

The science legacy of IPY: Antarctic and Arctic Research Partnership Opportunities

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Slide 1. Title

Slide 2. Physiogeography. The two polar regions are both similar and different. Both are cold. Both have ice sheets, ice shelves, sea ice and permafrost. Both have aurora. But the Antarctic is a continent surrounded by ocean, while the Arctic is an ocean surrounded by land. So the challenges of research are similar but also differ from one to the other.

Slide 3. Ownership and Governance. The research challenge is also complicated by politics and demography. People live in the Arctic, where the land is 'owned' and governed by the rim nations. Bodies like the Arctic Council coordinate affairs. Apart from a few scientists who winter over, nobody much lives in the Antarctic, where the land is governed by the Antarctic Treaty, whose parties coordinate their activities through the annual Antarctic Treaty Consultative Meeting. All territorial claims are set aside as long as the Treaty lasts.

Slide 4. Key reasons for scientific research.

Arctic:

- (i) the consequences of shrinking sea ice; melting permafrost; reduced snow cover, and the changing hydrological cycle;
- (ii) the potential effect of collapse of the Greenland ice sheet on sea-level;
- (iii) shifting vegetation zones and animal species diversity, ranges and distribution;
- (iv) socio-economic impacts.

Antarctic:

- (i) the Southern Ocean carbon sink, leading to ocean acidification;
- (ii) the stability of the West Antarctic ice sheet and the impact on sea-level of its potential collapse;
- (iii) the Antarctic Peninsula hotspot, and its effect on ice, fauna and flora;
- (iv) the role of one of the world's largest unexploited marine protein resource (krill in the ocean ecosystem);
- (v) ecosystem responses to climate change;
- (vi) the role of the Southern Ocean as a cradle of deep sea biodiversity;
- (vii) Antarctica as a platform for observing stars

Bipolar:

- (i) the role of the poles in global ocean circulation; and in the world's climate and weather;
- (ii) the role of plate tectonics in creating gateways between continental fragments, allowing currents to penetrate the polar regions and so change climate over time;

- (iii) the nature of the transitions between the greenhouse world of interglacials and the icehouse world of glacial periods;
- (iv) documenting and understanding the rapidity of those changes, as the basis for forecasting similar changes in future;
- (v) the convenience of the frigid regions as unique natural laboratories for experiments of all kinds;
- (vi) the convenience of the poles as platforms for observing Sun-Earth interactions;
- (vii) importance of the poles to developing a basic understanding of Planet Earth.

Slide 5. International Polar Science Organisations

In the Arctic, IASC is one of the primary agencies for coordinating scientific research, supported by the operators working through their organisation Forum of Arctic Research Operators FARO. IASC provides scientific advice to and works closely with the Arctic Council. Other bodies coordinating scientific research and with which IASC must work include the Arctic Ocean Science Board (AOSB), the International Arctic Social Sciences Association (IASSA), the Northern Research Forum (NRF), the University of the Arctic (UArctic), and several others.

In the Antarctic, SCAR is the primary agency for coordinating scientific research, supported by the operators working through their organisation COPMNAP (Council of Managers of National Antarctic Programmes). SCAR provides scientific advice to and works closely with the Antarctic Treaty Parties. Other bodies coordinating scientific research and with which IASC must work include CCAMLR (the Commission for the Conservation of Marine Living Resources), which focuses on fishing, and ACAP (the Advisory Committee on Albatrosses and Petrels).

Both SCAR and IASC must work closely with those scientific organisations having a specific bipolar remit, like CliC (the Climate and Cryosphere element of the World Climate Research Programme), like IPA (the International Permafrost Association), and like EPB (the European Polar Board).

In addition, SCAR and IASC must work closely with the myriad scientific organisations that have a global remit and therefore have at least some polar interests, such as WMO (the World Meteorological Organisation), UNESCO (the United Nations Educational, Scientific and Cultural Organisation), ICSU (the International Council for Science) and its subsidiary bodies, UNEP (the United Nations Environment Programme), and non governmental organisations like the WWF.

Slide 6: Membership

IASC and SCAR share 17 member countries in common. In addition, IASC has Iceland, while SCAR has 17 additional countries, many of them from the southern hemisphere. Practically all SCAR members are parties to the Antarctic Treaty. In addition to its national members, eight of ICSU's scientific unions are members of SCAR.

Slide 7. The Missions of IASC and SCAR.

IASC is a non-governmental organisation whose aim is to encourage and facilitate

cooperation in all aspects of Arctic research, in all countries engaged in Arctic research and in all areas of the Arctic region.

SCAR aims to be the leading independent organisation for facilitating and coordinating Antarctic research, and for identifying issues emerging from greater scientific understanding of the region that should be brought to the attention of policy makers.

Slide 8. Common Objectives

SCAR/IASC share common objectives:

- (i) Scientific coordination
- (ii) Pan-regional approaches
- (iii) Linkage to the global system
- (iv) Education and training (capacity building)
- (v) Encouraging easy access to data
- (vi) Policy advice
- (vii) Outreach

Slide 9 Connections.

IASC is an **international associate** of the International Council for Science (ICSU) and observer to the Arctic Council, and has connections to numerous international Arctic organisations.

SCAR is an **interdisciplinary body** of the International Council for Science (ICSU) and observer to the Antarctic Treaty Consultative Meeting, and to the Commission for the Conservation of Antarctic Living Marine Resources. **SCAR** has numerous international partners.

Both **IASC** and **SCAR** are *ex-officio* members of the ICSU/WMO IPY Joint Committee.

Slide 10. Principal Outputs

IASC

- (i) Arctic Climate Impact Assessment (ACIA)
- (ii) 2nd International Conference on Arctic Research Planning (ICARP II)
- (iii) International Study of Arctic Change (ISAC)
- (iv) Observing Systems (Sustained Arctic Observing Network)
- (v) Arctic Science Summit Week (ASSW)

SCAR

- (i) State of the Antarctic and Southern Ocean Climate System (SASOCS) for ATCM in May 2008
- (ii) 1st and 2nd SCAR Open Science Conferences (Bremen 2004, Hobart 2006)
- (iii) 10th International Symposium on Antarctic Earth Science (ISAES)(Santa Barbara, Aug. 2007)
- (iv) 10th International Antarctic Biology Symposia (Sapporo, 2009)
- (v) Observing Systems (Bipolar IGOS Partnership Cryosphere Observing System (June 2007); Southern Ocean Observing System (SOOS); October 2007)
- (vi) Databases (Antarctic Master Directory, etc)
 - (viii) Special issues of journals (e.g. Antarctic Science; Deep Sea Research, etc)

Slide 11. Key Meetings

IASC

- (i) Annual Arctic Science Summit Week (ASSW)
- (ii) Annual Council Meeting
- (iii) Biennial Executive Committee Meeting
- (iv) International Conferences on Arctic Research Planning (ICARP)

SCAR

- (i) Biennial SCAR Open Science Conferences and science business meetings
- (ii) Biennial Delegates Meeting
- (iii) Annual Executive Committee Meeting
- (iv) 4-yearly Symposia in Earth Sciences and Biological Sciences

Slide 12. SCAR's and IASC's Role in the International Polar Year

The IPY will comprise a burst of investment, scientific activity and outreach from 1 March 2007 to 28 February 2009. Ongoing research will continue at much the same level, but it is anticipated that there will be significant increases in the development of observing systems, in access to data, in scientific cooperation, and in building the next generation of polar scientists. Many investments have already been made or will soon be made by national funding agencies, so this plan is already a reality. Assessments, like the Arctic Climate Impact Assessment (ACIA) and the Arctic Human Development Report (AHDR), the ICARP process, and SCAR's reorganised science programme have helped the scientific community to plan the efforts required to implement the plan. The next trick is to at the very least sustain, and preferably increase, the new level of investment and activity. Conferences will take place in 2008, 2010, and 2012 to monitor progress – more on that later. SCAR and IASC are assisting in the planning for the IPY through their contributions as members of the ICSU/WMO IPY Joint Committee that steers the IPY process, and by promoting the IPY within their communities and to policy makers.

Slide 13. IASC, SCAR and The Honeycomb Chart of IPY Projects

The honeycomb chart shows how the various approved IPY projects are distributed between the Arctic and the Antarctic, with some being bipolar, and how the projects are clustered into those dealing with the solid earth, the land, humans, the oceans, ice, the atmosphere, outer space, and last but not least – education and outreach, not forgetting data and information. IASC and SCAR will assist the development of the projects in their respective areas. SCAR and IASC have already influenced this process in that several of the projects are based on ongoing SCAR or IASC research areas or were stimulated by SCAR and IASC plans.

Slide 14. Observing Systems

A major legacy from the International Geophysical Year of 1957-58 was the network of bases around Antarctica and in the Arctic that facilitated access to these frozen wastes by the scientific community at least in the summer season, and in some cases year-round. The IPY planners are keen to see observing systems emerge as an equivalent major legacy from the IPY of 2007-2008. Many of the IPY projects are devoted to developing aspects of observing systems, but almost none are devoted to developing comprehensive and integrated observing systems in their own right. SCAR and IASC are therefore

promoting the development of these systems. In the north IASC is supporting the efforts of the Arctic Ocean Sciences Board to develop an integrated Arctic Ocean Observing System (iAOOS). In the south, SCAR has begun developing a Southern Ocean Observing System (SOOS). Both iAOOS and SOOS will be parts of comprehensive and overarching observing systems embracing observations of the land, sea, ice and air – the Sustained Arctic Observing Network (SAON) in the north and the Pan-Antarctic Observing System (PantOS) in the south. The cryosphere element of both SAON and PantOS will be the Cryosphere observing programme developed by SCAR and the Climate and Cryosphere (CliC) programme of the World Climate Research Programme for the Partners for and Integrated Global Observing Strategy (IGOS), which will be published in June 2007.

Slide 15. IPY Legacy – Scientific Cooperation

The IPY will provide a major benefit in bringing people together to cooperate in the 200+ approved IPY projects. Progress will be monitored for the IPY Joint Committee through a series of conferences.

- (i) the Mid-Term IPY Conference will assess - How is it going? This will be the SCAR/IASC Open Science Meeting in St.Petersburg in July 2008.
- (ii) an IPY Early Science Conference in Oslo in 2010 will assess - What did we get?
- (iii) also in 2010, SCAR will hold an IPY-focussed Open Science Conference in Buenos Aires, which it is hoped will bring southern hemisphere researchers together.
- (iv) in 2010, there will be a final IPY Science and Policy Conference, to address - What did we learn? This will combine the efforts of SCAR and IASC and will engage the policy community - the Arctic Council and the Antarctic Treaty Parties.

Slide 16. The Mid-Term IPY Conference

The mid-term IPY conference will focus on *Polar Research - Arctic and Antarctic Perspectives in the International Polar Year*. It will be organised by SCAR and IASC and will take place between 8-11 July in St Petersburg, Russia. A first circular is expected in July 2007.

Slide 17. Details of the Mid-Term IPY Conference

The guiding document for the conference is the recently published IPY report "*The Scope of Science for the International Polar Year*", which can be downloaded from the IPY web site (www.ipy.org) or from the IASC and SCAR web sites. The conference will be organised into the 6 main themes of the IPY:

Status
Change
Global Linkages
New Frontiers
Vantage Point
Human Dimension.

IASC and SCAR have formed a joint Scientific Organising Committee with one co-chair from each organisation. The conference is likely to comprise around 50 sessions on one topic or another under the 6 main themes, and there are likely to be around 300 oral papers and 300 posters. We hope to attract around 1500 attendees.

Slide 18. The Take Home Message

SCAR and IASC are working closely together to make the IPY and its legacy a success.