

**SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH:
A DECADE OF PROGRESS; NEW CHALLENGES AHEAD**

REPORT OF THE 2009 SCAR REVIEW GROUP

JUNE 8, 2009

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LETTER OF TRANSMITTAL

June 8, 2009

Dr. Mahlon C. (Chuck) Kennicutt
President
Scientific Committee on Antarctic Research
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Dear Chuck,

The report of the 2009 SCAR Review Group is submitted herewith. The report reviews progress the Scientific Committee on Antarctic Research (SCAR) has made in a decade since it commissioned the major review of its mission, organization, administration, communication and outreach, interface with the Antarctic Treaty Consultative Meeting (ATCM), facilitation of data management coordination, and other activities.

The Review Group that you appointed in the autumn of 2008 worked over the last two months of 2008 and in 2009 until conclusion of this report. Most of our work, including a solicitation sent to national committees and the government operators of national research programs in Antarctica, was done via the internet. The Review Group met for two days in Cambridge on February 2-3, 2009. At that time in addition to systematically discussing SCAR's progress in addressing the recommendations made by the 1999-2000 Ad Hoc Group on SCAR Organization and Strategy, the 2009 Review Group discussed challenges that SCAR must address in the next decade.

Our recommendations are organized along the lines of the major recommendations of the 2000 Report of the Ad Hoc Group on SCAR Organization and Strategy as the Review Group believes that template for change and renewal provides the best benchmark for understanding the sweeping changes that SCAR has made since 2000. Progress in implementing these changes is noted and applauded. At the same time the 2009 Review Group makes 24 recommendations in eight areas and two recommendations on maintaining SCAR's present momentum. We believe that these recommendations will lead to the further strengthening of SCAR in the years ahead and to increasing its effectiveness as a coordinator, facilitator, and authoritative voice on Antarctic science and its evolving findings and understandings of that continent and the Southern Ocean. Implementing the recommendation will, we believe, also increase effectiveness of SCAR's relations with the ATCM and COMNAP, the Council of Managers of National Antarctic Programs, and other organizations.

The Review Group expresses its deep appreciation to Dr. Colin P. Summerhayes, Executive Director, who facilitated the Group's work throughout its deliberations. He made pertinent documents and reports available to the Group, assisted in their review during the Cambridge meeting and helped the

Group and especially the Chair in the preparation of this report through fact checking. Dr. Mike Sparrow, SCAR Executive Officer, met with the Group in Cambridge where he provided helpful perspectives. Ms. Rosemary Nash provided the Review Group with invaluable assistance to the Review Group by arranging our travels and preparations for the Cambridge meeting in February.

As Chair, I thank the members of the 2009 SCAR Review Group for their consistent and thoughtful participation in the Group's work and deliberations. It has been a pleasure for us to serve SCAR. We hope that our evaluation of SCAR's progress in implementing change and our recommendations for the future will be of help as SCAR prepares for the second decade of the 21st Century

Sincerely,

Philip M. Smith
Chair, SCAR 2009 Review Group.

EXECUTIVE SUMMARY

In 1999, SCAR President Robert H. Rutford, acting on a SCAR recommendation, appointed an Ad Hoc Group on SCAR Strategy and Structure to examine all aspects of SCAR: its statement of mission, its science initiatives, its organization, its administration including its communication practice internally and with other organizations and the science community, and its role as an advisory to the ATCM and others. The Ad Hoc Group's report that called for sweeping changes in SCAR was adopted by SCAR Delegates in 2000.

SCAR then began a process of change by restating and re-invigorating its science mission, its attention to early career Antarctic scientists and national capacity building, by reorganizing at the Delegate level and in subsidiary SCAR committees, by modernizing its communication procedures and by revamping its administrative practices. In 2004 SCAR appointed an Executive Director to fulfill the Ad Hoc Group's recommendation that SCAR should have pro-active executive leadership.

The report of the 2009 SCAR Review Group, appointed by SCAR President Dr. Mahlon C. (Chuck) Kennicutt, evaluates the progress that SCAR has made in fulfilling the recommendations of the Ad Hoc Group. In all areas where there were Ad Hoc Group recommendations, SCAR has made significant progress. The Review Group comments favorably on SCAR's decade of progress in this report.

The Review Group makes recommendations on ways to build on the progress SCAR has made. Altogether there are 27 recommendations. While this may seem to be a large number, it should be noted that they cluster into nine areas. They center in the following themes that are the major areas of discussion, finding, and recommendation in the 2009 Review Group Report:

- Science planning and facilitation;
- Nurturing capacity and early career polar scientists;
- Internal and external communications;
- Relations with ICSU and other organizations;
- SCAR and the Antarctic Treaty;
- Facilitating data management and archiving;
- Delegate-level, Standing Scientific and other groups;
- The SCAR Secretariat; and,
- Maintaining SCAR's momentum.

In contrast to the Ad Hoc Group's conclusions the 2009 Review Group's findings, as noted, are favorable. The Review Group's recommendations are designed to build on SCAR's significant accomplishments, 2000-2009; and to prepare SCAR for an even more effective role in the second decade of the 21st Century.

Antarctica and the Southern Ocean, always important scientifically and diplomatically will be evermore so in the decades ahead. Understanding Antarctic climate change and objectively interpreting this information for policy makers and the public, is perhaps the greatest immediate challenge. SCAR must continue to play a central role in this process. There are other daunting

challenges, e.g. the over-exploitation of living resources. While exploitation of natural resources has receded from view in recent years, it is possible to imagine scenarios that will bring this issue to the fore once again. Environmental protection, including sound environmental practice in research, will grow in importance. There will also be emerging areas of scientific inquiry that should receive priority. In some instances the inclusion of new science initiatives will require that other programs receive less financial or logistic support. In all of these and other emerging challenges sound scientific advice must be at the core of policy making so that it is well informed on a continuous basis as scientific understanding continues to grow. SCAR has prepared itself well to address emerging challenges through the reforms undertaken during 2000-2009. By building on these developments through the recommendations presented here, SCAR can continue to play a central role in facilitating and coordinating science and advising governments working together in the Antarctic Treaty System.

SCAR: A DECADE OF PROGRESS; NEW CHALLENGES AHEAD

REPORT OF THE 2009 SCAR REVIEW GROUP

INTRODUCTION

In 1998, the Scientific Committee on Antarctic Research, then in its 40th year, decided to have a major review of all aspects of its operation. Accordingly, Dr. Robert H. Rutford, President of SCAR appointed a ten person international Ad Hoc Group on SCAR Organization and Strategy (hereafter referred to as the Ad Hoc Group). The members of the Ad Hoc Group were experienced as researchers and as directors of programs in Antarctica and they were knowledgeable about SCAR, but they worked totally independently from SCAR or any of the positions that some of the members held in SCAR working groups at the time. The Ad Hoc Group worked over much of 1999 and the first half of 2000 and presented its findings and recommendations at SCAR XXVI in Tokyo, Japan in July. In plenary session, the SCAR Delegates voted to adopt the recommendations of the Ad Hoc Group report.

The report called for what was essentially a total reform of SCAR ranging from an examination and restatement of the SCAR mission, a new organization of SCAR at the Delegate level, its Executive Committee and at the subsidiary working group level. Recommendations on revamping SCAR's internal and external communication practices and the organization of its administrative office and management practices were also made by the Ad Hoc Group and adopted. The report called for the appointment of a pro-active Executive Director to direct SCAR activities and provide regular liaison with other scientific organizations. Finally, the Ad Hoc Group recommended a reinvigoration of SCAR's working relationship with the Antarctic Treaty Consultative Meeting (ATCM) system including its subsidiary organizations such as the Committee on Environmental Protection (CEP).

Between 2000 and 2004 SCAR reorganized and developed two SCAR Delegate level committees and a new structure for its standing scientific, ad hoc, and other working groups. A revised Constitution and by-laws were adopted in 2004. Executive Director, Dr. Colin P. Summerhayes was hired in 2004 at which time implementation of many of the other recommendations of the Ad Hoc Group began. The composite view of SCAR reforms, therefore, includes the first phase of reorganization that took place 2000-2004 and the second phase that has taken place from 2004 to the present.

In 2008, in preparation for the development of the second SCAR strategic plan (2010-2016), and bearing in mind the need to prepare for an eventual routine review by its parent body, the International Council for Science (ICSU), SCAR president Mahlon (Chuck) Kennicutt formed the present 2009 SCAR Review Group (hereafter termed Review Group). The Review Group has four members. Some members are less immediately associated than others with Antarctic research but they brought to the evaluation considerable perspective on major

disciplinary and interdisciplinary scientific developments that include research in the polar regions.

The Review Group began its work in late October 2008. In a first phase of effort, the Review Group solicited comments and opinions on SCAR's present operational effectiveness from national committees adhering to SCAR and from national programs responsible for research in Antarctica and the Southern Ocean. The Review Group also began examining a variety of documents that - combined - presented a portrait of SCAR's recent developments and activities.¹ The Review Group held a two-day meeting in Cambridge, England on February 2-3, 2009. On the first day the Review Group discussed the responses it had received to its call for comments, which had been circulated in mid-November 2008, reviewed SCAR documents and held a luncheon session with SCAR President Kennicutt where he presented his perspectives. Executive Director Summerhayes helped organize and explain materials that were evaluated and discussed. The Review Group met in Executive Session on February 3, reaching a tentative set of conclusions and recommendations. These have been vetted in internet dialog in the months since the Cambridge meeting in preparation this report.

The Ad Hoc Group made 20 recommendations clustered in eight areas for the revitalization of SCAR's mission, its reorganization at the delegate level and in its subsidiary committee structure, intersession work of the SCAR Executive Committee, its communication practices, the Secretariat, etc.

The template of the Ad Hoc Group's report provided the Review Group with a framework for conducting its discussions and for reaching the conclusions and recommendations it has reached in its evaluation. Below we discuss SCAR's activities and accomplishment in eight areas, with recommendations for further SCAR progress in each area. A final section of the report addresses the vitally important issue of maintaining SCAR's newfound momentum.

A comment should be made concerning the letters that were received in response to the Review Group's broad solicitation to national committees adhering to SCAR and the executives of the national research programs working in Antarctica. In contrast to the responses the Ad Hoc Group received to a similar request in late 1999, the response letters to the December 2008 solicitation were comparatively few; about half of the national committee chairs wrote to the Review Group with comments. In general responses supported the progress that SCAR has made in its reforms of mission, activities such as the SCAR Open Science Conferences, and the work of the SCAR Delegates and those engaged in the work of the Standing Scientific Groups (SSGs) and other SCAR bodies. There were a few suggestions for further refinement of SCAR operations which were discussed by the Review Group. The Review Group appreciates the

¹ In addition to the *SCAR Strategic Plan 2004-2010*, 34 other reports and documents were posted on a Review Group website. www.scar.org/review

thoughtfulness of the responses. The report takes into account many of the comments and suggestions the Review Group received.

**EIGHT STRATEGIES FOR THE REVITALIZATION AND
RENEWAL OF SCAR FOR THE 21ST CENTURY**

_____ [Ad Hoc Group on SCAR Strategy and Structure] _____

- Revitalize SCAR by making SCAR more proactive and update its mission in four areas.
- Engage SCAR delegates, alternates, and officers more actively in SCAR to accomplish SCAR's mission as the preeminent authority on science in Antarctica and surrounding oceans.
- Create more flexible and responsive mechanisms at the operating level to coordinate and plan science and provide scientific advice.
- Improve the planning and decisionmaking functions in the biennial SCAR cycle.
- Improve SCAR's internal and external communication systems.
- Modernize SCAR's secretariat.
- Engage national Antarctic committees and other adhering bodies to renew their commitment to SCAR.
- Implement change rapidly to maintain and enhance SCAR's position as the authoritative leader for science in Antarctica.

RENEWAL OF MISSION: SCIENCE PLANNING AND FACILITATION

The re-invigoration of SCAR's science mission was at the heart of the Ad Hoc Group's evaluation of SCAR in 2000. SCAR responded to the several recommendations made by the Ad Hoc Group. The notable changes implemented by SCAR are:

- The work of the Delegates in Plenary Session was restructured so that a Delegate Sub-committee would be focused on science to help guide SCAR's subsidiary science committees, and to report on both its work and that of the subsidiary committees to the Plenary Session.
- SCAR developed a strategic plan, *SCAR Strategic Plan 2004-2010*, which describes the five primary foci for national and international research in Antarctica in the present decade. This strategic vision was partly created by SCAR at the Delegate level and through broad science community input, which re-engaged working scientists with SCAR.
- Three Standing Scientific Groups (SSGs) were established to guide implementation of the strategic plan for each strategic area, and five Scientific Research Program steering committees (SRPs) were established to steer the development of the five focal programs.
- Delegates conceived and supported the development of the biennial SCAR Open Science Conference, which has become a scientific meeting that has had unexpectedly wide attendance, including attendance by many early career polar researchers.
- SCAR was extensively engaged in the planning of IPY 2007-2009.
- SCAR realized the need to undertake an assessment like *The Arctic Climate Impact Assessment* and is engaged in a comprehensive review of Antarctic climate change, with a major publication appearing in a

scientific journal in January 2009.² A follow up was presented to Antarctic Treaty Consultative Meeting (ATCM) and Committee on Environmental Protection (CEP) in Baltimore, Maryland in April 2009.

- There are important science-based policy interventions that have been forwarded to the ATCM, e.g. SCAR's statement on scientific and environmental issues that may be associated with research in the sub-glacial lakes below the Antarctic ice sheets, and SCAR's advice on listing or delisting of species that are in need of special protection.
- SCAR has struggled with the strategic question of how to maximize research that is undertaken by the several national research programs that are more or less co-located on an Antarctic Peninsula island. Operators could gain greater collective effectiveness through enhanced collaboration in scientific research and environmental management and protection and SCAR will therefore table this paper at a joint meeting with the Council of Managers of National Antarctic Programs (COMNAP).³

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 Delegates Committee on Scientific Affairs and that there is full deliberation of these initiatives at SCAR plenary sessions. Importantly, a second and perhaps even greater challenge for the Delegates 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 coordinated with the Standing Committee on the Antarctic Treaty System, COMNAP, and others.

Delegates Committee on Scientific Affairs and the Vice President for Scientific Affairs: The Delegates Committee on Scientific Affairs, which is chaired by the Vice President for Science Affairs, plays a crucial role in setting strategic scientific research directions, reviewing performance against stated program objectives and goals, and adjusting the portfolio of SCAR's major research efforts to reflect changing themes and issues. The Delegates Committee on Scientific Affairs appears to be working effectively. The challenge now is for the Delegates Committee to keep abreast of emerging science issues in Antarctica and the Southern Ocean and to provide leadership in relation to important emerging science.

Recommendation: *The Review Group suggests that at each biennial meeting the Delegates Committee should receive a keynote paper on polar scientific frontiers and emerging issues as an additional guide to its deliberations.*

² *Reviews of Geophysics*, 47, RG100.30.doi:10.1029/2007RG000231, 2009

³ See *King George Island and SCAR Science*, 2009

Science that Enables Policy Making: At the time of the Ad Hoc Group review many members of SCAR, national committee chairs, and representatives to the ATCM felt that SCAR was less effective as a policy adviser than it could be. Beyond the perceived lack of willingness to provide policy advice, SCAR's capability for timely input on critical issues was impaired by its cumbersome administration. The Ad Hoc Group, noting these concerns, urged SCAR to "take a more proactive stance with the Antarctic Treaty System (ATS) in providing the highest level independent advice on scientific aspects of issues affecting the governance and management of Antarctica and the Southern Ocean."

The Review Group found that 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.

Antarctica has entered an era of change, in terms of climate, the greater frequency of visitation by scientists, tourists, eco-adventurers and sports people. The over exploitation of species in the Southern Ocean has become a growing international issue where the ATCM with SCAR's advice, must engage in broad international discussions if the declines are to be reversed. Of the challenges that lie ahead, climate change is in the view of the Review Group the highest immediate priority for SCAR and SCAR should continue to play a pro-active role in the matter.

Recommendation: *The Review Group, noting the Ad Hoc Group's recommendation that SCAR should be a more pro-active leader in science and policy, applauds SCAR's active role as a policy adviser and urges that it maintain momentum to continue as a pro-active leader in this role.*

The SCAR Open Science Conferences: Three SCAR Open Science Conferences have been held. They have been unexpectedly well attended and importantly, they have drawn together an interdisciplinary community, including many early career researchers. For some early career researchers this may have been their first large polar science symposia. The Review Group discussed two issues related to the Open Science Conferences. One deals with their frequency, the other with their logistical management.

Open Science Conference Frequency: The large Open Science Conference attendance may reflect a pent up desire on the part of Antarctic researchers and polar researchers to participate in interdisciplinary fora where contemporary research is discussed, often before it finds its way into scientific journals. The Review Group discussed whether the present two-year schedule should be maintained, or whether the Open Science Conferences should shift to a four-year cycle. While attendance has been large, there is a plethora of international scientific meetings all competing for the attendance of large groups of scientists. There has been no drop-off in attendance over the six years that the conferences have been held. However, the planned IPY 2007-2009 scientific conferences in

2010 and 2012 may compete with the SCAR Open Science Conferences. If the polar science community vote with their feet through less registration for the Open Science Conferences, it may then be wise to consider whether a four-year cycle would be more appropriate in the next decade.

Recommendation: SCAR, through its Vice President tasked with science and the Delegates Committee for Scientific Affairs, should carefully monitor the Open Science Conferences and report to SCAR on whether the present schedule should be maintained or whether SCAR might be well advised to move to a four-year cycle for these international scientific meetings.

Open Science Conference Management: While there were many supportive comments about the Open Science Conferences in the responses received by the Review Group there were also some complaints that focused on conference management and costs. It is recognized by the Review Group that the host SCAR national committee, national research program and other sponsors take on a huge burden when they agree to convene a science meeting with a thousand or more attendees. In discussions with the Secretariat, however, the Review Group has come to the conclusion that some of the problems of managing the Open Science Conference might be alleviated by having the SCAR Secretariat more involved as a co-planner and organizer of the science conferences. The Review Group feels that with perhaps few exceptions national hosts may have less expertise for conference planning than the Secretariat could bring to bear as a co-planner. Moreover, the Review Group noted that a number of scientific organizations that routinely sponsor large-scale science conferences actually turn a revenue profit, which is frequently directed to the planning of a next scientific meeting thereby reducing overall cost to attendees.

Recommendation: SCAR with the advice of the Delegates Committee on Science and the SCAR Secretariat should study the programs, logistics and costs of the Open Science Conferences so far held with the objective of increasing their cost effectiveness through greater participation of the SCAR Secretariat as a co-host. A detailed study should be made of ways to improve planning efficiency to reduce costs and perhaps to create a revenue stream that would help to sustain the science conference activity.

Role of Standing Scientific Groups: A key role of the SSGs is to recommend new SRPs to the SCAR Executive Committee and to SCAR. The current SRPs represent important science areas, and they are widely perceived to be a real strength of the current SCAR structure. However, there will always be a small number of SRPs because of budgetary and logistical limitations, and there is the need for SRPs to have a finite lifetime so that other research areas can receive support. It is therefore important to ensure that the SRP's continue to represent important emerging and current Antarctic science areas. There is a need for strategic balance of priorities for establishing future SRP's. The current "bottom-up" approach of nominating new SRPs is effective because it ensures that advocacy for new SRPs is being driven by scientifically active and engaged individuals. However, this process also has the potential to be driven by vocal special interest groups or by other *ad hoc* suggestions if strategic and balanced oversight is not exercised by the SSGs.

Recommendation: It is recommended that the SSGs be tasked to operate strategically by aiming specifically to take an overview of current, emerging and potentially exciting future science. This reinforces a recommendation below that national delegates need to be scientifically active, engaged, and aware of the range of scientific issues and emerging science across the remit of their specific SSG to be able to provide the required leadership.

Scientific publication: The highest quality publications being produced by members of the Antarctic research community are outstanding. SCAR should be congratulated for its leadership in coordinating publication of high quality papers through its SRPs. Efforts to continue such initiatives are encouraged. The review group is concerned, however, about community publication habits and the journals that are targeted for more routine scientific papers. Routine publication of special issues in Antarctic journals, books and non-ISI journal special volumes diminishes the impact of Antarctic science. Antarctic scientists will be disadvantaged in their careers, especially those who work in university environments, if they are not publishing consistently in high quality ISI-listed journals. The issues at stake relate to visibility in the wider scientific community, career advancement, and recognition through citation indices.

Recommendation: SCAR should proactively encourage Antarctic journals that are not ISI listed to seek to meet the criteria to enable them to be listed. This will immediately increase the visibility and recognition of the work published in such journals. Nevertheless, publication in non-Antarctic journals is also crucial for widening the influence and impact of Antarctic science. This practice should be deliberately and pro-actively encouraged to drive up the quality (where necessary), but also the visibility, and impact of Antarctic science.

RENEWAL OF MISSION: NURTURING NATIONAL CAPACITY AND EARLY CAREER POLAR SCIENTISTS:

In its 2000 report the Ad Hoc Group recommended an update of SCAR's mission in four ways, one of which was "Increasing emphasis on scientific capacity of all national groups working in Antarctica and on outreach to younger scientists." The Review Group found that SCAR has worked consistently in recent years to fulfill this recommendation. Scientific capacity building has been given increased emphasis through its specific inclusion in the revised statement of mission adopted by SCAR in 2004. *The SCAR Strategic Plan 2004-2010* specifically addresses capacity building goals that should be initiated and at SCAR XXVIII the Delegates established a SCAR Capacity Building and Education Group. The topic has therefore been on the SCAR-COMNAP agenda. SCAR has also encouraged national committees to strengthen their efforts in capacity building through emphasis on fostering the efforts of early career polar scientists and by working with countries that have smaller Antarctic communities.

For its part SCAR has implemented renewed attention to future careers and capacity building in several important ways. The SCAR biennial Open Science

Conferences, with their interdisciplinary agenda of scientific discussion have been attractive to early career polar researchers; some early career scientists have been empowered to attend Open Science Conferences through modest but important travel grants provided by SCAR from funds raised from philanthropic foundations in several nations. Furthermore SCAR and the national host organizers of the Open Science Conferences in Germany, Australia and Russia have reached out to early career polar scientists through communication with the Association of Polar Early Career Scientists (APECS), a self organized transnational internet association of young polar scientists. In addition, the SCAR Fellowship Program specifically targets early career researchers (PhD and Post-doc). The revamped communication strategies, which are discussed in detail elsewhere in this report, effectively reach early career scientists through the worldwide web.

The Review Group was greatly encouraged by SCAR's progress in national capacity building and the fostering of early career polar scientists. From its own investigations and deliberations and from responses to the call for comments, the Review Group believes that SCAR has made much progress in reaching out to, and encouraging early career polar scientists. Less headway has been made on national and regional capacity building, which SCAR's strategy for education and training recognizes as more the responsibility of members than the organization centrally, as noted above. On balance the Review Group applauds SCAR's progress in this area. Capacity building – in the nations with smaller Antarctic communities and among early career polar researchers in all SCAR member research communities – must remain central SCAR initiatives. The Review Group has three recommendations in this area.

(i) Mentoring Young Antarctic Scientists: Experience gained with the SCAR Fellowships indicates that early career scientists from countries with emerging Antarctic research capabilities are disadvantaged. They are often less accustomed to applying for research grants. It is desirable in building Antarctic research capacity in these nations to provide assistance to such early career scientists. SCAR should focus attention on assisting individuals from these nations to write proposals to an appropriate peer review standard.

Recommendation: Development of a mentor system should be arranged by, but remain independent of, the SCAR Secretariat. It is recommended that individuals with experience in successful proposal writing in English should be identified to serve as mentors for each SSG. Contact details of mentors should be publicized alongside information about the Fellowships.

(ii) Training and developing the next generation of Antarctic scientists: Developing the next generation of Antarctic scientists and providing opportunities for high-level training, access to world-leading infrastructure and trans-national interaction were central recommendations of the Ad Hoc Group review. Much progress has been made. However there are many additional avenues for SCAR's financial support in its efforts beyond the ones exploited to date. Now that many other elements of SCAR's overall reforms have fallen into place, the Review Group encourages the SCAR Secretariat to investigate additional sources of independent funds that can be

directed to fostering early career scientists. Funding opportunities for such purposes exist, but need to be proactively exploited. For example, the European Union invests large amounts of funding through its Marie Curie actions to support training of early career scientists through PhD training networks. Such efforts obviously need to involve universities, but entire research groups can be involved; this could provide a powerful mechanism to develop the capacity that is so often mentioned in the context of Antarctic science. Marie Curie actions can increasingly involve non-EU partners, especially when leveraging resources from funding agencies of non-EU countries.

Recommendation: The SCAR Secretariat should initiate and encourage external fund raising for fostering early career scientists through, for example, exploratory meetings of interested parties to prepare proposals to relevant funding agencies. Such efforts could provide added value to the wider Antarctic and scientific community.

(iii) National Capacity Building: As pointed out in the SCAR Strategy for Capacity Building (Education and Training) there is ample scope at the national level for building capacity in polar research through education and training.⁴ However, there is also the opportunity to develop a visiting professor scheme like that operated by the Partnership for Observations of the Global Oceans (POGO). POGO Visiting Professorships allow short visits (two weeks to three months) of distinguished scientists from oceanographic institutes in developing countries and economies in transition. The visiting professors provide training and mentoring to develop collaboration and enhance the networking of scientists with peers in advanced institutes. The goal of the visiting professor arrangement is capacity building in the host institution. SCAR could seek external funds that would underwrite a professorship arrangement analogous to the POGO Fellowships. In addition, there is opportunity for SSGs and SRPs and their various subgroups to decide to host workshops in developing countries to expand their science and science communities.

Recommendation: While national capacity building, education and training must remain primarily the responsibility of national committees, there is much to be said for SCAR investing funds in a visiting professorship program, and for SSGs and SRPs to arrange scientific workshops to be held in all member countries to help the development of local polar scientific communities to develop further. Such efforts would require development of new funding streams, e.g. from philanthropic foundations.

⁴ SCAR Report 27

INTERNAL AND EXTERNAL COMMUNICATIONS

Since 2000 SCAR has made enormous progress in the total revamping of all aspects of its internal and external communication systems. At the time the Ad-Hoc Group conducted its review, SCAR relied entirely on printed records for internal communication with SCAR delegates and SCAR working groups, for the records of SCAR meetings (which were printed much after the fact in *The Polar Record*), for the work of the SCAR Executive Committee and in intersession communications. External communication with the scientific community, with the leaders of ICSU and other organizations, and the interested “polar public” were mostly non-existent except by letter, facsimile, telegram, and the printed administrative record that appeared in *The Polar Record*, which at the time was not available on-line. The printed records were distributed much later than an event, e.g. a SCAR plenary, and were not useful for the efficient conduct of SCAR business. Most importantly, the broader Antarctic research community had limited access to SCAR and its proceedings, and its recommendations for scientific programs in which scientists could become engaged. Of equal concern to the Ad Hoc Group was the fact that the interested “polar public,” which is large and ever growing, did not see the important work of SCAR unless they subscribed to *The Polar Record* or had library access to it, or unless they saw information about SCAR through their other polar contacts. In summary, the Ad Hoc Group was extremely frustrated because at the turn of the millennium most scientists were routinely using the internet for communication with national and international colleagues and most institutions were beginning to develop home pages about their activities that were accessible via the internet. SCAR remained in a pre-electronic era.

This situation has dramatically changed in the last nine years and especially since 2004. 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 can not 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 coordination of Antarctic science has quickened and the conduct of its internal administrative business has moved to an effectiveness that was not imaginable in 2000; much else that the Review Group favorably notes in this report benefits from the total transformation that has taken place in SCAR’s move from a printed to an electronic record. Of equal importance is the fact that the shift to 21st Century information technologies has made SCAR much more relevant to the practicing polar scientist and to the interested public whose appetite for Antarctic information is growing with world awareness of the polar regions in Earth’s changing climate grows. A sign of this success is the register of 130,000 hits per month on the SCAR website during 2008; in January 2004 when the website was launched there were 16,000 hits. The Review Group, therefore, gives SCAR high marks for these developments; they have greatly transformed SCAR and made it a relevant and active player through electronic communication.

The Review Group has two recommendations in the area of communication and outreach.

Open and transparent reporting: SCAR had made substantial progress in “opening up” its internal organization and administration by placing much information about these matters on its website thus making it easily accessible to national committees adhering to SCAR, scientists working in Antarctica, and the interested public. The SCAR web site now contains a large amount of useful information concerning SCAR operations, including annual member subscriptions. This openness and transparency is to be applauded. This said, the Review Group noted that there are some aspects of SCAR administration, especially the finances, which although posted on the web site are not easily accessible. Now that SCAR is registered as a company, complete openness and transparency in declaring annual expenditure will be necessary.

Recommendation: *The review group recommends that an open access approach should be extended to all information handled by SCAR including all aspects of its budget and financing. In making this recommendation the Review Group accepts that the papers made available for Delegates and Executive Committee meetings should continue to be posted on a Members-only page until after their approval at the relevant meeting because meeting discussions may lead to their modification.*

SCAR Web Site: The SCAR Secretariat is to be congratulated for its development and ongoing management of the SCAR web site. There is comprehensive coverage of information items relevant to SCAR’s interests and the overall organization of the site is good. It is appreciated that hosting of this site is out-sourced to the Scott Polar Research Institute and that the SCAR Secretariat does not have control over the technology and software that supports it. The Review Group recognizes that web site management takes much time. However, some improvements could be made to make the site even better.

A Google search of the site’s ranking showed that it is not the top ranked site for matters on “Antarctica” or the “Antarctic”, although it is in the top 20 for the latter term. Exploiting techniques used for marking-up the content and fostering cross-linking between the SCAR site and others could elevate its search engine ranking. Being listed among the top 10 sites on a search will raise SCAR’s profile. The site is currently focused internally and is aimed mainly at a SCAR audience. If there is an expectation that the SCAR website should appeal to a wider audience, some modifications to layout and structure may be needed. The site could be modernized by including dynamic features within, or as an adjunct to, the static web pages (e.g. use of drop-down menus, RSS feeds, inclusion of multimedia material). The front page could also be made more alluring to attract visitor attention and might encompass a continuously updated news section that showcases SCAR’s work, its achievements and breaking news about Antarctica in the form of important research papers that have appeared in peer reviewed journals or news stories of interest to the public, e.g. the news appearing on the 50th Anniversary of the signing of the Antarctic Treaty in 2009. There is much to

be said for profiling key issues like biodiversity or climate change in layman's language accessible via simple navigational links on the SCAR home Page.

Web sites are no longer simply vehicles for disseminating information but are also collaborative work-spaces. Given the large number of SCAR business and task groups that meet virtually, the SCAR Secretariat might consider including Wiki-based technology in the SCAR web site. This would negate each group having to establish their own electronic work-spaces. Material that needs to be archived in the longer-term and that is ultimately of interest to a broader audience could then be migrated from the Members-only Wikis into the main web site.

Recommendation: *The Review Group urges SCAR to continue to develop its web site for use by SCAR members and its committees as a collaborative work space for the scientific community working in Antarctic, and for the public interested in Antarctica.*

RELATIONS WITH ICSU AND OTHER ORGANIZATIONS

The revitalization of SCAR has also reinvigorated SCAR's relations with the International Council for Science (ICSU), science organizations, and other organizations concerned with the polar regions or the coordination of research and its conduct in Antarctica. Throughout its history SCAR has been a leader and coordinator of Antarctic research. Such coordination has been a priority because of the continent's remoteness, the difficulty of access for research, and the costs of mounting expeditions to the continent or the Southern Ocean. As global climate research has elucidated the inter-connectedness of natural systems, coordinating of research with organizations facilitating research elsewhere on Earth has become a larger imperative.

For these (and other) reasons SCAR's communication and coordination with other scientific organizations, always important, has grown in the first years of the 21st Century. The Review Group did not examine all of SCAR's working relationships with other organizations. For example, while it noted SSG communications and interplay with other ICSU organizations such as the Scientific Committee on Oceanic Research, the World Climate Research Program, and relevant components of International Geosphere-Biosphere Program, the Review Group did not examine those in any detail. Instead the Review Group focused on three organizational relationships that are discussed below. In the Review Group's considered judgment, they represent SCAR's most important organizational relationships beyond its scientific advisory role to the ATCM.

ICSU: The International Council for Science is the primary international body for facilitating and coordinating science. Much of its work takes place through its 30 scientific unions. ICSU has been a champion of the free circulation of scientists and openness and transparency in scientific communication. At many times over its history, ICSU has played a pro-active role in promoting international collaborative research. It was the leader in the planning of the International Geophysical Year

and immediately after the IGY it became the umbrella organization for the then new SCAR, the Scientific Committee on Ocean Research (SCOR) and the Committee on Space Research (COSPAR). ICSU played a key role in the planning of IPY 2007-2009, and in February 2009 it co-hosted with the WMO, a plenary wrap up summary conference on IPY and some of its major findings.⁵

The Ad Hoc Group while noting SCAR's improved communication with ICSU believes there is a need for further improvement, e.g. there is no space at the ICSU General Assembly or in meetings of its Executive Board for timely reporting on SCAR programs and initiatives. Consequently ICSU is not receiving regular updates on polar scientific advances. The *SCAR Strategic Plan 2004-2010* greatly improved SCAR's "image" at the ICSU Secretariat and the regularizing of electronic communication has also furthered an improved interplay in the ICSU-SCAR relationship. The Review Group notes these developments and was encouraged by them but feels that polar science should be on the agenda at ICSU General Assembly and/or Executive Board meetings.

Recommendation: *SCAR should continue to strengthen its excellent working relations with ICSU.*

The Review Group was also concerned to note that SCAR had not been directly involved in providing advice on Antarctic climate change to the Intergovernmental Panel on Climate Change (IPCC). In part this was because SCAR was not itself an Observer to the IPCC and in part because its parent body, ICSU, which was an IPCC Observer had not taken up its position. Consequently ICSU did not invite inputs from its subsidiary bodies such as SCAR to the IPCC. Thus advice on Antarctic climate change to IPCC came from individual scientists associated with SCAR rather than formally through SCAR. . The Review Group noted that in recent months SCAR had attempted to find out how best to bring its advice to the IPCC, with or without assistance from ICSU and had experienced difficulties in so doing. These difficulties may soon be resolved.⁶

Recommendation: *SCAR should continue to seek independent Observer status with IPCC to ensure that the best possible advice on Antarctic climate change and its effects are brought to the IPCC; failing that SCAR should press its case to provide input to IPCC through ICSU.*

The Review Group recognized that in 2005 SCAR had decided to be proactive in the synthesis of Antarctic climate assessments and changes that are occurring and will likely occur. SCAR developed a synthesis process that is somewhat analogous to the one utilized by IASC in facilitating *The Arctic Climate Assessment (ACIA) "Impacts of a Warming Arctic"*.⁷ That assessment was under the official sponsorship of the

⁵ See *Polar research reveals new evidence of global environmental change*, a press summary release. [www.ipy.org/index.php?i\[y/detail/state_of_polar_research/](http://www.ipy.org/index.php?i[y/detail/state_of_polar_research/)

⁶ As the Review Group report was in preparation, the SCAR Executive Director informed the Review Group that some of the difficulties cited at the time of the Review Group's February 2009 meeting may soon be resolved. However, the Review Group stands by its recommendation.

⁷ *The Arctic Climate Assessment* is found at: www.amap.no/acia

Arctic Council, which consists of governmental representatives of the eight Arctic nations. Both the ISAC and SCAR assessment processes generally follow the synthesis process developed by IPCC over several assessment cycles. A final report *Antarctic Climate Change and the Environment*, as noted, was presented to the ATCM at its 2009 meeting in Baltimore. Following the ATCM meeting and the meeting of CEP, SCAR will publish the 400 page report for wider distribution later in the year. The SCAR Executive Director reported to the Review Group that SCAR will make continuing updates of *Antarctic Climate Change and the Environment*, and will report the findings to ATCM, COMNAP, and other organizations. The Review Group noted this pro-active role in Antarctic climate assessment with satisfaction. In the next decade, the Review Group believes that SCAR should work to make the ATCM a full partner in the climate assessments updates. Such a partnership would make the assessment reports ever more powerful policy documents in a period where policy makers must grapple with climate change, amelioration, and adaptation

Recommendation: *SCAR should continue to periodically assess what is known and what is projected concerning climate change in Antarctica. SCAR is encouraged to develop future assessments as a cooperative activity between SCAR, ATCM, CCAMLR, and encourage governments to provide necessary financial resources for assessment activities.*

IASC: In the first two and half decades of SCAR's operation there was no counterpart organization to facilitate and coordinate science in the Arctic. International political tensions between the USSR and NATO nations prohibited much international collaboration in Arctic research even while Arctic nations themselves individually mounted research programs in their northern territories. In 1990 national academies and science organizations with interests in the Arctic were able to create the International Arctic Science Committee (IASC) and the Arctic Council. IASC matured slowly in its first years but gained momentum and effectiveness in the late 1990s. This provided SCAR an opportunity to begin collaboration with a somewhat parallel organization that coordinated research in the Arctic. At the SCAR meeting in Bremerhaven in October 2004 it was agreed that SCAR should start discussions with IASC in the lead up to IPY 2007-2009, then in its early planning stages. In July 2006, the Presidents of IASC and SCAR signed a letter designed to enable the two organizations to make a more effective contribution than they might otherwise make to the success of the IPY. SCAR and IASC started sending representatives to each others' major management meetings: IASC joined SCAR's cross-linkages science group meetings; SCAR and IASC agreed to co-sponsor the second high latitude climate meeting (Seattle 2007); IASC became a co-sponsor of SCAR's ice sheet mass balance and sea level group; and, SCAR, IASC and WCRP were awarded a grant of 30,000 Euros by ICSU to run a summer school on ice sheets and sea level scheduled for 2009, to name a few examples. IASC and SCAR became ex-officio members of the IPY Steering Committee for the IPY, which enabled them to influence its direction and program. The Review Group applauds these developments.

IPY 2007-2009 has produced a two-fold legacy that is an opportunity for future SCAR-IASC cooperation:

- There has been a substantial expansion of observing networks and monitored sites – manned and automatic stations – that will continue to collect valuable data on polar physical and ecological systems. These will require maintenance, continued financial and logistical support.
- IPY 2007-2009 has produced a treasure trove of scientific data that must be well archived for future research use.

These two IPY legacies and the ongoing advance of interdisciplinary research illustrating the interconnectedness and divergences of systems in the Polar Regions present SCAR and IASC many future opportunities for cooperation.

Recommendation: *Recognizing the differences in organization structure and diplomatic relationships SCAR should continue to vigorously develop collaboration with IASC where mutual interests exist, including stewardship of data and observing networks that are the legacies of IPY 2007-2009.*

COMNAP: In SCAR's early decades the only nations undertaking research in Antarctica were those that had been engaged in the IGY. Logistical support though formidable was a less complex affair than it became as the numbers of research programs grew and austral summer tourist expeditions grew in number. In its early years SCAR hosted several symposia on logistic and operations. Recognizing the growing complexity of Antarctic logistics, the Council of Operators of National Antarctic Programs was formed in 1988. Relations between SCAR and COMNAP have not always been felicitous. The Ad Hoc Group found that many members of COMNAP perceived SCAR to be non-responsive when it came to laying out prospective science efforts with major logistics and infrastructure needs. Other COMNAP members complained that SCAR was slow in its communications with COMNAP. At the time of the Ad Hoc Group evaluation of SCAR there also were widely differing perceptions as to the effectiveness of JCADM, the jointly sponsored committee on data management.

The Review Group found that SCAR-COMNAP relations have improved considerably. On its part COMNAP has continued to mature as an organization that is effective in coordinating Antarctic logistics and in its guidance to tourist operators. SCAR through its Secretariat now provides timely communications to COMNAP. SCAR's identification of five strategic multiyear collaborative research programs has given COMNAP a greater sense of the research that national committees will emphasize in their own research programs and international collaboration. SCAR's leadership in helping with the planning of IPY 2007-2009 furthered SCAR-COMNAP relations. Holding its intersession Executive Committee meeting in close proximity to a COMNAP meeting has also strengthened relations, especially with a joint session of the two Executive Committees in the margins of those meetings. In addition the SCAR and COMNAP Directors meet from time to time to follow up on actions. SCAR has developed a paper on the future of Antarctic science to present at the August 2009 COMNAP meeting which hopefully will stimulate a dialogue about longer term infrastructure needs along with the aforementioned paper on collaboration among national programs on King George Island. However, the Review Group also noted that COMNAP and SCAR no longer work together on data management, which is discussed elsewhere in this report. With this exception

the Review Group finds that SCAR and COMNAP have greatly increased their partnership.

Recommendation: *Building on the collaboration that now exists, SCAR should work vigorously to continue developing its mutual working relationships with COMNAP.*

SCAR AND THE ANTARCTIC TREATY

The 1959 Antarctic Treaty was in part born from the highly successful scientific collaboration of the twelve national scientific programs that engaged in Antarctic research during the IGY. Among treaties and other diplomatic documents and protocols, the Antarctic Treaty had then and now after five decades, a number of prescient features: it resolved some contentious issues, e.g. territorial claims, by setting them aside without prejudice or resolution; it provided for a system of international inspection of national activities in Antarctica; it recognized that science and international cooperation in science and other peaceful activities were the *raison d'être* for human activity in Antarctica; it provided for additional nations conducting research in Antarctica and others to adhere to the Treaty; and, importantly, it included provisions that permitted the extension of the Treaty through additional conventions, protocols, etc. that – under the umbrella of the Treaty – have made the Antarctic Treaty a dynamic diplomatic ‘System’ (ATS).

SCAR is not mentioned in the Treaty but from 1959 SCAR has been recognized by the ATCM as its principal scientific adviser. SCAR has participated in meetings of the ATCM and provided advisory papers on scientific policy matters. 28 nations now adhere to the Treaty as consultative parties and 19 adhere to the Treaty as non-consultative parties. The ATS includes the now annual meetings of the consultative parties, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), the Committee on Environmental Protection (CEP) that was established by the Protocol on Environmental Protection, and the Convention for the Conservation of Antarctic Seals. SCAR has advisory relationships with all of these groups, and for the ATCM it has provided valuable scientific advice that has led to other protocols such as the designation of specially protected natural and historic areas. SCAR provided the major scientific input into the now abandoned Convention on the Regulation of Antarctic Mineral Resources Activities (CRAMRA). Today the Treaty Parties are supported by a permanent secretariat in Buenos Aires, Argentina and CCAMLR is supported by a permanent secretariat in an office in Hobart, Australia.

The Ad Hoc Group noted the many interrelations of SCAR and ATS but felt that SCAR Delegates and officers needed a more focused approach to these important scientific-diplomatic policy relations. The Ad Hoc Group recommended that a SCAR vice president be tasked with oversight of Treaty relations and that the SCAR Delegates, in plenary session, focus additional deliberation on SCAR’s ATS role. SCAR addressed the recommendation of the Ad Hoc Group by tasking a vice president (now the president) to oversee treaty matters and by establishing a

Standing Committee on the Antarctic Treaty System (SC-ATS). SCAR's advisory input – in the form of scientific policy papers – was just a few each year at the time of the Ad Hoc Group 1999-2000 review. By 2005 submittals to the ATS had risen to six. In 2006-2009 the numbers of policy documents has averaged about ten a year. Throughout its report, the Review Group comments on aspects of the ATS-SCAR relationship, and on SCAR's critical role as the principal scientific adviser to the ATS. Review Group recommendations made elsewhere will enhance the ATS-SCAR relations.

Here the Review Group wishes only to address the residual perception that in some quarters that SCAR is less responsive and less timely in its ATS input than the present record indicates. It makes this comment on the basis of some of the responses it received to its call for comments. The Review Group believes that the impression of tardiness and non-responsiveness is much more a matter of perception rather than reality. Moreover, documents do not always move with alacrity within national committees or within the ATS communication channels and it may be that some SCAR transmittals get held up at these "receiving ends." Nonetheless, SCAR officers should be aware of this lingering "image" of SCAR in some parts of the larger Antarctic community.

Recommendation: *The SCAR Officers should continue to communicate with national committees and national program operators on SCAR science policy inputs to the ATS so that they are fully and continually informed about SCAR's advisory activities.*

FACILATING DATA MANAGEMENT AND ARCHIVING

Scientific Data Management: Antarctic research spans many scientific disciplines, space, the atmosphere, the cryosphere, the Southern Ocean and Earth's surface and deep interior. Each discipline and its constituent sub-disciplinary groups have their own niche requirements in terms of data management. A lack of proven and pervasive, off-the-shelf information publishing technologies coupled with this diversity, has made it difficult in the past for SCAR to successfully promote development of a collaborative, connected data management system that goes significantly beyond the registration of metadata records. However, since the Ad Hoc Group review, 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 a unified, multi-disciplinary metadata system, which is to be roundly applauded. However, current approaches to developing a SCAR data system have to date focused mainly on one aspect of the data management life-cycle (i.e. data documentation and discovery). It is "access" to various forms of data that scientists value the most in a system.

Having laid the foundations through the establishment of a robust metadata system, SCAR scientists and data management practitioners must now agree

upon a strategy to build a data system that provides on-line access to qualified, discipline-based data that are re-usable into the future. This requires a coherent vision and an achievable implementation plan. Resource limitations dictate that the SCAR system must be based upon a loosely connected federation of authoritative data repositories (e.g. National Antarctic Data Centers and other thematic, national and World Data Centers), global data publishing networks and data service providers. Many of these already exist and are being patronized by SCAR research programs. It is therefore crucial that SCAR science programs actively engage with data management experts in defining the future directions for SCAR data management, particularly through input into the SCAR Data and Information Strategy and its implementation plan.

SCAR has commendably created two data-centric expert groups (the Standing Committee on Antarctic Data Management – SCADM and the Standing Group on Geographic Information – SGAGI) to help steer and implement development of an Antarctic Data Management System (ADMS). These groups are staffed by national volunteers. In many instances the work and expertise required to pursue development of the ADMS is beyond that which is available. SCAR must recognize these shortcomings and actively seek mechanisms to supplement the resources that are available to achieve its stated data management goals.

Recommendation: *SCAR should continue to facilitate the effective operations of SCADM and SCAGI and encourage national committees to assist these groups as possible with modest financial assistance or with occasionally posted seconded staff because these two resources – financial and human – can positively impact the committees' efforts.*

Reengagement of COMNAP in the facilitation of data management: Improved up-front planning for data management by scientists, at the respective national project planning/proposal stages and also when individual and national research plans become SCAR projects would highlight early on what skills and resources will be required to add project data to the evolving SCAR data management system. Not only would this better factor data management support into overall resourcing estimates for the research, it would also make granting agencies or national institutes cognizant of the true costs of doing the research. An education program covering good data management practices aimed at national institutes and large granting bodies could also prove beneficial in unlocking more funds for these fundamental scientific activities.

The Review Group is heartened by SCAR's progress in facilitating data management and archiving. At the same time, however, it observes that national research organizations have the greatest leverage on insisting that research programs and teams of scientists comply with efforts to quickly place data into permanent archives. Because they are the grantors, the engagement of national funders is crucial for enabling long-term data archiving and data re-use. While SCAR and COMNAP worked jointly on data archiving and management, COMNAP withdrew from the partnership from the end of 2008.

Recommendation: SCAR should reopen discussions with COMNAP about jointly managing Antarctic scientific data. SCAR can be the leading partner in the relationship, but the role of national research funders in encouraging timely entry of research data into the archive system is crucial and thus SCAR should re-open a dialog with COMNAP in this area.

Scientific Data as “Products”: Within the SCAR community there are many useful data-centric products and applications, some of which have been purposefully designed for use by SCAR. For example, SGAGI has developed a place names gazetteer, an Antarctic digital (topographic) database and a map catalogue. Other SCAR groups have developed valuable thematic databases, a small sample of which includes the following repositories’:

- READER Databases (meteorological, oceanographic and terrestrial ice core data)
- Antarctic Biodiversity Database (flora and fauna in Antarctica)
- BEDMAP Database (Antarctic bedrock mapping)
- Seismic Data Library
- MarBIN (Marine Biodiversity Information Network)

Although these products, and more, are now listed on the SCAR web site, the Review Group believes that many in the SCAR community are unaware of their existence, or indeed of their utility. Considering the level of investments in building these products it is important that they are used, and where appropriate perhaps improved and updated through greater collaboration with an active user-community. Products that have no discernable SCAR-based user community should not draw continuing investment of resources from SCAR. Moreover, as has been demonstrated by the major web search organizations, e.g., Google and Yahoo, mining data and organizing data as “products” creates a larger user demand because the organized information becomes a commodity that provides efficiency in information gathering and the saving of time spent browsing for data and information. The Review Group believes that SCAR through the Secretariat, SCADM and SGAGI, and, building on progress in organizing metadata pathways to the vast data resources on Antarctica, should study the feasibility of moving some data into a product or commodity mode to increase utilization.

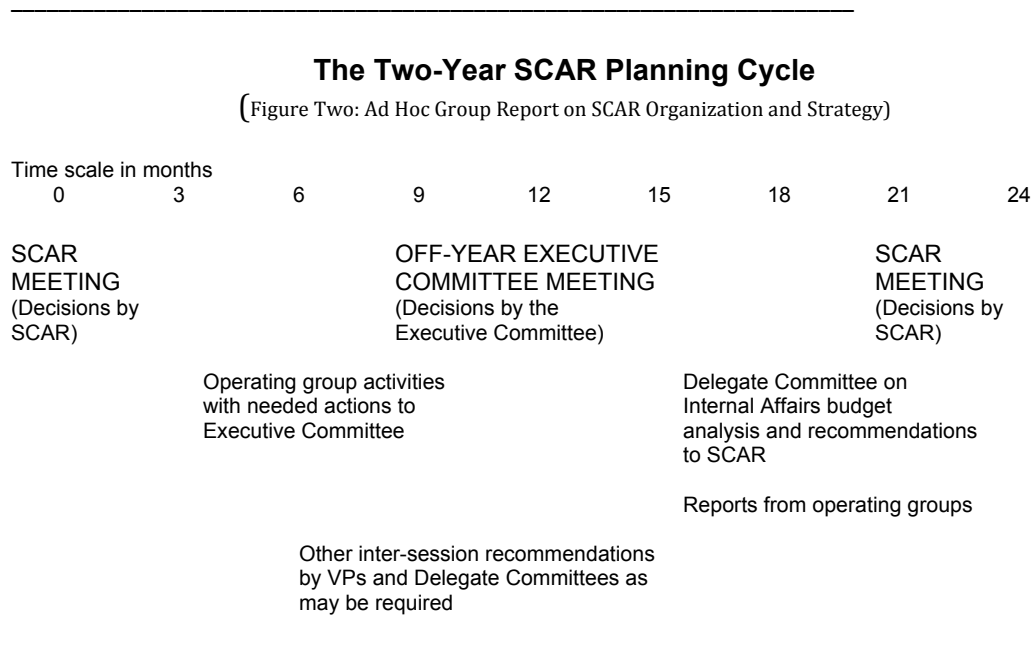
Recommendation: SCAR, through SCADM and SGAGI and the SSGs, should proactively promote the availability of some Antarctic data sets as “products” to further increase the use of Antarctic data.

SCAR DELEGATE LEVEL, STANDING SCIENCE AND OTHER GROUPS

The Ad Hoc Group made a number of recommendations related to SCAR’s organization when it undertook its 1999-2000 evaluation. Central were: greater participation of SCAR Delegates in the SCAR plenary meetings through the development of action oriented Delegate Committees with specific portfolios of responsibility, tasking SCAR vice presidents with specific SCAR duties,

harmonizing the inter-session activity of SCAR and the work and responsibilities for decision-making of its Executive Committee, and a total restructuring of the then existing working group organization into a small number of standing disciplinary groups and action groups on priority science initiatives, advice to the ATCM, etc. Reorganization of SCAR during 2000-2004 implemented these Ad Hoc Group’s recommendations. As the SCAR officers and Secretariat have continued to create an improved understanding of the responsibilities of Delegates and national representatives to SSGs, SRPs, and Action Groups, it has worked to codify clear guidelines on the responsibilities of those involved in SCAR at various levels.⁸ In its evaluation 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.

Harmonization of inter-session SCAR activities: The Ad Hoc Group, as noted, spent considerable time discussing the activities of the Executive Committee in making inter-session decisions and its work flow, both the inputs it received from SCAR Vice Presidents, including the inputs of the Vice President tasked with SCAR financial affairs, and the preparations for the upcoming SCAR plenary sessions. It suggested the following timetable:



The timetable developed by the Ad Hoc Group was premised on the administrative capabilities of SCAR in 2000, which was then entirely paper-driven. The Ad Hoc Group was trying to make practical suggestions to SCAR that would better harmonize the work flow between SCAR plenary sessions, prepare SCAR delegates for the next plenary in a timely way, and create a more timely response to the ATCM, COMNAP, and other organizations SCAR with whom SCAR

⁸ For example, see SCAR Draft: *Reform of the SCAR Delegates and Business Meetings* (working draft 7/17/08 that will be considered by the SCAR Executive Committee in August 2009).

interacted on a regular basis. While the Ad Hoc Group hoped that some of its other recommendations for modernization of the SCAR Secretariat would take hold, it wanted to try to ensure that SCAR would better plan for the next plenary session, produce productive inter-session activity including the actions which could be taken by the Executive Committee on the behalf of SCAR, and create more timely responses to ATCM, COMNAP and other organizations. In its call for comments on SCAR the Review Group received several comments from national committee chairs and individuals suggesting that the present working time table, as developed by SCAR officers and Executive Director in the last several years and which “accelerates” the momentum of the SCAR two-year planning cycle beyond that recommended by the Ad Hoc Group, compresses decisionmaking too greatly. The Review Group does not agree with these comments because SCAR has moved to internet communications and decisionmaking capability. Moreover, SCAR’s decisions to hold intersession Executive meetings in tandem with COMNAP and to more pro-actively prepare for the ATCM meetings support the evolution of the inter-sessional schedule as it has developed to 2009.

Recommendation: *SCAR is to be applauded for the harmonization of its inter-session schedule. The concurrent sessions of the Executive Committee and COMNAP are effective; costs suggests that SCAR’s increasing move to “real time” transmission of documents for decisions is working effectively. SCAR should continue to develop the present arrangements that are now serving SCAR and other organizations well.*

Role of National Delegates on the Standing Scientific Groups: Revitalization of SCAR has been tangible and pervasive through all components of the SCAR structure. However, some fine-tuning is needed with regard to the role of national delegates on the SSGs. The SRPs are made up of active scientists. There is a real sense in the SCAR science community that the SRPs work well, but that the national delegates on the SSGs are not always as highly engaged as would be desirable. It is recognized that the delegates are volunteers who give valuable professional time to these important activities. They are nominated by their respective national science academies and there is little room to influence this process. However, in taking on such responsibilities, delegates should be given terms of reference that make it clear that they are taking on real obligations to serve the science community and that scientific engagement and active involvement are crucial to the successful discharge of their duties.

Recommendation: *Appointment of high-quality, scientifically active and engaged national delegates to SSGs is crucial to the ongoing success of SCAR. The SCAR President should place this issue on the agenda at the next SCAR plenary session to again remind delegates that all participants nominated by national committees for roles in SCAR should be qualified, engaged scientists and science managers who will commit themselves to active engagement in SCAR issues during their terms of office.*

Role of Standing Scientific Groups: A key role of the SSGs is to recommend new SRPs to the SCAR Executive Committee. The current SRPs represent important science areas, and they are widely perceived to be a real strength of the current SCAR

structure. There will always be a small number of SRPs because of budgetary limitations and the high value of strategic focus on priority science issues in Antarctic research. This focus has had demonstrable benefit in the last five years. Furthermore, there is a need for SRPs to have a finite lifetime so that other emerging science problems of high priority can be designated for strategic SCAR-wide research support. SCAR is already facing the issue of evaluating the present SRP collaborative research programs, deciding which should continue, and how it will prioritize candidate emerging SRP proposals. It may be the case that not all areas of Antarctic science require a special focus because some are well organized and benefit from other priority planning processes. On the other hand, comments received by the Review Group suggested that some disciplines felt that they had been overlooked in the SCAR strategic science planning process. It is therefore important to ensure that the SRPs continue to represent important emerging and current Antarctic science areas. There is a need to strategically balance priorities for future SRPs. The current “bottom-up” approach of nominating new SRPs is effective because it ensures that advocacy for new SRPs is being driven by scientifically active and engaged individuals. However, this process has the potential to be driven by vocal special interest groups or by other *ad hoc* suggestions if strategic and balanced oversight is not exercised by the SSGs and by SCAR at the Delegate level.

Recommendation: It is recommended that the SSGs be tasked to operate strategically by specifically aiming on an overview of current, emerging and potentially exciting future science. This reinforces the above recommendation that national delegates need to be scientifically active, engaged, and aware of the range of scientific issues and emerging science across the remit of their specific SSG to be able to provide the required leadership. The Review Group further recommends that the SCAR Delegate Committee on Scientific Affairs begin discussing the evolution of SCAR strategic science programs and that it develop recommendations for SCAR to review at its plenary sessions over the next two biennial cycles.

THE SCAR SECRETARIAT

The findings and recommendations of the Ad Hoc Group concerning the SCAR Secretariat were among the most central in the 1999-2000 evaluation. The reorganization of the SCAR Secretariat began in 2004 with employment of the present SCAR Executive Director. In rapid order a new Administrative Assistant was employed, followed by the present Executive Officer. Both the Executive Director and Executive Officer have backgrounds in the physical sciences and they are experienced in working with national research programs and international scientific organizations. The Review Group believes that the SCAR Secretariat is working extremely well at this time.

Concurrent to these staffing changes, which demonstrably are at the core of SCAR's revitalization, the Scott Polar Research Institute (SPRI) reallocated space in its building to provide the SCAR Secretariat with a more organized, coherent office suite. On occasion the Secretariat staff has requested augmentation, on a short term basis, by using seconded staff to help with specific assignments. However, national committees have not yet shown themselves willing to

participate in the secondments plan despite the offer of \$5000 in assistance to any individual seconded. Such secondments may be essential for the implementation of the SCAR Data and Information Strategy. Furthermore, and importantly, as SCAR initiates additional policy papers and studies to support the ATCM, CCAMLR and CEP, seconded specialists for short-term assignment may be essential for timely, analytical and objective scientific advice. The Review Group, in discussing the question of seconded staff noted also that the experience of working in an international setting and perhaps in another nation can be an intensely enriching career experience for the individuals involved.

Recommendation: *National Committees are urged to provide secondments to the SCAR Secretariat for periods of several months to a year to facilitate implementation of SCAR data and information, policy advice, and other activities.*

As the Secretariat transferred SCAR activities from paper to electronic records, SPRI through its administrative arrangements with Cambridge University has been able to provide SCAR with crucial and excellent expert information technology assistance and support, a *sine qua non* in today's world of business, academia, philanthropy, or non-profit organization or association. Because of the vast polar resources at SPRI it remains a highly suitable location for the SCAR Secretariat. The redeveloped administrative relationship between SPRI and SCAR has worked well and has been beneficial to SCAR.

Recommendation: *The President of SCAR should advise the Director of SPRI of the Review Group's findings concerning SCAR-SPRI relations and its commendation of SPRI for its support, as host organization, of SCAR.*

The Review Group did not spend significant time deliberating matters associated with the SCAR Secretariat that had occupied the Ad Hoc Group because it concluded that the SCAR Secretariat is now operating extremely well. The Review Group's only additional recommendations that center on the SCAR Secretariat and the SCAR delegates management responsibilities for the Secretariat are found in the final section of its report, below.

MAINTAINING SCAR'S MOMENTUM

This report reflects an overall belief by the Review Group that SCAR has made enormous progress since 2000 in executing the reforms that were recommended by the Ad Hoc Group. Momentum accelerated in 2004 when the SCAR constitution and by-law changes were fully adopted by SCAR and when the present SCAR structure was put in place and the new Secretariat team was employed. The Review Group deliberated issues related to the maintaining this momentum in SCAR. The Group's focus was on sustaining SCAR as a vigorous and key scientific advisory and science planning organization in the decade ahead. The next decade will be critical for SCAR for several reasons but particularly because Antarctica now has world attention in relation to its central role in understanding global response to climate change. The Review Group discussed many other aspects of SCAR's future. Voluntary enterprises and

organizations, such as SCAR, are likely to face significant cost pressures in the next decade. While national committees have embraced the increases in membership dues that were enacted in 2006, they are likely to encounter internal, national budget pressures brought about by global economic difficulties impact national science budgets. This could affect SCAR's ability to maintain its current momentum. Furthermore, SCAR's momentum is quite tied to its leadership, both those elected to offices by SCAR and by the leadership of its Secretariat. Elsewhere the Review Group has commented on the elected and nominated leadership that serves SCAR and its subsidiary groups and committees. In this final section of the Review Group report, we focus on two issues that we believe are critical for SCAR in the decade ahead.

Fund-raising: SCAR serves a crucial coordinating role in Antarctic science, but it must carefully operate within priority areas because of its small budget. Further valuable activity could be carried out, but more funding is needed to enable this. The Ad Hoc Group Review recommended engagement in philanthropic fund-raising to assist with SCAR activities. 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. Many similar organizations provide opportunities for member support (e.g., the American Geophysical Union, etc.). We recommend formation of a donor group to support worthy causes such as conference travel support for early career Antarctic scientists or for development of scientists from countries that have emerging Antarctic research capabilities. For donations from the UK, SCAR should exploit its status as a registered charity to seek tax relief on donations through Gift Aid. In addition, as a result of the 2000 SCAR Review, an annual budget line of \$5,000 was introduced from 2009 onward to facilitate fund-raising.

Recommendation: Priority should be placed on forming an advisory group to help identify fund-raising opportunities and develop a plan to deploy SCAR leadership and volunteers to assist with fund-raising development.

Leadership succession planning: 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 excellent recent progress must be sustained for SCAR to continue to fulfill its mission and to continue to overcome any remaining skepticism of SCAR based on its performance prior to its recent revitalization. It would be undesirable for SCAR if there were to be simultaneous turnover of these key leaders. Dr. Summerhayes has had a distinguished career in academic and industry research, including two decades of leadership in international scientific organizations. The Executive Director in his discussions with the Review Group noted that at some point in the not too distant future he might elect to step down as Executive

Director.⁹ The Review Group understands from conversations with the Executive Director and President that reasonable succession plans can be developed to avoid an undesirable outcome, namely a void in SCAR's momentum while a search is underway for a dynamic new Executive Director

Recommendation: *Succession planning within the Secretariat needs to be managed and planned, with full awareness of the constraining factors, by the SCAR Executive Committee.*

CONCLUSION

As noted throughout this report, the SCAR 2009 Review Group has been 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. The Review Group has made suggestions for continued progression of SCAR's effectiveness and in each instance there is a specific recommendation.

SCAR's challenge now will be to continue to develop its internal operations and to continue to build its relationships with other organizations, especially the ATCM, ICSU, COMNAP, CCAMLR and IASC. Continued efforts to augment national committee financial contributions with grants from other sources will help SCAR to build on its current momentum. Maintaining momentum also will require smooth transitions for Secretariat staff replacements.

Antarctica and the Southern Ocean, which are always important scientifically and diplomatically, will continue to grow in their importance in the 21st Century. Understanding Antarctic climate change and objectively interpreting this information for policy makers and the public, is perhaps the greatest immediate challenge. SCAR must continue to play a central role in this process. There are other daunting challenges, e.g. the over-exploitation of living resources. While exploitation of natural resources has receded from view in recent years, it is possible to imagine scenarios that will bring this issue to the fore once again. Environmental protection, including sound environmental practice in research, will grow in importance. There will also be emerging areas of scientific inquiry that should receive priority. In some instances the inclusion of new science initiatives will require that other programs receive less financial or logistic support. In all of these and other emerging challenges sound scientific advice must be at the core of policy making so that it is well informed on a continuous basis as scientific understanding continues to grow. SCAR has prepared itself well to address emerging challenges through the reforms undertaken during 2000-2009. By building on these developments through the recommendations presented here, SCAR can continue to play a central role in facilitating and coordinating science and advising governments working together in the Antarctic Treaty System.

⁹ Since the February 2009 Review Group meeting in Cambridge Executive Director Summerhayes has announced his retirement plan.

APPENDIX ONE: SCAR 2009 REVIEW GROUP MEMBER BIOGRAPHIES

Kim Finney is the Manager of the Australian Antarctic Data Centre and current Chief Officer of the SCAR Standing Committee on Antarctic Data Management (SC-ADM). She has over 20 years experience in applying information management technologies to both small and large-scale scientific data management problems. In 2007 she served on the Prime Minister's Science, Engineering and Innovation Council Expert Working Group that developed a national strategy for managing data in science. In the same year she was also appointed to the International Council for Science (ICSU) ad-hoc Strategic Committee for Information and Data (SCID), which was charged with recommending future directions for ICSU's activities in relation to scientific information and data. She is also a member of the Australian Academy of Science, National Committee for Data in Science (NCDS). In 2004 Ms Finney was instrumental in establishing an Australian Ocean Data Centre Joint Facility (AODC JF), a consortium of 6 federal government agencies (i.e. Defense, Bureau of Meteorology, CSIRO, Australian Institute of Marine Science and Geosciences, Australia and the Australian Antarctic Division). The AODC JF is working towards establishing a virtual national marine data centre. She is a member of the AODC JF Board and in 2005 was responsible for gaining funding for an AODC JF spin-off entity called Blue Net. Blue Net, in conjunction with Australian universities is developing technologies for large-scale data sharing and data integration. Between 2001 and 2004 Ms Finney worked as the Chief Information Officer for the federal executive agency, the National Oceans Office and prior to that managed the CSIRO Marine Division's Data Centre and computing support for the National Research Facility - RV Franklin. She holds B.Sc and M.Sc degrees from Sydney and Macquarie Universities respectively and has a post graduate diploma in Environmental Studies. She is also currently studying for her doctorate in the field of semantic technologies at the University of Tasmania.

Andrew P. Roberts is Professor and Head of the School of Ocean and Earth Science at the University of Southampton and Associate Director of the National Oceanography Centre, Southampton, UK. After completing his PhD in New Zealand in 1990, Roberts had a post-doctoral year at the Centre des Faibles Radioactivités, Gif-sur-Yvette, France, followed by five years at the University of California, Davis, USA, before moving to the UK 13 years ago. His research expertise is in paleomagnetism and rock magnetism, which he applies to problems in geomagnetic field behavior, paleoceanography and climate change, regional tectonics, technique development, and rock magnetism. He has worked in most of the world's major ocean basins and on all continents, including Antarctica where he undertook 3 field seasons as part of the Cape Roberts Project in the late 1990's. Roberts has served on the Editorial Boards of several international scientific journals and he serves, or has served, on review and advisory committees for scientific institutes or organizations in the USA, UK, France, Germany, and China. He has given more than 30 invited and keynote presentations at conferences around the world and he has organized or co-organized a number of research conferences. Roberts has published 120 papers in peer-reviewed international scientific journals.

Christoph Scheidegger is Head of the Research Unit Biodiversity and Conservation Biology at the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) in Birmensdorf, Switzerland and he is a Professor at the University of Berne. After completing his PhD at the University of Berne in lichen systematics and biogeography, Scheidegger moved to WSL where he first specialized in low-temperature electron microscopy to study turgescence-related functional states of plant and fungal cells. He studied ultrastructural effects of controlled long-term ozone fumigation experiments on trees and investigated the ultrastructure of symbiotic interactions in mycorrhizae and lichens. Later, Scheidegger specialized in conservation biology and the population genetics of forest-dwelling lichen species and he is involved in a range of regional studies into the phylogeography of rare and endangered species.

Scheidegger has published 8 books and 80 papers in peer-reviewed international scientific journals and he currently chairs the IUCN-SSC Lichen Specialist group and serves the International Union of Biological Sciences as Secretary General.

Philip M. Smith (Chair) is a science and technology organization executive. His associations with the Arctic and Antarctica cover more than five decades. In 1955-56 Smith spent 14 months in northern Greenland as an officer in a US Army engineer and transportation unit experimenting with over ice transportation, runway ice compaction, and sub-surface snow construction for military facilities. Later in 1956 he pioneered a 650-mile over ice traverse supply route inland from Little America V to 80°S 120°W, the site of the IGY Byrd Station. In 1957-58, Smith was a member of the staff of the US National Committee for IGY at the National Academy of Sciences and conducted glaciological research on Antarctic's Ross Ice Shelf. At the National Science Foundation in 1959 Smith helped organize the US Antarctic Research Program and directed research planning and logistical support for global scientific programs in polar and ocean research. He helped expand collaborative research programs in the Arctic made possible by the US-USSR détente agreements of the early 1970s.

Over the 1970s Smith served in three US presidential administrations in the White House Offices of Management and Budget and Science and Technology Policy. From 1981 to mid-1994, Smith was executive director of the National Research Council, the policy advisory arm of the US National Academies of Sciences and Engineering. While at the academies he helped found IASC and signed its charter for the US at the first IASC meeting at Resolute, Canada. In 1999-2000 Smith chaired the Ad Hoc Group on SCAR's Strategy and Structure. Smith was a member of a National Academies advisory committee on the US program for International Polar Year 2007-2009. He has been an adviser to the US Committee for Economic Development, the Mexican Academy of Sciences, and several philanthropic foundations. Recently he has served on US academy committees making recommendations on: science and technology for countering terrorism; increasing science advice and staff in the US State Department, the US Agency for International Development; the United Nations system; and, on the future management of the Colorado River. A resident of Washington DC for forty-eight years, Smith now resides in Santa Fe, New Mexico.

APPENDIX TWO: ACRONYMS

APECS	Association of Polar Early Career Scientists
ATCM	Antarctic Treaty Consultative Meeting
ATS	Antarctic Treaty System
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
COMNAP	Council of Managers of National Antarctic Programs
COSPAR	Committee on Space Research
CRAMRA Activities	Convention on the Regulation of Antarctic Resources
CEP	Committee on Environmental Protection
IASC	International Arctic Science Committee
ICSU	International Council for Science
IGY	International Geophysical Year
IPY 2007-2009	International Polar Year 2007-2009
ISI Journal	Institute for Scientific Information
IPPC	Intergovernmental Panel on Climate Change
MAR-Bin	Marine Biodiversity Information Network
NASA	National Aeronautics and Space Administration
POGO	Partnership for Observation of the Global Oceans
SCOR	Scientific Committee on Oceanographic Research
SCADM	Standing Committee on Antarctic Data Management
SGAGI	Standing Group on Geographic Information
SCAR	Scientific Committee on Antarctic Research
SSG	SCAR Standing Scientific Groups
SRP	SCAR Strategic Research Projects
UK	United Kingdom
WCRP	World Climate Research Program
WMO	World Meteorological Organization