Chapter 1

The Beginning

Introduction

Antarctica was the last continent to be discovered and the last to be explored. Indeed, some would say that we have not yet completed our exploration of Antarctica, begun over 200 years ago when Captain James Cook first began the delimitation of the continent between 1772 and 1775, until then known as *Terra Australis Incognita*.

The early explorers were driven by interests in discovery and conquest, this being the period of empires and annexation, as well as by interests in science. Their voyages into the unknown began the long and slow process of charting the coastline of the continent, identifying the outlying islands and, very quickly, learning how to exploit its resources. Our lack of detailed knowledge of what the early sealers and whalers did is due in large part to the commercial value attached to locations and size of marine mammal stocks at that time. However, there were other early interests in Antarctic co-operation. In 1836 Alexander von Humbolt suggested to the Royal Society the establishment of permanent magnetic stations in various British colonies as part of a programme of co-ordinated observations led by K F Gauss. When sending this on to the British Government the Royal Society added recommendations of their own about the Antarctic which in turn resulted in the magnetic observations on the James Clark Ross expedition of 1839–43.

In 1861 Matthew Fontaine Maury proposed to the British Association for the Advancement of Science that maritime nations should explore the Antarctic as part of their search for currents in the world's oceans but little came of that.

Whilst there were important voyages in the 19th century that produced valuable science – the Russian voyage led by Fabian Gottlieb von Bellingshausen, the United States Exploring Expedition led by Charles Wilkes, the visit of HMS *Chanticleer* to Deception Island, and the pioneering voyage to the Ross Sea of HMS *Erebus* and *Terror* led by James Clark Ross – it was not until the so-called "Heroic Age" expeditions began in 1898 that Antarctic science really began in earnest.

These expeditions between 1898 and 1923 were all privately organized although often supported heavily by governments, all were nationalistic to a greater or lesser degree and their scientific legacies varied widely. At one end was the Norwegian expedition to the South Pole led by Roald Amundsen, who never claimed to have scientific objectives and contributed little of lasting scientific value. At the other extreme were those with clear science objectives, like the First German Antarctic Expedition led by Erich von Drygalski, the Australian Antarctic Expedition led by Douglas Mawson and the British National Antarctic Expedition led by Robert Scott. The scientific reports and papers from these and other expeditions, Belgian (Adrien de Gerlache), French (Jean-Baptiste Charcot), Scottish (William Bruce), Japanese (Nobu Shirase) and Swedish (Otto Nordenskjöld), provided the foun-

dation for much of our present Antarctic science.

Although rivalry between nations was a feature readily exploited by the expedition leaders to raise money these expeditions did show some real signs of international collaboration. The Belgian expedition led by Adrien de Gerlache was probably the most international in terms of its crew but other leaders helped each other with advice and equipment. There was even a plan drawn up by Otto Nordenskjöld for a joint Swedish-British expedition, which had to be abandoned at the outbreak of the First World War.

International scientific co-operation in high southern latitudes had actually begun earlier with the Transit of Venus Expedition in 1874–75. This was the first time that scientists from Brazil, France, Germany, the United Kingdom and the United States had formally agreed to work together to establish observatories in the subantarctic to study polar phenomena. And this was to be taken a stage further through the efforts of Lieutenant Carl Weyprecht of the Imperial Austro-Hungarian Navy, whose experiences in the Arctic lead him to realize that serious scientific progress could only be achieved through systematic and coordinated data collection.

International co-operation in Antarctica was debated at the 8th International Congress on Geography in Washington in 1904 and this stimulated a group of countries to meet in 1905 to create an International Association for the Study of the Polar Regions. At a meeting in Brussels in 1906 to work out a constitution 15 countries were present. They decided to establish an International Polar Commission, the main objects of which were to promote closer scientific relationships between polar explorers, and to co-ordinate their scientific objectives and methods. Despite these very worthy intentions little of substance actually happened and in 1913 the Commission was officially closed. Norway attempted to revive international interest in the polar regions by proposing a Congress of Polar Explorers and a Polar Exhibition to be held in Bergen in 1940 but this had to be abandoned on the outbreak of the Second World War.

The Special Committee on Antarctic Research (SCAR) was established by the International Council of Scientific Unions (ICSU) in the closing stages of the International Geophysical Year (IGY) and held its first meeting in The Hague, The Netherlands, 3–5 February 1958. Whilst this date marks the start of the formal history of SCAR it is worth looking back farther in time to set the historical context from which SCAR eventually emerged.

It is always arguable where or when any history should begin but many Antarctic historians would probably agree that for polar science, and especially for SCAR, Vienna, Austria, in December 1871 might be the appropriate point. Carl Weyprecht presented a paper on ice cover in the Arctic Basin to a meeting of the Imperial Academy of Sciences in Vienna in which he theorized that the central Arctic Ocean would be sufficiently devoid of sea ice during the autumn for it to be navigable and proposed that expeditions should be sent to explore the central Arctic and the Siberian coast.

In 1871 Weyprecht had made a first expedition to the Barents Sea, jointly with Julius Payer. In 1872, the Austro-Hungarian North Pole expedition, under the leadership of Weyprecht and Payer, sailed from Bremerhaven to explore the Northeast Passage.

In the light of his experience, Weyprecht became a fervent advocate for circumpolar research stations that would replace the former traditional polar expeditions. He wrote an essay entitled “Fundamental Principles of Arctic Research” in which he proposed the systematic exploration of the polar regions through international collaboration. He emphasized the importance of the polar regions for scientific research and stressed the need for coordinated serial observations, especially in meteorology and geomagnetism.

Carl Weyprecht (1838–81)

Carl Weyprecht was born on 8 September 1838 in Darmstadt, Germany. He received a scientific education and was commissioned in the Austro-Hungarian Navy. His first Arctic expedition was to the Barents Sea in 1871, following which he proposed a budget for ice cover in the Arctic Ocean. In 1872 with Julius Payer he led the Austro-Hungarian North Pole expedition aboard the ice-strengthened vessel *Admiral Tegetthoff* to explore the North-east Passage. The archipelago of Franz Josef Land was discovered but none of the expedition's other geographical goals was achieved. After two winters in the ice, the ship had to be abandoned. Weyprecht led the return across the ice using sleds and boats and reached open water after a trek of 90 days. The journey continued in the four boats and eventually the expedition reached land.

After the expedition, Weyprecht developed his ideas for polar research based on the principle of systematic exploration by circumpolar research stations through international collaboration. In December 1874, the Bremen Polarverein (Polar Society) had sought support for a new East Greenland expedition, intended to coincide with a British expedition to the west coast of Greenland. A major component was to be simultaneous data collection across a large spatial scale in meteorology, geomagnetism and auroral research, consistent with Weyprecht's principles. In 1879, during the second International Meteorological Congress in Rome, Weyprecht's efforts were met with major approval for the first time and, on 5 October that year, the International Polar Commission was founded at the German Hydrographical Office in Hamburg. Georg von Neumayer, Director of the Hydrographical Office, became chairman of the commission. Within three years, Neumayer had paved the way for the First International Polar Year (1882–83) and had successfully integrated an Antarctic component into the programme.

Weyprecht died in Michelstadt on 29 March 1881, just a year before the start of the first International Polar Year and the realization of his dream.

The First International Polar Year (1882–83)

The Permanent Committee of the first International Meteorological Congress (IMC) met in London on 21 April 1876. The discussions on distant stations were based on Weyprecht's proposal to establish observatories in the Arctic. The Committee was convinced "that such observations would be of the greatest value for the progress of both sciences" and recommended all countries to take part by establishing a regularly distributed network of stations at the following locations: Spitsbergen, Point Barrow (Alaska), Alten in Finmark, Boothia Felix (Canada), the mouth of the Lena River (Siberia), the New Siberian Islands (Russian Arctic Ocean), Upernavik (West Greenland), Pendulum Island (East Greenland).

At the second International Meteorological Congress in Rome, 1879, there was much debate with various views being expressed: some suggested that the south polar region should not be included; some saw difficulties in the combination of meteorological and magnetic observations. The resulting recommendation to governments was that the International Meteorological Committee should establish a special commission comprising members from those governments that would take part in what was to become the first International Polar Year.

The Director of the Deutsche Seewarte in Hamburg, Georg von Neumayer, had been pleading for south polar research since 1865. The transit of Venus on 9 December 1874 and again on 6 December 1882 would provide good opportunities and he favoured German expeditions to Iles Kerguelen (1874) and South Georgia (1882) that would also provide good starting points for Antarctic research. Weyprecht was developing his ideas for polar research and his proposals for the locations of Arctic observatories were the same as the meteorologists except that Novaya Zemlya would substitute for Boothia Felix. He was also influenced by Neumayer's ideas, particularly for a network of stations around Antarctica, and he suggested stations at Cape Horn, Auckland Islands and Iles Kerguelen or the Macdonald Islands in the Southern Hemisphere.

The first International Polar Commission was founded at the Deutsche Seewarte in Hamburg and Neumayer became chairman of the Commission. Within three years he had successfully paved the way for the First International Polar Year, including a Southern Hemisphere component. In 1882, a year after Weyprecht's death at the age of 42, eleven nations took part in the First International Polar Year, the largest scientific project of its time with 14 co-ordinated expeditions to the Arctic and the Southern Hemisphere. In the event, twelve Arctic stations were established by ten nations at: Point Barrow (Alaska); Fort Rae (North-West Territories); Kingua Fjord (Baffin Island); Fort Conger (Ellesmere Island); Godthåb (Greenland); Jan Mayen (Norwegian Sea); Cape Thordsen (Spitsbergen); Bossekop (Norway); Sodankylä (Finmark); Karmakuly (Novaya Zemlya); Dikson (Kara Sea, Russia); Sagastyr (mouth of the Lena River, Russia). In the Southern Hemisphere, stations were established by France on Tierra del Fuego and by Germany on South Georgia.

At the first International Meteorological Congress in Vienna, 2–16 September 1873, the major discussions were on standardizing methods of observation and analysis, standardizing units and symbols, publication and exchanges of results, completing and extending the existing network of observatories. Meteorologists were, therefore, already practising many of the principles that would become central to the operation of the IPY. Earth magnetism was the other main focus of the IPY. A schedule of obligatory observations was agreed and these would be made simultaneously at all the IPY stations.

The French established a station at Bahía Orange, Isla Hoste, near Cape Horn on Tierra del Fuego with an associated secondary station at Ushuaia, Argentina, run by Thomas Bridges and his family. The French station was remarkably successful, being equipped with an almost complete set of self-recording instruments. In addition, the expedition ship *Romanche* stayed in the region for the entire period and made many complementary observations. The expedition also made, apart from the obligatory observations, a wide range of studies and observations in other disciplines, including botany, ethnology, geology, hydrography, oceanography, zoology and others.

The Germans established their station at Royal Bay on the eastern coast of South Georgia with a secondary station in Stanley, Falkland Islands (Islas Malvinas), making meteorological observations. Like the French, they also made extensive studies in other fields, particularly biol-

ogy and cartography, in addition to the obligatory observations of the IPY. Both expeditions successfully observed the transit of Venus on 6 December 1882. Both expeditions also operated self-recording tide gauges and independently suspected that their instruments were malfunctioning when some erratic wave measurements were recorded. Subsequent analysis showed that there was no malfunction but that both instruments had recorded the tsunami triggered by the cataclysmic eruption of the volcano Krakatau in the Indonesian archipelago on 26–27 August 1883.

Following the close of the IPY observational period, the International Polar Commission met in Vienna, 17–24 April 1884, to discuss analysis and publication of the results. Some of the data were not forthcoming and there was no overall publication or synthesis of the results. Nevertheless, the published results were extremely valuable to the scientific community, particularly the meteorological data. Britain and Germany made synoptic charts for the north and south Atlantic Ocean and a first climatology of the Arctic was produced. A final meeting of the Commission was held in Munich, 3 September 1891, at which it was agreed that the publications of all the various IPY expeditions should be archived at the Central Physical Observatory in St Petersburg, Russia. At the close of the meeting the International Polar Commission was dissolved.

There is no doubt that the International Polar Year had been a success, bringing together, as it did, the scientists and their governments from eleven countries to work in co-operation and, most importantly, in co-ordination with each other.

The Second International Polar Year (1932–33)

On 16 November 1926, at a meeting of "Studiengesellschaft zur Erforschung der Arktis mit Luftfahrzeugen" (International Society for the Exploration of the Arctic by means of Aircraft, or AEROARCTIC), the German representative, Leonid Breitfuss, floated the idea of a Second International Polar Year to commemorate the 50th Anniversary of the original IPY. The meeting was also attended by Johannes Georgi of the meteorological research institute Gross-Borstel. A year later, at a meeting in the Deutsche Seewarte (German Naval Observatory), in Hamburg, Georgi aired the idea of a second IPY and it was agreed to make a formal proposal to the International Meteorological Organization. As a result, Johannes Georgi has been traditionally credited with the proposal but recent research has shown that the idea was not his originally, although he can be credited with initiating the process.

In 1929, after consideration by the International Meteorological Organization and others, the Meteorological Conference of Directors in Copenhagen endorsed a plan for the co-operative study of magnetic, auroral and meteorological phenomena. A Commission for the Polar Year 1932–33 was appointed and a collaborative agreement was reached with the International Union of Geodesy and Geophysics (IUGG). The Commission met in London, December 1930 to prepare a detailed a report containing proposals for research programmes in meteorology, terrestrial magnetism, atmospheric electricity, aurora, and aerology. During the worldwide economic depression the Commission was urged to postpone the Polar Year but the members decided that it should proceed as planned. Accordingly the Second International Polar Year began on 1 August 1932 and continued to 1 September 1933.

The plans for the Second IPY called for a wide network of geophysical and meteorological observatories across both polar regions. However, despite the involvement of many observing stations worldwide, the global economic situation seriously restricted the extent of the activities and the Antarctic was hardest hit. There were no formal IPY stations in the Antarctic region during this time, although the British station on South

Georgia and the Argentine Orcadas base in the South Orkney Islands contributed meteorological data. Many vessels in the Southern Ocean, particularly those of the Norwegian whaling fleet, also contributed data.

Despite the financial strictures, the Second IPY was a reasonable success for the Arctic but little was achieved for the Antarctic. There were problems with publication of results due, in part, to the outbreak of war in September 1939.

The International Geophysical Year (1957–58)

The legacy of the Second World War was more than economic ruin and population decline for the European countries. As Winston Churchill so aptly described it "An iron curtain has descended across the continent" and the growing political problems of differing Soviet and American views of the world engendered the Cold War. Estrangement between the Eastern Bloc scientists and those of Western Europe and North America was an important feature of the early 1950s. The interchange of ideas and collaboration were strictly controlled by governments.

On 5 April 1950, at a dinner in the home of James A van Allen, to which he had invited a number of American physicists to meet visiting British scientist Sydney Chapman, Lloyd V Berkner proposed the idea of a third Polar Year. He believed that progress in geophysical instrumentation had been so great since the Second IPY, largely as a result of technical developments during the Second World War, that it would be appropriate to hold a third Polar Year 25 years after the Second IPY. 1957–58 would also be the time of maximum solar activity. A formal proposal was made to the Joint Commission for the Ionosphere and was subsequently approved by its parent bodies the international unions for radio science (URSI), astronomy (IAU), geodesy and geophysics (IUGG), geography (IGU), pure and applied physics (IUPAP), and by the International Meteorological Association (IMA). The World Meteorological Organization (WMO) and IUGG suggested that the scope of the programme should be widened to a global programme and the name of the programme was formally changed to the International Geophysical Year (IGY). The period of the programme was fixed as 1 July 1957 to 31 December 1958; an 18 month period to ensure complete coverage of one year in both polar regions.

In October 1952 the International Council of Scientific Unions (ICSU) established a Special Committee for the International Geophysical Year, customarily known by its French title: Comité Spécial de l'Année Géophysique Internationale (CSAGI), and its task was to co-ordinate the whole IGY programme. Sub-committees were created to consider the programme in the different regions of the Earth and one of these was for the Antarctic that would be a special focus for IGY activities.

The First CSAGI Antarctic Conference

The first CSAGI meeting was held in Paris, 6–10 July 1955. The organizer, Georges Laclavère (France), a cartographer who was the Secretary General of IUGG and later the first President of SCAR, was elected President. J A de Tezanos Pinto, Argentine Ambassador, and Lawrence M Gould (United States, and later a President of SCAR) were elected Vice-Presidents, and Paul-Emile Victor (France) was elected Secretary.

In opening the meeting, the President emphasized the technical character of the Conference and that financial and political questions were not its concern. Accordingly the Conference adopted the following motion:

> "The Antarctic Conference entirely endorses M Laclavère's statement of purposes at the opening session, and specifically his affirmation that the overall aims of the Conference are exclusively scientific."

Lloyd Viel Berkner (1905–67)

Lloyd Berkner was born in Milwaukee, United States, on 1 February 1905. He was an American physicist and engineer who joined the US Navy in 1926 where he assisted in the development of radar and navigation systems, naval aircraft electronics engineering, and studies that led to the construction of the Distant Early Warning system. He was a radio engineer on the First Byrd Antarctic Expedition, 1928–30. After leaving the regular Navy, he continued in the US Navy Reserve, reaching the rank of Rear Admiral.

On 5 April 1950, at a gathering of top scientists in the home of James van Allen, he suggested that, with the development of new tools such as rockets, radar and computers, the time was ripe for a third International Polar Year. The International Geophysical Year 1957–58 developed from this proposal.

Berkner was the first person to measure the height and density of the ionosphere that led to the first complete theory of short wave radio propagation. He was President (1957–59) of the International Council of Scientific Unions during the whole of the IGY.

He investigated the development of the Earth's atmosphere and, in 1963, with L C Marshall, he advanced a theory to describe the way in which the atmospheres

of the solar system's inner planets had evolved.

He wrote more than 100 papers and several books, including *Rockets and Satellites* (1958), *Science in Space* (1961), and *The Scientific Age* (1964). Berkner Island (79°30'S, 49°30'W), separating the Filchner Ice Shelf from the Ronne Ice Shelf in Antarctica, is named for him.

Berkner died in Washington DC, United States, on 4 June 1967

This motion has been a fundamental principle in all subsequent scientific activities in the Antarctic. All legal and political matters regarding Antarctica and its governance have been regarded as the responsibility of the individual governments.

The agenda for the Conference was wide-ranging and included co-ordination of the distribution of bases in the Antarctic. The United States reported that it was preparing to establish a base at the South Pole. The Soviet Delegate, Professor V V Beloussov, announced that the Soviet Union was also planning a station at the South Pole. However, the Conference accepted that the American preparations were already well-advanced and suggested that the Soviet Union, if it was proposing to establish an inland station, might consider occupying the South Geomagnetic Pole as this lay mid-way between the South Pole and the Knox Coast where a station was also planned. Professor Beloussov agreed.

Dr Gordon de Q Robin, an Australian member of the British Delegation and later a Secretary and then President of SCAR, described this situation slightly differently. He said that Beloussov did not arrive until the third day of the meeting and, after apologizing to the President, asked what matters had been discussed. He was told that a major topic has been the siting of the stations. He responded by saying that the Soviet Union would build a station at the South Pole to which the President replied that it had already been agreed that the United States would do that. Beloussov then said that the Soviet Union would go to the South Geomagnetic Pole, now Vostok Station. So, said Gordon Robin, that is why there is an American and not a Soviet base at the South Pole, because Beloussov arrived three days late for the meeting!

The first resolution adopted by the Conference was to allow IGY scientists free access to established gravity stations in the southern parts of the Southern Hemisphere countries to allow the calibration of gravimeters for use farther south. This proved to be an important principle of the IGY, as embodied in the motion supporting Laclavère's statement, and opened up the question of sovereignty. There had been statements by the Argentine and Chilean Delegates that allowing access and the siting of stations within the areas of their territorial claims in Antarctica was to be seen only as a temporary measure to facilitate the goals of the IGY and would have no implications for sovereignty.

A resolution with many subordinate recommendations was adopted on "Antarctic Weather Central" and radio transmissions. Effective radio communication would be essential for relaying scientific data but especially for collecting weather data in real time for them to be used in forecasting. Radio communication between bases would also be vital for co-ordinating activities, exchanging operational scientific data, liaison with and between field parties, and in emergency situations.

Resolutions were also adopted on mutual logistic support, publications, and polar training, all of these underlining the spirit of international co-operation within a co-ordinated network of stations, scientists and observations. Weyprecht can be proud that the principles of polar exploration that he described in his essay were being following 80 years later and, of course, are still being followed today as SCAR passes its 50th anniversary.

Twelve countries would take part in the Antarctic component of the IGY: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Union of Soviet Socialist Republics, United Kingdom, United States of America. In each country the academy of science, or other national body adhering to ICSU, would form a national committee for the IGY that would be the national point of contact. When inviting countries to take part in the IGY, a special letter had to be sent to the USSR Academy of Science, encouraging the Soviet Union to take part because, at that time, the USSR did not adhere to ICSU. However, Soviet scientists were enthusiastic and played an important role in the IGY programme.

The Second CSAGI Antarctic Conference

This was held in Brussels, Belgium, 8–14 September 1955. Laclavère reviewed progress since the first Conference and it was apparent that several of the resolutions had not made adequate progress during the short period of two months. In particular, plans for some of the stations had not been finalized and, at that moment, Belgium announced that it would not be taking part in the Antarctic programme at all. A map, showing the distribution of the confirmed stations, was tabled and the spread of stations was agreed to be satisfactory although the lack of stations in the Pacific sector, specifically on Peter I øy, was regretted, particularly from a meteorological perspective. It is interesting to note that the problems of establishing and maintaining a station on Peter I øy, also on Bouvetøya in the Atlantic sector and Heard Island in

the Indian Ocean sector are still evident today. Remoteness is a problem for all of the islands but both Bouvetøya and Peter I øy are both extremely inaccessible.

There was considerable discussion about producing a general map of the Antarctic at a scale of 1:1,000,000. Such a map would be very useful for presenting a variety of geophysical data as well as for logistic purposes. All countries could contribute cartographic data, particularly those operating aircraft that could provide air photography. It was concluded that cartography of Antarctica was not a proper discipline for inclusion in the IGY programme but it was hoped that the data gathered might be made publicly available and used by map-makers.

Another topic of discussion was the proposal that medical officers on stations should take advantage of the opportunity to carry out biological and physiological research. The US National IGY Committee offered to be the initial point of contact for international correspondence on this subject.

The Third CSAGI Antarctic Conference

At the meeting more than a year later in Paris, France, 30 July – 4 August 1956, the details were added to the overall plan for the IGY Programme in Antarctica. This Conference would benefit from the experiences gained by the various reconnaissance expeditions during the 1955–56 austral summer.

Delegates separated into 10 Working Groups for the duration of the Conference. The meteorologists reported that all their questions had been resolved except the matter of a station on Peter I øy that was still considered vital to the observing network. It was suggested that a weather ship might substitute for a station. Delegates were asked to encourage whaling vessels from their countries operating in the high southern latitudes to contribute data to the programme.

It was noted that the creation of a communications network over the immense spaces of the Antarctic had never been attempted before and there were inevitably new problems to be solved. The group discussing publications noted the urgent need for "Manuals" to be published before the departure of the expeditions and suggested that, if necessary, preliminary versions should be distributed so that observations may be recorded in a standard form.

The Fourth CSAGI Antarctic Conference

Serious deficiencies in the functioning of the radio network in Antarctica precipitated a fourth conference in Paris on 12–13 June 1957. All participants to the Antarctic IGY programme were present except Norway.

A full report of the activities of the IGY Antarctic Weather Central at the US Little America Station on the Ross Ice Shelf was tabled. Difficulties were being experienced in collecting all the weather data for Antarctica but a weather-collective for Antarctica was being broadcast four times daily. Various weather analyses were also being prepared twice daily. Several offers to relay weather data to and from Antarctic Weather Central were made to overcome the problems of communication.

The United States, New Zealand and the Soviet Union all presented films of their recent activities in Antarctica that were well-received and helped those who had not been to Antarctica to understand the magnitude of the operations undertaken. Argentina offered to host an Antarctic Symposium in Buenos Aires in late November 1959 at which the results of the IGY work could be presented.

The US National Committee for the IGY had sent a telegram to the General Secretary of CSAGI suggesting that, in view of the enormous investment made in Antarctic research during the IGY, the Antarctic programme should be continued for an additional year.

This proposal for a year extension was enthusiastically supported by the scientists

but political intervention brought considerable dissension. Australia was still greatly concerned about any excuse allowing the Soviets to remain in Australian Antarctic Territory and opposed extension, as did the UK and Chile. France and Japan sat on the fence, suggesting that there would be no more funding forthcoming whilst the USA, USSR, Argentina and Belgium wanted to continue. South Africa professed no strong position and Norway was absent.

It was suggested that an international body to co-ordinate future scientific research might be appointed, possibly under the auspices of ICSU. After considerable discussion of this matter the following Resolution on the "Continuation of the Scientific Programme in Antarctica" was adopted.

The CSAGI Antarctic Conference

RECOMMENDS that the Bureau of CSAGI at its next meeting forward to the ICSU Executive Board the recommendation expressed as follows:

"That ICSU appoint a scientific committee to examine the merits of further investigations in the Antarctic covering the entire field of science, and to make proposals to ICSU on the best way to achieve such program. That in view of the desirability of avoiding an interruption in the current series of IGY investigations in Antarctica, ICSU takes immediate action in order that the findings be available by the middle of August."

The Bureau of CSAGI accepted this Resolution of the Antarctic Conference and forwarded it to ICSU. The Executive Board of ICSU approved the creation of an *ad hoc* committee that met in Stockholm, Sweden, 9–11 September 1957 under the convenorship of Dr N Herlofson. This committee included representatives from Argentina (L M de la Canal), Chile (R Canas-Montalva), France (A Gougenheim), Norway (H Solberg), UK (D Brunt), USA (H Wexler) and USSR (M M Somov) with observers from Japan and ICSU, served by V Schytt as secretary.

The Committee addressed the Resolution, agreed that there was need for further international organization of scientific activity in Antarctica and recommended that ICSU should establish a Special Committee to undertake this task. However, it was resolved that the continuation of scientific activity in Antarctic research should be regarded as being inspired by the interest roused by the activities of the IGY but in no way was an extension of the IGY. The Bureau of ICSU acted quickly and by the end of September 1957 12 nations and four scientific unions had been invited to nominate members for the Special Committee on Antarctic Research (SCAR). Thus, within 8 months of the closure of the Fourth Antarctic Conference, representatives of the Antarctic IGY nations were meeting in The Hague at the first meeting of SCAR, 3–5 February 1958.

The legacy of the IGY

It is appropriate to consider briefly the achievements and the legacy of the IGY.

The IGY changed ICSU, which could now confidently plan to initiate international research programmes on a much larger scale than ever before. In 1957, ICSU established the Special Committee on Oceanic Research (SCOR) that took the world's oceans as its province. SCAR followed in 1958 to initiate, promote and co-ordinate scientific research in the Antarctic and, later, to provide scientific advice to the Antarctic Treaty. ICSU established the Committee on Space Research (COSPAR) in 1958 as a direct result of the IGY when it was recognized how important research in space and from space was going to be.

It was recognized very early on that the value of the enormous volume of data that would be generated by the IGY would be much diminished if the data were not readily accessible to the scientific community at large. Many of the IGY data were amenable to recording in "machine-readable" form that, in the late 1950s,

International Council for Science

The International Council of Scientific Unions (ICSU) was founded in 1931 to promote international scientific activity in the different branches of science and its application for the benefit of humanity. ICSU is one of the oldest non-governmental organizations in the world and represents the evolution and expansion of two earlier bodies known as the International Association of Academies (IAA; 1899–1914) and the International Research Council (IRC; 1919–31). ICSU's strength and uniqueness lie in its dual membership, National Scientific Members (mostly non-governmental national academies of science) and International Scientific Unions, whose wide spectrum of scientific expertise allows ICSU to address major, international, interdisciplinary issues.

ICSU has addressed specific global issues through the creation of Interdisciplinary Bodies, and by Joint Initiatives in partnership with other organizations. Important programmes of the past include the International Geophysical Year (1957–58) and the International Biological Programme (1964-74). Major current programmes include the International Geosphere–Biosphere Programme: A Study of Global Change (IGBP), the World Climate Research Programme (WCRP), DIVERSITAS: An Integrated Programme of Biodiversity Science, the International Human Dimensions Programme on Global Environmental Change (IHDP) and now the Third International Polar Year (3IPY).

In 1992, ICSU was invited to act as principal scientific advisor to the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and again, in 2002, to the World Summit on Sustainable Development (WSSD) in Johannesburg. Prior to UNCED, ICSU organized an International Conference on an Agenda of Science for Environment and Development into the 21st Century (ASCEND 21) in Vienna, in 1991, and ten years later, ICSU mobilized the scientific community even more broadly by organizing, with the help of other organizations, a Scientific Forum in parallel to the WSSD itself.

In order to strengthen international science for the benefit of society, ICSU mobilizes the knowledge and resources of the international science community to:

- Identify and address major issues of importance to science and society.
- Facilitate interaction amongst scientists across all disciplines and from all countries.
- Promote the participation of all scientists—regardless of race, citizenship, language, political stance, or gender—in the international scientific endeavour.
- Provide independent, authoritative advice to stimulate constructive dialogue between the scientific community and governments, civil society, and the private sector.

In 1998, Members agreed that the Council's current composition and activities would be better reflected by modifying the name to the International Council for Science, while its rich history and strong identity would be well-served by retaining the existing acronym, ICSU.

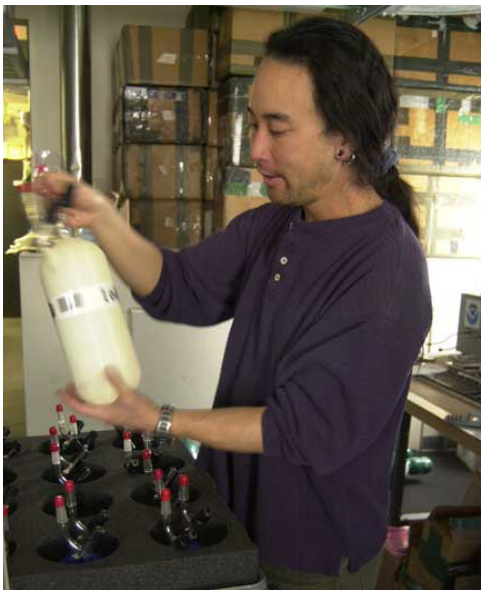
The ICSU Secretariat is located at 5, rue Auguste Vacquerie, 75016 Paris, France.

meant using a "punched-card" system. ICSU set up a system of World Data Centres (WDCs) to handle these data. The United States and the Soviet Union volunteered to establish archive systems and created WDC-A and WDC-B respectively. The WMO created WDC-C for meteorology. The WDCs did not process data, they collected and exchanged data, made copies available at cost, published

catalogues of holdings, and helped users to find and access data. The WDCs have grown over the years and have recently been subsumed into the new ICSU World Data System. ICSU also initiated the publications of results, creating The Annals of the International Geophysical Year that ran to 48 volumes until 1970, the last being a bibliography of IGY papers. In addition, countless scientific papers based on research during the IGY were published in innumerable scientific journals.

It is arguable, perhaps, that the greatest achievement of the IGY was to show that scientists from different countries could work together so that their overall research was greater than the sum of the individual parts. In the Antarctic this begged the need for a political diplomatic agreement between governments to allow this co-operation to continue. The result was, of course, the signing of the Antarctic Treaty in Washington DC on 1 December 1959, by the governments of the twelve nations that had taken part in the IGY, and its entry into force on 23 June 1961. As further chapters in this book will show, SCAR has been inextricably linked with the evolution of the Antarctic Treaty in the subsequent decades.

Above: Jennifer Mercer at McMurdo Station watching the launch of a balloon carrying instruments to measure ozone depletion in the stratosphere. Photograph: Peter Rejcek / NSF.



Above: Glen Kinoshita (NOAA) holding a flask of air collected at the South Pole. Photograph: Kristan Hutchison / NSF.

Below: Mart Nyman launching a weather balloon at Concordia Station. Photograph: Karim Agabi.

Above: Joe Farman, Brian Gardiner and Jonathan Shanklin, discoverers of the “ozone hole” in 1985, standing beside a Dobson ozone spectrophotometer that measures stratospheric ozone concentrations. Photograph: Chris Gilbert / BAS

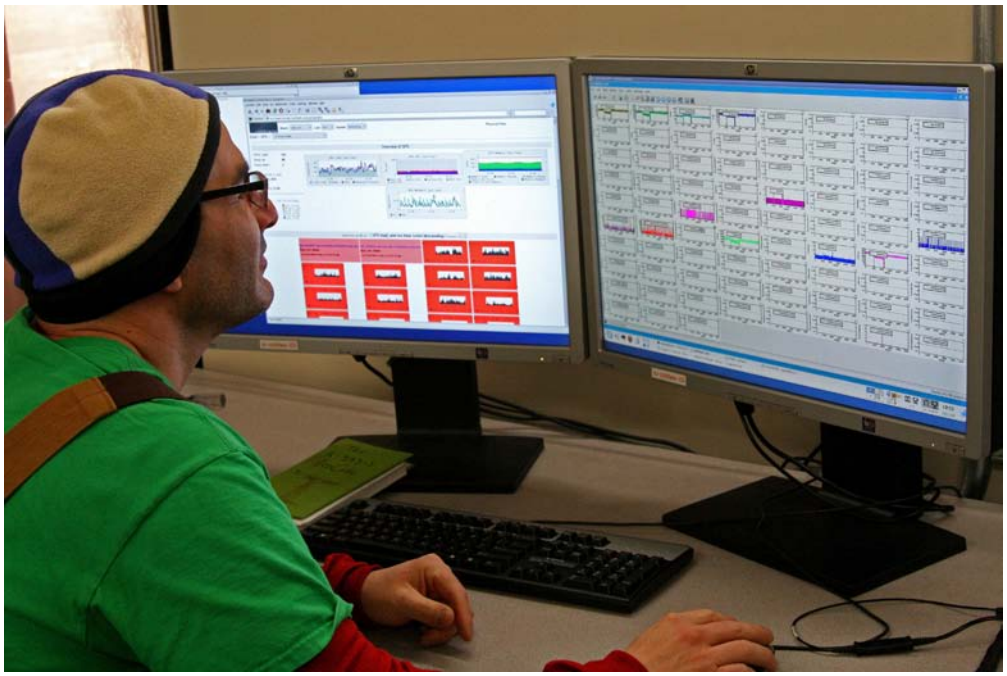
Below: A field meteorological station on the sea ice beside MV *Polarstern*. Photograph: G Birnbaum.

Above: Stuart Bradley with SODAR, a monostatic acoustic radar, at Halley Research Station. Photograph: Chris Gilbert / BAS.

Below: Cosmological Observations at Concordia with High-Sensitivity Instruments for Source Extraction (COCHISE) experiment for the detection of Cosmic Microwave Background (CMB) distortions installed at the French/Italian Concordia Station. Photograph: Italian Antarctic Expedition.

Above: Maintaining the antenna system of the Southern Hemisphere Antarctic Radar Experiment (SHARE) that uses high frequency backscatter radar to investigate the structure and dynamics of the ionosphere. Photograph: Pete Bucktrout / BAS.

Below: Edgar 'Tex' Nielsen analysing IceCube data. Neutrinos from distant astrophysical sources passing through the Earth are detected when a collision produces a muon which radiates blue light. Photograph: Calee Allen / NSF.



Above: Moonlight illuminating the 10-metre telescope at the South Pole. Photograph: Keith Vanderlinde / NSF.

Below: An unmanned airborne vehicle (UAV) developed by the Technical University of Braunschweig, Germany, that will be used to study the interaction of the Antarctic atmosphere, sea ice and ocean as part of the FOCAS project. Photograph: Pete Bucktrout / BAS.

Above: John Oldroyd using the Quartz Horizontal Magnetometer in the magnetometer tunnel at Halley Research Station to measure the components of the Earth's magnetic field. Photograph: Chris Gilbert / BAS.

Below: Irina Gorodetskaya on the roof of the Belgian Station using the only microrain radar installed in Antarctica. Photograph: R Robert / International Polar Foundation.