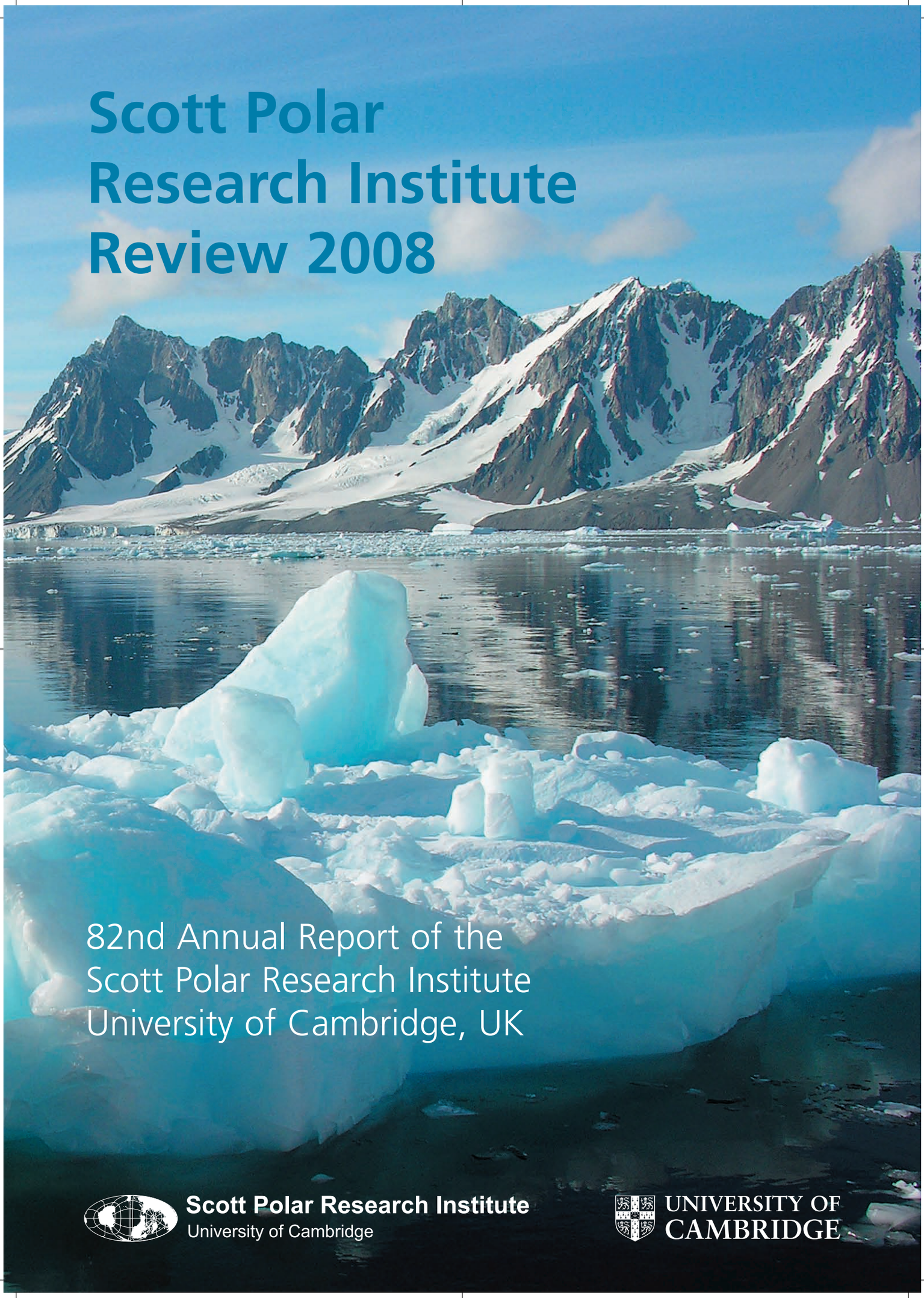
Scott Polar Research Institute Review 2008

82nd Annual Report of the
Scott Polar Research Institute
University of Cambridge, UK



Scott Polar Research Institute
University of Cambridge

UNIVERSITY OF CAMBRIDGE

Detail of the façade of the Institute, with penguins

Contents

Director's Introduction

The Arctic and Antarctic have, over the past few years, been recognised by scientists and the wider public to be particularly sensitive parts of the global climate system. Huge reductions in summer sea-ice extent in the Arctic Ocean, the increasing rate of mass loss from the Greenland Ice Sheet, and the breakup of floating ice shelves on the Antarctic Peninsula are all manifestations of change. The work of the Institute has as major research themes the changing cryosphere, its glaciers and ice sheets, sea ice and snow. Research grants held by our staff, and won competitively from the UK research councils and charitable trusts, support work on both the behaviour of modern ice sheets and investigations of the geological record of their past fluctuations as the earth has warmed and cooled over the past few million years. These observations are, in turn, used to inform and calibrate computer models that predict how ice may respond to future changes in the climate system that may affect our children and grandchildren. Our research on ice and environmental change is projected through scientific publications, reports to government bodies and NGOs, and also by public outreach that ranges from museum displays to appearances on national radio and television.

The Arctic Ocean has been a particular focus of recent interest for several reasons. Environmentally, its temperature and salinity structure is changing and its sea-ice cover is thinning and shrinking in extent. It is an area rich in hydrocarbons; extraction is beginning in the eastern Barents Sea and geophysical exploration is taking place elsewhere in the Arctic seas. Shipping may use the progressively more navigable route from the Atlantic to the Pacific via the Northwest Passage within the next few decades. The sovereign nations of the Arctic rim countries, and the Arctic Council, are debating the future of the Arctic Ocean and national claims are being submitted to the United Nations Commission for the Limits of the Continental Shelf. In this context, the Institute, in collaboration with the Judge Business School, has established a new research group on Arctic Ocean geopolitics. The group is headed by Dr Paul Berkman, who has a background in oceanography and has also worked previously on topics relating to the Antarctic Treaty System.

The scientific work of the Institute has been widely projected at a variety of levels. In October, their Royal Highnesses Prince William and Prince Harry came to the Institute as part of a visit to Cambridge, focusing on the environment and sustainability. The Director gave the Princes a short introduction to glaciers and ice sheets in a warming world before a tour of the museum and library, emphasising the links between British exploration and the development of our modern scientific understanding of the polar regions. Earlier in the year, the Director was also invited as a science expert on week-long cruise of the National Geographic *Endeavour* around the Svalbard archipelago. The aim of the trip was to show a group of influential Americans climate change in action. Participants included President and Mrs Jimmy Carter, along with a number of state governors, senators and leading industrialists. Sites of key scientific interest were visited around Svalbard, with the Director describing the changes in glacier extent and behaviour that had taken place recently.

At the Institute, the polar museum has attracted increasing numbers of visitors, partly linked to the publicity associated with new acquisitions and the series of temporary exhibitions that have taken place during the year. In addition, our programme of public outreach to schools continues to grow, with almost 70 organised tours in 2008; a six-fold increase over the position two years ago. This illustrates the important work carried out by Ros Wade, our part-time Schools Liaison Officer. This post, together with that of Archives Assistant and several others relating to the museum, library and archives, are all 'soft money' positions, supported by a series of short-term grants. One of the aims of our Appeal is to support these posts with endowment money to provide long-term underpinning for these activities.

In December, we were notified of the success of our Stage 2 bid for Heritage Lottery Fund support of £1 million for the redesign and refurbishment of our polar museum on the theme of 'exploration into science'. We now have the task of raising £700,000 in matching funds. The programme of alterations to both the museum itself, and the important curatorial, storage and archival spaces that go with it will begin early in the New Year. This is a very important step forward for the Institute in terms of the public projection of both Britain's polar heritage and also the significance of the polar regions as part of the changing global environmental system.

Their Royal Highnesses Princes William and Harry with Professor Dowdeswell in the SPRI museum

The collections of the Institute continue to grow through the generous donation of materials ranging from sculptures by Inuit artists to letters relating to the planning of early polar expeditions. A particularly important gift this year was the complete archive of Sir Ranulph Fiennes's Transglobe Expedition of 1979 to 1982. Developed by the curatorial team to highlight the image collections, an exhibition and accompanying book by Huw Lewis-Jones, *Face to Face: Polar Portraits* presented archival photographs of fifty past polar explorers alongside images of fifty contemporary scientists and explorers photographed by Martin Hartley. This exhibition, and another featuring examples of Herbert Ponting's iconic photographs of Scott's last expedition, will both go on tour while the museum is closed for refurbishment next year.

It is, once again, a pleasure to record my thanks to the staff of the Scott Polar Research Institute for the time and commitment that they have shown in making possible the breadth of work that we undertake. The large number of well-produced exhibitions in the museum and foyer of the Institute over the year, and the extensive seminar programmes in both polar physical and social sciences are just two examples of this. Two members of our administration team have left during the year. Judy Heath, who has for many years been our financial manager, has moved with her husband to Africa to undertake voluntary work. Liz Crilley, my Assistant for six years, has also moved to a part-time post in the university. All of us at SPRI thank them for their support.

Julian Dowdeswell

Professor Julian Dowdeswell

Institute Staff

Senior Academic and Related Staff

Professor Julian Dowdeswell	Director and Professor of Physical Geography
Dr Neil Arnold	University Lecturer
Dr Paul Berkman	Senior Research Associate
Dr Michael Bravo	University Senior Lecturer
Dr Poul Christoffersen	University Lecturer
Mrs Heather Lane	Librarian and Keeper of Collections
Professor Elizabeth Morris, OBE	Senior Research Associate
Dr Gareth Rees	University Senior Lecturer
Dr Ian Stone	Editor, *Polar Record*
Dr Piers Vitebsky	Assistant Director of Research
Dr Ian Willis	University Senior Lecturer

Research Staff

Mr Toby Benham	Research Associate
Mr Frank Bowles	Research Associate
Dr Marion Bougamont	Research Associate
Dr Huw Lewis-Jones	Research Associate
Ms Mel Rouse	Education Research Officer
Dr Olga Ulturgasheva	Research Fellow

Library and Archive Staff

Mr Tim Banting	Digital Imaging Assistant
Ms Naomi Boneham	Archives Manager
Ms Cara Bootman	Museum Assistant
Mr Mark Gilbert	Library Assistant
Ms Lucy Martin	Picture Library Manager
Ms Shirley Sawtell	Information Assistant
Ms Rebecca Stancombe	Library Assistant
Ms Hilary Shibata	Antarctic Bibliographer
Mr Robert Smith	Museum Project Manager
Ms Sally Verrall	Digital Imaging Assistant
Miss Rosalyn Wade	Schools Liaison Officer
Mrs Isabella Warren	Russian Bibliographer
Mr Jeremy Wong	Arctic Bibliographer

Support Staff

Mr Stanley Chapman	Maintenance (to September 2008)
Mrs Liz Crilley	Director's Assistant (to May 2008)
Mrs Kate Gilbert	Director's Assistant (from June 2008)
Mrs Judy Heath	Senior Clerk (to August 2008)
Ms Jamie Horsley	Administrator
Ms Marion Jeffries	Maintenance
Ms Claire Lampitt	Receptionist/Secretary
Mr Martin Lucas-Smith	Web Manager
Dr Alison Maguire	Administrator
Mr Matt Nelson	Computer Officer
Mrs Maria Pearman	Senior Clerk (from September 2008)
Mr Brian Smith	Maintenance

Doctoral Students

Ms Narelle Baker
Mr Kelly Dolan
Ms Amy Donovan
Mr Peter Evans
Ms Janne Flora
Mr Jorge Guzman
Ms Kelly Hogan
Mr Adrian McCallum
Ms Dinah Molloy Thompson
Ms Ruth Mugford
Mr Martin O'Leary
Mr Cameron Rye
Ms Christina Sawchuk
Mr Laur Vallikivi

M.Phil. Students

Ms Rachels Carr
Mr Alasdair Graham
Mr Sylvan Long
Ms Nicola Stiastny

Institute Associates

Dr John Ash
Dr Lawson Brigham
Dr Liz Cruwys
Dr Bob Hawley
Mr Robert Headland
Mr Keith Hill
Dr Neil Kent
Dr Beau Riffenburgh
Dr Elena Khlinovskaya Rockhill
Dr Florian Stammler
Dr John Tichotsky
Dr Olga Tutubalina
Dr Emma Wilson

Emeritus Associates

Dr Peter Clarkson
Mr Michael Gorman
Mr Harry King
Dr Simon Ommanney
Professor Larry Rockhill
Mr Peter Speak *(deceased)*
Dr Bernard Stonehouse
Dr Charles Swithinbank
Dr Janet West
Professor Peter Williams

Other organisations based at SPRI

World Data Centre for Glaciology, Cambridge

Mr Rick Frolich	Manager

International Glaciological Society

Dr Magnús Már Magnússon	Secretary General
Mrs Linda Gorman	Assistant to the Secretary General

Scientific Committee on Antarctic Research

Dr Colin Summerhayes	Executive Director
Dr Michael Sparrow	Executive Officer
Mrs Rosemary Nash	Senior Clerk

Polar Research

Research Group Structure

The research work of the Institute continues to focus around its research groups, each of which has a mix of senior academic staff, post-doctoral researchers and postgraduate students. During 2008, the Arctic Ocean Geopolitics Group was established, led by Dr Paul Berkman. The activities of this group are collaborative with the Judge Business School, and reflect the growing political and economic interest in the Arctic circumpolar coasts and seas. The work of the groups is supported by a number of externally funded research grants, which are listed below. In addition, the Institute contributes to the NERC Centre for Polar Observation and Modelling (in collaboration with UCL and Bristol University). The groups are:

- Glaciology and Climate Change
- Glacier-Influenced Marine Sedimentary Environments
- Polar Landscapes and Remote Sensing
- Polar Social Science and Humanities
- Circumpolar History and Public Policy
- Arctic Ocean Geopolitics

Institute staff organise seminar series in both polar physical sciences and social science and humanities. Speakers from universities and research centres in the UK and overseas, together with Cambridge colleagues, have contributed during the year. The seminars are well attended by staff and research students from a number of Cambridge departments and from, for example, the British Antarctic Survey. A selection of the physical and social science research projects in which we are currently engaged is outlined briefly below.

A crevassed glacier reaches fjord waters in East Greenland

RRS James Clark Ross offshore of an Antarctic Peninsula glacier

Polar Physical Science

Iceberg calving flux and mass balance of Austfonna, Nordaustlandet, Svalbard

Satellite radar interferometry, 60 MHz airborne ice-penetrating radar data, and visible-band satellite imagery were used to calculate the velocity structure, ice thickness, and changing ice-marginal extent of Austfonna (8,120 km^2 and 2,500 km^3), the largest ice cap in the Eurasian Arctic. Ice-cap motion is less than about 10 m yr^{-1}, except where faster-flowing curvilinear features with velocities of several tens to over 200 m yr^{-1} occur. Most drainage basins of Austfonna have undergone ice-marginal retreat over the past few decades at an average of a few tens of metres per year. Integrating margin change around the whole ice cap gives a total area loss of about 10 km^2 yr^{-1}. Iceberg flux from the marine margins of Austfonna is about 2.5 km^3 yr^{-1}, about 45% of the total calving flux from the whole Svalbard archipelago. When mass loss by iceberg production is taken into account, the total mass balance of Austfonna is negative, by between about 2.5 and 4.5 km^3 yr^{-1}. This iceberg flux represents about 33% of total annual mass loss from Austfonna, with the remainder through surface ablation. Iceberg flux should be included in calculations of the total mass balance of the many large Arctic ice caps, including those located in the Russian and Canadian Arctic that end in tidewater. The neglect of this term has led to underestimates of mass loss from these ice caps and, thus, to underestimates of the contribution of Arctic ice caps to global sea-level rise.

Julian Dowdeswell and Toby Benham

Hydrology of the Greenland Ice Sheet

The Greenland Ice Sheet has recently been losing mass at an accelerating rate due to both increased surface melting and more rapid flow of outlet glaciers. There is growing interest in the possible links between these two processes, with evidence suggesting that higher melt rates may deliver more water to the bed, elevating subglacial water pressures and promoting basal slip. We are currently developing a semi-distributed hydrology model that is capable of predicting melt rates across the ice sheet surface, routing this water across the surface (through unsaturated and saturated snow and firn, and across bare ice) to supraglacial lakes and moulins which then eventually deliver the water to the bed of the ice sheet. Subglacial water flow is currently modelled in terms of flow through a dendritic network of channels, which enlarge and contract in response to the discharge and pressure of water flowing through them. We are currently developing the model for the Paakitsoq / Swiss Camp region of West Greenland where we have good surface and bed topography data to set boundary conditions, meteorological data to drive the model, and proglacial stream discharge data to test the model. A key area of model development includes the role of ice fracturing and the delivery of large volumes of surface lake water to the bed. Preliminary results suggest that stable channels can exist beneath the lower portion of the ice sheet (up to ~6 km from the margin) where meltwater delivery is high and ice is relatively thin. Subglacial channels are unstable further from the margin due to low channel melt rates and high closure rates (due to thicker ice) suggesting flow here is via a distributed drainage system. Knowledge of the stability or otherwise of the subglacial drainage system, and the water pressure within it, is a key factor in understanding the possible mechanisms which might explain the acceleration of parts of the Greenland Ice Sheet. The work is being undertaken together with our former Masters student, Sylvan Long, current PhD student, Alison Banwell, and Dr Andreas Ahlstrøm (Geological Survey of Denmark and Greenland).

Ian Willis and Neil Arnold

Investigating basal conditions and flow dynamics on Vestfonna Ice Cap, Svalbard

The body of scientific evidence for significant anthropogenic impacts on the global climate is growing and public concern underscores a need for better assessments of contemporary environmental changes in regions such as the Arctic. Although the vast majority of ice on Earth is stored in Greenland and Antarctica, maritime ice caps and alpine mountain glaciers are expected to dominate the cryospheric contribution to 21th century sea-level rise. Arctic ice caps are an important component of global change, especially as Arctic temperatures are increasing at almost twice the global average. A new project led by the SPRI and funded by the Natural Environment Research Council focuses on Vestfonna Ice Cap, which is located in remote northeast part of Svalbard. This Arctic ice cap is of particular interest because its northern ice margin terminates on land while the southern margin contains a series of tidewater outlet glaciers, comparable to those draining the Greenland Ice Sheet. We are conducting glaciological investigations with the aim to determine how ice flow responds to atmospheric and oceanic forcings. The project includes the collection of radio-echo sounding data in a traverse across the ice cap and in two designated study areas, one on the land-terminating northern ice margin and one on a southern tidewater glacier. The radar data provide a means to measure ice thickness and examine the nature of the bed (e.g. the distribution of melting and freezing and the presence of lubricating water). In 2008, we installed five GPSs on Frazerbreen, a fast-flowing tidewater glacier, and two GPSs on the land terminating northern ice margin. Outputs from the GPS equipment, which will monitor changes in surface position over one year period, will be integrated with radar data and outputs from automatic weather stations. The fieldwork is coordinated through the Kinnvika International Polar Year Consortium.

Poul Christoffersen and Julian Dowdeswell

Understanding contemporary change in the West Antarctic Ice Sheet

Satellite investigations have revealed a spatially complex pattern of contemporary change in the West Antarctic Ice Sheet. The ice streams that discharge into the Amundsen Embayment are thinning and accelerating, but the ice streams feeding the Ross Ice Shelf are slowing down and some have even ceased to flow fast. The Scott Polar Research Institute is part of a collaborative project that aims to determine the cause and magnitude of contemporary change in the West Antarctic Ice Sheet by development of a higher-order numerical ice-flow model. The model will have accurate predictive capabilities for simulation of the 21st century when coupled to an Earth-system model. The study will make use of a wide range of observations including satellite imaging, airborne surveys and ground-based field campaigns. This latter aspect of the project is facilitated by links to a range of project partners and to close collaboration with the US National Science Foundation's programmes on West Antarctica; in particular, the Amundsen Sea Embayment Plan coordinated through the International Polar Year. The project will take place over a three-year period. It links expertise in subglacial processes and ice-stream dynamics (SPRI), large-scale numerical modelling (Bristol University) and data assimilation techniques (Durham University). The project is funded by the Natural Environment Research Council.

Poul Christoffersen and Marion Bougamont

CryoSat-2

SPRI staff continued to participate in international campaigns to validate data collected by a new radar altimeter (SIRAL) to be carried by the CryoSat-2 satellite. In Spring 2008 a two-person team from SPRI completed a traverse across the North West sector of the Greenland Ice Sheet, ending at the Danish "NEEM" drilling camp. Measurements of snow density profiles were made using an automated neutron profiling system and will be compared with data from the airborne ASIRAS radar altimeter which was flown along the traverse by scientists from the Danish National Space Centre. These measurements have extended the CryoSat-2 pre-launch validation studies to an area of low accumulation where thick layers of hoar crystals form within the firn. The observations help to explain why the correlation coefficient of height change versus power change in the ENVISAT altimeter data is high in this part of the dry snow zone on Greenland. This was the last of the pre-launch activities, as CryoSat-2 is due to be launched at the end of 2009. Post-launch field studies are planned for 2010 onwards.

Liz Morris

A major submarine fan in the Bellingshausen Sea, West Antarctica

A 330-km length of the little known continental shelf edge and slope of the Bellingshausen Sea, West Antarctica, has been investigated using multibeam swath-bathymetric and sub-bottom profiler evidence. When full-glacial ice advanced across the shelf to reach the shelf break about 20,000 years ago, it was partitioned into fast- and slow-flowing elements, with an ice stream filling the trough. This had important consequences for the nature and rate of sediment delivery to the adjacent continental slope. Off Belgica Trough, the upper continental slope has convex-outward contours indicating a major sedimentary depocentre. Acoustic profiles and cores from the depocentre show a series of glacigenic debris flows. The depocentre is interpreted as a trough-mouth fan, built largely by debris delivered from the ice stream. The main morphological features on the Bellingshausen Sea slope are gully systems and channels, which are found mainly on the fan surface. The largest channel is over 60 km long, about a kilometre wide and 10 to 15 m deep. The channels provide pathways for sediment by-passing of the upper slope and transfer to the continental rise and beyond by turbidity currents. Gullies on the Bellingshausen Sea margin cut through debris flows on the slope. Assuming the debris flows are linked mainly to downslope transport of diamictic debris when ice was at the shelf edge under full-glacial conditions, then those gullies cut into them formed during deglaciation. Belgica Fan is about 25,000 km^2 in area. It is the largest depocentre identified to date on the continental margin of the West Antarctic Ice Sheet, fed by an interior ice-sheet basin of approximately 200,000 km^2. This work is collaborative with R.D. Larter and C.-D. Hillenbrand of the British Antarctic Survey.

Julian Dowdeswell, Riko Noormets, Jeff Evans

Circumpolar treeline research by the IPY core project PPS Arctic

2008 has been a year of intense activity by the international research consortium 'PPS Arctic', which is jointly coordinated by the Norwegian Institute for Nature Research and SPRI. A key question is: Are trees invading the Arctic? The 'expected' answer is 'yes', but this is based on rather simple models that relate the position of the treeline to the local climate. The idea is that it is too cold for trees to exist north of the present-day treeline, so a warming climate ought to produce a northward advance of the trees. However, nature responds in a complex manner to environmental changes – where temperature, precipitation, snow distribution, wind, soil conditions, tundra and forest fires, insect outbreaks, browsing, melting permafrost and land use all interact – and the existing models are almost certainly too simplistic. Until now, there has also been very little hard evidence for an advance of the treeline. The few studies that have been carried out represent a small fraction of the huge area covered by the transition zone between the boreal forest and the tundra. The work of PPS Arctic is integrated by three questions:

- Is the Arctic treeline zone moving; and if so, in what direction and where?
- What controls the position and structure of the Arctic treeline zone?
- What are the ecological and social consequences of changes in the position of the zone?

We see examples of advancing, retreating and stationary treeline zones across our study sites, but the advancing zones are dominant. These questions are addressed both from a scientific perspective and through interaction with stakeholders and the general public. The perspective is circumpolar, and the project group consists of over 110 researchers and graduate students, studying sites in Alaska, Canada, Norway, Sweden and Russia. We are using fieldwork ecological and socio-economic methods, airborne and satellite remote sensing, and historical data from aerial photography. We have been actively collecting data from more than 30 sites around the Arctic since 2007, and data collection will continue into 2009. During 2008, SPRI scientists participated directly in data collection activities across the Kola Peninsula, Russia. Project planning meetings took place in St John's, Newfoundland, Vancouver and Helsinki. The project website is http://ppsarctic.nina.no.

Gareth Rees

Polar Social Sciences and Humanitie

Polar governance, security and geopolitics

The future of Arctic governance has become a topic of much discussion over the past year. High commodity prices and the prospect of new opportunities for oil and gas extraction have raised new questions about sovereignty, security and environmental regulation. Major issues such as energy security, climate change, sustainable livelihoods, and the protection of marine mammals and fish shape policy priorities very differently in disparate political regions. As prospective stakeholders like the European Union, China, and the extractive industries seek greater access to the Arctic Council, new governance fora seeking to influence the international machinery of governance have emerged. In such a climate, experienced Arctic researchers have an important role in helping to ensure that public policy debates are well informed by disinterested and objective research in scientific and policy-based processes. During 2008, Bravo was invited to provide briefings on the state of the Arctic for a broad range of stakeholders, including the governments of the United Kingdom and Canada. Bravo has also accepted invitations to make policy analysis presentations in such non-governmental fora as the Canadian Institute of Research on Public Policy (Montreal-based), the Institute on Applied Circumpolar Policy (Dartmouth College, Univ. of Alaska, Fairbanks), and the World Wildlife Fund (Zeist, Netherlands).

Michael Bravo

Setting Arctic research in a wider global context

Concerned that Arctic research is often isolated from research on other regions of the world, SPRI social scientists are making systematic regional comparisons. Following a recent special issue of *Cambridge Anthropology* co-edited by Olga Ulturgasheva which compared Siberia and Amazonia as resource frontiers, Piers Vitebsky and Otto Habeck organised a conference on 'De-provincialising Arctic research' at the Max-Planck Institute for Social Anthropology in Halle, Germany, within the framework of the European Science Foundation's BOREAS programme of Arctic Humanities research, of which Vitebsky is the Chair. Teams of BOREAS researchers presented their ongoing projects for comment by researchers on or from South Asia, Latin America, and Africa, thereby revealing hitherto unrecognised synergies. Themes included frontiers and borders; indigeneity and indigenism; conversion and community cohesion; migration and relocation; development and conservation; and environmental change. A case-study considered the position of indigenous peoples at the margin of the industrial super-state, comparing nomadic hunters and reindeer herders in the taiga of Arctic Siberia with shifting cultivators in the tropical forests of Tribal India, and correlating forms of subsistence ecology, shamanic religiosity and historical resistance.

Piers Vitebsky

Negotiating pathways to adulthood: social change and indigenous culture in four circum-Arctic communities

SPRI is participating, with Sami University College (Kautekeino, Norway) and the Universities of Massachusetts, Alaska Fairbanks, Illinois Champaign-Urbana, Toronto and Oslo, in a study of youth resilience in Arctic communities in Norway, Canada, Siberia and Alaska. Dr Olga Ulturgasheva is principal investigator for the Siberian part of the study. This innovative project, funded under the National Science Foundation's International Polar Year initiative, brings indigenous youth and elders from these communities into direct collaboration with social scientists in order to identify the stressors and the social and material resources which shape culturally patterned resilience strategies of native youth. Through a community-based participatory research approach, the project seeks to provide insights into the family, community, and cultural contexts which support healthy youth development, to identify key protective factors which may promote the development of effective, culturally consonant prevention programmes so as to reduce current disproportionately high rates of substance abuse and suicide, and to build indigenous research capacity and a collaborative network of researchers and community members.

Piers Vitebsky and Olga Ulturgasheva

A reindeer herding camp on Yamal Peninsula, Arctic Russia

Extractive Industries Working Group (EIWG) of the International Arctic Social Sciences Association (IASSA)

In many areas of the Arctic, industry is increasingly extracting mineral resources on territories that are also used by indigenous peoples. While these activities often cut across indigenous hunting and herding economies, mineral resources may also be the foundation of northern regions' hopes for future prosperity. During the 2008 IASSA meeting in Nuuk, Greenland, Piers Vitebsky proposed establishing an IASSA Extractive Industries Working Group, to cover oil, gas, mining, and hydropower. This proposal arises from the recent ESRC-funded workshop series at SPRI on oil and gas in the Russian North organised by Vitebsky with SPRI Associates Florian Stammler and Emma Wilson, and the resultant special issue of the journal *Sibirica*. The proposal was accepted and the working group is now coordinated by Florian Stammler. The group aims to become a 'think tank' of cutting-edge research and information on all social aspects of extractive industry activity throughout the circumpolar North, applying academic insights to contribute social science expertise to public documents, guidelines and legislation, and to process and channel requests by intergovernmental organisations, indigenous people's organisations, industry, NGOs and states.

Piers Vitebsky, Florian Stammler and Emma Wilson

The town of Longyearbyen in Spitsbergen

Research stations and Arctic science policy

Traditionally, research stations have served states both as geopolitical expressions of Arctic intent and as platforms for undertaking scientific research. Today, there is a growing realisation that most key scientific research problems in the Arctic cross national boundaries and can only be studied adequately through international collaborative networks. The two states with the greatest area of Arctic territory, Canada and Russia, have both recently made significant investments to upgrade their networks of Arctic research stations, thus reversing decades of underfunding and in some cases, neglect. Seeking to demonstrate its commitment to the sovereignty and stewardship of its Arctic territory, the Canadian government announced its intention to establish a major new Arctic research station in the Prime Minister's 2007 Throne Speech. New strategies are required to meet the kind of research and monitoring required by states, industry, and the citizens of the Arctic. Recognising these policy challenges, the Council of Canadian Academies commissioned an international panel in 2008 to make recommendations on Arctic research priorities, and to advise how a new Canadian research station could best enable international Arctic science cooperation. Bravo was invited to act as rapporteur for the panel, which recommended a distributed 'hub and spokes' model for the new research station that could be integrated with upgraded existing infrastructure. In the 2009 budget, the Canadian Government acted upon the recommendations of the report (www.scienceadvice.ca) by allocating $87 million for the improvement of research stations and a feasibility study for the new station.

Michael Bravo

Current Research Grants

Institute research staff currently hold grants of about £3.65 million, of which £900,000 is from the UK research councils

Grants from UK Research Councils

Sediment transfer from the Antarctic continent to deep ocean: a shelf-slope-basin system investigated using the ISIS Remotely Operated Vehicle
Source: Natural Environment Research Council, Grant NE/C506372/1
£143,632 (2004-2008)

Validation and provision of CryoSat-2 measurements of fluctuations in the Earth's land and marine ice fluxes
Source: Natural Environment Research Council, Grant NER/O/S/2003/00620
£319,635 (2004-2009)

Marine geophysical and geological investigations of past flow and stability of a major Greenland ice stream in the late Quaternary
Source: Natural Environment Research Council, Grant NE/D001986/1
£217,341 (2006-2010)

Mass balance of Langjokull, Iceland
Source: Natural Environment Research Council Airborne Remote Sensing Facility (ARSF) Project, Award No. IPY07/08
£26,950 (equivalent funding)

Understanding contemporary changes in the Antarctic Ice Sheet
Source: Natural Environment Research Council, Grant NE/E005950/1
£165,878 (2007-2010)

The UK's polar art heritage: enhancing documentation and access to the collections at the Scott Polar Institute
Source: Arts and Humanities Research Council, Grant MG10134
£43,618 (2007-2008)

Investigating basal conditions and flow dynamics on Vestfonna Ice Cap, Svalbard
Source: Natural Environment Research Council, Grant NE/F011466/1
£53,258 (2008-2009)

Airborne geophysical exploration of central East Antarctica
Source: Natural Environment Research Council, Grant NE/F016646/1
£11,250 (2008-2012)

Grants from Other Sources

Potential threats to the future of Inuit Beluga Whale hunting in Canadian Arctic
Source: British Academy, Grant BAPDF0508
£67,929 (2006-2008)

Arctic glaciers and their response to environmental change
Source: John Ellerman Foundation
£90,000 (2008-2011)

Baptist and Hindu conversions in tribal India: changing language, emotion and morality
Source: British Academy, Grant SG-49620
£7,460 (2008-2009)

Permafrost changes in the Arctic
Source: ENI SPA, Italy
£521,744 (2008-2012)

Negotiating pathways to adulthood: social change and indigenous culture in four circumpolar communities
Source: University of Massachusetts, Amherst
£68,000 (2008-2009)

Management of Bar-coding data for the identification of Antarctic marine animals from genetic (DNA)
Source: Scientific Committee for Antarctic Research CAML Barcoding Project
£45,578 (2007-2010)

HLF Stage 1 Museum Grant - Promoting Britain's Polar Heritage: Developing the Scott Polar Research Institute Museum
Source: Heritage Lottery Fund HG-06-01385/1
£50,000 (2007-2008)

HLF Stage 2 Museum Grant - Renovation of Museum and Archives: Developing the Scott Polar Research Institute Museum
Source: Heritage Lottery Fund HG-06-01385/2
£994,000 (2009-2012)

HLF Collecting Cultures Grant - Arctic Visions: Inuit Art and Material Culture
Source: Heritage Lottery Fund CC-07-011106
£200,000 (2008-2010)

Discovering the Poles: historic polar images 1845-1982 (Freeze Frame Project)
Source: Joint Information Systems Committee Capital Programme: Digitisation
£423,697 (2007-2009)

Investigations into the impacts of environmental change on the glaciers and ice caps of the Arctic
Source: ConocoPhillips
£100,359 (2008-2011)

Eurasian Arctic melting ice
Source: Discover the World
£15,000 (2008)

Arctic Ocean Geopolitics
Sources: Judge Business School, World Wildlife Fund, Foundation for the Good Governance of International Spaces
£145,000 (2008-2010)

Publications by Institute Staff

Papers

Brandt, O., **Hawley, R.L.**, Kohler, J., Hagen, J.O., **Morris, E.M.**, Dunse, T., Scott, J.B.T. and Eiken, T., 2008. Comparison of airborne radar altimeter and ground-based Ku-band radar measurements on the ice cap Austfonna, Svalbard. *The Cryosphere*, v. 2, p. 777-810.

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Ash, J.A., Ph.D., Assessment of environmental risk in the Arctic

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Polar Information and Historic Archives

Library and Information Service

The Library received over 750 visits from external readers, in addition to providing services to students and academic staff from many departments of the University. Undergraduate use of the library increased once again, with the continued popularity of the Geography 2nd and 3rd year glaciology and Arctic peoples courses. Library staff also provided induction sessions and training in the use of electronic resources on demand for all new postgraduate students. During 2008, the Library hosted visits from the graduate trainees working in a range of libraries within the University, from the Desk Officers of the Foreign and Commonwealth Office Polar Regions Unit, the Friends of Norwich Cathedral, students from the Arizona Center for Medieval and Renaissance Studies, the McKinsey & Co. leadership programme and the Canadian High Commissioner James Wright and his senior staff. The Librarian again provided tours during the Alumni Weekend, which proved very popular.

A total of 2330 monographic items and issues for 530 periodical titles were added to the library during the year, with items from a further 170 electronic titles recorded. The sections of the library catalogue accessible via the web as SPRILIB (Antarctica, Ice and Snow and Russian North) were also updated to include material published up to the end of 2007. Records were again sent for two updates of the *Arctic and Antarctic Regions* CD-ROM published by the National Information Services Corporation. Working in co-operation with the World Data Centre for Glaciology, records of items relating to the current International Polar Year were submitted quarterly to the IPY Publications Database, http://www.nisc.com/ipy, also hosted by NISC. Input continued to the Antarctic Bibliography, searchable free of charge on the web at http://www.coldregions.org/dbtw-wpd/antinfo.htm. A notable acquisition during the year included a beautiful atlas of Siberia: "Siberia: Atlas of Asiatic Russia", published in 2007 by Dizayn and edited by famous ethnographer and archaeologist A.P. Derevyanko.

A second tranche of funding provided by the Gladys Krieble Delmas Foundation enabled Library staff to continue preparatory work on the Data Migration Project. Much was done during the year to bring library records into line with international cataloguing standards and to identify areas requiring further attention, such as the development of name authority files.

The Librarian, Heather Lane, continued to be involved in discussions on information policy during the International Polar Year and the work of the IPY Education, Outreach and Communication subcommittee, contributing to the design of the IPY web site and in the further development of the IPY Publications Directory. Plans were also put in place for the Institute to act as the repository for the electronic IPY planning archive, at the request of the international Joint Committee. At the meeting in Edmonton, Alberta in June, the Librarian was elected Chair of the Polar Libraries Colloquy, to serve for two years. Mrs Lane also continued as Chair of the Cambridge University Bibliographic Standards Advisory Group and continued as the School's representative on the General Board Committee on Libraries, as well as joining the Journals Coordination Scheme Consultative Committee for the School of Physical Sciences. In April, our Russian Bibliographer, Isabella Warren attended the COSEELIS conference which took place in Oxford. Jeremy Wong continued as the library's representative to the user group of the print-on-demand company, Lightning Source.

Volunteers continue to play a crucial part in researching and maintaining the Library's collections. Percy Hammond and Jean Cruttwell continued their valuable work cataloguing the collection and updating their Access database. Janine Lettau, Ailsa MacQueen, Jonathan Pinhey, John Reid and Maria Shorthouse all provided time and expertise on a variety of projects during the year. Jack Williman spent time with us for his Duke of Edinburgh bronze service award, helping out in both the Library and Museum.

In addition to research grants received for specific projects, the Institute received, during the financial year, sums for the general support of information and library services. Thanks are due to the following supporting bodies.

Ministry of Defence grant in aid (DC-ICSP)	£35,000
Royal Society grant in aid (for WDC-C)	£11,000
Gladys Krieble Delmas Foundation	£15,000
CO Polar Regions Unit	£5,000

During the year, the Library also hosted a number of scholars visiting the Institute for extended periods, including: Professor Bjørn Basberg (Norwegian School of Economics and Business Administration, Economic History Section); Dr Peter Dann (Research Associate of Melbourne University, Australia); Professor David Day (Centre for Pacific and American Studies, University of Tokyo); Bryan Lintott (Gateway Antarctica. University of Canterbury, Christchurch. New Zealand); Brian Lymbert (Antarctic Treaty); Dr Bruce Minore (Centre for Rural and Northern Health Research, Thunder Bay, Ontario); Jennifer Newton (Department of Anthropology, University of Alaska, Fairbanks); Professor Petri Pellikka (University of Helsinki. Department of Geography).

Heather Lane

Carving in walrus ivory of an igloo with man and woman by an Iglulik artist, Nunavut, Canada

World Data Centre (WDC) for Glaciology, Cambridge

The WDCGC manager is responsible for acquiring and cataloguing glaciological material for the Scott Polar Research Institute Library, supply of material to the WDCGC website and maintenance of the online Directory of European Glaciology. WDCGC also responds to requests for glaciological information from academic and media researchers and the general public, either directly or by referral.

Fully abstracted and indexed records for 49 monographs and 570 articles of glaciological interest acquired were added during 2008 to the in-house database SPRILIB, which now contains over 184,000 records. Three issues of *Polar and Glaciological Abstracts*, now a SPRI in-house publication, were produced in 2008. WDCGC is responsible for compilation, editing and production, with other responsibilities shared with SPRI Library staff.

Updates were supplied to the quarterly CD-ROM and online database *Arctic and Antarctic Regions* (published by National Information Services Corporation). WDCGC also manages the SPRI contribution to a new NISC database dedicated to the International Polar Year 2007-08 available at www.nisc.com/ipy. Relevant SPRILIB records continue to be made available freely (approximately eight months after appearing in Polar and Glaciological Abstracts) via the online database SPRILIB ICE AND SNOW, available at www.spri.cam.ac.uk/resources/sprilib/icesnow/. With over 52,000 entries, this resource receives around 18,000 requests annually. Several improvements to the SPRILIB Online interfaces have been made during 2008.

The WDCGC website receives new material as resources permit. The site received hits from over 100 countries in 2008. The Directory of European Glaciology - http://wdcgc.spri.cam.ac.uk/directory/ - has been maintained and continues to be well used, receiving many thousands of hits from over 50 countries in the past year.

Rick Frolich

Picture Library

The Picture Library continues to assist many visitors and enquiries from all over the world with their research of photographic material for use in a variety of publications, television programmes, lectures, museum exhibitions and theatre productions. Images have been supplied to the BBC, to the Canadian Museum of Civilisation, the National Maritime Museum, Greenwich, National Geographic Books and to accompany a performance of 'Sinfonia Antarctica' by the Leeds Youth Orchestra; for a number of publications including forthcoming books by Meredith Hooper, Leif Mills and Bob Burton and for the SPRI exhibition and publication *Face to Face: polar portraits* by Huw Lewis-Jones. Photographic material has also been supplied for exhibitions at the Wardown Park Museum, Luton, the South Georgia Museum, SESC Pompeia, Sao Paulo, Brazil, the McManus Galleries & Museum, Dundee and The Inniskillings Museum, Ireland.

The Picture Library acquired by donation eighty-one lantern slides from the Relief Voyages of *SS Morning*, generously given by Judy Skelton. The slides enhance the existing collection of photographs held by the Institute and complement other material from the British National Antarctic Expedition, 1901-04. Another very welcome addition to the Picture Library is an album of photographs relating to both Captain Scott and Ernest Shackleton. Baroness Sharples, who was given the photographs by J.J. Kinsey, Captain Scott's agent in New Zealand, donated these photographs to the Institute.

The preventive conservation programme continues with the boxing of five more albums in the collection. Purpose-built boxes were constructed by a conservator for the collection of photograph albums compiled by Lt James Hamilton Martin who was on both the British Arctic Air Route Expedition, 1930-31 and the British Graham Land Expedition, 1934-37. The Friends of SPRI generously provided funds. The Picture Library would like to acknowledge the invaluable help given by the team of volunteers; Angela Haines and Jennifer Hirsh and to Winifred Ware, who very sadly passed away in August after a short illness.

Lucy Martin

Freeze Frame: historic polar images

With funding from the Joint Information Systems Committee (JISC), major progress was made on the Institute's project to digitise its historically important but little known photographic negative collection. The Freeze Frame project will result in a new web-based resource for further and higher education, although feedback in 2008 suggests that it will be of much wider interest. The project has the added benefit of enabling us to conserve some of the most fragile holdings in our collection. Digitisation of the historic photographic negative collection continued throughout 2008, under the supervision of Naomi Boneham.

Tim Banting replaced Jennifer Newbury as Digital Imaging Assistant, working through the 20,000 images selected for scanning. He was assisted by Sally Verrall and later by Jon Bird in the work of post-processing, which provides us with two images, one recording the original condition of the negative and one a clean, cropped and generally more presentable image for web delivery. Mel Rouse joined the project as Education Officer and has been working on creating resource packages built around the images. Willow Silvani took over the job of cataloguing each image from Frank Bowles, who moved to a permanent position in the University Library. Web site design began in 2008 and we began to develop strategies for the launch in 2009.

Heather Lane and Julian Dowdeswell

Thomas H Manning Polar Archives

December 2008 was the last month before the closure of the archives for renovation. The month saw 78 half-day visits booked for the three readers' desks in the archive. Visiting scholars shared the reading room with SPRI students in the run-up to Christmas. The year has been characterised by two major projects. The *Freeze Frame: historic polar images* project and the Heritage Lottery Fund bid for the redevelopment of the Museum and its associated archival and curatorial spaces.

New accessions to our archival collection have continued to arrive. On 19 June, we welcomed Sir Ranulph Fiennes to the Institute for a formal presentation of his Transglobe Expedition records to the Archive. This collection consists of a large number of maps and all the expedition files from its first inception to the triumphant return. The continued generosity of Sir Ranulph and other polar explorers and their descendants has, however, created a problem of space. The old store designed as part of the 1960s redevelopment of the Institute has almost reached capacity, and so plans for a complete redesign were included in the Heritage Lottery Fund bid for the redevelopment of the Polar Museum. Work on the collections during the latter part of the year was therefore undertaken with this in mind and plans drawn up for a complete refit.

John Barnes and family kindly donated the diaries and photographs of his uncle H.R. 'Bob' Young, who was a member of both of Admiral Byrd's first two Antarctic expeditions, 1928-1930 and 1933-35. A further acquisition is a group of letters, all addressed to William Bradford, relating to nineteenth century Arctic exploration. Correspondents include John Rae, Lady Franklin, Charles Hall and George Nares, and the collection also contains a diary by J. Purvis of the Antarctic voyage of *Discovery II* from 7 October to 21 December 1930. We would like to thank the Friends for their generous support in assisting with the purchase of the Bradford collection.

The Friends also provided matching funding for an MLA/V&A Purchase Grant Fund award of £8,250 towards the purchase of a sketchbook produced by the 19th-century Kilamiut (West Greenlandic) artist Isak fra Igdlorpait. This very fine sketchbook, produced by a naive Greenlandic artist, documents everyday life in Greenland at the end of the 19th century. The illustrations, colourfully executed in a simple style, are accompanied by explanatory notes in Greenlandic written by the artist and translations of those notes into Danish by a later owner. Representations include boats, fishing, hunting, native costumes, icebergs, the landscape, buildings, local birds, and fish and other sea creatures. Only two other picture-books by Isak fra Igdlorpait are known to exist, both of which are in public collections in Europe.

The support of the Friends and the continued, dedicated work of the archive volunteers Deirdre Hanna, Michael Laughton, Sally Stonehouse and Lucy Lewis is gratefully acknowledged.

Naomi Boneham

Polar Record

Four issues of *Polar Record*, an internationally refereed journal of polar research for the sciences, social sciences and humanities, were published by Cambridge University Press during 2008. Twenty-five articles appeared in the year along with eight notes, twenty-seven book reviews and other contributions, including six obituaries. No fewer than fifty-seven academic referees were consulted during the peer-review process which each contribution goes through prior to acceptance and, for their input towards making the journal a success, the Institute is most grateful. The number of submissions for publication is increasing significantly, no doubt partly because of the journal's ISI status, received in 2006. This status means that each published paper is now included in the Science Citation Index.

Ian R. Stone (Editor)

SPRI Website

Usage of the SPRI website continues to grow, as more material is added. Various sections of the site were upgraded during 2008, due particularly to the increased activity of the Museum, Library and Archives. The Museum section of the website was overhauled, with more information on the many exhibitions now taking place. The Picture Library catalogue was also launched, starting with a collection of modern photographs (www.spri.cam.ac.uk/library/pictures); these will shortly be supplemented with images that have entered the catalogue as part of the Freeze Frame project. The Friends of SPRI have also developed their web pages further. The coming year will see more catalogued items appearing online.

Martin Lucas-Smith

Teaching, Learning and Understanding

University Teaching

Academic members of the Institute's staff coordinate and participate regularly in undergraduate lecture courses in the departments of Geography, Physics and Social Anthropology. Undergraduate supervisions are also provided to students in many colleges. Members of our staff are Fellows of Christ's, Downing, Jesus, New Hall, St. Catherine's and St. John's colleges. Our M.Phil. course in Polar Studies has academic strands in Physical Sciences and in Social Science and Humanities, and staff also contribute to other M.Phil. programmes taught in the Department of Geography. We have twenty or so doctoral students, registered to study topics which range from geophysical studies of glaciers and ice sheets to the nature of Inuit society. Each student is nested within one of our research groups, providing a strong and integrated research culture.

Julian Dowdeswell

SPRI Polar Museum

The Museum was notified of the success of its Stage 2 bid to the Heritage Lottery Fund in December 2008, with an award of £994,500, bringing the total granted to the project to £1.04 million. Following his work on the development of the project bid, Robert Smith agreed to continue as Museum Project Manager, to coordinate with Claire Gresswell and William Daykin from Blue, the design company, Hilary Glegg, the University Architect and the team from Estates Management. We will begin in Spring 2009, renovating the galleries and archive strong room and building a new museum store and curatorial spaces. Work is projected to finish in 2010. Institute staff continued to develop plans for the permanent displays on the science and history of the polar regions, in conjunction with scientists from the British Antarctic Survey.

The Museum mounted a series of temporary exhibitions during the year, including *First Across: the 1955-58 Commonwealth Trans-Antarctic Expedition* (17 January - 26 April 2008) which put a selection of SPRI's extensive CTAE archive on display alongside material kindly loaned by Peter Fuchs; and *South Georgia: A Centenary of Good Government* (17 July – 24 September 2008), arranged in conjunction with and sponsored by the South Georgia Association. This latter exhibition was subsequently toured and was on display at Discovery Point, Dundee, to coincide with the visit of the Princess Royal. The final exhibition planned before the closure of the Museum, *Nimrod*, an exhibition celebrating the centenary of Shackleton's British Antarctic Expedition 1907-1909, opened on 21 October 2008. On display have been diaries from expedition members, including Raymond Priestley, Alfred Cheetham and Shackleton's personal diary for the South Pole journey, which had its pages turned each week to allow visitors to follow in his footsteps. This exhibition will continue until April 2009.

In addition, exhibitions of art and photography were presented in the Foyer Gallery including *Ships & Shoes & Snow Goggles*, paintings and sketches by Vincent Alexander Booth (12 January - 15 March 2008); *Melt Down: The Changing Arctic* - photography by Louise Murray (20 March – 17 May 2008); etchings from the international travelling exhibition *Breaking the Ice: Works from the Antarctic by Jörg Schmeisser* (30 May – 19 July 2008); Nanoq – photographs by Snæbjörnsdóttir/Wilson (13 May - 30 August 2008); *Face to Face: Polar Portraits* – historic photography from the SPRI collections with modern portraits from leading expedition photographer Martin Hartley (25 July - 13 September 2008); etchings and paintings from the polar travels of *Chris and Vikky Furse* (18 September - 8 November 2008); *Maybe Tomorrow / Immaqa Aqagu* – photography by Tiina Itkonen (9 September – 8 November 2008) and *Glacial Shift: Drawn to the Alps* – recent drawings and prints by Emma Stibbon (13 November 2008 – 10 January 2009).

Touring exhibitions included *Face to Face*, on display at the Shackleton Study School in Athy, Ireland (24 October - 21 November 2008). The book to accompany the exhibition, *Face to Face: Polar Portraits* by Dr Huw Lewis-Jones, was also launched in November.

Over 15,500 visitors were recorded in 2008. Rosalyn Wade continued to build on the Museum's very effective educational outreach programmes as Schools' Liaison Officer. As this aspect of the work continues to grow, some of the duties of managing the Museum Shop have been taken on by the Institute's Senior Clerk, Maria Pearman. There were 67 separate school visits during the year, with 1,950 pupils of all ages visiting the Museum. Four further family events were held, including craft sessions for younger children. The Museum again participated in national initiatives such as the Big Draw, this year with the assistance of artists Vikky and Chris Furse. The "To the ends of the Earth" polar activities in Science Week also attracted many new visitors to the Museum, and the Twilight and Summer Trail events again proved very popular. The SPRI Museum and the IPY worked together to host a special "Above the Poles" event, connecting pupils of all ages with polar experts around the world, including a live connection to Antarctica. At SPRI, pupils were at the heart of this event, meeting and talking to

local polar scientists face to face, asking questions, and exploring polar equipment in the museum.

Acquisitions during the year included a model of *Nimrod* made by Wyndham B. Williams to 1:72 scale, for which the Friends made a contribution towards the cost of materials. A group of geological samples from the South Shetland Islands and the Shackleton Range, Antarctica, was kindly gifted by Peter Clarkson. We also received a narwhal tusk modified for use as a harpoon, possibly dating from the Franklin search era, a bequest from the late Robert Moss; two IGYE sledging ration boxes donated by William Bellchambers and a group of items of whaling paraphernalia recovered by the British Army Antarctic Expedition, relating to the wreck of the *Gouvernøren*, a whaling ship run aground in 1916, in Svend Foyn Harbour. Mr David Williams gifted ten outstanding pieces of Inuit sculpture to the collection, as well as a narwhal tusk in exceptional condition and a painting by Keith Shackleton. We are also grateful to Mr John D. Harper and the Rev. Stuart Burns, who each donated tupilaks which were brought back from north-east Greenland by Stephen Pitt, who travelled aboard H.W. Tilman's vessel *Mischief*.

During the summer the Institute purchased, with assistance from the Friends, the Quintin Riley collection, comprising of diaries, letters, photographs and expedition equipment, including a wonderful group of cameras and accessories. The material covers both the British Graham Land Expedition, 1934-1937, and Riley's Arctic expeditions. A small section of the material deals with his involvement with the John Mills film *Scott of the Antarctic*.

Huw Lewis-Jones began a 20-month project funded under the Collecting Cultures scheme by the Heritage Lottery Fund. The £200,000 grant is for the improvement of and research into SPRI's Inuit art collections. Library Assistant, Mark Gilbert, who has a particular interest in the subject, has been seconded to this project for one day a week. His post will be covered by Mrs Ann Keith.

Two new sections of our online Museum catalogue were prepared during the year. Dr Janet West provided invaluable advice and assistance on the Scrimshaw collection, providing the descriptions and overseeing photography by Don Manning. The second group of materials form the catalogue of SPRI's Polar Art collection, which has been compiled by Dr Huw Lewis-Jones, with the aid of a grant from the Arts and Humanities Research Council. In the process, several hundred paintings and sketches have been identified and described. The catalogue also incorporates images of all 1100 of Edward Adrian Wilson's works from the SPRI collection.

The Museum loaned a range of material to external bodies. The whaling equipment donated by the British Army Antarctic Expedition (2001-02) was displayed for a celebration of the Expedition's achievements at the Painted Hall in Greenwich, an event attended by HRH The Prince of Wales. Items from the Wordie expeditions of the 1930s were exhibited at the Cambridge University Museum of Archaeology and Anthropology. At the request of the National Maritime Museum Cornwall, further items from Shackleton's Imperial Trans-Antarctic Expedition were loaned for display. The mid-19th century model baidarka from the Aleutian Islands, Alaska, was loaned for an exhibition entitled "Smoking coasts and ice-bound seas: Cook's voyage to the Arctic" held at the Captain Cook Memorial Museum, Whitby.

The Museum gratefully acknowledges the help given by its volunteers, who contribute so much to collections care. Bryan Lintott, who has extensive museum management experience in his native New Zealand, volunteered for one day per week to assist with the redevelopment project. Mrs Jennifer Hirsh continued to provide advice as Honorary Curator. Jack Williman helped with the continuing inventory project and Janine Lettau joined us to assist with photographic cataloguing and the development of a marketing strategy for the new museum.

Heather Lane

Projecting the Significance of the Polar Regions

Institute staff have continued to be involved in the wider projection of polar research in the Arctic and Antarctic through, for example, media work, public lectures and visits by schools to our polar museum. Staff made appearances on both radio and television, including BBC and ITV news programmes. Views and quotations on polar topics, many of which include an emphasis on polar environmental change issues, have also appeared in broadsheet newspapers and journals at home and abroad, including *The Times, The Independent, The Guardian* and the Sunday broadsheets. Several staff have given external talks at primary and secondary schools, in addition to academic seminars at British and foreign universities. Our regular series of Saturday evening Public Lectures, organized by Celene Pickard, also attracts audiences of up to 100. The Museum hit the headlines in January when two fragile chalk drawings of penguins, sketched by Captain Robert Falcon Scott and Sir Ernest Shackleton were rediscovered in a SPRI basement store. The penguins came to SPRI in 1998, through William Mills, having been rescued from a basement in Manchester in the 1930s, where they were originally drawn during lectures at Owens College. The Cave family, who donated the boards, visited to Institute later in the year.

Julian Dowdeswell

Expedition Support: Gino Watkins Memorial Fund

The Fund, under the joint trusteeship of the University of Cambridge and the Royal Geographical Society, provides 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 £8,500. The members of the Committee who served during the year were Mr. D. Fordham (Chair), Dr. P. Adams, Dr. I. Campbell, Mr. R. Crabtree, Dr. L. Craig, Dr. K. Crosbie, Professor J.A. Dowdeswell, Dr. D. Goodman, Dr. M. Humphreys, Professor M. Lea, Mr. J. Muston, Professor R.C. Schroter, and Dr. M. Tinsley.

The Committee made the following awards for 2008, from the Gino Watkins Fund and the Arctic Club:

Gino Watkins Memorial Fund

Greenland East Coast Kayak Base	£1,500
Arctic Voice Expedition 2007-08	£1,000
Queen Elizabeth II High School Expedition to West Greenland 2008	£1,500
Svalbard Summer 2008	£1,000
British 2008 Tasermiut Fjord Expedition	£1,500
Greenland Renland Expedition (including £500 Arctic Club Award)	£1,500
Swansea University's Summer Science Exhibition (Polar science)	£ 250

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 polar regions, and are members of the editorial boards of a number of international journals. These include:

- UK Delegate to the Council of the International Arctic Science Committee (IASC)
- Head of the Glaciers and Ice Sheets Division of IUGG International Association of Cryospheric Sciences (IACS)
- Member of the UK Antarctic Place-Names Committee
- Three members of UK International Polar Year Committee
- Member of the International Arctic Social Sciences Association (IASSA) International Polar Year Taskforce
- UK representative on the International Arctic Science Committee (IASC) working group on Arctic Glaciers
- UK Delegate to the Arctic Ocean Sciences Board (AOSB)
- Treasurer, International Glaciological Society
- UK Delegate to the International Science Initiative for the Russian Arctic
- Member of the international steering group for the Tundra-Taiga Initiative
- Chair of Scientific Committee, BOREAS Programme of Arctic Humanities and Social Science Research, European Science Foundation
- Chair of Scientific Committee, Forward Look on Religion and Belief Systems, European Science Foundation
- Permanent UK representative of the Association of Marine Mammal Hunters of Chukotka
- Trustee, Sutasoma Trust
- Chair, Polar Libraries Colloquy
- Editorial Board members: *Polar Record, Transactions of the Royal Society of Edinburgh, Ethnology and Anthropology of Eurasia, Anthropology and Archaeology of Eurasia, Earth's Cryosphere, Cultural Geographies, Worldviews: Environment, Culture, Religion.*

International Glaciological Society

The International Glaciological Society (IGS) is based at the Institute. Its aim is to serve the worldwide community of glaciologists by publishing activities, organization of symposia and actively promoting the exchange of information and ideas on all aspects of snow and ice. 2008 again saw a record number of paper submissions to the *Journal of Glaciology*. This is the third year in a row we have broken the previous year's record. In total, 153 submissions were received, 43% above the 1993-2007 average. This increase in submission prompted the IGS Council to agree to publish a fifth issue in 2008 instead of the normal four. The average time between submission and publication remains well within a year. During 2008, the IGS also published three issues of ICE, its news bulletin, and three volumes of the *Annals of Glaciology*. Two symposia wer organised in 2008, the International Symposium on Radioglaciology, held in Madrid, Spain, in June and the International Symposium on Dynamics in Glaciology, held in Limerick, Ireland, in August. We also organized two workshops; one on 'Mass Balance Modelling and Measurements', held in Skeikampen, Norway in March and one on 'World Glacier Monitoring' in Lanzhou, China in September. Details on the IGS and its activities are available from its website (www.igsoc.org), hosted by the SPRI.

Magnús Már Magnússon (Secretary General)

Scientific Committee on Antarctic Research (SCAR)

SCAR and IASC (International Arctic Science Committee) arranged the first joint SCAR/IASC Open Science Conference in St Petersburg from 8-11 July 2008. The topic was: "*Polar Research – Arctic and Antarctic Perspectives in the International Polar Year*". There were 1150 attendees, and 1068 presentations (526 oral and 542 posters). The conference was part of the 30th SCAR meeting and took place in SCAR's 50th Anniversary year. It was preceded by three days of scientific business meetings of SCAR's various science groups, and followed by a 3-day meeting of the SCAR national delegates.

All five of SCAR's major Scientific Research Programmes (SRPs) were peer-reviewed externally during the year. A new SRP on Astronomy and Astrophysics in the Antarctic (AAA) was approved for funding in 2010. Three SCAR medals were awarded: to Vladimir Kotlyakov (Russia) for Antarctic Science; to Angelika Brandt (Germany) for Antarctic Research; and to Claude Lorius (France) for International Scientific Coordination. Four SCAR Fellowships were awarded to young scientists from Canada, New Zealand, Italy and Hungary. In addition, SCAR and IASC together agreed to co-sponsor the new Association of Polar Early Career Explorers (APECS), which now has 1,500 members from around the world.

SCAR has led the development of a network of the four main bodies of the International Council for Science (ICSU) that are concerned with research in the polar regions and/or the cryosphere. SCAR works closely with IASC on bipolar issues of common interest. Together with the World Climate Research Programme (WCRP) and IASC, SCAR is co-sponsoring the Climate and Cryosphere programme (CliC). SCAR and IASC have also signed an agreement with the newly formed International Association for Cryospheric Sciences (IACS) of the International Union for Geodesy and Geophysics (IUGG). Creation of this four-component network will help to ensure effective coordination of polar scientific research.

SCAR contributes scientific advice to the Antarctic Treaty Parties, and participated in the annual Antarctic Treaty Consultative Meeting and associated Committee on Environmental Protection meeting, which took place together in Kiev in June. SCAR presented 3 Working Papers and 5 Information Papers. Finally, there were on average 130,000 hits per month on the SCAR web site for 2008, continuing the pattern of year-on-year increases.

Colin Summerhayes (Executive Director)

Fundraising and the SPRI Appeal

Friends of the Scott Polar Research Institute

The Friends' sledging activities in Norway during 2008 raised record sums exceeding £80,000. This extraordinary generosity has enabled the Friends to meet their match funding commitments to the Institute in support of Heritage Lottery Fund grants for both the Museum redesign and refurbishment project and the expansion of the Institute's Inuit art collection. The sledging programme has given rise also to some further polar-orientated efforts by those who took part. Bob Russell (2007 sledger) is leading his own private trek to the North Pole in April 2009 and, at the other end of the globe, Angie Butler has recently made and installed a bronze plaque in the Church on South Georgia to the memory of Frank Wild, RNVR, CBE, FRGS who accompanied Ernest Shackleton on no less than five polar expeditions.

The Lent and Michaelmas term lecture series was well attended and covered a wide range of topics. We were delighted to welcome the South Georgia Association in February when we enjoyed an evening of films of the activities at the station during its heyday. Other topics included the Museum's expansion plans, Tom Crean, Kayaking in the Antarctic Peninsula and Dr Mike Stroud's 'From Ice to Dust'; an illuminating insight into extreme suffering in polar and desert climates. In November, Friends and guests were treated to a revival of an 1830s art form, the toy theatre, with a production of 'Captain Ross or the Hero of the Arctic Regions'.

In July 2008 Wendy Driver was elected Vice Chairman of the Friends and has rejoined our committee. We also welcome Gloria Ward. Gloria brings great expertise in the travel industry and we look forward to her insights. At the same time we welcome Duncan Lawie whilst saying farewell and thank you to Pauline Young and Paul Davies. Pauline remains very much involved, however, as does David Wilson, who has rejoined our committee as Scott Centenary coordinator at the Institute.

Finally, I must record my and the Committee's thanks to Celene Pickard, PA to the Friends. This role is ever more important as we develop more sophisticated fund-raising tools. I am also most grateful to all the members of the committee and to the staff at the Institute for their dedicated support over the year.

Robin Back
(Chair, Friends of the Scott Polar Research Institute)

The Friends 2008 sledging team in Norway with dogs

The Great Ice Barrier looking east from Cape Crozier by Edward Wilson

SPRI Appeal

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 an 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.

Funding is being sought for several purposes. We need to raise £700,000 towards the redesign and refurbishment of our Polar Museum under the theme of 'Exploration into Science'. This sum represents matching support for the £1 million Heritage Lottery Fund Stage 2 grant which was awarded in December. In addition, we wish to endow academic posts, and especially a Professorship in the field of polar environmental science. We are also working to enhance the future development of the Institute's Archives and Polar Library. Our highest priority in this area is to provide permanent security for the important post of Institute Archivist, which has until now been supported by a series of short-term grants - an inherently unstable position.

Particular thanks are due to Sir Humphry Wakefield and William Stancer for their continuing support of the Appeal.

Further information on the Appeal is available from the Director, Professor Julian Dowdeswell (director@spri.cam.ac.uk; 01223-336541).

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Printed in Great Britain by Piggott Black Bear (Cambridge) Lmited