



URGENT MESSAGES FROM THE SOUTH: ANTARCTIC AND SOUTHERN OCEAN SCIENCE AND POLICY

Strategic Plan 2023 - 2028



The Scientific Committee on Antarctic Research (SCAR)'s new strategy focuses on the climate crisis and the role of SCAR as the leading scientific organization on Antarctica. Concurrently, SCAR will continue to lead, support, and encourage a broad range of Antarctic and Southern Ocean science and research. SCAR strives to establish its presence as a forward-looking international scientific organization by upholding values common to all members and the wider scientific community, including the principles of equality, diversity, and inclusion (EDI). SCAR also commits to reducing its carbon footprint in all activities and cooperating with its partners to minimize environmental impacts on Antarctica and the Southern Ocean.

SCAR will focus on seven main objectives over the next five years:



Promote SCAR's leadership in science by strengthening and expanding high-quality, collaborative, visionary and societally relevant research through international partnerships while addressing urgent global priorities including climate change and biodiversity.



Provide independent scientific advice to the Antarctic Treaty System (ATS) and other international bodies in response to science and knowledge needs identified by policymakers.



Encourage and facilitate unrestricted and free access to Antarctic research data and samples in support of all the above objectives.



Enhance and expand research capacity in SCAR's member countries, recruit new members, and encourage the support of research that addresses the above imperatives.



Increase public awareness and understanding of Antarctic issues and the essential roles Antarctica and the Southern Ocean play in the Earth's climate systems.



Ensure equality, diversity, and inclusion (EDI) principles are applied to all of SCAR's activities and actions, including SCAR's management, structure, and the realization of its missions and vision.



Reduce the carbon footprint of all SCAR activities.



To achieve these objectives, SCAR will adopt a multifaceted strategy to ensure that research is effectively facilitated and globally supported, and its outcomes are efficiently communicated to society and decision-makers. The social sciences and humanities are an integral part of these objectives.

In the more than 60 years of its existence, SCAR has developed into an international organization of high standing, both in the scientific community and the ATS. The rising importance of polar research has made it more important than ever that SCAR strategically responds with excellent scientific knowledge to emerging questions posed by global changes and societal demands.

SCAR's vision is to create a lasting legacy for Antarctic science and knowledge to provide a more sustainable future for our planet. SCAR strives to establish a more complete and detailed understanding of the most critical elements of Antarctic and Southern Ocean physical, chemical and biological systems, and how they are interconnected. Facilitating international cooperation, coordination, and partnerships is essential to achieving this vision.

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SCAR'S VISION FOR 2023-2028

SCAR's vision is

“ to create a legacy for Antarctic science and knowledge that addresses a foundational requirement for discerning a path to a more sustainable future for our planet. ”

To realize this vision, SCAR strives to establish a more complete and detailed understanding of the most critical elements of Antarctic and Southern Ocean physical and living systems, and how they are interconnected. SCAR also strives to better define the unique roles the Antarctic region plays in Earth's climate system, and in turn how processes in lower latitudes influence and feedback to the southern polar regions and vice versa. In combination, this knowledge will be used to more completely and accurately identify the deleterious effects of ongoing and accelerating anthropogenic change in Antarctica, the Southern Ocean and beyond.

The knowledge generated will be used to forecast future change, and to identify and assess the efficacy of potential mitigation and adaptive responses to climate change. These goals are enabled by the research that national Antarctic programmes conduct, the observations and measurements collected, and numerical simulations (models) produced that describe the past dynamics and evolution of ice sheet, the present status and future trends of this complex

system. Facilitating international cooperation, coordination, and partnerships is essential to achieving this vision.

Through its growing programme in the social sciences and humanities, SCAR will engage with the range of society who influence, and are influenced by, Antarctica to ensure SCAR's science, scientists and research activities are fully engaged with the people and societies that value Antarctica and will give greater effect to the knowledge SCAR's research generates.

SCAR will establish its presence as a forward-looking, international scientific organization by upholding important values common to all our members and the wider scientific community under the International Science Council (ISC), including the principles of equality, diversity and inclusion (EDI). SCAR will also pursue a carbon neutral footprint and will lead efforts in carbon reduction for all activities, and cooperate with our partners to ensure that all environmental impacts are minimized.

Over the next five years, SCAR will achieve seven key objectives:

OBJECTIVE 1

Promote SCAR's leadership in science by strengthening and expanding high-quality, collaborative, visionary and societally relevant research through international partnerships; address the globally urgent priority to reduce uncertainty in the projections of the contribution of the Antarctic Ice Sheet to global mean sea level rise; continue to explore how processes in lower latitudes influence and feedback to the southern polar regions and vice versa; and encourage national Antarctic programmes to support research in such topics, as well as in terrestrial and marine biodiversity at the population, species, and community levels.

OBJECTIVE 2

Provide independent scientific advice to the Antarctic Treaty System and other international bodies in response to science and knowledge needs identified by policymakers and decision-makers. Continue to bring to the attention of policymakers expected changes in the Antarctic and the Southern Ocean and communicate the urgency of the need for additional research to narrow uncertainties about cryospheric change, its rate, and the implications for society.

OBJECTIVE 3

Encourage and facilitate unrestricted and free access to Antarctic research data and samples in support of all the above objectives.

OBJECTIVE 4

Enhance and expand research capacity in SCAR member countries, recruit new members, and encourage the support of research that addresses the above imperatives.

OBJECTIVE 5

Increase and improve public awareness and understanding of Antarctic issues and the essential role of Antarctica and the Southern Ocean in the Earth's climate system through communication of the outcomes of Antarctic and Southern Ocean climate change-related research and why this research is essential for policymakers and informed environmental conservation, protection, and management.

OBJECTIVE 6

Ensure equality, diversity, and inclusion (EDI) principles are applied to all of SCAR's activities and actions, including SCAR's management, structure, and the realization of its missions and vision.

OBJECTIVE 7

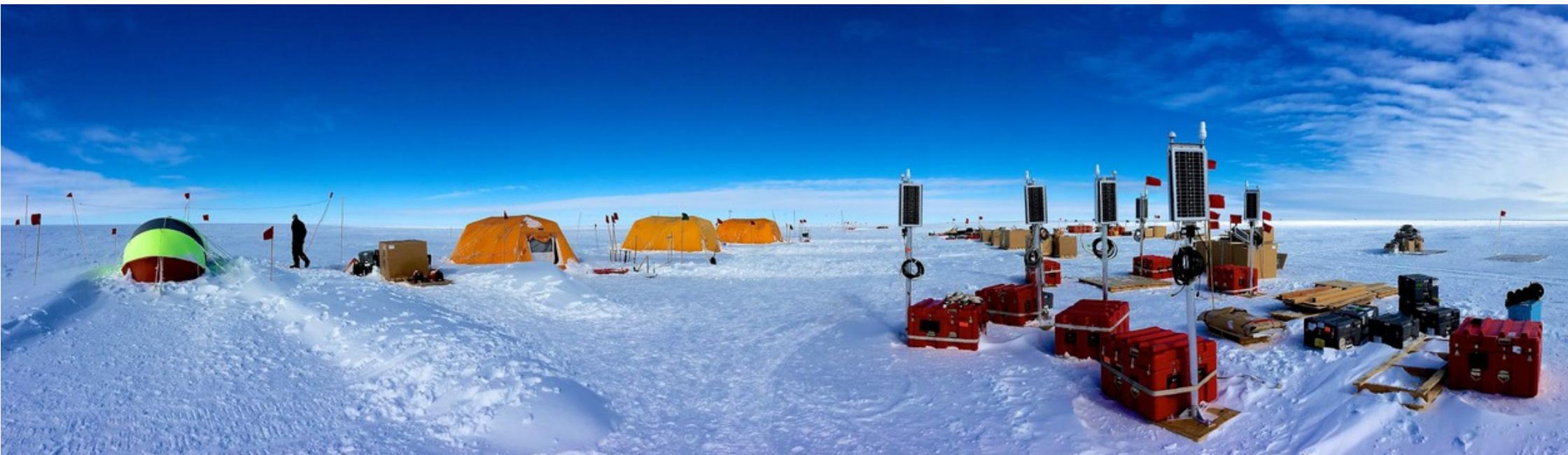
Encourage carbon footprint reduction in SCAR's research activities and SCAR meetings, and continuously monitor conformity to the ISC's Sustainability Principles.

Strategic planning prioritizes the most important areas of potential interest. In response to the global climate emergency, this Plan is weighted toward climate science that can be addressed in the Antarctic. The climate science in this Plan focuses on increasing temperatures, ice sheet melting and sea level rise, as well as impacts on ecosystem function, biodiversity, and human society. Other science topics remain of significant interest to SCAR and the community it supports. Therefore, while climate science is emphasized over the next few years as a matter of urgency, SCAR will continue to maintain and nurture a broad and deep portfolio of science activities, including curiosity-driven science, to reflect the full breadth of Antarctic science and to facilitate creative solutions to future challenges.

Curiosity-driven science is likely to involve research into fundamental atmospheric, oceanographic, geological and biological characteristics and processes. Some of these address the environment beneath the

ice and will be best advanced by geophysical surveys and direct-access drilling on land and in the ocean. Understanding Antarctica's past history is also crucial to understanding its future and studies of sediment, ice, and rock sampling, and proxy-based studies of geological records will provide insight into how geology is linked to ice sheet and climate processes in the past, present, and future. Atmospheric, astronomical, and astrophysical scientists can also use the Antarctic to understand fundamental questions about the universe and the physical phenomena occurring in the Earth's upper atmosphere.

The actions required in the next five years to achieve the above objectives are highlighted in the blue boxes contained within each section of this Plan. Underlying all objectives is SCAR's goal to enhance the flow of information to all interested researchers and policy/decision-makers, and to stimulate crossdisciplinary and transdisciplinary exchanges of knowledge.



THE STRATEGIES



To realize SCAR's vision and advance the seven overarching objectives, SCAR will adopt a multifaceted strategy with a focus on: a) enhancing scientific leadership, b) providing scientific advice to policymakers, c) promoting and facilitating access to data and sharing of samples, d) expanding capacity building, education, and training activities for SCAR's

members, e) improving communications, f) ensuring equality, diversity, and inclusion (EDI) values are applied to SCAR's activities, and g) adopting sustainability principles. These strategies are mutually supportive and are designed to create synergies across SCAR's missions and objectives.

(a) Enhancing scientific leadership

SCAR recognizes the global significance of Antarctica and the Southern Ocean and strives to promote excellence in all aspects of research from this region. Since its inception, SCAR has provided leadership in identifying key questions for scientific investigation, coordinating international efforts to address those questions, and delivering valuable research products for promoting further scientific inquiry and informing policymakers who are responsible for the management and conservation of the region. SCAR will continue to promote and advance scientific

excellence and embrace emerging technologies and challenges through its scientific portfolio and in cooperation with its international partners. SCAR especially encourages the use of new technologies that have revolutionized the way in which we gather scientific data in and around Antarctica, such as the use of remote sensing technology (e.g. the ARGO network) and the use of drilling to reach sub-ice cavities and bed.



To enhance leadership in international Antarctic science, SCAR will:

- Foster interdisciplinary and cross-cutting research activities, particularly the effective integration of the social sciences and humanities.
- Advance the policy and research recommendations of 'Antarctic Climate Change and the Environment: A Decadal Synopsis and Recommendations for Action' (Chown et al. 2022, see Appendix 4) and revisit the SCAR Horizon Scan (Kennicutt et al. 2014, 2015 and 2016) and its update (Kennicutt et al. 2019) to identify and refine areas of research focus.
- Engage the international Antarctic science community through the development of new initiatives from grassroots actions through to the development of new multinational, multidisciplinary Scientific Research Programmes (SRPs).
- Liaise with national Antarctic programmes through the national SCAR committees, the Council of Managers of National Antarctic Programs (COMNAP), and other international programmes of both polar and non-polar organizations, to identify common research priorities, encourage shared use of resources, promote SCAR's science products, and foster equitable and effective collaborations.
- Enhance the high-profile biennial SCAR Open Science Conference and expand the diversity of themes for SCAR's symposia to highlight the key role that Antarctica and the Southern Ocean play in the global system.
- Encourage the use of innovative remote technologies to i) enhance data collection, ii) reduce costs, iii) enable broader participation, and iv) reduce environmental impact and carbon footprint.
- Address the growing need for evaluating, understanding, and mitigating the increasing human impacts on Antarctica and the Southern Ocean by translating knowledge into policy-ready formats and clear messaging understandable by the general public.
- Publicize and reward excellence in SCAR research via awarding of SCAR medals, early career fellowships, visiting scholarships, and the Women in Antarctic Research programme.

SCAR's work is accomplished through the Science Groups, Standing Committees, joint programmes and all of the subsidiary Expert Groups and Action Groups. Flagship SCAR initiatives are the Scientific Research Programmes (SRPs). There are three current SRPs that were established in 2021 and will unfold over the next five to six years. The goals and objectives of these programmes directly support the objectives of this Plan.

Near-term Variability and Prediction of the Antarctic Climate System (AntClimnow)

AntClimnow investigates the prediction of near-term conditions in the Antarctic climate system on timescales of years to multiple decades. They will take an integrated approach, looking beyond climate projections of the physical system to consider the Antarctic environment as a whole.



Integrated Science to Inform Antarctic and Southern Ocean Conservation (Ant-ICON)

Ant-ICON will answer fundamental science questions (as identified by the SCAR Horizon Scan), relating to the conservation and management of Antarctica and the Southern Ocean and focus on research to drive and inform international decision-making and policy change.



INSTabilities and Thresholds in ANTarctica (INSTANT)

The INSTANT SRP will address a first-order question about Antarctica's contribution to sea level change. It encompasses geoscience, physical sciences, and biological sciences, of the way in which interactions between the ocean, atmosphere and cryosphere have influenced ice sheets in the past, and what expectations will be in the future with a special focus on quantifying the contributions to global sea level change. The aim is to quantify the Antarctic ice sheet's contribution to past and future global sea level change.



As these programmes mature and proceed to completion (in 2027-2028), it will be important to foster the next generation of SRPs. In this regard, SCAR has approved the establishment of a Programme Planning Group titled 'Antarctic Geospace and ATmosphere reseArch' (AGATA) to develop new SRPs.

SCAR's structure offers a range of potential ways to propose and advance the scientific interests of the community it supports, and all scientists are encouraged to take advantage of these opportunities.

(b) Providing scientific advice to policymakers

SCAR provides independent and best available evidence to the ATS and other organizations, such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). SCAR responds to direct requests from the ATS and provides proactive advice on emerging issues.

SCAR is designated as one of three official Observers to the ATS and provides scientific updates and advice on a variety of topics, particularly on environmental and conservation matters, to the Antarctic Treaty Consultative Meeting (ATCM), the Committee on Environmental Protection (CEP), and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

SCAR provides advice and recommendations on policy-relevant scientific issues submitted as papers for the ATCM, CEP and CCAMLR, and reviews of the state of knowledge through the [Antarctic Environments Portal](http://www.environmental.aq) (www.environmental.aq). SCAR's advice to the ATS is coordinated by the Standing Committee on the Antarctic Treaty System ([SCATS](#)), which consults with SCAR's experts and groups. SCAR also plays an important role in highlighting emerging scientific issues with potential future significance and impact.



To improve and enhance provision of scientific advice to policymakers, SCAR will:

- Provide scientific advice and strengthen relationships with the Antarctic Treaty System, the United Nations Framework Convention on Climate Change, the Intergovernmental Panel on Climate Change and other international agreements, organizations, and initiatives, such as the United Nations Decade of the Ocean.
- Respond to information requests and science needs identified by policymakers and be proactive in providing recommendations for policy and research to these policy bodies and to national Antarctic programmes by identifying emerging threats and scientific issues of regional and global significance.
- Present high-quality research in a policy-relevant manner accessible to the general public through the SCAR Science Lecture at ATCMs.
- Implement the policy recommendations made in the Antarctic Climate Change and the Environment Expert Group's report 'A Decadal Synopsis and Recommendations for Action' (Chown et al. 2022, see Appendix 5).
- Manage and expand the content of the Antarctic Environments Portal to deliver concise science summaries for policymakers.
- Create learning opportunities (e.g. webinars) for researchers to understand the process by which SCAR bridges the science-policy interface and to recruit the next generation of researchers involved in policy.

(c) Promoting and facilitating access to data and sharing of samples

The Antarctic Treaty was signed in 1959 and Article III clearly specifies that 'scientific observations and results from Antarctica shall be exchanged and made freely available'. Data provision was further embodied in two key recommendations: ATCM Recommendation XIII-5 (1985) which invites SCAR to offer advice on steps to improve the comparability and accessibility of Antarctic data, and ATCM XXII Resolution 4 (1998) which recommends to establish National Antarctic Data Centres and link these to the [Antarctic Data Management System \(formerly Antarctic Data Directory\)](#) for assuring free access to scientific information. The ISC also stresses the importance of a strong public domain for scientific data and information that promotes greater return from investment in research, stimulates innovation and enables more informed decision-making.

Effective data management is critical for adhering to the FAIR (Findable, Accessible, Interoperable and Reusable) principles of data usage and it is essential that SCAR provides clear guidance to researchers on data management requirements. To this end, the Standing Committee on Antarctic Data Management

(SCADM), in consultation with other international organizations, published the [Alignment of Polar Data Policies-Recommended Principles](#) in 2022 to provide guidance for managing, accessing and delivering Antarctic and Southern Ocean data.

SCAR supports data accessibility by providing training opportunities for scientists on data management relating to the Antarctic, as well as promoting cooperation with relevant data repositories and information platforms to ensure that SCAR's data are accessible and shared.

Facilitating access to and sharing of scientific samples (e.g. ice cores, rock and sediment cores, meteorites, biological specimens, geological specimens, fossils, and genomic material) is also important to reduce duplicated or unnecessary site visits that can have unwanted environmental impacts. Facilitating sample sharing thus enables a smaller human footprint in Antarctica and reduces carbon emissions.



To promote and facilitate universal access to data and sharing of samples, SCAR will:

- Require data be made accessible in a full and open manner in keeping with Article III.1.c of the Antarctic Treaty, except for ethical, cultural, or legal reasons.
- Encourage open access to, and sharing of, existing repositories and collections of geological, paleontological and biological samples from Antarctica and the Southern Ocean to help preserve its pristine environment and reduce carbon footprint.
- Apply FAIR principles to make data findable, accessible, interoperable and reusable.
- Require all science projects to develop a Data Management Plan such that data will retain value over the long term and be curated appropriately.
- Encourage availability of data/samples free of charge, excepting the cost of processing and delivery. This would follow a period of priority use to facilitate publication and recognition following collection. Ensure that data are accompanied by metadata containing sufficient information to understand, access, and analyze the data.
- Ensure that National Antarctic Data Centres preserve data in such a manner that the data are enduring, resilient to corruption or loss, and accessible via the Antarctic Metadata Directory ([AMD](#)).

(d) Expanding capacity building, education, and training

SCAR highly values training, support, and development of the Antarctic research community. SCAR assists educators, students and early career researchers and helps under-represented groups and emerging programmes to participate in SCAR's activities and Antarctic research. Further efforts are required to raise national scientific capacities, especially in countries that are developing Antarctic programmes. To enable all in the SCAR family to contribute to SCAR's activities, it is incumbent on SCAR to work with appropriate national Antarctic research agencies to build the research capacities of all Members and Associate Members.

The SCAR fellowship programmes, which facilitate collaboration and knowledge transfer between researchers and institutions, are good examples of SCAR's capacity building efforts for both early career and more established researchers. SCAR encourages and rewards excellence and outstanding service in Antarctic research through biennially awarded SCAR medals. SCAR will continue to engage with the Antarctic science community through its 'Women in Antarctic Research' initiative and ensure EDI principles are considered in all SCAR activities. SCAR will also continue to promote Antarctic research by participating in international educational and training activities.



To expand capacity building, education and training activities, SCAR will:

- Grow SCAR's membership by engaging with emerging Antarctic science programmes in order to better address complex challenges in Antarctica as an international scientific community.
- Enhance SCAR's Fellowship and Visiting Scholar schemes to benefit SCAR member countries with less developed Antarctic research programmes.
- Encourage groups and member countries to hold specialized training courses for early career researchers and those interested in developing Antarctic research activities.
- Establish a mentoring programme for researchers in new SCAR member countries, particularly those with emerging Antarctic programmes.
- Partner with the Association of Polar Early Career Scientists (APECS) and similar organizations to provide career development and mentoring, and to promote involvement of early career researchers in SCAR's groups.
- Identify additional funding sources to grow and strengthen fellowships and awards.
- Facilitate networking through the use of social media and web-based communication.

(e) Improving communications

One of SCAR's primary goals is 'to communicate scientific information about the Antarctic region to the public'. Communication is essential in all aspects of SCAR's work, to ensure that scientists, policymakers and decision-makers understand the value of, and support, SCAR's activities. It is critical that the public is aware of the role of Antarctica and the Southern Ocean in global processes that influence climate. This will enable better support for national Antarctic programmes and lead to more international collaboration in the Antarctic region.

SCAR will enhance communications within the SCAR community through various forms of communication with SCAR Delegates and its subsidiary bodies. SCAR also aims to inform the wider public about Antarctic issues by continuing to collaborate in global initiatives, such as co-hosting side events at the UNFCCC's Conference of the Parties to better communicate the importance of Antarctica and Antarctic science to the public. For a systematic approach to SCAR's communication initiatives, SCAR will maintain and regularly update a Communications Strategy Plan.



To communicate with a broad audience, SCAR will:

- Enhance visibility and promote SCAR's activities using up-to-date communication technologies including social media, to expand the Antarctic research community.
- Regularly update the SCAR website and produce e-newsletters, questionnaires and notices to increase communication between Delegates and the Secretariat and among all subsidiary groups.
- Manage and update the Antarctic Environments Portal to provide impartial and best available science to address specific issues for policymakers, as well as Antarctic researchers and the general public.
- Expand participation in SCAR's activities by providing online opportunities for engagement, especially for SCAR's Open Science Conferences and international thematic symposia.
- Support SRPs in disseminating and communicating their key scientific and policy outcomes.
- Support the production of documentaries that provide insight into the work of SCAR and make these available on social media with subtitles in multiple languages, including the four official languages of the Antarctic Treaty System.

(f) Ensuring Equality, Diversity and Inclusion (EDI) values are applied to SCAR's activities

SCAR desires an environment that values EDI within the Antarctic scientific community. SCAR promotes equitable opportunities for access to science and its benefits, and opposes discrimination based on such factors as ethnic origin, religion, citizenship, language, political or other opinion, sex, gender identity, sexual orientation, disability, or age. SCAR welcomes diversity in all of its scientific disciplines.

SCAR highly encourages researchers that are interested in advancing science in Antarctica and the Southern Ocean to partake in SCAR's activities regardless of their background or stage in their career. SCAR's newly established EDI Action Group will ensure that EDI principles are considered in its activities and actions, including research activities in subsidiary groups and SCAR's management and structure. Through a series of reviews on SCAR's adherence to EDI values, SCAR endeavors to become a leading organization in promoting EDI values in scientific communities in the Antarctic and beyond.



To ensure EDI principles are reflected in SCAR's activities, SCAR will:

- Foster an environment where individuals involved in SCAR's activities receive fair, just and impartial treatment.
- Review nomination and evaluation processes for SCAR Fellowships, the Visiting Scholar Scheme and SCAR Medals.
- Engage with SCAR's subsidiary groups to enhance the community's understanding and awareness of EDI issues.
- Produce recommendations for Codes of Conduct in coordination with partner organizations that can be referenced by national Antarctic programmes.
- Review SCAR's statements and documents to confirm EDI values are upheld.
- Link with partners and other relevant initiatives to ensure best practices in EDI.



(g) Adopting sustainability principles

In 2020, the ISC announced the principles of sustainability in its policy and practices and encouraged other organizations to adopt their own practices to address the challenges of environmental change and sustainability. As a trusted scientific advisor on climate change, SCAR endeavors to minimize the carbon footprint of all activities. SCAR is working toward carbon neutrality by 2030 and action is needed to

achieve this ambitious goal. To this end, SCAR encourages all of its subsidiary bodies and programmes to optimize the utilization of online meetings (e-meetings) wherever possible. SCAR also pledges to work with the Council of Managers of National Antarctic Programs (COMNAP) to develop best practices that reduce the carbon footprint of science conducted in, from, and about Antarctica and the Southern Ocean.



To adopt the Sustainability Principles of the ISC, SCAR will:

- Reduce environmental impact and carbon footprint, especially in support of preserving Antarctic and Southern Ocean physical and living systems.
- Develop a system-wide carbon management plan with the aim of reaching net zero CO₂ emissions.
- Consider alternatives to in-person meetings and prioritize lower carbon forms of transport (e.g. trains and direct flights).
- Conduct events such as the Open Science Conference and biennial symposia in hybrid formats.
- Advise members to prioritize carbon footprint reduction in planning processes prior to any field research activities.
- Use innovative remote technologies to enhance communication, reduce costs, and enable broader participation in all of SCAR's activities.





IMPLEMENTING THE STRATEGIC PLAN

The Strategic Plan will be implemented by explicit actions including: a) coordinating and facilitating science, b) strengthening and expanding partnerships, c) ensuring sustainable income and effective support of SCAR's activities, d) producing value-added products, and e) ensuring excellence by rigorous and regular review.

a) Coordinating and facilitating science

SCAR facilitates coordination of the international scientific community through SCAR's Scientific Groups, Standing Committees, Research Programmes and subsidiary groups, the biennial Open Science Conferences, thematic symposia, workshops, webinars, training schools, and participation in international events. SCAR maintains a virtual network through mailing lists, websites, social media and other communication mechanisms.



To effectively coordinate and facilitate Antarctic science, SCAR will:

- Stimulate transdisciplinary and international collaboration via its SRPs and specialized science groups.
- Encourage exchange of ideas through biennial SCAR Meetings and Open Science Conferences as well as SCAR thematic symposia.
- Ensure wide participation by facilitating access to SCAR's activities, including coordinating technologies to support virtual participation for in-person meetings.
- Strengthen coordination of activities with the Council of Managers of National Antarctic Programs, the International Arctic Science Committee ((IASC), the ISC and other international partners.
- Promote Antarctic sessions in international and national conferences such as the annual meetings of the American Geophysical Union and the European Geosciences Union.
- Co-sponsor regional science meetings on Antarctic research and promote the Antarctic region for scientists, early career researchers and the general public.

b) Strengthening and expanding partnerships

Partnerships support SCAR's goals and can bring lessons from Antarctica to other global challenges. SCAR's diverse partnerships include bodies of the ISC, advisory groups to the ATS, organizations with polar missions, and observing networks and programmes with polar interests (Figure 1). During the next phase, SCAR will put particular emphasis on those partnerships that can help to realize specific SCAR goals outlined in this Strategic Plan with respect to science issues and the demands of society and politics toward Antarctic knowledge and its role in global interconnectivity.

Communication and education about Antarctic science in partnership with other cultural and societal actors is essential to enable further appreciation of the value of Antarctica and the Southern Ocean for current and future human wellbeing, biodiversity, and the interdependence of humans and nature.

To strengthen and build on its network of international partners, SCAR will:

- Nurture and expand partnerships relevant to SCAR's mission.
- Identify global priorities related to Antarctica and the Southern Ocean with stakeholders interested in supporting polar research.
- Reinforce alliances with Arctic counterparts (e.g. IASC) to develop polar perspectives on climate change and other research issues.
- Increase partnerships with regional polar research groups such as the Asian Forum for Polar Science, the European Polar Board, and the Reunión de Administradores de Programas Antárticos Latino-americanos.
- Encourage communication and cooperation, emphasizing aspects of climate change, biodiversity, and human impacts by working with associated research programmes of international science initiatives such as Future Earth, WCRP, and ARGO.



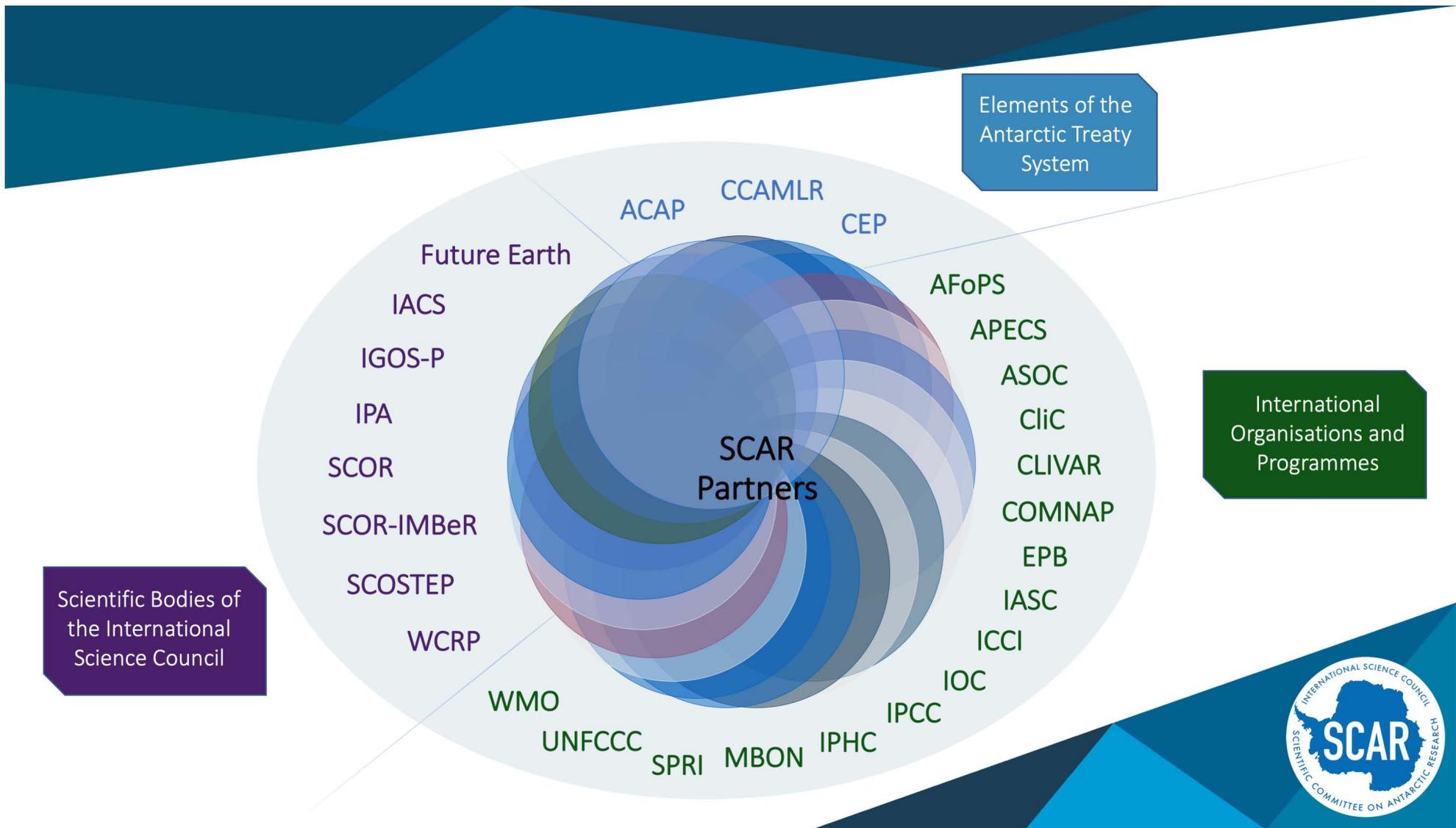


Figure 1. SCAR's partners. Partnerships with complementary organizations bring added value to SCAR's activities. SCAR partners with ISC bodies, advisory bodies to the ATS, organizations with polar missions, and programmes with polar interests. Partnerships support SCAR's goals to provide authoritative scientific advice to policymakers, expand its advisory sphere of influence on global issues, develop the capacity of students and early career scientists, and encourage cooperation with Arctic counterparts (for acronyms see page 45).

c) Ensuring sustainable income and effective support of SCAR's activities

SCAR is primarily funded by contributions from member nations and unions. SCAR seeks support from other sources including charitable foundations for specific activities. Over the past decade, SCAR has had a strong presence in all traditional media and has also managed effective communication through social media. SCAR has staffed a new officer for communications to ensure this presence continues. Due to the emergence of new issues emphasized at the ATS and the rising demand for the best available evidence for decision-making, SCAR has been increasingly requested to provide scientific advice and reports at the ATCMs. The benefits of being a SCAR member include: participating in SCAR SRPs and other relevant science groups, eligibility for SCAR Fellowships and the Visiting Scholar Scheme, and direct access to SCAR products and outputs. To continue to serve the community and provide advice, SCAR endeavors to attract new funds to expand existing activities and add new opportunities.

To ensure that all its activities are adequately resourced, SCAR will:

- Work with National Delegates to maintain appropriate levels of membership fees to sustain SCAR's activities.
- Work closely with National Antarctic Committees and partners to leverage new funding beyond member countries' contributions, including in-kind support.
- Explore options for obtaining funding for international cooperative and capacity building efforts particularly for members in Initial-stage Programmes.
- Promote online platforms to increase international scientific exchange, as well as reduce costs and carbon footprints.
- Mitigate risks and effectively manage existing financial resources.
- Promote multinational field and laboratory efforts to ensure effective use of available funding.

d) Producing value-added products

SCAR has consistently developed and managed products including datasets, publications, digital maps, and educational resources for the general public as well as Antarctic researchers.

SCAR products are developed by the research community to organize Antarctic datasets and provide easy access. These include searchable databases and digital maps and are active products used and valued by the Antarctic community. Examples include: the ongoing International Bathymetric Chart of the Southern Ocean ([IBCSO](#)), Bed Topography of the Antarctic ([BEDMAP](#)) and the Southern Ocean Observing System map ([SOOSmap](#)). For the BEDMAP2 project, scientists from 36 institutions in 18 countries provided data and the output from the project has become one of the most cited Antarctic products of the last decade. The next generation BEDMAP3 links groups with a strong interest in subglacial mapping with other groups that would benefit from the output.

SCAR also produces and shares educational resources to help scientists and educators communicate topics related to Antarctica. Many of these activities come from the SCAR scientific community and partner organizations. SCAR will communicate the importance of Antarctica and Antarctic science to the general public, especially children and adolescents.

To expand its catalogue of value-added products and their usage, SCAR will:

- Actively support the generation of data products that can be used extensively in research (e.g. BEDMAP).
- Continue to create new products such as art, books, documentaries, videos, and educational tools with partners such as Polar Educators International to deliver research results to the general public relevant to Antarctica and the Southern Ocean.
- Encourage affiliated groups to present their findings in publications, maps, videos and other products with innovative technologies including to schools, universities and the general public.
- Actively publicize products through websites and social media.
- Manage and update existing products.

e) Ensuring excellence by rigorous and regular review

SCAR continues to refine its organizational structure, set new research priorities and plan new research programmes, enhance communications, and support capacity building efforts based on internal and external evaluations. As SCAR responds to internal changes and external demands, regular reviews are needed to ensure efficiency. In particular, social sciences and humanities have become an integral part of SCAR, reducing carbon footprint is a key priority, and EDI practices are now routinely applied; therefore, efficient measures to improve the organization, policies, and action plans are needed. Post-pandemic, the mode of the Open Science Conferences, Symposia, Business Meetings, and Delegates Meetings will be re-evaluated considering the ISC's Sustainability Principles to reduce carbon footprint. EDI principles are recognized as fundamental for the success of SCAR and its members. SCAR's EDI goals will be achieved by providing fair and equal opportunities regardless of gender, culture, language, religion, age, socioeconomic status, geographic background, or academic discipline. EDI values can only be adopted through education and continuous practice.

SCAR's activities are reviewed through regular Directors Meetings, biennial Delegates Meetings, and, as required, by international experts to enable SCAR to function as an efficient and sustainable organization.



THE PATH FORWARD

Barriers to accessing Antarctica and the Southern Ocean are diminishing and activities are increasing in terms of science, resource use and tourism. The rising global human population is expected to increase pressures on natural resources and the Antarctic environment.

Studying this remote environment is essential to our understanding of the functioning of the Earth System. Antarctica and the surrounding Southern Ocean are influenced by global changes and in turn feed back into global changes. International collaboration and joining of resources is more important than ever. Rapidly changing Antarctic and Southern Ocean environments require rapid environmental management responses, including potential changes to agreements that have previously taken many years to establish. Research conducted in Antarctica and the Southern Ocean, and strong policies developed from its results, are critical for the development of an integrated Earth System approach and the discernment of a path to a sustainable future for the planet.

Human influence on the climate and biodiversity is clear, with climate changes and greenhouse gas concentrations unequivocally attributable to human activities. Human-induced climate change has had extensive negative consequences for people and for nature. Some of these changes are irreversible, such as marine inundation of coastal areas and low-lying islands as well as the extinction of species. Climate change is

having demonstrable impacts now and is increasingly exacerbating the effects of other human activities on the environment and human wellbeing. These effects are expected to grow with the increasing and accelerating rates of climate change. Some changes will be slower, owing to the inertia of the thick Antarctic ice sheets and the Southern Ocean. We still have time to save some of the Antarctic ice sheets. The resilience of the environment may be limited in the long term and our living conditions need to be sustainable with the Earth System functions.

To preserve the uniqueness of Antarctica and the Southern Ocean, protect its ecosystems, and sustainably manage its living resources, international communication and cooperation need to be continued and expanded. Scientific research should continue to be international, collaborative and transdisciplinary and should expand our knowledge to be shared with the general public, as well as enable unbiased and independent advice to be provided to those tasked with the management of Antarctica and the Southern Ocean. The provision of such independent and objective advice, based on high-quality and peer-reviewed science, is fundamental to informed decision-making. Considering the increased need for international coordination of Antarctic research resulting from a greater public and political interest in Antarctica, SCAR will continue to play a major role.



“

The IPCC AR6 WGII unambiguously emphasizes the urgent need for action: ‘cumulative scientific evidence is unequivocal: Climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.’ ... Cooperative and coordinated international responses are required to address critical research needs in Antarctica and the Southern Ocean. Enhanced investment in science will provide policymakers and planners with more comprehensive and coherent sets of information over time to help put in place timely, scalable adaptation and mitigation strategies. ... Effective action is now more urgent than it has ever been.

”

Chown et al. 2022.

SCAR will continue to facilitate international collaboration and cooperation in research, and build on the interest and importance of research in all its forms. SCAR will promote capacity development and the resources that enable such development while optimizing engagement and synergy with partners in the Antarctic and Southern Ocean community and beyond. SCAR will undertake these roles recognizing its role within the ISC and as a trusted provider of scientific advice in the Antarctic and the Southern Ocean.

ON DEVELOPMENT OF SCAR

SCAR's mission and vision have remained largely unchanged for its more than 60-year history.

SCAR's mission is multifaceted (SCAR Articles of Association, 2021):

- i.** *To advance and promote scientific knowledge, understanding and education on any aspect of the Antarctic region¹, on the role of the Antarctic region in the Earth System, and on the effect of global change on the Antarctic region.*
- ii.** *To initiate, facilitate, coordinate and encourage international scientific research activity in, from, and about the Antarctic region.*
- iii.** *To provide objective and independent scientific advice to the Parties to the Antarctic Treaty and other organizations on issues of science and conservation affecting the management of the Antarctic region.*
- iv.** *To facilitate free and unrestricted access to scientific data and information regarding the Antarctic region.*
- v.** *To develop scientific capacity in the members and early career scientists, and to promote the incorporation of Antarctic science in education at all levels, including public outreach.*
- vi.** *To communicate scientific information about the Antarctic region to the public.*

While SCAR's mission has remained largely unchanged, the context within which SCAR strives to realize its mission and vision has significantly changed and changes are accelerating. SCAR must adapt to the environment within which it operates and as such renews its strategic approach on a five-year cycle.

Formed in 1958, SCAR is a thematic body of the ISC and currently includes 46 member nations and nine ISC Unions² (Figure 2). SCAR strives to include new members as non-member countries develop interests in Antarctic science and policy. At regular intervals, SCAR evaluates its achievements and adjusts its structure and strategy to improve its functioning and accommodate emerging issues ([SCAR organogram](#)). Involvement in SCAR science is open to all. To a large degree, the work of SCAR depends on volunteer researchers who choose to participate in SCAR's activities whether their country is a member or not. For a summary of SCAR's subsidiary bodies, see Appendix 2.

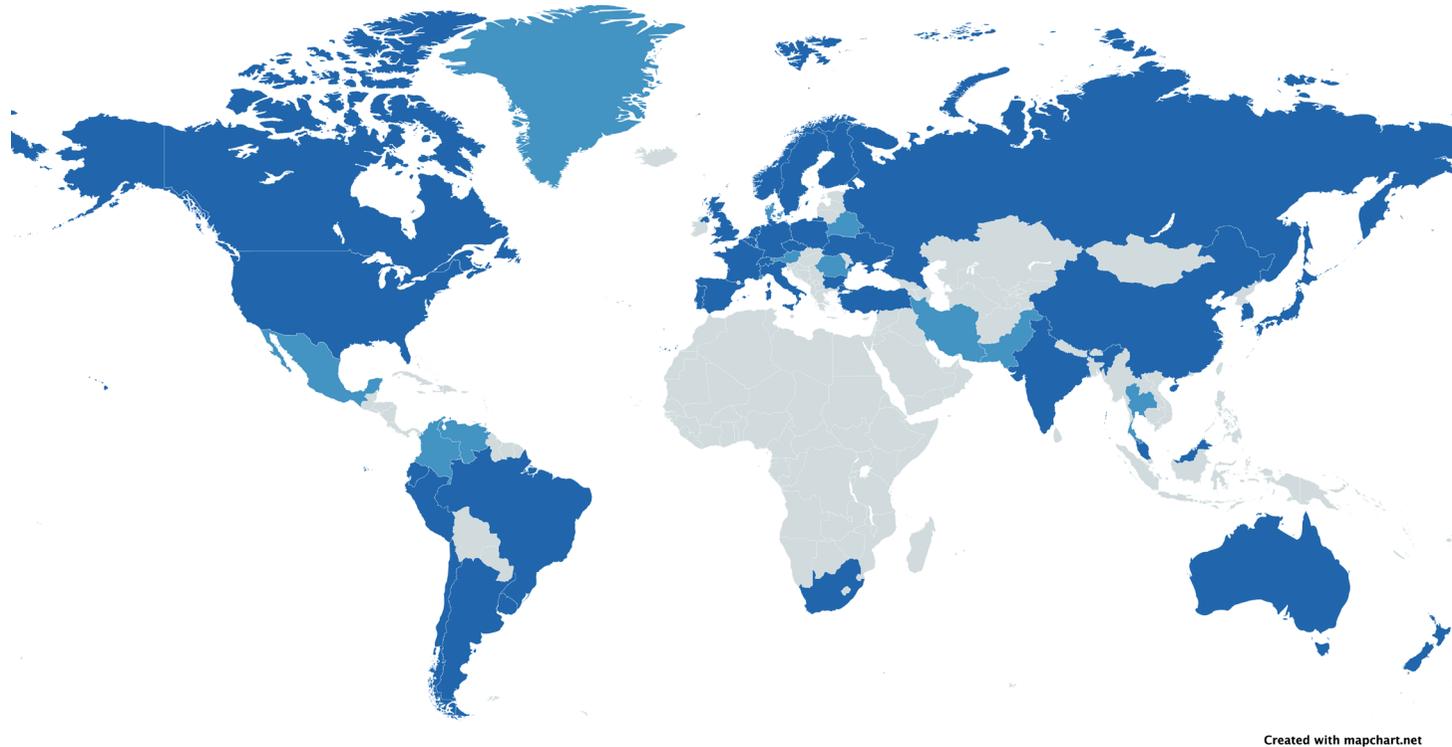


Figure 2. A map of SCAR's member countries from September 2022. Full Members are in dark blue, Associate Members are in lighter blue.

¹The term "Antarctic region" shall include Antarctica, the offshore islands of Antarctica, the surrounding ocean including the Antarctic Circumpolar Current, the northern boundary of which is the Subantarctic Front, and the Subantarctic islands lying south of the Subantarctic Front as well as those which lie north of the Subantarctic Front but fall within the SCAR's area of interest, namely Ile Amsterdam, Ile St Paul, Macquarie Island and Gough Island. (Articles of Association of SCAR, March 2021).

²ISC members are the International Astronomical Union (IAU), International Geographical Union (IGU), International Union for Quaternary Research (INQUA), International Union of Biological Sciences (IUBS), International Union of Geodesy and Geophysics (IUGG), International Union of Geological Sciences (IUGS), International Union of Physiological Sciences (IUPS), International Union of Pure and Applied Chemistry (IUPAC) and International Union of Radio Science (URSI).

SCAR strives to be engaged, active, and future-focused in its efforts to promote, facilitate, and deliver excellent science and evidence-based policy advice on globally significant issues. SCAR's vision includes the recognition that the planet is experiencing unprecedented change dominated by human influence that started in the mid-20th century. The 21st century SCAR is in many ways a product of this period. SCAR is acutely aware of the influence of human activities on the Earth System and the importance of scientific evidence to inform how a sustainable future might be achieved. Antarctica and the Southern Ocean have critical roles in the Earth System and are home to unique records and iconic living systems. Therefore, research in these regions is essential to secure a sustainable future for our planet. Ensuring that research is effectively facilitated and globally supported, and its outcomes efficiently communicated to society and decision-makers, are high-priority objectives over the term of this Strategic Plan.

As a thematic body of the ISC, SCAR supports and adheres to the principles of its parent organization, including the freedoms and responsibilities of scientists. The ISC promotes the idea that science is a common human endeavor that transcends national boundaries and is to be shared by all people.

SCAR has made significant achievements guided by previous Strategic Plans. For scientific advice, SCAR has provided lectures and important papers to the ATCM. SCAR also consolidated the biennial SCAR Open Science Conferences and the SCAR meetings as a productive occasions for the interaction of the international and multidisciplinary Antarctic community. SCAR successfully developed the Antarctic and Southern Ocean Science Horizon Scan and identified research priorities for the decades to come. Several international field campaigns and coordinated initiatives such as the Southern Ocean Observing System (SOOS) and the Integrating Climate





and Ecosystem Dynamics in the Southern Ocean (ICED), the International Ocean Discovery Program (IODP) expeditions 318, 374, 389, 382 in the Ross Sea, the Amundsen Sea and the Scotia Arc were formed and implemented. SCAR also managed to produce diverse products and outputs of broad interest, such as the Biogeographic Atlas of the Southern Ocean, a major update to the topographic map of the ice sheet bed (BEDMAP2), the Southern Ocean Acidification Report, the International Bathymetric Chart of the Southern Ocean, among others. SCAR's work on geological data from paleo-oceanographic studies with numerical ice sheet and climate models has revolutionized our knowledge of how the Antarctic ice sheets respond to high CO₂ and has been influential in IPCC Assessment Reports. SRPs have been successfully conducted since 2004. Six SRPs were recently completed (2012-2020) that answered fundamental questions on climate change and its impact and resilience to the ecosystem, solid earth response to cryospheric changes, and created a testing site for astronomical observation in the Antarctic. Most recently, the decadal update of the Antarctic Climate Change and the Environment report 'Antarctic Climate Change and the Environment: A Decadal Synopsis and Recommendations for Action' was published and presented to the XLIV ATCM in 2022 with great success. The report was based on an extraordinary body of internationally collaborative research, much of which had been supported by national Antarctic programmes. For a summary of SCAR's major achievements, see Appendix 3.

Over the next five years, SCAR will use the highest priority questions formulated by the community via the first SCAR Antarctic and Southern Ocean Science Horizon Scan (Kennicutt et al. 2014, 2015, 2016), the Scan's update in 2019 (Kennicutt et al. 2019), and the Antarctic Climate Change and the Environment report 'A Decadal Synopsis and Recommendations for Action' (Chown et al. 2022) to guide research priorities, research directions and resource allocations.

RATIONALE

Every five years, SCAR updates its Strategic Plan. This is the fourth such Plan since the re-structuring of SCAR in 2002 (for previous SCAR Strategic Plans, see Appendix 1). SCAR's founding mission and vision remain as relevant today as they did more than 60 years ago. However, the world around SCAR has evolved over these six decades and SCAR's membership has grown from the original 12 founding members to 46 national members (34 full and 12 associate) and 9 International Council of Science Unions (ICSUs) as of 2022. Today, we stand at a nexus of three key issues: 1) the growing recognition that humans play a major, and perhaps determinative, role in our planet's destiny and that it is insufficient to only consider the physical and life sciences in describing the Earth System, 2) the growing consensus and concern that global climate change is an existential threat to our planet in our lifetime, and 3) that equality, diversity and inclusion are critical in ensuring the best and brightest minds are engaged in addressing our most pressing challenges. The current Strategic Plan, 'Urgent Messages from the South: Antarctic and Southern Ocean Science and Policy', positions SCAR to meet these challenges and adapt to the rapidly changing social and natural environment within which SCAR operates.

In 2017, the members of the ICSU and the International Social Science Council (ISSC) merged to become the

International Science Council (ISC). The mission of the ISC, SCAR's parent organization, is to advance the creativity, rigor, and relevance of science worldwide. It creates a unified, global voice for science, with representation across the natural sciences (including physical, geological, mathematical and life) and social sciences (including behavioral and economic). Since 2017, SCAR has witnessed a similar evolution with the growth of the Antarctic humanities and social sciences community. The current Strategic Plan recognizes this community as an integral and essential part of the SCAR research portfolio and fosters its further growth over the next five years.

The urgency of the climate crisis is summarized in the SCAR report 'Antarctic Climate Change and the Environment: A Decadal Synopsis and Recommendations for Action' (ACCE Update) presented to the XLIV ATCM in May 2022. The policy and research recommendations of the ACCE Update serve as a framework for this Strategic Plan. The essential message of the ACCE Update is that due to the current trajectory of human-derived emissions of CO₂ and other greenhouse gases, the atmosphere and ocean will continue to warm, the ocean will continue to acidify, atmospheric and ocean circulation patterns will be altered, the cryosphere will continue to lose ice, and sea levels will rise. While uncertainties remain about



various aspects of the Earth System, much is beyond dispute. These trends, based on observations and confirmed by modelling, will accelerate if high rates of CO₂ and other greenhouse gas emissions continue apace. While SCAR supports and encourages a broad range of research on Antarctica and the Southern Ocean, this Plan is focused on the climate crisis and the role that SCAR plays as an authoritative, objective, and independent scientific advisor.

SCAR has long embraced a comprehensive programme of activities to support capacity building, education, and training. SCAR aims to foster early career researchers and to assist under-represented groups and countries in the initial stages of developing Antarctic programmes. In this Plan, SCAR renews and enhances its commitment to EDI in all its activities, subsidiary bodies, programmes, and projects. A special Task Force was convened to address these issues and the recommendations of this group, based on extensive deliberations and consultation with the community, were adopted. This Plan reinforces this commitment in all of SCAR's actions. EDI is not an afterthought, but a primary consideration in how SCAR manages, structures, and realizes its mission, vision, and objectives.

SCAR is well-positioned to continue to be the voice of the southern polar regions of our planet, delivering and communicating these urgent messages to a global audience.

SCAR Directors and Secretariat

MESSAGE FROM THE PRESIDENT

One of the most important crises the world faces today is global climate change and its impact on the Earth's ecosystems. In Antarctica, as a part of the Earth System, climate change and biodiversity are areas of significant interest to the region. SCAR's leadership in Antarctic research is embodied in its three SRPs, which are designed to focus on SCAR's greatest concerns, attempting to identify the impact of climate change on Antarctica's cryosphere and ecosystem, and the role of Antarctica in global climate change. The findings will be made available to the Antarctic Treaty Parties and other international organizations, and will benefit our society when SCAR's advice is reflected in policymaking.

Antarctica today faces new challenges, from global climate change to political struggles spilling over into Antarctica. The most effective response to such challenges is to maintain governance through a mitigation strategy based on evidence-based science. SCAR is unique and specified in the Protocol on Environmental Protection to the Antarctic Treaty to provide independent advice to the Antarctic Treaty Consultative Parties. SCAR's highest priority, therefore, is to ensure the provision of independent and objective advice based on the best available science from the Antarctic and the Southern Ocean.



The SCAR Strategic Plan 2023-2028 will focus on what SCAR does best: facilitating international science coordination and providing evidence-based advice to the ATS and policy-facing global climate change and biodiversity assessments. SCAR will continue to engage with national Antarctic programmes to ensure that scientific priorities are aligned and coordinated and persist to foster various science disciplines through its extensive scientific portfolio. At the same time, the Plan delineates SCAR's efforts to adapt to the changes and the growing demands of our time, which includes communicating better for greater international presence and engaging more actively with the public on Antarctic science, ensuring EDI principles in activities, ensuring its endeavors are in line with the 'principle of freedom and responsibility in science' and the 'sustainability principles' of its parent body, the ISC, by encouraging new and innovative remote technologies, and reducing carbon footprint as necessary. This Plan aims to blend the above priorities that will ensure SCAR is forward-looking, effectively facilitating science, and providing sound advice.

SCAR especially values scientific collaboration that enables us to answer big science questions that are impossible to address as an individual nation or programme, and its role as a facilitator of science and engagement in building friendships and mutual respect that reinforces our common goals of peace and coexistence found nowhere else in the world other than in Antarctica. SCAR strongly believes this heritage must continue, and advocates for the open exchange of, and access to, scientific knowledge and associated information. SCAR will strive to lead and promote the betterment of our society through its ceaseless efforts in advancing scientific knowledge in the Antarctic and rendering these into scientific advice that is independent, objective, and actionable for the Antarctic Treaty Parties and other bodies.

I would like to take this opportunity to thank SCAR's community for their enduring commitment to SCAR's mission and vision. The SCAR Directors' and Secretariat's efforts to incorporate as many voices as possible into this Plan outlining SCAR's future for the next five years is also much appreciated. I would also like to acknowledge all others that have provided invaluable contributions, especially Prof. Mahlon 'Chuck' Kennicutt II for his work in developing the Plan. SCAR looks forward to the next five years and beyond, and sincerely intends to remain a principal scientific organization on Antarctic science.

Yeadong Kim
SCAR President (2021-2025)

List of figures

Figure 1. SCAR's partners.

Figure 2. A map of SCAR's member countries from September 2022.

Acronyms

AAA	Astronomy and Astrophysics from Antarctica
ACA	Antarctic Clouds and Aerosols
ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACCE	Antarctic Climate Change and the Environment
ADM	Antarctic Metadata Directory
ADMAP	Antarctic Digital Magnetic Anomaly Project
AFoPS	Asian Forum for Polar Sciences
AGIVA	Action Group on Intrinsic Value in Antarctica
ANGWIN	Antarctic Gravity Wave Instrument Network
AntArchitecture	Antarctic Architecture Action Group
AntClimNow	Near-term Variability and Prediction of the Antarctic Climate System
AntVolc	Antarctic Volcanism
Ant-ICON	Integrated Science to Support Antarctic and Southern Ocean Conservation
Ant-TAG	Antarctic Tourism Action Group
ANTOS	Antarctic Near-shore and Terrestrial Observation System
ANTPAS	Antarctic Permafrost, Soils and Periglacial Environments
APECS	Association of Polar Early Career Scientists
ASOC	Antarctic and Southern Ocean Coalition
ASPeCt	Antarctic Sea Ice Processes and Climate

ATCM	Antarctic Treaty Consultative Meeting
ATCP	Antarctic Treaty Consultative Parties
ATS	Antarctic Treaty System
BEDMAP	Bed Topography Antarctic Treaty System
BEPSII	Biogeochemical Exchange Processes at the Sea-Ice Interfaces
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEP	Committee on Environmental Protection
CGG	Connecting Geophysics with Geology
CLiC	Climate and Cryosphere Project of the WCRP
CLIVAR	Climate and Ocean – Variability, Predictability and Change
COMNAP	Council of Managers of National Antarctic Programs
EDI	Equality, Diversity and Inclusion
EG-ABI	Expert Group on Antarctic Biodiversity Informatics
EG-BAMM	Expert Group on Birds and Marine Mammals
EN-AQ	Action Group on Meeting and Managing Antarctic Environments
EOAG	Earth Observation Action Group
EPB	European Polar Board
FRISP	Forum for Research into Ice Shelf Processes
GIANI	Geodetic Infrastructure of Antarctica
GRAPE	GNSS Research and Application for Polar Environment
IAATO	International Association of Antarctica Tour Operators
IACS	International Association of Cryospheric Sciences
IASC	International Arctic Science Committee
IAU	International Astronomical Union
IBCSO	International Bathymetric Chart of the Southern Ocean
ICCI	International Cryosphere Climate Initiative
ICED	Integrating Climate and Ecosystem Dynamics in the Southern Ocean
IGOS-P	Integrated Global Observing Strategy-Partnership
IGU	International Geographical Union
ImBER	Future Earth's Integrated Marine Biosphere Research
ImPACT	Input Pathways of Persistent Organic Pollutants to Antarctica
INQUA	International Union for Quaternary Research

INSTANT	Instabilities & Thresholds in Antarctica
IPA	International Permafrost Association
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem
IPCC	Intergovernmental Panel on Climate Change
IPHC	International Polar Heritage Committee
IPICS	International Partnership in Ice Core Sciences
ISC	International Science Council
ISMASS	Ice Sheet Mass Balance and Sea Level
IUBS	International Union of Biological Sciences
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUPAC	International Union of Pure and Applied Chemistry
IUPS	International Union of Physiological Sciences
JEGHBM	Joint Expert Group on Human Biology and Medicine (COMNAP)
MBON	Marine Biodiversity Observation Network
OpMet	Operational Meteorology in the Antarctic
OSC	SCAR Open Science Conference
PAGES	Past Global Changes
PEAR	Action Group on Public Engagement with Antarctic Research
Plastic-AG	Plastic in Polar Environments Action Group
PolSciNex	Policy-Law-Science Nexus Action Group
PRAMSO	Paleoclimate Records from the Antarctic Margin and Southern Ocean
RAPAL	Reunión de Administradores de Programas Antárticos Latino-americanos
RINGS	Antarctic RINGS Action Group (Ice Sheet Margin)
SCADM	Standing Committee on Antarctic Data Management
SCAGI	Standing Committee on Antarctic Geographic Information
SCAR	Scientific Committee on Antarctic Research
SCATS	Standing Committee on the Antarctic Treaty System
SC-HASS	Standing Committee on the Humanities and Social Sciences
SCOR	Scientific Committee on Oceanic Research
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SKAG	SCAR Krill Action Group

SOOS	Southern Ocean Observing System
SORP	Southern Ocean Region Panel
SO-CPR	Expert Group on the Continuous Plankton Recorder
(SO)GLOBEC	Southern Ocean Global Ocean Ecosystem Dynamics
SPRI	Scott Polar Research Institute
SRP	Scientific Research Programme
TATE	Tropical Antarctic Teleconnections
UNFCCC	United Nations Framework Convention on Climate Change
URSI	International Union of Radio Science
WCRP	World Climate Research Programme
WMO	World Meteorological Organization

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Acknowledgements

Oversight Committee:

Yeadong Kim
Deneb Karentz
Jefferson Cardia Simões
M Ravichandran

Sub-committee on Administration, Data, and Products:

Johnathan Kool
Songtao Ai
Boris Dorschel
Peter Fretwell
Cristina Purcareia
Robert Bialik

Sub-committee on Science and Advice:

Jesús Galindo-Zaldivar
Naresh Pant
Ian McDonald
Mary-Anne Lea
David H Bromwich
Ilana Wainer
Mercedes Santos
Florence Colleoni
Peder Roberts
Tony Travouillon
Susie Grant
Akinori Takahashi
Mike Williams
Rai Kookana
Birgit Njåstad
Jane Francis
Dirk Welsford
José Queirós

Sub-committee on CBET and Communications:

Silvia Dotta
Huw Griffiths
Hanne Nielsen
Burcu Özsoy
Pablo Lepe
Dragomir Mateev

Sub-committee on Finance and Partnerships:

Mike Bentley
Marcello Leppe
Mathieu Denis
Gerlis Fugmann
Renuka Bhadhe
Michelle Rogan-Finnemore
David Agnew
Takuji Nakamura
Azizan Samah
Ole Arve Misund
Alyce Hancock

Blue Ribbon Committee of Past SCAR Presidents:

Chris Rapley
Chuck Kennicutt
Jeronimo Lopez
Steven Chown

SCAR Secretariat:

Chandrika Nath
Eoghan Griffin
Johanna Grabow
Rosemary Nash

Revision Group:

Yeadong Kim
Gary Wilson
Ole Arve Misund
Yan Ropert-Coudert
Azizan Samah
Ashley Casierra
Ian Hogg

Editing and formatting:

Andrea Herbert
Sebin Lee
Ian Hogg
Emma Needham

Strategic Plan image credits:

Avinash Kumar
Ryan Reisinger
Nina Gallo
Rick Aster
Tobias Stål

Appendix 1 - SCAR's previous Strategic Plans

<https://www.scar.org/scar-library/other-publications/strategic-plans/>

Appendix 2 - A summary of SCAR's subsidiary bodies – 2022

Science Groups	Geosciences	Life Sciences	Physical Science		
Standing Committees	Humanities and Social Sciences	Antarctic Data Management	Antarctic Geographic Information	Antarctic Treaty System	Finances
Scientific Research Programmes	Near-term Variability and Prediction of the Antarctic Climate System	Integrated Science to Inform Antarctic and Southern Ocean Conservation	Instabilities & Thresholds in Antarctica (sea level)		
Action/ Expert Groups	(Bold - cross SG)				
Geosciences	AntArchitecture (internal structure of ice sheets)	ADMAP (magnetic anomaly)	ANTOS (near-shore and terrestrial observation systems)	ANTPAS (permafrost & soils)	AntVolc (Antarctic Volcanism)
	CGG (geology and geophysics)	Geo-conservation	GIANT (geodetic infrastructure)	GRAPE (GNSS research)	IBSCO (bathymetric chart)
	RINGS (ice sheet margin)				

Life Sciences	ANTOS (near-shore and terrestrial observation systems)	BEPSII (Biogeochemical exchange processes at sea-ice interface)	EG-ABI (biodiversity informatics)	EG-BAMM (birds & marine mammals)	SO-CPR (plankton recorder)
	ImPACT (persistent organic chemicals)	JEGHBM (human bio & medicine)	Plastics in polar environments	SKAG (SCAR Krill Action Group)	
Physical Sciences	AntArchitecture (internal structure of ice sheets)	ACA (clouds & aerosols)	ANGWIN (gravity wave instrument network)	ANTOS (near-shore and terrestrial observation systems)	ASPeCT (sea ice processes & climate)
	EOAG (earth observations)	FRISP (ice shelf processes)	GRAPE (GNSS research)	ImPACT (persistent organic chemicals)	IPICS (ice cores)
	ISMAS (ice sheets)	OpMet (meteorology)	PRAMSO (paleoclimate records)	RINGS (ice sheet margin)	SORP (CLIVAR/ CLiC/ SCAR Southern Ocean Region Panel)
	TATE (Tropical Antarctic Teleconnections)				
Humanities and Social Sciences	COVID-19 Project	AGIVA (Intrinsic value in Antarctica)	Ant-TAG (Antarctic Tourism)	PEAR (Public engagement with Antarctic Research)	PoLSciNex (Policy-Law-Science-Nexus)
Special Bodies	Astronomy & Astrophysics Expert Group	BEDMAP3 (topographical model of Antarctica)	Southern Ocean Observing System (SOOS)	Capacity Building, Education, and Training Advisory Group	Equality, Diversity. And Inclusion Action Group
	ICED (climate & ecosystem)				

Appendix 3 - SCAR's major achievements in recent years

This appendix summarizes the highest impact (not all) activities of SCAR in recent years.

- Major Publications:
 - Release of the decadal update of the Antarctic Climate Change and the Environment report ([Antarctic Climate Change and the Environment: A Decadal Synopsis and Recommendations for Action, Chown et al. 2022](#))
 - Release of the [Southern Ocean Action Plan for the UN Ocean Decade](#)
 - Publication of the [Marine Ecosystem Assessment for the Southern Ocean \(MEASO\): Birds and marine Mammals in a Changing Climate](#)
 - For additional major publications, follow the [link](#).
- The completion of six Scientific Research Programmes (2012-2020). Selected highlights include:
 - Antarctic Climate Change in the 21st Century
 - Contribution of scientific literature to IPCC reports, both special and full assessment reports.
 - The provision of extensive support for ECRs inclusion in running AntClim21, support for attendance at AntClim21 workshops and meetings, support for attendance at major international conferences and through networking events at conferences.
 - State of the Antarctic Ecosystem
 - An expansive list of publications (over 200 articles, reports and book chapters) including the SCAR Biogeographic Atlas of the Southern Ocean.
 - Founding members of the Marine Ecosystem Assessment of the Southern Ocean.
 - Contribution of scientific literature to IPCC reports, both special and full assessment reports.
 - Antarctic Thresholds – Ecosystem Resilience and Adaptation
 - Formation of an open network of experts in Antarctic ecology, who actively cooperated in fundamental, interdisciplinary and stakeholder-orientated research.
 - Provided support for ECRs through travel grants and targeted workshops, including a specialized course on Biological Processes (in Argentina, attended by 44 ECRs from 10 countries).
 - Synthesized new results on climate-change dependent biological processes, contributed to regular updates for the ACCE reports, the global assessment of IPBES, and UNFCCC conferences, and provided policy-focused summaries of scientific results.
 - Concluded that there is growing evidence for risks to unique ecosystem functions and diversities, regionally as well as globally.
 - Past Antarctic Ice Sheet Dynamics
 - Fundamental new insights in Antarctic Ice Sheet sensitivity during past high-CO₂ worlds and its contribution to global sea level change.
 - New knowledge on the extent and nature of major Antarctic glaciations.
 - First geological evidence of ocean forcing and marine ice sheet instability.

- Paleo-data calibrated ice sheets models provide revised global sea level predictions for IPCC scenarios.
- Solid Earth Responses and Influences on Cryospheric Evolution
 - Accelerated and broadened research on GIA modelling, ice sheet modelling, glacial seismology, and other related fields, by training new cohorts of researchers through co-sponsored Schools.
 - Building a new generation of scientists working on understanding glacial isostatic adjustment (GIA) and notably the observation and modelling of spatial variations in solid Earth properties and their feedback on the ice sheet.
- Astronomy and Astrophysics in Antarctica
 - Provision of a forum to facilitate international cooperation, clarifying science goals, consolidating comparative site testing data, and raising the profile of SCAR within the international astronomical community and the public.
 - Completed the Testing Site for the future 'data portal'.
- Provision of advice to the Antarctic Treaty System by the Standing Committee on the Antarctic Treaty System
 - SCAR ATCM Lecture topics:
 - [2017](#): What does the United Nations Paris Climate Agreement mean for Antarctica?
 - [2019](#): What does the Paris Climate Agreement Mean for Antarctic and Southern Ocean Environmental Protection?
 - 2021 – No lecture, meetings online
 - 2022 – Antarctic Climate Change and the Environment
- Paper Submissions:
 - [2017](#) - 7 Working Papers, 11 Information Papers, and 2 Background Papers
 - [2018](#) - 2 Working Papers and 4 Information Papers
 - [2019](#) – 6 Working Papers, 16 Information Papers, and 1 Background Paper
 - 2020 – no meeting
 - [2021](#) – 7 Working Papers and 10 Information Papers
 - 2022 – 4 Working Papers, 6 Information Papers, and 1 Background Paper
 - For past SCAR lectures given since 2003, follow the [link](#).
 - **Topics from 2017 to 2022 (number of reports)** – Future Antarctic Science Challenges, Strategic Plan for Biodiversity, SCAR Horizon Scan and COMNAP Roadmap Challenges, Codes of Conduct (6), Wildlife Responses to RPSA, the Antarctic Environments Portal (3), Antarctic Biogeography, Southern Ocean Ecology, Southern Ocean Observing System (3), ACCE Update (3), Conservation Plan for the Antarctic Peninsula, Anthropogenic Noise in the Southern Ocean, Antarctic Protected Area System, Emperor Penguins Status and Trends, State of Antarctic Penguins, Biological Prospecting, Terrestrial Biodiversity, Antarctic Buoys, Antarctic and Southern Ocean Climate Change, Important Geological Sites, COVID and Antarctica, Important Marine Mammal Areas, Areas of Ecological Significance, UN Decade of the Ocean, and Persistent Organic Chemicals.
 - For other SCAR papers submitted to the ATCM, follow the [link](#).
- Recent Major International Meetings
 - In 2018, SCAR organized, managed, and staged the 2nd Joint SCAR/IASC decadal bipolar (8th) Open Science Conference in Davos, Switzerland entitled: “Where the Poles come together”.
 - 2515 total number of participants for the different meeting parts, 1014 Participants at the pre-meetings (15-18 June 2018) and 2244 Participants at the OSC (19-23 June 2018)

- In 2020 SCAR organized, managed, and staged the first Online Open Science Conference entitled “Antarctic Science and Global Connections”, consisting of:
 - 24 key events
 - 21 related events
 - 2712 registered participants from 60 countries
 - 584 virtual displays.
- In 2022 SCAR organized, managed, and staged its Online Open Science Conference entitled “Antarctic in a Changing World”, consisting of:
 - 11 key events
 - 58 related events
 - 2600 registered participants
 - More than 300 virtual displays.
- Thematic Symposia
 - XII Biology Symposium 2017 in Leuven, Belgium
 - XIII International Symposium on Antarctic Earth Sciences 2019 in Incheon, Korea
 - Standing Committee – Humanities and Social Sciences Conferences
 - 2017 HASSEG Conference "Depths and Surfaces: understanding the Antarctic region through the Humanities and Social Sciences" in Hobart, Tasmania, Australia
 - 2019 SC-HASS Conference "Antarctic Connections at the End of the World: Understanding the Past and Shaping the Future" in Ushuaia, Argentina
 - 2021 SC-HASS Conference “The Global Antarctic” at Kobe University, Japan
- In 2022, the first Scientific Symposium: From Arctic to Antarctic 'The Cold is Getting Hot!' in the framework of the Polar Initiative of the Prince Albert II of Monaco Foundation was held in Monaco.
- Other major workshops, symposia, conferences, and training schools SCAR hosted or co-organized in 2017-2022
 - [SOOS West Antarctic Peninsula Regional Working Group Workshop](#) (15-16 May 2017)
 - [2017 Glacial Seismology Training School](#) (11-17 June 2017)
 - [Forum for Research into Ice Shelf Processes \(FRISP\) Workshop](#) (19-22 June 2017)
 - [2017 HASSEG/History Groups Biennial Conference](#) (5-7 July 2017)
 - [Workshop on Priority Threat Management for Antarctica](#) (8-9 July 2017)
 - [SCAR Session at XXXII International Union of Radio Science \(URSI\) General Assembly & Scientific Symposium](#) (19-26 August 2017)
 - [International Association of Geodesy/SCAR SERCE Workshop on “Glacial isostatic adjustment and elastic deformation”](#) (5-7 September 2017)
 - [Past Antarctic Ice Sheet Dynamics \(PAIS\) Conference 2017](#) (10-15 September 2017)
 - [1st International ANTPAS Workshop on Antarctic permafrost, periglacial processes and soils](#) (4-5 October 2017)
 - [2017 West Antarctic Ice Sheet Workshop](#) (8-11 October 2017)
 - [The #GreatAntarcticClimateHack](#) (9-12 October 2017)
 - [4th Snow Science Winter School](#) (11-17 February 2018)
 - [TACTical Workshop “Taking the Temperature of the Antarctic Continent”](#) (21-23 March 2018)
 - [International Conference on Marine Ecosystem Assessment of the Southern Ocean](#) (9-13 April 2018)
 - [2nd SCAR Summer School on Polar Geodesy](#) (10-19 May 2018)

- 2018)
- [International Summer School on the Polar Climate System](#) (21-25 May 2018)
- [The 13th Workshop on Antarctic Meteorology and Climate](#) (16-18 July 2018)
- [32nd FRISP Workshop](#) (3-6 September 2018)
- [Workshop: Climate Variability in Antarctica and the Southern Hemisphere in the past 2000 years](#) (4-5 September 2018)
- [Polar Upper Atmosphere: From Science to Operational Issues](#) (17-21 September 2018)
- [SC-HASS Conference 2019 "Antarctic Connections at the End of the World: Understanding the Past and Shaping the Future"](#) (3-5 April 2019)
- [Workshop on CMIP6 21st century projections and predictions for Antarctica and the Southern Ocean](#) (26-28 June 2019)
- [Glacial Isostatic Adjustment \(GIA\) Modelling Training School](#) (26-30 August 2019)
- [Course on Tools for Southern Ocean spatial analysis and modelling](#) (2-6 September 2019)
- [33rd Forum for Research into Ice Shelf Processes \(FRISP\)](#) (15-18 September 2019)
- [Glacial Isostatic Adjustment, Ice Sheets, and Sea-level Change – Observations, Analysis, and Modelling Workshop](#) (24-26 September 2019)
- [Plastic in Polar Environments Workshop 2019](#) (28-29 October 2019)
- [Third Polar Data Forum](#) (18-22 November 2019)
- [Southern Ocean Regional Workshop](#) (16 February 2020)
- [34th Forum for Research into Ice Shelf Processes \(FRISP\)](#) (16-25 June 2020)
- [Polar to Global Online Interoperability and Data Sharing Workshop](#) (30 June 2020)
- [Polar Atmosphere Online Workshop from GRAPE/RESOURCE](#) (1-3 July 2020)
- [PALSEA Express 2020](#) (15-16 September 2020)
- [SOOS Weddell Sea and Dronning Maud Land Regional Working Group Online Workshop](#) (20-23 October 2020)
- [Webinar series: Biodiversity data from the field to research](#) (3-6 November 2020)
- [13th Polar Law Symposium](#) (9-10 November 2020)
- [Krill Workshop: Evaluating change in Antarctic krill populations, Online](#) (26-30 April 2021)
- [6th Workshop of the SCAR Astronomy & Astrophysics from Antarctica \(AAA\), Online](#) (8-10 September 2021)
- [2nd Southern Ocean Regional Workshop, Online](#) (20-22 September 2021)
- [SC-HASS Biennial Conference 2021 "The Global Antarctic", Hybrid](#) (18-19 November 2021)
- [Plastic pollution in the Southern Ocean: a global outlook](#) (10 March 2022)
- [GLacial Sedimentation School \(GLASS\)](#) (23-27 May 2022)
- [Antarctic RINGS workshop](#) (27-30 June 2022)
- [UN Ocean conference side-event "From The Southern Ocean to the Arctic"](#) (27 June 2022)
- [UN Ocean Conference side-event "Polar Oceans: engine to the global ocean"](#) (28 June 2022)
- [ISMASH workshop on Ice Sheets: Weather versus Climate](#) (23-24 August 2022)
- [35th international Forum for Research into Ice Shelf Processes: FRISP 2022, Online](#) (19-22 September 2022)

- [AntClimNow Workshop: Connecting Models and Observations of the Antarctic Climate System Across Timescales](#) (28-30 September 2022)
- [3rd IPICS Open Science Conference](#) (2-7 October 2022)
- [5th International ANGWIN Workshop, Online](#) (5-7 October 2022)
- Other highlights:
 - SOOS
 - Joint effort with SCAR's range of bodies, developed the Southern Ocean Task Force and generated a Southern Ocean Action Plan for consideration by the UN Decade of Ocean Science
 - ICED
 - Marine Ecosystem Assessment of the Southern Ocean (involving over 200 international authors and ECRs to provide a synthesis and state-of-the-art summary for policy)
 - Joint effort with SCAR in presenting the outcomes of MEASO at COP26, and together with SCAR's range of bodies, developed the Southern Ocean Task Force and generated a Southern Ocean Action Plan for consideration by the UN Decade of Ocean Science

Appendix 4 - Synopsis of urgent research needs focused on changes in the Antarctic that have significant implications for the Earth System and for society (Chown et al. 2022). *

Recommended sources: the SCAR Horizon Scan (Kennicutt et al. 2019) and SCAR Scientific Research and other programmes

- **RR 1** Further support the research required to reduce uncertainty about the future of the region and its impact on the Earth System and to identify commensurate management responses. Integrated, international, and targeted long-term monitoring programmes and observatories are among the most important for reducing uncertainty and for understanding the likely impacts of mitigation and adaptation responses.
- **RR 2** Urgently reduce uncertainty about the current and future behaviour of the Antarctic Ice Sheet. The current observation network, especially for the hydrology and conditions at the base of the ice sheet, and the temperature and bathymetry of ice shelf cavities, coastal regions and the continental shelf, is inadequate to fully anticipate change and to understand the risks of ice shelf collapse, loss of buttressing and rapid ice sheet mass loss in the coming decades. An international effort is urgently required to address this. A major exploration is required of key (unexplored) ice shelves and upstream glaciers using direct access techniques, ocean and airborne robotics, icebreaking ships, aircraft and space-borne remote sensing and other means to understand the ablation regime of the Antarctic ice sheet along the periphery; how it has changed in the past, is currently changing and will change in the future; and how this will drive rapid ice mass loss and sea level rise from Antarctica.
- **RR 3** Understand how changes in atmospheric circulation drive changes in ocean currents around Antarctica and the advection of ocean heat onto the continental shelf, into the ice shelf cavities and in contact with the glaciers, and the influence of meltwater feedbacks.
- **RR 4** Determine what the contribution will be of the Antarctic Ice Sheet to future sea level rise and reduce uncertainties in projections of the rate and magnitude of that contribution, and effectively communicate the impacts and risks to stakeholders and users.

- **RR 5** Account for and develop a detailed process-based understanding of the contemporary annual-to-decadal time-scale trends in the Antarctic climate system. Knowledge of how climate change and variability in the high southern latitudes are connected to lower latitudes, including the tropical oceans and monsoon systems, and will respond to ongoing changes to the ozone hole and to other anthropogenic forcing, is critical for improved climate projections and anticipation of extreme climate events.
 - **RR 6** Determine why the properties and volume of Antarctic Bottom Water are changing, and what the consequences are for global ocean circulation and climate.
 - **RR 7** Establish which species, ecosystems and food webs are most vulnerable in the Southern Ocean, how they are likely to change, and which organisms are most likely to go extinct and over what period, as a consequence of climate change and local interactions such as with non-native species.
 - **RR 8** Determine how increases in marine living resource harvesting in the context of climate change impacts will affect harvested, associated, and dependent species and Southern Ocean biogeochemical cycles, in contrast with other groups.
 - **RR 9** Establish which terrestrial ecosystems and food webs are most vulnerable, how they are likely to change, and which organisms are most likely to decline and/or to go extinct and over what time, as a consequence of climate change and local interactions such as with non-native species.
- * **NOTE:** Chown et al. 2022 contains 66 detailed research recommendations.

Appendix 5 - The following policy recommendations are from Antarctic Climate Change and the Environment: A Decadal Synopsis and Recommendations for Action (Chown et al. 2022).

The recommendations are ordered by significance.

PR 1 The Antarctic Treaty Parties (ATPs) and observers to the Treaty should communicate to governments and to civil society the urgency of, at the very least, meeting the Nationally Determined Contributions (i.e. country greenhouse gas emissions reduction targets) of the Paris Climate Agreement to ensure that Antarctic and Southern Ocean environments are preserved in a state close to that known for the past 200 years, and in so doing help ensure achievement of the Sustainable Development Goals. The ATPs and observers are also encouraged to convey to governments, to parties, to other international environmental agreements, and to civil society the outcomes of climate change-related research, and the benefits of informed immediate management actions in the Antarctic region. The need for additional extensive research to resolve uncertainties about cryosphere change, its rate, and its implications is urgent. Equally pressing is the need for effective communication to international efforts to address climate change beyond Antarctica.

PR 2 The Antarctic Ice Sheet (AIS) is changing rapidly, with the anthropogenic signal starting to become apparent. The AIS is projected to contribute substantially to global mean sea level rise, but the risks of significantly larger rates and magnitudes of sea level rise from rapid ice sheet mass loss in the coming decades to centuries are not well known, particularly from vulnerable marine basins in West Antarctica and parts of East Antarctica. Reducing this uncertainty is a globally urgent research priority that will require further support from National Antarctic Programmes (NAPs). Novel observations along sensitive marine-based sectors, and from paleoclimate archives, are urgently needed over the time scale of a decade to improve understanding of the physical processes driving the retreat, document the current evolution in detail, and comprehensively, and critically improve the skills of numerical projections.

PR 3 The consequences of sea level rise and melting ice (sea, land and shelves) around Antarctica's coastline will present significant risks to society. The need for, and outcomes from, research on sea level in the Antarctic should be communicated by the ATPs and observers: to international agreements, governments at all levels, the economic sector, and to civil society, as these entities will largely have to plan for, manage, and endure the impacts of sea level rise and its associated costs.

PR 4 The Southern Ocean is undergoing changes and these changes will continue under higher emissions scenarios. Major impacts on the cryosphere, marine ecosystems and their constituent species, and consequently on the ecosystem services they deliver, including on systems and services outside the Antarctic region, are expected. Significant changes are anticipated in areas that may be especially vulnerable to ice sheet instability and collapse once thresholds are reached. Changes to the Southern Ocean and its ecosystems will present growing management difficulties, logistics challenges and research requirements that will require special attention within the ATS. Research on these questions, including through expanded long-term monitoring, is imperative.

PR 5 Changes to the Southern Annular Mode, a major climate driver, have implications for climate means and climate extremes which may be accompanied by extreme events, such as major fires and droughts, especially on Southern Hemisphere land masses. Research to support further understanding of these influences, and their interactions with greenhouse gas-related climate change, should be supported by NAPs. The outcomes of this work and its significance for disaster preparedness and environmental management must be communicated by the ATPs and observers to governments and to civil society.

PR 6 The ATPs have declared an obligation to implement the mitigation and adaptation actions that will reduce climate change-related and other human impacts on Antarctic marine and terrestrial environments, their ecosystems and biodiversity, and the ecosystem services they deliver. Continued support for the research required to deliver evidence-informed options for action, including through coordinated, international and transdisciplinary research efforts across Antarctica and the Southern Ocean by all ATPs; the development of an appropriately-resourced scientific workforce for the future; and well-supported long-term monitoring programmes of the physical and living environment, are essential to meet this obligation. Our human future depends on the success of these actions.

PR 7 National Antarctic Programmes and International Association of Antarctica Tour Operators (IAATO) members are encouraged to strengthen biosecurity protocols for all pathways (ships, aircraft, and people), especially to the Antarctic Peninsula. Procedures to remove weeds and to trap other pests in ports of departure to the Antarctic need to be strengthened in anticipation of growing ease of establishment of non-native species owing to climate change. Surveillance and decision-making processes for determining actions for newly arrived species, especially in the vicinity of stations and sites with high visitor numbers, should be adopted. Collaborations with SCAR and other researchers are needed to establish an image- and DNA-based diagnostic service for newly detected species, building on the Barcode of Life Data System approach.

PR 8 The ATPs and members of the Committee for Environmental Protection (CEP) are encouraged to increase the priority given to documenting terrestrial and marine biodiversity (including in lakes and streams) at the population, species, and community levels - in some cases, to enable observation of these systems before they disappear. Such an enhanced focus, further informed by long-term monitoring of change, is essential to ensure the efficacy of environmental protection and to document the benefits of environmental management.

PR 9 The loss of sea ice, fast ice and ice shelves together with the expansion of ice-free areas on the Antarctic continent and changes to temperatures and precipitation, including extreme weather events, will present new challenges for the management of areas of high human activity in the Antarctic (including where infrastructure and other NAP assets are deployed). Biodiversity will change and conditions will become more suitable for the establishment of non-native species, especially along the Antarctic Peninsula. These challenges should be urgently addressed by the ATPs and by members of the CEP.



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