciences
Geography Department, Oxford University

Other organisations based at SPRI

Scientific Committee on Antarctic Research
Johanna Grabow
Dr Eoghan Griffin
Hanna Lempinen
Rosemary Nash
Dr Chandrika Nath
Communications and Information Officer
SCAR Executive Officer
Book Reviews Editor
SCAR Administrative Assistant
Executive Director
Polar Research

Research Structure

The research of the Institute continues to focus on several research themes, each of which has a mix of senior academic staff, post-doctoral researchers and post-graduate students. Work on these topics is supported by a number of externally funded research grants, which are listed later in this report. The research themes are:

- Glaciology and Climate Change
- Glacier-Influenced Marine Sedimentary Environments
- Polar Landscapes and Remote Sensing
- Polar Histories, Cultures, Environments and Politics

Institute staff organise seminar series in both polar natural sciences and social sciences and humanities. Face-to-face seminars were not held during the bulk of 2020 due to the coronavirus epidemic, but webinars and virtual seminars continued. A selection of the natural and social-science research projects in which we are currently engaged is outlined briefly below.

Polar Natural Sciences Research

Fibre-optic sensing of ice properties on the Greenland Ice Sheet

Scientists have long known that seismic energy detected with seismometers or geophones can be used to gain information about the Earth’s crust and interior. In a proof-of-concept study, researchers at SPRI used laser pulses transmitted through a fibre-optic cable to study the way seismic energy travels through the Greenland Ice Sheet. In this novel new technique, distortions in the laser pulses are interpreted by an interrogator unit (a form of computer) which reconstructs what the seismic disturbance would have looked like. In doing so, the entire fibre-optic cable is turned into the equivalent of hundreds of geophones; hence the name - distributed acoustic sensing. The fibre-optic seismic experiment was conducted as part of the ERC-funded RESPONDER project and is the first such experiment on a glacier in Greenland. The cable was installed in a 1,043 m deep borehole drilled on Store Glacier, with contributing project partners in Aberystwyth University, Leeds University and Silixa (a manufacturer of fibre-optic monitoring systems). Measurements along the cable, which stretched from the surface to the bed, detected a change in ice-crystal fabric at 870 m, where there is a transition from relatively young ice formed over the last several thousand years to older ice dating back to the last glaciation. The experiment also showed that the ice contains liquid water in its veins beyond 900 m deep and that the glacier bed consists of a layer of subglacial sediments. The results were published recently in the journal Geophysical Research Letters.

Poul Christoffersen, Marion Bougamont and Robert Law

Ski-equipped Twin Otter aircraft on the Fimbul Ice Shelf, Antarctica
Ice-sheet hydrology and meltwater plumes

Research in SPRI continues to explore Store Glacier, which is a large marine-terminating outlet of the Greenland Ice Sheet flowing into Uummannaq Fjord on the west coast. To complement experimental fieldwork in the ERC funded RESPONDER project, researchers in SPRI used the open-source computer model *Elmer/Ice* to perform numerical 3D simulations that include evolving subglacial hydrology. Specifically, the team looked at the way distributed basal water systems can develop into a network of much larger channels in summer, when surface meltwater reaches the bed of the glacier. The research showed that channels extend up to 30-60 km inland depending on how much meltwater is produced in summer. Results also indicate that the production of water from friction and geothermal heat at the base of the glacier is sufficiently high to drive year-round suspended-sediment plume activity, when the meltwater is discharged subglacially into the adjacent fjord. In summer, when the subglacial water system discharges surface meltwater in addition to basal meltwater, plume-induced melting of the glacier's terminus reaches a magnitude of 12 m per day. The research was published recently in the journal *The Cryosphere*.

Samuel Cook and Poul Christoffersen

Velocity variations on Antarctic ice shelves and their contributing glaciers

It is important to understand the dynamic coupling between floating ice shelves and their contributing glaciers because thinning and shrinkage of ice shelves may lead to inland grounding-line migration and accelerating mass loss to the ocean. This phenomenon has been observed over annual to decadal time periods, for example following the collapse of Antarctic Peninsula ice shelves, but much less is known about the dynamics of ice shelves and glaciers over shorter time periods. Velocity variations over monthly to annual timescales have the potential to alter ice-shelf strain rates, making them more vulnerable to fracture and even collapse. Ice-velocity data derived from offset-tracking of satellite radar imagery is being used in an attempt to identify previously unobserved velocity variations at monthly to annual timescales across George VI Ice Shelf and the glaciers feeding it. Distinct patterns of velocity variation have been found, and future work will attempt to identify their causes by exploring spatial and temporal variations in: i) climate and surface / shallow subsurface energy balance and meltwater movement; ii) surface mass balance and ice-shelf elevation change; iii) ocean tidal cycles; iv) iceberg calving events. Short-term velocity variations unrelated to these causes may be due to variations in basal sliding, if surface-derived water reaches the glacier beds or if basally derived water flows from the ice-sheet interior.

Karla Boxall, Frazer Christie, Ian Willis and Neil Arnold

Ice-shelf instability: mapping slush and water across Antarctic ice shelves

Surface melting is observed across the majority of Antarctica’s ice shelves, and its prevalence is expected to increase in response to rising air temperatures. Much of this surface meltwater is stored within firm pore spaces (slush) or within lakes, where it can impact ice-shelf dynamics and potentially facilitate collapse. Current research using remote-sensing imagery has focused on the occurrence of lakes on ice shelves, detected using the apparent ‘blueness’ of lakes in comparison with the surrounding ice or snow. We are extending this work, first to include mapping the occurrence of slush and, secondly, by using machine-learning techniques which make use of much more of the spectral information available in satellite imagery at non-visible wavelengths. Our classifier is a two-stage process, in which a set of training images is analysed, with pixels grouped into clusters based on their spectral similarity. These clusters of pixels are interpreted manually into lakes, slush and ‘other’ surface classes. The clusters are then used to train a machine-learning algorithm to identify similar pixels across a wide range of imagery. Our algorithm has a high degree of success when compared with manual pixel classification by experts in remote sensing of ice shelves, and has been successfully applied to the Roi Baudouin Ice Shelf to examine seasonal patterns of slush and lakes over multiple years. The next stage of this research is to apply our classifier to the entire catalogue of Landsat satellite imagery of Antarctica using the Google Earth Engine processing platform.

Becky Dell, Neil Arnold, Ian Willis and Alison Banwell
Grounding-zone flux observations at a continental scale: the Antarctic Ice Sheet

Ice shelves are the floating extensions of the Antarctic Ice Sheet, and currently fringe 74% of the ice sheet’s coastal perimeter. The transition region between grounded and floating ice is termed the ‘grounding zone’, through which seaward-flowing ice contributes directly to sea-level rise. Repeat-pass satellite observations acquired over several rapidly deteriorating parts of West Antarctica have shown that this zone is particularly sensitive to retreat in response to changing atmosphere and ocean interactions, yet little precise grounding-zone change information exists along ~70% of Antarctica’s coastal margin. This project, funded by the Prince Albert II of Monaco Foundation, aims to produce the first high-resolution and continuous survey of Antarctica’s grounding zone for almost 20 years. Together with ancillary glaciological information including, for example, observations of present-day ice-surface flow and thinning, derived grounding-zone information will be compared with historical records to shed new light into the past, present and future evolution of the Antarctic Ice Sheet.

Frazer Christie and Julian Dowdeswell

3D sedimentary architecture showing the inception of an Ice Age

Northeast Atlantic climate shifted into the Quaternary Ice Age around 2.6 million years ago. Until now, however, the detailed changes associated with the inception of an Ice Age have remained obscure. New high-quality three-dimensional seismic data reveal a detailed geological record of buried surfaces, landforms and sedimentary architecture over vast parts of the Norwegian North Sea. We show the sequence of near-coast geological events spanning the inception of an Ice Age in the northeast Atlantic. First, the location of immediate pre-glacial fluvially derived sandy systems where rivers from the Norwegian mainland built marine deltas is identified. Secondly, the stratigraphic position of a large submarine channel formed by enhanced meltwater from initial build-up of local glaciers is described. Thirdly, the transition to full ice-sheet growth over Scandinavia from the ice sheet’s earliest position to the later pattern of debris-flow lobes reaching the present-day shelf edge is documented. This work was undertaken in collaboration with Norwegian colleagues Helge Løseth and Dag Ottesen and published in Nature Communications.

Julian Dowdeswell and Christine Batchelor

Autonomous Underwater Vehicle and sediment corer aboard Antarctic research vessel
New insights into the formation of submarine glacial landforms from high-resolution Autonomous Underwater Vehicle data

Autonomous Underwater Vehicles (AUVs) deployed close to the seafloor can acquire high-resolution geophysical data about the topography and shallow stratigraphy of the seabed, yet have had limited application within the fields of glacial geomorphology and ice-sheet reconstruction. Multibeam echosounding, side-scan sonar, sub-bottom profiler and High-Resolution Synthetic Aperture Sonar (HISAS) data were acquired during three AUV dives on the northeast Antarctic Peninsula continental shelf. These data enabled glacial landforms, including mega-scale glacial lineations (MSGLs), grounding-zone wedges (GZWs) and iceberg ploughmarks, to be imaged at a horizontal resolution of a few tens of centimetres, allowing the identification of subdued morphological features. Tidal ridges were mapped and interpreted to have formed, first, along the ice-sheet grounding line by the squeezing up of soft seafloor sediments by vertical motion of the grounding line during tidal cycles, and, secondly, by the tidally driven motion of grounded or near-grounded icebergs. These data also enabled the mapping of small GZWs showing the location of short-term still-stands or re-advances of the ice-sheet grounding zone. No meltwater channels were identified, suggesting that free-flowing meltwater may not be essential for the formation of GZWs or MSGLs. The work demonstrates how high-resolution AUV-derived geophysical data provide a step-change in our ability to image seafloor glacial landforms, enabling new interpretations about past ice dynamics and glacial sedimentation at fine temporal and spatial scales. AUV data were acquired on the Weddell Sea Expedition 2019, sponsored by the Flotilla Foundation.

Christine Batchelor, Sasha Montelli, Evelyn Dowdeswell, Frazer Christie and Julian Dowdeswell

Detecting whales from space

Great whales have been detected using very-high-resolution satellite imagery, suggesting that this technology can be used to monitor whales in remote areas. However, the application of this method to whale studies is at an early stage and several factors need to be addressed, including capacity for species differentiation and the maximum depth of detection in the water column. Both require knowledge of the optical characteristics of whale species. We have investigated whether optical reflectance could be measured on dead whale tissue. We measured the spectral reflectance of fresh material collected during the bowhead subsistence harvest, and of thawed samples from strandings. These were shown to have different optical properties, with integument darkening after death and over time, even under frozen conditions. Our work, published in the journal Remote Sensing in Ecology and Conservation, provides a baseline for future work needed to advance the use of satellite imagery to monitor whales and facilitate their conservation. The project is collaborative with scientists at the British Antarctic Survey.

Hannah Cubaynes and Gareth Rees
Subarctic forest dynamics

The importance of the transition region between the circum-Arctic boreal forest and the tundra zone that lies to the north was affirmed by an international meeting convened by the International Arctic Science Committee in Abisko, Sweden, in 2000. This meeting also identified substantial gaps in our understanding of the behaviour of this zone. Since then, a major international effort to understand the response of this ‘forest-tundra ecotone’ (FTE) has been coordinated jointly from the Norwegian Institute for Nature Research and from SPRI. During the year, we published a major synthesis and analysis of the 20th century dynamics of the FTE and its statistical relation to climate change over the same period. Data from 151 sites across the circum-Arctic area were analysed to show that while the climatic histories differed between regions, all were characterized by similar qualitative patterns of behaviour. Only about half of the sites showed forest advancing into the tundra zone. The main associations between climate-trend variables and behaviour indicate the importance of precipitation rather than temperature, and the significance of non-growing season as well as growing season months. Poleward advance rates differed significantly among regions, but all were much smaller than the rates that would be expected if (as many global vegetation models have assumed) the vegetation distribution was in equilibrium with the climate.

Gareth Rees and Olga Tutubalina

Response of Russian boreal forest to climate change

The major part of the world’s boreal forest is located in Russia but, despite its climatological importance, its inventory status is poorly known. Since 2018 SPRI has been co-leading a collaborative UK-Russian project to develop a better understanding of biomass distribution in the Russian boreal forest, its change over the 21st century, and the role that climate change plays in this. Other partners in this project are Moscow State University, the British Antarctic Survey, the Institute for Space Research of the Russian Academy of Sciences and the Institute of Geography of the Russian Academy of Sciences. The project combines data over a wide range of spatial scales, obtained from fieldwork, from surveys using UAVs (‘drones’), and from satellite imagery that will allow a global perspective to be developed. Fieldwork has taken place in north-western Russia and in eastern Siberia. The planned fieldwork season for 2020 was cancelled because of the COVID-19 pandemic but virtual fieldwork was carried out using satellite imagery from north-central Siberia. We have also expanded our Science Diplomacy activity, helping to develop UK-Russian research links in the area of environmental monitoring, on the back of this research and with the active support of the UK Foreign, Commonwealth and Development Office. Our joint work has been presented at physical and online conferences, and at Science Festivals, organised in Cambridge and in Moscow.

Gareth Rees, Jack Tomaney and Olga Tutubalina

Arctic flora on deglaciated moraine, Spitsbergen
Arctic cultures

How did the Arctic come to be understood in the Western imagination as a ‘natural region’? Why have these formulations been so persistent? These questions are central to the ARCTIC CULT project and are being investigated by a team of five researchers based at SPRI and funded by the European Research Council. The project investigates the construction of the Arctic that emerged from exploration of the region by Europeans and North Americans and their contacts with indigenous people from the middle of the sixteenth century. By focusing on a diverse range of materials (e.g. written archives, maps, images and ethnographic objects), the project connects research in cultural history with aspects of museology and museum curation. A major project workshop was held at the SPRI in January 2020, which attracted over 60 international delegates to Cambridge. During most of 2020, in-person consultation of archives and collections, as well as fieldwork, has been disrupted by the pandemic. Remote research has continued, however, and presentations have taken place at virtual international conferences and workshops organised from Canada, the USA, Germany and the UK. The project continues to produce significant research findings, and reports this through public talks, social media and a blog. In doing so, the project presents new understandings of the enduring consequences of colonial representation for debates about the Circumpolar Arctic today.

Richard Powell, Johanne Bruun, Nanna Kaalund, Peter Martin and John Woitkowitz

Historical geographies of Halley Bay and Antarctic governance

This doctoral project examines the emergence of scientific governance in Antarctica by focusing on Halley Bay research station on the eastern coast of the Weddell Sea. Halley Bay was established by the Royal Society in 1956 in preparation for the International Geophysical Year, 1957-58. The scientific station operated continuously until 2017, when overwintering became problematic due to a growing crack in the Brunt Ice Shelf. The station has become an important centre for global science, including the discovery of the ozone hole in the 1980s. The project involves use of archival collections at the Royal Geographical Society, the Royal Society and the SPRI, supplemented by material from other collections, to investigate the history of Halley Bay and its place in the international story of Antarctic science and governance. It aims to inspire innovative collaborations across these collections and others. The project is funded through a grant awarded by the AHRC Collaborative Doctoral Partnership (CDP), Science Museums and Archives Consortium, partnering with the Royal Geographical Society and Royal Society.

Alice Oates and Richard Powell

The geopolitics of the Transpolar Sea Route: past, present and future

The Transpolar Sea Route has its origins in early modern imperial dreams as a northern alternative to the tropical sea routes dominated by the Spanish and Portuguese empires. Whereas the Greenland seas were for centuries heavily trafficked by European and American whaling fleets, the central Arctic Ocean remained relatively inaccessible to shipping related to heavy sea-ice cover. With current scientific models forecasting an ice-free central Arctic Ocean in summer by mid-century and potentially earlier, a direct shipping route via the North Pole connecting markets in Asia, North America, and Europe may open in the coming decades. The Transpolar Sea Route would represent a third Arctic shipping route in addition to the Northern Sea Route and Northwest Passage. In response to the continued decline of sea-ice thickness and extent, there is a growing recognition within the Arctic and global governance communities of the need to anticipate and regulate commercial activities in the central Arctic Ocean. This project examines the implications of a new Arctic shipping corridor, taking account of its historical geopolitics, its unfolding in the present, and its environmental consequences for local communities along the Transpolar Sea Route’s entrances. This work is a collaboration with Dr Mia Bennett, a SPRI alumnus who is now at the University of Hong Kong.

Michael Bravo
Svalbard Social Science Initiative

The pandemic put a stop to much field research in Svalbard during 2020. However, whilst the Svalbard Social Science Initiative (SSSI) has postponed its upcoming workshop, we have nevertheless been able to develop this research network remotely. 2020 saw the SSSI become a formal membership organisation that now has over 20 active members working in the social sciences, arts and humanities fields on a wide range of questions connected to Svalbard. Many of our interests coalesce around Svalbard as a site of socio-economic, cultural and environmental change. Our research explores how tourism, disaster management, urban planning, environmental policy, sustainable development, cultural heritage, energy provision, sovereignty and knowledge production come together and relate to these ongoing changes. Our first annual report is available online https://svalbardsocialscience.com/ssi-annual-report/. SPRI Teaching Associate Sam Saville has also joined the SVALUR Team as an advisor to their project ‘Understanding resilience and long-term environmental change in the high Arctic: narrative-based analyses from Svalbard’.

Richard Powell, Marc Jacobsen and Naï Zakharia

Polar expertise and polar geopolitics

Investigations have continued into the social practices involved in the constitution of the polar environmental sciences and the consequences for geopolitics, governance and resource development. Research into the social life of scientific field stations is being used in discussions about polar science policy in the UK, and more widely. This work is informed by examinations of Greenlandic geopolitics funded by the Carlsberg Foundation. The work also draws on new doctoral research examining the gendered histories of Arctic science funded by the UK Arts and Humanities Research Council (AHRC).

Richard Powell, Marc Jacobsen and Naï Zakharia

Samantha Saville

Flags of Antarctic Treaty nations and Admiral Byrd bust, McMurdo Station, Antarctica
Current Research Grants

Staff of the Institute currently hold research grants of £5.48 million, of which £601,000 is from the UK research councils and £4.07 million from the European Research Council and other EU sources.

Grants from UK Research Councils

The role of shear margin dynamics in the future evolution of the Thwaites Drainage Basin (TIME -Thwaites Interdisciplinary Margin Evolution)
Source: Natural Environment Research Council
£438,822 (2018-2023)

Ice-shelf instability caused by active surface meltwater production, movement, ponding and hydrofracture
Source: Natural Environment Research Council
£91,474 (2019-2021)

Instruments of scientific governance? Historical geographies of Halley Bay, 1956 - present
Source: Arts and Humanities Research Council (AHRC), Collaborative Doctoral Student Training Grant with The Royal Society and the Royal Geographical Society
£70,717 (2018-2022)

An instrumented drone flies over multi-year sea ice, Weddell Sea, Antarctica

Grants from Other Sources

Arctic Cultures: sites of collection in the formation of the European and American northlands
Source: European Research Council, Consolidator Grant ERC-2016-CoG-724317
£1,996,250 (2017-2022)

Resolving subglacial properties, hydrological networks and dynamic evolution of ice flow on the Greenland Ice Sheet (RESPONDER)
Source: European Research Council, Consolidator Grant ERC-2015-CoG-683043
£2,443,800 (2016-2021)

Grounding-zone flux observations at the continental scale: the Antarctic Ice Sheet
Source: The Prince Albert II of Monaco Foundation
£237,048 (2020-2023)

Autonomous Underwater Vehicle (AUV) investigations of floating ice shelves in the Weddell Sea sector, Antarctica
Source: The Flotilla Foundation
£350,000 (2018-2020)

Multi-platform remote sensing of the impact of climate change on northern forests of Russia
Source: The British Council
£150,000 (2018-2021)

Expanding Moscow-Cambridge links in Arctic ecological science and outreach
Source: UK Foreign, Commonwealth and Development Office (International Projects)
£96,000 (2019-2020)

Creating a UK-Russian research network on disturbance and recovery of terrestrial Arctic and boreal ecosystems
Source: UK Foreign, Commonwealth and Development Office (International Fund)
£46,640 (2020-22)

Conserving and sharing SPRI’s Antarctic heritage collections
Source: UK Antarctic Heritage Trust
£150,000 (2017-2020)

The third pole as a geographical imaginary: its historical, philosophical and political roots
Cambridge Humanities Research Grant
£19,705 (2019-2020)
Publications by Institute Staff

Books


Papers


Hogan, K.A., Larter, R.D., Graham, A.G.C., Arthern, R., Kirkham, J.D., Totten Minzoni, R., Jordan, T.A., Clark, R.,
Book Chapters and Other Contributions


Doctoral and Masters Theses

**Bebchuk, T.,** M.Phil., Multiscale approach to estimating forest biomass, the Sakha Republic, Russia.

**Boxall, K.,** M.Phil., Quantifying supraglacial debris thickness and the glaciological controls on its spatial distribution in high mountain Asia.


**Chudley, T.,** Ph.D., UAV-based investigations into the hydrology and dynamics of the Greenland Ice Sheet.

**Cook, S.,** Ph.D., Connect Store: A fully coupled 3D model of ice flow, calving, subglacial hydrology and ice-ocean interactions applied to Store Glacier, Greenland.

**Cubaynes, H.,** Ph.D., Whales from space: Assessing the feasibility of using satellite imagery to monitor whales.

**Everest, J.,** M.Phil., Drivers of Kola Peninsula forest change: climate, pollution, wildfire and fauna throughout the 21st Century.

**Fraser, B.,** M.Phil., Justifying Antarctic tourism: tour operator perspectives on sustainability and ambassadorship in a growing industry.

**Fuller, E.,** M.Phil., Hill-hole pairs: an inventory and detailed investigation of an example from the mid-Norwegian shelf.
Although the usual programme of seminars held at the SPRI was severely curtailed by COVID-19 pandemic during 2020, a number of seminars and workshops took place, most of them held virtually, including:

Hagen, I., M.Phil., Inferring subglacial hydrology from investigations of supraglacial lake drainages and meltwater plumes at Store Glacier, West Greenland.

Homer, N., M.Phil., Satellite remote sensing investigations into changing ice-shelf extents in the eastern Weddell Sea sector of Antarctica.

Lefroy, N., M.Phil., Quantification of the impact of supraglacial lakes and slush on surface energy balance of ice shelves.

Morris, C., M.Phil., Nature, culture and marginalised citizenship: using law-space relations to re-‘place’ Canadian Inuit in Auyuittuq National Park, Nunavut.

Teleti, P., Ph.D., Reconstruction of the historical climate of the Southern Ocean from whaling ships’ logbooks.

Vignolls, R., Ph.D., Understanding past and future changes in northern Fennoscandian snow cover.

**Seminars in the Institute, including:**

The use of marine geophysical data to investigate the climate and environment of the Quaternary
Christine Batchelor (SPRI and NTNU, Trondheim, Norway)

Characteristics and changes of glacier, rock glacier and glacial lakes in High Mountain Asia since the 1960s
Tobias Bolch (University of St Andrews)

SCAR in the 60s: the successes and failures of science diplomacy in Antarctica
Iqra Choudhury (University of Manchester)

Beyond Sublime: Antarctic art since World War II
Jean de Pomereu (SPRI)

Constructing the Other: representations of Arctic native communities in Russian regional museums
Sofia Gavrilova (University of Oxford)

Exploration, celebrity and the making of a transnational hero: Fridtjof Nansen and the Fram Expedition
Max Jones (University of Manchester)

Radar and optical imagery for identifying burnt forest areas
Polina Mikhaylykova (Moscow State University)

Gender and 20th Century Antarctic fieldwork: constructing and dismantling the ‘ice ceiling’
Morgan Seag (SPRI)

Why we should develop Arctic humanities?
Sverker Sörlin (KTH Royal Institute of Technology, Sweden)

Mapping vegetation cover around Norilsk with Google Earth Engine tools
Olga Tutubalina, Oleg Zheleznyy, Velentina Kravtsova (Moscow State University)
Polar Information and Historic Archives

Library and Information Service

This has been a remarkably busy year for the Library. At the start of 2020 the Library supported a practical session for an Arctic Cultures workshop on ‘Knowledge Formations and Colonial Encounters in the Arctic’, showcasing items from our special collection and map collection. We hosted a meeting of the Cambridge Eco-fiction Book Group with a well-attended discussion about Tanya Tagaq’s Split Tooth along with a visit from a cohort of Cambridge Libraries’ Graduate Trainees.

Throughout 2020, and despite the pandemic and its associated lock downs, we continued to acquire books, conference proceedings, reports, DVDs and maps, making the associated catalogue records available through the University of Cambridge iDiscover interface and promoting the new scanning service and organized a safe system with limited access in August. We also introduced a system to reserve a desk in the Library when it reopened in September. We produced an online booking system for students to purchase e-books during the year.

The Library was able to obtain significant additional funds to support the Library team. We were very fortunate that the University supported the Library catalogue migration project at CILIP’s Meta-Data and Discovery Group Conference held online. Eleanor Peers seized the opportunity to network with colleagues in the USA and Russia, via several Zoom meetings, enabling the Polar Library to publicise the Russian collection in Russia and the USA, and to establish the relationships needed to acquire books from Russia. Using Zoom, Eleanor gave presentations on:

- SPRI’s Russian collection at an event for Russian libraries organised by the General Public Academic Library of the Siberian Department of the Russian Academy of Sciences in Novosibirsk;
- Indigenous Siberian journalism in SPRI’s Russian collection at the Journalism Department of the North Eastern Federal University in Yakutsk;
- SPRI’s Russian collection at a conference organised by the State Library in Yakutsk.

During 2020 Eleanor also contributed to several SPRI outreach events making videos about the Syadei in the Polar Museum for the Cambridge Museum Remix: Unheard project, contributing to videos made for SPRI’s Alumni and Open Cambridge outreach projects and writing a blog on the Breitfuss Collection for History Day 2020 (part of the ‘Being Human’ festival).

We were sorry to lose Julie Godden who resigned as Library Assistant during the year. Meanwhile Frankie Marsh completed her Master’s in Library and Information Studies. During the financial year the Institute received the following grants for the general support of information and library services and special thanks are due to the following generous supporting bodies:

<table>
<thead>
<tr>
<th>Grant Provider</th>
<th>Amount</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Defence grant-in-aid</td>
<td>£37,500</td>
<td></td>
</tr>
<tr>
<td>Polar Regions Department, FCDO</td>
<td>£5,000</td>
<td></td>
</tr>
</tbody>
</table>

Peter Lund
The Picture Library

Although the COVID-19 pandemic curtailed visits to the photographic collection during much of 2020, this has provided time to focus on detailed database tasks. The beginning of the year was buoyant, with the continuation of assistance to many enquiries and visitors from around the world. Research into the photographic material led to the use of images in a variety of publications, films and displays.

Photographic material has been supplied for several exhibitions, academic theses, journals, books, magazines, and television programmes. Included amongst these are exhibitions at the British Museum, Arctic: culture and climate; Bromsgrove School and LWL Museum Fur Naturkunde, Germany. Images have been supplied for several book publications, which include: HMS Terror: Her Design, Construction and Polar Voyages by M. W. Betts; Expedition Relics from High Arctic Greenland 1853-1935 by Peter R. Dawes; Jordi Teixidor. Los Limites de la pintura by Mariano Navarro; Antarctic in British Children’s Literature by Sinead Moriarty; Antarctic Resolution, editor Giulia Foscarini; Penguin Diplomacy by June Roberts and Steve Heavens; Strinberg’s Arctic by Tyrone Martinsson; and Herbert Ponting: Scott’s Antarctic Photographer and Pioneer Filmmaker by Anne Strathie. Other publications using Picture Library material include: the Journal of the Society of Architectural Historians; The Polar Journal; the Natural History Museum’s magazine Evolve; and an article on Tom Crean in the Kerry’s Eye Newspaper. Images have also been reproduced in a promotional audio-visual film for Viking Cruises and in the documentary film Red Heaven, produced by Raised Wolves Productions LLC.

Once the pandemic took hold operational procedures transferred to home working for the Picture Library manager. This enabled a concentrated period of time to process many records previously catalogued by the team of volunteers working on Charles Swithinbank’s group of 8,500 35mm slides. The remainder of the slides have also been catalogued. These records are now on the main Picture Library database and the project is reaching completion. The digitisation of the remaining images will take place once the Institute is fully functioning again.

Updating of the Picture Library legacy records on the database has also started. This will ensure that all records follow an agreed template with the goal being to add them to the website. Currently many of the early records are in a variety of different formats which prohibits inclusion on the online Picture Library catalogue. The Picture Library would like to thank David Matzliach, Neville Taylor, and Mark Wilson for their voluntary work at the beginning of the year, which was sadly halted owing to the pandemic.

The Thomas H Manning Polar Archives

January and February 2020 were very much business as usual for the SPRI Archives with us welcoming researchers and volunteers to the collections. We submitted accession lists to the National Archives (who record all new material deposited in archives across the country) and continued with the day-to-day running of the service, answering enquiries and caring for the collections. In March 2020, along with the rest of the Institute, the Archive closed, with staff working full-time from home. Obviously, this radically changed working patterns as no immediate access to the collections was possible.

Having secured funding to work on the Institute’s Oral History collection, interviews with 24 members of the polar community connected to SPRI have been re-examined. The interviews, conducted between 1999 and 2004, had originally been deposited in the Archives on VHS, mini-disc and DVD. The project enabled us to catalogue, summarise and migrate the contents of the DVD’s to a stable format in order to secure access to the Oral History collection into the future. Guidance documents for staff and researchers to support future oral history projects have also been produced.

In October a new project began, to catalogue the Commonwealth Trans-Antarctic Expedition (CTAE) papers held in the Archive. This one-year project addresses one of our most important uncatalogued collections and will enable the CTAE papers to be available for wider research. 2020 also saw us reach the halfway point in our accreditation cycle and we were able to complete and submit a mid-term review which was accepted, securing continued accreditation for the Archives under the national scheme.

Physical outreach events were, of course, curtailed for most of the year, and the Archive supported the SPRI education and outreach team in supplying content for their online resources. In November the annual visit of Bishop Grosseteste University students went online and we were delighted to assist in this temporary but successful innovation. Our volunteers - Judy Skelton, David Matzliach, Neville Taylor, and Mark Wilson - started the year working on Charles Swithinbank’s group of 8,500 35mm slides. The remainder of the slides have also been catalogued. These records are now on the main Picture Library database and the project is reaching completion. The digitisation of the remaining images will take place once the Institute is fully functioning again.

Lucy Martin

Naomi Boneham
Teaching, Learning and Understanding

University Teaching

Academic members of the Institute’s staff continued to coordinate and deliver undergraduate lecture courses, and run laboratory classes, in the Department of Geography during the Lent Term of 2020. Long-running Geography courses include ‘The Cryosphere’, ‘Glacial Environments’, ‘Glaciology’ and ‘Geographies of the Arctic’. Undergraduate supervisions are also provided to students in many colleges. Members of our staff are Fellows of Christ’s, Downing, Fitzwilliam, Jesus, Peterhouse, St. Catharine’s and St. John’s colleges. After March, most lectures were delivered on-line as videos during both the Easter Term and the following Michaelmas Term due to the pandemic, and undergraduate supervisions were given using Zoom.

Our M.Phil. course in Polar Studies, with nine students graduating in 2020, has academic strands in Natural Sciences and in the Social Sciences and Humanities. Our group of doctoral students are registered to study topics ranging from hydrological processes on the Greenland Ice Sheet to ethnographic investigations of Arctic peoples. Each student works within one of our established research themes, providing a strong and integrated research culture. Research projects for the 2019-2020 cohort continued remotely with online supervision after March. In October, our new Polar Studies group was able to visit and work in the Institute on a limited basis until a further pandemic-related lockdown largely closed the SPRI building from early November.

Julian Dowdeswell

The Polar Museum

2020 marked the third period of sustained closure of the Polar Museum to the public in its hundred-year history. The first was during the Second World War, and the second in the early 2000s when the museum was refurbished. This year was characterised by the COVID-19 pandemic, which closed public spaces around the world. Consequently, the museum welcomed just 11,691 in-person visitors over the course of the year, mostly in the first three months, compared with our more usual annual figure of 50,000. Despite the challenges brought about by the pandemic, the museum found ways to support researchers and share its collections with our audiences.

The year began with the conclusion of the exhibition Walking on Thin Ice: Co-operation in the face of a changing climate. The exhibition was co-curated by a group of 12 teenagers, and also informed the outcomes of a collaborative project with the German Maritime Museum (Deutsches Schiffahrtsmuseum, DSM) in Bremerhaven. The collaboration began in late 2019 when, as part of their joint Leibniz-Cambridge Museum and Collection Fellowship, DSM historian Dr Martin Weiss spent two weeks at the Institute and Polar Museum curator Charlotte Connelly spent two weeks in Bremerhaven. The collaboration resulted in the development of an exhibition that was open to

Martin Lucas-Smith

Polar Record

Polar Record continued during 2020 as an internationally refereed journal of polar research for the sciences, social sciences and humanities. It has become an e-journal with up to six issues being published electronically each year by Cambridge University Press. We thank the many reviewers of manuscripts submitted for publication for their input towards maintaining high scholarly standards for the journal. We were sorry to learn that long-time editor of Polar Record, Dr Ian Stone, an Emeritus Associate of SPRI, died during the year.

Nikolas Sellheim (Editor)

SPRI Website

The SPRI website has seen a number of incremental improvements during the year, to tidy up legacy material and improve the layout of many sections. New material has continued to be added to the online catalogues, and improvements to the underlying infrastructure to support these have been made. The pandemic has meant there has not been the opportunity to progress a number of planned projects in 2020; key amongst these are the forthcoming addition of an online catalogue for the Archives, alongside the existing catalogues for the Museum and Picture Library. These projects will resume once government pandemic restrictions are lifted.

Martin Lucas-Smith

Polar Museum exhibition celebrating the SPRI Centenary
the Institute’s official 100th birthday on 26 November. Some highlights in an online exhibition in time for visitors to visit in limited numbers in October. We also shared some highlights in an online exhibition in time for the Institute’s official 100th birthday on 26 November 2020. One notable exhibit is Frank Debenham’s diary, noting the idea he had in 1912, while scaling Mount Erebus, for a headquarters for British polar explorers where they could share their findings and learn from each other.

When the Polar Museum was forced to close in March, Rosie Amos and Naomi Chapman of our education and outreach team quickly turned their attention to developing resources for home schooling, as well as more casual forms of digital engagement. Our series of five ‘Home School Challenges’ encouraged children to keep an expedition diary, become a reporter, learn about music on expeditions, plan a midwinter party or design their own museum. In addition, our ‘Boredom Buster’ series shared easy-to-follow instructions for making a fabric narwhal or humpback whale and penguin finger-puppets. Our digital content, including pre-existing films and teacher packs, performed exceptionally well throughout the year with over 22,000 downloads of teacher packs and 14,000 views of our online videos. Demand for online content was over three times higher from March to June 2020, during the first national lockdown, than the equivalent four-month period of 2019, with 20,000 recorded uses of our schools’ resources compared with about 6,000 the year before.

Despite the circumstances, the museum did accept some new objects into the collection, and a number of objects also went on loan during the year. A sun compass made and used during the British Antarctic Expedition 1910-13 (Terra Nova) went on loan to the Homo sapiens: Artist of Life exhibition at the LWL-Museum für Naturkunde (Natural History Museum), Münster, Germany. We also lent a number of objects to the British Museum’s Arctic: Culture and Climate exhibition. We added a carving by Alaskan artist Othniel Art Oomittuk Jr to the Institute’s art collection, and a Suunto magnetic compass used by Pen Hadow to navigate to the North Pole in 2003 to our collection of polar artefacts. The Suunto M3 magnetic compass had a mirror additionally affixed to the reverse to enable self-checks for cold injuries to the face, and the compass not only represents Pen Hadow’s expedition but is also an example of a typical piece of navigation equipment from the early twenty-first century, which was not previously represented in the SPRI collection.

Home schooling resources provided during the pandemic by the Polar Museum team

Our Collections Assistant Mia Surridge has been working behind the scenes on cataloguing our handling collection, ready for use when we can reopen safely. She has also been making our collections more accessible to blind and partially sighted people, and in 2021 she will embark on a project to develop improved access to our collections together with Rosie Amos, colleagues in the University of Cambridge Museums and members of the Cam Sight community. Mia also started her Associateship of the Museums Association qualification in late 2020, and will be working towards that goal alongside her work at the Polar Museum. Rosie Amos and Naomi Chapman in our Education and Outreach team have carried out exceptional work to ensure our online audiences can access our collections remotely while the museum has been closed. Our Collections Coordinator Alex Partridge has overseen a number of challenging acquisitions and loan requests in the circumstances brought about by the pandemic and the shifting regulations as a consequence of the UK leaving the EU. Meanwhile our Fundraising and Communications Assistant Emily Rigby pioneered new initiatives to help keep our audiences up to date while the museum was closed. She also played a key part in reopening the Institute to staff and students and working to make the Polar Museum COVID-safe for reopening to the public. Henrietta Hammant delivered our centenary exhibition before leaving the museum team at the end of September to study for a PhD in ‘Museum objects and the ‘heroes’ of early British Antarctic exploration’ in the University of Reading.

Special mention should also be made of the hard work of our visitor welcome team. Hannah Dennis and Adam Priestley, our weekend staff, have been excellent in adapting to new circumstances as COVID-safe procedures have been introduced for our limited openings, and in the museum shop Emily Higgins has worked hard to find new ways of serving our customers. Since the Polar Museum reopened following refurbishment in 2010, visitors to the museum have been greeted by one of our friendly and knowledgeable volunteers, who cumulatively have given many hours of their time to support the museum and its visitors. Our volunteers, as well as our visitors, have been very much missed during 2020 we hope to be able to welcome back both to the museum in 2021.

Charlotte Connelly
Expedition Support: Gino Watkins Memorial Fund

The Gino Watkins Memorial Fund, under the joint trusteeship of the University of Cambridge and the Royal Geographical Society, gives grants towards expeditions that meet its objectives of guiding and inspiring enterprising people towards scientific research and exploration in the polar regions.

The Committee of Managers of the Fund would like to thank the Augustine Courtauld Trust for their generous contribution of £6,000 in 2020.

The members of the Committee who served during the year were Dr L Craig (Chair), Professor J A Dowdeswell, Mr R Durbridge, Dr D Goodman, Mrs Penelope Goodman, Mr N Gwynne, Dr M Humphreys, Mr R Page, Mr Olly Sanders, Professor R C Schroter, Dr M Tinsley, and Dr F Wensley.

The Committee met on the 29 February 2020 and made the following awards:

<table>
<thead>
<tr>
<th>EXPEDITION</th>
<th>DESCRIPTION</th>
<th>AWARD</th>
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<tbody>
<tr>
<td>1 Baffin Island, June-July 2020</td>
<td>A climbing expedition to the mountains around the Summit Lake area of Auyuittuq National Park, Baffin Island, Canada</td>
<td>£6,000</td>
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<tr>
<td>2 Somatic polyploidisation in Saxifraga, Svalbard, July 2020</td>
<td>To work as a volunteer research assistant for a UNIS Masters fieldwork project on plant ecology by collecting data on purple saxifrage in Longyearbyen, Norway</td>
<td>£300</td>
</tr>
<tr>
<td>3 Zero Impact Adventures, Greenland, March-May 2020</td>
<td>To climb two first summits in the Stauning Alps, break an endurance world record and collect high definition footage of the region for a feature documentary</td>
<td>£2,000 + £2,000 Arctic Club £4,000</td>
</tr>
<tr>
<td>4 NW Greenland kayak climb/microplastic survey, July-August 2020</td>
<td>To kayak unsupported and climb new routes north of Upernavik and to participate in the global citizen science project ‘The Big Microplastic Survey’ (microplasticsurvey.org)</td>
<td>£2,000 + £1,000 Arctic Club (Simpson Award) £3,000</td>
</tr>
</tbody>
</table>
External Contributions to Polar Activities

National and International Roles of Staff

Members of the Institute are active in many roles relating to national and international committees and advisory groups involving the Arctic and Antarctic, and are members of the editorial boards of a number of international journals. These include:

- UK representative on the International Arctic Science Committee (IASC) Working Group on the Cryosphere; P. Christofferson
- UK representative on the International Arctic Science Committee (IASC) Working Group on the Humanities and Social Sciences; M. Bravo
- UK representative on International Science Initiative for the Russian Arctic (IASC); W.G. Rees
- Member of Council of the University of the Arctic (SPRI representative); R.C. Powell, W.G. Rees
- Member of the Place-Names Committee of the British Antarctic Territory; J.A. Dowdeswell, R.K. Headland
- Member of UK National Committee on Antarctic Research; J.A. Dowdeswell
- Member of Steering Committee, UK Arctic and Antarctic Partnership; R.C. Powell
- Member of the NERC Peer Review College; N.S. Arnold
- Member of the Advisory Council, European Union Arctic Forum Foundation.; M. Bravo
- Co-leader PPS Arctic Programme for international Arctic treeline research; W.G. Rees
- Trans-Antarctic Association; P.D. Clarkson (Chair); R.K. Headland, E.M. Morris (UK Advisory Committee members).
- Secretary General, International Commission on Stratigraphy of the International Union of Geological Sciences; P.L. Gibbard
- Member of the International Subcommission on Quaternary Stratigraphy (ISQS); P.L. Gibbard
- Chair, Polar Libraries Colloquy Steering Group; O.P. Lund
- Permanent UK representative of the Association of Marine Mammal Hunters of Chukotka; P. Vitebsky
- Trustee: Sutasoma Trust - P. Vitebsky; Fuchs Foundation, Royal Museums Greenwich - J.A. Dowdeswell
- Secretary General of the ‘International Council on Monuments and Sites’ International Polar Heritage Committee (ICOMOS-IPH); B. Lintott
- Member of SCAR’s Antarctic Climate Change and the Environment (ACCE) Advisory Group; C. Summerhayes
- Member of Advisory Group to the Higher School of Economics, Moscow; W.G. Rees
- Scientific Expert Board member, JustNorth project; W.G. Rees
- Member of Council, International Arctic Social Sciences Association; F. Stammers


SCAR Committee on Antarctic Research (SCAR)

SCAR is a thematic organisation of the International Science Council. Its mission is to facilitate international research in, from and about the Antarctic and Southern Ocean region and provide objective and authoritative scientific advice to the Antarctic Treaty and other bodies. The SCAR Secretariat has been generously hosted by SPRI since its creation over 60 years ago.

SCAR’s biennial Open Science Conference and Business meetings, due to be held in Hobart, Tasmania in August, were cancelled due to the COVID-19 pandemic but key elements of the conference were held virtually. SCAR 2020 Online (www.scar2020.org) used a combination of live-streaming and recorded presentations to deliver plenary presentations, mini-symposia, workshops, panel discussions and conference sessions. In all, 2712 participants from 60 countries produced 584 virtual displays and held 24 key events and 21 related events. Presentations can be found on SCAR’s YouTube channel. The 2020 Antarctic Treaty meeting was also cancelled, but CCAMLR moved its Scientific Committee and Commission meetings online in October. The SCAR delegation presented an update on SCAR activities relevant to CCAMLR, including research into the future of krill and an assessment of Areas of Ecological Significance.

2020 saw the approval of a suite of three new Scientific Research Programmes, the main vehicles through which SCAR facilitates and coordinates science in, from and about Antarctica and the Southern Ocean:

- AntClimNow (Near-term Variability and Prediction of the Antarctic Climate System) will investigate the prediction of near-term conditions in the Antarctic climate system, aiming to quantify and understand atmospheric and oceanic linkages between Antarctic climate variability and the rest of the planet.
- Ant-ICON (Integrated Science to Support Antarctic and Southern Ocean Conservation) will answer
fundamental science questions relating to the conservation and management of Antarctica and the Southern Ocean, and focus on research to drive and inform international decision-making and policy change.

- INSTANT (INStabilities and Thresholds in ANTarctica) will address a first-order question about Antarctica’s contribution to sea level, with the aim of helping decision-makers to anticipate and assess the risk in order to manage and adapt to sea level rise and evaluate mitigation pathways.

SCAR’s Standing Committee on Humanities and Social Sciences is spearheading an Antarctic COVID-19 Research Project examining the potential impacts of the pandemic on Antarctic research, operations and governance. The project aims to develop a suite of recommended actions to be taken to mitigate the adverse impacts on Antarctic communities and practice.

Friends of SPRI and the SPRI Centenary Campaign

Friends of the Scott Polar Research Institute

The Friends of SPRI, like so many voluntary organisations around the world, was impacted significantly by the COVID-19 pandemic during 2020. For the first time since the Friends was established in 1946, almost all events scheduled for the SPRI Centenary year of 2020, including the Annual General Meeting, had to be cancelled. The Friends’ Centenary Voyage to the Ross Sea with Oceanwide Expeditions did, however, go ahead just before the COVID-19 lockdown. A group of 25 Friends, including the Chair and Executive Secretary, the Director of SPRI and Dafila Scott (Captain Scott’s grand-daughter), sailed onboard the M/V Ortelius to Antarctica between 16 February and 18 March 2020. The highlight was a visit to Captain Scott’s hut at Cape Evans on Ross Island in bitter weather. We were privileged to go inside the hut in small groups and see how Scott and his men had lived over a century ago - a memorable day. Unfortunately, our journey home from Antarctica was badly disrupted, and we were delayed for over a week in South America because of COVID-19 restrictions.

Despite having to cancel our events for the remainder of the year, the Friends continued with other activities remotely. Our Artist in Residence scheme with the Royal Navy provides a placement on the UK’s ice-patrol vessel HMS Protector during each Antarctic summer. We advertised the placement on the SPRI website and on social media, and selected Claudia Myatt, who is a painter and illustrator based in Suffolk. Unfortunately, her scheduled voyage onboard HMS Protector in early 2021 has had to be postponed until next year because of the ongoing pandemic. Our most recent artist onboard HMS Protector was Andrew Lansley, in 2019. He returned from Antarctica with an extensive portfolio of sketches and ink drawings and over 5,000 photographs. His paintings were exhibited for the first time at the Informality Gallery in Market Place, Henley, in August 2020. Meanwhile, Shelly Perkins, published “Antarctica – A Creative Journey” in summer 2020, which was inspired by her voyage on HMS Protector in early 2017.

The year ended on a sad note with the death of one of our long-standing Friends and Committee member, Captain Simon Culshaw. Simon was highly regarded by all of us at the Friends of SPRI, and more widely across the polar and marine world. It was through Simon that the Friends established a continuing partnership with the Honourable Company of Master Mariners and has allowed us to hold several events onboard their ship, HQS Wellington, moored on the River Thames in London.

During 2020 the Friends have worked hard to raise funds for the SPRI Centenary Campaign. The goal is to raise £250,000 to create a permanent endowment fund for a post-graduate studentship at the Institute. By the end of 2020 £152,000 had been raised. This is a magnificent achievement, especially given the difficulties and problems caused by COVID-19. Major donors have been the Ross Sea voyagers and Steppes Travel, who together donated £46,175, John and Patricia Hollingsworth who donated £10,000, the late Simon Ommanney (past Secretary General of the International Glaciological Society) who donated £5,875, Susan Jourdain who gave £5,000, and the Trans-Globe Expedition Trust who donated £5,000. A further £21,150 was raised by an auction onboard the MV Ortelius during the Ross Sea Voyage and £3,080 from the sale of SPRI Centenary First Day Covers. Many thanks to all the Friends who have made donations to the Centenary Campaign.
Looking forward to 2021, we are planning for the next Friends polar expedition voyage to Spitsbergen and Northeast Greenland from 31 August to 13 September 2021. We have been working closely with Steppes Travel and Oceanwide Expeditions to organise the voyage, which will again be onboard MV Ortelius.

Finally, it is a pleasure to thank Celene Pickard, our Executive Secretary, for her outstanding work, and the members of the Friends Committee for all their help over the past year. Celene has made a huge contribution to keeping the Friends up-to-date with news from SPRI, completing a comprehensive review and update of the Friends membership database, and overhauling the administration and archives. I know we all look forward to the day when the Friends can meet together once again in the inspiring surroundings of the SPRI.

Dr John Shears (Chair, Friends of the Scott Polar Research Institute)

SPRI Centenary Campaign

The Scott Polar Research Institute is an international centre for research into the polar regions and is also home to unrivalled resources of polar information and expertise, housing the world's largest polar library, Britain's only dedicated polar museum, and a national repository for polar archives that record some of the most memorable episodes in exploration of the Arctic and Antarctic. The Institute's Archives, Museum and Library provide members of the general public, as well as scientists, government bodies, industry and polar inhabitants with important information on a variety of polar topics, including climate change, management of natural resources and historical polar expeditions. Through both the publication of our research and by public outreach, the Institute helps to educate and inform a worldwide audience about the polar regions.

The one-hundredth anniversary of the Institute is in 2020. We have established a number of fundraising priorities, relating to research, heritage and outreach activities, to strengthen the Institute's national and international roles over the coming decades. We wish to endow academic posts, and especially a Professorship in the field of Polar Environmental Science along with several lectureships. We are also working to underpin the further development of the Institute's Archive and Museum. Our highest priorities in these areas are to provide permanent endowment funding for the important posts of Institute Archivist and Polar Museum Curator. Funding for these positions has until now been supported by a series of short-term grants – an inherently unstable position. We also wish to build up endowment funds for the support of research students at the Institute (now initiated as the Scott Polar Scholarships Fund and the Debenham Scholars Fund), and to enable increasingly expensive polar fieldwork to continue to take place on a regular basis.

A series of events is being set up to celebrate the centenary. There will be a formal Centenary Gala Dinner on Saturday 16 October 2021 in Downing College, COVID-19 restrictions permitting. Those interested in further details should contact Emily Rigby at development@spri.cam.ac.uk.

The generosity to the Institute of a number of individual donors, together with private trusts and foundations, is gratefully acknowledged. Particular thanks are due to William Stancer for taking on the role of Campaign Chair and to HSH Prince Albert II of Monaco for acting as our Patron.

Further information on the Institute’s Centenary Campaign is available from the Director, Professor Julian Dowdeswell (director@spri.cam.ac.uk; +44-(0)1223-336560)

Friends of SPRI at the end of the Centenary Ross Sea Voyage in Ushuaia

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