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Library Note

Debate on 18 October: Scott Expedition to Antarctica and Scientific Legacy

This Library Note provides background reading for the debate to be held on Thursday, 18 October:

"the centenary of the Scott Expedition to Antarctica and of the United Kingdom's enduring scientific legacy and ongoing presence there"

The Note provides information on Antarctica's geography and environment; provides a history of its exploration; outlines the international agreements that govern the territory; and summarises international scientific cooperation and the UK's continuing role and presence.

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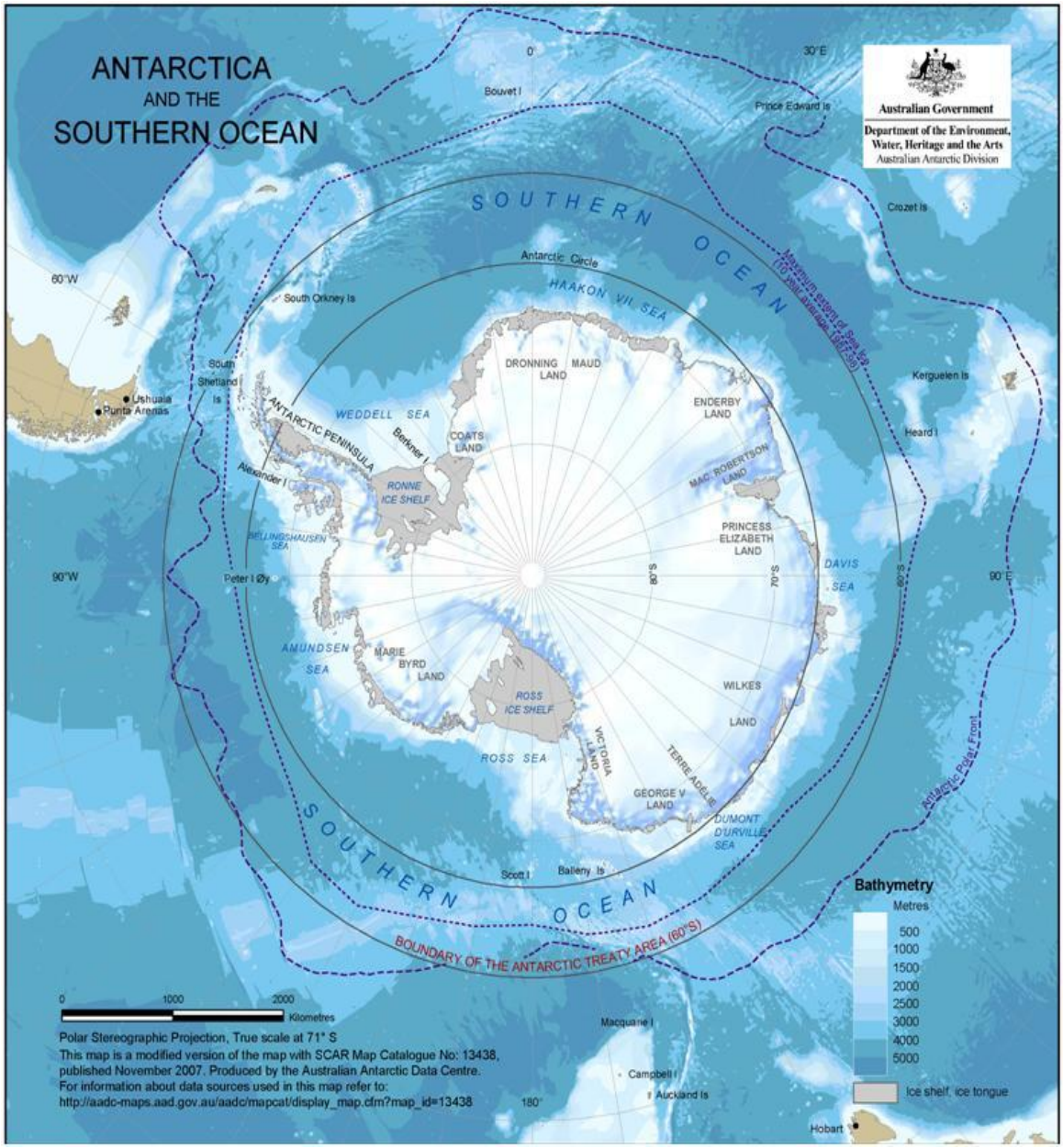
1.1 Geophysics of Antarctica



(Source: Secretariat of the Antarctic Treaty website)

The Council of Managers of National Antarctic Programs (COMNAP), an international association formed in 1988 which brings together National Antarctic Programs, gives the following geophysical overview of the Antarctic on its website:

> The Antarctic ice sheet is the largest single mass of ice on Earth. It covers an area of almost 14 million km² (6.5 million square miles) and contains 30 million km³ of ice. Around 90 per cent of the fresh water on the Earth's surface is held in the ice sheet, an amount equivalent to 70m of water in the world's oceans. In East Antarctica the ice sheet rests on a major land mass, but in West Antarctica the bed is in places more than 2500m below sea level. It would be seabed if the ice sheet were not there.

A small area (less than one percent) is free of ice and the continent contains some of the most spectacular mountain ranges anywhere in the World. The most extensive are the Antarctic Peninsula, 1700km, and the Transantarctic Mountains, 3000km. The highest mountain, Vinson Massif in the Ellsworth Mountains, peaks at 4897m.

Around the coasts of Antarctica, temperatures are generally close to freezing in the summer (December–February) months, or even slightly positive in the northern part of the Antarctic Peninsula. During winter, monthly mean temperatures at coastal stations are between −10°C and −30°C but temperatures may briefly rise towards freezing when winter storms bring warm air towards the Antarctic coast. Conditions on the interior plateau are much colder as a result of its higher elevation, higher latitude and greater distance from the ocean. Here, summer temperatures struggle to get above −20°C and monthly mean temperatures fall below −60°C in winter. Vostok station, a high plateau research station, holds the record for the lowest ever temperature recorded at the surface of the Earth (−89.2°C).

The majority of the biodiversity found in the Antarctic is in the marine environment not on the continent. In the oceans, you will find whales, fish, seals, squid, krill and a whole range of bottom-dwelling marine organisms. Many micro-organisms also inhabit the marine environment around Antarctica and marine sea birds including penguin, albatross, petrels and skuas can be found around the Antarctic and the sub-Antarctic Islands.

On the continent, terrestrial invertebrates are the most species-rich animal group in Antarctica and on the Southern Ocean islands. Nematode worms, water bears (tardigrades), wheel-animals (rotifers), springtails and mites are the most common.[1]

1.2 Environmental Concerns about the Antarctic

The *Europa World Year Book* Online summarises recent developments in research which have raised serious environmental concerns about the Antarctic. It notes studies which suggest that the ozone layer over the continent is deteriorating:

> The World Meteorological Organization (WMO) reported that the hole in the ozone layer formed over Antarctica in 2006 was the most serious on record. Having reached 29.5m sq km at its maximum point, the area of the hole marginally exceeded that recorded in 2000 (29.4m. sq km), hitherto the largest recorded. Furthermore, according to WMO, there had been the greatest recorded mass deficit in 2006—of 40.8m. metric tons, compared with 39.6m. tons in 2000—with the effect that the mass of ozone over Antarctica was lower than that ever previously recorded. WMO data for 2007 showed that the ozone hole area, at a maximum of 25m. sq km, was somewhat weaker, as was the mass deficit, which reached 28m. tons. WMO stated that the relatively smaller size of the ozone hole was not a sign of recovery, but was instead related to mild temperatures in the Antarctic stratosphere during the 2007 austral winter. In 2008 the ozone hole area reached 27m. sq km, and the mass deficit 35m. tons: each was the fourth largest recorded since 1999 (having been surpassed only in 2000, 2003 and 2006). The daily maximum ozone hole area in 2009 was 24.0m. sq km.

[1] The National Geographic website hosts an interactive map of the Antarctic which details its physical geography and wildlife. A concise list of various statistics about Antarctica can be found on the Scientific Committee on Antarctic Research (SCAR) website.

For 2010 the ozone hole reached a peak daily maximum of 22.6m. sq km in late September. The relatively shallow ozone hole in 2010, and a slow start to its formation, was attributed to the impact of warmer than usual stratospheric temperatures in reducing the volume of stratospheric clouds early in the season. In 2011 the daily maximum ozone hole area reached 26.0m. sq km in September. The mass deficit increased faster in 2011 than in 2008 or 2010, and in October was close to an all time maximum, reaching 36.8m. tons early in the month.

The *Yearbook* notes research indicating the retreat of glaciers and Antarctica's ice sheet:

A comprehensive study of glaciers in the Antarctic Pensinsula, published by researchers of the British Antarctic Survey in April 2005 (and conducted as part of a project by the US Geological Survey to map changes to Antarctica's coastline) showed that 87 percent of glaciers there were retreating, and that the rate of retreat had increased markedly since 2000. The survey's analysis of data back to the 1950s identified that an increasing number of glaciers had been retreating in recent decades compared to the situation in the 1950s, when a majority of glaciers were stable or advancing. Research published in March 2006, led by the University of Colorado, USA, gave evidence of the significant decline of the total mass balance of the Antarctic ice sheet. Satellite data indicated that the volume of ice being lost was raising global sea levels by some 0.4 mm per year. As much as 152 cu km was being lost annually from the ice sheet, with the bulk of the loss being from the West Antarctic sheet. Research published by an international team of scientists in January 2008 estimated that 132,000m. metric tons of ice had been lost from West Antarctica in 2006, compared with 83,000m. tons in 1996. Loss of ice from the Antarctic Peninsula was estimated at 60,000m. tons, compared with 25,000m. tons 10 years earlier.

.... Analysis published in November 2009 by scientists at the University of Texas at Austin, USA, of satellite data gathered in 2002–09 from the NASA Gravity Recovery and Climate Experiment suggested that the East Antarctic ice sheet was losing mass, mainly in coastal areas, at an estimated rate of some 57,000m. tons annually: it was thought that this loss may have begun as early as 2006. The same study confirmed annual ice loss from West Antarctica of 132,000m. tons. A study of changes in polar ice mass and trends in acceleration in polar ice loss, published in the journal Geophysical Research Letters in March 2011, based on analysis of data from 1992–2009, found that loss from the Antarctic ice sheet was increasing by an average of 14,500m. metric tons per year. The authors concluded that continuation in this rapid acceleration in loss, cumulatively with accelerated loss, also shown by the study, from the Greenland ice sheet, could contribute 150 mm to average global sea level by 2050. At present trends, according to the study, the overall rise in average sea level was likely to be higher than that predicted by the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Meanwhile, a study, led by US academics, of trends in Antarctic surface temperatures during 1957–2006, results of which were released in January 2009, suggested that the continent was warming by an average of about 0.1°C per decade, with the strongest warming trends being in winter and spring and over West Antarctica (where the rate of warming was faster than the world average). The report's authors concluded that while natural climatic cycles probably influenced the warming, it was difficult to explain the warming trend without considering the near-certain impact of increased concentrations of greenhouse gases.

The *Yearbook* also points to the impact upon the surrounding sea:

> Research published in July 2008 by the British Antarctic Survey, based on studies of the West Antarctic Peninsula seabed, suggested that the frequency of disturbance of the seabed by icebergs, known as scouring, was likely to increase as winter sea ice (which restricts the movement of icebergs in coastal waters) diminishes in extent and duration. This increased disturbance could, according to the report's authors, bring about unpredictable changes in near-shore marine ecosystems. An ice bridge linking the Wilkins ice shelf to the Charcot and Latady islands collapsed in April 2009. It had been reported in March 2008 that the Wilkins shelf was retreating more rapidly than had previously been anticipated, with the disintegration, at the end of the austral summer, of an area of ice of some 414 sq km. The collapse of the ice bridge would allow a mass of broken ice and icebergs to drift into the Southern Ocean. In February 2010 an iceberg measuring some 2,550 sq km was dislodged from the Mertz Glacier Tongue, East Antarctica, by an older berg which had begun to drift in 2009.

The Australian Antarctic Division website notes the important role that the Antarctic plays in terms of global climate systems:

> Many globally significant processes are driven by the unique climate and geography of the Antarctic region. These include the uptake of carbon dioxide by the Southern Ocean; the overturning circulation of the deep ocean; the balance between water storage and discharge in the main continental ice-sheet; changes in surface energy, mass and momentum exchange by ice masses; and energy transfer between all levels of the atmosphere to space. Understanding these processes is vital for understanding and predicting climate and environmental changes and their impacts. These impacts include future greenhouse gas levels, sea-level rise, the variability and rate of change of climate, and changes in atmospheric composition. The latter includes the stratospheric 'ozone hole', which affects life in Southern Hemisphere nations.

2.1 Britain's Early Interest in the Antarctic

British interest in the Antarctic dates back to at least the 18th century when explorer James Cook captained the first recorded ship to cross the Antarctic circle in 1773, though the first recorded sightings of the continental Antarctic landmass were notified in 1820 by separate British and Russian expeditions. On 20 February 1823, James Weddell reached a new Farthest South of 74°15' S in his ship Jane, while between 1830 and 1832 the Southern Ocean Expedition led by John Biscoe sighted Enderby Land and Adelaide Island and claimed the Antarctic Peninsula for Britain. A later expedition, led by James Clark Ross between 1838 and 1843, discovered the Ross Ice Shelf, Ross Sea, Mount Erebus, Mount Terror and Victoria Land and on 23 January 1842 extended the Farthest South to 78°10'.[2]

2.2 Heroic Age of Antarctic Exploration

The 'Heroic Age of Antarctic Exploration' is the term used to describe the 25-year period from 1897 to 1922, during which an international focus on exploring the South Polar regions took place. The term reflects the extreme and harsh conditions that members of

[2] For additional commentary on these expeditions to Antarctica see: E C Coleman, *Royal Navy in Polar Exploration—from Frobisher to Ross* (2007) and M J Ross, *Polar Pioneers: John Ross and James Clark Ross* (1994).

the parties faced, and from which many did not survive. This Heroic Age included sixteen major international expeditions:

> 1897–1899 Belgian Antarctic Expedition, led by Adrien de Gerlache (Belgium)
>
> 1898–1900 Southern Cross Expedition, led by Carsten Borchgrevink (UK)
>
> 1901–1904 Discovery Expedition, led by Robert Falcon Scott (UK)
>
> 1901–1903 Gauss Expedition, led by Erich von Drygalski (Germany)
>
> 1901–1903 Swedish Antarctic Expedition, led by Otto Nordenskjöld (Sweden)
>
> 1902–1904 Scottish National Antarctic Expedition, led by William Speirs Bruce (UK)
>
> 1903–1905 Third French Antarctic Expedition, lead by Jean-Baptiste Charcot (France)
>
> 1907–1909 Nimrod Expedition, led by Ernest Shackleton (UK)
>
> 1908–1910 Fourth French Antarctic Expedition, led by Jean-Baptiste Charcot (France)
>
> 1910–1912 Japanese Antarctic Expedition, led by Nobu Shirase (Japan)[3]
>
> 1910–1912 Roald Amundsen's South Pole Expedition, led by Roald Amundsen (Norway)
>
> 1910–1913 Terra Nova Expedition, led by Robert Falcon Scott (UK)
>
> 1911–1913 Second German Antarctic Expedition, led by Wilhelm Filchner (Germany)
>
> 1911–1914 Australasian Antarctic Expedition, led by Douglas Mawson (Australia)
>
> 1914–1916 Endurance Expedition, led by Ernest Shackleton (UK)
>
> 1921–1922 Shackleton-Rowett Expedition, led by Ernest Shackleton (UK)

The BBC History website sets out the background and reasons for the increased interest in the Antarctic:

> By the late 19th century, Antarctica was the last unexplored continent on earth. Unknown whale and seal hunters were probably the first human beings to set foot on the continent, looking for commercial opportunities. Rich Western nations eventually began to take an interest in this inhospitable terrain, with Britain, Japan, Germany, Sweden, Norway, France and Belgium all planning expeditions to Antarctica in the early years of the 20th century. They would compete against each other in its discovery, to gain knowledge and claim new territory. The geographical prize was the South Pole—the most remote spot on earth.

[3] An outline of this Japanese expedition was given in the *New Scientist* last year. See: Stephanie Pain, 'The rice man cometh: Norwegian and British explorers weren't the only ones dashing to the South Pole 100 years ago', *New Scientist*, (December 2011).

Edward J Larson, in the preface to his work on the subject, *An Empire of Ice: Scott, Shackleton, and the Heroic Age of Antarctic Science*, particularly highlights the scientific aspects of the expeditions, especially the British expeditions: "in the era before the First World War, when Antarctic exploration was largely a British project, that project was largely concerned with science". These aspects of the British expeditions, and particularly their emphasis on science and exploration, are set to be commemorated by the International Scott Centenary Expedition (ISCE) 2012, due to set off in November 2012 and the British Services Antarctic Expedition (BSAE) 2012, which has been carrying out scientific and exploration work on the Antarctic Peninsula since January 2012.[4]

2.3 Race to the South Pole

Prior to Captain Scott's famous expedition in 1910 a number of British visits were made to the Antarctic. The British Antarctic Expedition 1898–1900 was the first major British expedition and the first to over winter on the Antarctic mainland.[5] A year later, the Discovery Expedition led by Captain Robert Falcon Scott set off and on 30 December 1903 reached 82° 17'S, a new Farthest South. The expedition contained a number of members who would later become associated with Antarctic exploration, such as Ernest Shackleton, Edward Wilson, Frank Wild and Tom Crean.[6] Between 1902 and 1904 a Scottish National Antarctic Expedition led by William Speirs Bruce also explored the continent, to be followed in 1907 by the Nimrod Expedition, which included an unsuccessful attempt to reach the South Pole. As part of this expedition, on 9 January 1909, Ernest Shackleton reached 88° 23'S, less than 100 nautical miles from the Pole, while on 16 January 1909, Professor Edgeworth David reached the South Magnetic Pole.[7]

However, perhaps the most famous expedition took place between 1910 and 1912 and was called the Terra Nova Expedition and was led by Captain Robert Falcon Scott. Scott had decided to return to the Antarctic and had begun preparations before the Nimrod expedition had set off but with the failure of the latter he began planning in earnest. However, as the BBC History website notes, the experienced Norwegian explorer Captain Roald Amundsen was also preparing an attempt to reach the South Pole:

> Norwegian Captain Roald Amundsen was already a celebrated explorer. He had sailed through the North West Passage (1903-06) and was one of the first men to winter south of the Antarctic Circle, on board the Belgica in 1898. His dream as a boy was to be the first man to set foot at the North Pole, but in 1909 there were two American claims to have reached it. The rival explorers bitterly contested each other's claims, but for Amundsen, his dream was shattered. He turned the

[4] Both expeditions seek to recognise that Captain Scott's expedition undertook serious scientific and exploration work, along with a considerable education programme. The ISCE is generating education and public outreach for polar science and heritage around its historic visit to the ice in November 2012. Both expeditions are hoping to meet at the historic location of the last camp and burial site of Captain Scott and members of his Pole Party to hold a memorial service to mark the centenary of their burial in November 1912. Further details can be found on the ISCE website and BSAE website.

[5] For a more detailed summary of this expedition, also known as the British Southern Cross Expedition, led by Carsten Borchgrevink, see David Harrowfield (Antarctic Heritage Trust), *The History of the British Antarctic Expedition 1898–1900: Occupation of Cape Adare*.

[6] See David Harrowfield (Antarctic Heritage Trust), *The History of the British Antarctic Expedition 1907–09: Occupation of Cape Royds*, and T H Baughman, *Pilgrims on the Ice: Robert Falcon Scott's First Antarctic Expedition* (2008).

[7] See David Harrowfield (Antarctic Heritage Trust), *The History of the British Antarctic Expedition 1907–09: Occupation of Cape Royds*.

> focus of his Fram expedition (1910–12) to the South Pole, refusing to share his ideas in case people stopped him from making his attempt.

The BBC History website summarises Scott's expedition and its ultimate fate:

> The whaling ship Terra Nova left Cardiff, Wales in June 1910 and the expedition set off from base the following October, with mechanical sledges, ponies and dogs. However, the sledges and ponies could not cope with the conditions and the expedition carried on without them, through appalling weather and increasingly tough terrain. In mid December, the dog teams turned back, leaving the rest to face the ascent of the Beardmore Glacier and the polar plateau. By January 1912, only five remained: Scott, Wilson, Oates, Bowers and Evans.
>
> On 17 January, they reached the pole, only to find that a Norwegian party led by Roald Amundsen had beaten them there. They started the 1,500 km journey back. Evans died in mid-February. By March, Oates was suffering from severe frostbite and, knowing he was holding back his companions, walked out into the freezing conditions never to be seen again. The remaining three men died of starvation and exposure in their tent on 29 March 1912. They were in fact only 20 km from a pre-arranged supply depot.
>
> Eight months later, a search party found the tent, the bodies and Scott's diary. The bodies were buried under the tent, with a cairn of ice and snow to mark the spot.[8]

As noted above, the centenary of the deaths of Captain Scott and his team are being commemorated by the International Scott Centenary Expedition (ISCE) 2012, due to set off in November 2012 and the British Services Antarctic Expedition (BSAE) 2012, which has been in the Antarctic since January 2012.

Subsequent expeditions in this period included the 1914–1916 Imperial Trans-Antarctic Expedition led by Ernest Shackleton, which attempted to cross the Antarctic continent but failed when their ship, the Endurance, was crushed in the ice of the Weddell Sea. This expedition was also famed because of Shackleton's successful attempt to get help for his men, as the BBC History website details:

> Early in 1915, 'Endurance' became trapped in the ice, and ten months later sank. Shackleton's crew had already abandoned the ship to live on the floating ice. In April 1916, they set off in three small boats, eventually reaching Elephant Island. Taking five crew members, Shackleton went to find help. In a small boat, the six men spent 16 days crossing 1,300 km of ocean to reach South Georgia and then trekked across the island to a whaling station. The remaining men from the 'Endurance' were rescued in August 1916. Not one member of the expedition

[8] For further reading see: Diana Preston, *A First-Rate Tragedy: Robert Falcon Scott and the Race to the South Pole* (1998); Roland Huntford, *The Last Place on Earth* (1999); Pieter van der Merwe, *South: The Race to the Pole* (2000); David Crane, *Scott of the Antarctic: A Biography* (2007); Ross D E MacPhee, *Race to The End: Amundsen, Scott, and the Attainment of the South Pole* (2010); Edward J Larson, *An Empire of Ice: Scott, Shackleton, and the Heroic Age of Antarctic Science* (2011). Accounts are also given by those involved in the race to the South Pole, for instance: Robert Falcon Scott, *Journals: Captain Scott's Last Expedition* (2008); Roald Amundsen, *My Life as an Explorer* (2009); Apsley Cherry-Garrard, *The Worst Journey in the World: With Scott in Antarctica 1910–1913* (2010); Roland Huntford, *Race for the South Pole: The Expedition Diaries of Scott and Amundsen* (2010).

died. ‘South’, Shackleton’s account of the ‘Endurance’ expedition, was published in 1919.[9]

The 1914–1917 Ross Sea Party led by Aeneas Mackintosh, also as part of the Imperial Trans-Antarctic Expedition, had laid supplies for Shackleton’s proposed crossing. The end of the Heroic Age of Antarctic Exploration came with Shackleton’s fourth expedition—the Shackleton-Rowett Expedition, which aimed to circumnavigate the Antarctic continent. However, on 5 January 1922, Shackleton died of a heart attack off South Georgia. He was buried on the island.

2.4 ‘Whaling Period’ and the Emergence of Permanent Stations in Antarctica

Robert K Headland contends that after the ‘Heroic Age’, which came to a close in the early 1920s, two new discernible periods of activity occurred before the onset of the international regime governed by the Antarctic Treaty introduced in the early 1960s. The first he calls the ‘Whaling Period’ (1919–1942), which was a time when the majority of ships that came into Antarctic waters belonged to Norwegian whaling fleets, with some scientific expeditions assisted by such ships. It was often the whalers who discovered many of the coastal regions of the continent. This period also saw the first use of heavier aircraft, which was to greatly facilitate inland exploration and mapping.

The next period was that of the ‘Permanent Stations’ when, from the outbreak of the Second World War, there were regular annual expeditions from an increasing number of countries and the permanent occupation of Antarctica started at Port Lockroy (Wiencke Island) in 1943 and Hope Bay (Antarctic Peninsula) in 1944. The end of the war also saw increasing international collaboration. In 1945 the Swedish scientist, Hans Ahlmann, proposed a purely scientific multidiscipline international research expedition, sponsored jointly by Norway, Sweden, and the United Kingdom, to be undertaken in a previously unvisited part of Antarctica. The proposal was supported by senior scientists and endorsed by institutions with polar interests in the three countries concerned. The result was the Norwegian-British-Swedish Antarctic Expedition, 1949–1952. It was the “first modern, genuinely international scientific expedition in the polar regions without territorial pretentions”.[10] This helped lay the basis for the International Geophysical Year (IGY) (1957–58). The IGY led to an 18 month ‘year’ of Antarctic science that brought together the twelve countries that had stations in Antarctica to collaborate on a series of projects. These included the establishment of new bases. The Halley Research Station was founded in 1956 by an expedition from the Royal Society and was named after the astronomer Edmond Halley. The Japanese established the Showa Station in January 1957, the first Japanese observation base on Antarctica, while the French established the Dumont d’Urville Station and Charcot Station in Adélie Land. The Amundsen–Scott South Pole Station was erected as the first permanent structure at the South Pole in January 1957. It was this level of international collaboration that was to lay the basis for the Antarctic Treaty, discussed below.[11]

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[9] See also: Caroline Alexander, *The Endurance: Shackleton’s Legendary Antarctic Expedition* (1994); Ernest Shackleton, *South: The Endurance Expedition* (1999); Alfred Lansing, *Endurance: Shackleton’s Incredible Voyage* (1999); T H Baughman, *Shackleton of the Antarctic* (2009).

[10] Ernest Frederick Roots, *Background and Evolution of Some Ideas and Values That Have Led to the Antarctic Treaty*, in Paul Arthur Berkman et al., *Science Diplomacy Antarctica, Science, and the Governance of International Spaces* (2011), p 72.

[11] Robert K Headland, *Chronological List of Antarctic Expeditions and Related Historical Events* (1989), p 27.

3.1 Current International Agreements on the Antarctic

Since 1908 a number of countries, including the UK, Argentina, Australia, Chile, France, New Zealand and Norway, have made territorial claims to the Antarctic, some of which overlap. The main international instrument that governs the Antarctic is the Antarctic Treaty which was adopted on 1 December 1959 and entered into force on 23 June 1961 and essentially puts these territorial claims on hold. Twelve countries signed the original Treaty including: UK; South Africa; Belgium; Japan; United States; Norway; France; New Zealand; Russia; Argentina; Australia; and Chile. Since then 38 other countries have acceded to the Treaty. 16 of these countries have acceded as Consultative Parties, as under Article IX.2 of the Treaty they have demonstrated their interest in Antarctica by "conducting substantial research activity there". Along with the original twelve signatory countries this means that there are now 28 Consultative Parties in total who attend the Antarctic Treaty Consultative Meetings (ATCMs), where issues pertaining to Antarctica are discussed, and who can take part in the decision-making process. The other 22 Non-Consultative Parties are invited to attend the ATCMs but do not participate in the decision-making.[12] Marie Jacobsson points out that various NGOs and agencies of the UN also attend, reflecting the 'open door policy' of the Antarctic Treaty System which in her opinion has benefited the operation and development of the Treaty.[13]

The primary purpose of the Antarctic Treaty is to ensure "in the interests of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord". As noted above, the Treaty emerged in part from the International Geophysical Year of 1957–58, where 40 research stations were installed in Antarctica by scientists from twelve countries and which were marked by international collaboration and spurred efforts to find a solution to disputes over sovereignty. The Treaty applies to the area south of 60° South Latitude, including all ice shelves and islands. The British Antarctic Survey (BAS) website summarises the 14 articles of the Treaty and notes that it:

> Stipulates that Antarctica should be used exclusively for peaceful purposes; military activities, such as the establishment of military bases or weapons testing, are specifically prohibited;
>
> Guarantees continued freedom to conduct scientific research, as enjoyed during the IGY;
>
> Promotes international scientific cooperation including the exchange of research plans and personnel, and requires that results of research be made freely available;
>
> Sets aside the potential for sovereignty disputes between Treaty Parties by providing that no activities will enhance or diminish previously asserted positions

[12] A full list of Consultative and Non-Consultative Parties can be found on the Scientific Committee on Antarctic Research (SCAR) website.

[13] She notes that NGOs include the International Hydrographic Organisation, the Antarctic and Southern Coalition, the International Association of Antarctic Tour Operators, the World Conservation Union and a number of regional fisheries organisations. Though many of the NGOs are concerned with the environment, she notes that in terms of protecting marine resources there is an acceptance that this is best achieved by co-operation between environmental groups and fisheries organisations. Examples of the various UN agencies include the International Maritime Organisation, the Food and Agriculture Organisation and the UN Environment Programme. See: Marie Jacobsson, 'The Antarctic Treaty System: Legal and Environmental Issues', in Gillian Triggs and Anna Riddell, *Antarctica: Legal and Environmental Challenges for the Future* (2007), pp 3–4.

with respect to territorial claims, provides that no new or enlarged claims can be made, and makes rules relating to jurisdiction;

Prohibits nuclear explosions and the disposal of radioactive waste;

Provides for inspection by observers, designated by any party, of ships, stations and equipment in Antarctica to ensure the observance of, and compliance with, the Treaty;

Requires parties to give advance notice of their expeditions; provides for the parties to meet periodically to discuss measures to further the objectives of the Treaty; and

Puts in place a dispute settlement procedure and a mechanism by which the Treaty can be modified.[14]

The Treaty is augmented by recommendations adopted at ATCMs and a number of international agreements. The Agreed Measures for the Conservation of Antarctic Fauna and Flora (adopted June 1964; in force 1982) protects designated species and areas, prohibits the deliberate introduction of non-native flora and fauna, parasites and diseases, stipulates that native birds or mammals cannot be killed or captured without a licence from a competent authority and ensures that settlements of wildlife such as seal and penguin colonies and specially-protected species are not disturbed. The Convention for the Conservation of Antarctic Seals (adopted December 1972; in force March 1978) regulates the hunting of seals, banning it for certain species and setting quotas for others. It also established three seal reserves. The Convention on the Conservation of Antarctic Marine Living Resources (adopted May 1980; in force April 1982) controls commercial fishing in the Antarctic and takes a whole food chain approach, so that the fishing of food for larger animals is also regulated.[15]

The Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA) was adopted in 1988 but will not come into force. CRAMRA sought to regulate minerals prospecting, exploration and development activities, although mining would only be permitted if all Parties agreed that there was no risk to the environment. This latter aspect of the Convention was criticised by environmental groups and some governments who argued instead for a complete ban on such activities. This opened up the potential of a split between on the one hand those countries who favoured abandoning CRAMRA and establishing the Antarctic as 'wilderness reserve' or 'World Park', and on the other hand those countries who preferred keeping CRAMRA in conjunction with additional environmental measures.[16]

However, differences were bridged by the 1991 Protocol on Environmental Protection. Donald R Rothwell argues that the Protocol created "for the very first time an integrated environmental protection regime in Antarctica" and that its entry into force in 1998 was "a testament to the international goodwill to cooperatively manage Antarctica and the robustness of the Antarctic Treaty system". It also reflected the increasing environmental focus of the Antarctic Treaty System. The Protocol incorporated many of the

[14] http://www.antarctica.ac.uk/about_antarctica/geopolitical/treaty/explained.php. For a more detailed commentary see: Donald R Rothwell and Ruth Davis, *Antarctic Environmental Protection* (1997), pp 42–9.
[15] For further commentary see Donald R Rothwell and Ruth Davis, *Antarctic Environmental Protection* (1997), pp 49–58.
[16] See Donald R Rothwell, 'A World Park for Antarctica? Foundations, Developments and the Future', *Antarctic and Southern Ocean Law and Policy*, (1990), Occasional Paper 3.

mechanisms established under the Agreed Measures for the Conservation of Antarctic Fauna and Flora and Recommendations subsequently adopted by the Antarctic Treaty Consultative Parties. Article 2 of the Protocol designates the Antarctic environment and associated ecosystems "as a natural reserve, devoted to peace and science". Article 3(2) stipulates that activities are planned with such ecosystems in mind to limit adverse impacts, including prior assessments of their potential impact. Article 8 contains an obligation for such Environmental Impact Assessments. Article 7 provides that: "Any activity relating to mineral resources, other than scientific research shall be prohibited". As Rothwell argues, this was an important aspect of the Protocol, as it ended "the debate over whether mining in Antarctica was acceptable". The Annexes to the Protocol set out mandatory measures on: the requirement for environmental impact assessments (Annex 1); conservation of fauna and flora (Annex II); the disposal of waste (Annex III); marine pollution (Annex IV); the Antarctic Protected Areas System (Annex V); liabilities arising from environmental emergencies (Annex VI). The Protocol also allows for a Committee for Environmental Protection which provides permanent specialist advice to the Treaty Parties and oversees the detailed mandatory rules set out in the Annexes to the Protocol.[17]

The UK has signed the 1991 Protocol and ratified it with the Antarctica Act 1994, though the Act does not cover Annex VI, which requires anyone undertaking activities in Antarctica to ensure measures are in place to prevent any environmental damage, together with contingency plans to deal with any damage that might occur. The UK intends to ratify this part of the Protocol. In November 2009, the previous Labour Government published a draft Antarctica Bill (Cm 7635), which would have implemented the Liability Annex through a "polluter pays" mechanism and enhanced the provisions of the Antarctica Act 1994 to provide additional protection to the Antarctic environment and those travelling to the continent. Early ratification of the Liability Annex was also seen as desirable in order to "maintain the UK's influential status". No Bill was presented before the 2010 General Election. However, Neil Carmichael, Conservative MP for Stroud, has presented a Private Member's Bill, the Antarctic Bill, which has Government support and which is due to have its second reading on 2 November 2012. A commentary on the Bill is provided by House of Commons Library, *The Antarctic Bill* (10 October 2012, SN06388).

An overview of the Antarctic Treaty System is also provided by House of Commons Library, *Antarctica: The Treaty System and Territorial Claims* (18 July 2012, SN/IA/5040). This note also summarises the applicability of the law of the sea, particularly the 1982 UN Convention on the Law of the Sea, in relation to Antarctica and the Antarctic Treaty System.[18]

3.2 Administration of the Antarctic Treaty

Every year the original twelve Parties to the Treaty and those Parties that demonstrate their interest in Antarctica by conducting substantial research activity there—together called the Consultative Parties—meet "for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and

[17] Donald R Rothwell, 'Polar Environmental Protection and International Law: The 1991 Antarctic Protocol', *European Journal of International Law* (2000), vol 11, no 3, pp 519–614. See also Philippe Sands, *Principles of International Environmental Law*, (2003), pp 725–726 and D Vidas et al (eds), *Implementing the Environmental Protection Regime for the Antarctic*, (2000).

[18] See also Philippe Sands, *Principles of International Environmental Law*, (2003), pp 712–725; D Rothwell, *The Polar Regions and the Development of International Law*, (1996); Lee Kimball, 'Environmental Law and Policy in Antarctica' in Philippe Sands (ed), *Greening International Law*, (1993), pp 122–134.

formulating and considering and recommending to their Governments measures in furtherance of the principles and objectives of the Treaty" (Article IX). The meetings also involve: non-Consultative Parties; Observers—currently the Scientific Committee on Antarctic Research (SCAR), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and the Council of Managers of National Antarctic Programs (COMNAP); invited Experts, such as the Antarctic and Southern Ocean Coalition (ASOC) and the International Association of Antarctica Tour Operators (IAATO). This forum is called the Antarctic Treaty Consultative Meeting (ATCM). Previously from 1961 to 1994 the ATCM generally met once every two years, but since 1994 the meetings have occurred annually.

Measures, Decisions and Resolutions, which are adopted at the ATCM by consensus, give effect to the principles of the Antarctic Treaty and the Environment Protocol and provide regulations and guidelines for the management of the Antarctic Treaty area and the work of the ATCM. Decisions, which address internal organizational matters of the ATCM, and Resolutions, which are hortatory texts, are not legally binding on Contracting Parties. In contrast, Measures are legally binding on the Consultative Parties once they have been approved by all Consultative Parties.

Until 2004, the administration of the Treaty occurred without a secretariat. On 1 September 2004 the Secretariat of the Antarctic Treaty was established and based in Buenos Aires. Under direction of the ATCM, the Secretariat carries out a variety of tasks: supporting the annual Antarctic Treaty Consultative Meeting (ATCM) and the meeting of the Committee for Environmental Protection (CEP); facilitating the exchange of information between the Parties required in the Treaty and the Environment Protocol; collecting, storing, archiving and making available the documents of the ATCM; providing and disseminating information about the Antarctic Treaty system and Antarctic activities. The last ATCM took place in Hobart in June 2012.[19]

3.3 Antarctic Treaty as a Model for International Collaboration

A number of writers have argued that the novel manner in which the Antarctic Treaty was framed and has subsequently developed could offer important lessons for similarly contested areas. Gillian Triggs, for example, has stated:

> One of the factors contributing to the success of the Antarctic Treaty has been that it created a "process, not just a piece of paper". This means that the Treaty provides the means by which, in an organic way, the states parties could develop principles and procedures for Antarctic governance that would ensure its primary objectives while leaving intact their respective views on sovereignty.
>
> The ATS [Atlantic Treaty System] provides a valuable model for the evolution of international regimes that avoids irresolvable sovereignty and boundary issues. As access to living and nonliving resources becomes a vital matter of national and global security over the coming years, the ATS provides an exemplar for the promotion of peaceful problem solving. The ATS also demonstrates how regions beyond national jurisdiction might be managed in the future according to

[19] For a summary of the last ATCM: http://www.ats.aq/documents/ATCM35/ww/atcm35_ww002_e.pdf. The next ATCM is due to take place in Belgium, 20–29 May 2013.

> identified common interests and values that are more comprehensive than those of traditional national sovereignty.[20]

Lee Kimball has stated that perhaps Antarctica's remoteness has helped to shape the uniqueness of the Antarctic Treaty System. However, he contends that the ability of the system to integrate other treaties and other international agreements, such as the 1989 Basel Convention and various International Maritime Organisation treaties on ship safety and pollution, into an interlocking network for global environmental governance offers a model for other areas.[21]

Michael McCarthy, writing in the *Independent* in June 2012, sought to contrast the international community's approach to Antarctica with that of the Arctic and noted the efforts of organisations such as Greenpeace who argue for a similar approach in both regions:

> It is just beginning to become clear that an ominous new age is dawning for the Arctic, one of the world's most unspoiled ecosystems: a stampede for the region's minerals and other natural resources, oil and gas above all, as the exploitation of them is being made possible by the rapid melting of the Arctic Ice by the warming climate.
>
> You could compare this to the American gold rushes, but perhaps in its scale it resembles even more the "scramble for Africa" at the end of the 19th century, when European powers led by Britain, France, Germany and Belgium rushed to divide between them the African continent, then being opened to outsiders in a similar way.
>
> The scramble for the Arctic will involve both giant corporations such as Shell and Exxon and also nation states, especially the Arctic countries which surround the North Pole, and which... are already staking their territorial claims.
>
> Greenpeace has accurately shaped the aims of its new campaign: to internationalise the region, as the Antarctic has been internationalised, and to keep out industrialisation and unsustainable fishing—the very developments which are likely to come along very soon. But it is not only spot-on in its aims, it is spot-on in its timing: Shell begins drilling for oil in the Arctic Ocean next month. It is a historic moment, and the environment movement, in the shape of Greenpeace, has grasped it.[22]

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[20] Gillian Triggs, *The Antarctic Treaty System: A Model of Legal Creativity and Cooperation*, in Paul Arthur Berkman et al, *Science Diplomacy Antarctica, Science, and the Governance of International Spaces* (2011), p 48. See also Donald R Rothwell, 'Polar Environmental Protection and International Law: The 1991 Antarctic Protocol', *European Journal of International Law* (2000), vol 11, pp 592–3.

[21] Lee Kimball, 'Environmental Law and Policy in Antarctica' in Philippe Sands (ed), *Greening International Law*, (1993), p 138.

[22] *Independent*, 'The Scramble for the Arctic is Already Underway', 22 June 2012. See also: Timo Koivurova, 'Alternatives for an Arctic Treaty—Evaluation and a New Proposal', *Review of European Community and International Environmental Law*, vol 17, no 1, (April 2008), pp 14–26 and Philippe Sands, *Principles of International Environmental Law*, (2003), pp 727-731. For a discussion of the notion of a 'common heritage of mankind' or 'world park' see Prue Taylor, *An Ecological Approach to International Law*, (1998), pp 258–322 and Christopher Stone, 'Defending the Global Commons' in Philippe Sands (ed), *Greening International Law*, (1993), pp 35–49.

3.4 Antarctic Treaty: Challenges and Concerns

Though, as noted above, many commentators have praised the Antarctic Treaty System, a number of writers have highlighted continuing issues. Johannes Huber has argued that one issue has been that of regulation and enforcement:

> ... [A]lthough the Antarctic Treaty Parties and the ATCM established a comprehensive regulatory system to manage Antarctica, they have never shown much interest in the practical questions of ensuring its implementation or even its maintenance as a clear and consistent set of regulations. To put it in another way, the regulatory regime has outstripped the capacity of the parties to implement it.

He calls for a new partnership that would focus on joint, rather than purely national, implementation of the regulatory regime established through the ATCMs.[23] Alan Hemmings and Lorne Kriwoken have also drawn attention to the effectiveness of the 1991 Protocol on Environmental Protection to the Antarctic Treaty (see above). They point to the highest level Environmental Impact Assessment (EIA) permitted under the Protocol—a Comprehensive Environmental Evaluation (CEE), which requires international scrutiny and is the only form of EIA where such scrutiny occurs and the only context under the Madrid Protocol or any other part of the Antarctic Treaty System where the proposed actions of State Parties, or operators subject to their jurisdiction, are subject to formal international review. They note that until 2010 there had been 19 CEEs. But that "not one CEE appears to have led to substantial modification of the activity as first elaborated by the proponent, let alone a decision not to proceed with the activity, despite this being a mandatory consideration". They suggest that there "are indications that the imperatives in the CEE process are often administrative and diplomatic rather than environmental and that notwithstanding the international scrutiny of draft CEEs, state action may not be significantly changed".[24]

Christopher C Joyner has identified a number of potential challenges for the Antarctic Treaty System. He points to the possible conflict between claimant and non-claimant governments over access to possible hydrocarbon resources offshore the continent:

> ... Antarctic claimant states have made either full or partial submissions to the UN Commission on the Limits of the Continental Shelf (CLCS), as provided for in Article 76, concerning the possibility of asserting continental shelf claims offshore their claimed Antarctic territories. Australia was the first claimant to make a submission to the CLCS and did so in November 2004. The submission by New Zealand was filed with the CLCS in April 2006, although it excluded a prospective outer continental shelf claim offshore its claimed sector in Antarctica. Argentina made its submission with the CLCS in April 2009, which included a map and geographical coordinating for outer continental shelf limits overlapping the Antarctic Peninsula. Norway filed a partial submission to the CLCS in May 2009, in which Dronning Maud Land was included. Chile made its submission in the form of a "Preliminary Information" statement to the CLCS in May 2009.The United Kingdom made two public communications concerning its outer continental shelf claims in the Antarctic, one in a note on 9 May 2008 to the UN Secretary General, which indicated that United Kingdom would be making in

[23] Johannes Huber, 'The Antarctic Treaty: Towards a New Partnership', in Paul Arthur Berkman et al (eds), *Antarctica, Science, and the Governance of International Spaces* (2011), pp 89–97.
[24] Alan Hemmings and Lorne Kriwoken, 'High level Antarctic EIA under the Madrid Protocol: state practice and the effectiveness of the Comprehensive Environmental Evaluation process', *International Environmental Agreements*, vol 10, no 3, (September 2010), p. 187.

> 2009 “a partial submission” that “will not include areas of the continental shelf areas appurtenant to Antarctica, for which a submission may be made later”. Although France has not formulated any specific outer continental shelf claim offshore its clamed territory in Antarctica (Adelie Land), it did note in a “partial submission” to the UN Secretary General in February 2009 that such an offshore zone might well exist, for which a submission may later be made.
> ... two potential political problems are posed by these partial claimant state continental shelf submissions, either of which could have unsettling impacts on the stability of the Antarctic Treaty. First, if pushed on to full submission, these claimant state assertions would resurrect the dispute over the status of national sovereignty claims on the continent. Second, the allegation is bound to arise from nonclaimant governments that these submissions are actually extensions of claims made prior to 1959 or even new claims made by each state. Since 1961 when the Antarctic Treaty entered into force, both these critical complications have been held in check by the ingenious construction of its Article IV, and the political willingness of the claimant government not to push the sovereignty issue. Prudence suggests that all the ATCPs ought to view their national interest as being best served by preserving the integrity of the present system, rather than risk politically unraveling it for the sake of asserting claims over unknown (and very likely unrecoverable) continental shelf hydrocarbon resources.

He also notes another challenge to the integrity of the Antarctic Treaty through biological prospecting, or bioprospecting, which he suggests could lead to a blurring between scientific research and commercial exploitation. He argues that increasing scientific research on flora and fauna in and around Antarctica is “being conducted with the aim of discovering commercially beneficial genetic and biochemical resources” evidenced “by the fact that products from Antarctic genetic resources are already being marketed by several companies, including nutraceuticals from krill oil, antifreeze proteins, anticancer drugs, enzymes, and compounds for cosmetic products”. Much of this commercial activity he contends focuses on the marine environment, in particular, the crustacean krill. This includes nearly 200 research organizations and companies from major sponsoring states including Japan, United States, Spain, United Kingdom, Korea, Canada, Sweden, Russia, China, Chile, New Zealand, France, Belgium, India, Denmark, the Netherlands, Germany, and Poland.[25]

Other specific issues include fishing, tourism and marine pollution. Stuart Kaye, for instance, has argued that though much progress has been made in terms of international unregulated fishing (IUU) more is still to be done. He contends that a lack of complete progress reflects in part the nature of the international framework, the lack of meaningful cooperation from many flag states with open registries and the difficulties of regulation in “the most remote and hostile marine environment”.[26] The Antarctic and Southern Ocean Coalition has stated that they have significant concerns regarding krill and toothfish stocks, which have not yet recovered from previous periods of over-fishing, before stricter regulation came into force, and which are still vulnerable to IUU.[27] On the question of Antarctic Tourism, Debra Enzenbacher argues that “recent tourism developments in Antarctica cause great concern” and though “efforts expended by the ATPs [Antarctic Treaty Parties] and IAATO [International Association of Antarctica Tour Operators] in pursuance of safe and environmentally sound tourism in Antarctica are to

[25] Christopher C Joyner, ‘Potential Challenges to the Antarctic Treaty’, in Paul Arthur Berkman et al (eds), *Antarctica, Science, and the Governance of International Spaces* (2011), pp 97–102.
[26] Stuart Kaye, ‘IUU Fishing in the Southern Ocean: Challenge and Response’ in Gillian Triggs and Anna Riddell, *Antarctica: Legal and Environmental Challenges for the Future* (2007), p 59.
[27] http://www.asoc.org/issues-and-advocacy/antarctic-wildlife-conservation/southern-ocean-fisheries.

be applauded... there is no room for complacency". She suggests that a lack of expertise amongst ATPs is hindering a strategic response to the challenges that tourism poses.[28] The Antarctic and Southern Ocean Coalition notes that from a base of 4,698 tourists in the 1990/91 summer, annual numbers have risen to 36,875 over the 2009/2010 season and are expected to rise further in the future.[29] Denise Landau and John Splettstoesser take a slightly different approach and contend that the International Association of Antarctica Tour Operators (IAATO) has developed a number of management strategies, including establishing categories of membership that are tailored to accommodate size of vessels and passenger capacity, plus a variety of steps taken to ensure environmental protection. They argue that "benefits of Antarctic tourism are many, such as spin-offs that assist science programs through "ships of opportunity" by way of transporting science personnel and gear, as well as in numerous observations of marine wildlife by tour company naturalists".[30]

In relation to marine pollution, Ivan Zovko has argued that "an effective system of rules and regulations related to vessel-sourced pollution is unattainable in the Southern Ocean through the mechanisms of the ATS [Antarctic Treaty System] alone, ie without greater synergies between the ATS and the relevant global institutions".[31] On 1 August 2011, the UN International Maritime Organisation (IMO) announced that a ban on pollution from heavy grade fuel oils in the Antarctic region had come into effect. It noted that amendments to the International Convention for the Prevention of Pollution From Ships (MARPOL) detailing specific densities of crude oil which should not be used in the Antarctic would mean that ships plying that area with lower grade fuel would have to switch to a higher fuel grade whilst there.[32]

4.1 International Scientific Collaboration in the Antarctic

4.2 Scientific Committee on Antarctic Research (SCAR)

Much of the co-ordination of scientific research that takes places in Antarctica is overseen by the Scientific Committee on Antarctic Research (SCAR).[33] SCAR was formed in 1958 to continue activities begun during the International Geophysical Year of 1957–58 and is an interdisciplinary committee of the International Council for Science (ICSU). David W H Walton, who has written a brief history of SCAR, notes that though it is a nongovernmental organization, it has been intimately linked to the governmental discussions at the Antarctic Treaty since the first Antarctic Treaty meeting in 1961; and though its primary role has been to develop and coordinate international scientific research it has "also provided independent advice to Treaty Parties on many scientific

[28] Debra Enzenbacher, 'Antarctic Tourism Policy-Making: Current Challenges and Future Prospects' in Gillian Triggs and Anna Riddell, *Antarctica: Legal and Environmental Challenges for the Future* (2007), pp 155–89. See also Kees Bastmeijer et al, 'Permanent Land-based Facilities for Tourism in Antarctica: The Need for Regulation', *Review of European Community and International Environmental Law*, vol 17, no 1, (April 2008), pp. 84–99.
[29] http://www.asoc.org/issues-and-advocacy/antarctic-environmental-protection/antarctic-tourism.
[30] Denise Landau and John Splettstoesser, 'Management of Tourism in the Marine Environment of Antarctica: The IAATO Perspective', *Tourism in Marine Environments*, vol 4, nos 2-3, 2007, pp 185-193.
[31] Ivan Zovko, 'Vessel-sourced Pollution in the Southern Ocean: Benefits and Shortcomings of Regional Regulation' in Gillian Triggs and Anna Riddell, *Antarctica: Legal and Environmental Challenges for the Future* (2007), pp 191–222.
[32] http://www.un.org/apps/news/story.asp?NewsID=39201&Cr=marine&Cr1.
[33] For a brief account of SCAR and research more generally in the Antarctic see: Jörn Thiede, 'Modern Research in Polar Regions' in Paul Arthur Berkman et al (eds), *Antarctica, Science, and the Governance of International Spaces*, (2011), pp 161–63.

and environmental questions, initially through national government delegations". In 1987, SCAR was granted the status of observer and the right to attend Antarctic Treaty Consultative Meetings (ATCMs) and to submit information and working papers. In 1989, the logisticians from SCAR split to form the Council of Managers of National Antarctic Programs (COMNAP). In 2000, SCAR held a review of its structure and function, resulting in the establishment of Open Science Conferences, major new international programmes, increased educational outreach, and a greater input to the annual Antarctic Treaty meetings, often on controversial subjects like marine acoustics or specially protected species. There are currently 31 full members with four associate members and nine ICSU union members.[34]

SCAR has played a role in helping to form agreements in areas such as the Agreed Measures for the Conservation of Antarctic Fauna and Flora (1964), the Convention for the Conservation of Antarctic Seals, the Biological Investigations of Marine Antarctic Systems and Stocks (BIOMASS) programme and laid the foundations for the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR). Its non-political stance has allowed it to provide the only unified gazetteer for the Antarctic.

SCAR's mission is "to be the leading independent organisation for facilitating and coordinating Antarctic research, and for identifying issues emerging from greater scientific understanding of the region that should be brought to the attention of policy makers". It has five main objectives: to initiate, develop, and co-ordinate high quality international scientific research in the Antarctic region, and on the role of the Antarctic region in the Earth system; to provide objective and independent scientific advice to the Antarctic Treaty Consultative Meetings and other organisations on issues of science and conservation affecting the management of Antarctica and the Southern Ocean; to facilitate free and unrestricted access to Antarctic scientific data and information; to develop scientific capacity in all SCAR Members, especially with respect to younger scientists, and to promote the incorporation of Antarctic science in education at all levels; to communicate scientific information about the Antarctic region to the public. SCAR is currently focusing its efforts on four Scientific Research Programmes addressing major topical issues of the day. These programmes are: Antarctica and the Global Climate System; Antarctic Climate Evolution; Evolution and Biodiversity in the Antarctic; Astronomy and Astrophysics from Antarctica. SCAR is also planning the next suite of Scientific Research Programmes (SRPs) which includes: State of the Antarctic Ecosystem; Antarctic Thresholds—Ecosystem Resilience and Adaptation; Antarctic Climate Change in the 21st Century; Past Antarctic Ice Sheet Dynamics; Solid Earth Responses and influences on Cryospheric Evolution.

4.3 Council of Managers of National Antarctic Programs (COMNAP)

The Council of Managers of National Antarctic Programs (COMNAP), as noted above, was formed in 1988 and is an international association which brings together its Members, who are the National Antarctic Programs. National Antarctic Programs are those organizations that have responsibility for delivering and supporting scientific research in the Antarctic Treaty Area on behalf of their respective governments. COMNAP's purpose is to "develop and promote best practice in managing the support of scientific research in Antarctica". It does this by:

> Serving as a forum to develop practices that improve effectiveness of activities in an environmentally responsible manner;
>
> Facilitating and promoting international partnerships;

[34] For a full list of members and officers see: http://www.scar.org/about/officers/.

Providing opportunities and systems for information exchange; and

Providing the Antarctic Treaty System with objective and practical, technical and non-political advice drawn from the National Antarctic Programs' pool of expertise.[35]

COMNAP has a group of experts who advise on various logistical issues, such as transport, safety, training and outreach. This includes the production of various manuals and maps.[36]

4.4 Other International Bodies Involved in the Antarctic

A number of other international bodies are involved in scientific research in the Antarctic. For instance, the World Meteorological Organization (WMO) is "the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources". The WMO Space Programme co-ordinates satellite data including that related to the polar regions. The United Nations Environment Programme (UNEP) has linked global programmes on the conservation, management and monitoring of the marine environment and its living resources, including those of the Arctic and Antarctic. The UNEP participates in the annual Antarctic Treaty Consultative Meetings and meetings of the Committee for Environmental Protection (see above). The UNEP also prepares the report submitted by the UN Secretary-General every three years to the UN General Assembly to keep the international community informed on the activities of the Antarctic Treaty Parties.[37]

4.5 International Polar Year (IPY)

On four occasions over the past 125 years scientists from around the world have joined together to organize concentrated scientific and exploring programmes in the polar regions. In each one of these "polar years" scientific knowledge and geographical exploration of these regions have been advanced, thereby extending understanding of many geophysical phenomena that influence nature's global systems. Each polar year has also showcased international cooperation in science.

The first IPY (1882–1883) was the inspiration of the Austrian explorer and naval officer Lt Karl Weyprecht who was a scientist and co-commander of the Austro-Hungarian Polar Expedition of 1872–74. It involved 12 countries, and 15 expeditions to the poles were completed (13 to the Arctic, and two to the Antarctic). Beyond the advances to science and geographical exploration, a principal legacy of the first IPY was its setting of a precedent for international science cooperation.[38]

The second IPY (1932–1933) was promoted by the International Meteorological Organization as an effort to investigate the global implications of the newly discovered "Jet Stream". It involved 40 nations and led to advances in meteorology, magnetism, atmospheric science, and in the "mapping" of ionospheric phenomena that advanced radioscience and technology. 40 permanent observation stations were established in the Arctic, while in Antarctica, the US built the second Byrd Antarctic expedition, which established a winter-long meteorological station approximately 125 miles south of Little

[35] https://www.comnap.aq/SitePages/Home.aspx.
[36] https://www.comnap.aq/Publications/SitePages/Home.aspx.
[37] http://www.unep.org/dewa/Assessments/Ecosystems/Antarctica/tabid/6958/Default.aspx.
[38] For additional commentary on the First IPY see: http://www.arctic.noaa.gov/aro/ipy-1/History.html.

America Station on the Ross Ice Shelf at the southern end of Roosevelt Island. This was the first research station inland from Antarctica's coast. [39]

The third IPY or the International Geophysical Year (1957–58) included a celebration of the 75th and 25th anniversaries of the first and second IPYs. Its research, discoveries, and various synoptic observations revised or "rewrote" many notions about the Earth's geophysics. It confirmed the long disputed continental drift theory and discovered the Van Allen Radiation Belt encircling the Earth. Geophysical traverses over the Antarctic icecap yielded the first informed estimates of the total size of Antarctica's ice mass. It also, as discussed above, laid the foundations for the ratification of the Antarctic Treaty in 1961. Simone Turchetti et al have alternatively argued that the International Geophysical Year 1957–8 and the subsequent Antarctic Treaty were also shaped by international politics, particularly the Cold War and the hegemonic interests of the US. They contend that the "rise of the development of international cooperative research allowed the USA, the largest logistic operator in Antarctica, to gain control of local affairs by penetrating into strategic areas, influencing the policies of other nations, and defusing existing tensions between them".[40]

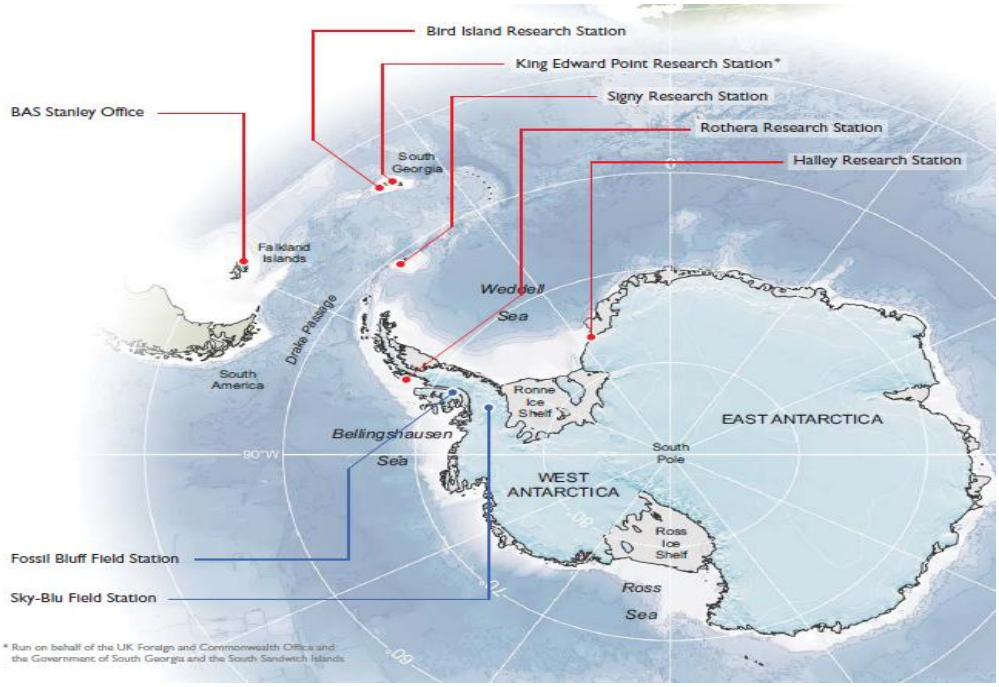
The fourth IPY (2007–2008) was hailed as the "largest internationally coordinated research programme in 50 years" and as "an intensive period of interdisciplinary science focused on the Arctic and the Antarctic". It had six major themes: to determine the present environmental status of the polar regions; to quantify, and understand, past and present natural environmental and social change in the polar regions and to improve projections of future change; to advance understanding on all scales of the links and interactions between polar regions and the rest of the globe, and of the processes controlling these; to investigate the frontiers of science in the polar regions; 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; 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.[41] In 2009, the World Meteorological Organization (WMO) published *The State of Polar Research*, which sought to summarise what had been learnt from the various IPY projects. Amongst the highlights, research found sea level rises due to the melting of ice sheets, sea-ice decreases in the Arctic, anomalous warming in the Southern Ocean, and the storage and release of methane in permafrost.[42] The UK involvement in the fourth IPY included a variety of projects ranging from the stability of the Greenland Ice Sheet to the effect of air pollution on the atmosphere and climate.[43]

5. UK's Continuing Presence in the Antarctic

The UK's presence in the Antarctic is largely maintained through the British Antarctic Territory (BAT), which is a sector of Antarctica claimed by the United Kingdom as one of its 14 British Overseas Territories. It comprises the region south of 60°S latitude and between longitudes 20°W and 80°W, forming a wedge shape that extends to the South Pole, overlapping the Antarctic claims of Argentina (Argentine Antarctica) and Chile

[39] For material on the Second IPY see: http://www7.nationalacademies.org/archives/igyhistory.html.
[40] Simone Turchetti et al, 'On thick ice: scientific internationalism and Antarctic affairs, 1957-1980', *History and Technology*, vol 24, no 4, (December 2008), p 351.
[41] See: International Council for Science (ISU), A Framework for the International Polar Year 2007–2008, (2004), p 7.
[42] See: http://news.bbc.co.uk/1/hi/sci/tech/7906539.stm.
[43] A list of UK projects can be found on the British Antarctic Survey website.

(Antártica Chilena Province). The Territory was formed on 3 March 1962, although the UK's claim to this portion of the Antarctic dates back to Letters Patent of 1908 and 1917. The area now covered by the Territory includes three regions which, before 1962, were administered by the British as separate dependencies of the Falkland Islands. However, as noted above, the Antarctic Treaty states that it "does not recognize, dispute, nor establish territorial sovereignty claims; no new claims shall be asserted while the treaty is in force", and as such most countries do not recognise territorial claims in Antarctica. The BAT hosts a number of research stations maintained by the British Antarctic Survey (BAS). These include two permanently staffed research stations, Halley and Rothera and summer research stations located at Signy, Fossil Bluff and Sky Blu (see illustration below).[44]



(Source: BAS, Polar Science for Planet Earth, 2009)

Another station, Faraday, was maintained until 1996 until it was sold to Ukraine and renamed Akademik Vernadsky Station.[45] The Territory is also inhabited by the staff of research and support stations operated and maintained by organisations other than the BAS, along with stations of Argentina, Chile and other countries. There are no native inhabitants.

The Territory also includes a number of heritage sites. Port Lockroy on Goudier Island was designated as Historic Site No 61 under the Antarctic Treaty on 19 May 1995 and restored 14 January–18 March 1996. Since November 1996 the station has been run as an Historic Site and is open to tourists and visitors during austral summer seasons. The main hut was named Bransfield House after the ship initially chartered to transport members of Operation Tabarin (see below) from the UK, and itself named after Edward Bransfield, Master, Royal Navy, the first person to chart an area of the Antarctic mainland (1819–20). The United Kingdom Antarctic Heritage Trust was key in repairing and maintaining the Port. The Trust has also taken on the conservation management of five other historic sites: Damoy Refuge, Detaille, Horseshoe, Stonington, and Wordie. Efforts to preserve two other key British landmarks in the Antarctic, Scott's and

[44] http://www.antarctica.ac.uk/living_and_working/research_stations/index.php.
[45] http://www.antarctica.ac.uk/about_bas/our_history/stations_and_refuges/faraday.php.

Shackelton's Huts, are being overseen by the Ross Sea Heritage Restoration Project, which is an international project led by the Antarctic Heritage Trust to conserve the huts and their artefacts.[46]

6.1 UK's Continuing Scientific Contribution in the Antarctic

6.2 National Environment Research Council (NERC)

The National Environment Research Council (NERC), which is the UK's main agency for funding and managing research, training and knowledge exchange in the environmental sciences, plays a key role in funding UK research in the Antarctic. NERC's strategy for 2007–12, entitled *Next Generation Science for Planet Earth* (2007), set itself the goal of delivering world-leading environmental research at the frontiers of knowledge that would: enable society to respond urgently to global climate change and the increasing pressures on natural resources; contribute to UK leadership in predicting the regional and local impacts of environmental change from days to decades; and create and support vibrant, integrated research communities. The British Antarctic Survey (BAS) is one of NERC's six major environmental research centres and the BAS receives the bulk of its funding from the Council.[47]

NERC has a wider polar research remit than the Antarctic. NERC's Arctic Research Base located at Ny-Ålesund on the island Spitsbergen in the Arctic Circle (79°N 11°E) is particularly suited to ecological research, glacial/periglacial geomorphology, hydrology and atmospheric chemistry. NERC's National Oceanography Centre works in close partnership with institutions across the UK marine science community addressing key science challenges including the future of the Arctic Ocean. NERC's National Centre for Earth Observation uses data from earth observation satellites to monitor global and regional changes in the environment to predict future environmental conditions, including significant environmental changes such as ozone depletion, atmospheric pollution, and melting sea ice. NERC's Polar Data Centre (PDC) co-ordinates the management of data collected by NERC and other UK funded scientists in the polar regions and replaces the Antarctic Environmental Data Centre. The PDC is based within the British Antarctic Survey.

NERC's Annual Report for 2011–12 notes that grant-in-aid and other funding from the Department for Business, Innovation and Skills (BIS) amounted to nearly £382 million for 2012.[48] In terms of examples of specific polar oriented programmes, NERC is investing £15 million into a five-year Arctic Research Programme, over the period 2010–15, whose overarching aim is to "improve our capability to predict changes in the Arctic, particularly over timescales of months to decades, including regional impacts and the potential for feedbacks on the global Earth System". Its Ice Sheet Stability Research Programme is a five year programme with a budget of £7.4 million over the period 2010–15 and aims to improve fundamental understanding of the interaction of ice with the oceans and the resulting ice sheet response, and to incorporate this new understanding into predictive models.

[46] More information can be found on the Natural History Museum's website. Virtual tours of the two Huts can be found on the googleblog website.
[47] The other centres include: British Geological Survey; Centre for Ecology & Hydrology; National Oceanography Centre; National Centre for Atmospheric Science; National Centre for Earth Observation.
[48] http://www.nerc.ac.uk/about/.

6.3 British Antarctic Survey

The British Antarctic Survey (BAS) is the UK's national Antarctic operator, and has for the past 60 years been responsible for most of the UK's scientific research in Antarctica. BAS emerged from Operation Tabarin. Tabarin was a secret World War II mission, which was designed to deny Antarctic waters to enemy ships but also had a scientific role and during the last two years of the war it collected data on Antarctic biology, geology and weather. After the end of the war in 1945, Tabarin's three bases and its scientific work were transferred to a new organisation, the Falkland Islands Dependencies Survey, which in turn was renamed in 1962 as the British Antarctic Survey (BAS). The BAS is headquartered in Cambridge and employs more than 400 staff. The BAS website states that its main objectives are to: provide a national capability for Antarctic science and logistics; carry out scientific research, long-term observations and surveys that cannot be done by anyone else in the UK; provide a focus for international co-operation and programme co-ordination; Concentrate on issues fundamental to NERC's science strategy and conservation of the Antarctic environment.

The BAS website acknowledges the importance of collaboration in the Antarctic:

> Collaboration is necessary for modern Polar science. Strong ties that BAS has established with other nations' scientists increase the intellectual capacity of Antarctic research programmes. Some Antarctic science projects are so large that they can only be conducted and funded through international programmes and cooperation.
>
> Only by working together can scientists address some of the most important questions facing the planet today. Therefore, we collaborate extensively with the environmental science community in the UK and overseas to share best practice and to maximise the scientific impact. This involves joint research projects with over 40 UK universities and more than 120 national and international collaborations.

On 19 April 2012, the Minister of State for Universities and Science, David Willetts, outlined the scope of the work of the BAS, its funding and its core programmes:

> The British Antarctic Survey (BAS) is responsible for the UK's scientific activities in Antarctica and provides the UK presence in the Antarctic and Southern Atlantic. BAS is a wholly-owned Research Centre of the Natural Environment Research Council (NERC) and decisions on its research activities/programmes are ultimately the responsibility of NERC. NERC is strategically committed to the existing base footprint and a world-class science programme.
>
> In 2010/11 total expenditure on BAS was £41.5 million. In addition, since 2010, NERC has awarded £14.5 million in grants for Antarctic related research. BAS research helps deliver insight into global issues such as climate change, energy and food security.
>
> BAS operates five research stations, two Royal Research Ships and five aircraft in and around Antarctica. The Government are investing £50 million in the revolutionary Halley VI Research Station for atmospheric research from ground level into space, including space weather. The construction of the station was completed in February 2012 and will be operational for the 2012/13 season.
>
> BAS researchers are currently leading a €2.54 million EU project to forecast space weather. The SPACECAST system went live on 1 March 2012 and will

provide forecasts so that satellite operators can better protect their satellites from space radiation damage.

In the 2012/13 field season, BAS will commence a number of projects with UK universities including the £7.4 million iSTAR and the £7 million Subglacial Lake Ellsworth Programmes. The former will investigate the stability of the West Antarctic Ice Sheet whereas the latter will collect water and sediment samples from a lake buried beneath three kilometres of ice.[49]

More detailed information can be found in BAS, *Business Plan 2010*, (2010).

6.4 BAS: Polar Science for Planet Earth

As noted above, key elements of the BAS research programme centre on climate change and the environment. For instance in 1995 the BAS observed a huge iceberg the size of Oxfordshire breaking off (or "calving") from the Larsen Ice Shelf on the east side of the Antarctic Peninsula. Along with enhanced plant growth in the Antarctic, so called 'green winters', the BAS concluded that research had to be carried out to investigate whether these developments were part of 'global warming'.[50] As noted in the introduction of this Note, the BAS along with other research centres has also produced studies relating to retreating ice sheets and the deterioration of the West Antarctic Peninsula seabed. In 2009, the BAS adopted a new programme, *Polar Science for Planet Earth*, which was based around six themes: Climate; Polar Oceans; Ice Sheets; Environmental Change and Evolution; Ecosystems; Chemistry and Past Climate.

The Climate theme seeks to: explain changes in atmospheric circulation, temperatures and sea-ice extent in both polar regions over the past 50 years and to determine how much of this change is due to human activity and how much is a result of natural factors (including solar variability); improve the representation of polar climate processes in large-scale models, using targeted observations; improve climate predictions in the polar regions on the space and timescales needed by the international scientific community (including glaciologists, oceanographers and biologists); maintain a programme of high-quality, long-term observations in the Antarctic using instruments at BAS research stations and remote field sites.

The Polar Oceans theme aims to: explain the processes that drive and close the overturning circulation in the Southern Ocean; determine the impact of, and the feedback between, the ocean and ice shelves; understand the physical drivers of changes in the marine environment, and the likely implications for climate; determine the impacts that changes in the polar regions have on the Earth System via ocean circulation.

The Ice Sheets theme focuses on: improving understanding of the ocean-atmosphere and bed interactions controlling ice-sheet flow and ice-sheet evolution; building and applying a robust mathematical and numerical framework for computer simulation of ice-sheet change and sea-level rise; determining current glacial change in the critical areas of the polar ice sheets; establishing improved histories of ice-sheet change to provide context and constraint for future projections.

The Ecosystems theme aims to: understand what determines the ability of species to adapt to change through genetic, physiological and ecological processes across a range of marine and terrestrial ecosystems; develop quantitative descriptions of the life-cycles

[49] HC *Hansard*, 19 April 2012, cols 557–8W.
[50] Parliamentary Office of Science and Technology, *Global Warming: The State of the Science*, (May 1995).

of species to determine their likely response to environmental change; determine the resilience of polar ecosystems to past and current climate change to predict how they may respond in the future; provide data and policy advice on key species and whole ecosystems to underpin further development of sustainable fisheries management in the Antarctic and beyond—fulfilling UK obligations under the Antarctic Treaty.

Chemistry and Past Climate seeks to: understand what controlled the timing and strengths of the major climate shifts of the last million years and beyond, particularly the shifts from glacials (ice ages) to interglacial warm periods; use the warmest periods of the last million years to tell us about the likely response of the polar regions to future climate change; determine how sea ice responded to past climate change and assess how this fed back into atmospheric chemistry and ocean circulation; produce detailed records of climate change in the Antarctic Peninsula region over the last 2,000 years.

6.5 Scott Polar Research Institute (SPRI)

The Scott Polar Research Institute (SPRI) was founded in 1920, in Cambridge, as a memorial to Captain Robert Falcon Scott and his four companions, who died returning from the South Pole in 1912. In terms of funding, Institute research staff currently hold grants of about £3.6 million, of which £1.3 million is from the UK research councils.[51] The Institute also conducts research in the Arctic and has a number of research streams. The Circumpolar History and Public Policy Research Group at SPRI aims to address issues of contemporary relevance to the polar regions by bringing together historical analysis and public policy debate. The Glacimarine Environments Group has a particular focus on the linkage between ice-sheet dynamics and sediment delivery to the marine environment, and the patterns and processes of glacimarine sedimentation. The Glaciology and Climate Change Group assesses the state of the cryosphere and how it changes with time and using a combination of fieldwork, satellite remote sensing techniques and computer simulations the Group have detected and documented developments such as the hydrology of former and modern ice sheets. The Polar Landscape and Remote Sensing Group seeks to develop an understanding of the phenomena of Arctic vegetation change and the processes that control them, from global to local scales, such as industrial and pastoral activity. The Polar Social Science and Humanities Group is interested in areas such as oil, gas and society.

6.6 Merger of the British Antarctic Survey and National Oceanography Centre?

On 7 June 2012, NERC issued a press release stating that it was considering a possible merger of the BAS with the National Oceanography Centre (NOC), which, as noted above, NERC also funds. The press release stated:

> A marine and polar headquarters would deliver a single management function whilst retaining the identity of the existing centres as component parts. All the existing BAS and NOC sites, at Cambridge, Southampton and Liverpool would remain, without the need for significant relocations of staff.
>
> Through combined scientific and logistics management and administration of NOC and BAS, NERC aims to better exploit the many scientific and operational synergies between marine and polar science.

[51] Further details of current grants can be found at: http://www.spri.cam.ac.uk/research/grants/. Details of previous grants and SPRI activities can be found in past copies of the SPRI's Annual Report, *Scott Polar Research Institute Review*, which go back online to 1995: http://www.spri.cam.ac.uk/about/sprireview/.

> More integrated management of increasingly expensive major research infrastructure, especially NERC's four research ships, may achieve further savings through improved opportunities for partnership and cost-sharing with the international marine and polar sciences communities.
>
> Council's intention is to increase the excellence and impact of NERC's marine and polar science whilst continuing to operate its scientific bases in Antarctica and South Georgia, and retaining the current level of activity in that region.[52]

On 11 September 2012, NERC published an open consultation document which set out the rationale for its proposal regarding the merge. The document sought to emphasise that the proposed merger would "not change the commitment that NERC has already made to support the current level of UK activity in Antarctica and South Georgia" and it would "enable NERC (via BAS) to continue to perform the roles that it has in supporting UK participation and leadership in the Antarctic Treaty System and in providing the facilities and logistics supporting the delivery of the UK's programme of science in Antarctica". NERC issued a subsequent press release on 2 October 2012, which sought to clarify and address media comment. It stated that NERC has demonstrated its commitment to sustaining polar activity in spite of the financial constraints of its CSR settlement, by awarding the BAS a higher level of funding than other NERC Centres. It had "no plans to close BAS or to close the BAS offices in Cambridge". Though it accepted that there might be some staff cuts, it maintained that this would have been the case without the merger and that NERC had to make difficult decisions across the entirety of its research portfolio.[53] The consultation closed on 10 October 2012 and is due to report its findings in December 2012.

Robin McKie, the Science Editor of *The Observer*, writing in September 2012 was against the plans, both in terms of climate change science and the UK's Antarctic legacy:

> The crucial word, of course, is threat. No one has yet closed down any BAS projects. But the risk is real; both the director and deputy director have already left their posts since the merger plan was announced and signs indicate a serious loss of morale. Senior scientists are unlikely to hang about at an institution that appears to be so ill-regarded by its controllers at the NERC and by the government. In such a situation, the next generation of Farmans, Gardiners and Shanklins—researchers who could pinpoint future risks to the planet—will not be on hand to do work that could have crucial environmental importance.
>
> And this is a key point. The impact of global warming is being felt first at the poles. This year summer sea-ice levels in the Arctic plunged to a record low and there is every sign of equally profound changes in the Antarctic, though it is a far more complex terrain than its northern counterpart. Yet the government is inflicting cuts that will prevent Britain playing a proper role in such investigations, say critics, who point out that, more than any other country, the UK has helped open up the Antarctic to scientific study. James Cook was the first person to cross the Antarctic Circle; James Clark Ross was the first to reach the continent's great ice shelves; Scott and Shackleton's expeditions were triumphs of scientific endeavour, even though Scott was beaten to the south pole by Roald Amundsen in 1912; and the Commonwealth Trans-Antarctic Expedition of 1955–58, led by the explorer Vivian Fuchs, was the first to cross the continent overland.

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[52] NERC Press Release, 'NERC considers combined management of polar and marine science', 7 June 2012.
[53] See the BBC website's coverage of the proposed merger: http://www.bbc.co.uk/news/uk-england-19799570.

> It is an impressive legacy. How long Britain can continue to add to it with new research remains to be seen.[54]

Mike Marshall, writing in the *New Scientist* on 6 October 2012, also criticised the merger:

> By itself, this might not necessarily be a bad thing. But there are disturbing rumours that more is going on behind the scenes. The director of the British Antarctic Survey left after NERC announced the plans, and there are fears that the merged institution will be a pale shadow of its predecessors.
>
> Ultimately, it comes down to money. As part of the austerity measures put in place to cut the UK deficit, the government is slashing the science budget. Polar research is expensive, so it is a tempting target. This is profoundly misguided. The Arctic and Antarctic are both changing rapidly as the planet heats up. If Antarctica's ice sheets begin collapsing, shallow coastal regions will be inundated. We need to know what is happening down there. Like the Arctic, it's a matter of vital global importance.

The *Independent on Sunday* on 7 October 2012 noted that Al Gore, the former US vice-president and environmental activist, had attacked the merger proposals and was reported as saying that: "From my personal knowledge, the BAS is a globally significant organisation ... In my view retaining the core elements of the BAS, integrated into a single unit with strong leadership, is of supreme importance, both as a UK national and international asset". The paper also raised the prospect of the House of Commons Science and Technology Select Committee taking evidence on the subject in October 2012.

David Shukman, the BBC's Science Editor, writing on the BBC website suggested that any decision over the UK's presence in the Antarctic would have wider implications in terms of the South and particularly the Falkland Islands. As such he stated that the Foreign Office was "watching this process closely, scrutiny that became more intense during the recent flare-up with Argentina over the Falkland Islands".

Duncan Wingham, Chief Executive of NERC, responded to Robert McKie's article in a letter to *The Observer* on 7 October 2012 and sought to defend the merger consultation:

> ... Far from posing a threat to polar research, we are continuing to sustain our polar activity, and its role in maintaining the UK presence in Antarctica and South Georgia, in spite of the pressure on science budgets that our present circumstances demand.
>
> Our aim in proposing the merger of the BAS and the National Oceanography Centre is to create a single institute that can take on the largest grand challenges of polar science, north and south, and that can make the most effective use of the combined fleet. We are considering matching the centre's ambition with a new name, but there are no plans to close BAS at Cambridge, whose existence remains integral to the new centre's ambition.

[54] *Observer*, 'Preserving the Spirit of Shackleton: Why the UK must Treasure its Polar Research', 30 September 2012.

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