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# Antarctic Science: the role of SCAR

## Ciencia antártica: el papel del SCAR

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ABSTRACT

This paper, after briefly discussing the structure and functioning of the Scientific Committee on Antarctic Research (SCAR), examines the elements of SCAR strategy to perform its role as a non-governmental organization "charged with the initiation, promotion and coordination of scientific activity in the Antarctic, with a view to framing and reviewing scientific programmes of circumpolar scope and significance".

An important element in the development of SCAR's science strategy consists in the promotion of multi-disciplinary research programmes that focus on major Antarctic scientific questions of global significance. The present SCAR Global Change Programme is a good example of this approach. These programmes should also address the strengthening of international co-operation and the provision of opportunities for the ample participation of all SCAR member countries in Antarctic research.

The provision of scientific and technical advice to the Antarctic Treaty (AT) is also an important role that SCAR has been successfully undertaking since 1961. One important aspect of this contribution is SCAR's long time involvement in Treaty matters pertaining to the integrity of the Antarctic environment, including the conservation of its terrestrial and marine ecosystems.

Until recent years, this role was performed exclusively by SCAR but it is now complemented by the Council of Managers of National Antarctic Programmes (COMNAP) with regard to the operational aspects of scientific research.

Establishment of the Committee on Environmental Protection (CEP) when the Protocol on Environmental Protection enters into force in the near future will probably result in a review of the role presently performed by SCAR for the AT on environmental matters. It is expected that any future arrangement will take into account the unique position of SCAR as a source of independent and expert advice.

RESUMEN

Este artículo, tras comentar brevemente la estructura y el funcionamiento del Scientific Committee on Antarctic Research (SCAR), examina los elementos de la estrategia del SCAR para ejecutar su papel como organización no gubernamental "encargada de la iniciación, promoción y coordinación de la actividad científica en la Antártida, con vistas a enmarcar y revisar programas científicos con enfoque y significación circumpolar".

Un elemento importante en el desarrollo de la estrategia científica del SCAR consiste en la promoción de programas de investigación multidisciplinares enfocados a las principales cuestiones antárticas de significación global. El actual Programa del SCAR sobre Cambio Global es un buen ejemplo de este objetivo. Estos programas están dirigidos también a procurar la cooperación internacional y a proporcionar oportunidades para la amplia participación en la investigación antártica de todos los países miembros del SCAR.

El proporcionar asesoramiento científico y técnico al Tratado Antártico (AT) es también un importante papel que el SCAR ha abordado exitosamente desde 1961. Un aspecto importante de esta contribución consiste en la inclusión, desde hace mucho tiempo, del SCAR en los aspectos del Tratado que han pretendido la integridad del medio ambiente antártico, incluyendo la conservación de sus ecosistemas terrestres y marinos.

Hasta años recientes, este papel fue asumido exclusivamente por el SCAR pero ahora está complementado por el Consejo de Gestores de los Programas Antárticos Nacionales (COMNAP) en lo que se refiere a los aspectos operativos de la investigación científica.

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El establecimiento del Comité para la Protección del Medio Ambiente (CEP), cuando el Protocolo al Tratado Antártico sobre Protección del Medio Ambiente (Protocolo de Madrid) entre en funcionamiento en un futuro cercano, probablemente acarreará una revisión del papel actualmente asumido por el SCAR ante el Tratado Antártico en asuntos medioambientales. Es esperable que cualquier arreglo futuro tendrá en cuenta la posición única del SCAR como fuente de asesoramiento independiente y experto.

## 1. Introduction: origin and growth of SCAR

It is generally accepted that it was the discussions related to the implementation of the International Geophysical Year (IGY) of 1957-58 that gave rise to the idea of setting up an organization that could provide co-ordination for further scientific research in Antarctica in post-IGY times.

SCAR, the organization that resulted from those negotiations, was established by the International Council of Scientific Unions (ICSU) in 1958 under the name of the Special Committee on Antarctic Research, changed to the Scientific Committee on Antarctic Research in 1961.

A common view in Antarctic literature is that in addition to SCAR, the Antarctic Treaty itself was also a direct descendant of the International Geophysical Year. In this way the interest of preserving the Antarctic continent as an international laboratory for scientific research was a main element in the negotiations that took place in 1958-59 and that led to the Antarctic Treaty of 1961. Other elements included in these discussions, reflected in the Treaty initial *considerandа,* were the promotion of international co-operation, as a basis for freedom of scientific investigation and the maintenance of peace.

It seems clear, therefore, that recognition of the value of science in the southern polar region by the Treaty Parties has always been closely associated with important political issues. The text of the AT has thus provided a framework in which Antarctic science has been carried out for the past 35 years.

A full analysis of the relationship of science to politics in Antarctica and the role of scientific research in the Antarctic Treaty System (ATS) through the years to today is beyond the scope of this paper. Some aspects of this relationship will nevertheless be referred to later on.

Until the end of the 1970s, the membership of SCAR remained constant. Membership more than doubled during the following decade but growth has been less intense since then. Figure 1 demonstrates the evolution of SCAR compared with that of the Antarctic Treaty. Important developments in the evolution of the Antarctic Treaty System are also shown on the figure. It demonstrates how the growth of Treaty membership may have been influenced by, for instance, the negotiations on the regulation of activities related to living and non-living resources in the Antarctic. The independent affiliation to the Treaty, an international governmental regime, on the one hand and to SCAR, a scientific, non-governmental organization, on the other is also clearly depicted in Figure 1. At present, only 32 of the 43 Consultative and Non-Consultative Parties to the Treaty are also Full or Associated Members of SCAR.

## 2. Structure and functioning of SCAR

The main elements that make up the structure of SCAR and the relationships between them are represented in Figure 2. They include the SCAR Working Groups and Groups of Specialists, the Meeting of Delegates, the Executive Committee and the Secretariat. The eight Working Groups (Biology, Geodesy and Geographic Information, Geology, Glaciology, Human Biology and Medicine, Physics and Chemistry of the Atmosphere, Solar-Terrestrial and Astrophysical Research, Solid-Earth Geophysics) play an essential part in the functioning of SCAR in its role of promoting, initiating and co-ordinating Antarctic science. They are permanent bodies whose principal members are representatives appointed by National Committees of Full Member countries of SCAR. They meet during SCAR biennial meetings or intersessionally to review the scientific progress achieved by the national programmes in each Antarctic science discipline and to propose new research themes that focus on relevant science problems. When necessary, Working Groups may form subordinate groups (Subcommittees or others) to

deal with specific science matters within the field of competence of the Group.

When a relevant science problem is identified that necessitates a multi-disciplinary or multinational approach, or in response to a request for technical or scientific advice from the Antarctic Treaty, a Group of Specialists may be formed by SCAR. This group differs from a Working Group in being temporary (usually 5-10 years) and comprises scientists, from inside or outside SCAR, appointed for their expertise.

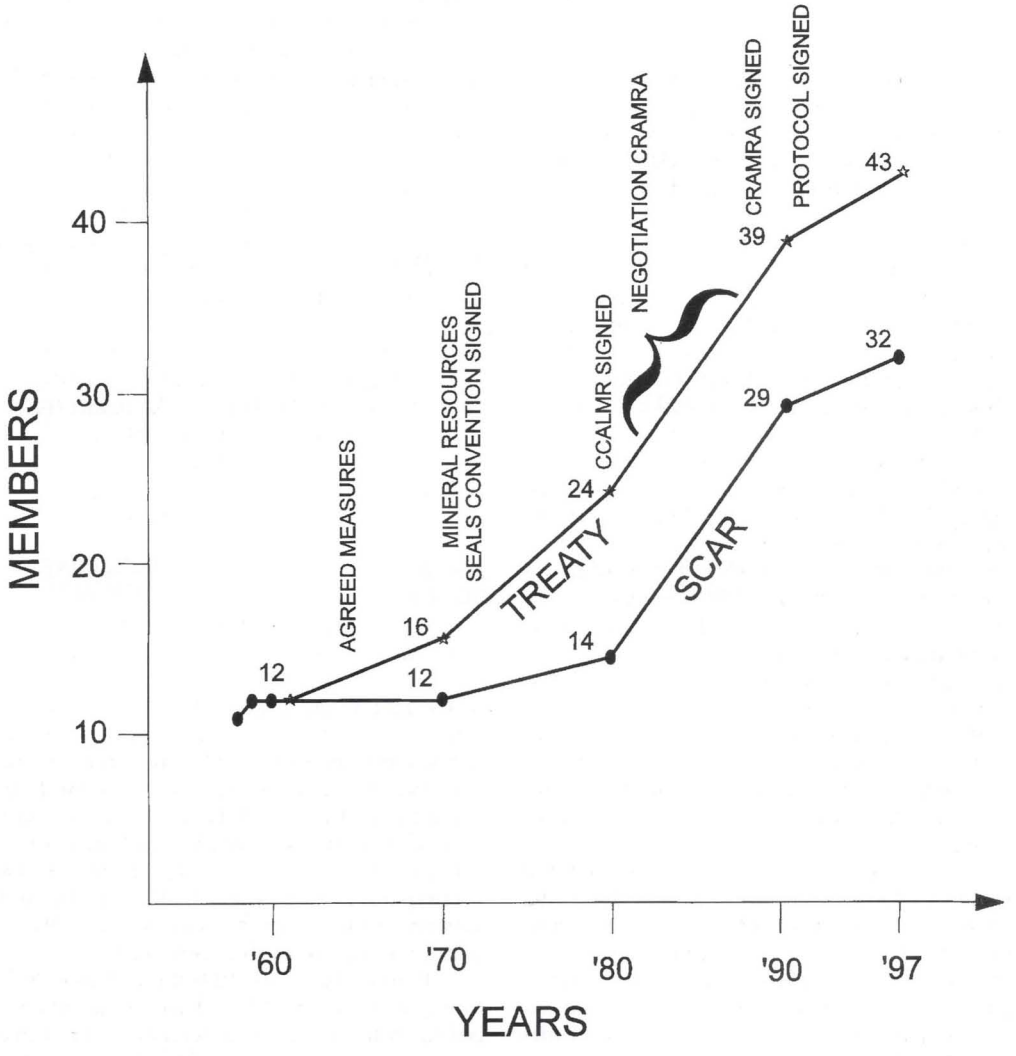


Fig. 1.–Evolution of membership of SCAR and of the Antarctic Treaty.
–Evolución de miembros del SCAR y del Tratado Antártico.

At present, SCAR has three Groups of Specialists: the Group of Specialists on Seals, on Environmental Affairs and Conservation (GOSEAC), and on Global Change and the Antarctic. The first operates in two

ways: by providing scientific advice to the Antarctic Treaty under the Convention for the Conservation of Antarctic Seals (CCAS), and by planning and co-ordinating research on seals. GOSEAC is mainly concerned with the provision of advice to SCAR on environmental and conservation matters, most of which is in response to requests from the Antarctic Treaty Consultative Meetings (ATCM). At their XXIV Meeting in Cambridge last year, SCAR Delegates agreed that the Group of Specialists on Global Change and the Antarctic should be restructured and the membership changed to better co-ordinate the SCAR Global Change Programme.

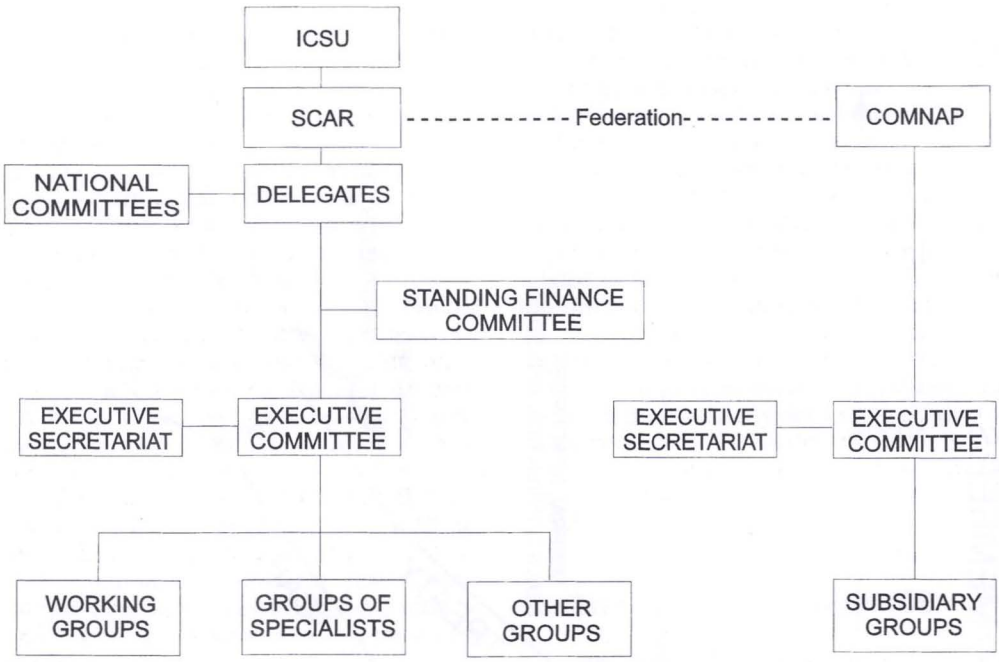


Fig. 2.–Structure of SCAR.
–Estructura del SCAR.

The Biological Investigations of Marine Antarctic Systems and Stocks (BIOMASS) programme that ran for 15 years is an outstanding example of a succesful scientific initiative proposed by a SCAR Group of Specialists. BIOMASS used an ecosystem approach to study krill (*Euphausia superba*), the shrimp-like crustacean which is the principal element of the food web in the Southern Ocean. The programme involved two complex multi-ship, multi-national field seasons in the Southern Ocean whose results formed the basis for the krill conservation policy developed by the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR). The SCAR Global Change Programme is a recent initiative of SCAR that is comparable in scale to BIOMASS, although different in its structure, and focuses on Antarctic research of global relevance.

It must be remarked that although it is true that the aegis of SCAR is highly influential in promoting a research initiative internationally, it is ultimately dependent upon the national programmes to participate in this initiative. This decision is generally influenced by the scientific interests and resource capabilities (financial, human and logistical) of each national programme. Therefore, in addition to the larger international science programmes generated by SCAR that require multi-national co-ordination, Antarctic research is also characterized by numerous

smaller initiatives taken by each national programme or through co-operation of two or more national programmes.

The ultimate authority of SCAR is the Meeting of Delegates that is held at each biennial SCAR Meeting. The Delegates represent each Full and Associate Member of SCAR and those interested scientific Unions of ICSU. The Meeting of Delegates determines SCAR's strategy and functions and prepares financial budgets, in addition to receiving scientific proposals developed by the Working Groups and Groups of Specialists.

The administration of SCAR is performed by an Executive Committee elected by the Delegates and formed currently by a President, the immediate Past-President, three Vice-Presidents and a Secretary, with the support of a permanent Executive Secretariat located at the Scott Polar Research Institute, Cambridge, UK. The Executive Committee is also responsible for conducting SCAR business intersessionally.

## 3. SCAR STRATEGY AND PRIORITIES

The international interest in Antarctic matters that has grown steadily since the mid to late 1970s has resulted in new pressures on the organization and management of Antarctic science.

The changing circumstances called for the integration of Antarctic research into the mainstream of international research, focusing on issues of a more global nature that require multi-disciplinary approaches, use of sophisticated technologies and major logistical resources.

Awareness of these new trends led SCAR to re-examine its role as the leading international organization in Antarctic science. At the same time, the changing political context involving the Antarctic Treaty System required also a re-assessment of the functioning of SCAR as the principal technical and scientific advisory body to the Antarctic Treaty. The organizational approach proposed by the Executive Committee to cope with these challenges is now a central part of SCAR strategy.

In the field of science, the recognition of the importance of the Antarctic in relation to ICSU's International Geosphere-Biosphere Programme (IGBP) resulted in Antarctic global change research being given high priority in the SCAR scientific agenda. Intensive discussions, held by SCAR scientists since 1990, led to the proposal in 1992 for a SCAR Global Change Programme and the establishment of a Group of Specialists on Global Change and the Antarctic to co-ordinate the programme. Further developments, approved by the SCAR Delegates at the Cambridge SCAR Meeting in 1996, led to a re-organization of the programme (Fig. 3). The SCAR Global Change Programme now integrates several multi-disciplinary science programmes covering all aspects of the Antarctic contribution to global change research. The complexity of this science enterprise required the establishment by SCAR of a Programme Office, staffed by a full-time Programme Co-ordinator in charge of the administration and co-ordination of the different Antarctic initiatives, as well as maintaining scientific liaison with the many other global change programmes around the world. In this context, the Programme Office will operate as the IGBP System for Analysis, Research and Training (START) Regional Office for Antarctica.

Identification of a high priority science topic such as global change, however, does not exclude recognition by SCAR of the scientific relevance of other research initiatives in basic science generated within the Working Groups. In fact, SCAR stimulates the generation of science plans focusing on key Antarctic issues in the different disciplines.

One important aspect of these proposals is the emphasis on international co-operation between Antarctic scientists in different programmes as a mechanism for rationalizing the use of scientific and logistical resources, avoiding or reducing duplication of effort and facilitating the integration of scientists from smaller programmes. Planning of adequate logistical support for large scale, international science efforts proposed by SCAR is another aspect in science management that has evolved rapidly in recent years. The creation, in 1988, of the Council of Managers of National Antarctic Programmes (COMNAP), an organization federated to SCAR, and of its subsidiary body, the Standing Committee on Antarctic Logistics and Operations (SCALOP) as an off-spring of SCAR, was a natural consequence of this development.

Another equally critical aspect of SCAR strategy refers to its role in the context of providing scientific, technical and environmental advice to the ATS. SCAR has been a source of such advice to the AT since its beginning in 1961 and it is fair to say that most of the complex body of regulations established by the AT in terms of protection of the Antarctic environment resulted from COMNAP with regard to the practical implementation of measures related to the protection of the Antarctic environment.

Additional challenges are foreseen in the near future, when the Madrid Protocol enters into force and its Committee on Environmental Protection (CEP) is established and begins operation. Functions assigned to the CEP under the Protocol may result in a

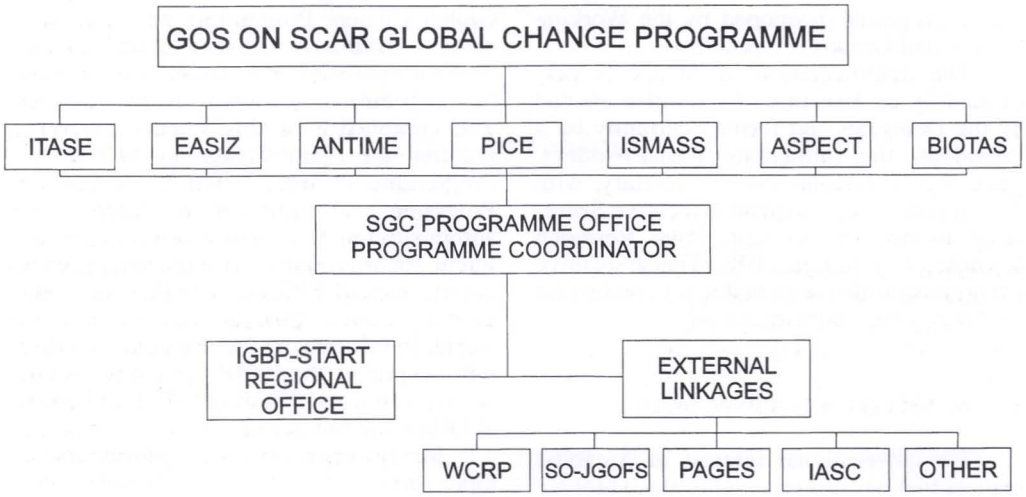


Fig. 3.–Organization of the SCAR Global Change Programme. Explanation:
ITASE: International Trans-Antarctic Scientific Expeditions; EASIZ: Ecology of the Antarctic Sea-Ice Zone; ANTIME: Late Quaternary Antarctic Sedimentary Record of Ice Margin Evolution; PICE: Palaeoenvironments from Ice Cores; ISMASS: Ice Sheet Mass Balance and Sea Level; ASPECT: Antarctic Sea-Ice Processes and Climate; BIOTAS: Biological Investigations of Antarctic Terrestrial Systems; IGBP: International Geosphere-Biosphere Programme; START: System for Analysis, Research and Training; WCRP: World Climate Research Programme; SO-JGOFS: Southern Ocean-Joint Global Ocean Flux Study; PAGES: Past Global Changes; IASC: International Arctic Science Committee.

–Organización del Programa del SCAR sobre Cambio Global. Explicación:
ITASE: Expediciones Científicas Internacionales Trans-Antárticas; EASIZ: Ecología de la Zona de Mar Helado Antártico; ANTIME: Registro Sedimentario de la Evolución durante el Cuaternario Superior del Margen de Hielo Antártico; PICE: Paleoambientes a partir de Sondeos en el Hielo; ISMASS: Balance de Masas de los Casquetes de Hielo y Nivel del Mar; ASPECT: Procesos Antárticos Mar-Hielo y Clima; BIOTAS: Investigaciones Biológicas de Sistemas Antárticos Terrestres; IGBP: Programa Internacional Geosfera-Biosfera; START: Sistema para Análisis, Investigación y Entrenamiento; WCRP: Programa de Investigación del Clima Mundial; SO-JGOFS: Océano Austral-Estudio Conjunto del Flujo Oceánico Global; PAGES: Cambios Globales Pasados; IASC: Comité Internacional de Ciencia Ártica.

proposals originated by SCAR. Since 1972, SCAR has also operated, through its Group of Specialists on Seals, as the *de facto* scientific committee for the Convention for the Conservation of Antarctic Seals.

Although SCAR is an influential observer and is the only independent, non-governmental scientific adviser to the AT, this role is now being complemented by reduction of the tasks that SCAR has traditionally undertaken for the AT, particularly in matters related to environmental protection.

The Protocol recognizes the importance of the contribution that SCAR can make to the work of the CEP, by specifically inviting SCAR to participate as an observer at its meetings and to advise in matters related to the functioning of the Committee itself and

in the implementation of the requirements in the annexes to the Protocol. It is therefore expected that co-operation between SCAR and the AT in environmental matters will continue at a significant level in the years ahead, in addition to SCAR's advisory and informative role in Antarctic science matters.

## 4. Is Antarctic science diminishing?

Rumours and conflicting statements that circulated a couple of years ago in the international news media in connection with the review of the US Antarctic Program by the US Senate raised the question of a possible global reduction of the international research efforts in Antarctica.

One of the arguments often utilized was that the prohibition of any activity of a commercial nature related to mineral resources in the Antarctic, as defined in the Madrid Protocol, could have provoked a reduction in the interest of some nations who were primarily seeking participation in the future exploitation of Antarctic mineral resources.

The complex and comprehensive measures embodied in the Protocol on Environmental Protection to the Antarctic Treaty has been and still is a source of concern to the scientific community. It was thought that possibly excessive environmental regulations could impose unnecessary restrictions on the execution of research. Scientists feared also that the new requirements for environmental impact assessment and for monitoring of human activities in the Antarctic, including scientific activities, could force national programmes to divert part of their often scarce financial resources, originally allocated entirely to science, to the implementation of those requirements. Possible implications for science of the future Annex on Liability for damage to the Antarctic environment is another source of concern.

The extensive survey of the status and future planning of most of the national Antarctic programmes made by the US Office of Polar Programs revealed, on the contrary, the high levels of enthusiasm and interest of countries involved in Antarctic scientific research to maintain or even expand their national programmes.

This positive trend was also made clear during the XXIV SCAR Meeting in Cambridge, UK, in 1996. Participation of member countries in the meetings of Working Groups, workshops and symposia, as well as in the Meeting of Delegates, was both wide and extremely productive. Important decisions on the organization of Antarctic science, in terms of new international multi-disciplinary programmes, and on other aspects of SCAR strategy were taken in Cambridge.

A proper perspective provided by the voluntary initial implementation of measures prescribed in the Madrid Protocol since 1991, also reveals that science will not only continue to be important but that opportunities for research can be even greater in Antarctica. Inevitably there will be many practical aspects to the implementation of the Protocol that national Antarctic programmes will have to take into account. These practical aspects, such as the requirement for environmental impact assessment and monitoring of activities, will change to some extent how science is done, and particularly, how it is supported. This new context is not, however, strange to scientists, since it has always been through the initiative of SCAR and Antarctic scientists that the existing body of measures for the protection of the environment has developed.

## 5. Outlook for the future

Some of the elements that comprise the rapidly changing contexts, both scientific and political, which have affected Antarctic science in recent years, have been briefly considered.

SCAR has had, for several decades now, the responsibility for initiating, promoting and co-ordinating international science in Antarctica. It is the single international interdisciplinary, non-governmental organization that is able to draw on the experience and expertise of scientists from across the boundaries of science disciplines, and also of nations.

In order to maintain and even enhance its important role, SCAR has to be aware of and keep pace with these changing factors. This requires the prompt addressing of relevant science issues and the formulation of viable research programmes that allow integration of resources from different science disciplines, and that promote and facilitate international co-operation. Research aimed

at the understanding of global change phenomena, that can be advantageously investigated in Antarctica, is an example of a topic that is currently at the forefront of scientific research. Integration and co-ordination of Antarctic programmes with those of the array of international organizations with interest in the Antarctic region are also essential. Other scientific realms should, however, be contemplated involving fundamental research programmes based on excellence and relevance in different disciplines. Here again, it is important that SCAR's proposals should provide national programmes with the incentive and opportunity to co-operate among themselves on important science questions.

In addition to these main issues, there are other aspects of the functioning of SCAR, involving Working Groups, Groups of Specialists, the Executive Committee, as well the way SCAR meetings are organized and held, that need to be addressed and enhanced.

In the AT arena it is imperative to assure that, in working out the practical implementation of the Protocol, governments maintain a strong position for the provision of independent scientific and technical advice from SCAR.

Here also it is necessary that the functioning of SCAR is adapted to the changed timing of AT meetings, as well as to those of other institutions, when the Protocol enters into force.

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