

A YEAR OF DISCOVERY AWAITS



A new era in our understanding of the polar regions and their impact on the Earth's climate, ecosystems and societies will awaken when the International Polar Year (IPY) gets underway in March 2007.

IPY 2007-2008, co-sponsored by the International Council for Science and the World Meteorological Organization, will lay the foundation for major scientific advances in the Arctic and Antarctic, while leaving a legacy of observing sites, facilities and systems to support ongoing research and monitoring. The official observing period will run from 1 March 2007 until 1 March 2009, to enable summer-based projects to be conducted over a full year.

International, collaborative research will be conducted under six broad themes:

- the environmental status of the polar regions;
- understanding past change and predicting future change;
- links between polar and global processes;
- bringing science frontiers to polar regions;
- observing the Earth and space from the poles;
- the sustainability of circumpolar societies.

The IPY follows on from three previous events. The First International Polar Year (1882-1883) was the inspiration of the Austrian explorer and naval officer Lieutenant Karl Weyprecht. Research during the year addressed fundamental problems of meteorology and geophysics and set a precedent for international scientific cooperation.

The Second International Polar Year (1932-1933), proposed by the International Meteorological Organization, investigated the global implications of the newly discovered jet stream and saw advances in meteorology, magnetism and atmospheric science. Both the first and second polar years placed the focus on the Arctic region.

The International Geophysical Year or IGY (1957-1958) emphasised the Antarctic, and included studies of meteorology, geophysics, the structure of the ionosphere, cosmic rays, solar activity, glaciology, oceanography, seismology and the Earth's gravitational field. The year saw the theory of continental drift confirmed, the discovery of the Van Allen Radiation Belt, the launch of the world's first satellites, and informed estimates of Antarctica's ice mass. Australia's second permanent Antarctic station, Davis, was established in January 1957, in preparation for the IGY, following on from Mawson which had been established in 1954.

IGY had been organised by the International Council of Scientific Unions (ICSU) through its Special Committee on Antarctic Research. The

success of Antarctic research during IGY led to the establishment in 1958 of a permanent ICSU group to foster Antarctic research — the Scientific Committee on Antarctic Research (SCAR). Importantly, IGY led directly to the negotiation and adoption of the Antarctic Treaty in 1959, which included the objective of facilitating further scientific cooperation in Antarctica.

The unprecedented level of cooperation, exploration and discovery achieved during these three years, but especially during IGY (which involved some 80 000 scientists from 67 countries), has raised the bar for 2007-08. At a time of global change and with significant advances in scientific knowledge and technology since the IGY, the stage is set for new insights and breakthroughs.

Australia will play a key role in the IPY – the Australian Government Antarctic Division will lead four of eight scientific projects being hosted by Australia, while Australian scientists will be involved in some 50 other international projects. The Australian coordinated projects are described below.

Census of Antarctic Marine Life

The five-year Census of Antarctic Marine Life (CAML), led by Antarctic Division Chief Scientist Dr Michael Stoddart and Project Manager Victoria Wadley, will determine species biodiversity, abundance and distribution around Antarctica – on the sea floor, continental slope, in deep waters, under collapsed ice shelves and in upper

sunlit waters. As knowledge of Antarctica's marine biodiversity is patchy, CAML will establish the state of these communities and provide a baseline against which future change – as a result of climate change – can be measured. More information: <http://www.caml.aq/>.

Taking the Antarctic Arctic Polar Pulse

A key component of this project will be the development of a snapshot database of health events occurring in the Antarctic during the IPY. Research will include investigations into the impacts of living in the total darkness of winter, the effects of isolated and confined conditions on the human immune system, metabolism, stress and social behaviour, and the viability of using internet-based telemedicine techniques to diagnose and treat disorders over exceptionally long distances. The project will be led by Antarctic Division Chief Medical Officer, Dr Jeff Ayton.

Solar variability linkages to atmospheric processes

Led by Antarctic Division atmospheric scientist, Dr Gary Burns, this project will investigate whether solar variability affects the Earth's weather and climate. Scientists will measure the global electric circuit – an electric current that flows around the world between the ground and the lower reaches of the ionosphere (about 70 km up) – to determine whether changes in the sun have an effect on the Earth's weather system. Such changes could alter the global electric circuit and the conditions under which clouds develop, potentially providing a link between solar activity and climate. Accurate measurements of the current could also enable scientists to monitor changes in global thunderstorm activity as the world warms. Instruments to measure the global electric circuit will be deployed on the Antarctic plateau and the Greenland ice plateau.

Aliens in Antarctica

The Aliens in Antarctica project, led by Dr Dana Bergstrom of the Antarctic Division, will assess the extent to which people unintentionally carry propagules (seeds, spores, eggs) of alien (non-native) species into the Antarctic region during the 2007-08 summer. People travelling to the Antarctic and subantarctic islands, by ship and

aircraft, will have their clothing and equipment inspected for propagules. The project will provide an understanding of the threat that alien propagules pose, enabling appropriate mitigation methods to be established to combat this threat.

International Research Expedition

The Royal Society of Victoria will lead 'RSV-INTREPID' – two 40-day summer voyages of scientific investigation involving 50 year 12 students and 60 scientists. Students will participate in intensive ship-board and shore-based investigative and experimental projects designed to complement other IPY projects, and will prepare an investigative report for publication in the Society's Proceedings. The project will support one of the IPY's key objectives of education, outreach and communication through its continuing promotion and advancement of science and technology and by encouraging young people to pursue a career in science.

Astronomy from the Polar Plateau

The polar plateaus provide the best sites on the Earth's surface to conduct a wide range of astronomical observations, due to the extremely cold, dry and stable air found there. Led by Associate Professor Michael Burton of the University of New South Wales, the project aims to quantify these conditions at four sites – Summit in Greenland, Ellesmere Island in Canada, and Domes A and C on the Antarctic plateau – and begin the process of turning these sites into front line observatories. The project will build upon a decade of site testing experience, at both the South Pole and at Dome C, including the development of autonomous observatories that can gather data over winter. Currently, the research team is working on delivering an automated observatory to Dome A through a Chinese-led traverse planned for the region.

International Antarctic Institute

The International Antarctic Institute (IAI) will serve as an educational centre for Antarctic programmes, facilitating cross accreditation of courses from partner institutes. The IAI currently involves 12 countries with programmes in Antarctic education and/or Antarctic research. While its headquarters will be based at the University of Tasmania, the IAI will be a multi-campus, multi-disciplinary institution that will offer jointly accredited degrees from undergraduate level to Masters. Establishment of the institute is being led by Professor Andrew McMinn of the Institute for Antarctic and Southern Ocean Studies at the University of Tasmania.



Climate of Antarctica and the Southern Ocean

Led by Dr Steve Rintoul of the Antarctic Climate and Ecosystems Cooperative Research Centre and CSIRO, this project will obtain a broad, circumpolar snapshot of the physical environment of the Southern Ocean. Collaboration with other IPY activities will extend the snapshot to include biogeochemistry, ecology, and biodiversity. The work aims to enhance understanding of the role of the Southern Ocean in past, present and future climate.

A key element of the project will be the establishment of a Southern Ocean Observing System to routinely monitor the behaviour of the ocean. Information from this system will be used in models for ocean and climate forecasts. The system will involve measurements of temperature, salinity and ocean currents using ships, free floating instrumentation, satellite trackers attached to marine mammals and seabirds, current meters and tide gauges.

More information about IPY projects is available at: <http://www.ipy.org/>.

Dr Ian Allison of the Australian Government Antarctic Division and the Antarctic Climate and Ecosystems Cooperative Research Centre, is Co-Chair of the Joint Committee for the IPY. Dr Allison has studied the Antarctic for over 35 years, participated in more than 25 research expeditions to the Antarctic, and published more than 100 papers on Antarctic science. His current research interests include the interaction of sea ice with the atmosphere and ocean; the dynamics and mass budget of the East Antarctic ice sheet; melt, freezing and ocean circulation beneath floating ice shelves; and Antarctic weather and climate. Dr Allison was active in the planning and co-ordination of a number of international programmes within the Scientific Committee on Antarctic Research and the World Climate Research Programme before his present involvement in the IPY 2007-2008.



The aurora australis or Southern Lights are produced as a result of charged particles from the sun (solar wind) colliding with gases in the upper atmosphere. The interaction of the solar wind and the Earth's magnetic field, the same process that leads to the aurora, influences the global electric circuit in the Polar Regions.