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SCAR Annual Report 2007-2008

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1. Acronyms

Executive Summary

The Scientific Committee on Antarctic Research (SCAR) is the foremost, non-governmental organisation for initiating, developing, and coordinating high quality international scientific research in the Antarctic region, including the study of Antarctica's role in the Earth System. SCAR adds value to research conducted by individual nations by facilitating and encouraging researchers to extend beyond their programmes and to partner with other colleagues worldwide that have similar or complimentary research interests. Collectively, SCAR programmes can often accomplish research objectives that are not easily obtainable by any single country, research group, or researcher.

Through its biennial Open Science Conference SCAR provides a forum for the community of polar scientists, researchers, and students to gather to report on the latest science, exchange ideas and explore new opportunities. SCAR also supports research Fellows and provides a broad range of data management and information products and services.

SCAR provides objective and independent scientific advice on the underlying scientific knowledge and principles necessary for the wise management of the Antarctic environment by the Antarctic Treaty Parties (through Consultative Meetings); the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR); the Commission for the Conservation of Antarctic Seals (CCAS), the Advisory Committee of the Agreement on Conservation of Albatrosses and Petrels (ACAP) and the Council of Managers of National Antarctic Programmes (COMNAP).

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; these include SCAR, the World Climate Research Programme (WCRP), the International Arctic Science Committee (IASC), and the newly formed International Association for Cryospheric Sciences (IACS) of the International Union for Geodesy and Geophysics (IUGG). Creation of this 4-component network will help to ensure that polar scientific research is effectively coordinated.

We are now in the International Polar Year (IPY) 2007-2009, to which SCAR is making a significant contribution through its scientific research programmes. In recognition of the importance of the IPY the SCAR Open Science Conference for July 8-11 2008 (St Petersburg, Russia) has been broadened to be the SCAR/IASC Open Science Conference, and has the theme "Polar Research – Arctic and Antarctic Perspectives in the IPY". The IPY Steering Committee has formally adopted it as the first of three thematic IPY conferences (the second will be in Oslo in June 2010 and the third in Canada in 2012). Planning for the conference, which has attracted almost 1400 registrants, has occupied much of the year.

SCAR leverages its limited resources by partnering with selected global science programmes, providing them with an Antarctic perspective. These include the World Climate Research Programme (WCRP), elements of the International Geosphere-Biosphere Programme (IGBP), the International Permafrost Association (IPA), the Global Ocean Observing System (GOOS), the Partnership for Observations of the Global Ocean (POGO), the Census of Marine Life (COML), the Global Biodiversity Information Facility (GBIF), the Scientific Committee on Oceanic Research (SCOR), and the Scientific Committee on Solar Terrestrial Physics (SCOSTEP).

During 2007, SCAR's research focused on five themes in Antarctic science: (i) the modern ocean-atmosphere-ice system; (ii) the evolution of climate over the past 34 million years since glaciation began; (iii) the response of life to change; (iv) preparations to study subglacial lakes and their environs; and (v) the response of the Earth's outer atmosphere to the changing impact of the solar wind at both poles. Highlights of scientific discoveries include:

1. A new medium depth (136 m) ice core has been drilled in a high accumulation site on the southwestern Antarctic Peninsula. It records a doubling of accumulation since the 1850s, with acceleration in recent decades. This rapid increase is strongly associated with changes in the regional meteorology – especially in the Southern hemisphere Annular Mode (SAM).

2. *Excess deuterium data from Dome A shallow ice cores show an increasing trend during the past ~4000 years, implying that the average moisture sources of Dome A in the southern hemisphere are moving equatorwards.*
3. *New marine geological data suggest the possibility of rapid and synchronous ice retreat from much of Antarctica's continental margin following the last glaciation, beginning about 11,500 years ago and lasting less than 1,000 years, which may be related to globally-relevant meltwater pulses.*
4. *The latest inventory of Antarctic subglacial lakes and aquatic environments has identified more than 160 features. The spectrum of subglacial environments provides a framework for comparing and contrasting lake environments enhancing our ability to test hypotheses about the origin, evolution, and significance of subglacial aquatic environments.*
5. *Tests of the extent to which auroral events in both hemispheres are joined together (inter-hemispheric conjugacy) have long showed that some auroral structures are synchronous and may even pulsate in tune (i.e. are conjugate). Recent observations with ground-based all-sky TV-cameras confirm this conjugacy but also show some non-conjugate auroras: (i) pulsating auroras in both hemispheres with different spatial appearance and period, and (ii) pulsating auroras in one hemisphere only.*
6. *A continent-wide analysis of biological distribution patterns provides many independent examples of long-term persistence and evolution within Antarctica, over timescales from the Pleistocene to Gondwana breakup, providing a new challenge and constraint to reconstructions of the history of ice on the continent.*

1. What Is SCAR (for further details see www.scar.org)?

The Scientific Committee on Antarctic Research (SCAR) is the principal non-governmental organization responsible for the international coordination of scientific research in the Antarctic region. SCAR is an Interdisciplinary Body of the International Council for Science (ICSU). ICSU formed SCAR in 1958 to continue coordination of scientific research in Antarctica that began during the International Geophysical Year of 1957-58. The need for such coordination has grown as the role of Antarctica in the global system has become apparent and continues unabated in the International Polar Year (IPY) 2007-2008, in which SCAR is playing a leading role. SCAR's Members currently include 34 nations and 8 of ICSU's Scientific Unions linking SCAR to a wide range of scientific activities.

SCAR aims to improve understanding of the nature and evolution of Antarctica, the role of Antarctica in the Earth System, and the effects of global change on Antarctica. Its main objective is to initiate, develop, and co-ordinate high quality international scientific research in the Antarctic region including studying the role of the Antarctic in the Earth system. To meet this objective SCAR carries out a comprehensive programme of coordinated scientific research that adds value to national research in the Antarctic by enabling national researchers to work together on large scientific questions.

In addition SCAR provides objective and independent scientific advice, as an official Observer, on issues of science and conservation affecting the management of Antarctica and the Southern Ocean, to four intergovernmental bodies having responsibilities in the Antarctic region:

- (i) the Antarctic Treaty System through the Antarctic Treaty Consultative Meeting (ATCM) and the Committee for Environmental Protection (CEP);
- (ii) the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), and its Scientific Committee;
- (iii) the Advisory Committee of the Agreement on Conservation of Albatrosses and Petrels (ACAP);
and
- (iv) The Council of Managers of National Antarctic Programmes (COMNAP)

2. SCAR Science

2.1 Major Scientific Research Programmes

Currently SCAR research is focused on five major Scientific Research Programmes (SRPs), each addressing key issues at the frontiers of science:

- Antarctica and the Global Climate System (AGCS), a study of the modern ocean-atmosphere-ice system;
- Antarctic Climate Evolution (ACE), a study of climate change over the past 34 million years since glaciation began;
- Evolution and Biodiversity in the Antarctic (EBA), a study of the response of life to change;
- Subglacial Antarctic Lake Environments (SALE), a study of lakes buried beneath the ice sheet;
- Interhemispheric Conjugacy Effects in Solar-Terrestrial and Aeronomy Research (ICESTAR), a study of how the Earth's outer atmosphere responds to the changing impact of the solar wind at both poles.

Project Implementation Plans are available at the SCAR web site. Advances in each programme in 2007-8 are summarized below. SCAR welcomes the involvement of scientists in these programmes (enquiries to info@scar.org).

Earth System Science tells us that all components of the earth are interconnected. To ensure the sort of cross disciplinary interactions that are essential to effectively addressing the most pressing and societal relevant

scientific questions in Earth System Science, strong links are fostered between SCAR's Scientific Research Projects; SCAR's Standing Scientific Groups; and other global programmes.

2.1.1 Antarctica In The Global Climate System (AGCS)

Antarctica in the Global Climate System (AGCS) is a cross-disciplinary science programme that focuses on three key aspects of climate change: (i) how does the modern climate system work in the Antarctic; (ii) how has it developed over roughly the last 10,000 years (i.e. outside the longer geological time frame addressed by the ACE programme); and (iii) producing improved estimates of how the climate of the Antarctic may evolve over the next century under different greenhouse gas emission scenarios. The results will be of value to a number of groups within SCAR, as well as to the Intergovernmental Panel on Climate Change (IPCC). For background to the programme see the web site: http://www.antarctica.ac.uk/met/SCAR_ssg_ps/AGCS.htm. AGCS and its sub-project are co-sponsored by the World Climate Research Programme (WCRP). Several IPY projects contribute to AGCS goals.

2.1.1.1 Progress

A number of advances were made during 2007. A paper was accepted for publication in the Journal of Geophysical Research that gave improved projections for how the climate of the Antarctic and Southern Ocean would evolve over the 21st Century. The work was based on the output of the models used in the Fourth Assessment Report of the IPCC and was reported as a SCAR highlight last year (Bulletin 163).

Another paper accepted by the same journal, is the first assessment of the circumpolar distribution of sea ice and snow thickness on the sea ice around Antarctica. The paper is derived from the SCAR Antarctic Sea Ice Processes and Climate (ASPeCt) climatology, which is based on ship observations from 1980 to 2005.

Regional changes in bottom water production have been discovered that have the potential to affect the ventilation of the global ocean abyss. The densest layers of the oceanic overturning circulation form in the Southern Ocean. An oceanographic section across the eastern Scotia Sea revealed significant variability in the deep and bottom waters. Warming (~0.1°C) of the warm mid-layer waters in the Scotia Sea between 1995 and 1999 reversed through to 2005, reflecting changes seen earlier upstream in the Weddell Sea. The volume of deep waters with potential temperature less than 0°C decreased during 1995-2005. Entry of the abyssal waters to the eastern Scotia Sea changed from the south to the northeast between 1995 and 1999, then back to the south by 2005. These changes reflect inter-annual variations in the deep waters exiting the Weddell Sea, that are due to changes in the strength of the Weddell Gyre, and large-scale atmospheric variability that may include the El Niño/Southern Oscillation. These signals promulgate into the world ocean.

Exciting new data on snow accumulation, temperature and ice thickness have been obtained from Dome A. Excess deuterium data from Dome A shallow ice cores show an increasing trend during the past ~4000 years, implying that the average moisture sources of Dome A in the southern hemisphere are moving equatorwards. A deep ice core collected here could provide a climate record extending back more than a million years.

A new medium depth (136 m) ice core has been drilled in a high accumulation site on the southwestern Antarctic Peninsula. Its record reveals a doubling of accumulation since the 1850s, from a decadal average of 0.49 m (water equivalent) per year in 1855–1864 to 1.10 m per year in 1997–2006, with acceleration in recent decades. This rapid increase is the largest observed across the region. It is strongly associated with changes in the regional meteorology – especially the Southern hemisphere Annular Mode (SAM).

AGCS has been involved in a number of successful field campaigns, many of which contribute to IPY:

- Traverse to Dome-A as part of the Chinese IPY programme, PANDA, measuring ice layers, bedrock, snow accumulation rates and ice flow;
- Ice cores collected near Maîtri station as part of the Indian ITASE (2006-2007) collaborative programme;
- Joint Brazilian-Chilean-US ice core drilling on the Detroit Plateau, Antarctic Peninsula, as part of the Climate of the Antarctic and South America (CASA) programme;
- The US ITASE team completed their second traverse to the Pole on 24 December 2007;

- The Norwegian – US Scientific Traverse of East Antarctica involved scientific investigations along two overland traverses in East Antarctica.
- The Australian Sea Ice Physics and Ecosystem eXperiment (SIPEX) and the US Sea Ice Mass Balance of Antarctica (SIMBA) campaigns aimed to improve understanding of the physics, biology and biogeochemistry of the sea ice. The Geoscience Laser Altimeter System (GLAS) aboard NASA's ICESat satellite was turned on for 33 days to coincide with the field campaigns to calibrate and validate satellite data.

Good progress has been made in preparing the SCAR Antarctic Climate Change and the Environment (ACCE) review document. A draft of the review will be presented to the SCAR Delegates in Moscow. As part of this exercise a major paper on the State of the Antarctic and Southern Ocean Climate System (SASOCS) has been prepared and is under revision for Reviews of Geophysics.

The Australian Antarctic Data Centre has made good progress in establishing a sea ice data portal for *in situ* sea ice data, as recommended by the International Workshop on Antarctic Sea Ice Thickness, co-sponsored by SCAR in Hobart in July 2006. SCAR funded a student to source and enter data from almost 150 files from various national programmes. This stimulated funding from Australia to develop the data portal.

AGCS led organisation of the Second Workshop on Recent High Latitude Climate Change (Seattle, USA; 22-24 October 2007), a joint effort with IASC and the WCRP/SCAR/IASC Climate and the Cryosphere (CliC) project that considered atmospheric, oceanic and cryospheric changes that had taken place during the last 50 years in the Arctic and Antarctic. A report on the meeting will appear in the scientific literature. A workshop, jointly organised with CliC, on Global Prediction of the Cryosphere, was held at the British Antarctic Survey in October 2007. The meeting reviewed our ability to predict the evolution of various aspects of the cryosphere over the coming century. A symposium on Antarctica and the Global Climate System was held at the European Geosciences Union General Assembly in Vienna, Austria in April 2007. The second issue of the AGCS Newsletter 'Notus', edited by Dr. Mike Meredith, was issued in July 2007.

2.1.1.2 Plans

1. Complete drafting the ACCE review for the SCAR Delegates meeting in July 2008.
2. Support continuous ice-core drilling at Dome-A during IPY and beyond.
3. Support long-term monitoring of meteorology and ice/air interactions along the Zhongshan-Dome A traverse route.
3. Hold a workshop on driving cryospheric models with high-resolution atmospheric data.
4. Hold an ITASE Synthesis Workshop in September 2008.

2.1.2 Antarctic Climate Evolution (ACE)

The Antarctic ice sheet began forming near the Eocene-Oligocene boundary 34 Ma ago. Its considerable fluctuations have been one of the major driving forces for changes in global sea level and climate to the present time. ACE is collecting and analysing geological data from selected time periods and integrating them with the results of advanced numerical models to establish the origin of the present configuration of the ice sheet and to assess the rates at which it grows and decays over time, as the basis for improving forecasts of the behaviour of the ice sheet, and hence sea-level, through time.

2.1.2.1 Progress:

ACE has now formed an official link to IGBP's PAGES programme, and is also an IPY project.

Aside from many papers in journals, ACE produced a new Special Issue of *Palaeogeography, Palaeoclimatology, Palaeoecology* on Antarctic Climate Evolution, which is now online at the Elsevier website and will appear as hardcopy early in 2008. This is the fourth such ACE contribution. It contains sixteen research papers based on presentations at the ACE sponsored EGU meeting in Vienna (April 2006), and at the XXIX SCAR open Science meeting, Hobart, Tasmania (July 2006). ACE also published an overview of its work in the journal *Antarctic Science*, and Florindo and Siegert are editing a book on Antarctic Climate Evolution for publication in 2008.

ACE has been much involved in scientific meetings. It supported many activities in the 10th ISAES Conference (Santa Barbara, California, August 2007), including a short course on Geoscience Modelling for Novices, and ten individual sessions and meetings. ACE also held a Special Session on Antarctic Climate Evolution at the 2007 INQUA meeting. In addition to the many ACE-themed sessions at the 2007 Fall meeting of the American Geophysical Union, ACE organized a Town Hall Meeting attended by 65 people. Interest was high, and several people volunteered for leadership roles on ACE groups.

ACE continues to stimulate or be involved in geological drilling. ACE supported a workshop to organise a 2008 proposal to the International Ocean Drilling Programme (IODP) for drilling in the Ross Sea, where focus is on the Cenozoic evolution of the West Antarctic Ice Sheet from Eocene to present. Plans for the IODP Wilkes Land drilling are moving ahead. Co-chief scientists have been nominated (Carlota Escutia from ACE and Henk Brinkhuis), the pre-cruise meeting between the Operators and the co-chief scientists was held at College Station, Texas between 17 and 19 December 2007.

During the year, the ANDRILL (Antarctic Drilling) Project (IPY Project #256), which ACE supports, has made a major contribution to increasing the geological data set of Antarctic climate and ice sheet history for the past 20 million years. The project completed its first drill hole beneath the McMurdo Ice Shelf in January 2007. A record depth of 1284.87 metres below sea floor was reached. The recovered strata provide a record of ice shelf and climate history for the past 14 million years. The initial report is now in press as Volume 14, No. 3 of *Terra Antarctica*. ANDRILL's second season of drilling was completed in November 2007 with another record depth of 1138.54 m drilled beneath the sea ice of Southern McMurdo Sound. The recovered strata overlap with those from the first drill hole, and extend the record back to 20 million years.

Plans to undertake deep-field airborne radar surveying of the structure of the East Antarctic ice sheet have progressed, with a new ACE-focused programme emerging between the US, UK, Australia and New Zealand. The project will survey the ice sheet base across Dome C to the surrounding coastal regions in 2008. In addition plans were consolidated for the airborne surveying component (joint US-UK-Germany) of the IPY Project AGAP, which will be concentrated around Dome A in the 2008/09 field season.

An ACE Blog was established in August 2007 (www.antarcticclimate.blogspot.com), to complement the current ACE website (www.ace.scar.org), with posts on news, research updates, and events.

2.1.2.2 Plans

- (1) complete the ACE book to be published by Elsevier;
- (2) undertake deep-field airborne geophysics surveys;
- (3) contribute to the several major science meetings, including the SCAR Open Science Conference in St Petersburg, the International Geological Congress in Oslo, and the European Geosciences Union in Vienna;
- (4) reconfigure and update the ACE website;
- (5) publish the IODP Wilkes Land drilling Scientific Prospectus.
- (6) sponsor a graduate student to attend the Urbino School of Palaeoclimate.
- (7) plan the first ACE Open Sciences Conference (Granada, Spain, June 2009).

2.1.3 Evolution And Biodiversity In The Antarctic (EBA)

EBA aims to understand the evolution and diversity of life in the Antarctic, to determine how these have influenced the properties and dynamics of present Antarctic and Southern Ocean ecosystems, and to make predictions on how organisms and communities will respond to current and future environmental change. EBA integrates work on marine, terrestrial and limnetic ecosystems. By comparing the outcome of parallel evolutionary processes over the range of Antarctic environments, fundamental insights can be obtained into evolution and the ways in which life responds to change, from the molecular to the whole organism level and ultimately the biome level. Most national programmes individually cannot attempt a study on such a bold scale. EBA's role, as a non-science-funding umbrella or facilitator, is primarily one of connection, and encouragement of various research initiatives being undertaken towards the goals of EBA by a large number of projects, programmes and individuals covering very diverse areas of biology. To facilitate its work, EBA has established five Work Packages to cover its main areas of research (see below).

2.1.3.1 Progress:

EBA is both a SCAR and an IPY programme. Several other projects that contribute to EBA are themselves IPY endorsed projects such as CAML (Census of Antarctic Marine Life), MarBIN (Marine Biodiversity Information Network), Aliens, TARANTELLA[MSOffice1], MERGE, the Latitudinal Gradient Project, and ICED (Integrating Climate and Ecosystem Dynamics in the Southern Ocean). Of these, CAML, MarBIN and ICED are either SCAR activities or sponsored by SCAR. They are part of the list of some 40 national and international programmes contributing to EBA.

EBA's success is reflected in part in publications emerging from its scientific community, and totaled at least 159 peer-reviewed papers in 2007, including:

- IX SCAR International Biology Symposium - Evolution and Biodiversity in Antarctica. *Antarctic Science Special Edition Volume 19(2) 2007*. Eds E. Fanta, W. Arntz, W. Detrich, H. Kawall
- Antarctic Ecology: From Genes to Ecosystems. Part 1. Rogers, A.D, Murphy, E., Clarke, A., Johnston, N. (eds). *Philosophical Transactions of the Royal Society B. Vol. 363(1477), 2007*.
- Antarctic Ecology: From Genes to Ecosystems. Part 2. Rogers, A.D, Murphy, E., Clarke, A., Johnston, N. (eds). *Philosophical Transactions of the Royal Society B. 2007*.
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- Convey, P. 2007. Non-native species in the Antarctic terrestrial environment: presence, sources, impacts and predictions. “*Non-native species in the Antarctic*” *Workshop Proceedings, Gateway Antarctica, Christchurch, New Zealand*. de Poorter, M., Gilbert, N., Storey, B., and Rogan-Finnemore, M. (Eds.)
- Frenot, Y., Convey, P., Lebouvier, M., Chown, S.L., Whinam, J., Selkirk, P.M., Skotnicki, M. & Bergstrom, D.M. 2007. Biological invasions in the Antarctic: extent, impacts and implications. “*Non-native species in the Antarctic*” *Workshop Proceedings, Gateway Antarctica, Christchurch, New Zealand*. de Poorter, M., Gilbert, N., Storey, B., and Rogan-Finnemore, M. (Eds.)
- Convey P, Stevens M.I. 2007. Antarctic Biodiversity. *Science* 317(5846): 1877-1878.

EBA facilitates collaboration through workshops and conferences that maximize international and multidisciplinary involvement; in 2007 these included:

A MERGE workshop (Microbiological and Ecological Responses to Global Environmental Changes in Polar Regions), which was held[MSOffice2] during the International Conference on Cryogenic Resources of Polar Regions (18_21 June 2007, Salekhard, Russia) (www.ikz.ru/permafrost). A publication from NIPR Japan is being planned as an outcome of the meeting.

The Latitudinal Gradient Project (LGP; www.lgp.aq) workshop (Wellington, New Zealand, 2July 2007), which was held in conjunction with a conference celebrating 50 Years of New Zealand's involvement in Antarctica. The workshop explored the possibilities of comparing ecosystem studies along the Victoria Land coast with those along the Antarctic Peninsula.

A SCAR_MarBIN workshop (Bialowieza, Poland, June 2007), which examined the Admiralty Bay Benthos Diversity Database; the Arctic Ocean Diversity data system; a Data Management Protocol for CAML cruises; technology for georeferenced Barcoding of biological data; an Interactive Antarctic Field Guide; development of the Register of Antarctic Marine Species; and improvements to the web site.

EBA also contributed to (i) the International Workshop on Antarctic Biology: Critical Issues and Research Priorities for IPY (2007-2009) (Follonica, Italy, 7-9 June 2007), and (ii) the 10th International Symposium on Antarctic Earth Sciences (ISAES) (Santa Barbara, USA 26 August - 1 September 2007), where there was a joint EBA-ACE session.

Highlights from the different Work Packages include the following:

WP 1: Evolutionary history of Antarctic organisms: Synthesizing this data is a challenge that has been met in a recent paper by EBA participants (Convey et al. *Biological Reviews*, 2008), which describes the

evolutionary history of Antarctic organisms in the terrestrial realm from Gondwana to the present. Key results from this paper were highlighted in the 2006 annual report. Members of this EBA work package are contributing to the SCAR 'Antarctic Climate Change and the Environment' (ACCE) report.

WP2: Evolutionary adaptation to the Antarctic environment: Microorganisms in terrestrial habitats including lakes and ponds are studied to understand their evolutionary adaptation to Antarctic conditions. The IPY-MERGE project is making a key contribution. Several MERGE expeditions and projects are underway, including ones run by Poland, UK, Japan, Spain, Malaysia, Belgium and Brazil. Organisms studied include fungi, methanogens, cyanobacteria, bacteria and microalgal protists (particularly diatoms and green algae). MERGE is bipolar and includes Arctic projects.

WP 3: Patterns of gene flow and consequences for population dynamics: isolation as a driving force: There has been work on this topic in the Ross Sea Sector. Among terrestrial organisms the work targets rotifers, tardigrades, nematodes, terrestrial arthropods (springtails and mites), lichens and mosses. In the marine realm, New Zealand's RV *Tangaroa* has been collecting fish and invertebrate samples at several sites in the Southern Ocean. Studies are planned on patterns of gene flow in populations of amphipod crustaceans.

WP 4: Patterns and diversity of organisms, ecosystems and habitats in the Antarctic, and controlling processes: Much of the faunal work under this heading is being undertaken under the Census of Antarctic Marine Life (CAML) programme, which contributes to EBA (see CAML details, below). Various studies have shown that Antarctic benthic systems are not as stable as once thought, but that they are exposed to dynamic conditions and respond to environmental changes. We are trying to find out how, and what parameters limit the resilience of such systems. In shallow water, along the Western Antarctic Peninsula, studies are focusing on the response of assemblages or key species to disturbance by sea-ice and geographical shift. Deeper offshore communities are locally and regionally shaped by iceberg scouring, which can alter biodiversity. Other studies try to correlate biological and physical processes in the water column and sea-ice with higher trophic levels such as fish and benthos. Some assemblages show significant pelago-benthic coupling. Recent studies show that algae, krill and salps, which play a key ecological role as food for predators, respond sensitively to atmospheric and oceanic changes. Efforts continue to clarify the tolerance of assemblages to changes in food supply. Gradients are being investigated (e.g. from shallow to deep waters, or along latitudes) to detect ecological controls and changes over time. The ultimate objective is to predict the evolution of marine Antarctic ecosystems.

WP 5: Impact of past, current and predicted future environmental change on biodiversity and ecosystem function. This topic addresses ecological questions and theories related to the consequences of climate change and biological invasions in the subantarctic islands. Dispersal of invasive species is being investigated, their spatial dynamics are being monitored and rates of dispersal modeled. The vulnerability of endemic biota to biological invasions is being assessed, as is the effect of climate change on invasive species.

Census of Antarctic Marine Life (CAML)

CAML is in the midst of an extensive fieldwork phase, with coordination of research on 18 Antarctic voyages during IPY. Each addresses the central CAML and EBA themes of biodiversity and evolution in Antarctica (for detail see www.caml.aq). *Polarstern* is conducting the "SYSTCO" project to examine benthic pelagic coupling of the ecosystem to 5,000 m depth in the Weddell Sea. *Aurora Australis*, *L'Astrolabe* and *Umitaku Maru* will synchronise investigations for the East Antarctic survey "CEAMARC". *Humboldt* and *Ary Rongel* from South America are active around Admiralty Bay. *Tangaroa* has worked in the Ross Sea. Other vessels will be sailing soon. All biodiversity data will be submitted to SCAR MarBIN. An Education and Outreach scientist on each ship sends daily material to websites.

Seabird and mammal observations from tourist ships are now coming to CAML, following agreement with IAATO. The World Conference on Barcoding in Taipei in September 2007 provided directions and contacts for CAML's special DNA barcoding project, based at the British Antarctic Survey and Scott Polar Research Institute. Barcoding of Antarctic species is connected to the new POLARBOLI group based in Trondheim.

CAML is part of the global Census of Marine Life (CoML). CAML representatives attended the CoML All Programmes meeting in Auckland in November 2007 to strengthen collaboration with related projects on

Arctic biodiversity, zooplankton, seamounts, and nearshore and abyssal environments. CAML is preparing an Encyclopedia of Antarctic Marine Life as a contribution to CoML. CAML also participated in the Scientific Steering Committee meeting of CoML in Antarctica in mid February 2008.

GLOBEC and ICED

SCAR is a co-sponsor of IGBP's Southern Ocean GLOBEC (Global Ecosystems Dynamics) and ICED (Integrating Climate and Ecosystem Dynamics in the Southern Ocean) programmes, which also contribute to CAML, and thence to EBA. For ICED the challenge is to predict i) how the diverse Southern Ocean ecosystems will respond to climate change and ii) the impacts of marine ecosystem change on the Earth System. Climate related changes are already having a profound effect on the marine ecosystems (especially krill), parts of which are also commercially exploited. ICED brings together oceanographers, biogeochemists, climatologists, and ecosystem and fisheries scientists to generate unique circumpolar datasets, undertake coordinated field activities and develop models to address three key questions:

1. *How do climate processes affect the dynamics of circumpolar ecosystems?*
2. *How does ecosystem structure affect circumpolar ocean biogeochemical cycles?*
3. *How should ecosystem structure and dynamics be included in sustainable approaches to fisheries management?*

ICED will approach its challenges through three main areas of i) historical data synthesis, ii) fieldwork, and iii) model development. A project has begun with EUR-OCEANS to retrieve biological information from past Southern Ocean cruises, especially on the abundance and distribution of pelagic species - to build a more complete picture of the changing circumpolar ecosystem. ICED will integrate international fieldwork, to address gaps in coverage and knowledge. As a first step, a picture of Southern Ocean fieldwork is provided through the interactive ICED IPY fieldwork map on the ICED website (www.iced.ac.uk). This is designed to encourage communication and cooperation, and will help to develop coordinated field activities in future. ICED convened its first modeling workshop (Old Dominion University, Virginia, USA 16 - 18 April 2008) to begin to characterise the Southern Ocean food web across a range of species (microbes to cetaceans), trophic levels and geographical areas, so as to identify major gaps in knowledge and data availability, and to explore the issues in modeling the Southern Ocean ecosystem.

In part the success of EBA rests on the extent to which biological data can be maintained, archived and exchanged. For the most part this is achieved through the Australian Antarctic Data Centre, which hosts and maintains a Biodiversity Database (<http://data.aad.gov.au/aadc/biodiversity/>) that contains data on Antarctic and sub-Antarctic flora and fauna. The database started through EBA's predecessor, RiSCC, and is now EBA's main database, containing all of the collections of data that we are aware of in the public domain (see <http://data.aad.gov.au/aadc/biodiversity/collections.cfm>). EBA also relies on other databases that are coordinated by several of the individual projects and programmes that contribute to EBA, such as SCAR-MarBIN, MERGE, and the Southern Ocean Continuous Plankton Recorder Programme (SO-CPR). EBA has set up a portal within the Antarctic Master Directory, which allows access to metadata that contribute to EBA's aims. For more detail see the new EBA website at www.eba.aq.

2.1.3.2 Plans

1. EBA contribution to the Polar and Alpine Microbiology, Banff, Alberta, Canada, 11-15 May 2008;
2. An Antarctic Gradients workshop will be held at BAS, 19-20 May 2008;
3. EBA contribution to international workshop "The polar and alpine environments: molecular and evolutionary adaptations in prokaryotic and eukaryotic organisms", Naples, Italy, May 29th--30th, 2008;
4. Presentations at the SCAR Open Science Conference, St. Petersburg (July 2008);
5. Antarctic Gradients Open Workshop St Petersburg, Russia, 5 July 2008;
6. Extremophiles 2008; Cape Town, South Africa, 7-11 September 2008;
7. MARBEF, Valencia, November 2008;
8. Xth SCAR International Biology Symposium; Sapporo, Japan, 26 - 31 July 2009;
9. CAML papers for special volume of Deep Sea Research and a synthesis document entitled "The Status of Antarctic Marine Biodiversity".

2.1.4 Subglacial Antarctic Lake Environments (SALE)

SCAR's SALE programme continues to promote, facilitate, and champion international cooperation and collaboration to explore and study subglacial lakes and streams in Antarctica following appropriate standards of environmental protection. SALE is a recognized IPY programme under the auspices of the SALE-UNified International Team for Exploration and Discovery (SALE-UNITED) programme. For more details on SALE go the newly revised programme website at <http://scarsale.tamu.edu/>.

2.1.4.1 Progress

SALE facilitates partnerships and cooperation. Members of SALE are funded through their national programmes to conduct the science of SALE. As such, the achievements of SALE are a collaborative set of advances produced by a cohort of national efforts. Major new understanding and recognition of phenomena related to subglacial aquatic environments have advanced our understanding of Antarctica on a number of fronts during the past year. Since these environments have yet to be penetrated and sampled in a rigorous manner, SALE science and discovery is at the beginning of what will be many years of research and discovery. The following highlights three recent, major scientific advances in understanding subglacial aquatic environments. A complete bibliography of SALE related publications is provided at: <http://scarsale.tamu.edu/selected-publications>.

Subglacial accumulations of water are common features beneath thick ice sheets. In 2005, the second inventory of Antarctic subglacial lakes and aquatic environments was published, containing details (location, size, ice thickness) of 145 lakes, 68 more lakes than the previous inventory of 1996 (Siegert et al. 2005). Since this publication, several new lakes have been identified, bringing the total identified features to over 160. A third inventory is planned for 2010. It is expected that as aerial coverage by various types of survey techniques planned during the IPY improves, the number of recognized subglacial features would dramatically increase.

Outburst discharges of subglacial water have repeatedly occurred over geologic time and are an on-going process that influences the dynamics of the overlying ice. Satellite altimetry of the ice sheet surface has shown that a portion of the central East Antarctic ice sheet lowered by 2-3 m between 1996 and 1997, at the same time the ice sheet was elevated 1-2 m some 250 km away. The only feasible explanation for this observation is the rapid loss of 1.8 km³ of water from a subglacial lake, which flowed along the base of the ice sheet and into a series of other lakes. Similar observations have been made near the margins of West Antarctica. Significant fluxes of water are flowing beneath the Antarctic ice sheet producing an interconnected system of subglacial lakes. The consequences for subglacial lakes as habitable environments and for modifications to large-scale ice flow conditions are considerable. The expected pathways of subglacial water drainage have been calculated, revealing a coherent network of channel systems, feeding water from large upstream catchments into several large outlets. Through these hydrological systems it is plausible that subglacial water can flow from the interior of ice-sheets to the ocean. The landforms created by paleo-outbursts have been documented suggesting that these processes have been an important agent of morphologic change over geologic history.

A spectrum of subglacial aquatic environments exists. Subglacial aquatic environments occur in a range of geological settings suggesting that individual lakes may have differing origins and evolutions. Subglacial aquatic environments are not randomly distributed across the Antarctic continent, but occur in preferred locations. This suggests that the limnological conditions, the age, the source of founder microbes, the time of isolation and the extant microbiological inhabitants will vary from location-to-location. More than one classification system has been proposed. The recognition of a spectrum of subglacial lake types provides a framework for comparing and contrasting lake environments across the Antarctic continent, greatly enhancing our ability to test fundamental hypotheses about the origins, evolution, and significance of subglacial aquatic environments to the evolution of the Antarctic continent, its ice sheets and microbiota.

During the last year, SALE has:

- built a community through workshops, meetings, and sessions at scientific meetings;

- identified major scientific and technological goals for SALE research and exploration through active engagement of the community;
- provided a framework for the US National Academies report on environmental stewardship of subglacial aquatic environments;
- held regular meetings that serve as forums for the discussion of science and technology amongst national programmes; and
- educated the public through extensive and sustained coverage of SALE science in the lay and scientific press.

The SALE IPY Programme is SALE – the Unified International Team for Exploration and Discovery (SALE-UNITED) http://www.ipy.org/index.php?ipy/detail/sale_united/. Antarctica's Gamburtsev Province Exploration programme includes subglacial lake characterization. Subglacial aquatic environments are a target for exploration by the US-Norway Traverse 08-09. The number of SALE related publications in peer-reviewed journals is increasing each year. Lists of publications by year are maintained at the SCAR SALE web site <http://scarsale.tamu.edu/selected-publications>. The SALE Workshop organizers (Kennicutt and Petit) published an EOS front-page article in 2007 (EOS Transactions Vol. 88, No. 11, 13 March 2007, Pages 129, 131). Many important articles have been published in Science and Nature on various aspects of SALE science authored by SALE participants and collaborators during the last few years.

2.1.4.2 Plans

1. Future SALE meetings will focus on a major aspect of SALE science and a programme of invited speakers will be developed for each topic.
2. The outcome from each meeting will be given in a white paper and submitted for publication in a journal.
3. SALE will propose and organize sessions at all major earth and polar science meetings and venues.
4. There will be a subglacial aquatic environments session at the SCAR/IASC IPY Conference in St.Petersburg in July 2008.
5. An informal SALE dinner meeting will be scheduled in St.Petersburg in July 2008.
6. SALE sessions will be proposed for the AGU and EGU meetings in 2008/2009.
7. A SALE annual meeting will be held in 2009 (location to be determined).
8. Application has been made for an AGU Chapman Conference entitled "Exploration And Study Of Antarctic Sub-glacial Aquatic Environments", for 2010.

2.1.5 Inter-Hemispheric Conjugacy Effects In Solar-Terrestrial And Aeronomy Research (ICESTAR)

ICESTAR is creating an integrated, quantitative description of the upper atmosphere over Antarctica and of its coupling to the global atmosphere and the geospace environment. ICESTAR operates with 4 Thematic Action Groups (TAGs):

- TAG-A: Quantification of the coupling between the polar ionosphere and neutral atmosphere from the bottom-to-top and the global electric circuit;
- TAG-B: Quantification of the inner magnetospheric dynamics using remote sensing techniques;
- TAG-C: Quantification of the state of the upper atmosphere, ionosphere, and magnetosphere over the Antarctic continent and how it differs from the Northern hemisphere during a wide range of geophysical conditions;
- TAG-D: Creation and management of the data portal.

For details of ICESTAR plans and progress see <http://www.scar-icestar.org>.

2.1.5.1 Progress:

Like other SRPs, ICESTAR achieves much of its impact through workshops and conferences. Among these:

- ICESTAR had a dedicated session on "Solar Influence on Geospace as Determined by Hemispherically Conjugate Observations", in the Greenland Space Science Symposium (May 2007). Proceedings will be published, in 2008, in a special issue of Journal of Atmospheric and Solar-Terrestrial Physics, with the title "Transport in the Coupled Solar Wind - Geospace System seen from a High-Latitude Vantage Point".

- ICESTAR participated in the EISCAT workshop in Åland (Finnish Archipelago) to discuss results from the system of EISCAT incoherent scatter radars; the workshop was accompanied by a two-week summer school to teach students to use the radar facilities. Papers from the workshop will appear in a special issue of *Annales Geophysicae* in 2008.
- ICESTAR co-sponsored the polar Gateways Arctic Circle Sunrise 2008 meeting in Barrow, Alaska, 23-29 January 2008

ICESTAR's IPY programme is "Heliosphere Impact on Geospace", involving 29 international research groups from ICESTAR and the International Heliophysical Year communities. The project has three main themes: (i) Coupling processes between the different atmospheric layers and their connection with solar activity, (ii) Energy and mass exchange between the ionosphere, the magnetosphere, and the heliosphere, and (iii) Inter-hemispheric similarities and asymmetries in geospace phenomena.

ICESTAR is also developing a strong collaboration with the multidisciplinary IPY project POLENET (meteorology, glaciology, volcanology, seismology), which will build and maintain an extensive Antarctic network of dual-frequency GPS receivers. Data from the network will be invaluable for the ICESTAR-IPY community, which also maintains GPS receiver stations in the Antarctic for ionospheric research.

Selected scientific highlights that emerged during the year are as follows (for lists of papers and other highlights see <http://www.scar-icestar.org>):

Geospace-atmosphere coupling: Lightning during strong thunderstorms launches electromagnetic waves that propagate both in the wave-guide between the earth surface and ionosphere (spherics) and along geomagnetic field lines (whistlers). Whistlers can interact with radiation belt electrons and cause their precipitation into the atmosphere. Combined observations from VLF-antennas, lightning detection systems, and the DEMETER satellite show a causal relationship between lightning and electron precipitation events. Both data and models confirm the connection between the intensity of the electromagnetic waves and the fluxes of electrons in precipitation events [Inan, U.S., Piddiyachiy, D., Peter, W.B., Sauvaud, J.A., and M. Parrot: DEMETER satellite observations of lightning-induced electron precipitation, *Geophys. Res. Lett.*, doi:10.1029/2006GL029238, 2007]

Interhemispheric comparison studies: Tests of the extent to which auroral events in both hemispheres are joined together (inter-hemispheric conjugacy) have long showed that some auroral structures are synchronous and may even pulsate in tune (i.e. are conjugate). Recent observations with ground-based all-sky TV-cameras confirm this conjugacy but also show some non-conjugate auroras: (i) pulsating auroras in both hemispheres with different spatial appearance and period, and (ii) pulsating auroras in one hemisphere only. [Watanabe, M., Kadokura, A., Sato, N., and T. Saemundsson, Absence of geomagnetic conjugacy in pulsating auroras, *Geophys. Res. Lett.*, doi:10.1029/2006GL030469, 2007].

Arctic and Antarctic polar winter NO_x: GOMOS satellite nighttime observations of middle atmosphere NO₂ and O₃ profiles during recent polar winters in the Arctic and Antarctic have been used to study the relation between energetic particle precipitation and downward transport of polar NO_x. NO_x is commonly enhanced when there are high levels of high-energy particle precipitation and/or geomagnetic activity. In the Arctic winter of 2005–2006 the NO_x enhancement was higher than expected from the geomagnetic conditions, indicating the importance of changing meteorological conditions. [*Geophys. Res. Lett.*, 34, L12810, doi:10.1029/2007GL029733, 2007].

2.1.5.2 Plans

ICESTAR will be involved in organising or participating in several workshops or conferences, including:

1. The Third International Workshop on Riometry (June 22, 2008, Zermatt Resort in Midway, Utah); [Riometers are an important tool for space science and space weather];
2. SCAR/IASC Open Science Conference (St Petersburg July 2008);
3. Winter 2008 ICESTAR-IHY-IPY meeting;

2.2 Specific SCAR Research Areas

2.2.1 Life Sciences Group

The Standing Scientific Group for the Life Sciences (SSG-LS) is responsible for a number of activity areas aside from EBA and SALE (above).

(i) **Seabirds:** Members of this Group continue to provide advice regarding the nomination of Specially Protected Species status for the Southern Giant Petrels. Trends in the population of this species will be examined at a workshop in Cambridge, UK, in May 2008, under the aegis of SCAR's Standing Committee on the Antarctic Treaty, to determine what advice to provide to Treaty Parties. The Group continued to work with BirdLife International to define Important Bird Areas in the Southern Ocean region, and continued its assessment of the potential impact of flipper banding on penguins. The Chief Officer of the Group, Dr. Eric Woehler, resigned in 2007. Appointment of a successor was postponed pending the outcome of discussions on the possibility of merging with the Expert Group on Seals (see iii below). With the resignation of the Chief Officer, SCAR's representation on the Advisory Committee on Albatrosses and Petrels (ACAP) became temporarily vacant.

(ii) **Seals:** This Expert Group produced an update on the progress and products of the Antarctic Pack Ice Seals (APIS) programme, which was presented at the 2007 ATCM Meeting, and posted on the SCAR website (<http://www.seals.scar.org/>). In addition, a White Paper on the status of knowledge of the biology, distribution and abundance of the Ross Seal, which militates against the removing of the species from the list of Specially Protected Species in Appendix A to Annex II of the Environmental Protocol, was tabled. A new research programme is being designed to understand the role(s) of top predators in the Southern Ocean. It will integrate long-term studies with new animal-borne instrument technologies for the study of water masses, behaviour and movement patterns.

(iii) **Higher Predators:** Following the advice of the July 2007 meeting of the Executive Committee, the Life Sciences SSG continued preparing a plan for merging the Expert Groups on Birds and Seals to form a new Expert Group on Higher Predators. The plan will be discussed during meetings of the two Expert Groups in St Petersburg, Russia (July 2008), and by the Delegates to XXX SCAR in Moscow in July 2008.

(iv) **Human Biology and Medicine:** This Expert Group now has annual meetings with the Medical Network (MEDINET) group of COMNAP (Council of Managers of National Antarctic Programmes). A full merger of the two groups has still not been effected, but combined meeting is an essential first step on this route.

(v) The Action Group on Continuous Plankton Recorder Research (CPRAG) was formed during the SCAR XXIX meeting in Hobart 2006 and started its activities in 2007. It supports and develops the SCAR Southern Ocean CPR Survey based at the Australian Antarctic Division. The CPR Survey maps the biodiversity and distribution of plankton, including euphausiid (krill) life stages, and then uses the sensitivity of plankton to environmental change as early warning indicators of the health of the Southern Ocean. CPRAG's members include representatives of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), and the Sir Alister Hardy Foundation for Ocean Science, which leads the northern hemisphere CPR surveys. The data set holds more than 100,000 records for about 200 zooplankton species from the Scotia Arc east to the Ross Sea. The SO-CPR Survey contributes to the Census of Antarctic Marine Life, with a circum-Antarctic CPR survey conducted from at least 10 vessels.

(vi) SCAR continued its co-sponsorship of both the Southern Ocean programme of the Global Ocean Ecosystems Dynamics (GLOBEC) project of the International Geosphere-Biosphere Programme (IGBP), and of a new programme by the name of Integrated Climate and Ecosystems Dynamics (ICED), which is also part of IGBP. ICED set up a web site (<http://www.antarctica.ac.uk/Resources/BSD/ICED/index.htm>) and circulated a draft science plan for comment.

(vii) In 2008 SCAR obtained Associate Participant status in the Global Biodiversity Information Facility (GBIF). SCAR will be involved in the governing of GBIF and in implementing GBIF's goals and work plan. Bruno Danis (Belgium), manager of the SCAR-MarBIN data network, will represent SCAR in the GBIF

Governing Board, and Dave Watts, (Australia), in charge of the management of the EBA Antarctic Biodiversity Database, will represent SCAR in the GBIF Participant Node Managers' Committee.

(viii) In the wake of the sinking of the MV Explorer on 23 November 2007, SCAR decided to create an Action Group on Antarctic Fuel Spills (AGAFS). AGAFS stands ready to address issues that might arise related to the fate and effects of fuel releases in Antarctica. The group is tasked with responding when specific advice is requested. In this context the group will operate as an executive committee directing, facilitating and coordinating responses. Its activities will be largely quiescent until a specific need arises. Responses might include a white paper on selected topics, compilations of biological resource data for an affected geographic location, convening of a workshop of experts, and/or provision of contact information for experts as examples.

(ix) Planning for the 10th SCAR Biology Symposium (26 – 31 July 2009), which will be held at Hokkaido University, Sapporo, Japan, began in 2007. Japanese colleagues established a Local Organising Committee chaired by Dr. Mitsuo Fukuchi of the National Institute for Polar Research.

2.2.2 Geosciences Group

The Standing Scientific Group for the Geosciences (SSG-GS) contains several Expert and Action Groups aside from the Scientific Research Programmes ACE and SALE.

(i) The 10th SCAR International Symposium on Antarctic Earth Science (ISAES-X) was held on August 26-31, 2007, at the University of California, Santa Barbara, USA. This is the tenth in a series that is repeated at a different location every 4 years. It is a highlight of the activities of the SSG-GS and a key recurring event for Antarctic Geoscientists. The Proceedings “Antarctica: A Keystone in a Changing World” can be ordered from the National Academies Press (USA). Detailed description and summary of the event is available on the SCAR SSG-GS web page <http://www.scar.org/researchgroups/geoscience/>.

(ii) The Expert Group on Geodetic Infrastructure of Antarctica (GIANT) provides a common geodetic reference system for all Antarctic scientists and operators. It also contributes to global geodesy for studying the physical processes of the earth and the maintenance of the precise terrestrial reference frame, and provides information for monitoring the horizontal and vertical motion of Antarctica. GIANT is a leader in the bipolar IPY POLENET (Polar Earth Observing Network) project, to which GIANT will contribute the Antarctic GPS component. A POLENET workshop was organized in the frame of the 10th ISAES in Santa Barbara in August 2007. It is planned to propose POLENET as a Scientific Programme Planning Group (SPPG) for 2008-10 at the XXX SCAR meeting, with the intention of it becoming a Scientific Research Programme in 2010. During the XXX SCAR meeting a proposal will also be made to create a joint working group between ICSTAR/IHY and POLENET, on “GPS for Weather and Space Weather Forecast”. For more information on GIANT see: <http://www.geoscience.scar.org/geodesy/giant.htm>. For information on POLENET see: <http://www.polenet.org/>.

(iii) High quality bathymetric maps are needed for safe navigation, as input for ocean modellers, to provide information on ecosystems, and as a clue to geological processes. The SCAR Expert Group on the International Bathymetric Chart of the Southern Ocean (IBCSO) aims to produce a high quality bathymetric map of the Southern Ocean together with topographic, geophysical, and other data. The IBCSO is a contribution to the General Bathymetric Chart of the Oceans (GEBCO). The Intergovernmental Oceanographic Commission (IOC) and the International Hydrographic Organization (IHO) accept IBCSO as a regional ocean-mapping programme and provide assistance through the Hydrographic Commission on Antarctica. IBCSO has expanded international collaboration in data collection and exchange during 2007. New multi-beam data were collected and processed by the Alfred Wegener Institute during two *Polarstern* cruises in Antarctic waters. IBCSO collaborates and exchanges data with the RADARSAT Antarctic Mapping Programme (RAMP), Antarctic Bedrock Topography (BEDMAP2), Antarctic Digital Magnetic Anomaly Project (ADMAP), Earth Topography (ETOPO2), and GEBCO. The first IBCSO meeting took place during the 10th ISAES in Santa Barbara in August 2007. The IBCSO Editorial Board now comprises 15 experts from the fields of hydrography, oceanography, and ocean mapping. Presentations on IBCSO and its relevance to other projects was given to the GEBCO Sub-Committee on Digital Bathymetry (New York, September 2007), the Southern Ocean Observing System (SOOS) planning meeting (Bremen, October 2007), the Standing Committee on Antarctic Geographic Information (SC-AGI) (Buenos Aires, October

2007), and the GEBCO Guiding Committee (Paris, November 2007). During the year, SCAR and SCOR distributed Circulars to their Members and Principal Investigators regarding the importance of bathymetric data acquisition in Polar Regions and their transfer to project databases. The SCAR/SCOR Expert Group on Oceanography made an explicit request to national members for bathymetric data for completing Bathymetric Charts in Antarctica. For more detail see www.ibcso.org.

(iv) The Antarctic Digital Magnetic Anomaly Project (ADMAP) aims to map Antarctica's magnetic anomaly field to aid in understanding geological processes. It is managed jointly with IAGA (International Association of Geomagnetism and Aeronomy). ADMAP contributes data to the World Magnetic Anomaly Map (for details see: <http://www.geology.ohio-state.edu/geophys/admap>). During 2007, ADMAP: updated a DVD of the data compiled up to 1999 for release to the World Data Centers; developed and promoted regional and continental scale interpretation of ADMAP data; updated near-surface anomaly predictions; continued the compilation of a rock magnetic properties database in support of geological applications of the Antarctic magnetic anomalies; developed an Antarctic Reference Model for improved magnetic anomaly determination in the Antarctic; and worked on establishing a spherical harmonic cap model for the database to facilitate analytical manipulations of the Antarctic magnetic anomaly grid for geological applications. The ADMAP team met at the 10th ISAES meeting in Santa Barbara. In 2008, ADMAP will continue compiling all available terrestrial, marine, and satellite magnetic survey data collected since the IGY 1957-58 for the region south of 60°S into the ADMAP digital database. As magnetic surveys since 2001 have nearly doubled the amount of data for inclusion into the database, a database manager will be needed to carry out the work. SCAR will co-sponsor a workshop to release the updated database to the World Data Centers. ADMAP will continue developing and promoting regional and continental scale interpretation efforts, and identifying areas for new collaborative magnetic surveys.

(v) The Expert Group on Antarctic Permafrost and Periglacial Environments (EGAPPE) coordinates, communicates and exchanges data amongst Antarctic permafrost researchers within SCAR and the International Permafrost Association (IPA). It works closely with the IPA working group on Antarctic Permafrost and Soils. The activities of both are described under the acronym, ANTPAS, the Antarctic Permafrost and Soils group (see <http://erth.waikato.ac.nz/antpas/>). During 2007 the Group:

Hosted a workshop at the 10th ISAES meeting (Santa Barbara, USA, August 2007);

Published in December 2007 a special issue of *Geoderma* titled "Antarctic Soils and Soil-Forming Processes in a Changing Environment";

Continued developing legends for soil and permafrost map units;

Prepared provisional soil and permafrost maps of (i) Transantarctic Mountains, and (ii) Antarctic Peninsula and islands, and a permafrost map of the Andes (Trombotta, Argentina);

Published more than 50 papers in refereed journals pertaining to soils and permafrost in Antarctica, in the period 2005-2008.

Developed the LATITUDE60 project in Portugal that includes (i) a 18' film about Antarctic Permafrost research distributed to over 200 schools in Portugal; (ii) 30 talks about Antarctic Permafrost research in high schools all over Portugal, including the Azores; (iii) wrote daily reports and answered questions from students, directly from the Antarctic;

Held the 1st Iberian Workshop on Antarctic Peninsula Permafrost and Climate Change (17 December 2007, Lisbon, Portugal).

Maintained the EGGAPE database at Waikato University (<http://erth.waikato.ac.nz/antpas>).

Monitored the active layer depth, permafrost temperatures in boreholes, and soil climate in the McMurdo Dry Valleys, North Victoria Land, and South Shetland Islands.

In 2008, EGGAPE will run one workshop at the Ninth International Conference on Permafrost (Fairbanks, Alaska, June 2008), and another at the SCAR Open Science Conference in St. Petersburg, Russia (July 2008), and develop a Cryosol session with an Antarctic focus for the International Union of Soil Scientists meeting (Brisbane, Australia, 2010). They will also prepare electronic versions of soil and permafrost maps and databases of the Transantarctic Mountains and Antarctic Peninsula region.

(vi) The Sub-Ice Geological Exploration (SIGE) Action Group aims to look into ways of developing a collective SCAR-wide pan-Antarctic approach to drilling into the rocks beneath the ice to improve our understanding of Antarctica's geological history. Informal discussions were held in the margins of the

ISAES meeting in Santa Barbara in 2007. The first meeting to develop a five-year work plan will be held in St Petersburg at the SCAR Open Science Conference in July 2008.

(vii) The Antarctic Neotectonics Group (ANTEC) ceased to exist, and its activities were absorbed into the IPY POLENET Programme. For more on POLENET see (ii) above.

2.2.3 Physical Sciences Group

The Standing Scientific Group for the Physical Sciences (SSG-PS) reported a number of highlights aside from those associated with its SRPs - AGCS and ICESTAR (above).

(i) Publication of the Bipolar Cryosphere Observing System (CryOS) Plan concluded SCAR's work on this topic with WCRP and the Integrated Global Observing System Partnership (IGOS-P) (the plan can be downloaded from <http://cryos.ssec.wisc.edu/>). Space agencies and others will implement the requirements as part of the Global Earth Observing System of Systems (GEOSS). SCAR will take responsibility for monitoring progress in implementing the system in Antarctica.

(ii) The joint SCAR/SCOR Oceanography Expert Group continued with its objective of planning a Southern Ocean Observing System (SOOS). A workshop was held in Bremen, in October 2007, to more fully develop the SOOS plan. It is hoped that a draft plan will be available for discussion and the next meeting of the Expert Group that takes place as part of XXX SCAR St Petersburg (July 2008) and that it will be ready for publication in late 2008. SOOS is co-sponsored by SCAR, SCOR, the Census of Antarctic Marine Life (CAML), the Partnership for Observation of the Global Oceans (POGO), the Global Ocean Observing System (GOOS), and WCRP. The US National Oceanic and Atmospheric Administration (NOAA) has also provided significant funding. For details see:

http://www.clivar.org/organization/southern/expertgroup/SOOS_interim_report.pdf.

(iii) In ocean sciences SCAR also co-sponsors with CLIVAR and CliC the Southern Ocean Implementation Panel (SOIP), which is involved in the development and assessment of the Southern Ocean Observing Systems, and the International Programme for Antarctic Buoys (IPAB), which deploys drifting buoys on the sea ice. These two panels provide the practical side of SOOS development, and so complement the work of the Expert Group. The SOIP did not meet in the current period but will meet in February 2009, in Melbourne. IPAB had some extensive buoy deployments during UK, Australian, and US research cruises. More than 15 buoys were deployed in February, March, September and October 2007 in the Bellingshausen Sea, Ross Sea, and East Antarctic by various IPAB partners to study small scale ice deformation and large scale ice drift. IPAB will hold its biennial meeting in Bern in early July 2008 to discuss first results of this intensive buoy deployment campaign.

(iv) Both CryOS and SOOS (i and ii, above) are key components of the SCAR Pan Antarctic Observations Network (PAntOS) (see: http://www.scar.org/researchgroups/physicalscience/PAntOS_Plan_Rev1.pdf), which is currently being developed and will be further discussed in St Petersburg in July 2008.

(v) The SCAR Expert Group on Ice Sheet Mass Balance and Sea Level (ISMASS) is assessing methods and uncertainties in estimating Antarctic Ice Sheet mass balance and its relation to sea level. Current models of ice sheet decay used by the IPCC are inadequate, making forecasts of sea level change unreliable. During 2007 ISMASS developed a strategy to improve existing prognostic ice-sheet models. Following an informal meeting during the 2006 Fall Meeting of the American Geophysical Union, ISMASS developed the case for "A need for more realistic ice-sheet models", published in 2007 as SCAR Report 30. The report documents key gaps in our knowledge that prevent development of more realistic models for the polar ice sheets and form the starting point for focussed discussion during a three-day workshop as part of XXX SCAR in St. Petersburg (July 2008). The meeting will formulate a 5-year plan for devising and implementing more realistic ice-sheet models.

(vi) SCAR is co-sponsoring IPICS, the International Partnerships in Ice Core Sciences, which is planning major international endeavours to improve science from ice coring (<http://www.pages-igbp.org/ipics/index.html>). Other sponsors include the IGBP's PAGES programme on past global change, and the International Association of Cryosphere Sciences (IACS). During 2007 IPICS drafted science and

implementation or coordination plans for its priority projects. The drafts for “The oldest ice core: A 1.5 million year record of climate and greenhouse gases from Antarctica” and “The IPICS 40,000 year network: a bipolar record of climate forcing and response” are complete, and were edited and approved by the IPICS steering committee (Vienna, April 2008). The plan for the IPICS 2K project – “A network of ice core climate and climate forcing records for the last two millennia” - is being drafted. 20 nations are members of IPICS, with a 21st applying to join. The IPICS agenda has been endorsed in Europe with the formation of EuroPICS under the European Polar Board.

(vii) A new Action Group, for Environmental Contamination in Antarctica (ECA), was formed by XXIX SCAR in July 2006. It aims:

1. To understand the mechanisms and processes controlling distribution and transport of microcomponents in polar environments, and their environmental effects.
2. To assess the effects of global climatic changes on processes controlling the dispersion and transport of micro-components and to estimate the contribution of micro-components on climate and environmental changes in polar regions.
3. To monitor the environmental characteristics in Antarctica and set up a database of environmental parameters to follow the environmental evolution in Polar Regions.

ECA held its first workshop in Venice (14-16 June 2007). Preliminary groups were formed for initial data collection on the following themes: Atmosphere and aerosols, Biological contamination, Hg, Inland waters and soils, Minor and trace elements in biota, POPs in general, Seawater, and Trace elements in snow and ice. ECA will hold its second meeting at XXX SCAR in St Petersburg in July 2008. A web site is under construction.

3. Data And Information Management

(i) **Antarctic Data Management:** One of SCAR’s goals is to facilitate free and unrestricted access to Antarctic scientific data and information in accordance with article III-1c of the Antarctic Treaty. This is the task of the Joint SCAR-COMNAP Committee on Antarctic Data Management (JCADM) (<http://www.jcadm.scar.org>). During the reporting period JCADM has involved yet more National Antarctic Data Centres (NADCs) or designated national focal points, and its now has members from 31 nations. In 2007 JCADM held its annual meeting in Rome (3-7 September), where a capacity building workshop was organized to train NADC operators. The meeting was attended by representatives from 20 countries and from the Global Change Master Directory (GCMD). One of JCADM’s primary tasks is to encourage national operators and principal investigators to populate the Antarctic Master Directory (AMD) with metadata. The AMD currently contains over 4500 data set descriptions, many of these directly linked to online data. 25 nations plus SCAR-MarBIN now contribute to the AMD. The AMD proves to be a very useful tool, which is being accessed increasingly by the wider community. The number of retrievals (= information downloads) has grown from a steady 500/month in the period January 2005-March 2007 to a very impressive 2500 to 4000/month since the start of the International Polar Year (IPY) in March 2007. JCADM is now much more engaged with the scientific community, through participation in the meetings of the Chief Officers of the SSGs and of the SCAR Executive Committee and also through the JCADM liaison persons, who are members of the Steering Committees of the Scientific Research Projects (SRP). JCADM took part in the planning meeting for the Southern Ocean Observing System (Bremen, October 2007), presenting the outline for a SOOS Virtual Observatory. Ideas for this were further discussed at an ad-hoc meeting of JCADM and SCAR officials at the British Antarctic Survey in November. JCADM’s progress and plans will be reviewed in 2008, prior to the SCAR and COMNAP meetings in Russia. JCADM is in the process of developing a SCAR Data Strategy, a draft of which will be presented at XXX SCAR for discussion. JCADM continues to be closely engaged in developing the IPY scheme for data management.

(ii) **Antarctic Geographic Information:** At XXIX SCAR in July 2006, the former Expert Group on Geographic Information (EGGI) became the Standing Committee on Antarctic Geographic Information (SC-AGI). SC-AGI provides geographic information products and policies to support Antarctic science and operations. Its work is relevant to a wide range of users including provision of geographic limits to Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs), and geospatial web services that might be needed for scientific, logistic, or tourism-related applications. A report of the deliberations of the SC-AGI workshop in Buenos Aires (September 2007) is available as SCAR Bulletin 165 (see <http://www.scar.org/publications/bulletins/>). A range of SC-AGI geographic information products is available as follows;

- (i) Place Names: The SCAR composite gazetteer (http://www3.pnra.it/SCAR_GAZE).
- (ii) SCAR Map Catalogue: (<http://aadc-maps.aad.gov.au/index.cfm>)
- (iii) Topographic Database: The Antarctic Digital Database (ADD) at: <http://www.add.scar.org/>
- (iv) The SCAR King George Island Geographical Information System (KGIS):
<http://www.kgis.scar.org/>
- (v) The Cybercartographic Atlas of Antarctica: <http://www.carleton.ca/gerc/caap>
- (vi) The SCAR Feature catalogue: <http://aadc-maps.aad.gov.au/aadc/ftc/index.cfm>

4. International Polar Year

SCAR is making a significant contribution to the International Polar Year (IPY)(2007 – 2009) launched on 1 March 2007. The SCAR President and Executive Director are members of the Joint ICSU/WMO Committee for the IPY, which also contains several eminent scientists from SCAR science programmes. They contributed to writing ‘The Scope of IPY Science’, published early in 2007. SCAR is either leading or involved in 70% of the Bipolar or Antarctic natural science projects approved by the IPY Joint Committee. SCAR’s 5 scientific research programmes lead project clusters for the IPY, and the Chief Officer of JCADM is co-chair of the IPY Data and Information Management Subcommittee. IPY activities will include three major scientific conferences, the first of which is the Joint SCAR/IASC Open Science Conference in St Petersburg (8-11 July 2008) on: “*Polar Research – Arctic and Antarctic Perspectives in the International Polar Year*”. Almost 1400 people had registered for the conference by end April. The IPY-JC will meet in St. Petersburg immediately before the conference. Recognising that the IPY is about education and outreach as well as about science, SCAR is hosting as part of the XXX SCAR Meeting an IPY Open Forum (July 7), a one-day workshop of the Association of Polar Early Career Scientists (APECS)(July 7), and a conference session on Education and Outreach in the context of the IPY. SCAR is also assisting in development of an archive documenting the development of the IPY and has a paper in press in Polar Record on this topic.

5. Scientific Advice To ATCM, CEP, CCAMLR and ACAP

Through its status as Observer, SCAR continues to be the primary source of independent scientific advice to the Antarctic Treaty Consultative Meeting (ATCM) and the Committee on Environmental Protection (CEP). SCAR participated in the XXXth ATCM in New Delhi (May 2007). The SCAR Lecture, on ‘Climate Change and the Antarctic – What Next?’ was delivered by the SCAR President, Prof. Chris Rapley CBE (available from <http://www.scar.org/communications/>). SCAR presented 2 Working Papers and 9 Information Papers. An additional Working Paper, on the status of the Southern Giant Petrel was withdrawn when conflicting data emerged shortly before the meeting. SCAR’s advice is provided through the Standing Committee on the Antarctic Treaty System (SC-ATS). In 2008 SCAR is conducting a review to increase the efficiency and effectiveness of its interactions with the CEP and ATCM. An Action Group under the leadership of Clive Howard-Williams (NZ) will address these matters at a meeting in May 2008. Also in May 2008 a SC-ATS workshop will be held in Cambridge to study all available data on the Southern Giant Petrel and provide the XXXI ATCM in Kiev (June2008) with the latest information on this species.

SCAR is also an Observer to the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Graham Hosie (Australia) represented SCAR at the 26th annual CCAMLR meeting in Hobart (October 2007). Several of SCAR’s marine biology programmes provide strong links to CCAMLR’s interests, especially SCAR’s Census of Antarctic Marine Life (CAML) programme, the SCAR Continuous Plankton Recorder (CPR) programme, EBA, and SCAR’s Marine Biodiversity Information Network (MarBIN). The work of the SCAR/SCOR Ocean Expert Group is also relevant to CCAMLR, as is that of our Expert Groups on birds and seals. SCAR is assisting CCAMLR in developing the concept of bioregionalisation of the Southern Ocean.

Recognising the expertise of the SCAR Bird Group, SCAR is invited as an Observer at meetings of the Advisory Committee on Albatrosses and Petrels (ACAP). ACAP is contributing to the SC-ATS Southern Giant Petrels workshop in May 2008.

6. Other Developments

The SCAR History Group held its third workshop, on 'National and Trans-national Agendas in Antarctic Research Since the 1950s', at the Byrd Polar Research Center, Columbus, Ohio (25–26 October 2007). The results of the first workshop (Bremen, 2005) were published in 2007 in the Alfred Wegener Institute's Reports on Polar and Marine Research; the report of the second workshop (Santiago, 2006) will be published by the Chilean Antarctic Institute in 2008; the report of the third workshop (Columbus, 2007) will be published by the Byrd Polar Research Institute. A fourth session will be held as part of the SCAR/IASC Open Science Conference in July 2008, and published in the Polar Record. These collections of papers provide insight into the evolution of Antarctic research since the 1950s, and into the emergence and development of institutions to co-ordinate that research in a pan-Antarctic way through SCAR.

As indicated in SCAR Report 28, SCAR plans to increase its contribution to Capacity Building, Education and Training (CBET). The main contribution continues to be the SCAR Fellowship Programme (4 Fellows funded in 2007-2008). SCAR and its partner the International Polar Foundation are working to attract fellows from non-traditional Antarctic countries into the fellowship programme for 2008-9, through their shared IPY programme 'The 6th Continent Initiative'. SCAR is an Associate Member of the International Antarctic Institute (IAI), which is a "virtual" university comprising the Antarctic science courses of a number of universities and institutes around the world, led by the University of Tasmania. Along with IASC, SCAR is now co-sponsoring the APECS meeting of young polar scientists as part of the XXX SCAR Meeting in St Petersburg (July 2008).

7. Administrative Achievements

In recent years, SCAR has led the development of a network of the four main bodies of ICSU concerned with research in the Polar Regions and/or the cryosphere. SCAR co-sponsors with the World Climate Research Programme (WCRP) the Climate and Cryosphere programme (CliC). SCAR works closely with the International Arctic Science Committee (IASC) on bipolar issues of common interest, and SCAR and IASC are jointly sponsoring the Open Science Conference in 2008, which will be a bipolar science meeting and the first of three major IPY science conferences. SCAR is also in the process of signing an agreement with the newly formed International Association for Cryospheric Sciences (IACS) of the International Union for Geodesy and Geophysics (IUGG). Creation of this 4-component network will help to ensure that polar scientific research is effectively coordinated.

SCAR's communications continued to be focused through the SCAR web site, especially the SCAR quarterly Newsletter. There were on average 100,000 hits per month on the SCAR web site for the first 4 months of 2008, approaching the levels typical before the 2006 Open Science Conference.

Personnel changes in the SCAR Secretariat included the departure of Dr Marzena Kaczmarek in March 2007 to join the Norwegian Polar Institute programme in Svalbard. She was replaced as Executive Officer in July 2007 by Dr Mike Sparrow, a physical oceanographer with Southern Ocean experience from the National Oceanography Centre in Southampton, UK, where he provided administrative assistance to the CLIVAR Office. Mrs Rosemary Nash was appointed as the new Administrative Assistant, operating part-time from early October 2007, replacing Mrs Karen Smith.

The Secretariat was responsible for organising the SCAR Executive Committee (Washington DC, July 9-11, 2007), and planning for XXX SCAR in Russia in July 2008 (Science Business Meetings, July 5-7; SCAR/IASC Open Science Conference, July 8-11, and SCAR Delegates Meeting, July 14-16).

In March 2008 SCAR obtained independent legal status as a Company Limited by Guarantee, and applied to become a Charity under UK Law, a process that should be complete by July 2008.

8. Organizational Details

1. SCAR MEMBERS and Secretariat can be seen at: <http://www.scar.org/about/officers/>

2. OFFICERS of SCAR and its Main Subsidiary Bodies can be seen at:
http://www.scar.org/publications/bulletins/SCAR_officers2006.pdf

3. MEMBERS of the Steering Committees of SCAR's Scientific Research programmes can be seen at:
<http://www.scar.org/about/annualreport/>

4. THE SCAR ORGANISATIONAL CHART can be seen at:
<http://www.scar.org/about/introduction/organization/>

Appendix 1

List Of Acronyms

ACAP	Advisory Committee on Albatrosses and Petrels	EBA	Evolution and Biodiversity in the Antarctic
ACCE	Antarctic Climate Change and the Environment	ECA	Environmental Contamination in Antarctica
ACE	Antarctic Climate Evolution	EGAPPE	Expert Group on Antarctic Permafrost and Periglacial Environments
ADD	Antarctic Digital Database	EGGI	Expert Group on Geographical Information
ADMAP	Antarctic Digital Magnetic Anomaly Project	EGU	European Geophysical Union
AGAFS	Action Group on Antarctic Fuel Spills	ETOPO	Earth Topography Digital Dataset
AGCS	Antarctica in the Global Climate System	GBIF	Global Biodiversity Information Facility
AGU	American Geophysical Union	GEBCO	General Bathymetric Chart of the Oceans
AMD	Antarctic Master Directory	GEOSS	Global Earth Observing System of Systems
ANDRILL	Antarctic Geological Drilling Project	GIANT	Geodetic Infrastructure for Antarctica
ANTEC	Antarctic Neotectonics	GLAS	Geoscience Laser Altimeter System
ANTPAS	Antarctic Permafrost and Soils	GLOBEC	Global Ocean Ecosystems Dynamics
APECS	Association of Polar Early Career Scientists	GOMOS	Global Ozone Monitoring by Occultation of Stars (instrument on Envisat)
APIS	Antarctic Pack-Ice Seals	GOOS	Global Ocean Observing System
ASMA	Antarctic Specially Managed Area	GPS	Global Positioning System
ASPA	Antarctic Specially Protected Area	IAATO	International Association of Antarctic Tour Operators
ASPeCt	Antarctic Sea Ice Processes and Climate	IACS	International Association of Cryospheric Sciences
ATCM	Antarctic Treaty Consultative Meeting	IAI	International Antarctic Institute
BAS	British Antarctic Survey	IASC	International Arctic Science Committee
CAML	Census of Antarctic Marine Life	IBCSO	International Bathymetric Chart of the Southern Ocean
CASA	Climate of the Antarctic and South America	ICED	Integrated Climate and Ecosystem Dynamics in the Southern Ocean
CBET	Capacity Building, Education and Training	ICESat	Ice, Cloud and land Elevation Satellite
CCAMLR	Convention on Conservation of Antarctic Living Marine Resources	ICESTAR	Inter-hemispheric Conjugacy Effects in Solar-Terrestrial and Aeronomy Research
CCAS	Commission for Conservation of Antarctic Seals	ICSU	International Council for Science
CEP	Committee for Environmental Protection	IGBP	International Geosphere-Biosphere Programme
CliC	Climate and Cryosphere Programme	IGOS	Integrated Global Observing Strategy
CLIVAR	Climate Variability programme of WCRP	IGOS-P	Integrated Global Observing Strategy Partnership
COML	Census of Marine Life	IGY	International Geophysical Year
COMNAP	Council of Managers of National Antarctic Programmes		
CPR	Continuous Plankton Recorder		
CPR-AG	Continuous Plankton Recorder Action Group		

IHO	International Hydrographic Office	POGO	Partnership for Observations of the Global Ocean
IHY	International Heliophysical Year	POLENET	Polar Earth Observing Network
INQUA	International Union for Quaternary Research	POP	Persistent Organic Pollutants
IOC	Intergovernmental Oceanographic Commission (of UNESCO)	RiSCC	Regional Sensitivity to Climate Change in Antarctic Terrestrial and Limnetic Ecosystems
IODP	Integrated Ocean Drilling Programme	SALE	Subglacial Antarctic Lake Environments
IPA	International Permafrost Association	SAM	Southern hemisphere Annular Mode
IPAB	International Programme of Antarctic Buoys	SASOCS	State of the Antarctic and Southern Ocean Climate System
IPCC	Intergovernmental Panel on Climate Change	SC-AGI	Standing Committee on Antarctic Geographic Information
IPICS	International Partnership in Ice Core Science	SCAR	Scientific Committee on Antarctic Research
IPY	International Polar Year	SC-ATS	Standing Committee on the Antarctic Treaty System
ISAES	International Symposium on Antarctic Earth Science	SCOR	Scientific Committee on Oceanic Research
ISMAS	Ice Sheet Mass Balance and Sea Level	SCOSTEP	Scientific Committee on Solar Terrestrial Physics
ITASE	International Trans-Antarctic Scientific Expedition	SIGE	Sub-Ice Geological Exploration
IUGG	International Union of Geodesy and Geophysics	SIMBA	Sea Ice Mass Balance of Antarctica
JCADM	Joint Committee on Antarctic Data Management	SIPEX	Sea Ice Physics and Ecosystem eXperiment
KGIS	King George Island Geographical Information System	SOIP	Southern Ocean Implementation Panel
LGP	Latitudinal Gradient Project	SOOS	Southern Ocean Observing System
MarBIN	Marine Biodiversity Information Network	SPPG	Scientific Programme Planning Group
MEDINET	Medical Network	SRP	Scientific Research Programme
MERGE	Microbiological and Ecological Responses to Global Environmental Changes in Polar Regions	SSG	Standing Scientific Group
NADC	National Antarctic Data Centre	SSG-GS	SSG on Geosciences
NASA	National Aeronautics and Space Administration	SSG-LS	SSG on Life Sciences
NOAA	National Oceanic and Atmospheric Administration	SSG-PS	SSG on Physical Sciences
PAGES	Past Global Change Programme	SYSTCO	S Ystem-Coupling (IPY Programme)
PANDA	The Prydz Bay, Amery Ice Shelf and Dome A Observatories	TAG	Thematic Action Group
PAntOS	Pan Antarctic Observations Network	VO	Virtual Observatory
		WCRP	World Climate Research Programme
		WMO	World Meteorological Organization