XXVIII ANTARCTIC TREATY CONSULTATIVE MEETING
XXVIII TRAITÉ SUR L'ANTARCTIQUE RÉUNION CONSULTATIVE
XXVIII TRATADO ANTÁRTICO REUNIÓN CONSULTIVA
XXVIII ДОГОВОР ОБ АНТАРКТИКЕ КОНСУЛЬТАТИВНОЕ СОВЕЩАНИЕ
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Progress implementing the International Polar Year 2007–2008

Progress implementing the International Polar Year 2007–2008

Submitted by SCAR on behalf of the ICSU/WMO Joint Committee for IPY

1. In response to Information Paper 120 submitted by SCAR at XXVI ATCM in Madrid, the representatives of the Antarctic Treaty Parties adopted Resolution 2 (2003) on "Support of the ATCM for the International Polar Year 2007/8". The text of the Resolution is attached as Annex I.

2. The International Council for Science (ICSU) formally agreed to establish an International Polar Year in 2007–2008, and in 2003 formed a Planning Group to direct the development of an IPY programme. The Fourteenth World Meteorological Congress in May 2003 also approved an International Polar Year in 2007–2008 and the World Meteorological Organization (WMO) is co-sponsor of the Polar Year with ICSU.

3. The IPY Planning Group consulted widely with the polar research community in 2003 and 2004 and produced "A Framework for the International Polar Year 2007–2008". This was published and distributed widely by ICSU in November 2004 (also available at http://www.ipy.org). This document outlines a science plan for IPY 2007–2008 which is structured on the 6 themes that are detailed in Annex II. The Framework document also includes a Data Management Plan, an Education, Outreach and Communication Plan and a proposed Organizational Structure and Implementation plan for IPY 2007–2008.

4. The official period of the IPY will be from 1 March 2007 until 1 March 2009 to allow observations during all seasons, and the possibility of two summer field seasons, in each polar region. The geographic focus will extend over latitudes from approximately 60° to the pole, both north and south.

5. In September 2004 the IPY Planning Group completed its brief and handed over leadership of the Polar Year planning to the ICSU-WMO Joint Committee. Members of the Joint Committee are listed in Annex III

6. The concept of IPY 2007–2008 has been welcomed enthusiastically, and twenty-nine nations have established National Committees for the IPY, and a further five have points of contact for IPY or are establishing National Committees. These are listed at Annex IV.

7. An IPY Programme Office (IPO), funded by the UK Natural Environment Research Council, has been established by ICSU and WMO at British Antarctic Survey, Cambridge. Dr David Carlson has been appointed by ICSU and WMO and commenced work as Director of the IPO. The IPO will provide the day-to-day administrative support to the Joint Committee, its Sub-Committees and, to a more limited degree, to the Project Steering Committees which will manage individual IPY science projects.

8. There was overwhelming support from the scientific community to the ICSU-WMO Call for Expressions of Intent (EoI) for potential IPY activities. Over 900 EoIs were submitted by the closing date in January 2005. About 63% of the EoIs focus on Arctic activities, 20% on Antarctic activities and 17% are bipolar.

9. All EoIs have been assessed by the Joint Committee against the criteria for IPY projects that are outlined in the Framework document. Very few EoI submissions were rejected as unsuitable for IPY, although some need to develop stronger international linkages to fully meet the IPY criteria. The Joint Committee also suggested ways that the large

number of EoIs could be clustered into 50 to 60 larger initiatives, and identified those EoIs that were potential lead projects for specific cluster topics. The scientific clusters that are developing within IPY, and how they link to the IPY themes, are summarized in Annex V.

10. A number of exciting new IPY initiatives have been proposed in the Antarctic region, covering studies of the Southern Ocean, the ice sheet and land mass beneath, and the atmosphere above. These proposed large-scale and internationally collaborative projects are likely to lead to significant advances in Antarctic science. The improvements that the IPY 2007–2008 will bring to the Antarctic regions in new knowledge, in enhancements to observing systems, and in understanding of natural processes, will lead to a lasting legacy.

11. A Call has been made for fuller proposals to be submitted by 30 June 2005. The IPY Joint Committee has provided guidance on how clusters might form and be developed as part of these fuller proposals.

12. An initial set of "core" IPY projects will be identified from the fuller proposals by August 2005. Further opportunities for inclusion of IPY projects, especially those that do not require large logistic support, will be available through into 2006, and there may be a second formal Call for submissions late in 2005.

13. On behalf of the ICSU/WMO Joint Committee for IPY, SCAR requests that the ATCM notes the progress made and reaffirms its support for the IPY 2007–2008, urging Parties to include the IPY core projects related to the Antarctic in national research programmes and to provide financial and logistic support for their implementation.

Annex I

Resolution 2 (2003)

SUPPORT OF THE ATCM FOR THE INTERNATIONAL POLAR YEAR 2007/8

The representatives,

Aware that the Polar Regions are key components of the Earth System;

Considering the important role of the Polar Regions both in driving and responding to Global Climate Change;

Recognising the opportunities afforded by new technological and logistical developments for polar research in the 21st century to develop an understanding of key global phenomena at the frontiers of discovery;

Acknowledging the important contribution to scientific knowledge resulting from international cooperation in scientific investigations in the Polar Regions;

Noting the opportunity offered by the 125th anniversary of the first International Polar Year (IPY), the 75th anniversary of the second IPY, and the 50th anniversary of the International Geophysical Year (IGY), to galvanise an intensive programme of internationally coordinated research in the Polar Regions;

Noting the active commitment to an International Polar Year of the World Meteorological Organisation (WMO), and interest of other international bodies responsible for the coordination of research in the Arctic.

Noting the establishment by the International Council for Science (ICSU) of an overarching Planning Group to coordinate the planning for and the establishment of the IPY (2007/08) that will encompass a wide range of science issues of global interest.

Recommend that the parties:

- call upon SCAR and COMNAP to work with International Council for Science (ICSU) to pursue actively the planning and implementation by all interested organizations of an International Polar Year (2007/9) to address priority polar science issues of global relevance;
- within the context of their national Antarctic research programmes and capabilities to support science programmes proposed for the IPY (2007/8) to achieve outcomes which would not otherwise be possible if undertaken by national programmes alone;
- make the support of the IPY (2007/8) a priority within their national research activities.

Annex II

Themes for the IPY 2007-2008

[Extracted from "A Framework for the International Polar Year 2007-2008"]

The six scientific themes for IPY 2007-2008 have been developed from extensive input from the polar science community and are intended to provide a framework for the specific activities comprising the IPY 2007-2008.

Each theme is presented below along with several key related questions that the IPY 2007-2008 activities will make significant contributions towards answering.

Theme #1: To determine the present environmental status of the polar regions

Previous International Polar Years and the International Geophysical Year brought the international scientific community together to obtain an integrated assessment of the polar regions and polar processes. Today, rapid environmental change that is occurring in the polar regions has increasingly significant global ramifications. Well-planned synoptic observations of the environmental status of the polar regions will serve as a valuable benchmark for scientists and decision-makers globally. Consequently a key output of the IPY 2007-2008 will be to document contemporary natural and human environments of the polar regions, quantifying their spatial and short-term variability and characterizing present day processes.

Characterising the natural and human environments of the polar regions, and their short-term variability, should address questions such as:

1. What are the current composition and the patterns of circulation of the high latitude ocean-atmosphere-ice system; and what are the interactive processes that drive high-latitude circulation?
2. What is the present status of demography, health and educational conditions, language, economy, access to infrastructure, etc. of polar peoples, and how do these vary regionally and in time. What are the contemporary factors of social cohesion and values for polar societies?
3. How do the structure and function of polar ecosystems vary through space and time and how much of this variation can be attributed to anthropogenic causes?
4. How do human societies interact with the present natural environment of polar regions, and with its spatial and temporal variability.

This theme requires development of an integrated, interdisciplinary plan for synoptic observations that will capture the modern environmental status of the poles and document the current spatial variability. It must include integrated physical, biological and social observational programmes. Achieving such synoptic and multidisciplinary observations will involve social surveys; transects of ice sheets, land and ocean; an enhanced observational network for annual time series measurements and gradients; new technologies such as robotic and autonomous observational systems; and enhanced use of satellite observations.

Key variables and processes to be targeted should include sea ice thickness distribution and its development, ocean circulation and stratification, water mass modification, ocean-atmosphere-ice interaction, ice shelf-ocean interaction, ice sheet and glacier mass balance, snow cover, the polar hydrological cycle, carbon storage and export, ecosystem response to

physical and chemical forcing, and biodiversity. Questions concerned with polar biodiversity require biodiversity surveys including those based on modern genomic techniques; attribution of functional diversity; and spatial and temporal sampling at a variety of scales. The further development of quantitative food-webs is required to enhance understanding of polar marine ecosystem structure and function.

Programmes emphasizing the status of the polar inhabitants require a network of social observatories, comparative case studies and databanks of social realities. Physiological, public and occupational health and psycho-social observations can utilize efficient and innovative health and telemedicine technologies to provide an IPY 2007–2008 snapshot of human health in polar regions that is a reference for prior and future research. Interactions between social and natural environments, for example the significant impact on indigenous hunting and on the economically important fishing industry that would occur with changes in sea ice and water temperatures, are an important component of this theme.

Theme #2: ***To quantify, and understand, past and present natural environmental and social change in the polar regions; and to improve projections of future change***

Physical, chemical, biological and social processes in the polar regions together produce a dynamic environment: a natural environment which has seen major changes in the past and a social environment which is currently experiencing rapid change. To provide a framework for interpreting the synoptic observations made during IPY 2007–2008 we need to advance our understanding of the factors which drive natural environment and social change in the polar regions, and to develop and implement better systems to both monitor and predict future changes. The physical and chemical processes and interactions which determine change in the polar cryosphere, and their resultant impacts on the total Earth system, is one priority target. Also important are processes in the polar hydrological cycle, stratospheric processes, and socio-economic consequences of, and feedbacks on, environmental change. Our overall objectives must be to quantify past changes, understand present and ongoing changes and to improve out ability to monitor and predict future changes over a range of time and space scales.

Major questions that might be addressed under this theme include:

1. How are the atmosphere, cryosphere, hydrosphere, high-latitude oceans, ecosystems and social systems changing in polar regions?
2. How has polar biodiversity responded to long-term changes in climate?
3. What are the socio-economic consequences of environmental changes in polar regions, and how do polar communities respond to and interact with change?
4. How will mass balance changes on the polar ice sheets impact global sea level over the next 100 years?
5. How has the planet responded to past multiple glacial cycles, and what critical factors triggered the cooling of the polar regions?

Quantifying, monitoring, understanding, and predicting environmental change can be done with a variety of methodologies. These include the recovery of historical, archaeological and paleoclimatic records; documenting the physical factors which controlled past climate change; enhancing modelling capability through re-analysis and improved parameterization; and development of a long-term observation system. Socio-economic studies need to consider the consequences of these natural environmental changes on polar communities.

Strategically located circumpolar paleoclimatic records are required to quantify the magnitude and natural variability of past environmental changes, to better understand the mechanisms controlling these, and to identify inter-hemispheric connections. Potential activities within IPY 2007–2008 cover time scales ranging from tens of million of years (ocean sediment cores) through hundreds of thousands of years (deep ice cores) and thousands of years (lake cores and shallow ice cores) to hundreds of years (borehole temperatures and permafrost studies). Geophysical mapping of the key ocean gateways in both hemispheres is needed to understand the important roles they played in controlling the past cooling of the polar regions, and the fundamental role they continue to play as boundary conditions for the modern polar environment. Present and future sea level changes are directly related to ice mass balance changes which must be addressed through satellite and surface measurements in combination with modelling forced by high resolution atmospheric data from meteorological re-analyses.

Activities necessary to understand more recent change include meteorological and sea-ice re-analyses; collation of a comprehensive database of polar weather, climate, cryosphere, ocean, ecosystem and socio-economic data; enhanced studies of cryospheric processes and feedbacks in polar climate; and parameterization of the hydrological cycle of cold regions. The IPY 2007–2008 synoptic snapshot (Theme #1) will also contribute to the understanding of processes needed to improve integrated models and our ability to predict future change.

An enhanced system to observe the polar natural and social environments during the IPY should leave a long-term legacy for documenting change. These enhancements should include the activities proposed by WMO for IPY 2007–2008 to improve synoptic weather observations in polar regions, increase monitoring of the ozone layer and of greenhouse gases and aerosols; and the establishment of polar ocean and hydrological observing systems.

Theme #3: To advance our understanding on all scales of the links and interactions between polar regions and the rest of the globe, and of the processes controlling these links

Although the polar regions are frequently omitted from world political maps, their global influence, especially in the climate system, is profound and far reaching. The polar regions contain some of the world's major resources such as fisheries and minerals; hold massive stores of ice capable of causing significant global sea level rise under global warming; represent large carbon sinks that may ameliorate anthropogenic carbon dioxide production; and are also home to peoples that contribute to global cultural diversity. Just as the polar regions influence global processes, global processes also impact the poles. Examples include the formation of the ozone hole, the accumulation of pollutants in the Arctic, the influence of global satellite communication connectivity on polar residents and the impacts of world price variations on resource exploitation.

Research into polar-global linkages during IPY 2007–2008 might address questions such as:

1. What role do the polar regions play in the global cycles of water and carbon?
2. What are the interactions among the physical, chemical and biological systems in the polar regions and how can these be better simulated?
3. What are the implications to human socio-environment and quality of life, both at poles and globally, of natural polar processes?
4. What are the impacts of polar climate change on resource exploitation, world economy and global politics?

5. How are solar variability and the response of the magnetosphere, ionosphere and upper atmosphere coupled to lower atmospheric climate, ecosystems and environment through the polar regions? What are the effects of space weather on technological systems and modern societies?

The programmes proposed to enhance our understanding of the polar-global linkages include physical, biological and social ones. Activities to address these issues include measurements of carbon fluxes in both marine and terrestrial polar ecosystems, improvement of polar meteorological and hydrological networks, analysis of climate indices and data sets, socio-economic surveys**,** comparative case studies and investigations of living conditions of the polar residents, and modelling studies that seek to integrate each of these elements. Many solar-terrestrial physical phenomena are best observed near the poles, and expanded observational networks for these are needed in both polar regions.

Key phenomena to be targeted should include the patterns of multi-year climatic fluctuation that affect the polar regions (e.g. North Atlantic Oscillation, Southern Hemisphere Annular Mode), and the potential for feedback from the polar regions to lower latitude climate. Conversely, forcing of the polar environment by low latitude patterns of variability (e.g. El Nino - Southern Oscillation), and the response of polar marine ecosystems and carbon fluxes to such forcing, require investigation.

Although IPY 2007–2008 activities will be focused on the polar regions, coordination with global programmes will be necessary to achieve an advanced understanding of the polar-global linkages. Projects outside the poles may be part of IPY if they have essential links with polar processes. There are logical connections between the International Heliophysical Year (IHY), which is global but has strong polar elements, and IPY. Collaboration with existing Arctic organizations to further develop the overall IPY human dimension themes, and the observational initiatives that serve these, will also be appropriate.

Theme #4: To investigate the frontiers of science in the polar regions

Humans have probed the polar regions, investigating the frontiers of the planet, since people began living in the Arctic as the ice sheets retreated thousands of years ago. Nevertheless, gaps in our knowledge remain and there are important scientific challenges to be investigated in the polar regions. Beneath the polar ice sheets and under the ice-covered oceans, the bedrock and sea floor are largely unknown. Similarly, the pattern and structure of polar ecosystems is yet to be mapped in detail, and nor can the impacts of large-scale resources exploitation on polar biodiversity and societies be reliably projected. Today the new scientific frontiers in the polar regions are at the intersection of disciplines. Progress can be made not only using new observational techniques, but also by interdisciplinary cross-analysis of existing databases, utilizing the overwhelming recent advances in computing capability.

IPY research endeavours at the frontiers of science might address questions such as:

1. What are the nature, composition and morphology of the deep sea floor and Earth's crust beneath the polar ice, and what effect does the solid earth have on ice sheet dynamics and vice-versa?
2. What are the characteristics of the most extreme environments on the surface of the Earth, such as on the summits of the Antarctic plateau?
3. What are the pattern and structure of the overall polar ecosystems, and what unknown ecosystem characteristics may be hidden beneath continental ice and in the deep polar oceans?

4. How does genetic and functional diversity vary across extreme environments and what are the evolutionary responses underpinning this variation?
5. What have been the connections between the northern and southern hemispheres during past periods of large or abrupt climate change, and what processes have driven these changes?
6. What will be the nature and extent of social transformations induced by large-scale resource exploitation, industrialization and infrastructures development in polar regions? How will these influence relations between demographic, economic and social trends, and ultimately impact the environment?

A diverse range of activities is required to address these questions. Geophysical exploration of sub-glacial lakes and other unknown terrain beneath the Antarctic and Greenland ice sheets should use modern remote sensing technologies, airborne and ground geophysical surveys using remotely operated vehicles, and new rapid access ice-drilling techniques. Marine and terrestrial biological surveys should employ modern genomic methods. Tools to support social science activities should include circumpolar demographic, social and economic data banks; and comparative studies can be made to investigate the social impact of industrial exploitation within different political and socio-economic context, for example between the North-American Arctic and the Russian North.

Theme #5: ***To use the unique vantage point of the polar regions to develop and enhance observatories from the interior of the Earth to the Sun and the cosmos beyond***

The unique position of the poles on the planet makes them an ideal site for observation of diverse processes. Improved understanding of many processes and phenomena, such as solar-terrestrial interactions, the rotation of the Earth's inner core and the strength of its magnetic dipole, cosmic ray detection, and astronomy and astrophysics, are uniquely benefited by observations from both northern and southern polar regions. Several disciplinary based groups have existing programmes or well advanced plans to use the polar regions as observing platforms. These are complemented by interest in developing broader science agendas for new polar research stations proposed by several nations.

Questions that can be addressed by polar observations include:

1. How does the neutral atmosphere interact with geospace in the polar regions and what are the consequences?
2. How does solar variability impact the structure and dynamics of the middle atmosphere?
3. How do upper atmospheric phenomena and space weather interact with Earth's climate and biosphere
4. What is the state of the Earth's magnetic dipole?
5. Is the inner core rotating differentially?
6. Are the characteristics of the premier sites for observing the cosmos on the surface of the Earth, the summits of the Antarctic plateau, good enough to permit the exceedingly sensitive observations required to detect other Earth-like planets in the Galaxy?

Resolution of some of these issues will require extended (up to 6-month) uninterrupted time-series observations in solar, planetary and stellar astronomy. Proposed activities for polar observatories are generally mono-disciplinary but reflect well-developed concepts. Some of these activities have strong connections to the IHY (see Box 2).

Theme #6: ***To investigate the cultural, historical, and social processes that shape the sustainability of circumpolar human societies, and to identify their unique contributions to global cultural diversity and citizenship***

Some 10–12 million people, both indigenous and more recent emigrants, now live in polar regions. The well-being of polar peoples has always been closely linked to their understanding of, and adaptation to, their environment, and polar societies have been agents in shaping changes in their environment for millennia. Understanding of the historical, social, and cultural dimensions of the polar regions and of the complexity and diversity of polar living conditions, both human and physical, has grown considerably. But key deficiencies remain with issues of partnership and public involvement, socio-economic development, governance, cultural viability, and the human rights of all polar people, but especially indigenous people. Internationally coordinated research projects involving constituencies ranging from disciplinary experts to policymakers to local communities are needed to explore how humans and the environment interact in polar regions at scales from the local to the global.

Societal questions central to the IPY 2007–2008 objective of enhancing the understanding of human-environmental interactions in the polar systems might include:

1. How can the "wellness" of polar environments be studied in terms of changing socio-political conditions and the health of ecosystems?
2. What has been the effectiveness of governance regimes in polar regions, and how can these respond to the divergent and rapidly evolving cultural and socio-economic systems?
3. What research methodologies are best suited to an interdisciplinary understanding of the fundamental links between ecosystems, economies and cultural diversity? How can polar residents become more instrumental in shaping these activities; and how can social sciences, humanities, and fine arts communicate this understanding to diverse audiences?
4. What are the key human health and medical issues in polar regions? How, for example, are diseases carried into polar communities and how is community health affected by environmental change?
5. How can historical studies and records of the polar regions enhance understanding of contemporary social and cultural problems?
6. What do the polar societies contribute to global cultural diversity and the political status of indigenous people worldwide?

IPY 2007–2008 offers an unprecedented opportunity to examine data from the human environment, past and present, and to identify emerging paradigms of development in the Arctic and Antarctic. Studies of the vulnerability, resilience, adaptability and sustainable development of polar human societies should be undertaken by networks of researchers and experts, both local and international. Research in the social sciences and humanities has changed significantly during the last few decades, and there is now an inclusion of polar

peoples as scientific partners in research. Methodologies will include structured and semi-structured interview techniques, questionnaire surveys, participant observation, participatory research approaches, archival and archaeological studies, discourse analysis, and reception theory.

The IGY of 1957–1958 resulted in the creation of an innovative model of Antarctic governance based on international scientific and political agreements: IPY 2007–2008 could provide a comparable opportunity to further advance and facilitate international scientific cooperation in the Arctic.

Annex III

ICSU/WMO Joint Committee for IPY

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Annex IV

List of IPY National Committees and Points of Contact

IPY National Committees

Contact details and membership are available at http://www.ipy.org/national/committee.htm

Argentina
Australia
Belgium
Brazil
Canada
Chile
China
Denmark
Greenland (Local Committee)
Finland
France
Germany
Iceland
India
Italy
Japan
Korea
Malaysia
The Netherlands
New Zealand
Norway
Poland
Russia
Spain
Sweden
Ukraine
United Kingdom
United States of America
Uruguay

IPY Points of Contact

Contact details are available at http://www.ipy.org/national/poc.htm

Austria
Czech Republic
Portugal
South Africa
Switzerland

Annex V

Preliminary Scientific Clusters Developed from IPY Expressions of Intent

This list illustrates how the clusters of Expressions of Intent map onto the original six themes of IPY 2007–2008.

THEME 1 - Status

Biodiversity of Polar Regions (Marine, Terrestrial, Lacustrine)
Clouds, aerosols and atmospheric chemistry
Hydrological cycle and freshwater budget
Ocean circulation
Space Snapshot
Ice Caps, Ice Sheets, Glaciers and Permafrost
High Latitude Weather and Climate
Biochemistry and Ecosystems
Coasts and Margins
Improved forecasts (WMO THORPEX-IPY)

THEME 2 - Change

Life Under Natural and Anthropogenic Changes: Stress, responses and adaptation
Migration: Invasions, expansions reductions
Palaeoclimate (Glacier/Ice Core; Geosciences, Atmosphere and Climate)
Adaptation and Vulnerability: coupled human environment systems
Transitions and Border Zones
Rapid Change Societal Responses
Ecosystem Response to change and variability in the physical environment
Evolution of Polar Glaciation

THEME 3 - Global

Teleconnections between polar regions and mid-latitude
Plate tectonics and Polar Gateways

THEME 4 - Frontiers

Exploration beneath the ice (traverses and earth history, sub-glacial lakes)

THEME 5 - Vantage Point – Observing System

Life in the Polar Regions; Pattern evolution and adaptation
Geophysical, Glaciological, Atmospheric and Climate Observation Systems
Local and indigenous visions
Solar-Terrestrial and Aeronomy Research; Interhemispheric Conjugacy
Astronomy
Stratospheric Processes and Climate

THEME 6 - Human Issues

Natural Resources Uses, Management and Conservation
Northern Resources
New Risks and Stresses (including contaminants)
Resources – Geosciences

Outreach and Education

Preservation of IPY Legacy

List of Acronyms and Abbreviations

ATCM	Antarctic Treaty Consultative Meeting
EoI	Expression of Intent
ICSU	International Council for Science
IGY	International Geophysical Year
IHY	International Heliophysical Year
IPO	IPY Programme Office
IPY	International Polar Year
SCAR	Scientific Committee on Antarctic Research
THORPEX	THe Observing system Research and Predictability EXperiment
WMO	World Meteorological Organization