

AROUND THE WORLD IN 365

The International Geophysical Year (IGY) of 1957-58 was one of the most significant events in the human history of the Antarctic – it defined the role of science and the way it is conducted in Antarctica.

IGY followed in the tradition of a central role for geophysics in scientific research, which began with the 1829 voyage of Henry Foster in *Chanticleer* to measure gravity and magnetic features, and continued with the search for the South Magnetic Pole in the mid-19th century.

The idea for IGY arose during dinner in honour of the renowned physicist Sydney Chapman, at the home of James van Allen (after whom the Van Allen Radiation Belt is named). In 1950 the

idea was formally proposed to the International Council of Scientific Unions, which welcomed it and established an organising committee. From the beginning the programme was to be purely scientific, with no concern for politics or finances, which would be the responsibility of participating nations.

The IGY was to be the third international polar year, following those of 1882-83 and 1932-33, and coincided with a peak in sunspot, and hence auroral, activity. The programme included upper atmosphere and cosmic ray physics, meteorology, seismology, glaciology, and gravity and magnetic studies. It was soon recognised that the phenomena to be studied had global relevance and, in 1952, the terms of reference were widened to take these into account. The name 'IGY' reflected the focus on physical sciences. Prominent modern disciplines such as geology, biology, oceanography and cartography were not included, although countries active in the IGY used existing facilities to conduct their own research in some of these non-geophysical disciplines.

The IGY was the first major international scientific effort with a dedicated Antarctic component. The first polar year in 1882-83, involving 12 nations, had 15 expeditions but only two in the Southern Hemisphere – at Orange Bay in southern Tierra del Fuego and one on South Georgia. The year recognised that the study of global meteorology and geophysical phenomena required large scale international collaboration, and thus set a precedent for collaborative work. The second polar year, involving 40 nations, investigated the global implications of the newly discovered jet stream, and saw advances in meteorology, magnetism and atmospheric science.

In the spirit of these collaborative successes the IGY involved 67 nations. Research was conducted at a time when many aspects of Earth's magnetic field were unknown, and continental drift was not widely accepted. Our modern understanding of the origin, structure and evolution of the ocean



As part of its programme of educational outreach, the National Academy of Sciences IGY committee put together a booklet providing a brief introduction to the earth and environmental sciences. The booklet was organised around six posters, each devoted to an area of geophysics and created expressly for the outreach project. This poster, *Sun & Earth*, illustrated the current scientific understanding of the sun, its interactions with Earth, and the equipment used to study solar phenomena. The posters can be downloaded from www7.nationalacademies.org/archives/IGYPlanetEarthPosters.html. Films about the IGY can be viewed at http://lasp.colorado.edu/igy_nas/.

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floor was in its infancy, and thus the programme would be seen in retrospect as concentrating on a narrow spectrum of what constitutes geophysics. The link between the magnetic features of the outer atmosphere and the inner reaches of Earth was unknown, but suspected. By the end of the IGY, scientists had discovered the Van Allen Radiation Belt, launched the world's first satellites (including Sputnik), made informed estimates of Antarctica's ice mass, and confirmed the theory of continental drift.

The IGY set in place the modern *modus operandi* in the Antarctic, including internationally coordinated scientific and logistic programmes, and long-term observatory studies. The days of the dedicated amateur or one-off adventure were over; from this time on, programmes were dominantly national. In addition, nations had to abide by evolving, internationally recognised scientific standards.

The IGY also addressed the need for stations in Antarctica, to support the research effort. Several nations, including Australia, already had stations operating in Antarctica, and many expanded their presence with the IGY in mind. Australia had established stations at Mawson in 1954 and Davis in 1957 – in preparation for the IGY. The United States built many stations including Wilkes, which eventually evolved into Australia's Casey station, and the USSR built Mirny and Vostok and shorter-term bases in the Australian Antarctic Territory.

While IGY was entirely scientific at the outset, the consequences of the international cooperation explicit in the programme were of far greater consequence in the long run, as it led to two globally significant initiatives:

- negotiation of the Antarctic Treaty (see box), which gave science a pivotal role in the affairs of the Treaty; and
- establishment of the Special (now Scientific) Committee on Antarctic Research (SCAR) in 1958 by the International Council of Scientific Unions, to coordinate multilateral science in Antarctica.

The IGY contrasts in many ways with the current IPY. The IGY was a *global* programme, focused fairly narrowly on geophysics. The IPY is concerned primarily with *polar regions* and with a very wide range of disciplines, including strong social, cultural and educational components. It would be gratifying to think that the IPY could, following the example of the IGY, lead to something greater than just the research that is currently envisaged.

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Antarctic Treaty makes IPY mission possible

The International Polar Year (IPY) is said to represent 'one of the most ambitious coordinated international science programmes ever attempted'. But cooperation in Antarctic science is nothing new. In fact, the IPY marks the jubilee of the 1957-58 International Geophysical Year (IGY), which was characterised by large scale scientific cooperation in Antarctica (see main story).

However, we cannot take scientific collaboration for granted. After the recent launch of the IPY it is timely to consider the history of scientific cooperation in the Antarctic, and the legal and political framework that makes such cooperation possible.

Interest in Antarctica grew rapidly during the first three decades of the 20th century, as scientific curiosity replaced geographical discovery. After the Second World War, this interest coincided with the efforts of several nations to consolidate territorial claims on the Antarctic continent. The continent was being mapped and built upon, but knowledge of it was still surprisingly scant. The International Council of Scientific Unions capitalised on this growing presence in Antarctica and, unlike previous polar years, made Antarctica the focus of the IGY.

Nations active in Antarctica soon realised that the value of IGY research would be undermined if they were pre-occupied with defending their sovereign concerns. So they agreed to set aside their sovereign interests during the IGY, allowing science to proceed unfettered by the boundaries marked on maps. The remarkable thawing of the 'Cold War' in Antarctica encouraged the 12 nations who had supported the research programmes to perpetuate this spirit of cooperation and tolerance.

Negotiations commenced on an international agreement to cement this cooperation. In December 1959 the 12 nations adopted the text of the Antarctic Treaty, which declared that Antarctica should forever be used for peaceful purposes and remain free of scientific or international discord. The Treaty prohibited nuclear explosions and the disposal of radioactive wastes, guaranteed scientific cooperation, and obliged the free exchange of the scientific results. The Treaty also accommodated differences over territorial claims.

Following its entry into force in June 1961, the Treaty spawned the broader Antarctic Treaty system which offers a raft of instruments, measures, decisions and resolutions that together provide for the governance of the continent.

Since 1961, signatories to the Treaty have expanded to 46. From an instrument of just 14 articles, we now have a regime of measures addressing a range of issues. We also have science proceeding peacefully and productively.

Cooperation in Antarctic research now appears common sense and routine. The breadth of IPY activities in Antarctica is a manifestation of the legacy of the IGY and the vision of the original negotiators of the Treaty.

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