Challenges and Legacies of International Polar Research

"The International Polar Year 2007-2008 comes at a crossroads for the planet's future. February's first phase of the Fourth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) has shown that these regions are highly vulnerable to rising temperatures" says Mr Michel Jarraud, Secretary-General of the World Meteorological Organization.

The recent IPCC report indeed confirms that global temperature rise has impacts on both the Arctic and the Antarctic environments: Arctic temperatures have increased at almost twice the global average rate in the past 100 years; the area covered by permafrost has decreased by about 7% in the Northern Hemisphere since 1900; the annual Arctic sea ice extent has shrunk by almost 3% per decade, with larger decreases in summer of 7% per decade; widespread decreases in glaciers and ice caps have contributed to global sea level rise.

As a result of positive feedback mechanisms in which reduced snow and ice cover increases solar heat absorption, the atmosphere and the ocean are warming much faster in some areas of the polar regions than elsewhere on the planet. The International Polar Year occurs amidst abundant evidence of changes in snow and ice, with reductions in the extent and mass of glaciers and ice sheets, timing and duration of snow cover, and in the extent and thickness of sea ice. There are clear indications that the rate of reduction of several snow and ice masses has accelerated over the past decade.

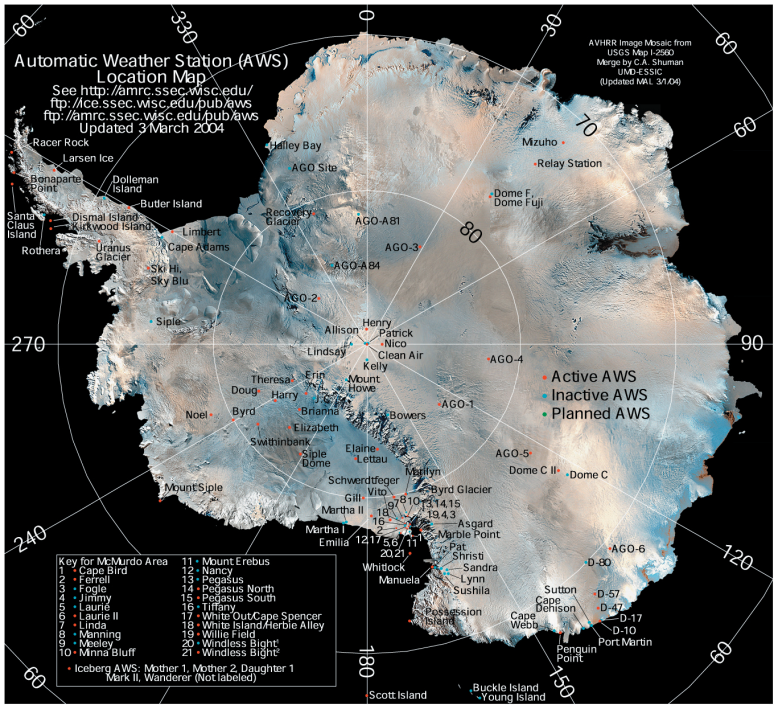
All parts on the planet are connected through atmospheric and oceanic circulation patterns. The changing polar environments are closely linked to changing environments globally – and vice versa. The rise of global sea level due to the increased melting of land-based snow and ice at the poles is only one of the many adverse effects that concern the entire planet. Global warming, in turn, affects the daily living environment of more than four million people in the Arctic. Those communities and societies face changes in their natural environment and in their natural resources and food systems. These changes are, for the most part, of a rapidity and magnitude beyond recent experience or traditional knowledge.

For the first time, the International Polar Year 2007-2008 tries to capture the human dimension of societies living in the far North. In partnership with polar residents, local communities and their institutions, scientists seek to understand the complex factors that determine individual well-being and community resiliency in the face of environmental and social changes.

The International Polar Year 2007-2008 occurs amidst abundant evidence of changes in snow and ice, with reductions in the extent and mass of glaciers and ice sheets, timing and duration of snow cover, and in the extent and thickness of sea ice. Image: C. Arndt.

On 1 March 2007, the International Polar Year 2007-2008 was launched. It builds on a 125-year history of internationally coordinated

studies of polar regions and marks the 50th anniversary of the International Geophysical Year. In order to include the complete annual cycle of seasons in the Arctic and the Antarctic, the Polar Year will occur from March 2007 until March 2009. The international mega-event has been initiated and is sponsored by the World Meteorological Organization and the International Council for Science. A total of 228 projects with researchers from more than 60 countries have been endorsed. All projects were developed in a bottom-up process driven by the research community itself.



All data collected during the International Polar Year 2007-2008, including operational data delivered in real time, are made available fully, freely, openly and on the shortest feasible timescale. Source of image showing Antarctic automatic weather stations: Antarctic Meteorological Research Center.

The projects address six scientific themes: (1) to determine the present *status* of the polar regions; (2) to quantify past and present natural environmental and social *changes*; (3) to advance understanding on *global linkages* between polar regions and the rest of the planet; (4) to investigate *new frontiers* of science; (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; and (6) to investigate the cultural, historical and social processes that shape the sustainability of circumpolar *human societies*.

"Climate research dominates the agenda of the International Polar Year" says Dr Barry Goodison, Chair of the World Climate Research Programme's Climate and Cryosphere (CliC) project which developed and coordinated the preparations for the Polar Year.

Climate research for the benefit of society is coordinated by the World Climate Research Programme (WCRP). The needs of society for climate applications and services is coordinated by the World Climate Programme (WCP).
The Climate Information and Prediction Services (CLIPS), an implementing project of WCP's World Climate Applications and Services Programme (WCASP), builds on the recognition that short-range climate predictions could be of substantial benefit in adapting to and mitigating climate variations in many parts of the world. CLIPS brings together experts in various fields, local meteorologists and end users of forecasts in an environment that encourages interaction and learning. The main objective of CLIPS activities is to build capacity in a region prone to large climate variations. The Polar Year will become a true milestone in polar studies because of the unprecedented level of engagement of polar residents, including polar indigenous people, in research planning, observation, processing and interpretation of the various data sets created through the projects.

During the Polar Year an unprecedented amount of high-quality data will be collected, stored and eventually analysed. The strong and clear data policy for the International Polar Year reads: "All data, including operational data delivered in real time, are made available fully, freely, openly and on the shortest feasible timescale". A successful Data and Information Service during the Polar Year will engage and connect many national and international data centres and promote the development of common formats, improved

reference systems and geographic browsers. The observing networks to be established or improved during the Polar Year period will be kept in operational mode for many years up to decades. The establishment of comprehensive climate data management systems, which are readily available to WMO Members in formats suitable for use in modelling climate processes, detecting climate change, monitoring climate variability, developing climate applications and services and assessing the impacts of climate is the expertise of WCP's World Climate Data and Monitoring Programme (WCDMP).

Of particular importance during the Polar Year is the recovery and preservation of relevant historical data and to ensure that these are also made openly available. The World Climate Research Programme's Arctic Climate SYstem Study (ACSYS), which concluded in 2003, produced a climatology of the Arctic Ocean sea-ice edge dating back as far as 1553. This strong legacy is being continued during the 2007-2008 International Polar Year.

"Meteorological and other regular environmental in-situ observation facilities at the poles are few and it is essential to install more and increase satellite coverage to gain a better overall picture of how rapidly these areas are changing, and of the global impact of these changes" says Mr Jarraud.

It is the World Meteorological Organization's aim to establish and implement climate watch systems at national levels – in analogy to weather watch systems – by the end of 2011. Climate Watches heighten awareness and improve preparedness for adverse climatic conditions – and reduce socioeconomic vulnerability to climate hazards by alerting the community well in advance.

The International Polar Year provides significant opportunities to everyone to actively participate and learn about the polar regions and their communities. Education and outreach is a substantial component during the Polar Year with the aim to attract and develop the next generation of polar scientists, experts and leaders.

The largest challenge and legacy of the 2007-2008 International Polar Year is to strengthen international cooperation of research and enhance international cooperation in polar regions, particularly among scientists, local residents and their institutions in scholarship, education, health and environmental protection. *[ca]*

Contact

World Climate Programme, WMO
wcdmp@wmo.int

References and links

ACSYS http://acsys.npolar.no/
CliC http://clic.npolar.no/
CLIPS www.wmo.int/web/wcp/clips2001/html/index.html
ICSU www.icsu.org/index.php
IPY brochure wcrp.wmo.int/pdf/PolarBrochureScientific_v2.pdf
IPY launch Press Release www.wmo.int/web/Press/PR_IPY.doc
IPCC www.ipcc.ch
IPCC AR4 Summary for Policymakers www.ipcc.ch/SPM2feb07.pdf
IPY www.ipy.org
WCASP www.wmo.int/web/wcp/clips2001/html/index.html
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