

Chapter 8

The Achievements of SCAR

As we have tried to show throughout this history, SCAR provides the framework and facilitation for international collaboration in Antarctic science. As a key part of the International Council for Science (ICSU), SCAR adds value to national scientific research in the Antarctic by encouraging co-operation and synthesis, providing a pan-Antarctic view beyond the capability of any one nation.

For more than 50 years SCAR has helped to enhance the scientific understanding of Antarctica and its environs, moving on over time from its initial role of helping to ensure the legacy of the International Geophysical Year of 1957–58, in which SCAR was created, to highlight the role of Antarctica in the global Earth System. After all this time and effort it ought to be easy to identify just what SCAR has achieved but it turns out to be quite difficult. To be fair to all it is essential to distinguish between the achievements of SCAR and those of the national programmes that fund and undertake the actual research in the Antarctic. As a facilitating organization SCAR has run on virtually no money, hardly any employees, a great deal of good will and free labour from around the world. How then can we realistically attribute success?

Of course, reference to the Appendices to this book shows just how many publications have appeared with the SCAR logo and name but even here SCAR itself did not normally fund the major meetings. And as for the research objectives – the actual science has all been funded entire-

ly by national organizations using government money or international funds from bodies like the European Union. So if we want to list the SCAR achievements we must understand that these are, almost without exception, outputs achieved in concert with national programmes. Nevertheless, despite the base of the science in national programmes, there is and will remain a need for a body to bring people together to provide a pan-Antarctic view of science that is larger than any one nation can achieve by itself. That gluing together for this larger objective has been the secret of SCAR's success – it has made a whole that (meeting the wishes of its creators) turns out to be greater than the sum of its parts. The trend continues not only through SCAR's continual round of meetings of specialist bodies, but also nowadays through its biennial Open Science Conferences, each attracting around 1000 participants, its separate quadrennial meetings of biologists, Earth scientists, and glaciologists (the latter in association with the International Glaciological Society) and the specialized sessions on Antarctic science at many major meetings like those of the AGU. Colin Summerhayes has also attempted to provide a more detailed overview of achievements to 2006 (www.scar.org/publications/reports/29/Report_29.pdf).

Undoubtedly one of the most important and lasting international achievements has been the provision of scientific advice on conservation and environmental management issues including protected



Danco Island (left) in Errera Channel, west coast of the Antarctic Peninsula.

areas, specially protected species, pollution and monitoring, environmental impact assessment and marine acoustics, to the Antarctic Treaty System. This began with the Agreed Measures for the Conservation of Fauna and Flora in 1964 which, together with other elements also submitted by SCAR over the intervening years, provided the core of the 1991 Protocol of Environmental Protection to the Antarctic Treaty. SCAR's conservation activities have also included the development with IUCN of the first Antarctic Conservation Strategy, although this has proved less influential than might have been hoped. Whilst there is no record in the Treaty reports prior to 1987 of the material originating from SCAR it is clear in the answers to requests for information raised by the ATCM that SCAR input has provided the basis for most of the environmental legislation, including the Management Plan Handbook and Visit Report form, and together with COMNAP the Environmental Impact Assessment Guidelines and the Environmental Monitoring Handbooks.

It was certainly a SCAR meeting at which concerns over uncontrolled krill and fin

fish fishing were first raised and it was a major SCAR effort that organized a co-ordinated international investigation (BIOMASS) to establish the functional processes of the Southern Ocean ecosystem, including establishing the key role of krill. The BIOMASS programme provided the scientific basis for the creation of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). In a rather different way it was also SCAR input that provided the scientific basis for the Convention on the Conservation of Antarctic Seals, and its international expertise was recognized by its specific inclusion in the legislation as scientific advisor.

There have been many achievements in the biological sphere. The work of countless ornithologists was pulled together to establish the International Survey of Antarctic Seabirds, to document the distribution, abundance and long-term trends in Antarctic and Subantarctic seabirds. These data are used to monitor the effects on birds of national Antarctic programmes, of fishing and of tourism, to identify critically endangered species, and (with BirdLife International) to select

Important Bird Areas (IBAs) for conservation and management. The Antarctic Pack Ice Seals survey has provided the most accurate assessment yet of the major part of Southern Ocean seal populations.

SCAR has provided new insights into understanding the diversity, ecology and population dynamics of the benthos beneath the Antarctic sea ice, and their sensitivity to environmental change. The data are used to test general ecological theory, and to assess the response of the biota to global change. SCAR has also made a major contribution to the Antarctic component of the global Census of Marine Life, which discovered more than 1000 new species in the Antarctic marine environment during the IPY. The establishment of the MarBIN database provides a major new facility not just for Antarctic scientists but for those who study biogeographic and evolutionary patterns in the world's oceans.

SCAR has established the ways in which land, lake and pond life respond to the dramatic climate changes affecting, in

particular, the Antarctic Peninsula and the subantarctic islands, where surface temperatures have warmed by up to 3°C in 50 years and springtime UV has increased dramatically. The data provide the basis for defining biodiversity regions, as well as identifying protective physiological and biochemical processes determining community sensitivity to stresses.

SCAR's efforts, along with the World Climate Research Programme, have provided the basis for understanding climate trends in and around Antarctica, culminating recently in the publication of a major new work as a contribution to the understanding of global climate trends and predictions by the IPCC. Such a major synthesis of data will be an invaluable resource to scientists in many disciplines working at both regional and global scales and will help to improve global modelling especially of the role of sea ice.

SCAR's work on rescuing balloon data from Russia (recorded in manuscript) and synthesizing meteorological data from many countries through the READER project has allowed not only the discovery of



View northward through LeMaire Channel past Cape Renard, Antarctic Peninsula,

Chapter 8. The Achievements of SCAR

a major warming of the Antarctic winter troposphere, 5 km above sea level, that is larger than any other tropospheric warming on Earth, but also the recent confirmation that while the Antarctic Peninsula has warmed significantly in recent years, air temperatures in East Antarctica have remained steady or cooled slightly.

Research on the Antarctic ice sheet has been a major focus for SCAR throughout the fifty years. SCAR has been the organizer of many meetings to develop the basis for determining the mass balance of the Antarctic Ice Sheet and hence determining where and whether it is growing or shrinking, and at what rates. The international concerns about the West Antarctic Ice Sheet and the stability of ice shelves have also proved a major focus. Recently, the finding that global change has strengthened the prevailing westerly winds, bringing more warm air across the peninsula in summer, has provided an explanation for the collapse of the Larsen-B Ice Shelf east of the Antarctic Peninsula.

Once airborne radar profiling of the ice sheet had been developed by SPRI and

the Technical University of Denmark many countries began to collect data on sub-ice topography. Eventually this was combined with over-ice seismic data in the SCAR BEDMAP project to allow the first detailed map of the continental bedrock underlying the ice.

The earth scientists have mapped the existing rock outcrops and measured both gravitational and magnetic fields across the whole continent. The synthesis of the magnetic data into a magnetic anomaly map was an important SCAR achievement but even more significant in the long run was the establishment of the Seismic Data Library. This ground-breaking move to share these partial data sets is intended both to prevent duplication of effort and also to allow synthesis of the data for details of the Earth's crust over as wide an area as possible.

Of course, in many instances it is not SCAR alone that is developing the products but SCAR is a key part of a consortium. Good current examples are the IBC-SO mapping project which also involves IOC, IHO and GEBCO, whilst the Southern Ocean



Mount Erebus, Ross Island at the head of the Ross Sea.



Robbery Beaches on the north coast of Livingston Island, South Shetland Islands.

Observing System is a new joint development with SCOR and others.

In the geodesy and geographic groups there has been the development of a whole raft of tools that could never have been achieved individually by national programmes. And this is true also of the establishment of databases by several groups that have implications for many different disciplines.

With the help of various grants all the Antarctic topographic data were collected and combined to provide the Antarctic Digital Database, a quality assured product containing all the latest information needed for Antarctic mapping at a large scale. Developed alongside this has been the Antarctic Composite Gazetteer, the only place to find all the published place-names and positions of geographical features. In addition to this there has been the Antarctic map catalogue, the Antarctic Bedrock Mapping database, the Geodetic Control database, the Digital Magnetic Anomaly dataset and the Common Geodetic Reference System. The more recent establishment of the Ant-

arctic Marine Biodiversity Database and the Reference Antarctic Data for Environmental Research meteorological data set are now essential tools for scientists everywhere. Support for the Antarctic metadata system at the Global Change Master Directory (GCMD) is yet another hard-won achievement that has still to be fully utilized.

Bringing together the community seeking to penetrate and study sub-glacial lakes, so as to generate collective plans and guiding principles for exploration, research, data management and environmental stewardship, is right at the forefront of SCAR's mission to look at the new frontiers in Antarctic science and stimulate ways to address them.

In recent years it has become increasingly obvious that in order to understand the behaviour of the environment it is necessary to monitor it by making routine and systematic observations. These can be used to detect change and, in turn, along with an understanding of the underlying processes, can be fed into numerical models capable of forecasting the tim-



Windscoop around a nunatak in Dronning Maud Land.

ing, direction and magnitude of future change. This would be useful under any circumstance, but is increasingly so given the imperatives of climate change associated with global warming. Independently of the research already described above, SCAR teamed up with the World Climate Research Programme to develop a Cryosphere Observing System (CryOS) involving *in situ* and space-based observations. From 2007 onwards this has been the basis for cryospheric observations and forecasts within the Global Earth Observing System of Systems (GEOSS) set up by the United Nations along with major international science bodies like ICSU, IOC and WMO. At XXIX SCAR in Hobart in 2006, SCAR began a similar approach to the development of a Southern Ocean Observing System (SOOS), the design plan for which will be published in 2011, and which will be a contribution to the Global Ocean Observing System (GOOS), a component of the GEOSS.

Of course, SCAR has played a key role in planning and implementing the International Polar Year of 2007–08 and is actively working on its synthesis and legacies. It has encouraged exchanges of scientists between countries, resolved disagreements and rewarded excellence with its medals. Its fellowships encourage young scientists in developing their Antarctic careers as does its support for APECS. It has an extensive array of agreements with other scientific organizations, intended to spread Antarctic science from a regional to a global stage as well as harnessing a wider range of expertise to focus on Antarctic problems.

Its membership encompasses all the countries active in Antarctica and its major science programmes are selected to address topical and significant issues so that the science may be used not only to understand better our natural world but also to provide a firm basis for policy. Indeed, although there are others willing

to provide advice to the CEP/ATCM on many specific topics it is difficult to see what organization could supplant both the breadth of competence and the neutrality of advice that SCAR has managed to achieve through the turbulence of the last fifty years.

Over fifty years any organization suffers from ups and downs in its performance, outputs and management. Complacency can increase the inertia to change, and whilst those within see nothing wrong, those outside the organization see a steady drift away from the key elements of topicality, relevance and novelty which are critical for any organization wanting to stay at the front of its field. SCAR was rescued from a growing lack of purpose and drive in the late 1990s by an internal challenge to undertake a detailed and critical scrutiny of all of its aspects or lose some of its key members. The consequent re-organization was painful for many but has changed SCAR completely

and re-vitalized its members in a startling way.

Whilst we could continue to tell our own story of success, perhaps instead it is better to cite a few extracts from the Performance Review carried out in February 2009 by an external peer group chaired by Phil Smith, who chaired the review of 2000.

“All of these developments, in the judgment of the Review Group, have re-established SCAR as the principal authority on scientific research in Antarctica, its role as a facilitator of collaboration in the conduct of Antarctic science and its voice on ways science can usefully inform policy makers on critical issues. The Review Group believes that a central issue in the next decade will be managing the science initiatives that SCAR has launched and ensuring that they remain vigorous, are regularly reviewed in depth by the Delegate Committee on Scientific Affairs and that there is full deliberation



Icebergs calving from Fimbulisen in Dronning Maud Land.

Chapter 8. The Achievements of SCAR

of these initiatives at SCAR plenary sessions. Importantly, a second and perhaps even greater challenge for the Delegate Committee on Scientific Affairs will be to give due attention to emerging scientific information about Antarctica's natural systems that suggest policy recommendations and applied research that should be co-ordinated with the Standing Committee on the Antarctic Treaty System, COMNAP, and others. SCAR has made significant headway in its provision of important policy advice to the ATCM. This is noted in two ways. First, the numbers of policy papers submitted to the ATCM, including CEP, have risen dramatically since 2000. Second, SCAR's revamped and modernized administrative practices have enabled timely submittals, which is a critical aspect of policy making."

"Since 2000 SCAR has made enormous progress in the total revamping of all aspects of its internal and external communication systems. SCAR, under the

leadership of the Executive Director, has transformed itself from a paper-driven institution into one that conducts virtually all of its administrative work, communications and outreach electronically. The efficiencies gained cannot be appreciated fully unless one was familiar with the pre-2000 SCAR and its administration. Thus the pace of SCAR's work and its effectiveness in the planning and co-ordination of Antarctic science has quickened and the conduct of its internal administrative business has moved to an effectiveness that was not imaginable in 2000".

Regarding SCADM, "the groups within the SCAR community who are responsible for establishing, managing and contributing to the SCAR Antarctic Master Directory System (hosted by NASA) have by international measures achieved considerable success, particularly in the area of standardization and in the development of content. The SCAR community is one of very few that can claim to subscribe to



Icebergs crowding together in Washington Strait, South Orkney Islands.



Spectacular mountains in Dronning Maud Land.

a unified, multidisciplinary metadata system, which is to be roundly applauded. The Review Group is heartened by SCAR's progress in facilitating data management and archiving."

Regarding general management, *"the Review Group noted with pleasure that the organizational developments have led to a revitalization of SCAR at the Delegate level, in the work of the SCAR Executive Committee, the oversight roles that vice presidents now play, and in the activities of SCAR's subsidiary committees."*

Regarding funding, *"We congratulate the SCAR leadership on its recent successful fund-raising efforts, with funds secured from a number of sources, including grants from ICSU, the Sloan Foundation, the Total Foundation, the Tinker Foundation and Memorial University of Newfoundland. This excellent activity should continue, and must remain focused because of limited human and financial resources."*

Regarding the transformation in general, *"The recent and current Presidents of SCAR and the Executive Director should be congratulated for their effective leadership that has been crucial for delivering the transformation of SCAR as recommended by the ad hoc Group."*

The Review Group was – *"favorably impressed by the reform process that SCAR initiated in 2000 in response to the recommendations of the ad hoc Group. It is a record of change that few national or international voluntary science associations can equal. SCAR has prepared itself well to address emerging challenges through the reforms undertaken during 2000-2009."*

The new SCAR now has responsibility for an expanded range of science programmes and is making significant contributions to global environmental science, for example with the publication of the *"Antarctic Climate Change and the Environment"*, with the output of the multi-



Beche Blade, Shackleton Range, Coats Land.

nation Census of Antarctic Marine Life, and with a major contribution to the International Polar Year and managing the IPY legacy.

Strategic planning and performance reviews are now key management aids. More advice than ever is being provided to the ATCM, and SCAR is working more closely and in a more structured way with a larger group of international partners. SCAR is more efficient, more effective, and now has its own independent legal status, having registered as a UK Company Limited by Guarantee (14 April 2008) and, from 4 July 2008, a Charity under UK law - a status that brings certain financial benefits. As another sign of success, SCAR has gained four new national members and two new ICSU union members since 2000. Biennial meetings are now much shorter (largely by having science and administration groups meet in parallel) and have been re-organized to give national Delegates greater contact with the science through the biennial Open Science Conference. It has vastly improved and enhanced its communications, both internally and externally and

attracted increasing numbers of early career scientists.

There is no doubt that many of the changes can be attributed to SCAR's implementation of the 2000 Review Group's recommendation that it appoint an Executive Director. As the first Director, Summerhayes threw himself into the role, looking for agreement on a new structure, a new vision, more effective links with other organizations and a strategic plan to guide all this. His enthusiasm was infectious and the present energetic state of SCAR is a testimony both to his efforts and the support he engendered from EXCOM, the Delegates and ordinary scientists in SCAR's many member countries.

During Summerhayes' first year he was ably assisted and learned a great deal from the outgoing Executive Secretary, Peter Clarkson (UK), who retired in June 2005 to be replaced by Marzena Kaczmarek (Poland) as Executive Officer. She in turn was replaced by Mike Sparrow (UK) in June 2007. Peter helped to train both officers. With Mike's appointment to

replace Summerhayes in mid-April 2010, he was replaced as Executive Officer by Renuka Badhe (UK/India). Summerhayes also initiated a deliberate programme of taking SCAR to the regions, involving visits to hold discussions with representatives of the national committees of Germany, Russia, USA, Norway, UK, India, Italy, Chile, Argentina, Australia and Spain (by Summerhayes); Argentina, Brazil, Ecuador and Peru (by Executive Officer Mike Sparrow); and of Bulgaria, Belgium, Chile, Argentina, Uruguay, Korea, Japan, China, the UK, the USA and Italy by President Chuck Kennicutt, who also visited the Antarctic stations of Korea, Chile, China, and Russia on King George Island. All of this has taken the SCAR message around the world as well as providing many countries with the opportunity to discuss directly with SCAR what their future contribution could be.

The development of a strategic plan and a range of implementation documents were crucial steps in making SCAR look

and act more professionally as well as being topical and relevant. With grants from the Sloan Foundation, the TOTAL Foundation and from ICSU as well as the Asturias Prize and the management of the Martha Muse Award the income streams are substantially different and augur well for future potential awards.

It was a significant challenge to the Secretariat to implement all of the recommendations of the 2000 Review Group. That challenge was compounded by the addition of the workload imposed by managing the biennial Open Science Conferences, by administering the new programmes for Fellowships and Medals, by distributing the external funds for such large new programmes as CAML and the Martha Muse Award, and by SCAR take a leading role in the development and implementation of the IPY. In spite of the added workload, these challenges have been met by a Secretariat now reduced to two full time officers and a part-time administrative assistant Mrs Rosemary



A perched block on Untersee, a frozen lake in Wohlthatmassivet, Dronning Maud Land.

Chapter 8. The Achievements of SCAR

Nash (appointed in October 2007 to follow in the footsteps of Mrs Mandy Dalton and Mrs Karen Smith).

SCAR continues to be beholden to the Scott Polar Research Institute, Cambridge, and its Director, Julian Dowdeswell, for very generously hosting the Secretariat, which it has done for the past 50 years. SPRI is a wonderful base for SCAR operations, containing as it does the world's greatest polar library, and being the location of choice for visits to the UK by polar scientists from around the world.

Much remains to be done under the new Executive Director, Mike Sparrow, not least to address the recommendations of the Review Group of 2009 and to ensure management of the IPY legacy in the south. SCAR's future is now being planned in the shape of the SCAR Strategic Plan for 2011–16, which was presented to the SCAR Delegates for approval at their meeting in August 2010. It is generally agreed that more needs to be done, for example, to encourage all national operators to share scientific results and contribute to SCAR science programmes, to encourage the sharing of major facilities in support of science, and to get more international collaboration while at the same time cutting fuel costs. At the same time there is a need to expand SCAR's science horizons even further, for example to put ocean acidification on the agenda, given that the Southern Ocean is likely to suffer first and most from it, and to integrate SCAR's several initiatives in climate change research. The Delegates and the SSG meetings need to take a more strategic view of the science and its development. There is the promise of developing stronger links with COMNAP

and CCAMLR but, above all, there is now a strong platform to build on.

SCAR's future looks bright with the increased public interest in the polar regions developed by the 4th IPY, a strong and prioritized link to the ATS, and a growing participation from young scientists excited by the Antarctic challenges. The inclusion of the Chief Officers in the Executive meetings has made a major difference to management whilst the Open Science Conferences go from strength to strength. Yet the support for SCAR is still wildly unequal with a subset of countries having shouldered the major burden of hosting meetings and symposia over the years, and only a limited range of countries have contributed Presidents. Perhaps its public profile could be higher and there will never be enough money to satisfy all the demands but the expanded SCAR Office and an active Executive Director bode well for the future.

Looking back we can see a small SCAR club of twelve member countries growing slowly into a major forum of thirty-five countries, surviving global recessions and the Cold War, the changing science priorities and the increasing costs for doing science. It has maintained its scientific independence despite providing major assistance to an international political forum and has many major achievements to its credit. SCAR's concerns for quality science, for sharing of data and opportunities, and for providing its own special form of camaraderie for those who wish to work in Antarctica and the Southern Ocean suggests that its role will be just as important in the future as it has been in the past.