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Steps of Foundation of Institutionalized Antarctic Research

Proceedings of the 1st SCAR Workshop on the History of Antarctic Research
Bavarian Academy of Sciences and Humanities, Munich (Germany), 2-3 June, 2005

Edited by Cornelia Lüdecke

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List of Abbreviations

AARI	Arctic and Antarctic Research Institute
ASOC	Antarctic and Southern Ocean Coalition
AT	Antarctic Treaty
ATCM	Antarctic Treaty Consultative Meet*ings*
ATS	Antarctic Treaty System
AWI	Alfred Wegener Institute for Polar and Marine Research
CAE	Complex Antarctic Expedition
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CFC	Chlorofluorocarbons
COMNAP	Council of Managers of National Antarctic Programms
COSPAR	Committee on Space Research
CP	Consultative Party
CRAMRA	Convention on the Regulation of Antarctic Mineral Resource Activities
CSAGI	Comité Speciale de l'Année Geophysique Internationale
DEW	Defence Early Warning
EPICA	European Project for Ice Coring in Antarctica
FRISP	Filchner Ronne Ice-Shelf Programme
IAU	International Astronomical Union
ICSU	International Council of Scientific Unions
IGC	International Geophysical Cooperation
IGU	International Geographical Union
IGY	International Geophysical Year
IMI	International Metereological Institute
IPC	International Polar Commission
IPCC	Intergovernmental Panel on Climate Change
IRS	International Union of Radio Science
IUBS	International Union of Biological Sciences
IUCN	International Union for the Conservation of Nature and Natural Resources
IUGG	International Union of Geodesy and Geophysics
KNAW	Royal Dutch Academy of Sciences
KNMI	Royal Dutch Meteorological Institute
NBSX	Norwegian-British-Swedish Expedition
NCP	Non-Consultative Parties
NIOZ	Netherlands Institute for Sea Research
NSF	National Science Foundation
PYC	Polar Year Committee
RAE	Russian Antarctic Expedition
RARE	Ronne Antarctic Research Expedition
RGS	Royal Geographical Society
SCAR	Scientific Committee on Antarctic Research
SAE	Soviet Antarctic Expedition
SAR	South African Republic
SCOR	Scientific Committee on Oceanic Research
SG	Secretary General

SOZ	Stichting Onderzoek der Zee
SPRI	Scott Polar Research Institute
SSAG	Swedish Society for Geography and Anthropology
UN	Unites Nations
UNCLOS	United Law of the Sea Conference
UNEP	United Nations Environmental Program
USA	Unites States of America
USSR	United Soviet States of Russia
USAP	United States Antarctic Program
USARP	United States Antarctic Research Program
WWF	World Wide Fund for Nature

Dear colleagues,

„Change has become a constant; managing it has become an expanding discipline. The way we embrace it defines our future." This statement was made by Queen Elisabeth II in her speech at Westminster Hall on Tuesday 30th April, 2002, related to the 50 years of her regency. But could this declaration not be adopted justly with good reason as the motto for the SCAR meeting as well?

With these short remarks, I would like to welcome you on behalf of the Bavarian Academy of Sciences and as the Chairman of the Commission for Glaciology. I am glad that you have chosen Munich for your first workshop. In these premises we are the guests of an Academy who looks back on a long tradition. The foundation of the Bavarian Academy by Kurfürst Maximilian II Joseph took place in 1759. In the memorandum of the association is written that the aims and activities of the Academy should be to promote scientific work and research. This is realised by the Academy in different ways. The Academy is responsible for many research institutions, organises symposia and workshops and has a library, which has an exchange of publications with more than 800 national and international institutions. The Academy is also responsible for the "Leibniz Rechenzentrum", one of the few high-speed computer centres in Europe with nearly 100 collaborators. The Academy is organised in two classes, a philosophic –historic one and a class for mathematics and natural sciences. Today the Academy houses 19 scientific commissions with more than 300 scientists and collaborators.

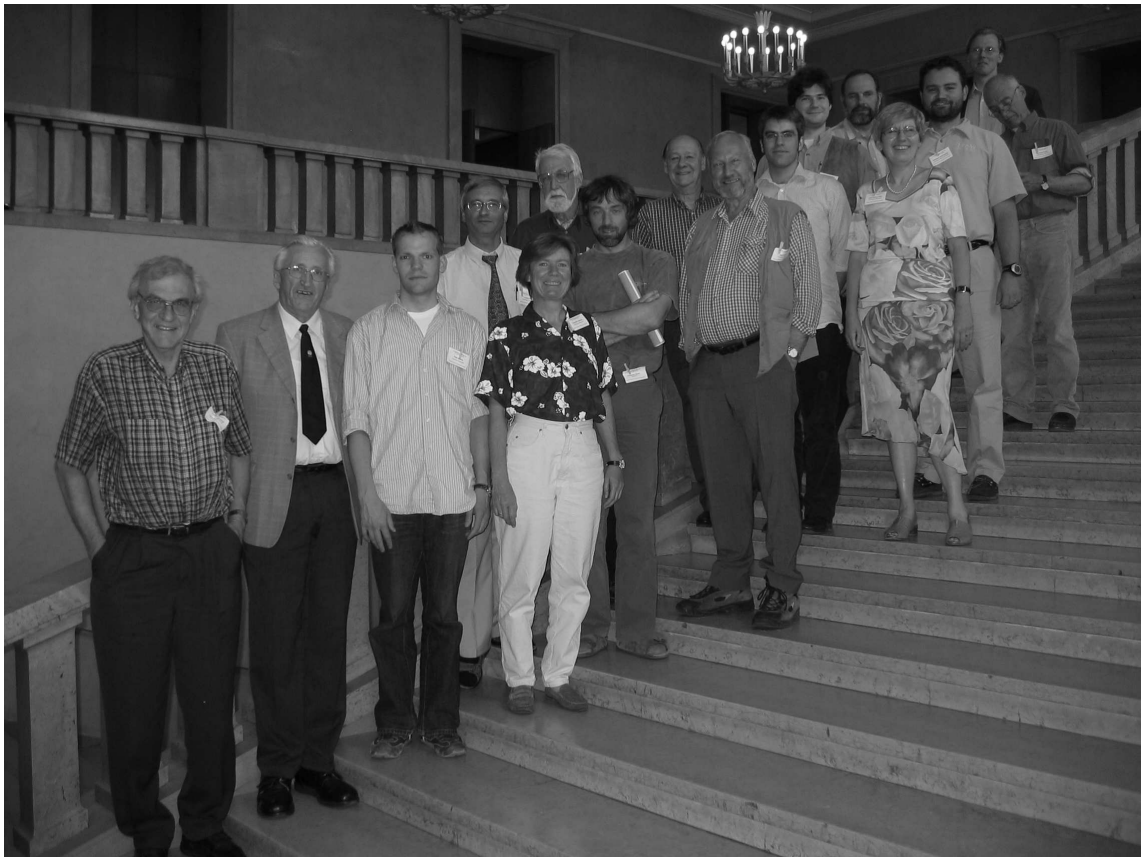
One of these commissions is the Commission for Glaciology, which was founded in 1962 on the initiative of several members of the Bavarian Academy to investigate the link between glacier behaviour and climatic conditions. Therefore the commission's research work has mainly been aimed at alpine glaciers, but also polar glaciology has been an important scientific subject. In this connection I take pride in all those results that have been achieved in the Antarctic glaciology by our former scientific leader of the commission, Dr. Oskar Reinwarth, who was a member of the German Antarctic Expedition „Ross-Ice-Shelf-Survey II (RISS II)" in 1965/1966 and who is involved in the Antarctic Research until today.

I believe that the current efforts in Antarctic research can profit very much from the historical roots that will be discussed here. Only when we understand the historical surroundings, we can appreciate the efforts of the scientists who prepared the way to the physical understanding of these remote places and the role they play in the current Global Change debate.

You have chosen Munich for this workshop. Munich is well known in Germany, in whole Europe and allover the world as the capital of breweries. Here you can find one of the most famous places in Germany, where water, that comes partly from the "alpine glaciers", is turned - together with malt and hops - into beer. I hope you will have time enough to prove this transformed melted snow and ice!

I wish you a fruitful workshop and time enough to taste Munich's hospitality and "Münchener Bier"!

Prof. Dr. Dr. h.c. Horst Hagedorn
Chairman of the Commission for Glaciology
Bavarian Academy of Sciences and Humanities



Participants of the 1st SCAR workshop on history of Antarctic research at the Bavarian Academy of Sciences and Humanities in Munich (3 June 2005). From left to right: John Behrendt, Horst Hagedorn, Peter Abbink, Ludwig Braun, Cornelia Lüdecke, Johan van Bennekom, Christoph Mayer, Jorge Berguño, Aant Elzinga, Adrian Howkins, Jason Davis, Erich Heucke, Heidi Escher-Vetter, Balthasar Indermuehle, Wolfgang Karg und Reinhard Krause.
(Source: Cornelia Lüdecke)

Introduction

The 50th anniversary of the International Geophysical Year is in 2007-2008. On this occasion an Action Group on the "History of the institutionalisation of Antarctic Research within SCAR" was established under the Delegate Committee on Standing Committees and Outreach of SCAR during the SCAR XXXIII Delegates Meeting at Bremerhaven in October 2004. It is the first international and interdisciplinary group devoted to the history of polar research.

The Aim of the Action Group

The aim of this working group is to obtain insight into the evolution of Antarctic research and the emergence and development of institutions to co-ordinate what was first called the Special Committee, and then Scientific Committee on Antarctic Research (SCAR). We plan to study to what degree research in the Antarctic has been driven by scientific criteria, and to what extent compromises were made in the light of political barriers, levels of technological development, logistical limitations, and physical hazards.

In historical perspective, a review will be made of essential background factors, both scientific and non-scientific, at work when nations were moved to participate in the International Geophysical Year (IGY, 1957-1958) at the time of the Cold War. Pertinent in this respect are the different roles played by non-governmental scientific organisations as distinct from intergovernmental organisations or modes of international organisation. Additional socio-cultural and political background factors will be considered with regard to major nations that chose not to contribute to the IGY.

Our Plans

We plan to discuss several aspects of the phase prior to the International Geophysical Year and the initial attempts to institutionalise polar research. Traditionally, field science practised in remote geographical regions was either a byproduct of exploration or an activity exploited by economical interests or territorial claimants. An important aspect of the early international polar year initiatives in the past has been the requirement that expeditions and projects be driven by scientific research instead of exploration. This principle was reiterated in Belgium by a number of internationally minded scientists (Henryk Arctowski, Otto Nordenskjöld, Jean Charcot, William Speirs Bruce, and others). This was when efforts were afoot to establish an international polar commission, a hybrid combination of inter-governmental and non-governmental scientific and other organizations. Although such a commission was actually founded, it had a very marginal influence on events and was soon eclipsed by the First World War.

Our questions to the history of Antarctic Research

Engagement: What motivated an individual person or a given country to engage in Antarctic research? Did the motivation differ during different historical time periods? Is it possible to identify different types of role-figures?

Realisation: How were Antarctic research agendas set up and implemented? What kind of arguments were used to promote Antarctic research?

What sort of funding was available, and did different modes of fund-ingaffect the character of an expedition and the way it was con-ducted?

Co-operation: When did co-operation for research pertaining to Antarctica occur, and what was the general orientation and scope? What were some of the obstacles associated with multi-lateral or international co-operation?

Leading figures: In the context of different national settings and perspectives, who were the persons that came to be recognised as leading figures in Antarctic research, and for what reasons? To what extent did some scientists emerge as diplomats within science, or beyond it in the international political arena?

How were they regarded by their scientific colleagues, by politicians, media, etc.?

The answers may be found in our workshop.

Cornelia Lüdecke and Aant Elzinga

1 The Dawn of Antarctic Consciousness

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1.1 Introduction

The roots of the gigantic effort in international cooperation concerning the Southern Continent can be associated to the late eighteenth century expeditions of La Pérouse, Malaspina, James Cook and, at the start of the nineteenth century, Bellingshausen and Foster. Authorities in the ports of call were respectful and keen to cooperate with the scientific goals of these maritime expeditions. One must remember that the *Terra Australis* was also a scientific endeavour, even before its official discovery in 1819, and States exercised restraint with regard to any eventual claims to these unexplored territories. The eighteenth century Anglo-Spanish treaties consolidated a *statu quo* in the northern and southern extremities of the Western Hemisphere (San Lorenzo or Nootka Sound Treaty in 1790) whose effects extended to the polar areas.

The intellectual construction of Antarctica is nevertheless an accomplishment of the nineteenth century. This paper explores the motivations of the main actors, governments and their agencies, learned and scientific societies, explorers and scientists, international congresses, in the creation of an atmosphere conducive to a type of international cooperation which does not exclude rivalries or competitions as substitutes for international conflict. The world that prepared itself to receive the 1874 Transit of Venus, and the subsequent Transit in 1882, which would overlap with the First Polar Year (1882-1883) had witnessed an extraordinary expansion, comparable in some sense with the great changes of the Age of Renaissance.

One can distinguish two stages in this process: the commonly designated “magnetic crusade”, whose remote origins can be found in Halley’s observations of magnetic variations in the *Paramour*, Hansteen´s treatise on the “Magnetism of the Earth”, Baron von Humboldt´s suggestion that the origin of magnetic perturbations was cosmic, and Gauss´s extraordinary prediction that a South Magnetic Pole would be found near latitude 66° S and long itude 146° E. The second stage is marked by the trend towards international scientific cooperation and technological developments in the fields of communications, transportation and agreements on international standards and aspirations in the field of global cartography.

Without prejudice to the necessary linkages between the two periods, the focus is on events within the span of time starting in 1874 and finishing in 1916 (Shackleton’s *Endurance* Expedition being considered as the end of the “Heroic Age of Exploration”). The parameters mentioned at the First Workshop on History of Antarctic Research are applied to individuals, learned and scientific societies and congresses; the funding, organization, composition and aims of expeditions, including logistic and other support provided at departure ports in the Southern Hemisphere. It is argued that the support afforded by countries in

the south flowed not only from hopes for economic return but equally from the promise of prestige and symbolic reward associated with science and exploration, thence contributing to a growing "Antarctic consciousness", spiritually as well as in visible terms, not least in Argentina and Chile.

1.2 Preliminary Remarks on the History of Antarctic Science

George Sarton, a recognized specialist in the history of sciences considered, at an early stage of his own thought, that Auguste Comte should be considered the founder of this discipline, since he was endowed with a clear and concise view of its objectives. Sarton would seem to privilege the French tradition of Comte, Tannery, Duhem, Boutroux. However, at the end of his treatise, Sarton departs from the positivist tradition and advances the blueprint of a "new scientific humanism" admitting that the fundamental question of human values, including scientific values, remains beyond the scope of science, but we must not "subordinate humanities to technicalities"[1]. Philosophers have a more radical answer to these questions by reminding us that "Scientific knowledge of things is not a knowledge of their being"[2]; or calling for the "marriage of exact research with a wide and profound philosophical scanning of the horizon"[3]; or the comment on Einstein´s system by a Spanish philospher: "a scientific doctrine is not born, however obvious the facts upon which it is based may appear, without a well defined spiritual orientation"[4] .

We would like to draw away from this dispute and take a different approach, retaining Alexander von Humboldt´s assertion that every great intellectual change is preceded by a long-term preparation[5]. The development of a particular discipline must be referred to a global epistemological situation. If this is the case, the pace of Antarctic exploration does not dictate or rule on the advance of Antarctic science. On the contrary, particular developments in the history of science enhance the importance of Antarctic scientific research, as is the case of plate tectonics which, once recognized as the dominant theoretical interpretation of the earth´s geology, makes Antarctica its focus and provides a central role for Antarctic research in the earth sciences[6].

The author of a history of Antarctic science[7] believes that the domain of Antarctic research is certainly not independent, or even diverse, from the common scientific tree of knowledge. He does find in both the origin and the aims of Antarctic science a holistic approach, which reminds us quite obviously of Humboldt and Ritter, but also of some of the prominent figures in the period of early Antarctic science, as Neumayer, Drygalski, and particularly of his teacher, Ferdinand von Richthofen, who sought to revive the concept of the unity of earth´ s surface and to bring the analytical approach into a closer relationship

[1] Sarton 1948: 28.
[2] Jaspers 1960: 12.
[3] Szilasi 1951: 166.
[4] Ortega 1995: 202.
[5] Humboldt 1837.
[6] Pyne 1986: 268-278.
[7] Fogg 1992: 396-397.

with chorological studies which Ritter had undertaken without a tangible research method. Fogg is not particularly stimulated by these geographic issues, but visualizes the trend towards global change and ecosystemic change as representative of this holistic approach which is not unique to Antarctica but is particularly relevant to ecosystemic changes and evolutionary biology [8].

In the case of Antarctic science, its history, in practical terms, is not only characterized by a chain of outstanding personalities and their respective discoveries, but more specifically by the communication, in a vital form, of a previous experience, knowledge or thought. This is particularly true for the explorer, but it is also of enormous significance for the scientist. In addition, the history of ideas can better explain the two concepts advanced in the abstract: the "intellectual construction" of Antarctica and the "Dawn of Antarctic Consciousness". The first one implies that Antarctica is a special place for Antarctic research. The second one reflects a broader approach in which Antarctica is appreciated as a theme in literature and human thinking more generally, signifying a widening in the scope and greater complexity of awareness on the part of humankind and her action in the world as a whole.

We now know many of the assets of the first concept, thanks to the efforts of several generations of Antarctic explorers and scientists, as both exploration and scientific inquiry contribute to the intellectual construction of Antarctica. These contributory elements flow from Resolution 3, approved by the Sixth International Geographic Congress, Antarctica is both "the greatest piece of exploration still to be undertaken" and a site from where can be drawn "additions to knowledge in almost every branch of science". Robert K. Headland considers this formulation as the theoretical beginning of the "Continental Penetration" stage of Antarctic History[9]. However, at the start of the "Heroic Age of Exploration" different approaches towards the scientific exploration of the Antarctic Continent arose and the fact that continental penetration prevailed over maritime coastal exploration, and the race towards the South Pole became a symbol of individual and national prestige was not predetermined by the above mentioned theoretical framework.

Georg von Neumayer (1826-1909) had advocated an international Antarctic expedition at the First International Geographic Congress (Antwerp, 1871) in connection with the forthcoming Transit of Venus in 1874, and is currently remembered for encapsulating his demand in a famous sentence: "*Auf zum Südpol*!"; John Murray (1841-1914), President of the Royal Scottish Geographical Society, had conceived a British Antarctic Expedition in 1886 and pleaded in 1894 for a maritime reconnaissance of Antarctica. They are certainly not the precursors of "Continental Penetration", although Neumayer´s proposals for an indispensable "gravitation survey" and other geophysical research in Antarctica enhanced the importance of latitudinal observations in high polar latitudes; and Murray´s vision of Antarctic research influencing "the whole complex of natural philosophy and natural science" had the same effect. On February 24th 1898, John Murray read a paper at the Royal Society in London on the advantages of an Antarctic expedition and various specialists, including Neumayer

[8] Fogg 1992: 397.
[9] Headland 2004: 18.

who had been specially invited to this event, responded from the perspective of their own research. With a single exception, scientists participating in the Royal Society Antarctic symposium (1898) did not consider Antarctic continental penetration a worthy scientific endeavour.

But it is suprising that several of them considered the area below 60° S as the specific field for Antarctic research and concluded that a selected group of scientists, installed at a modest base on Cape Adare could perform appropriate scientific work. Shortly after this symposium was held, Carsten Egeberg Borchgrevink and the *Southern Cross* Expedition (1898-1900) landed on Cape Adare on 2 April 1899 and carried out geological, meteorological and terrestrial magnetic observations. A man who did not appreciate the intrusion of a Norwegian, resident in Australia supported by private patronage, saw his descent at Cape Adare in an altogether different light. Sir Clements Robert Markham (1830-1916), President of the Royal Geographical Society probably noted that Borchgrevink had also sledged from Cape Adare into the unknown Antarctic lands and his very brief comments on the merits of geographic exploration of Antarctica seemed to anticipate his struggle to wrestle from the Royal Society the leadership of the future Antarctic expedition.

Going one step further to the assumption that there is an intellectual construction of Antarctica, the issue of "Engagement" or "Commitment" presupposes the existence of "Consciousness". Such conciousness is a part of the "spirit of the times". When Goethe mocks the concept by defining the "*Geist der Zeiten*" as the historians' "own spirit in which the times are reflected"[10], he is at once right and wrong. In a seminal essay on the major needs of intellectual history, one writer has pointed to "detailed studies of the relationship of thought in relatively brief periods of time"[11]. Such studies may contribute to detect when cross over from one domain to another takes place, what "beliefs"[12] most of the intellectuals, including the scientists, agree on at a specific time and circumstances, and, on the other hand, what are the most significant variations within a common intellectual framework. Our particular study is focused on the ways and means that an Antarctic awareness, conciousness and engagement develops.

1.3 The Diverse Impact of some Key Disciplines on Antarctic Consciousness

Disciplines early on central to the Antarctic endeavor were astronomy, meteorology and oceanography. Of these, astronomy had an intellectual cross-over function, while the impact of the other two to a greater extent hinged on the personal initiative and networks of enterprising individuals. Let us consider the disciplines in the reverse order, beginning with the influence of John Murray and Mathew Maury respectively. In all three cases we shall be concerned with the emergence of a notion of parallel comparative observations across large portions of the globe guided by agreed-upon standards of measurement. Our claim

[10] Goethe, Faust, Part I, "Night".
[11] Baumer 1949: 193-194.
[12] Ortega 2001: 23-34.

is that such principles of standardization had a bearing on the development of an “Antarctic consciousness” in the sense referred to in the previous section.

The Voyage of the *Challenger* has been highlighted as a turning point both in the field of oceanography and in the initial steps of Antarctic exploration. We can probably discard now the generally accepted view that the ship in question was the first to cross the Antarctic Circle. But it did carry on research at sub-Antarctic islands and the wealth of samples, experiments, observations and knowledge about the data gathered by this scientific expedition was indeed remarkable. Nevertheless, the concern for marine research in the Antarctic seas was not immediately heightened by this expedition and other naval expeditions which followed its path. A quite different picture arises from John Murray´s campaign for exploration of the Antarctic Continent. Sir Clements Markham called him “outspoken”[13]. Murray happened to be on board of the *Challenger*, and the circumstances and achievements of the voyage had some effect on his own intellectual development, but his individual capacity to influence people and institutions, rather than any particular contribution from the marine sciences, is at the root of the new Antarctic consciousness. The role played by the Royal Scottish Geographical Society in Antarctic affairs and William Speirs Bruce´s Scottish National Antarctic Expedition to the Antarctic Peninsula (1902-04) are a significant reference point in this respect.

Quite a different question is the importance of weather phenomena and the need for sailing ships and other vessels to know as much as feasible about the ways to prevent or anticipate the adverse effects of severe weather. Mathew Fontaine Maury, Director of the U.S. Naval Observatory, made a proposal “On the establishment of a Universal System of Meteorological Observations by Sea and Land” in 1851. His impetus provided the favourable climate for the adoption by the First International Maritime Meteorological Congress held at Brussels in 1853 of a standardized regime of nautical meteorological observations. All the representatives to that Conference were naval officers with only two exceptions, a British military engineer and a Belgian statistician[14]. In 1860 he lectured at the Royal Geographical Society on the geographic nature of the seas surrounding Antarctica. In April 1861 he delivered in Washington a proposal to the diplomatic representatives of Austria, France, Great Britain, Italy, Netherlands, Portugal, Russia and Spain on the scientific objectives which could best be served by Antarctic exploration. No reply was received from any of the maritime powers concerned by the proposal[15].

Let us now move to a very different field, requiring a more comprehensive review: the overlapping of astronomic research and the start of international polar cooperation. Edmond Halley (1656-1742) had observed the transit of Mercury from the island of St Helena in 1677. He had been the Secretary of the Royal Society and then turned to calculating comet orbits and designing the “Halleyan” method for the observation of the Venus Transit. It may be useful to recall that his main contender in this field, Joseph-Nicholas Delisle (1688-1768) came from a family of geographers and cartographers intensely associated with the

[13] Markham 1986: 7.
[14] Speeckaert 1980: 141.
[15] Bertrand 1972: 204-205.

question of a Southern Continent. Halley´s broad interests impressed the British Admiralty that took the decision to place the sloop *Paramour* at his disposal for the first sea voyage ever undertaken by a naval vessel for strictly scientific reasons. The scientific work included navigation, atmospheric circulation, and the Earth´s magnetic field. In that domain, Halley can be considered as the founder of geophysics and his chart of magnetic variations in the Atlantic represented a major contribution to future research in the Southern Ocean[16].

Halley had come close to facing a mutiny in Barbados and when a new Transit was envisaged in 1769, the Admiralty again agreed to furnish a ship to the Royal Society but refused to entrust the command of such expedition to the hydrographer Alexander Dalrymple, even though he was the recognized grand scholar on issues concerning the *Terra Australis*, which was the complementary objective of the naval expedition being planned. The outcome was the designation of Captain James Cook by both the Navy and the Transit Committee. He was accompanied by the astronomer Charles Green, the naturalist Joseph Banks and the Swedish botanist Solander. After observations in Tierra del Fuego, Cook crossed the Pacific to Tahiti where Green carried on his observations at Pointe Venus, and the exploration of the Southern Ocean initiated a cycle which included the circumnavigation of New Zealand, landing on Botany Bay and the observation of the transit of Mercury. As is well known, the next expedition was the great Antarctic voyage, promoted by the Board of Longitude, the Royal Society and the British Admiralty, where a complete scientific programme was implemented[17].

When we reflect on these maritime voyages (Halley´s and Cooks's) and their place in Antarctic exploration, the relevance of astronomic observations carried on a routine basis by naval officers and civilians on board of vessels to Antarctic research is provided only by their geographic location providing a casual bridge which sometimes may be crossed over. The issue of place and time is nevertheless not superfluous. Neumayer´s proposal for a polar expedition put to the First International Geographic Congress (Antwerp 1871)[18] is connected with a survey for finding a good site for the observations of the Transits of Venus in 1874 and 1882[19]. In his Antwerp paper and a subsequent essay he refers to the well known British Astronomer Royal Sir George Bidell Airy (1801-92). However, the first proposal for a web of Antarctic or sub-Antarctic stations was made in connection with the forthcoming 1874 Transit by a Fellow of the Royal Astronomical Society, who was also an influential scientific journalist, Richard Antony Proctor (1837-1888). Unfortunately, his proposals were rejected precisely by Airy and by the British Admiralty, among other reasons because some of the locations included non-existent sub-Antarctic islands[20]. Although none of them could anticipate how these ideas would coalesce, and irrespective of their very different roles and backgrounds, both Neumayer and Proctor could be considered as pioneers in a process which leads, through the overlapping of the 1882

[16] Fogg 1992: 8-17.
[17] Rubin 1982: 33-47.
[18] Dautert 1957: 43-44.
[19] Krause 1998: 58-59.
[20] Sheehan and Westfall 2004: 232-234.

Transit with the 1882-83 Polar Year, to consider the establishment of stations and observation posts close to Antarctica.

A pattern develops (Halley, Cook, Maury, Murray, Neumayer, Proctor), underlining the importance of physical connections across the Southern Ocean; but do ideas readily cross over from one intellectual cluster to another? In fact, parallel observations on various scientific fields are being performed but the unifying factor of location lacks a defined conceptual expression unless these observations develop into comparative measurements which gradually integrate into the framework which seeks comparisons between physical phenomena in the sub-Polar and Polar Regions[21]. There is one outstanding example of cross-fertilization: the elaboration made by Karl Weyprecht of Maury´s ideas of synchronous meteorological and magnetic observations by submitting the idea of a network of stations for synoptic observations in the north polar areas to various scientific societies. However, before its formal adoption by the International Meteorogical Congress (Rome, 1879) the influence of Dr. Heinrich Dove, Director of the Prussian Meteorological Service had to be exerted at various instances. Baker has traced the idea from Halley and Maury to Weyprecht, recalling that K.F. Gauss and W. Weber through the auspices of the Göttingen Magnetic Union had united 44 stations in observations of the Earth´s magnetism[22]. We would like to present three other cases where the concept of comparative observations had an indirect or direct effect on the course of scientific research related to Antarctica and the rise of an Antarctic consciousness in Chile.

1.4 Three Types of Comparative Observations

The three examples of comparative observations taken up in this section were all predicated on an interest in comparisons of natural phenomena in northern and southern hemispheres. In each case an initiative taken in Europe prompted greater awareness in Chile of the scientific significance of territories ultimately extending to the polar south. Such awareness did not remain only in the minds of select circles of people but it also to greater or lesser degrees translated into institutional responses to the requests coming from abroad, thereby drawing Chile more firmly into international networks and regimes for monitoring and standardization. The first example concerns astronomy, the second geography and geology, and the third concerns far-reaching standardization of efforts in meteorology and earth magnetism.

The results of the eighteenth century efforts to time and measure the Venus Transits of 1761 and 1789 lacked precision. An important attempt to rectify this shortcoming was made as early as 1824 by the German astronomer Franz Encke, a disciple of Carl Friedrich Gauss. Another disciple of Gauss, the mathematician Christian L. Gerling of Marburg wrote in April 1841 a letter to Lieutenant J.M. Gillis from the U.S. Naval Observatory, in which he maintained that new and more accurate measurements of the solar parallax or a confirmation of the existing figures established by Encke could be obtained by a series of observations of Venus carried out during approximately the same period in both

[21] Nordenskjöld 1913: IV, 179-184.
[22] Baker 1982: 276.

the Northern and the Southern Hemispheres[23]. When Gillis selected Washington D.C. and a spot near Santiago, Chile, for his simultaneous and opposite observations, the project for a Chilean National Astronomical Observatory was born with the strong support of Andrés Bello, Rector of the University of Chile and Adviser to the Chilean Ministry of Foreign Affairs.

A pupil of Christian Gerling at Marburg, Carlos Moesta, became the first Director of the Observatory and Chile participated actively in the International Observatory Transit of Venus Conference (Paris, October 5-13, 1881) becoming also a privileged venue for both the Transit and the Polar Year Missions of 1882-1883[24]. Mention also must be made of the Oceanographic Service, the Natural History Museum and the birth of the "Société Scientifique du Chili" whose first Chairman and Director of the Astronomical Observatory, French-born Jean-Marie Obrecht, became an influential member of the first Chilean Antarctic Commission set up in 1906 to prepare an expedition which failed to materialize due to the disastrous earthquake that took place that same year. Such sequence of events is not casual but the initial step ("comparative astronomical observations in both hemispheres") does not explain by itself the end product which is mostly the institutional build-up and the gradual emergence of an intellectual elite committed to scientific exploration of the polar lands adjacent to Chilean continental territory.

"The interest that has manifested itself of late in exploration in Antarctic regions was the impulse that gave rise to the Swedish expedition to the Magellan territories in 1885. At a time when the eyes of the whole geographical world were turned towards that portion of the earth, it seemed only fitting that Sweden´s sons and explorers, who have had so important and extensive a share in opening up the north polar territories, should be prepared to participate in similar labours in the south, for we may confidently expect results obtained there to elucidate many of those already established for the north, placing them in their right light and showing their true value and application"[25]. Dr. Otto Nordenskjöld initiates his preliminary report of the origin, plan, and general progress of the Swedish expedition by these introductory words. Nordenskjöld´s attention was directed towards the geology and historical evolution of this sub-Antarctic territory, and to its fauna and flora, with special reference to forms identical with or analogous to those of the northern hemisphere, and to its interesting and almost extinct aboriginal population. "We desired further to arrive at a characterization of Tierra del Fuego as a geographical unit distinguished from and compared with its neighbours, the Antarctic polar lands lying to the south and Patagonia and the South American continent north of it".

The Chilean Government was seized with a request from the Swedish Government, on behalf of Nordenskjöld, for support to an expedition intended to "explain some of the scientific questions, the solution of which is only possible by comparative studies both in the northern and the southern polar regions". The request was for "the same facilities and advantages as at a previous occasion have been allowed a German expedition undertaken in this country some years

[23] Ponko 1979: 94-95.
[24] González Polanco 2002: 6-8.
[25] Nordenskjöld 1901: 8-9.

ago under the guidance of Dr. W. Michelsen from the Natural History Museum in Hamburg free passage on Government transport ships, permission to execute drags from the ships, provisions, the necessary porters, and special support for the inner part of the Fireland /.../ luggage duty free across the frontiers between Chile and Argentina /.../ and protection from the respective Governments"[26]**.** As Nordenskjöld mentions in his preliminary report, his uncle Baron A.E. Nordenskiold had suggested to him that the Fireland Expedition could be an adequate preparation for a subsequent polar exploration and, previous to his voyage he had visited the specialists: Professor Steinmann at Freiburg, M. Rousson of Paris and Dr. Michelsen in Hamburg whose expedition had set the standards in international cooperation which Nordenskjöld would demand and obtain from the Government of Chile. The importance of the expedition to the Fireland was, in addition to the objective of comparative observations, its spillover into the Antarctic, manifested in the failed attempt to organize an Antarctic expedition from Punta Arenas in 1897, in the precedent it established for future international scientific cooperation, and the influence it had in shaping the aims and objectives of Nordenskjöld's 1901 Antarctic Expedition.

The last example of comparative observations to be examined here has been analyzed and documented thoroughly[27]**.** It covers the coordination of meteorological and magnetic measurements using the same kind of instrumentation at various locations as well as establishing an agreed regime for simultaneity in the periodic intervals of time when observations would be carried out. The leadership of Drygalski and previously of Richthofen, under whose presidency the Berlin Geographic Congress approved a format for meteorological and magnetic observations, and of both Richthofen and Markham, prompting Argentina to upgrade its Observatory at Año Nuevo Island, was strongly deployed during the so-called "Grand Antarctic Expedition". The same type of cooperation led to the enhancement, upgrading or establishment of new stations in the north and south hemispheres, and prepared the way for the creation of new magnetic stations during the Second Polar Year (1932-1933) in Punta Arenas, Cape Town and Elisabethville, and enhancement of Christchurch[28]. At the time of the *Gauss* expedition, the Government of Chile was approached by the German Imperial Government, with a sample of the joint programme of magnetic and meteorological observations agreed by the Anglo-German Committee, and requested to provide such observations in the indicated format. Some assumption was made by the German diplomatic representative and the Chilean Foreign Minister in 1901 that the *Gauss* could visit Punta Arenas sometime in the spring of 1903 or 1904[29]**.** This is an intriguing issue since the *Gauss* expedition was shortened at the end but the fact remains that the records of all meteorological observations made at the Salesian Colegio de San José at Punta Arenas were provided to the German authorities, as well as all the observations collected by the Navy's Meteorological Office existent under its Maritime Territory Division. In the medium-term, the request of the German Imperial Government had two consequences in Chile: the Navy´s Meteoro-

[26] Lewenhaupt 1895: 1-2.
[27] Lüdecke 2003: 35-48, 2004: 247-261.
[28] Helms 1971: 233.
[29] Yañez 1901: 1.

logical Office was reorganized and obtained new instruments and, previous to the Second Polar Year, the Salesian Observatory at Punta Arenas was supplemented with the means to carry out magnetic observations.

1.5 Implementation of Antarctic Expeditions

The national frameworks in which Antarctic research was able to move from the planning stage to actual realization depended on a large number of factors, chief among which counted economic and political support. An examination of several expeditions that failed to make it is especially interesting at this point for the light it can throw on the various kinds of adversities that had to be faced and insurmountable hinders that might block the way. It becomes evident that national as well as private entrepreneurial patronage was important, but these did not come without the prospects of a return in terms of real or symbolic capital gains. The symbolic-instrumental value of lending a hand to expeditions coming from Europe should not be underestimated in order to appropriately understand the function of generating recognition of the importance of science in Argentina and Chile, as well as "Antarctic consciousness" more generally in those two countries, as well as other countries of the Southern Hemisphere.

During the 1901-1916 period thirteen national expeditions were sent to Antarctica. Most of them had some assistance from their national governments, although contributions from scientific societies and wealthy donors were important. Many other expeditions were crippled by lack of funds, antagonisms or indifference from their own midst or external intervention. Funding not only determined the expedition´s viability and success but also influenced its scientific productivity. Dr. Lewander has raised the issue of whaling in connection with Nordenskjöld´s first expedition, as well as his efforts to a successful comeback as the Palander-Nordenskjöld expedition in the period 1912-1919[30] and a specialized historian of whaling[31] has explored some useful perspectives on the role of the Antarctic whaling industry. It may be convenient to add that at the time of the 1901 Expedition, the Swedish Government transmitted Nordenskjöld´s interest in cooperating with Argentina, Chile and the Falkland Islands authorities, considering "that investigation on such prominent places may be accompanied by many practical results, for instance that of facilitating the fishery of whales and seals "[32].

Consider now some specific cases of expeditions that did not take place, and start with one where too many actors with mutually conflicting goals and intentions were involved. At the start of his personal narrative of the origins of the British National Antarctic Expedition, 1901-04, Sir Clements Markham mentions "The first abortive campaign (1885-89)". This initiative was not his "campaign" since the merit belongs to the Melbourne Antarctic Committee, chaired by Baron Mueller and the announcement of the Government of Victoria that it would contribute five thousand sterling pounds for an Australian Antarctic Expedition, to be headed by Baron A.E. Nordenskiöld, provided the British Govern-

[30] Lewander 2002: 97-114.
[31] Basberg 2004: 25-38.
[32] Nordenskjöld 1901: 75-76.

ment would make an equal contribution. The British Treasury refused to grant any money and the generous offer by the Swedish philantropist Baron Dickson to donate a similar sum was insufficient to warrant the success of any expedition. At this particular time, a young German scientist who had heard in the Spring of 1897 the South polar plans of Baron Nordenskiöld felt : "..I would like to join him as well.."[33] Sir Clements Markham's comment was that the Government of Victoria had acted in bad faith. The final comment he makes, which is that Sir Allen Young would have commanded the expedition if it had got beyond the "talking stage" points to the nature of the problem. It was too early to conceive an Australian Expedition led by a Scandinavian explorer, pursuant to a local initiative led by a German scientist (Mueller but perhaps also Neumayer, who became vice-chairman of the Melbourne Antarctic Committee, and was already in the wings).

Our second case points to difficulties deriving from a mismatch between national ambitions and individual personal ones. The Argentine-Italian Expedition of 1881-82, initially led by Giacomo Bove and subsequently by Luis Piedrabuena, intended to visit the Antarctic Peninsula and proceed to the Ross Sea. The Italian Government provided no funds for this endeavour but Bove found some support among Argentinian public figures such as Estanislao Zeballos and the Argentinian Navy. The expedition ended in Tierra del Fuego, rented a cutter from the Punta Arenas entrepreneur José Nogueira, the *San José*, captain Pritchard, wrecked at Bahía Slogget while the personnel was saved by the *Allen Gardiner* from the Protestant Mission. Not a glorious end, but useful geodetic, geologic, botanic and zoological research was performed mainly for the Museum of La Plata, Bove is a tragic figure, he wanted to go to Antarctica at a time when Italian colonial ambitions aimed at Africa. When he was assigned to an African post he committed suicide.

The next two cases involve the negative impact of unforeseen events, e.g., the death of a possible patron and a natural catastrophe. The 1896 expedition planned by the Chilean Scientific Society, chaired by Federico Puga Borne, having as its leader Otto Nordenskjöld, with the logistic support of the Chilean naval ship *Magallanes*. Funds could not be raised in Chile or Sweden, Baron Dickson offered this time no money but support for the participation of two Swedish scientists. The main difficulty was the unsuitable vessel, the costs involved and the untimely death of Baron Dickson when discussions were still going on. Ten years latter the 1906 abortive Chilean National Antarctic Expedition also fell through, but still there was some impact. A National Committee was established, funds were requested and approved by the National Congress to the amount of 150.000 pesos, a vessel would be bought in England and the Commander of the Expedition would be General Jorge Boonen, a charismatic figure in the Army. The 1906 earthquake shifted the appropriation but the University of Chile was granted money to develop vulcanological and seismic studies. The first head of this Department, Count Montessus de Ballore, was a friend of Jean Charcot and scientists at the University of Chile cooperated with the analysis of observations made by Lieutenant Bongrain of the *Pourquoi-Pas?*

[33] Drygalski 1989: 3.

Some of the preliminary results were presented jointly at International Geographic Congresses[34].

Well-planned expeditions with a strong and serious scientific thrust may also run afoul of great power politics and national chauvinism. A case in point is the Palander-Nordenskjöld Expedition. The minutes of the Swedish Committeee, deposited at the Swedish Royal Academy of Sciences in Stockholm contain some correspondence which shows the fragile nature of the project which has been examined by Lisbeth Lewander[35]. It had obtained a thousand pounds from the Royal Geographical Society on the basis of joint biological research to be carried by two members of the staff of the British Museum of Natural Science. But the base would remain Swedish and be located at the Antarctic Peninsula or at Joinville Island. It was to be supplied by Norwegian and Chilean whalers from Deception Island[36]. However, a Swedish Whaling Company would act as an umbrella for the Norwegian and Chilean whalers. The project received successive blows: any application coming from a foreign whaling company was ruled out as unacceptable by the British authorities; biologic research at the Orkney Islands had already been planned by a formidable adversary, the marine biologist Johan Hjorst, also the main Norwegian negotiator with the British authorities. Finally, the Foreign Office acted decisively in favor of Shackleton´s enterprise, as was reported by the Royal Geographical Society whose preference lnitially lay with Nordenskjöld. While the official veto addressed a British national, John Foster Stackhouse, who was a prestigious Fellow of the Royal Geographical Society, it obviously inclined the balance against the Austrian Dr. Koenig, who had equipped Filchner´s vessel *Deutschland.* König and Stackhouse were rivals with Shackleton in the attempt to stage a transcontinental crossing of Antarctica, but endeavours at further exploration of the Weddell Sea planned by Nordenskjöld and probably by Bruce were also viewed as potential interferences with Shackleton´s grand design of a traverse that would link the Weddell and Ross Seas[37].

These examples are not chosen randomly. They are intended to unveil some of the difficulties that intended Antarctic expeditions faced. On the other hand, funding has not been scrutinized in a thorough manner, thus avoiding some unwelcome conclusions. While funds were denied by the British Treasury for an early Australian expedition, they were requested from Commonwealth countries to support Scott´s Antarctic Expedition and at least one Australian State (Queensland) subscribed one thousand pounds for the fund[38]. A question that must also be asked is: to what extent were Shackleton´s *Nimrod* expedition and the *Aurora*, which carried the Ross Sea Party, in fact funded by the Governments of New Zealand and Australia Funds provided by private donors could not hold sway when compared to the huge investment involved in revamping the *Aurora* for the Ross Sea Party´s rescue[39].

[34] González-Ferrán 1991: 38-39.
[35] Lewander 2002: 97-114.
[36] Letter from Captain Adolf A. Andresen to Dr. Nordenskjöld in the possession of Dr. Fred Goldberg of Stockholm.
[37] Berguño 1989: 15-17.
[38] Markham 1986: 8.
[39] McElrea and Harrowfield 2004: 220-261.

Amundsen's expedition may also be scrutinized regarding the return on real and symbolic capital invested. The expedition obtained a grant of 75.000 kroner from the Norwegian Department of Defense, but the project was really saved by Pedro Christophersen, a wealthy entrepreneur and one of the founders of the Sociedad Argentina de Pesca, who donated 150.000 kroner. There were some strings attached however. A condition was that the ship call at Buenos Aires or Montevideo, since Amundsen´s narrative of his conquest of the South Pole ought to be finished at don Pedro´s farm in Argentina.[40]

How can the support by countries and ports of call near the Antarctic be assessed? The Argentine Congress passed a law to provide all the necessary coal for Charcot´s 1903 expedition in *Le Francais*. The Chilean Sociedad Ballenera de Magallanesdid the same for the *Pourquoi-Pas?* both in Punta Arenas and Deception Island. The vessel was repaired of very serious damage at a nominal cost in Montevideo. How can the rescue of the Nordenskjöld expedition or the Shackleton expedition be assessed, or how can supplies granted freely, as well as free transport by vessel or train, and other facilities such as communications by telephone or wire be estimated? This same question could be raised for expeditions supported at Hobart, Lyttleton or Cape Town. But the answer is that the presence in the Southern Hemisphere of expeditions coming from the Northern Hemisphere towards Antarctica was worth much more than the expenses incurred, provided that some recognition was extended to their cooperative assistance to Antarctic exploration and science.

1.6 The Role of Institutions, Congresses and Societies

In this final section we shall trace the growing "Antarctic consciousness" by considering its manifestation particularly at the International Geographic Congresses held from 1871 to 1913, ten congresses in all before another mode of international organization with a more modern professional and scientifically oriented spirit began with the establishment of the International Geographical Union in 1922. The existence of continual tension between a focus on geographic exploration on the one hand and scientific research on the other will also be noted.

Among several useful tables Professor Budd has provided in his essay on the scientific imperative of Antarctic Research,[41] there are three (N° 4, 5, 6) which show respectively the growth in scientific associations since the formation of Academies of Science, comparisons of Observational Systems in England, France, Germany, Russia and the USA in the nineteenth century and the development of International Science Associations. Mention should also be made of Elisabeth Crawford´s studies of scientific elites during the period 1880-1914, as well as the conceptual and historiographic methods she uses to approach a social history of national and international scientific development, and the forces that shape the patterns of models for international scientific cooperation[42].

[40] Berg 2003: 99.
[41] Budd 2001: 46-50.
[42] Crawford 1992: chapters 1-3.

Budd´s tables and Crawford´s studies supplement an excellent overview of international cooperation between 1815 - 1914 by G.P. Speeckaert[43]. Budd appropriately distinguishes between the national Academies, specialist scientific societies such as the Linnean, Geological, Astronomical and the Royal Geographical Society which flourished in England between 1799 and 1830, and a broader type of scientific associations, whose emphasis is more practical, with a greater social impact, and quite often a commitment to specific scientific and technological undertakings: Gesellschaft Deutscher Naturforscher und Ärzte (1821), British Association for the Advancement of Science (1831) and the American Association for the Advancement of Science (1848).

In the history of Antarctic Research, the British Association for the Advancement of Science was responsible for the development of the scientific programme undertaken by the British Expedition of James Ross. It developed a document, duly approved by both the Royal Society and the British Admiralty, where the proposal for magnetic observations intended to take place in areas of the Southern Hemisphere ranging from New Holland (Australia) to Cape Horn was partially implemented by an Observatory in Hobart. The bridge between the period of the "magnetic crusade" and the new crusade advocated by the 1895 Geographic Congress is again made by the establishment some ten years before the last date (Aberdeen, 1885) of an Antarctic Committee, Sir Clements Markham becoming a member. But the personal and spiritual continuity of the idea of an Antarctic Expedition was incarnated in Captain Davis, who served with Fitzroy in the *Beagle* and was Second Master of the *Terror* under Ross, and who constantly lectured and lobbied for a new Antarctic Expedition". In time, Clements Markham would be able to transfer this project to the Royal Geographical Society, and finally defeat the Royal Society´s desire for a greater scientific input and finality in the 1901 British Expedition. The publication in 1986, under the enticing title *Antarctic Obsession*, of Markham´s personal narrative, whose original manuscript ("The Starting of the Antarctic Expedition, 1892-1903") is kept at the Scott Polar Research Institute, including the original Instructions of the Joint Committee as finally overthrown at Markham´s insistence, allows an appreciation of both the scientific views of the Royal Society and the exploration bias of the Royal Geographical Society[44].

While there is no question that, from the very early stages of Antarctic exploration, a certain antinomy exists between Scientists and Seamen[45] the cleavage and, at the same time, the necessary relation between science and exploration has not been sufficiently highlighted. A recent study of Captain Scott's expeditions[46] refers to the description by the novelist Joseph Conrad of the transit from a "Fabulous" Geography including in particular the *Terra Australis*, to the era of "Militant" Geography; and recalls Markham´s report to the Royal Geographicalal Society on the need to train travelers, limiting their activities to surveying and mapping, and his presentation to the British Association for the Advancement of Science on that same year: "Our first work as geographers is to measure all parts of the earth and sea, to ascertain the relative position of all places upon

[43] Speeckaert 1980: 1-192.
[44] Markham 1986: 152-172.
[45] Finney 1991: 89-101.
[46] Jones 2003: 16-47.

the surface of the globe, and to delineate the varied features of that surface". A useful complement to the quotation is Markham´s own article on the field of geography published several years after.[47]

The fact is that national geographic societies, but also local geographic societies as the Polar Society of the city of Bremen, play a decisive role in fostering international exploration. Publications such as the "*National Geographic Magazine*" (1889), "*Annales de Geographie*" (1891), "*The Geographical Journal*" (1893) and "*Geographische Zeitschrift*" cross the interest barrier of specialists into the realm of the general public. But societies, publications and congresses mobilize simultaneously the interests of exploration and science. While the lineage of scientific congresses can be traced to Alexander Humboldt who organized at Berlin in 1821 the first congress of German naturalists, explorers, researchers and philosophers, it is the sequence of geographic congresses, which indicates the relative balance between exploration and science. A table has been appended to facilitate the examination of the dominant themes in the first ten International Geographic Congresses (1871-1913).

That table reflects the balance of resolutions and decisions adopted at International Geographic Congresses and reveals that during the fifty years counted from 1871, the polar areas were not neglected and exploration was constantly promoted, but the geographic societies of Europe, within the pattern established by the Royal Geographical Society and Sir Clements Markham, were strongly dominated by explorers, surveyors and cartographers. Since the end of the First World War, a more scientific spirit prevailed, as the International Geographical Union has been run by professional geographers and organized as a strictly professional organization.[48]

While the World War declared in 1914 did not stop Sir Ernest Shackleton from undertaking his ambitious Trans-Antarctic Expedition, it did interfere with many other initiatives, and was certainly a blow to the internationalist approach advocated by the International Polar Commission (IPC). The IPC has been studied in some detail by Aant Elzinga[49]. Cornelia Lüdecke[50] has provided a picture of the German attitudes towards such organization. The German reluctance to the type of approach taken by the IPC was most certainly shared by Great Britain and the Royal Geographical Society. France also differed from the prevailing view of the IPC which tried to balance a variety of conflicting factors, such as national positions, explorers' interests, a reliance on private initiative, a lack of genuine representation (i.e. Borchgrevink and Sobral appeared as representatives of Norway and Argentina without consulting their respective governments).

Moreover, we share Elzinga´s appreciation for this first effort to institutionalize Antarctic exploration and research. In particular, the creation of an International Antarctic Institute, the bibliographical effort undertaken by Jean Denucé, the idea of an International Polar Museum, but above all the concept of a perma-

[47] Markham 1898: 2.
[48] Dickinson 1978: 267-283.
[49] Elzinga 2004: 262-290.
[50] Lüdecke 2001: 161-169.

nent international organization while all previous Polar Commissions had been entrusted only with the organization of the Polar Years. The IPC, for the first time, was a forum attended by representatives of the southern nations (Australia, Argentina, Chile and New Zealand) and remains a watermark in the process leading towards the present Antarctic Treaty System, including governments represented by diplomats, scientists grouped in SCAR, national Antarctic programmes with the Council of Managers of National Antarctic Programms (COMNAP), and the Antarctic Treaty Secretariat providing the continuity of the special legal and political regime applied to Antarctica.

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1.8 Appendix I: Figures of the Southern Consciousness

Three maps are shown to indicate some visual aspects of the trend towards Antarctic consciousness.

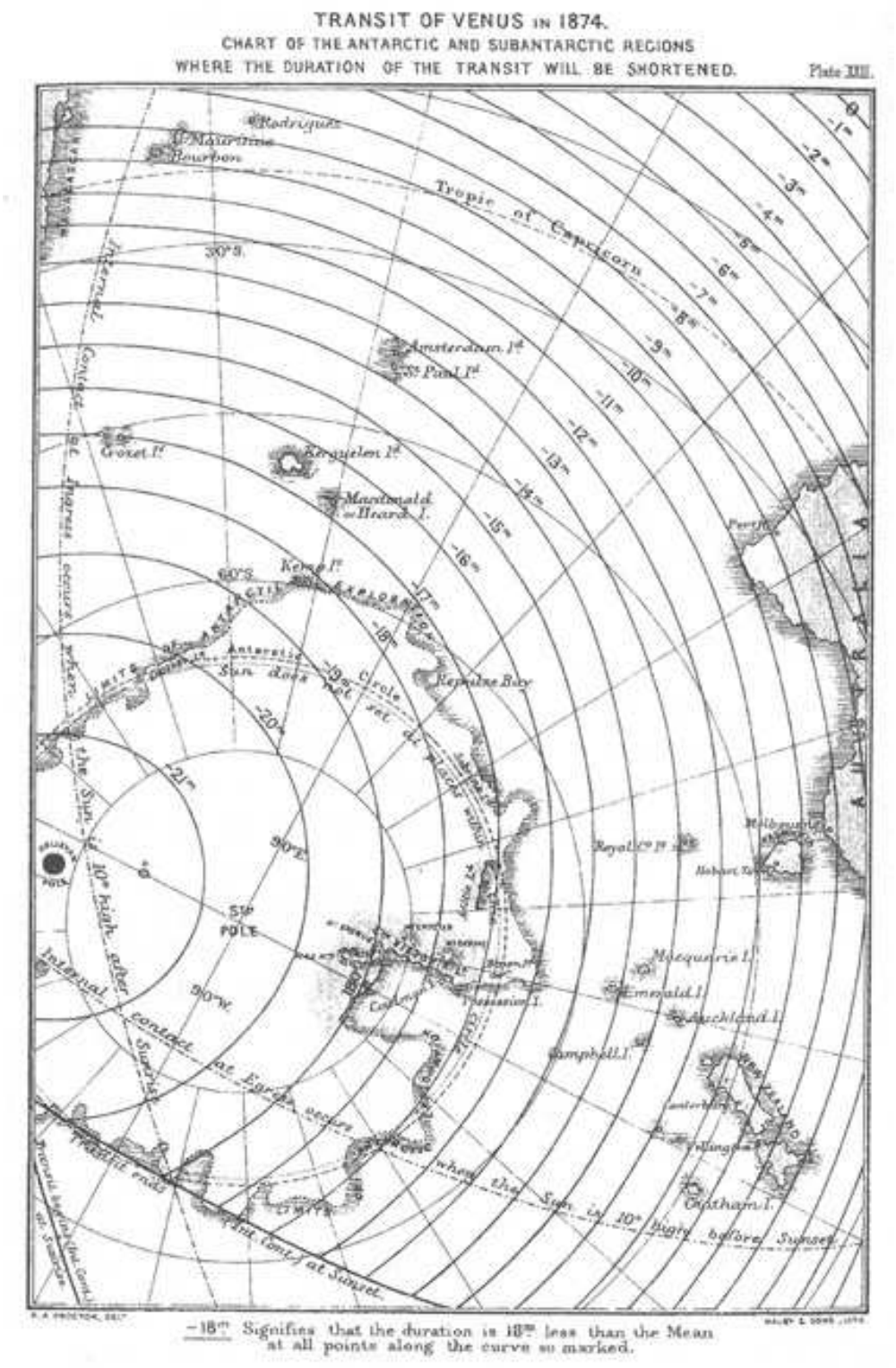

Figure 1-1: One of several plates that illustrate Richard Proctor's book *The Universe and the Coming Transits.* London Longmans, Green, 1874.

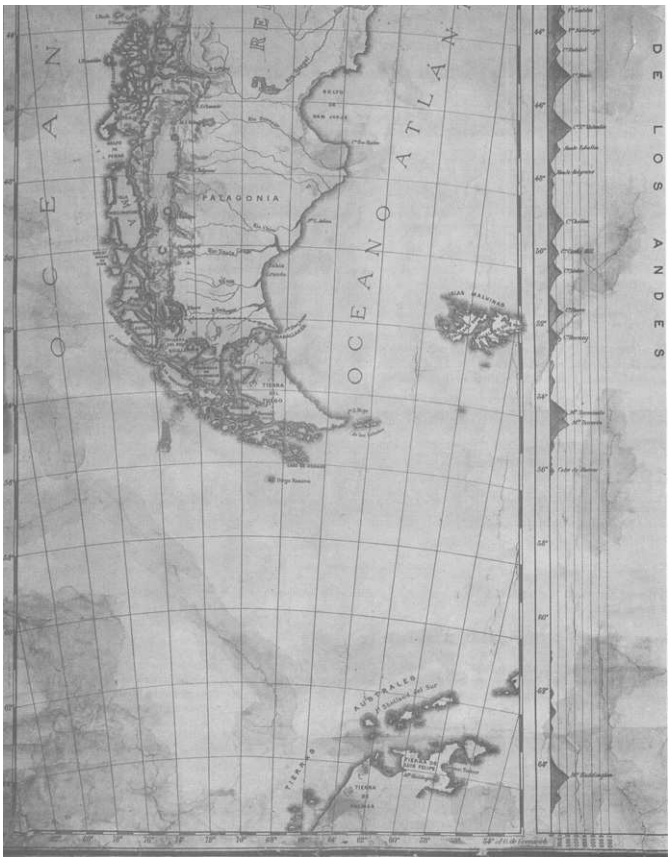

Figure 1-2: Official Chilean map designed in 1884 by Engineer Alejandro Bertrand, intended to be used in all schools of the Republic. Antarctic lands are incorporated and the profile of the Andes continues with Mount Haddington on Ross Island, Antarctica.

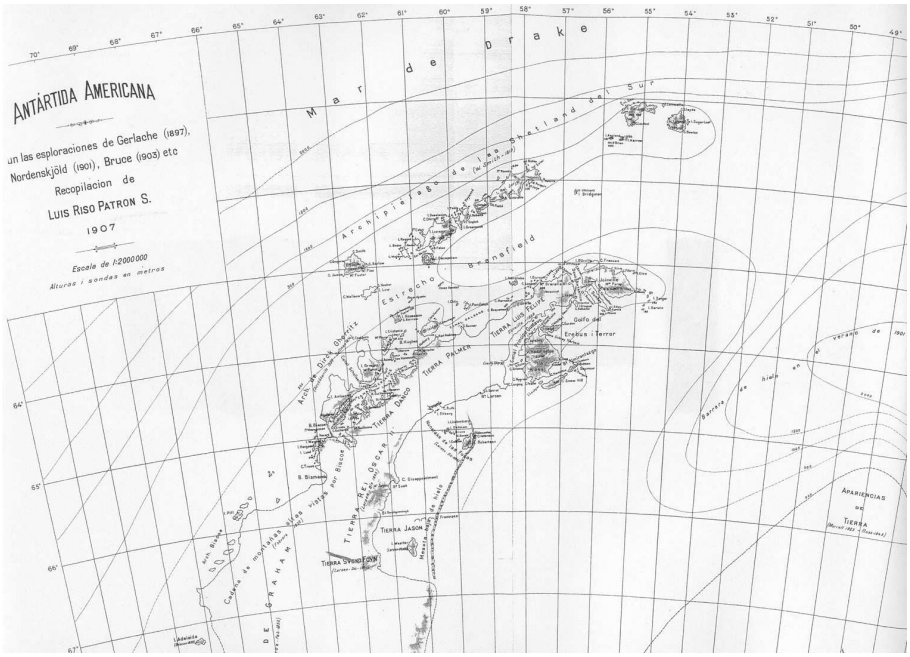

Figure 1-3: Map constructed in 1907 by Chilean geographer Risopatrón of part of the quadrant he named the American Antarctic in an essay published in 1908. This map was used by the Chilean and Argentinian Governments to discuss a delimitation treaty in Antarctica during inconclusive negotiations (1906-1908).

1.9 Appendix II: International Geographic Congresses (1871 – 1913)

Organization and focus, and polar issues during the first ten geographic congresses.

No.		**Year**	**Place**
1		**1871**	**Antwerp**
	Organization and focus	Initiated by Charles Ruelens and addressed to specialists of “la science de la terre” in order to honour Mercator and Ortelius whose statues were unveiled. Central issues concerned surveying, place names and map projections. One of the few professional geographers of the times, Elisée Reclus attended and actively participated in the meeting.	
	Polar Issues	The geographical section was dominated by Neumayer´s proposal for an Antarctic Station during the forthcoming Transit of Venus (1874).	
2		**1875**	**Paris**
	Organization and focus	Attended by Richthofen, Perthes, Petermann, Sir Henry Rawlision RGS, Lesseps, Béaumont, Vivien de St. Martin. A twofold definition of geography considered as an end in itself (géographie physique) and as the study of the relationship of the earth with its inhabitants (géographie politique, ethnographique, éconmique) was approved.	
	Polar Issues	Exploration was established as a distinct section.	
3		**1881**	**Venice**
	Organization and focus	Conducted its business in eight sections that formed the basic framework for future congresses.	
	Polar Issues	Exploration continued as a distinct section. Colonial issues were dominant but the polar regions were mentioned.	
4		**1889**	**Paris**
	Organization and focus	Chaired by Ferdinand de Lesseps, President of the Geographical Society of Paris. Structured in seven groups.	
	Polar Issues	Lesseps introduced the issue of Arctic and Antarctic expeditions in the group dealing with voyages of exploration but the matter was not debated.	

5		**1891**	**Berne**
	Organization and focus	Attended by Allbrecht Penck, Eduard Brückner, Joseph Partsch and Sir Thomas Holdich. Penck proposed a world map on a standard scale of1: 1,000,000.. First attempt by Kalten-brunner to establish an International Geographic Institute.	
	Polar Issues	Exploration was neglected as the decision supporting the world map stated “car il ne reste pour ainsi dire plus de grandes découvertes à faire”.	
6		**1895**	**London**
	Organisation and focus	Chaired by Sir Clements Markham RGS. Special attention given to the teaching of geography. Commissions appointed for the development of a bibliography of geographical works and the promotion of polar exploration.	
	Polar Issues	Resolution 3 advocated exploration of the Antarctic Regions, as “the greatest piece of geographical exploration still to be undertaken”and recommended to scientific societies to undertake this work “before the close of the century”.	
7		**1899**	**Berlin**
	Organization and focus	Chaired by Ferdinand von Richthofen. Stressed the importance of scientific work. H.R. Mill, J. Scott Keltie, Fried-rich Ratzel, P. Vidal de la Blache, Erich von Drygalski contributed to the debate. Otto Nordenskjöld and William S. Bruce also attended the Congress.	
	Polar Issues	Markham proposed a division of labor between the British and German expeditions to Antarctica. Drygalski agreed and proposed a scheme for international meteorological Antarctic cooperation. Chairman Richthofen requested Argentina to upgrade its sub-Antarctic observatory at Año Nuevo Island.	
8		**1907**	**USA**
	Organization and focus	The Congress itinerated between Washington D.C. and 4 other cities. Chaired by Robert F. Peary, the Arctic explorer. Penck´s world map was strongly supported by the American Geographical Society chaired by Isaiah Bowman.	

	Polar Issues	The recommendations of the International Polar Congress (Brussels, 1906) establishing an International Polar Commission (IPC) were endorsed.	
9		**1908**	**Geneva**
	Organization and focus	Chaired by the President of the Geographical Society of Geneva, Penck (Germany) and Gannet (USA) reported on progress achieved by the international world map project. The number of sections expanded to 14.	
	Polar Issues	Adopted Resolution 5 advocating the "systematic exploration of the polar areas" introduced by Arctowsky who presented a paper on Antarctic exploration; and Resolution 4 supporting the International Polar Commission, introduced by Lecointe.	
10		**1913**	**Rome**
	Organization and focus	Structured work on eight sessions incorporating methodology and teaching as separate sections. The Commission for the International Map decide to call a conference in Paris in December, 1913. Oceanographic work was promoted. A move to create an International Geographical Union was delayed by the outbreak of war.	
	Polar Issues	Umberto Cagni reported to the Congress on the work of the International Polar Commission (IPC)	

2 The National Geographic Magazine's portrayals of Antarctica

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Abstract

This paper explores how Antarctica has been portrayed by various authors from 1888 to 1997 in the *National Geographic Magazine* and how this might reflect trends in the dominance of various interest groups over that period of time. Previous scholarship in popular geopolitics has shown that the study of popular media can offer insights into the political process, which bolsters the efforts undertaken here. The analysis undertaken involves the creation of six themes derived from previous scholarship of Antarctic identities as well as observations of the quotes regarding Antarctica garnered from *National Geographic* articles from this period of time. These six themes are: Antarctica as a place of national interest, Antarctica as a place of science, Antarctica as an economic opportunity, Antarctica as an environmental "World Park", Antarctica as an aggressor to be conquered, and Antarctica as a source of awe. Using these six themes as a guide and overarching structure, this paper explores the metaphors presented within each theme and how they advance the goals of various interest groups or reflect changes to Antarctic politics over time. The growth of multiple interests from just an initial view is shown to have occurred, with the International Geophysical Year of 1957-58 as a focus point of changes to Antarctic identity.

2.1 Introduction

"The media is often presumed to exert a prominent role in shaping public opinion and hence foreign policy formulation. Interestingly, according to some U.S. Antarctic policymakers, the most influential media force pertaining to Antarctic policy in recent years has been *The National Geographic Magazine*[1]*.*

The political construction of Antarctica is informed by a number of different sources. Critical studies of geopolitics have suggested that there is both a formal geopolitics, composed of experts and government officials signing treaties and trying to control the process, and a popular geopolitics, composed of the construction of ideas for mass consumption and prevailing attitudes[2]. Studies of the United States of America's involvement in Antarctica have been largely centered on analysis of formal geopolitics, studying the actions of policy-makers[3]. Although the public perception of Antarctica is sometimes regarded as a non-factor[4], it is an important socio-cultural and political background element and has had an influence in Antarctic policy as a form of popular geopolitics. If I may extrapolate from the introductory quote, the most powerful influence on American perceptions of Antarctica over the last century has been the *National*

[1] Joyner and Theis 1997: 71.
[2] Ó Tuathail 1996; Dodds 2000.
[3] Hall 1989; Joyner and Theis 1997; Moore 1999; Moore 2001.
[4] Moore 1999.

Geographic Magazine. This paper will investigate the representations of Antarctica produced in the texts of the articles within *National Geographic Magazine* in order to understand how the different portrayals of the continent have surged and declined in popularity in accordance with the evolution of activities on the continent.

Popular geopolitics is comprised of media elements such film, television, political cartoons, newspaper, magazines, music, and even architecture which affect public perceptions of geopolitical issues. Outside of Antarctica, scholars have shown how popular geopolitics can influence events as well[5]. If produced in a purposeful manner to mislead the public, this is known as propaganda. Not all popular geopolitics is propaganda, but all of it adds the creation of a discourse that can shape the course of political debate. Particular magazines have been analyzed as institutional sites where geopolitical knowledge is constructed. *Reader's Digest* has been shown to have attempted to shape political perceptions of the United States public regarding the Cold War between the United States and Soviet Union by creating spaces within its text where the two could be counterpoised against each other using specific narratives[6]. Popular magazines have therefore been shown to have a hand in shaping political discourse.

The *National Geographic Magazine* is one of the most popular magazines to regularly incorporate Antarctica. Indeed, the editors even claim that "Few regions of the earth seem to hold greater fascination for Geographic readers than do the Poles, both North and South" (James 1990). The National Geographic Society, the parent organization of *National Geographic Magazine*, occupies a unique place in the American cultural and political milieu. It is a private organization which has had close ties to the United States government. It sits on the uneasy line between scientific research and popular entertainment. It has a worldwide readership of six million people[7]. Although the general goal of the Society is to promote scientific research, it does not always reflect the views of the modern scientist, but instead creates a narrative about the places it details for its own agenda.

National Geographic Magazine is the main medium through which the public of the United States receives information about places which may be considered exotic to their everyday experience. The Antarctic is considered an exotic local for most Americans, and is therefore mostly perceived through this magazine. The magazine's set of editorial policies encourage positive accounts of subjects covered and a writing style that is accessible to the public[8]. Through this process, the editors claim to articulate a progressive national vision[9]. The magazine has been shown to reflect hegemonic American ideals through its articles and with that has been critiqued for its orientalist editorial tendencies and other American cultural traits and perceptions. Specifically, *National Geographic Magazine* has been used to examine how the United States perceived "The

[5] Ó Tuathail 1996; Dodds 2000 Ó Tuathail 1996; Dodds 2000.
[6] Sharp 1996; Sharp 2000.
[7] National Geographic Website 2005.
[8] Haraway 1989.
[9] Lutz and Collins 1993.

New South"[10], the justification of U.S. territorial expansion into the Philippines[11], and the coding of gender in primatology studies[12]. All of these analyses lead me to believe that *National Geographic Magazine* is an excellent source to use in order to understand how the U.S. public geographically imagines Antarctica.

Popular perceptions of Antarctica have helped to define how its governance should operate and its acceptance of certain laws. Changes to the popular conception of the Antarctic continent have lead to large impacts in its laws and regulations. An example of this would be the demise of the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA): which was finalized in 1988 but brought down through the widespread promotion of a "World Park" conception of Antarctic identity, and subsequent adoption of a temporary mining ban in the Madrid Environmental Protocol of 1991 because of this promoted identity[13]. Some scientists feared that the adoption of a "World Park" identity would result in a decrease in scientific power on the continent and opposed it[14]. The importance of public perceptions of Antarctica has been recognized by the United States Antarctic Program (USAP). The USAP has gone to tremendous lengths to accommodate a mythology of Antarctic science, casting the continent as a "natural laboratory for the sciences". The USAP's overseer, the National Science Foundation (NSF) seeks to popularly promote a scientific perspective on Antarctica through promoting the Antarctic Artists and Writers Program, annual invitations for journalists to report on Antarctic scientific activity, and educational programs to take grade-school teachers to the region to work with scientists[15]. These directed efforts to control or influence U.S. public perceptions of Antarctica show the degree of influence that popular geopolitics has over the USAP.

2.2 Methods

The focus of my study was the archival record of the articles of the *National Geographic Magazine*. Although previous studies of the magazine have focused on the pictures, it has been pointed out that the narratives of the accompanying articles can be just as revealing[16]. I used the databases of the complete *National Geographic Magazine* (1888-1997) on CD-ROM. I input "Antarctica" into the program's search engine in order to select the relevant articles and 119 articles were listed. In this way, I allowed the Magazine's index to inform what could be considered an Antarctic article or not. Some articles were letters, one-page summaries, or notes from the editors but most were feature-length articles. All 119 articles that were offered were read, and from those 437 quotes were selected that referred to Antarctica in some way. My criteria for selecting the quotes were that they had to refer to Antarctica, qualities of Antarctica, activities undertaken in Antarctica, or motivations for

[10] Jansson 2003.
[11] Tuason 1999.
[12] Haraway 1989.
[13] Clark 1994.
[14] Pennisi 1991.
[15] Horgan 1996.
[16] Jansson 2003.

going to the Antarctic within the context of the quote. These quotes could then be divided up and classified according to pre-existing criteria mixed with my own observations.

There are a number of ways to classify the way that people talk about the Antarctic. Elena Glasberg is currently working on an Antarctic Artists and Writer's project entitled "Final Arrivals, Endless Ends: A US Antarctic Imaginary" which posits that Antarctica is perceived as a frontier in which both utopic and apocalyptic visions are articulated in fictional accounts of the continent[17]. Val Kirby and his group have pursued studies of how individuals perceive "Antarctic Heritage" through a variety of what they call "filters and kaleidoscopes", resulting in a fourfold typology: an Emotional Version, a Cultural Version, a Natural and Cultural Version, and a Global Version[18]. Klaus Dodds used critical geopolitics to classify geographical representations of Antarctica into five eras: Antarctica as a partially filled space (1900-40), Antarctica and the Cold War (1945-60), Antarctica as a place for science (1960s), Antarctica as a place of resource potential (1970-80s), and Antarctica and the global environmental challenge (1990s)[19]. Divisions into interest groups such as environmental, geostrategic, and ideological interests have also been used[20].

I combined elements of these previous typologies along with my own observations to create six categories of Antarctic description: Antarctica as a place of national interest, Antarctica as a place of science, Antarctica as an economic opportunity, Antarctica as an environmental "World Park", Antarctica as an aggressor to be conquered, and Antarctica as a source of awe. The first four categories were largely based on different interest groups described by others[21]. The last two categories are more emotional interpretations of Antarctica, which may be reflected in the idealizations of Antarctica as a utopia or dystopia[22]. All six of these themes feature prominently in the magazine's descriptions of Antarctica, and deserve scrutiny.

Although a quantitative study of the number of quotes in each category might have been useful, this was problematized. Some quotes incorporated more than one theme and could not be strictly classified as one or the other. Also, quantifying the number and types of quotes would not address the questions of how attitudes changed or what interest groups were represented. Therefore my analysis is to examine the quotes for consistent metaphors and themes within the overarching categories.

Semiotic analysis is the tool which I use here to take apart what the articles are saying and try to understand their patterns and underlying interests. Within each of the themes, there are a number of metaphors used to refer to Antarctica

[17] Storey 2004. For a more complete bibliography of Antarctic literary criticism, I recommend Elizabeth Leanne'swebsite: http://www.utas.edu.au/english/Representations_of_Antarctica/literary_crit.htm
[18] Kirby, Stewart et al. 2001.
[19] Dodds 1997.
[20] Joyner and Theis 1997:
[21] Dodds 1997; Joyner and Theis 1997.
[22] Leane 2003; Storey 2004.

or qualities of the continent and activities on it.

Metaphors allow us to understand one thing (in this case, Antarctica) in terms of another (the symbolic reference). These metaphors will be analyzed to see what interests are being served by their use or what ideas the writer is attempting to convey[23]. I will take into account the context of Antarctic history that the statements or metaphors take place in and attempt to ascertain patterns of the use of concepts. It should be noted, however, that I am attributing meaning to these words based on own my interpretations and experience. All narratives are open to interpretation[24], and I therefore encourage the reader to engage in the sources directly[25]. What follows are my interpretations of the words and metaphors which construct each category and how they fit into the timeline of Antarctic history.

2.3 Antarctica as a place of national interest

Antarctica has long been held as a place of interest to states. It may be of interest to them as the result of a number of goals, which may include the potential for attaining natural resources, attainment of geostrategic ground, the incorporation of further territory into empire, or the converse of denying the territory to other parties. The official U.S. approach to Antarctica has been shaped by the 1924 Hughes 'open door' doctrine, articulating that the U.S. makes no claims to Antarctica and simultaneously recognizes no claims[26]. There was some conflict about this within the U.S. government, but the politics of the Cold War combined with the success of the International Geophysical Year (IGY) of 1957-58 solidified this position and helped to make the Antarctic Treaty of 1959 a document in which claimant and non-claimant nations agreed to work cooperatively in Antarctica. Within the pages of *National Geographic Magazine*, the promotion of an American claim to Antarctica has competed with an image of Antarctica as a site of international cooperation in which the U.S. participates. The rise and fall of the push to claim an American portion of Antarctica has been largely reflected through the use of flags in Antarctica.

The rhetoric surrounding U.S. territorial claims to Antarctica occupied the first part of the twentieth century *National Geographic Magazine* coverage of the continent, but faded out as the rhetoric of international cooperation swept in and dominated the last half of the last century . Articles in the magazine from 1903 to 1912 argued forcefully for the recognition of American accomplishment in Antarctica and against the subsequent denial of this by scholars from other nations[27]. Although an American claim to portions (if not all) of Antarctica is never stated directly in these articles, the securing of the honors of discovery implies a subsequent basis for claim. More direct references to U.S. claims to territory

[23] Coffey and Atkinson 1996.
[24] Riessman 2002.
[25] This is why I initially presented my findings in a poster format in which the viewer could read and interpret selected quotes on their own against a timeline of the twentieth century (albeit with my own color-coded suggestions of the categories superimposed upon the quotes).
[26] Hall 1989.
[27] Balch 1903; National Geographic 1903b; Balch 1904; Grosvenor 1907; National Geographic 1908; Greely 1912.

were made a little later by Admiral Richard Byrd and Lincoln Ellsworth[28]. There are also mentions of other nations claiming dominion over Antarctica and sub-Antarctic islands during this time period[29], to the degree that the naming of Antarctic features told a story of the nationalities of those who first encountered them[30]. In this way, claims are linguistically inscribed upon the landscape and maps that describe it. The last strongly-worded claim to territory comes from a mention of encountering Chileans at Deception Island in December of 1955[31].

After the IGY of 1957-58 and the Antarctic Treaty of 1959, talk of claims becomes more muted and sterilized. The next time that claims are explicitly mentioned is in the 1970s , and nations are supposed to "forgo territorial claims to the continent for at least 30 years"[32]. There is also talk of claims to South Georgia Island being contested between Britain and Argentina, as the Falkland Islands are[33]. The same article points out that both the United States and Soviet Union share a policy of neither claiming nor acknowledging claim to Antarctic territories. An article encompassing all of Antarctica from 1987 explains to the reader that "National claims are frozen; their boundaries … are relegated to a small inset in our supplement map"[34]. The term "frozen" here is not only apt because of the cold setting, but it gives the impression of Antarctic claims as biological entities trapped in ice: they still exists (and may be alive or dead), but they are immovable and inactive. The relegation of territorial claims to a small insert also shows their declining importance. This diminishment continued into the 1990s, in which another broad article about Antarctica declared that "The promise - and peril - of Antarctica has been that no one owns it, although seven nations have pressed sometimes overlapping claims"[35]. The reality stressed in this quote is that no one owns Antarctica, and that claims have only been pressed and not realized.

Claims are one aspect of some national political agendas, but another aspect is international cooperation. Cooperation is a broad term which can involve varying degrees of integration between two groups. The general trend in *National Geographic* references to cooperation in the Antarctic has been to go from less integrated and cordial to more friendly and involved, particularly in the conduct of scientific activities. Cooperation in Antarctic endeavors has been written about in the magazine as early as 1899, but the cooperation of nations was generally defined as splitting up the Antarctic territory into discrete units such that activities would not overlap[36]. This form of cooperation was created to avoid unpleasant interactions by avoiding interactions altogether. As the references to possible American claims grew in number, references to international cooperation faded from view.

References to cooperation in the magazine re-emerged and strengthened with

[28] Byrd 1930; National Geographic 1935.
[29] National Geographic 1903b; Murphy 1922.
[30] McKinley 1932.
[31] Bumstead 1955.
[32] Matthews 1971: 648.
[33] Poncet 1989.
[34] Vesilind 1987: 560.
[35] Hodgson 1990: 17.
[36] Grosvenor 1899; Kollm 1901; National Geographic 1901a; 1901b.

the development of the IGY in the 1950s. Articles referred to scientists from different countries pooling their findings, and noted the free exchange of ideas that was taking place between nations during the "worldwide collaboration" that was the IGY[37]. This describes an exchange and interaction between nations, rather than simply a division the work of science to be conducted. These activities connote exchange between equals, but convey little enthusiasm for the task. In 1968, "working together" was used to describe the interaction of Russian and American scientists in Antarctica in counterbalance to the Cold War idea that these two groups should be separate[38]. It implied that something progressive was being accomplished. The term "goodwill" developed to describe the bond between scientists from different nations[39]. This implied an even more positive connection between the two groups. This increasing idea of friendship and goodwill between people of different nationalities had a crescendo within Will Steger's expedition across Antarctica as he described it:

> "Perhaps our expedition - as a small example of multinational effort focused on the last great frontier - would be accepted as a contribution toward the world's new awakening"[40].

Through this statement, Steger implies that international cooperation is leading us to a new and better political attitude towards Antarctica and the world.

Flags have stood in as representative for nations at many occasions, and through the use of flags in descriptions of the Antarctic the shift from viewing the continent as a place to be claimed to a site of international cooperation can be seen. Planting a flag in the ground can be seen as a display of personal accomplishment, but when the flag represents a nation this has long been understood as an indicator of claiming a portion of land. That was certainly the intent of Sir Ernest Shackleton (1877-1922) when he raised the flag at the southernmost point in his trip:

> "We hoisted his Majesty's flag and the other Union Jack afterwards, and took possession of the plateau in the name of his Majesty"[41].

As if by magic, the entire plateau had become British territory through the simple act of inserting the British national flag (nicknamed the Union Jack).

During the period of time before the IGY in which U.S. explorers sought to claim portions of the Antarctic, the planting of the flag was often used as a metaphor for claiming the territory. The U.S. flag is sometimes referred to as "Old Glory" or "The Stars and Stripes", and those nicknames were engaged by a number of American explorers as they described their actions and plans to claim parts of Antarctica. The National Geographic Society attempted to garner support for an Antarctic expedition by appealing to the reader's patriotism in saying that "[t]he primary object of the expedition would be to plant the Stars and Stripes at the South Pole…"[42]. By placing the U.S. flag at the South Pole first, the potential expedition likely had the goal of establishing a basis for an American claim to the territory. When other nations reached the pole first, other

[37] Byrd 1956; National Geographic 1957; Siple 1957.
[38] Matthews 1968.
[39] Byrd 1956; Matthews 1971; Hamner 1984.
[40] Steger 1990: 93.
[41] Shackleton 1909: 1000.
[42] Grosvenor 1910: 170.

undiscovered sites in Antarctica became prone to flag-planting. Lincoln Ellsworth (1888-1951), an American Antarctic explorer, boasted in the magazine that he had raised an American flag over 350,000 square miles of the last unclaimed land on earth and named it after his father[43].

Besides existing as a symbol to claim territory, flags were used in Antarctica for symbolic gestures which signified the changing attitudes towards nations in the Antarctica from claimants to cooperators. Although the pole had already been flagged through a land traverse, this did not stop Admiral Richard Byrd (1888-1957) from using a flag to mark the occasion of the first flight over the South Pole. He brought along the flags of Norway and Britain to honor the first two explorers to reach the South Pole, but reserved a unique honor for the U.S. flag which he brought along when he reached the air above the Pole:

> "We opened the trapdoor and dropped the American flag, weighted by the stone from Bermett's[44] grave. We saluted our country's flag and the spirit of our gallant comrade"[45].

Although not strictly a territorial claim, it does mark the first supposed flight over the South Pole as an American achievement. What gives this event added poignancy is contrasting it to the flag symbolism used by Byrd at a subsequent flight over the South Pole:

> "I dropped a cardboard box containing the multicolored little flags of the United Nations. The symbolism should be obvious- the dedication of this goal of so much selfless heroism of the Norwegians and the British to the ideal of brotherhood among peoples"[46].

This act symbolizing "brotherhood among peoples" was to herald the development of the IGY and an increase in the rhetoric of international cooperation within the *National Geographic*'s portrayals of Antarctica. The first person to scale Antarctica's highest peak built on Byrd's symbolic example and planted the 12 flags of the Antarctic Treaty nations at the top of the mountain[47]. The use of multiple flags in these areas high above the rest of Antarctica had come to signal the international cooperation that was taking place below them.

2.4 Antarctica as a scientific "Laboratory"

The conduct of science in Antarctica has changed through the years both in character and size. Science is a broad term which can cover a wide range of activities, but the goal of those activities, as seen by *National Geographic*, is the production of knowledge[48]. Throughout the last century of the magazine, there have been changes to the scale of knowledge production described in Antarctica as well as shifts in the priorities of which subjects to study. Science has

[43] Ellsworth 1936.
[44] Floyd Bennet (1890-1928) was Richard Byrd's pilot on his attempted flight over the North Pole in 1926. Byrd was devastated by Bennet's death in 1928 from pneumonia contracted as a result from a crash of a test flight for the Orteig prize (for the first trans-Atlantic flight). In addition to dropping a stone from his grave at the South Pole, Byrd honored his former pilot by naming the airplane that he flew in on that expedition after Bennet.
[45] Byrd 1930: 216.
[46] Byrd 1947: 463-464.
[47] Clinch 1967.
[48] Grosvenor 1907.

become the dominant activity on the continent through the developments of the IGY and subsequent inscription into the Antarctic Treaty. The Antarctic Treaty is an agreement made between nations, however it positions science as the one activity which legitimates national membership in the Treaty through Article Nine[49]. The growth of the dominance of science in Antarctica can be seen through the increasing use of laboratory metaphors to describe the continent and its component parts.

This growth into a dominant activity was accompanied by a change in the character of scientific contingents of Antarctic expeditions. Throughout the first half of the last century, leading up to the IGY, the most heavily promoted Antarctic science was that of geography. Other sciences were acknowledged as being important and conducted alongside geography, but it was the understanding and mapping of this previously unexplored continent which took precedence over other activities. Several early accounts of expeditions made this very explicit by listing geographic discovery as the first in a list of sciences to be conducted[50]. Other scientific observations, such as meteorological records, were said to be specifically valuable if they were conducted in newly-discovered area[51]. At the same time, different priority lists show that science is less important than shows of national claims or accomplishment during this period. The ranking of geographic interests above other scientific ones was also an indicator that national interests were prioritized higher than the pursuit of general knowledge, since early geography was known to be an imperial science, helping to catalog territory and legitimate the claims of its sponsors. For those people who did not think that planting the U.S. flag at the South Pole was sufficient enough reason to mount an expedition, scientific advancement was given as a secondary reason to send an American expedition to the South Pole[52]. Amundsen was praised in the magazine for finding a new route to get to the South Pole and increase geographic knowledge, just as other expeditions were criticized for attempting the only known route[53]. This known route was taken because the representatives of the nations involved sought to be the first to claim dominion over the pole first and prioritized that above the collection of new data in new lands. The scientific results and collections acquired during the German expedition were clearly stated to be the property of its government, although scientists would be employed to arrange them[54]. In this way, scientists were directly subsumed beneath the state.

The growth in the importance of conducting Antarctic science for its own sake started appearing in the rhetoric of *National Geographic* in the 1930s and grew from there. Byrd noted that science made up the bulk of the work conducted during the time his group was in Antarctica and was proud to send out "one of the longest sledge journeys ever made for purely scientific purposes"[55]. In a later expedition, Byrd commented that he took more people to the continent

[49] Treaty 1959.
[50] National Geographic 1901b; Byrd 1947.
[51] National Geographic 1903a.
[52] Grosvenor 1910.
[53] National Geographic 1911; 1912.
[54] Kollm 1901.
[55] Byrd 1930: 220.

solely because he would require a large staff of scientists[56]. In a counterpoint to the 1910 proposal of a South Polar expedition, Byrd also curtailed his own ambitions to get to the Pole on one trip with scientists in favor of scientific objectives:

> "Needless to say, there was an urge to go on to the Pole itself, which they could have done had they prepared for it. But their work lay in the mountains which, scientifically, were more important than reaching the Pole"[57].

As the importance of science in general arose, the stress on geographical discovery started to wane. This paralleled the development of scientific equipment, which scientists were eager to apply to the continent. Although in his 1947 article, Byrd still ostensibly ranked geographical discovery above pure science, he included this quote:

> "Equally as important as immediate geographical discovery was the responsibility of learning to use these marvelous new instruments, to test them under extreme conditions, to ascertain and devise means of overcoming their defects. In this respect we were pioneers, trail blazers of exploration's new age"[58].

The simultaneous subjegation of "pure science" to geographical discovery and the equality shown between that discovery and the testing of new scientific equipment indicates that this was truly a transition period in which priorities were changing even within the article itself. The quote acknowledges this transition itself by noting the entrance of "exploration's new age".

This new age of a more scientific brand of Antarctic exploration was readily apparent in the *National Geographic* articles regarding development and conduction of the IGY. The shift to a scientific motivation came with some skepticism, but the scientist Paul Siple tried to assuage the reader's doubts:

> "Some people, I know, find it difficult to believe that such stations in Antarctica are truly part of a peaceful, open, international scientific research effort. They question the avowed free exchange of scientific discovery among IGY nations. They point out that American armed forces built our Antarctic houses. They even circulate rumors we are planning to use Antarctica for testing atom and hydrogen bombs. These rumors are definitely not true"[59].

An open confrontation of these doubts was appropriate for the time, given the history of nations claiming portions of the continent as their own. As noted in the previous section, this period of time was also a transition from claims to cooperation rhetoric, so the overall image of Antarctica had to be transitioned. Knowledge during this time was extolled as a great enterprise, being of inestimable value, and raw material for future problem-solving (Siple 1957; Dufek 1959; Fuchs 1959). The scientific work became less about striking out into newly discovered territory and more about the scientific questions that the continent could yield answers to through investigation. Admiral George Dufek (1903-1977), the Naval Commander of Operation Deep Freeze which prepared the American scientific stations for the IGY, noted that recruiting scientists had

[56] Byrd 1935.
[57] Byrd 1935: 457.
[58] Byrd 1947: 432.
[59] Siple 1957: 20.

become more difficult as Antarctic work became more routine and less glamorous[60]. This was a sign that scientific activity had gained a degree of normalcy in Antarctica.

Although the glamour had worn off, this new age of scientific investigation in Antarctica brought with it many advantages and power for scientists. After the IGY, it was more well-established that science could be legitimately called a dominant activity on the continent. In an article entitled “New Era in the Loneliest Continent”, the author states that:

> "The United States spends millions of dollars each year and sends hundreds of men to this inhospitable continent, not for military or economic reasons, but for scientific investigations and for development of the world's last true frontier. The role of the Navy in this endeavor is that of support- building and maintaining the bases, and providing the housing, food, and transportation that the scientists need"[61]

The needs of the scientist are shown in this quote to be of primary importance. American scientists no longer had to be experts in cold-weather survival because their logistical needs were supplied by the U.S. Navy[62]. Sophisticated equipment was imported to the continent for use by scientists[63]. Even nature came to be seen as subject to the need of scientists, as one noted a penguin that was captured, studied, and then released after providing a service to science. In the last few decades of the twentieth century , science seemed be implicitly in command. One article abstractly labeled science as “king” in Antarctica[64] and another specifically noted that the chief scientist aboard the USAP research ship Nathanial Palmer directed where it should go[65].

The growth of the laboratory metaphor for Antarctica within *National Geographic*’s articles paralleled this growth of scientific power and prestige. Laboratories are sites of scientific power. Although the actual practice of science within laboratories has been famously critiqued[66], in their ideal form laboratories are controlled settings in which the scientist may experiment without interference from the world outside. Within the confines of the laboratory, the scientist is in control of things. The first reference to Antarctica as a laboratory within the magazine came from Byrd in 1930 in his description of his flight to the South Pole:

> "I counted fourteen mountain peaks (and there were more) running north and south for about 30 miles. Here was something to put on maps; here was a fine laboratory for geological exploration"[67].

The laboratory metaphor is initially restricted to a mountain range of Antarctica, and also limited to geologists. In his article regarding Operation High Jump later in 1947, Byrd would expand the metaphor to include a few more sciences and apply it to the entirety of Antarctica:

> “Here has been set up by Nature herself a titanic physical, chemical,

[60] Dufek 1959.
[61] Tyree 1963: 282.
[62] Matthews 1968.
[63] Matthews 1971.
[64] Vesilind 1987.
[65] Stevens 1996.
[66] Latour and Woolgar 1979.
[67] Byrd 1930: 157.

> and biological laboratory where phenomena impossible of duplication elsewhere are in progress"[68].

This statement by Byrd would later be quoted again in the magazine, reiterating its importance as an Antarctic descriptor[69]. In another article, Grosvenor would refer to Antarctic mountains as laboratories[70]. Later articles would qualify the term laboratory in different ways to stress certain aspects about Antarctica. In a 1968 article, Antarctica was described as both an "International Laboratory", linking it to the theme of international cooperation mentioned in the previous section, and a "Laboratory of Peaceful Exploration" which may have heavily contrasted with the news of the Vietnam War that the United States was engaged in at the time[71]. The laboratory metaphor would be expanded out to encompass the world in one article[72], and so the classification of Antarctica as a "unique laboratory" became necessary[73]. As environmental identities of Antarctica arose, they were also incorporated into this metaphor as Antarctica became a "vast natural laboratory for the study of our planet"[74]. By studying the planet, the hope became to prevent environmental catastrophes:

> "The fifth largest continent is a giant outdoor laboratory where scientists strive to decipher clues to our planet's history and detect early warning signs of global pollution"[75].

This shows that while the metaphor for a scientifically controlled area has grown to be a powerful icon for representing Antarctica, it has the capability of incorporating additional ideas into it.

2.5 Antarctica as a resource frontier to be exploited

The Antarctic is home to a number of natural resources, and *National Geographic* articles have sometimes speculated upon their potential use and exploitation. One article speculated that one of the prime reasons that governments supported Antarctic expeditions was out of a desire for resources[76]. The resources, biological of whales, seals, krill, and fish have all been subject to commercial harvesting by humans at some time during the previous century. The beauty of the environment there has also been viewed as a resource to lure tourists into paying money for visits. There are the mineral resources of Antarctica as well, which were the source of much debate in the latter half of the twentieth Century. Although interests to all of these resources are referenced, few authors actively promoted their exploitation. Byrd explicitly stated "I dislike to think of money in connection with Antarctica. It has higher values"[77]. The end result is that there are fewer quotes that refer to Antarctica's resources and no well-established metaphors regularly used within the magazine. Most portrayals of economic exploitation are used with a negative connotation.

[68] Byrd 1947: 506.
[69] Grosvenor 1957.
[70] National Geographic 1967.
[71] Matthews 1968.
[72] Matthews 1973.
[73] Curtsinger 1986.
[74] Scott 1987: 541.
[75] Hodgson 1990: 3.
[76] Parfit 1993.
[77] Byrd 1947: 520.

The earliest references to commercial exploitation in the region reflected the industries present at the time. A century of sealing was acknowledged to have already taken place at South Georgia Island by the time it had become one of the largest whale fisheries in the world in the 1920s[78]. The increase in scientific activity on the continent brought with it thoughts that new food resources might be discovered in the region. Science was portrayed as the harbinger of commercial exploitation:

> "Testing for organic carbon present in these seas, therefore, is a vital step towards their use. Someday, a world of vanishing resources may turn to this area for food"[79].

Speculation that krill from Antarctica might someday become an important new food resource rose sharply in magazine articles from the 1970s and 80s[80]. With the establishment of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) in 1980, this speculation began to subside. Fears of over-exploitation began to decrease:

> "Perhaps such overfishing will not occur. Costs and distance may curtail the harvest. The Antarctic waters are remote from the countries best able to exploit their resources, so it is difficult to operate a cost-effective fishery there"[81].

One article noted how this went against the model of science leading to commercialization: “Exploration continues, but without the exploitation that usually follows"[82]. This same expectation was applied to geological studies and mineral exploitation.

Early articles could only speculate about the potential resources that Antarctica might yield, particularly regarding mineral resources[83]. From the 1970s through the early 1990s, intensified speculation of the mineral contents of Antarctica led to the long negotiation of CRAMRA. During its negotiation, an article in *National Geographic* noted that "[t]he most pressing issues of the Antarctic relate to resources"[84]. The defeat of CRAMRA through the pressure of environmental non-government organizations has already been mentioned[85], but the rejection of economically exploitative values can also be seen in the articles of *National Geographic*. Negative portrayals of mining activities were implied in the language of authors:

> "All parties acknowledge the high risks of oil spills, pollution, and the harmful effects of industrial activity on the Antarctic environment. Yet many consider these risks perfectly acceptable in exchange for a few years' additional supply of raw materials"[86].

The language of this quote stresses the risks associated with industry and the meager benefits to be gained through the exploitation of Antarctica. The concerns over mining died down in the same way that they did regarding krill over-

[78] Murphy 1922.
[79] McDonald 1962: 261.
[80] Matthews 1971; Hamner 1984.
[81] Hamner 1984: 642.
[82] Vesilind 1987: 560.
[83] Ellsworth 1936; Byrd 1947; Boyer 1957.
[84] Vesilind 1987: 560.
[85] Clark 1994.
[86] Scott 1987: 541.

fishing:

> "The diversity and extent of Antarctica's mineral wealth remains largely undetermined, although extensive coal deposits are known to exist. But daunting logistical problems make exploration and mining, already controversial, commercially unfeasible"[87].

The conclusion seemed to be that the relative inaccessibility and harsh conditions of Antarctica were significantly large barriers as to prevent commercial activity from taking place there.

The speculation over commercial uses of the Antarctic has not been limited to minerals and sea-life within *National Geographic*. One creative idea to utilize Antarctica came from Byrd, who suggested that the continent might be used to preserve food and crops in a frozen state as a safeguard against world hunger[88]. Dufek imagined the area's future as a tourist paradise, and noticed some of his men preparing for this contingency by making souvenirs[89]. The tourism industry is one that gets cautious approval from some *National Geographic* writers. One article noted that before the tourist trips of Lars-Eric Lindblad started in the mid-1960s only scientists and support personnel could access the continent, implying that more access to Antarctica was a good thing[90]. Other articles temper that acceptance of tourists with the conditions that they should not disturb the scientific work being undertaken[91] or the environment[92]. The tourism industry (particularly the eco-tourism industry which composes the bulk of Antarctic tourism) is the one business which actively promotes environmental preservation. This is perhaps the reason that it has not been wholly derided. The industry is even said to produce environmentalists as

> "… no one who witnesses the desolate beauty of Antarctica can fail to come back home as anything but an advocate for its preservation"[93].

This leads to an investigation of environmental constructions of Antarctica within *National Geographic*.

2.6 Antarctica as an environmental "World Park" to be preserved

The environmentalist view of Antarctica has already been showing through some of the descriptions of commercial exploitation, but it is not simply a reaction against industry. Environmentalists generally view the earth and its environments as something to be preserved (remain as it is) or conserved (used in moderation, reserving some quantity for the future). Environmental ideas regarding Antarctica have risen largely in tandem with economic ideas within *National Geographic*. The same article which addressed the exploitation of whales and seals on South Georgia Island calls for the enforcement of absolute protection for the sea-elephant lest it be completely exterminated[94]. The major-

[87] Hodgson 1990: 10.
[88] Byrd 1947.
[89] Dufek 1959.
[90] Peterson 1977.
[91] Matthews 1971.
[92] National Geographic 1993.
[93] Grosvenor 1991.
[94] Murphy 1922.

ity of articles which contain environmental depictions of Antarctica are from the period of time from the 1970s onward. The metaphors of purity and a "World Park" are regularly applied in an environmental context to stress environmental ideals of preservation and conservation.

With the dominance of the science established in *National Geographic* depictions of Antarctica by the 1970s, environmental concerns were fostered by biological scientists. The comprehension of the foreign Antarctic wildlife brought with it environmental sensibilities, sometimes couched in familiar terms of politics:

> "Penguins, albatrosses, skuas, seals and whales are other nations, responding to life rhythms quite alien to our own. To the naturalist, the Antarctic is a tremendous experience. Because of the simplified ecosystem and the great numbers of individuals of very few species, he can more readily observe cause and effect; he can understand more clearly some of the basic principles of survival- and life"[95].

It is the simplified ecosystem, relatively undisturbed by humans, which provides the naturalist the tremendous experience described here. For that area of study to be maintained, it is only logical to assume that it should be preserved in that state for use by future naturalists to gain further knowledge of the basic principles of life. The principle of survival is described in another article as demanding "unremitting vigilance and meticulous care" of the life-support systems in Antarctica[96]. The killing of animals is to be opposed. To this end, the site of a former whaling station is described as "…a silent, grim, and ugly memorial to the relentless destruction of earth's largest living creatures"[97]. This places the killing of animals in the past as a kind of dark age which progress has left behind. The future of Antarctica is envisioned as a "World Park". The idea of Antarctica being set aside as that kind of international wildlife preserve is attributed to environmental groups, such as Greenpeace, but encouraged by several authors[98]. Part of that encouragement is through presenting Antarctica as a "pure" place in danger of being contaminated.

The metaphor of Antarctic purity is increasingly used through *National Geographic* articles about the continent throughout the 1980s and 90s when the environmental movement was gaining strength in the region. A pure object has no traces of foreign elements within it. Calling Antarctica "pure" also connotes a level of cleanliness and holiness. The main reference to purity comes from the editor of the magazine: "The purity of Antarctica, after all could change as rapidly as its weather"[99]. Purity is implied to be a fragile state here and something may become impure through contamination, pollution, or disruption. References to contamination or pollution of Antarctica abound in the magazine's Antarctic articles of the 1980s and 90s[100]. Most present situations in which humans struggle against polluting the environment with their waste, but for some writers, human beings themselves are the contaminant. In this way,

[95] Peterson 1977: 254.
[96] Lewis 1984.
[97] Peterson 1977: 243.
[98] Scott 1987; Vesilind 1987.
[99] Grosvenor 1991.
[100] Lewis 1983; Scott 1987; Vesilind 1987; Grosvenor 1991.

some environmentalists conceive of Antarctica without any humans existing there. One reference to an Antarctic film depicts the continent as "…an astonishing world apart, where humans will always be out of their element"[101]. The removal of human beings from the Antarctic seems contrary to other interests of states, scientists, and entrepreneurs. While the complete removal of humans from the continent is not a position more widely adopted, there has been a shift in how people think about Antarctica as a result of the environmental movement. In the words of one editor, "The real Antarctic challenge is no longer one of conquest but one of preservation"[102].

2.7 Antarctica as an opponent to conquer

The idealization of Antarctica as a place to be preserved contrasts greatly with another characterization within *National Geographic* of Antarctica as a place to be tamed and subdued. The theme of conquest represents no one interest group in particular, but rather a generalized attitude towards the continent expressed through a number of articles. The exploration of and conduct of activities in Antarctica has been depicted by these articles as something akin to a war. On one side of the battle are humans and on the other are the forces of nature, which in Antarctica can be extremely inhospitable for humans. The struggle of humans against nature is a powerful and popular narrative device that has been the heart of a number of fictional classics. Here the conflict is being superimposed upon real interactions between humans and the environment of Antarctica, attributing human characteristics to nature in some cases. This whole category is a metaphor, and one used often in Antarctic *National Geographic* articles to provide an exciting story. The titles of several articles even incorporate this aggression: "The Conquest of Antarctica by Air"[103], "All-out Assault on Antarctica"[104], and "First Conquest of Antarctica's Highest Peaks"[105]. Exactly how this story is told reflects the importance of each of the interest groups previously dealt with.

The earliest war-like descriptions depicted the polar explorer as a man fighting with nature as a representative of the rest of humanity. Roald Amundsen (1878-1928), in his attempt to reach the South Pole, was described as about to

> "…inaugurate his attack upon the Pole immediately, not waiting for the winter to pass before beginning his advance"[106].

This portrays Amundsen as bold and resolute, having the qualities of humanity that are idealized. Former U.S. President Herbert Hoover (1874-1964), referring to Byrd's first flight over the South Pole, commented that:

> "I do not minimize the scientific gains of such expeditions, but the human values are so immediate and so universal in their effect that it may well be that they transcend the scientific service. Every hidden spot of the earth's surface remains a challenge to man's will and

[101] National Geographic 1994.
[102] James 1990.
[103] Byrd 1930.
[104] Byrd 1956.
[105] Clinch 1967.
[106] National Geographic 1911: 409.

> ingenuity until it has been conquered. Every conquest of such a difficult goal adds permanently to mankind's sense of power and security. Great explorers, therefore, do not merely add to the sum of human knowledge, but also they add immensely to the sum of human inspiration"[107].

Hoover therefore acknowledges the scientific gains from Antarctic exploration which were becoming more prominent during this period, but ranks a general feeling of power and security as the greater accomplishment. Power and security are generally two ideas which are typically associated with the services that the state provides. The fact that this statement is also coming from a head of state also indicates the importance of the national in Antarctic expeditions at the time. During this time, the continent was described as impregnable[108]. In a later article, Byrd would declare that

> "This was an enticing region! Its ice bulwarks had withstood man's attacks for more than a century. Here were 345,000 square miles that man had not penetrated. Our first attack had been unexpectedly fruitful"[109].

Aside from a large intonation of masculinity, Byrd shows through this quote that he has succeeded in his explorations where others have failed. This increases his sense of accomplishment and power over the territory which may be possibly translated into a claim.

The wording of conquering Antarctica is slightly altered in the period surrounding the IGY, which is depicted as an assault or invasion of Antarctica. Despite the seven claimant nations, there were really no people to conquer in Antarctica, so the foe again is depicted as nature. There are numerous references to terms of warfare through the articles of this period: attacking on several fronts, a campaign being waged, beachheads being seized, assault tactics, and the spearheading of an Antarctic invasion[110]. In later articles, the IGY and its continuing impacts are summarized with “Science Mounts a Peaceful Assault”[111]. The juxtaposition of the words peace and assault reflects both the massive influx of humans to the continent where there had been few before as well as the fact that this was done without violence or malice. The incorporation of “peace” also signals the rise of international cooperation that was taking place at the time, as nations did not quarrel over the IGY, but banded together for it. The enemy here is nature, and within the magazine, the wind is usually singled out as a particularly hostile foe[112]. The ice and cold are also given credit for thwarting human efforts[113]. The continent itself has been described as an obstacle[114]. But the recent environmental movement has posed the question of whether this obstacle is meant to be overcome.

While references to conflict and conquest have not faded from *National Geographic’s* articles, the approach to them has slightly. No longer are humans simply

[107] Grosvenor and Hoover 1930: 231.
[108] Byrd 1930.
[109] Byrd 1935: 418-419.
[110] Byrd 1947, 1956; Boyer 1957; Byrd 1957; Dufek 1959.
[111] Matthews 1971: 625.
[112] McDonald 1962; Tyree 1963.
[113] Tyree 1963; Clinch 1967; Lewis 1973.
[114] Fiennes 1983; Swan 1987.

the aggressor against the Antarctic environment, as they clearly were depicted during the IGY, but an opponent that can also loose ground. An account of an archaeological investigation of one station acknowledges the environment's power over human creations in its depiction of that edifice: "…historic East Base - the United States' first permanent toehold in Antarctica, surrendered to the cold in 1948"[115]. The fact that it was a toehold signifies the meagerness of the base in relation to the vastness of the Antarctic environment it was built in, and its surrender a submission to those forces of nature. Depictions of native Emperor penguins imply their mastery of the environment: "Largest of 17 penguin species, they are the undisputed rulers of earth's coldest realm"[116]. By labeling penguins as rulers of Antarctica, this quote implicitly denies that position to humanity. It is also implied that humanity can't even contest that position, since the title is undisputed. One writer even expressed:

> "…I have come to see this transient frontier not as a harsh place but as a living creature that nurtures a multitude of other lives. Yet no humans can ever live here. We can't conquer it, settle it, even own it. The winter ice belongs only to itself"[117].

In this quote, the Antarctic cannot be conquered by humans, and there is little else that they can do there either. These quotes which utilize symbols of conflict and dominion reflect the extreme environmental position that humans do not belong in Antarctica, a position that has grown stronger in recent years.

2.8 Antarctica as an inspiration of awe and spiritual connection

There is a final approach to depicting Antarctica within *National Geographic* which does not depict it as a site to be dominated by particular interests or as an implicit foil to humanity, but rather as an inspiration of awe and wonder that humans can interact with. This is the second generalized attitude towards Antarctica. Antarctica, in this depiction, is a beautiful place which inspires fascination, love, and devotion. It is a complement to the humans that encounter it, representing everything unknown compared to our known world. Whatever the explorer lacks, it has, and vice-versa. But rather than see this as an oppositional relationship, as the previous approach does, this approach views Antarctica as a more mystical and powerful partner:

> "Death, of course, is an ever present part of the backdrop for any expedition that pits fragile humans against exceedingly powerful (I refuse to call them hostile) forces of nature"[118].

Through the inspiration of awe, the explorer is impelled to merge with this unknown and incorporate it into their being. This is an attitude that has been consistently articulated by the many different humans that have written about the continent in the magazine. The descriptions of Antarctica are lyrical and poetic here. It also complements the fluctuations of several themes and the types of people who are found on the continent.

As the great majority of humans who explored the continent were male, the

[115] Parfit 1993: 110.
[116] Oeland 1996: 53.
[117] Stevens 1996: 53.
[118] Lewis 1984: 642.

continent was portrayed as a mysterious and alluring female in many early articles. Shackleton cites the lure of the Antarctic as one of his motivations for exploring there[119]. Antarctica is also portrayed as an ice princess by Byrd:

> "At the bottom of this planet lies an enchanted continent in the sky, like a pale sleeping princess. Sinister and beautiful she lies in her frozen slumber, her billowy white robes of snow weirdly luminous with amethysts and emeralds of ice, her dreams iridescent ice halos around the sun and moon, her horizons painted with pastel shades of pink, gold, green, and blue. Such is Antarctica, luring land of everlasting mystery"[120].

Ideas of the enchantment and divinity of Antarctica abound in Byrd's article, which also describes the continent as a "Sermon in Ice"[121]. The way that Byrd describes Antarctica here makes it sound beautiful. Other authors have also cited beauty as a quality of Antarctica without such an intricate metaphor as Byrd has provided[122]. However as women were introduced to Antarctica, this beauty became rhetorically detached from a female depiction of the continent.

In more recent days, the continent has almost become a refuge from the rest of humanity. Many authors write of (with varying degrees of affection) the sense of isolation that they have felt in Antarctica[123]. This may have been paralleled with the rise of international cooperation and increase of scientific activity on the continent. The increasing interconnectedness of the world through the process of globalization has been paralleled for some people by increasing feelings of alienation and separation. The Antarctic is an area that allows for that and where such feelings might be seen as appropriate, as it is distant (in many senses) from the rest of the world. David Lewis, in his description of his solo boat journey around Antarctica, said that:

> "I longed to be able to pray, to cry out for help, but strangely I was not lonely. My drama was being played out on the vast stage of the ocean, with death lurking in the wings, but my solitude was never lonely. I never experienced total isolation like someone friendless in a big city"[124].

This connection with nature may replace this disconnect that is felt elsewhere in the writers' lives. It also reflects an urge to return to nature that the rising environmental movement incorporates.

2.9 Conclusion

There is definitely a connection with the way that Antarctica has been portrayed in *National Geographic Magazine* and the shifts between the interest groups that have had an impact on Antarctica. The short list of states involved in Antarctic expeditions at the start of the twentieth century were slowly made to share influence and power over the continent with a growing list of actors. The

[119] Shackleton 1909.
[120] Byrd 1947: 429.
[121] Byrd 1947.
[122] Siple 1958; Dufek 1959; Curtsinger 1986; Vesilind 1987.
[123] Dufek 1959; Clinch 1967; Lewis 1973; Fiennes 1983; Lewis 1983.
[124] Lewis 1973: 818.

widening scale of state actors involved in Antarctic governance was reflected by the shift from magazine article references to claims to international cooperation. The widening scope of non-state actors involved was shown by the incorporation of other metaphors for Antarctica, reflected in the increase of the use of Antarctic descriptors such as a scientific laboratory or an environmentally pure world park. It is also evident that the IGY of 1957-58 was a pivotal period of time around which great changes took place in Antarctica. The way that Antarctica was discussed after the IGY differed from the way it was discussed before the event. We currently live in a period of time in which many different conceptions of Antarctica overlap and coexist, and it leads me to wonder if the upcoming International Polar Year of 2007-8) will bring with it a similar transformation in Antarctic perceptions.

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3 History of Antarctic Research: The Australasian Context

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Abstract

The history of Australian Antarctic research is being examined within the context of Australia's involvement in Antarctica during the first three Polar Years, with particular reference to the interest shown by early scientific societies, scientific institutions and governmental agencies.

The activities of these agencies are being further examined within the context of the four Workshop Themes during each Polar Year time frame. The establishment of the short lived Australian Antarctic Committee 1886/88, which grew out of the activities of the first Polar Year 1882/83 and the role played by Royal Society of Victoria and European scientists both in Australia and overseas (Neumayer, etc.), in developing Australia's interest in Antarctica is also being examined. Within a purely historical context, Australia's association with early Antarctic and sub-Antarctic exploration from the 1800's to the *Challenger* Expedition of 1874 will also the documented. The 'Heroic Age' activities centred on Australian Antarctic Territory and the Ross Dependency, followed by the Second Polar Year activities (the Mawson Years) and the Third Polar Year (IGY1957/58) activities (the Law Years) and Antarctic Research in the modern era – the past 40 years, will be examined.

The treatise will form a valuable backdrop to the Royal Society of Victoria's voyages of scientific discovery for young scientists (refer to the RSV-INTREPID - IPY project No 81), to be conducted during the forthcoming IPY 2007-2008.

4 Wilhelm Filchner and Antarctica

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4.1 Curriculum vitae of Wilhelm Filchner

Wilhelm Filchner was born in Munich on September 13, 1877[1]. Soon after his birth the family moved to Bayreuth, but after the sudden death of his father, the family moved back to Munich where Filchner spent his youth. He soon showed interest in fine arts and received various artistic inspirations, mainly by the famous artists Lenbach, Stuck, Böcklin, Siegfried Wagner and others. The family, however, decided that the young son should take up a career as an officer.

In 1900, being a cadet in the military (Fig. 4-1), he used a three-month leave to undertake his own first expedition to Russia, the Caucasus and Turkestan. With his -for this time rather spectacular- ride over the Pamirs[2], he soon found support for further plans. Due to an accusation for being a spy he got no permit to enter the territory of the Russian Empire for a certain period.

Figure 4-1:Wilhelm Filchner 1905 (Filchner Archive, BAdW, Munich).

Figure 4-2: Travelling in Central Asia at Filchner's time (Filchner: 1938)

[1] Filchner 1950.
[2] Filchner's list of publications is given in the appendix of the paper.

For getting a scientific basis for preparing and carrying out his expeditions, he studied surveying and geography at the Technical University of Munich followed by practical education (mostly in Berlin) especially in geophysics at various military and civil institutions. In this time he had close contacts to various travelling scientists such as Sven Hedin (1855-1952), Ferdinand Frh. von Richthofen (1833-1905), Armin Vámbéry (1832-1913) and numerous others.

Filchner's next expedition led to North-East Tibet and Western Chinain 1903-1905 with the main goal to carry out Earth-magnetic measurements as well as mapping (Fig. 4-2). For preparing an expedition to Antarctica, Filchner had intensive contacts with Otto Nordenskjöld (1869-1928), Ernest Shackleton (1874-1922), Fridtjof Nansen (1861-1930), and Georg von Neumayer (1826-1909). A test voyage to Spitsbergen/Svalbard) was undertaken in 1910 (Fig. 4-3, 4-4). The expedition comprised six people, who crossed the main island from the Advent Bay to the Wiche Bay.

Figure 4-3: Spitsbergen 1910, the crew: upper row, left-right: Barkow, Seelheim, Philipp, lower row: Przybyllok, Filchner, Potpeschnigg) (Filchner und Seelheim 1911: Tafel 11).

Figure 4-4 Spitsbergen 1910, crossing the ice field (Filchner und Seelheim 1911: Tafel 5).

In the same time period as Roald Amundsen (1872-1928), Robert Falcon Scott (1868-1912), and the Japanese Nobu Shirase (1861-1946) Filchner started the Second German Antarctic Expedition (1911-1912). For more details see below.

The plans to participate in a further expedition to the Arctic organized by Amundsen failed due to the beginning of World War I, in which Filchner participated as an officer[3].

From 1926 till 1928 a long expedition to Central Asia followed (Fig. 4-5). The goals were similar to those of the expedition of 1903-1905. As a special task the connection of the Earth-magnetic networks observed in Europe to Western Asia, China and India was planned and finally carried out in a 6000 km long loop from Tashkent to Leh. The geographic coordinates of the observed stations were determined by astro-geodetic methods. Besides these registrations

[3] Filchner 1950: 140-143.

detailed route mapping was done, too, together with meteorological measure ments and other data collection.

As a famous result of this expedition, the film "*Mönche, Tänzer und Soldaten (Monks, Dancers and Soldiers)*" has to be mentioned. The film follows the course of the route of the expedition from Tashkent via Ili (former Russian gouvernement Turkestan), Urumtschi (Sinkiang) and Lan-chou (Kansu, China) to the Monastery Kumbum (Province Amdo, Tibet, west of Sinning-Fu). Especially the chapters referring the Monastery Kumbum present a historically valuable documentation of this famous site, which at the time accommodated up to 7000 monks. The film shows various scenes of the monastic life at that time. In the Chinese Cultural Revolution 1966-1976, the monastery was severely damaged, only a few original buildings remained. At present a rather small group of monks is allowed to continue the religious practices.

In order to stabilize the loop of Earth-magnetic observations another expedition to Central Asia followed in the years 1934-38 (Fig. 5-5), the main work resulted in a 3500 km long line Lan-tschou - Leh connecting the most eastern and western points of the previous loop.

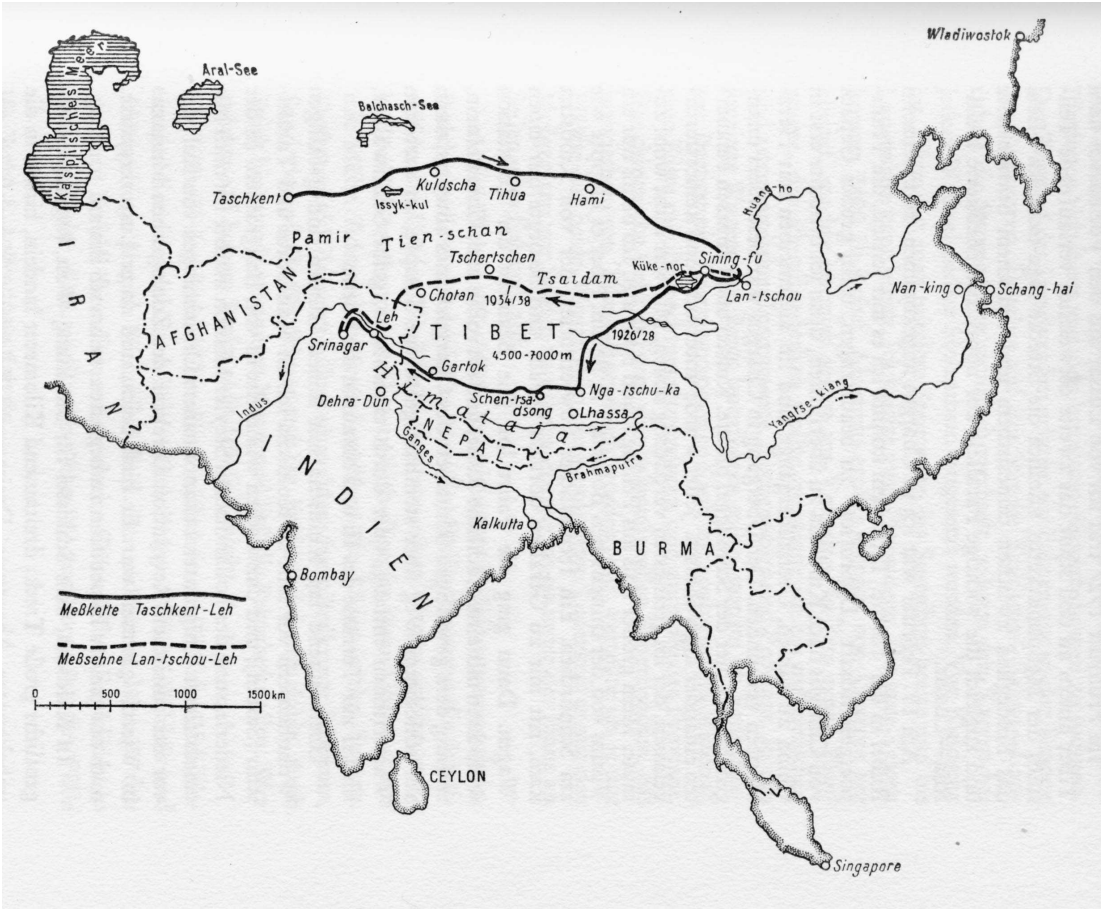

Figure 4-5: Filchner's expeditions 1926-28 and 1934-38 to Central Asia and the observed Earth-magnetic lines (Filchner 1950: 180).

In 1939 a new expedition to Afghanistan and Iran for similar purposes as before was started, but having arrived in India, Filchner changed his plans and turned

to Nepal where magnetic surveys were carried out in the Western and South-Eastern regions. Due to severe health problems Filchner returned early on to India hoping for and finally receiving medical help. World War II then had fully broken out, so, together with many others, Filchner was interned in a British military campwhere, however, he was allowed to work and move rather freely. After the ending of the war he stood in Poona, but finally returned to Europe in 1949 to settle in Zürich, where he spent his last years and died on May 7, 1957.

In Zürich he became familiar with the professors for geodesy at the ETH Zürich, F. Baeschlin and F. Kobold who were members of the German Geodetic Commission, so by them connections to his home town Munich followed. By these contacts Filchner's estate finally found its place in the Filchner-Archive at the Bavarian Academy of Sciences and Humanities (<http://dgk.badw.de>).

4.2 Filchner and the Second German Antarctic Expedition 1911-1912

4.2.1 Antarctic Problems at 1910

Between 1901-1905 five expeditions investigated Antarctica from different places and concluded that Antarctica was a continent. Around 1910 new questions came up. Is Antarctica a continent with mountain ranges going through it? William Speirs Bruce (1867-1921) had the idea that the mountain range of Victoria Land would be a continuation of the mountain ranges of Graham Land (Antarctic Peninsula)[4]. Wilhelm Filchner wanted to investigate if Antarctica is a continent, divided in an eastern and a western part by an inlet filled with ice and going from the Weddell Sea to the Ross Sea[5]. Are west and east Antarctica connected by land or separated by water (Fig. 4-6)?

Figure 4-6: Map of Antarctica showing Filchner's Antarctic expedition route (Filchner 1911: 154).

[4] Bruce 1910.
[5] Filchner 1911.

4.2.2 Main Tasks of the German Antarctic Expedition 1911-1912

Filchner wanted to go south from the Weddell Sea with dog or pony sledges, cross the Pole and proceed to the Ross Sea with the help of depots set by a second ship from that direction. He hoped that Robert Falcon Scott (1868-1912) might take over this part. When this plan could not be realised, Filchner concentrated on the investigation of the area south of the Weddell Sea. His main tasks were

- Oceanographic measurements in the South Atlantic during the crossing.
- Meteorological and magnetic measurements during the wintering on Antarctica.
- Geological observations during sledge trips in Antarctica.

Filchner bought a three masted Norwegian barque with auxiliary machine, which had been designed especially for work in ice. The “Deutschland” was refitted for an Antarctic expedition at Blohm & Voss in Hamburg (Fig. 4-7).

Figure 4-7: Filchner's ship "Deutschland" (Filchner Archive, BAdW, Munich).

4.2.3 The expeditions members

Filchner's ship "Deutschland" left Hamburg on 3 May 1911, and arrived in Buenos Aires on 7 September. Unfortunately Filchner did not lead the expedition from the very beginning as he still had to organise the funding of the expedition[6]. Seelheim should replace him during the crossing to South America, where he would take over the leadership in Buenos Aires. Besides Seelheim

[6] Lüdecke 1995: 135-136, 158-160.

and the ill technician Neuberger Ule and Lohmann left having completed their investigations during voyage (Table 4-1, Fig. 4-8). Four other seamen among them the very experienced carpenter and only diver available, who came from the First German South Polar Antarctic Expedition, were exchanged. Personal problems between the expedition member were already there, when Filchner came aboard. He produced even more problems, as he did not adopt to the life on a ship and to his status being under the command of the captain, although he was a military officer[7].

Table 4-1: Participants of Filchner's Antarctic expedition:

Scientists	**Officers**
Wilhelm Filchner, expedition leader for the voyage starting in Buenos Aires	*Richard Vahsel*, Captain (former II. officer of "Gauss" - First German South Polar Antarctic Expedition)
Heinrich Seelheim, expedition leader for the voyage Bremen - Buenos Aires (left in Buenos Aires)	*Wilhelm Lorenzen*, I. officer, captain after Vahsel's death
Erich Barkow, meteorologist	*Johannes Müller*, watch and navigation officer
Wilhelm Brennecke, oceanographer	*Walter Slossarczyk*, III. and wireless officer, committed suicide at South Georgia
Fritz Heim, geologist	*Wilhelm Goeldel*, ship's doctor
Felix König, mountaineer	
Ludwig Kohl, medical doctor and mountaineer (left the expedition in South Georgia)	22 seamen, among them ice pilot *Paul Björvik* and three other seamen of "Gauss" – First German South Polar Antarctic Expedition (1901-1903).
Hans Lohmann, zoologist (left in Buenos Aires)	
Erich Przybyllok, astronomer and earth magnetician	
Willi Ule, geographer (left in Buenos Aires)	
Kaspar Neuberger, technician for motor sledges (left in Buenos Aires)	
Alfred Kling, watch keeping officer and captain of the return trip of "Deutschland" from South Georgia	

4.2.4 The "Deutschland" in the Weddell Sea

"Deutschland" left Buenos Aires on 4 October. The expedition arrived in Grytviken on South Georgia (Fig. 4-9) on 21 October 1911. Here Filchner became good friend with the leader of the whaling station of the Compania Argentina de Pesca Carl Anton Larsen (1860-1924).

During their stay at South Georgia they visited the former German station of the International Polar Year (1882-1883) to determine the changes of magnetic field

[7] Lüdecke 1995: 217-218.


Erich Barkow


Wilhelm Goeldel


Fritz Heim


Conrad Heyneck


Alfred Kling


Felix König


Wilhel m Lorenzen


Johannes Müller


Erich Przybyllok

Figure 4-8: Some Participants of the Second German Antarctic Expedition (1911-1912) (Filchner-Archive, BAdW, Munich).

since then[8]. They also took meteorological measurements for comparison with the data which would be taken at Antarctica. A research trip to the Sandwich Islands was stopped due to bad weather conditions. Kohl, who still suffering after an operation due to appendicitis had to left at Grytviken, before “Deutschland” left for southern Weddell Sea on 11 December. He later married Larsen’s daughter and was called Kohl-Larsen since then.

Figure 4-9: Whaling station in Leith Harbour at Grytviken on South Georgia (Filchner 1994: 45).

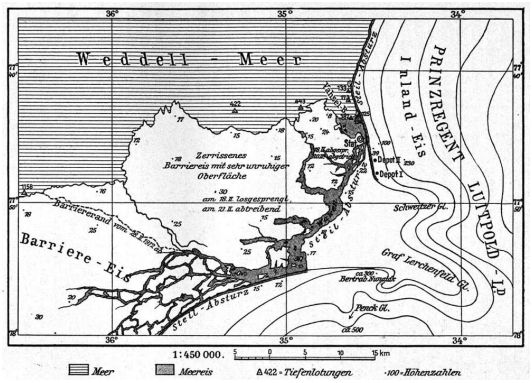

Figure 4-10: Northeast part of the Barrier and Vahsel Bay (Przybyllok 1913: 3).

On 30 January 1912 the expedition found land which was named Prinzregent – Luitpold-Land (Fig. 4-10, 4-15) . Caused by a sudden spring tide the attempts to install a wintering station in the "Vahsel-Bay" on a previously solid iceberg failed (Fig. 4-11). However, Filchner was the first to observe and to survey the decay of a gigantic ice field leaving behind the Herzog Ernst Bay (Fig. 4-13). Another started attempt to install the station on the ice cap could not be completed, too, firstly due to enormous ice barriers broken off by the flood, and later by rapidly developing sea ice. It was decided to stop the plan to reach the ice cap or even the Antarctic continent and to try to return to the open sea in direction of South Georgia.

Figure 4-11: After the catastrophe on Station Iceberg, 18 February 1912 (Filchner 1994: 116).

Figure 4-12: Dog lines durring ice drift, 7 September 1912 (Filchner 1994: 183).

[8] Filchner 1994: 51-57.

By various manoeuvres the ship could be let out from the most dangerous areas, where it presumably would have been crushed by pack ice. Nevertheless, the ship soon was inevitably trapped by ice at 73°34' S, 33°12' W. Unable to move, the ship started on 15 March 1912 an 8-month drift north generated by the Weddell Sea Gyre (Fig. 4-12).

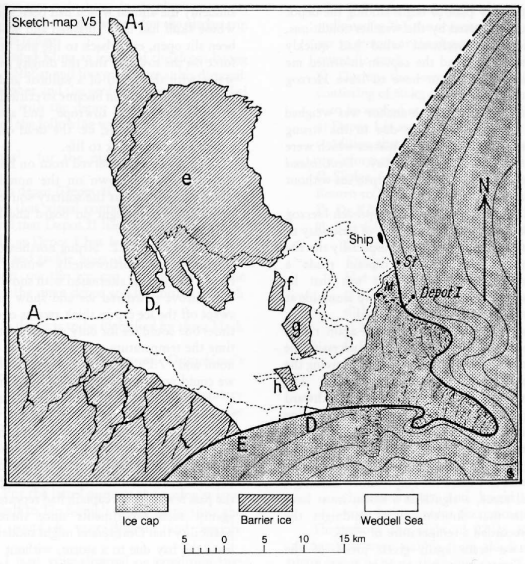

Figure 4-13: Status of break-up of part of the barrier, 7 p.m., 24 February 1912 (Filchner 1994: 127).

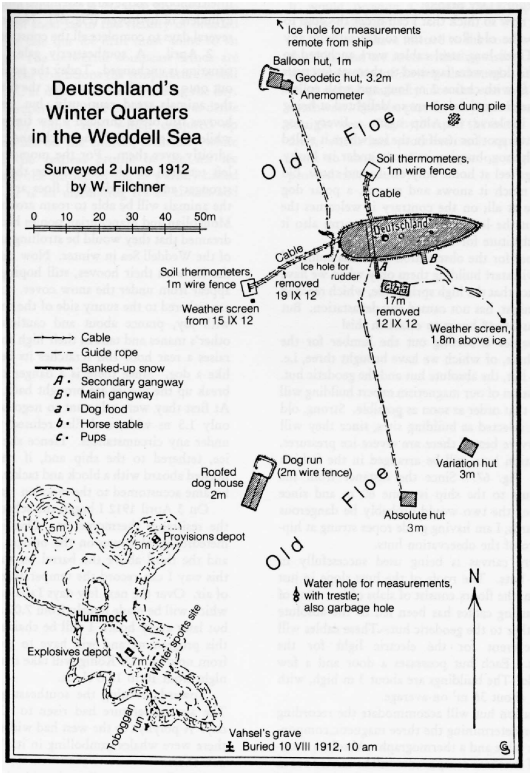

Figure 4-14: Sketch of "Deutschland"'s winter quarters in the Wedded Sea (Filchner 1994: 1 47).

A station for scientific observations was installed on solid sea ice and the work was continued as far as the conditions allowed (Fig. 4-14). By this occasion a 160 km sledge trip was undertaken to the location 70°32' S, 43°45' W to investigate whether the suspected Morell Land existed or not. It proved that former reports were obviously based on fallacies by mirages. On 8 August 1912, captain Vahsel died due to syphilis, succeeded by Lorenzen, whom Filchner disliked as much as Vahsel before. The social conditions aboard "Deutschland" had developed unfavourable with two groups fighting against each other and thus obstructing all activities. On 26 November the ship got free at 63°37' S, 36°34' W and immediately returned to South Georgia, arriving there on 19 December. With Larsen's help the expedition was dissolved officially due to a mutiny against Filchner. The plans for a further expedition to Antarctica were no more discussed.

4.2.5 Results

Filchner showed that there was no inlet in the Weddell Sea, but a limiting ice shelf - today called Filchner Ice Shelf. Just by chance the southern most

sounding of the ocean depth (1158 m) indicated a trench, which nowadays is called the Filchner Trench, leading in a NE-SW direction. When the "Deutschland" drifted in the Weddell Sea it provided the first evidence of the Weddell Sea Gyre.

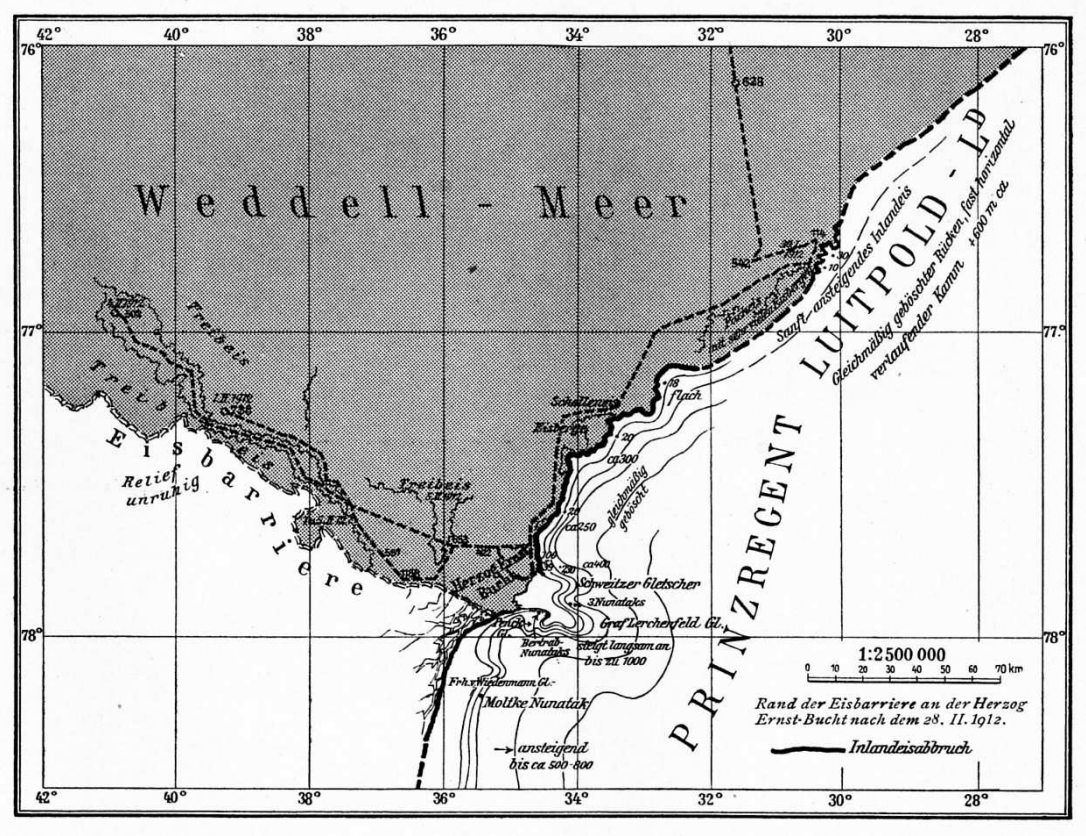

Figure 4-15: Prinzregent Luitpold-Land and the position of the Ice Barrier, 28 February 1912 (Filchner 1994: 93).

Apart from these rather accidental results, pioneering work was done by aerological ascents to describe the condition of the upper air of the Weddell Sea, which showed an inversion of temperature at 2000 m.

Oceanographic investigations, moreover, led for the first time ever to a description of the temperature distribution of the southern Atlantic Ocean. Most interesting was the discovery of four alternate ocean layers transporting warmer and colder water south and north respectively.

4.3 Outlook

In 1982 the German Antarctic "Filchner-Station" was installed on the Filchner Ice Shelf in the Southern Weddell Sea. The tasks for the station, operated by the Alfred Wegener Institute in Bremerhaven were especially glaciological and geophysical research on the shelf ice (Filchner-Ronne Ice-Shelf Programme - FRISP). In 1998 a several thousand square kilometres large block broke off from the shelf ice and started to drift off. At the time of the event no staff was in the station. In a special action in February 1999, all equipment could be rescued and brought to the *Polarstern*.

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Przybyllok, E., 1913, Deutsche Antarktische Expedition. Bericht über die Tätigkeit nach Verlassen von Südgeorgien. Zeitschrift der Gesellschaft für Erdkunde zu Berlin, 1-17.

Uebach, H., 1999: personal communication.

4.5 Appendix: Books written or initiated by W. Filchner

4.5.1 Popular Books

Ein Ritt über den Pamir, Berlin 1903
Das Kloster Kumbum in Tibet. Ein Beitrag zu seiner Geschichte. Berlin 1906
Das Rätsel des Matschu. Meine Tibet-Expedition. Berlin 1907
Quer durch Spitzbergen, Berlin 1911
Zum sechsten Erdteil. Die zweite deutsche Südpolar-Expedition. Berlin 1923
To the Sixth Continent: The Second German South Polar Expedition, 1911-1913. Translated and edited by W. Barr, 1994
Sturm über Asien. Erlebnisse eines diplomatischen Geheimagenten. Berlin 1924
Quer durch Osttibet. Berlin 1924
Tschung-Kue. Das Reich der Mitte. Alt-Chinavor dem Zusammenbruch. Berlin 1925
Hui - Hui – Asiens Islamkämpfe. Berlin 1928
Wetterleuchten im Osten. Erlebnisse eines diplomatischen Geheimagenten. Berlin 1928
Om mani padme hum. Meine China- und Tibetexpedition 1925/28. Leipzig 1929
Kumbum Dschamba Ling. Leipzig 1933
Bismillah! Vom Huang Ho zum Indus. Leipzig 1938
Ein Forscherleben. Wiesbaden 1950
In der Fieberhölle Nepals. Wiesbaden 1951
together with D. Shridhar Marathe: Hindustan im Festgewand. Celle 1953
Kumbum. Lamaismus in Lehre und Leben. Zürich 1954

4.5.2 Scientific Work

Wissenschaftliche Ergebnisse der Expedition Filchners nach China und Tibet 1903-05, 11 vol., 6 map-collections, 1906-14
Ergebnisse der W. Filchner'schen Vorexpedition nach Spitzbergen 1910. Dr. H. Philipp (Hrsg.), 1914
Erdmagnetische Messungen während der deutschen Antarktischen Expedition von Prof. Dr. E. Przybyllok
Die astronomischen Ortsbestimmungen und Höhenmessungen Dr. Filchners auf seiner Expedition in China und Tibet 1926/28. Ed. by E. Przybyllok and K. Walter
Die erdmagnetische Beobachtungen von Dr. W. Filchners auf seiner Reise nach China und Tibet 1926/28. Ed. by O. Venske
Kumbum-Dschamba-Ling. Das Kloster der hunderttausend Bilder. Leipzig 1932
Kartenwerk der erdmagnetischen Forschungsexpedition nach Zentralasien 1926-28, Erster Teil: China und Tibet I. 1933, China und Tibet II. 1937
Geographische Bestimmungen und Höhenmessungen in Zentralasien. Ed. by E. Przybyllok, 1939
Meine geophysikalischen Arbeiten in Zentralasien. 1939
Route Mapping and Position Locating in Unexplored Regions. New York 1957. Together with E. Przybyllock and T. Hagen:

Most of the popular books were published in more than one edition. Still today the internet lists numerous books by W. Filchner. The electronic book research system "Zentrales Verzeichnis Antiquarischer Bücher (ZVAB)" e.g. lists about 1300 findings or "Abebooks" 1000 respectively (status summer 2005).

5 Argentine Antarctic Science, 1946-1959

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Abstract

This paper examines the motivations behind Argentine scientific research in Antarctica between 1946 and 1959. It argues that that Argentina conducted Antarctic research primarily for political purposes. During these years Argentina was engaged in a complicated dispute with Great Britain and Chile over the sovereignty of the Antarctic Peninsula, and Argentine politicians used science in various ways to support their claims. The paper will also show how the relationship between science and politics changed over time as both international and domestic circumstances changed. These changes will be examined by looking at the organizational structure of Argentine Antarctic Science, the type of scientific research conducted, and the ways in which Argentine politicians made use of Antarctic science in their political rhetoric.

5.1 Introduction

In 1959, Contraalmirante Rodolfo N. Panzarini, director of the Argentine Antarctic Institute, published an article entitled "Argentine Scientific Interests in Antarctica."[1]. In this article Panzarini attempts to set out the motivations for Argentine involvement in Antarctic science. The article begins with a description of the uniqueness of the Antarctic continent and the sheer excitement of scientific research in the region. It goes on to stress the connections between Antarctica and the Southern Hemisphere in such fields as geology and meteorology, arguing that geographical proximity gives Argentina both a special responsibility to conduct research in the region and a particular advantage in doing so. Utility is a major part of his justification of Argentine scientific interests. He mentions potential mineral resources alongside actual marine riches, and also argues for the usefulness of Antarctic research in various fields such as weather forecasting, radio communications, and air transport. The article stresses the difficulty of conducting scientific investigations in such an inhospitable environment, but states proudly that Argentines have proved themselves capable of the challenge. Finally, Panzarini makes a moral or utopian case for Argentine Antarctic Science, arguing that such research enhances an understanding of the planet, which he sees as an intrinsically good thing. One factor entirely absent from Panzarini's discussion, at least on the surface, is that of politics.

This paper will address a similar question to that posed by Panzarini: why did Argentina engage in scientific research in Antarctica between 1946 and 1959? However, in contrast to Panzarini, this paper will argue that during these years Argentine Antarctic Science took place primarily for political purposes. Throughout this period Argentina was involved in a complicated dispute with Britain and

[1] Panzarini 1959.

Chile for the sovereignty of the Antarctic Peninsula and the surrounding sub-Antarctic islands[2].

Argentine governments – in a similar fashion to their British and Chilean counterparts – used the scientific activities of Argentine nationals to support their claims to legal possession of the region. This international sovereignty dispute was a constant throughout the period 1946-1959, and Argentine governments never ceased to use Antarctic science to support their claims. At the same time, as this paper will show, the ways in which politicians promoted and used Antarctic science changed over time as both internal and external circumstances changed. By the time the Antarctic Treaty was signed in 1959, the connection between Antarctic science and politics had become very different from in 1946.

This paper will investigate the various connections between Antarctic science and politics at three levels: the organizational structure of Argentine Antarctic Science the nature of the scientific research conducted, and the use made of Antarctic science in Argentine political rhetoric. Following a brief historical background to the sovereignty dispute, the first main section of the paper will suggest that Argentine Antarctic Science over the period 1946-1959 broke down into three distinct phases: 1946-1951, 1951-55, 1955-1959. The second and third main sections of the paper will follow this chronological division as they examine the nature of Argentine scientific research in Antarctica and the changing ways in which politicians made use of this science.

5.2 Historical Background

During the Spanish Colonial period, Imperial Spain made claims to lands in the Western Hemisphere all the way to the South Pole. However, by the time of Argentine independence in 1816, Antarctica remained undiscovered, and the Spanish claims remained hypothetical at best. During the nineteenth century Argentina had some involvement with the Antarctic sealing industry, but it was not until the beginning of the twentieth century that the South American country began to show any official interest in the southern continent. In November 1903 an Argentine naval ship, the *Uruguay*, rescued the stranded members of Nordenskjold's *Antarctic* Expedition. In the same year the Argentine government took over the operation of a meteorological station on the South Orkney Islands built by the Scotsman William Speirs Bruce. In late 1904, an Argentine company, the Companía Argentina de Pesca Sociedad Anónima, began whaling operations from South Georgia. In 1907, and again in 1908, Foreign Ministers from Argentina and Chile met to discuss the question of Antarctic sovereignty. But these negotiations broke down without agreement, territorial rights in Antarctica did not become an important question in Argentine politics until thirty years later.

In 1908 Great Britain claimed possession of the Antarctic Peninsula and the surrounding sub-Antarctic islands by issuing Letters Patent (a form of Government Decree) that created the so-called Islands Dependencies[3]. This claim was

[2] Beck 1986: 21-148.
[3] Beck 1983.

revised in 1917 to avoid an overlap with Chilean and Argentine Patagonia. The main purpose of the British claim was to tax and regulate the booming South Atlantic Whaling Industry, centered upon the island of South Georgia[4]. The very name of the Dependencies, together with their administrative connection with the Falkland Islands, led to discontent among many Argentines, for whom the Islas Malvinas, taken by force by Britain in 1833, were becoming a symbol of national unity[5]. However, it was not until the mid 1930s, with the surge of a particularly anti-British nationalism in Argentina, that the Antarctic Peninsula really started to become an important issue in Argentine politics[6].

Just before the outbreak of the Second World War, a Norwegian invitation to attend a polar conference in Bergen stimulated further Argentine interest in Antarctica[7]. The outbreak of hostilities in Europe meant that the Bergen conference did not take place, but the provisional Argentine Antarctic Commission formed to prepare Argentina's case at the conference remained operative. In November 1940, the Government of Chile seized the diplomatic initiative by making its own claim to the Antarctic Peninsula which overlapped substantially with that of Britain[8]. Over the course of the next six years – through maps, expeditions, acts of possession and government statements – Argentina put forward its own official claims to the Peninsula region, thereby setting the stage for a three way sovereignty dispute with Great Britain and Chile (see Fig. 5-1 for the Argentine claim)[9]:

Towards the end of the Second World War, Great Britain responded to South American assertions of sovereignty in Antarctica by sending the secretive Operation Tabarin to establish a legal effective occupation in the region[10]. The British expedition had a significant scientific component, which strengthened the link between Antarctic politics and Antarctic Science and influenced the subsequent sovereignty dispute[11]. The connection between Antarctic science and politics was not an entirely new one: the earlier "scientific" expeditions of Shackleton, Mawson, Richard Byrd and the British Discovery Investigations had all contained significant political undertones. In May 1940 the newly created Argentine Antarctic Commission headed by Isidoro Ruíz Moreno made a report to the Argentine Government regarding the legality of a potential Argentine claim to the region.[12] The report had concluded that Argentina did have a good case for sovereignty in the Antarctic Peninsula, not only because of its geographical proximity, but also because it had exercised "effective occupation" over the entire region since 1904 through its meteorological station at Laurie Island in the South Orkneys. From the very start of the active period of the sovereignty dispute, the Argentine government made use of the scientific research of its nationals to support its political ambitions[13].

[4] Tønnessen and Johnsen 1982: 178-182.
[5] Guber 2001: 75-90.
[6] Piñeiro 1997.
[7] Comisión Nacional del Antartico 1948: 69.
[8] Pinochet de la Barra 1994: 37.
[9] Genest 2001: 97, 100-101.
[10] Dodds 2002: 14-19.
[11] Fogg 1992: 164.
[12] Ruiz Moreno May 1940.
[13] Moneta 1944; Sobral 1904.

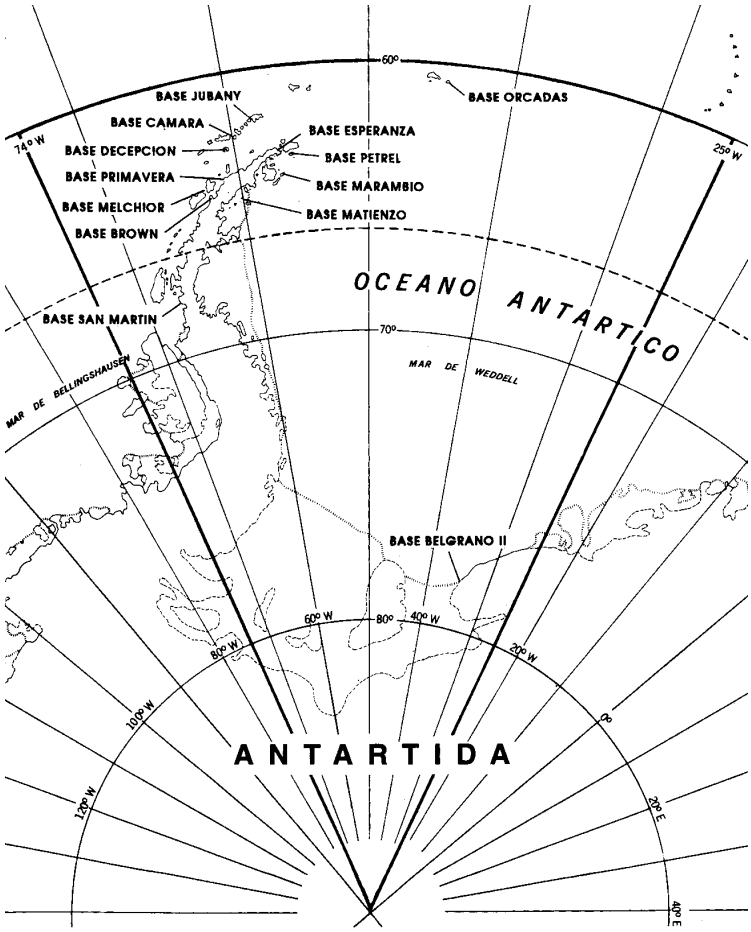

Figure 5-1: Contemporary Argentine map of the Antarctic Peninsula. Most of the Argentine bases shown were built in the period 1946-1959.

5.3 Organizational Structure

For the vast majority of the period between 1946-1959, Argentine Antarctic Science was not in the hands of specifically scientific ministries. Instead, it was under the direct or indirect control of the Foreign Ministry or various branches and incarnations of the Ministry of Defense. This gives a rather crude initial clue as to the purpose of Argentine scientific research in Antarctica at this time. In a more complicated fashion, the changing nature of the institutional structure that lay behind Argentine Antarctic Science provides a useful insight into the politics, especially the internal politics, that lay behind the science. The key figure in Argentine politics at this time was General Juan Domingo Perón, who was president of Argentina between 1946 and 1955[14]. Between 1946 and 1959, Argentine Antarctic Science can be broken into three distinct periods that broadly follow the chapters within Perón's presidency 1946-51, 1951-55, 1955-59. These sections will be explored in detail in the paragraphs that follow. Argentine Antarctic Science was not an abstract and separate part of Argentine history over this period, but rather that it was an integral part of the broader changes.

[14] Page 1983.

In March 1946, shortly after the election of General Perón, decree number 8,507 reorganized the Argentine Antarctic Commission, under the leadership of José M Moneta, a famous figure in the history of Laurie Island[15]. The commission had originally been created in 1940 but had become inactive after a military coup in 1943[16]. The re-organized Antarctic Commission remained part of the Ministry of Foreign Affairs and Worship, although it greatly increased the scope of its membership to include representatives of the Justice, War, Naval, Agriculture and Aeronautical Ministries. The main task of the Commission was political rather than scientific: namely to send expeditions to Antarctica in order to assert Argentina's sovereignty rights. Several months after the reorganization, Moneta resigned, claiming that the new President failed to support his plans for renewed Argentine activity in Antarctica[17]. Pascual La Rosa, who succeeded Moneta as leader of the commission in October 1946, enjoyed greater support from the President and under this new leader Argentina resumed its expeditions to Antarctica.

Early in 1947, Argentina sent its first expedition to Antarctica for four years. This expedition, which founded a meteorological station in the Melchior Archipelago, was conducted almost entirely by the Navy and set the tone for similar such expeditions which took place in 1948, 1949 and 1950[18]. The dominant role of the Navy in Antarctic expeditions meant that Naval Officials came to dominate the organizational structure. The Navy's hegemony in Antarctic affairs had been earned through over 40 years of involvement with the southern continent, but during this period it was something of a double-edged sword for President Perón. On the one hand, moves to assert Argentine sovereignty in Antarctica – particularly against British "imperialists" – fitted neatly with the nationalist element of Perón's policy. On the other hand. the Navy was perhaps the Argentine Institution most fiercely critical of the new President, and its leaders saw in Antarctica a chance to assert their autonomy[19]. As Perón's grip on power in Argentina increased, he looked for a way to usurp the Navy's power in Antarctic Affairs.

The second phase in the chronology of Argentine Antarctic Science began with Perón's takeover of Antarctic affairs. Perón's actions in assuming control of Antarctic policy mirrored his tactics in other areas of national life. Unhappy with the existing organizational structure, Perón simply created a new organization, favored this with his patronage and put his own man in charge. The foundation of the Instituto Antártico Argentino early in 1951, coincided with the so-called First Argentine Scientific Expedition to Antarctica that took place at the same time and which founded the San Martín base in Marguerite Bay. The driving force behind both the Instituto and the Scientific Expedition was Colonel Hernán Pujato of the Argentine Army[20]. Pujato had won the support of the President by putting forward a systematic program for a permanent Argentine presence in Antarctica. This program included greater scientific activity in the region.

[15] Genest 2001: 68.
[16] Comisión Nacional del Antártico 1948: 72.
[17] Comisión Nacional del Antártico 1953 [unpublished].
[18] Pierrou 1981: 91-349.
[19] Barbadori 1999.
[20] Genest 1998; Rigoz 2002.

Pujato's rise in Antarctic affairs marked a distinct shift from the Navy to the Army. High ranking naval officers responded to this shift by refusing to supply a boat to the Scientific Expedition, meaning that a merchant vessel, the *Santa Michaela*, had to be found instead[21].

Initially the Instituto – soon to be renamed the Instituto Antártico Hernán Pujato – was under the control of the Ministry of Technical Affairs. This was the nearest that Argentine Antarctic policy during the period 1946-1959 came to being under the control of a specifically scientific ministry. But in July 1952 the Instituto passed to depend upon the Ministry of Defense and its successors. Although the Instituto did make a greater effort to coordinate Antarctic Science, its primary purpose remained political as the preamble to its founding decree made clear: "It is the firm intention of this government to secure undeniable rights to the Antarctic region for the Argentine nation." The Antarctic Commission in the Ministry of Foreign Affairs was never formally disbanded during this period, although its importance waned rapidly after the foundation of the Antarctic Institute. Through the creation and patronage of the Antarctic Institute Perón left his distinctive stamp upon the organization structure of Argentine Antarctic Science. However, in doing so he had further alienated the Navy.

The third phase of Argentine Antarctic Science during this period began when the Revolución Libertadora toppled President Perón in September 1955. At this time General Pujato was commanding Argentina's newly constructed Belgrano base on the edge of the Filchner Ice Barrier in the Weddell Sea. When Pujato returned to Argentina early in 1956, the new government immediately informed him that he was no longer director of the Argentine Antarctic Institute, and he was forced to resign. The Revolución Libertadora, which had been largely inspired and led by Naval Officers, therefore marked another distinct shift in the organizational structure of Antarctic Science. However, the new military government maintained Perón's overall policy of asserting Argentina's rights to sovereignty in the region.

Under the military government, the Instituto Antárctico was re-constituted for a second time and became part of the Naval Ministry; Contraalmirante Panzarini became its new director. The decree that reorganized the Instituto stated that it was "an organism of scientific and technical character with the purpose of studying Antarctica." The Instituto moved to its present location in the center of Buenos Aires, and the building was equipped with up to date scientific facilities including apparatus purchased in the United States[22]. By this stage Antarctic Science had gathered international significance with preparations for the International Geophysical Year that would take place between 1957 and 1958, and the Instituto played a major role in coordinating Argentina's contributions to this important scientific endeavor. Prestige in Antarctic affairs had become inextricably linked to scientific research, and the political and scientific work of the Instituto could hardly be distinguished. By the time the Antarctic Treaty was signed in 1959, Argentina had returned to democratic government under President Frondizi.

[21] Rigoz 2002.
[22] Comerci 1979.

The Treaty was presented to the Argentine people as a guarantee of Argentina's sovereignty in the region rather than as an internationalization of the continent. Nevertheless, the Treaty led to a major change in the international politics of Antarctica and represented a conclusion of sorts to the three-way sovereignty dispute in the Antarctic Peninsula.

5.4 Antarctic Science

The organizational structure of Argentine Antarctic Science can only tell us a limited amount about the type and the nature of the Antarctic science carried out by Argentine scientists during the period from 1946 to 1959. To learn more about the science as science we have to turn to other sources, most notably to the published results of the research. These published scientific papers may be misleading, since for the first two parts of the chronology outlined above, Argentine scientific publications on Antarctica were very limited. Only in the third period from 1955 to 1959 did publication really take off, especially through the Instituto Antártico's "contributions" series[23] This does not mean that no research took place in the first two periods of my chronology; indeed, many of the papers are based on research carried out at precisely this time. Nor can the Institute's own publications be taken as representing all the scientific work taking place in Antarctica: much meteorological research, for example, appears to have been published and used in different ways. But the expansion of scientific publication after 1955 does tell us something about the changing priorities of Argentine Antarctic Science, not least the fact that from this date onward the country felt that it was politically expedient to be seen to be doing scientific research. And the publications themselves do give some hint as to the focus of Argentine Antarctic Science.

Between 1946 and 1951 there was little co-ordination of Argentine scientific research. Just as the Navy dominated the political organization during the period, so too it dominated the scientific work being carried out. The simple fact that it was the Navy that was providing transport for the expeditions meant that it was the Navy that was in a position to carry out research. The research conducted quite naturally reflected the priorities of the Navy: oceanography, cartography and meteorology. For example, the expedition of 1946/47 established a meteorological station in the Melchior Archipelago; the expedition of 1947/48 accelerated hydrological studies in the Gerlache Strait, the Melchior Archipelago and Dallman Bay[24] It could be argued that some of this work, in particular cartography, had an obvious political dimension. Maps had been used by the Instituto Geográfico Militar to make Argentine claims to the region, and maps provided the battlefield upon which the "war of Antarctic names" took place.[25] To name a place was to claim it, and Argentina renamed many of the places which had been given English names. Additionally maps and charts – as well as meteorology and oceanography – were useful strategic tools, and helped to give a country a practical advantage in the region. The high quality of Argentine cartography was revealed by a British Admiralty complaint to the Foreign Office that

[23] Dirección Nacional del Antártico 1983.
[24] Pierrou 1981: 91-349.
[25] Dodds 2002: 13-36.

the Argentines and Chileans had far superior maps[26]. At this stage the link between science and politics remained fairly obvious, as the scientific research conducted had clear political advantages.

The "First Scientific Expedition to Antarctica" sent to establish the San Martín base in Marguerite Bay in 1951, may have been intended primarily as a political tool to wrest control of Antarctic matters from the Navy, but it also began a period in which the range of scientific research being carried out increased markedly. Two main factors assisted with this increase. Firstly, the Antarctic Institute provided a center to co-ordinate and focus Antarctic Research, under the single-minded leadership of Pujato. Secondly, the fact that the Army took over from the Navy as the dominant force in Antarctica led to a growing interest in the interior of the Peninsula. During this period various studies took place: geological surveys of Deception Island and Half Moon Island; underwater geology of Deception Island; investigations of the Paleontology of Hope Bay; bio-ecological investigations of insular and continental fauna; glaciological studies; astrophysical and geomagnetic studies; contributions to the study of systematic botany; studies of human life in Antarctica; and contributions to the geological study of the South Orkneys.[27] These scientific investigations were carried out by a team of researchers from the national universities and from various state bodies. Generally, the results of this work were not published until a later date, and General Pujato became keen to accelerate the publication process. The first scientific paper published by the Instituto Antártico – I.R. Cordini's "Contribution to the Knowledge of the Argentine Sector of Antarctica" – came out in 1955 before the overthrow of Perón. It is interesting for a number of reasons, not least because of its politicized title and for the fact that the name "Hernan Pujato" has been erased from every page. During this stage, Argentine scientific research began to move away from having the obvious political motivations of the earlier period, although, as the title of Cordini's work revealed, politics remained very close to the surface.

Between 1955 and 1959 the Argentine Antarctic Institute published 47 scientific "contributions."[28] The number of articles dealing with the following themes was as follows: campaigns/expeditions (16); biology (10); geology (5); institutional (5); geophysics (3); meteorology (2); oceanography (1); cartography (1); human ecology: (1); other (3). Apart from the large focus on campaigns and expeditions (over one third) there does not appear to be any significant political trend in the type of scientific research being published. Biology and Geology are high on the list mainly because the Peninsula region lends itself to such studies. The relative absence of publications on Meteorology, Oceanography and Cartography reflects the fact that the National Meteorological Service, the Navy and the Instituto Geográfico Militar each continued with their own research independently of the Antarctic Institute. In 1956 a scientific department was formally integrated into the Instituto.[29] The permanent scientific staff was made up of four geologists, two biologists, two geophysicists, one physiologist, one chemist, one meteorologist, and one glaciologist. The head of the scientific department

[26] Dodds 2002: 26.
[27] Comerci 1979: 32.
[28] Dirección Nacional del Antártico 1983.
[29] Comerci 1979.

was Otto Schneider, a geophysicist. The inclusion in the scientific department of several scientists who had earlier worked with Pujato suggests a certain political pragmatism among both the scientists themselves and the Institute.

The most important scientific research done by Argentine scientists during this final period was done as part of the IGY, that took place during 1957 and 1958. This work was detailed in an Argentine report to SCAR.[30] All eight of Argentina's permanent stations participated in some way with the IGY research, as did several research ships and temporary scientific bases. Research was done in ten main areas: meteorology, geomagnetism, the aurora, the ionosphere, glaciology, seismology, oceanography, tides, gravity and biology. The aurora research is an interesting example since it took place at all eight permanent stations and was coordinated by the Instituto Antártico. Each station conducted a visual observation of the night sky for three hours every day and gave a detailed description of the aurora where it was present. On special alerts and the so-called "World Days" additional observations were taken. The report to SCAR notes that "All stations were equipped with cellulose acetate color filters and with a special auroral clinometer. Some stations had, in addition, red and green interference filters. Aerological sounding theodolites were used by some observers for detailed observation of azimuths and elevation angles."

Additionally, the Belgrano base near the Filchner Ice Barrier on the Weddell Sea (Argentina most southerly base's) was equipped with an Alaskan type "all sky camera." This camera took 24 hour continuous recordings during the dark season, and continuous nocturnal readings for the period between March and September 1958. By this stage there appears to have been no direct political motivation behind the type of research conducted, although it is interesting to note that all Argentina's research during the IGY took place within the sector which Argentina claimed.

5.5 Political Rhetoric

Throughout the period 1946-1959 Argentine politicians made use of the scientific work being done by Argentine nationals in Antarctica, in order to support their claims to sovereignty in the Antarctic Peninsula. In the crudest form, politicians viewed scientists as effective occupiers of Antarctic territory: to boast of Argentine nationals living and working in the Antarctic Peninsula was to make a legal case for possession of the region. In a similar fashion, politicians used the fact that Argentine scientists were taking the trouble to conduct scientific research in such inhospitable surroundings as evidence of Argentina's commitment to the region. This "difficulty" argument was often loaded with racial undertones, and the political rhetoric presented Antarctica as a proving ground for the Argentine *criollo* race. In a much more sophisticated fashion Argentine politicians actually built the results of scientific enquiry into their case for sovereignty. For example, the Natural History Museum in La Plata displays fossils discovered in the Antarctica Peninsula alongside similar fossils discovered in Argentine Patagonia, putting the two together to make a case that the Peninsula

[30] Instituto Antártico Argentino 1960.

region is a "natural" extension of Argentine territory. By the 1940s and 1950s, many of the scientific facts used by Argentine politicians to support their case – such as that of geological continuity – had already been established. But during this period there was an ongoing dialogue between politics and science, especially as the IGY approached. Many Argentine scientists – just like their British and Chilean counterparts – attempted to give their research a political significance in order to win wider support for their work. Far from being neutral idealists, Antarctic scientists often presented themselves as extremely committed to the political cause.

Juan Domingo Perón was the consummate political opportunist, and shortly after becoming President he came to see Antarctica as a cause that could rally the Argentine people around him. From the Argentine point of view, sovereignty in Antarctica was intimately connected to the question of the Islas Malvinasand their illegal occupation by the British. Claims against the British in Antarctica therefore created a form of "formal imperialism" upon Argentine territory, which neatly complemented Perón's campaign against British "informal imperialism" in Argentina itself.[31] In the first period of his Presidency, the role of the Navy in Antarctic affairs put Perón in an awkward situation: he could not overemphasize the Antarctic issue without giving implicit support to his internal enemies. But this did not stop Perón making use of Antarctic science and geography in his political rhetoric. Perón's fullest expression of his Antarctic doctrine in this period came in the introduction to a booklet published in 1948 by the *Comisión Nacional del Antártico* entitled *Soberanía Argentina en La Antártida:*

> "The fundamental fact is that this region constitutes a natural geological prolongation of our territory, situated in the most southern part of our land and in the extreme south of America. Geographical and historical reasons add to our legal case for sovereignty."[32]

Claims to sovereignty based upon proximity and geographical continuity meant that Argentina could not entirely deny Chile's claims to Antarctic Sovereignty. Indeed, so long as Argentina remained the senior partner, Perón's position during this period was very much to work alongside the Chileans promoting the idea of *Antártida Sudamerica* against the pretensions of British imperialists.[33]

Following the First Scientific Expedition to Antarctica and the Creation of the Instituto Antártico Hernán Pujato, Perón found himself in a much better position to make political capital out of the Antarctic Sovereignty dispute. The period 1951-1955 saw a rapid increase in the use made of Antarctica and Argentine Antarctic Science in political rhetoric. The magazine *Mundo Peronista* provides an extreme example of Peronist propaganda. One article, entitled "For all the men of the world", discusses Argentine scientific research into cosmic radiation.[34] After explaining the great work that Argentine scientists were doing for the good of humanity, the article concludes that such research could only take place in Argentina because of its privileged geographical situation stretching from Salta in the north to the South Pole. Such rhetoric works at a number of

[31] Hennessy and King 1992.
[32] Comisión Nacional del Antártico 1948: 10.
[33] Genest 2001.
[34] Mundo Peronista 15 October 1951.

levels: the idea of Argentina justifying its sovereignty through conducting useful scientific research resonates with traditional utilitarian justifications of imperialism. Other articles were less subtle. On 15 May 1952 the *Mundo Peronista* published an article about Pujato's establishment of the San Martín base with the headline "The Peronist example with the support of Perón and of his people." When asked about his most memorable moment in Antarctica, General Pujato recalls the Argentine elections of 1951 and states that all eight members of his expedition voted for Perón: "Eight creole hearts, eight creole votes!" Such blatant politicization of the Antarctic issue became all pervasive, and even entered school curricula and text books.[35] During these years the political rhetoric around Antarctica was by no means confined to scientific interests, but politicians did not hesitate in using the work of Argentine scientists or their results when these suited their political purposes.

The overthrow of Perón in 1955 brought about a marked change in the political use of Argentine science. Whereas science had generally been only one part of Peronist political rhetoric concerning the Antarctic issue, in the period 1955 - 1959 it became central. This shift occurred more because of the growing international importance of Antarctica than because of internal changes in Argentina; although there was a generally acknowledged opening up of Argentine universities during this period that may well have had some impact. The importance of the International Geophysical Year (IGY) cannot be overstated.

From the mid 1950s scientific research became the currency of political debate in Antarctica: without a substantial scientific research program, a country lacked a voice in the political negotiations. Under the leadership of Panzarini the Antarctic Institute represented Argentina in the four conferences of coordination of the IGY, and participated in the formation of SCAR.[36]

In his article "Argentine Scientific Interests in Antarctica," Panzarini concludes his discussion of Argentine Antarctic Science as follows:

> "The geographical nearness, the historic tradition, the existing organization, the character of the interests in play, the clear understanding of the essence of each problem, the scientific and technical capacity of Argentina and the availability of the material and human resources, establishes a harmonious combination of factors that constitutes a valuable inheritance and signals an unavoidable duty for the country, namely to undertake a high quality and intense scientific activity in Antarctica."[37]

In this paragraph there is a sense that the rhetoric of Argentine Antarctic Science has gone full circle. Panzarini's language sounds very similar to Perón's case for Argentine sovereignty in Antarctica written eleven years earlier, which in turn mirrors the original language used by the Argentine Antarctic Commission in their letter to the Foreign Ministry in 1940. Just as Moreno and his colleagues used geology and geography to justify an Argentine interest in Antarctica, Panzarini is ostensibly making a case for scientific research rather than legal possession. In the context of 1959 the absence of any explicitly political rhetoric in Panzarini's article is hardly surprising. The overlapping language of

[35] Escudé 1992.
[36] Comerci 1979.
[37] Panzarini 1959.

science and politics suggests that the two elements have become profoundly connected, to the extent that even Panarinzi's failure to mention political motivations can be seen as being to some extent political. In the new language of the IGY, SCAR and the Antarctic Treaty negotiations, it was no longer politically expedient to mention politics.

5.6 Conclusion

At the Antarctic Treaty negotiations in Washington D. C. in 1959, Adolfo Scilingo, the head of the Argentine delegation, made a strong case against the proposed freedom of scientific investigation in Antarctica[38]. Argentina feared that absolute freedom to conduct scientific experiments would undermine its supposed sovereignty in the region. "Scientific" bases could be established wherever a country wanted, and could then easily be used for other, more hostile, activities. In the context of the Cold War, the Soviet Union, rather than Chile and Great Britain, aroused the greatest suspicion. Argentina, which had become adept at using science as a vehicle for political purposes, could recognize when others were doing the same. Although Argentina eventually gave some ground on Article 2 – the freedom of scientific investigation would remain as it had been during the IGY – in exchange for the proscription of nuclear activities in the continent, its initial opposition to such a clause clearly reveals the superficiality of any notion of "pure science".

This paper has made two connected arguments. Firstly, throughout the period 1946-1959 the Antarctic sovereignty dispute between Argentina, Chile and Britain provided the primary motivation for Argentine Antarctic Science. Secondly, although this international political motivation remained a constant, the nature of the connection between science and politics changed over time, due to both internal and external circumstances. The broad connection between politics and science was not unique to Argentina: every country that participated in the scientific activities of the IGY in Antarctica had political reasons for doing so. However, the precise nature of this connection between science and politics in relation to Argentine Antarctic Science was unique, and this connection was always in flux. The political background to Argentine Antarctic Science does not detract from the quality of the science conducted, but it does explain the changing patterns of Argentine scientific activity over this period.

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[38] Scilingo 1963: 50-53.

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5.8 Appendix: Chronology of important events in Argentina and acticities in Antarctica 1946-1959

Year	Important Events in Argentina	Argentine Activities in Antarctica	Important Events in Antarctica
1946	(Feb) Perón elected President.	Official Map delimits the boundaries of Antártida Argentina between 25° W and 74°W, South of 60°S.	
1947	Nationalization of the British-owned rail-roads.	(Summer 1946/47) Naval Expedition to Antarctica. Foundation of base on Melchior Island.	Chilean, British, and North American expeditions to the Antarctica Peninsula.
1948		(Summer 1947/48) Naval Expedition to Antarctica. Foundation of base on Deception Island. (March) Joint Argentine -Chilean Declaration of mutual rights in Antarc-tica.	Chilean President Gon-zalez Videla visited Antarctica. United States began communications con-cerned with resolving the question of Antarc-tica sovereignty.
1949	Change to the Ar-gentine constitution removes Presidential term limits.	Routine Naval Expedi-tions	(January) Tri-partite naval agreement be-tween Argentina, Chile, and Great Britain.
1950		Routine Naval Expedi-tions	
1951	(November) Reelec-tion of President Perón with an in-creased majority.	(Summer 1950/51) “First Scientific Expedi-tion” to Antarctica, run by the Army. Found-ation of Base San Martin. Navy founds Base Almirante Brown. (April) Creation of the Instituto Antártico Argentino.	
1952	(July) Death of Eva Perón (“Evita”)	(Summer 1951/52) Foundation of Argentine Base at Hope Bay. (May) Pujato awarded the Peronist Medal, First Class.	“Hope Bay Incident” between Britain and Argentina. Shots fired.

1953		(Summer 1952/53) Foundation of Camara Base.	British Marines remove Argentine Scientists from Deception Island.
1954			
1955	(Sep) Overthrow of President Perón by Revolución Libertadora" Military Junta takes over power.	(Summer 1954/55) Argentine Army Expedition to the Weddell Sea. Establishment of Base Belgrano.	Paris Conference to discuss International Geophysical Year)
1956	Argentina under military rule	Panzarini replaces Pujato as the head of the Argentine Antarctic Institute.	
1957	Argentina under military rule	(Summer 1956/57) Pujato returns from Antarctica to be removed from his position.	(July) IGY begins. India wanted to raise the question of Antarctica at the United Nations.
1958	Frondizi elected President.		IGY continues throughout the year.
1959			(December) Signature of the Antarctic Treaty

6 The U.S. Antarctic Oversnow Geophysical-Glaciological Research Program of the International Geophysical Year (IGY) 1957-58, from the View of a Research Scientist Participant

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Abstract

When 12 countries established scientific stations in Antarctica for the 1957-58 International Geophysical Year (IGY), the Cold War was at its height, seven countries had made claims in Antarctica, and the Antarctic Treaty was a few years in the future. The U.S. program was operated by the Navy and territorial claims were secretly made at several locations during the IGY; these were never officially announced and the U.S. remains a non-claimant state. I was a graduate student geophysicist (assistant seismologist) on the unexplored Filchner-Ronne Ice Shelf as part of the only major field project of the U.S. Antarctic Program.

Starting in 1957, the U.S. began a series of oversnow traverses making seismic reflection ice soundings (and other geophysical measurements) and glaciological studies to determine the thickness and budget of the Antarctic ice sheet. The USSR and France made similar traverses coordinated through the IGY. Although geology and topographic mapping were not part of the IGY program because of the claims issue and the possibility of mineral resources, the oversnow traverse parties did geologic work, where unknown mountains were discovered. The oversnow traverses continued through 1966 and resulted in an excellent first approximation of the snow surface elevation, ice thickness and bed topography of Antarctica, as well as the mean annual temperature of that era and snow accumulation.

The vacuum tube dictated the logistics of the oversnow traverse program. Seismic equipment including heavy batteries weighed about 500 kg. Therefore a Sno-Cat tracked vehicle was needed to carry this load. Usually three such vehicles were needed for safety. Because about 3 l/km of fuel were consumed by each Sno-Cat, about 100 kg/day of fuel per vehicle was required. A resupply flight could carry only ~600 kg/flight (varying greatly as to range and type of aircraft). Other than the resupply of the seven U.S. stations in Antarctica, the major air logistic effort of the U.S. IGY program was support of the three oversnow traverses.

The Filchner Ice Shelf Traverse, 1957-58, in which I participated, encountered many crevasses. Vehicles broke through thin snow bridges and one man fell deep into a crevasse. Fortunately there were no deaths and only one serious injury resulting from crevasse accidents on the U.S. oversnow traverse program, in contrast to an aircraft death rate of 3.8 deaths per year in the U.S. program from 1955-61.

The oversnow traverses, of the IGY employed the inductive method of scientific research with only the general objectives of defining the Antarctic Ice sheet as to surface elevation, thickness, snow accumulation and temperature. In contrast, Antarctic research today employs deductive logic with narrowly defined objectives and testing of hypotheses. This change has been necessary because of expense, and competition of proposals by many scientists. Nonetheless something has been lost by this approach, and there is still the need for "exploration" types of research in the still unknown vast continent of Antarctica.

6.1 Introduction

In this paper I will concentrate on one of the U.S. IGY oversnow traverses, based on my personal experience. All of the U.S. traverses used the same equipment and techniques; however, the experience of each was unique. Our general objective (along with that of other countries) was the definition of the Antarctic Ice sheet (surface elevation, configuration, and thickness), snow accumulation and other glaciological parameters.

"You can only go to Antarctica for the first time once!" Thus I was told, so I recorded events conscientiously in a daily journal I kept from our departure in November 1956 until our return in January 1958 to Buenos Aires, Argentina, which was the basis for my IGY book (Behrendt, 1998). I am a geophysicist, and in 1956 I had just finished my master's degree and had obtained a position as assistant seismologist to work on the IGY glaciological program. I was a twenty-four year old graduate student when I sailed from the U.S. Navy base at Davisville, Rhode Island. I had romanticized Antarctic exploration since a boy, and although the pursuit of science and a Ph.D. degree was my ostensible purpose, the romance and adventure part was what really drew me south to the seventh continent. What I didn't know then was that adventures in Antarctica only happen when someone makes a mistake. My IGY trip became a turning point in my life and led to twelve additional Antarctic trips over the past fifty years, most recently in 2003.

When we headed to the Weddell Sea and the Filchner Ice Shelf to set up Ellsworth Station there not only were no maps of the area, no one had ever been there or even seen 90% of it from the air (e.g. Fig. 6-1): I first traveled to Antarctica in 1956, at the beginning of the "scientific era" ushered in by the International Geophysical Year (IGY) 1957-58. Two books[1] are accounts of my personal experiences in Antarctica from November, 1956 to March 1958 (the IGY period), and October 1960 to March 1962 as a participant in this ambitious undertaking. The Antarctic Treaty was negotiated and signed in 1959 largely as the result of the peaceful cooperation and scientific success of the IGY and the continuation of the research programs on the continent in the following years. The Antarctic Treaty entered into force after all twelve signatories had ratified it in 1961. No territorial claims are recognized, all preexisting claims are essentially frozen, and no new claims can be made as long as the Treaty is in force (indefinitely).

[1] Behrendt 1998, 2005.

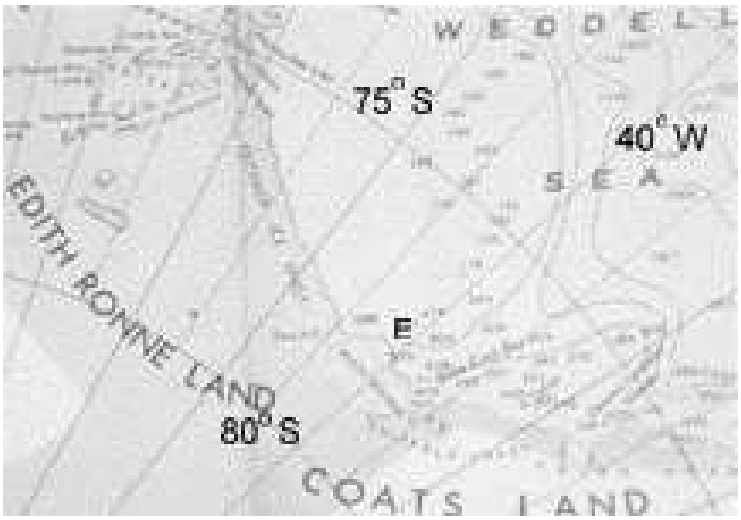


Figure 6-1: Map of Southern Weddell Sea - Filchner Ice Shelf area ca. 1956. From U.S. Navy Hydrographic Office map H.O. 138. E indicates location of Ellsworth Station.

The only ostensible purpose of the Antarctic expeditions (of 12 countries) during the IGY was the peaceful coordinated scientific study of the ice-covered continent. There were, of course, the hidden agendas of the Cold War, existing claims of seven countries and the territorial interests of the U.S. and the USSR. The U.S. and Russia still maintain that they have a "basis for a claim." U.S. Navy Operations Highjump in 1946-47 and Windmill in 1948-49 were authorized under a directive from Admiral Chester W. Nimitz, Chief of Naval Operations, and were assigned the political task "of consolidating and extending U.S. sovereignty over the largest practicable area of the Antarctic continent"[2]. Although I cannot document it, the same directive or a similar one likely guided Navy Operation Deep Freeze during the IGY. Specifically not included in the IGY program were geological research and topographic mapping because of the possible political problems related to potential mineral resources and competing territorial claims. The Cold War was at its height and the Antarctic Treaty was still three years in the future.

Although the IGY was a purely scientific program, the U.S. Antarctic Program was strictly U.S. Navy (Operation Deep Freeze[3]) because of historic considerations dating back to the Wilkes Expedition in 1840. The Byrd Expeditions of 1928-30 and 1933-35, although private, earned Richard Byrd the rank of admiral. The Navy carried out Operations High Jump in 1946-47 and Windmill in 1948-49. At all of the American scientific stations except Ellsworth there was joint station leadership consisting of a Navy officer (usually a lieutenant) in charge of operations, and a civilian leader with responsibility for scientific research.

[2] Sullivan 1957.

[3] The Navy designated their activities during these years as Operation Deep Freeze I, II, III, and IV for the austral summers of 1955 - 1956 through 1958 - 1959 respectively. The numbering system was changed after the IGY period, starting with the International Geophysical Cooperation, (IGC, one year, 1960) in that the 1959-60 austral summer season was designated Deep Freeze 60.

The National Science Foundation (NSF) provided much of the funding for the scientific part of the U.S. Antarctic Program during the IGY, along with other federal agencies, but their staff was not directly active in Antarctica. The entire scientific program then was managed by the U.S. National Committee for the IGY at the National Academy of Sciences and operated through the Arctic Institute of North America, which employed many of us. The big budget was the Navy's and was funded through the Department of Defense. As planned, the U.S. IGY expedition lasted from 1955 through 1959. By this time the NSF had taken over the scientific program designated the U.S. Antarctic Research Program, (USARP), which had a budget of about $6 million. The Navy budget for Antarctica was about $20 million/year.

When we young scientists first went to Antarctica to participate in the mission-oriented directed research of the IGY and in the USARP in the early 1960s, the world was quite different from the undirected proposal-driven U.S. Antarctic Program (USAP), of the 1980s-2006 period. The Cold War was at its height, and the Navy and participating researchers accepted risks that would not be tolerated today. The U.S. Antarctic air squadron VX-6 had an accident rate eight times that of U.S. Naval aviation in other parts of the world at that time. Because of these risks and U.S. strategic interests prior to the entry into force in 1961 of the Antarctic Treaty, with its disarmament and territorial claims articles, we graduate students, and technicians (all male), of draft age, were deferred from military service. We were also given a 25% hazardous duty pay differential for the period we were in Antarctica.

Fifty years later the U.S. Antarctic Program, has altered dramatically, as has my perspective as a researcher "on the ice" in each of six decades. Since the 1950s much has changed in the way Antarctic science and U.S. Antarctic expeditions operate. Most notable are the presence of women, and, in descending order, greater safety, availability of reliable maps, mail (more than once a year), transportation (in the IGY we had to spend 15 months to get a three month field season), fresh food during the summer, and of course technological advances particularly in electronics, communication, computers, satellites, navigation, etc. Fifty years ago, large areas of Antarctica, which we studied in the period described here, were totally unmapped, and had not been seen from the air.

Albert P. Crary had overall responsibility during the IGY for the oversnow traverse program comprising the three main U.S. Antarctic field projects, which each operated for several seasons. These U.S.IGY traverses were:

(1) the Ross Ice Shelf (1957-58) and Victoria Land (1958-59), headquartered at Little America Station on the Ross Ice Shelf under Albert (Bert) Crary;
(2) the Little America-Byrd (1957) and Sentinel Mountain (1957-58) under Charles (Charlie) R. Bentley (geophysicist) and Verne Anderson (glaciologist) and Horlick Mountains (1958-59) under Bentley, operating out of Byrd Station on the West Antarctic Ice sheet;
(3) the Filchner Ice Shelf (1957-58), led by Edward Thiel (geophysicist) and Hugo Neuberg (glaciologist), and the Ellsworth-Byrd led by John Pirrit (glaciologist), both out of Ellsworth Station on the Filchner Ice Shelf.

We now know that the average thickness of the Antarctic ice sheet is about three kilometers, much of it below sea level at its bed, but in 1956 the only clue to this great mass was a short seismic reflection traverse by the Norwegian-British-Swedish Expedition a few years earlier. The primary objectives of the U.S. IGY oversnow (and three airborne) traverses, along with Soviet and French traverses, was to measure the thickness of the Antarctic ice sheet primarily using seismic reflections, and to determine snow accumulation and other glaciological parameters. By 1966, we had accomplished this objective to a first approximation, entirely from seismic reflection and gravity methods. The radar ice-sounding method used from airplanes revolutionized the ease of ice-thickness determination over grounded ice, but did not become routine in Antarctica until the late 1960s. The ultimate objective was to ascertain whether the Antarctic ice sheet was growing or shrinking; this is still a subject of some disagreement.

Unlike today, carrying out Antarctic research, under the U.S. program (and probably others) was viewed by all scientists as a duty and obligation, rather than a privilege. From its start with the IGY (1957-59) there were never enough experienced American geophysicists and glaciologists to man the U.S. over-snow traverse program and other field research programs, in part because women were barred from participating. Many scientists, including graduate students, were recruited during the period 1956-66 from other countries. An incomplete list includes: Charles Swithinbank and John Hollin, glaciologists, Colin Bull, geophysicist (UK); Mario Giovinetto, glaciologist (Argentina); John Pirrit, glaciologist (Scotland); Feng Keng Chaing, geophysicist (Taiwan); George Doumani geologist-glaciologist (Lebanon); Manfred Hochstein, geophysicist, and Peter Schoek, glaciologist-aurora observer (Germany), Franz van der Hoeven, geophysicist (Netherlands); and Sven Evteev, glaciologist, USSR Some of these made outstanding reputations later in either the U.S. or their original countries; one went to jail.

6.2 Fichner Ice Shelf Traverse, 1957-1958

Ellsworth Station was the most isolated of the seven U.S. stations because the southern Weddell Sea is permanently covered by heavy pack ice and there was essentially no air transportation. One person, Captain Finn Ronne, filled both the role of civilian Station Scientific Leader and Naval Officer-in-Charge, so this was the only U.S. IGY station without dual civilian-military command. He was 57 years old and the only member of our thirty-nine man party who had earlier Antarctic experience. On the basis of his three previous winters there, he assumed he could tell scientists how to do their work. It never occurred to our young scientific party to look at it this way. Therein lay the root of our many problems during the difficult 1957 Antarctic winter as, described in Behrendt (1998).

I traveled to Antarctica in 1956-57 (Deep Freeze II) on the *Wyandot*, a U.S. Navy attack cargo ship escorted into the Weddell Sea by the Navy Wind-class ice-breaker *Staten Island* both ships of World War II vintage. In trying to reach the site where we intended to build Ellsworth Station, we encountered very heavy ice up to 8 m thick with many pressure ridges. The two ships, both

seriously damaged, were beset several times for a total of 21 days. We finally landed on 26 January, 1957 on the edge of the unexplored Filchner Ice Shelf, and unloaded cargo and supplies for our station and for the geophysical traverse. Instead of the planned 40 days for base construction, the ships departed for home on 11 February, leaving the station only 70-90% completed (estimates varied).

For the next several weeks the nine scientists and thirty Navy men worked exclusively on base construction as the winter approached. During the fall and throughout the winter we geophysicists and glaciologists carried out investigations in the area surrounding Ellsworth Station. The geophysical work included seismic reflection and refractionsurveys and measurements of the sea tide of the southern Weddell Sea using a gravimeter indoors at the station to measure the rise and fall of the floating Filchner Ice Shelf. The glaciologists dug a 31-m deep snow pit where temperature, annual snow accumulation measurements, density, and other observations were made.

6.3 Oversnow traverse

At the time of the IGY all of us on the oversnow traverse program had to be explorers as well as geophysicists and glaciologists. Most of Antarctica had not been seen from the air, and even the coastline was not completely mapped. Edward Thiel, and Hugo Neuberg (the traverse co-leaders), Finn Ronne, Charles McCarthy, and William Sumrall (the latter two were Navy pilots) had flown south over the ice shelf on 16 March, where they rediscovered a large rift of unknown length, apparently blocking any direct route to the interior (Figs. 2 and 3). This was the Grand Chasm, of which Vivian Fuchs, leader of the Commonwealth Trans-Antarctic Expedition, had seen the east end the previous year. On 21 October, Ronne, Thiel, McCarthy, and Sumrall had made a flight due south of Ellsworth over the high, grounded-ice of what is now named Berkner Island, to the Dufek Massif (Fig. 6-2).

These mountains had been first seen, but mislocated, on a flight by William Hawkes of Navy squadron VX-6 from McMurdo in January 1956. All else was unknown and unexplored. Ronne is reported to have secretly dropped a claim marker (i.e. the act of claiming this part of Antarctica for the United States) on this flight[4]. This was the last claim made by the U.S. in Antarctica, and is also significant because it was made after the beginning of the IGY on 1 July, 1957. We did not know if the high ice area was extensive. Ronne had named this general area Edith Ronne Land (Fig. 1), based on his flight from the west on the 1946-48 Ronne Antarctic Research Expedition (RARE). Edith Ronne, his wife, was one of the first two women to ever winter in Antarctica; both on that expedition. It was on this flight that Ronne discovered and named Gould Bay (Figs. 2 and 3). We did not know the extent of the Filchner Ice Shelf, or the´ configuration of the sub-ice bedrock. The only information we had on mountains to the west was the reported existence of a peak seen by Ronne at 77^{o} 30'S,

[4] Shapley 1985.

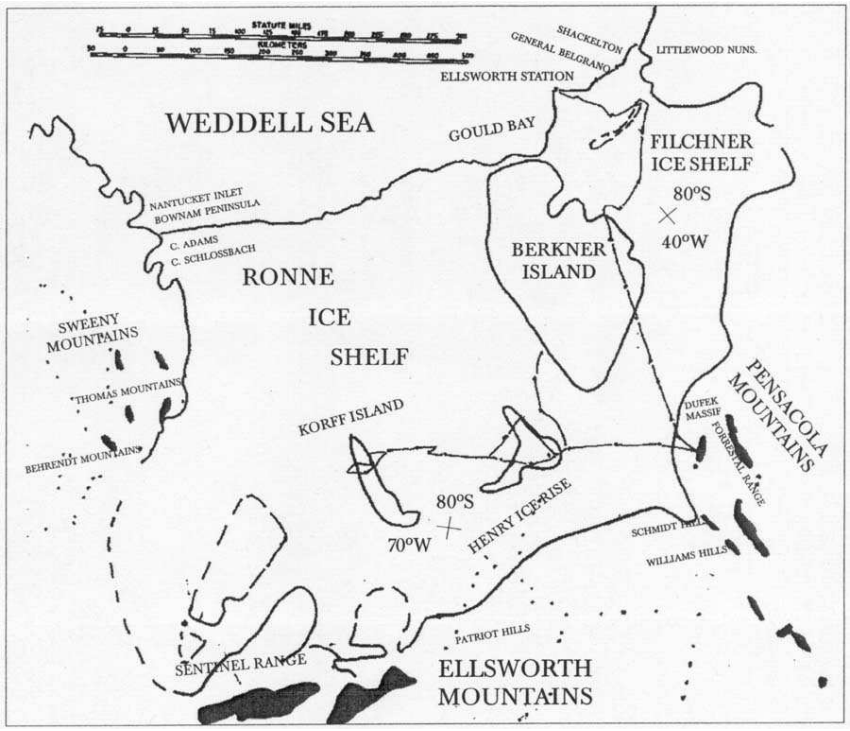


Figure 6-2: Map of route of Filchner Ice Shelf Traverse, 1957-58 and selected geographic features modified from American Geographical Society map of 1969, from Behrendt, 1998. Traverse route (solid line) makes sharp bend around east end of Grand Chasm. Other over-snow traverses are indicated by dotted lines.

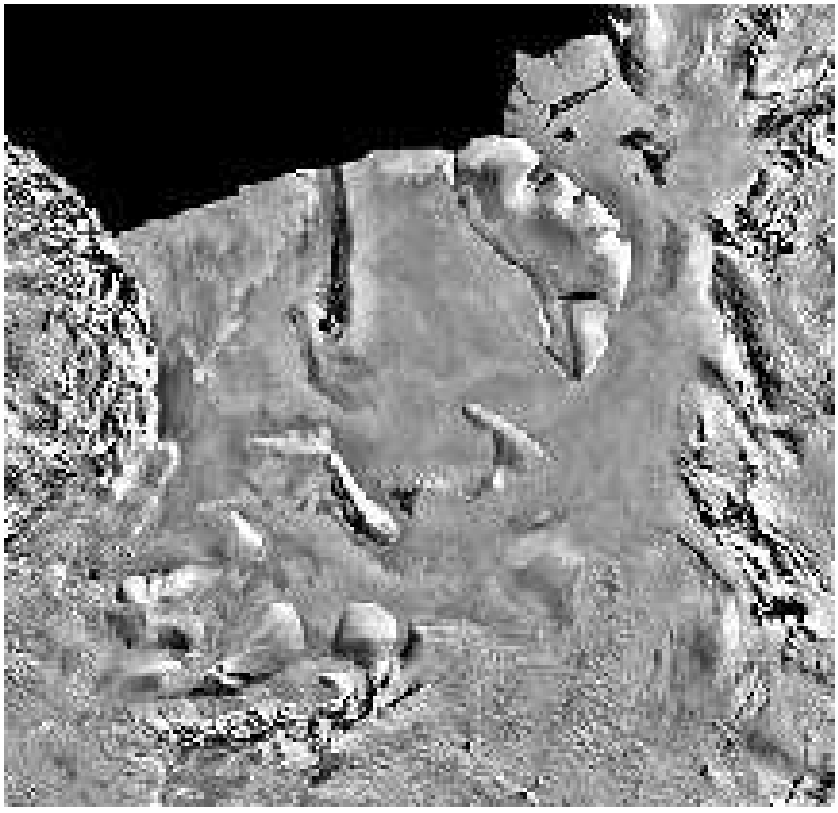


Figure 6-3: AVHRR Satellite Image of Filchner-Ronne Ice Shelf area from U.S. Geological Survey. Compare Figs. 6-1 and 6-2. The Grand Chasm (Fig. 6-2) is visible in this 1970 image, but is larger than in 1957.

71°40'W, where we hoped to meet or at least intersect the track of the Byrd StationTraverse.

Finally, after three months at sea, a troubled and difficult winter at Ellsworth, and an intense few weeks of preparation, five of us (Edward Thiel, chief seismologist, John Behrendt, assistant seismologist, Hugo Neuberg, chief glaciologist, Paul Walker, assistant glaciologist, and Nolan Aughenbaugh, geologist) left on an oversnow traverse across the essentially unexplored area south of the Weddell Sea coast. We were soon to find out whether the establishment of Ellsworth Station three kilometers south of the sloping ice front of the Filchner Ice Shelf had left us a reasonable route into the interior of Antarctica, or left us isolated us north of the Grand Chasm.

Our primary objective was the measurement of the snow-surface configuration, the ice thickness, and the depth to underlying bedrock, using seismic reflection and gravity methods. We would measure snow accumulation, average annual temperature, and other glaciological characteristics of the ice sheet, make observations of Earth's magnetic and gravity fields, study the geology of any mountains we encountered, and make other scientific observations as were presented.

On the *Wyandot* and *Staten Island* we had determined that a 1200 m-deep trough, of unknown trend, existed beneath the Filchner Ice Shelf front, and that the water depth was only about 300 m to the west along the front of the Ronne Ice Shelf (Fig. 2). On the oversnow traverse, we defined this Thiel Trough beneath the Filchner Ice Shelf curving south of Berkner Island (Fig. 2, where it is 1700 m deep) on the basis of our seismic and gravity soundings.

6.4 Traverse operations

On 28 October, 1957, our five-man party left Ellsworth with two Sno-Cats (the other U.S. IGY traverses had three or four) each pulling a 2.5-ton sled filled with fuel, food, explosives-, and all of our scientific and other equipment. For the next 81 days we made a geophysical-glaciological reconnaissance of the Filchner-Ronne Ice Shelf area, and made the first geologic observations of the Dufek Massif.

I put in my first magnetic station near Ellsworth and we then headed southeast, taking gravity, magnetic, and altitude observations every 8 km (Fig. 6-4). We used the gravity and magnetic measurements to study the variations in density and magnetic properties of rock beneath the ice, and therefore to make inferences about the ice-covered geologic features. We also used the gravity data to determine the depth to bedrock between the seismic reflection stations. This is possible because the rock is much denser than the ice or water. The lower the gravity, the deeper the bedrock. We had a radio in each vehicle, and the drivers were in constant contact using headphones to hear over the roar of the engines and the clatter of the vehicle tracks.

Figure 6-4: Traverse at intermediate station. Behrendt reading magnetometer at left. Walker and Aughenbaugh making snow hardness measurement left background. Thiel on track of Sno-Cat after making a gravity measurement. Crevasse detector visible on lead vehicle (Photograph by John Behrendt).

The logistics of our traverse were dictated by the fact that state-of-the-art electronics at the time depended on the vacuum tube, rather than the solid-state electronic microcircuits available today. The hundreds of tubes in our seismic system required large amounts of battery power produced by two 250 amp-hour truck batteries weighing 80 kg each. The only recording system was the heavy oscillograph "camera" with its tanks of photographic solutions (Fig. 6-5).

Figure 6-5: Behrendt operating seismic reflection equipment mounted inside Sno-Cat (Photograph by John Behrendt).

Altogether the seismic Sno-Cat carried a total load of about 500 kg of electronic equipment, gravimeter, magnetometer and seismic batteries. Counting the weight of two people in the vehicle, we carried about the maximum allowable load. Each Sno-Cat used about 3 l of fuel (gasoline) per km or about 200 kg for a 50-km day for two vehicles. This fuel - a little more than one barrel per day - would determine how frequently we needed resupply by the two available

single-engine Otter aircraft. These planes could only carry a few barrels of gas in one trip depending on our range out of Ellsworth. Their maximum allowed range was only 460 km from the base, although they exceeded this limit on several occasions.

Unlike many Antarctic field parties today, we could not have used snowmobiles (which had not yet been developed) because of our heavy loads. There were two other significant reasons for using the high fuel-consuming Sno-Cats on the traverses. The first was safety. A Sno-Cat was the lightest snow-pressure vehicle available at that time, which proved very important in crossing crevasses. Also, because we were a working scientific field party, not an adventure expedition, any convenience in general camping greatly speeded up our progress. We slept in the Sno-Cats, so on a number of occasions when we had been up for 24 hours or more, it took less than a minute to crawl into a sleeping bag after stopping for the "night," or after downing a quick meal. Putting up and taking down Scott tents, commonly used by geologists in semi stationary Antarctic field camps today, would have been time consuming and inconvenient for a field party moving every day. This was particularly true when stopping in a storm or when surrounded by invisible bridged crevasses. Several years later, when I led a traverse with three vehicles, we traveled with one six kilometers ahead of the other two for barometric altimeter corrections.

Navigation over the course of a day's travel was by dead reckoning using the gyro compass mounted in the lead Sno-Cat, #1. A few years later the U.S. traverses changed to magnetic compasses mounted in the Sno-Cats, which were an improvement because of the fragility of the gyro compasses. Despite the conventional wisdom, magnetic compasses work well in Antarctica, except possibly very close to the magnetic pole about 2000 km from our traverse area. About every 40-60 km, Neuberg, our navigator, measured the exact position of the sun using a theodolite on a tripod. He determined the time with a chronometer that was checked with a time signal from the U.S. National Bureau of Standards radio station WWV, which we received well. He then calculated our position using a slide rule (pocket calculators did not exist) to better than 200 m accuracy using a nautical almanac. It was easy to steer a Sno-Cat in a straight line despite the weaving, which averaged out. Therefore, we could correct the dead reckoning positions of the 8-km spaced gravity and magnetic stations along our route, every day that we stopped for station work, using the accurate position obtained from the sun shots.

Steering the Sno-Cats on a planned course, with compasses and odometers, was amazingly accurate. In 1960-61 I navigated by dead reckoning to poles left by an earlier traverse and later to a field camp in zero visibility caused by blowing snow. Unlike ships and airplanes, Sno-Cats did not drift sideways. Traveling at only 5-8 km per hour, they did not get very far off course in 8-12 hours.

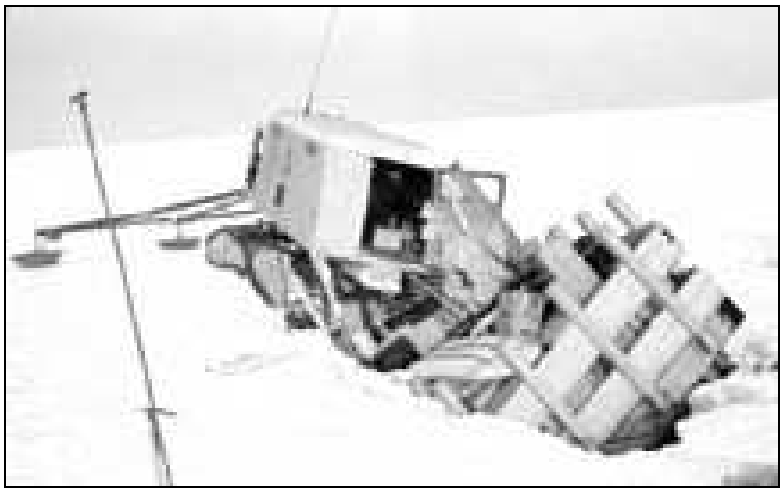
We had no geographic information, so we used a blank gridded chart as does a ship plotting its position at sea. In this manner we mapped the course of our traverse and any features of the snow surface that we could observe. As our horizon was quite limited, the process somewhat resembled blind men attempting to describe an elephant.

6.5 Crevasses

About 10 km out of Ellsworth Station, the sled behind the lead vehicle broke through a snow bridge into a crevasse, and sank about a meter, but was pulled out by the Sno-Cat without stopping. This minor incident set the pace for the entire 2100-km long oversnow traverse. Crevasses are tension or shear fractures in the ice shelf, having steep vertical sides and extending from 20 to >100 m deep. This small crevasse was probably about 20 m deep, pinching out at the bottom, but we generally could not see the bottom when looking down. The extreme case on our traverse was the Grand Chasm (Figs. 2 and 3), which extended entirely through the 700-m thick ice shelf there. With essential guidance by radio from a single-engine Otter aircraft we negotiated our way safely through the complex crevasse pattern at the east end of the Grand Chasm.

Although we commonly saw open crevasses on the traverse, the ones that gave us the most trouble were bridged with snow and could not usually be seen from the surface as we drove along. Sometimes we could safely drive across snow bridges, but other times we broke through. The Sno-Cats were nearly as safe as a man on skis because of their relatively low weight and four wide-tracked pontoons. It is much easier to see bridged crevasses from the air, but this method is severely limited, even when a plane is flying directly over the terrain.

The lead vehicle had a crevasse detector mounted in it projecting about 6 m ahead (Fig. 6-4), but it was never of much use to us. There were many false indications or indications of crevasses with bridges too thick to concern us. This detector was probably meant as a surveying instrument; as such, during the unloading of the ship it might have been useful in locating dangerous spots on the route to the camp. However, at the five to eight kilometers per hour we were attempting, it was not effective. When we encountered serious problems, we realized from the start that we had to leave the Sno-Cats and search out each crevasse out with long T-handled tubular aluminum probes. We traveled in



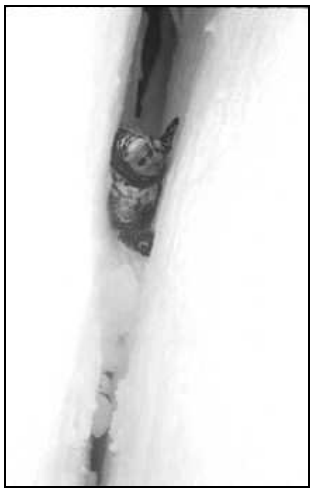


Figure 6-6 (left): Sno-Cat and sled broken into hidden bridged crevasse. Note T-handled probe, ice-axe, and crevasse detector extending forward of Sno-Cat (Photograph by John Behrendt).
Figure 6-7 (right): Man trapped in narrow crevasse after breaking through thin snow bridge. He was uninjured and rescued using a wire-rope ladder (Photograph by John Behrendt).

crevassed terrain most of the 81 days of the traverse; several times vehicles and sleds broke through (e.g. Fig. 6-6), and one man fell in about 10 m (Fig. 6-7), but was rescued safely. crevassed terrain most of the 81 days of the traverse; several times vehicles and sleds broke through (e.g. Fig. 6-6), and one man fell in about 10 m (Fig. 6-7), but was rescued safely.

Radio communication with Ellsworth Station was very difficult throughout the traverse, not only because our 7.5-watt transceivers were not very powerful, but also partly because we were on an ice shelf floating on seawater - a good electrical conductor. There were periods of time when we had no radio contact for several weeks and several hundred kilometers of travel. Today lack of radio contact for even a day is cause of concern, and probable launch of a search and rescue flight.

All our cooking was done outdoors on a large "white" gasoline stove. In contrast with the 200 kg of fuel we burned in the vehicles, the weight of any food we carried was negligible. Because of this we dined very well on fresh-frozen food including a 3-kg beef tenderloin every other day. Because there were many delays caused by crevasses and vehicle breakdowns, we gradually found ourselves (in the 24-hour daylight) on a 36-hour schedule: 12 hours science, 12 hours travel and 12 hours sleep (interrupted by huge meals).

6.6 Seismic and glaciology observations

We spaced seismic-glaciology stations at about one day of travel distance apart (~50-60 km). The geophysical measurements at these consisted of a seismic reflection sounding (Fig. 6-8) to measure the depth to bedrock and seismic

Figure 6-8: Geophysicist firing small explosive charge to obtain reflection from the base of the ice. The reflected energy was picked up by 24 small geophones connected to 330-m long cables and recorded in Sno-Cat (see Fig. 6-5). Box on Nitramon explosives in foreground. Chest reel for seismic cable is shown (Photograph by T. Laudon).

measurement of the increase in sound velocity (and thus snow density) with increasing depth. We would lay out our 330-m seismic cables in an L shape, which we unrolled from reels carried on our chests. We would then hand drill a 2-9-m-deep shot hole at the apex of the L. We fired a small explosive charge of 0.5-2 kg of ammonium nitrate detonated with an electric blasting cap and a 0.5-kg high-explosive primer charge. The sound waves penetrated to the ice-water contact (in the case of the floating ice shelf) and to the water-rock (or ice-rock) contact and reflected back to the surface where they were picked up by the geophones. Each of the 24 geophones was attached to one of the channels in the cables. The seismic signals were amplified and recorded on photographic paper for each of the channels. On a few occasions the wet paper record froze in my hands as I wrote the data on the back. We could identify the reflection by noting the wave form on each channel at slightly longer times, the farther the geophones were from the shot point at the center of the "spread" at the Sno-Cat. Because we knew the velocity of the sound wavesin the snow, ice, and seawater beneath the ice shelf, we could calculate the depths to the various reflectors The L-shaped array allowed determination of the dip of the underlying bed of the ice.

There was some hazard associated with laying out the cables when we were working in crevassed areas. In these cases we skied, which offered some protection. We also used skis when we were not in areas of known crevasses, if the snow was soft. Neuberg and Walker used a two- or three-meter pit in the snow (Figs. 6-9 and 6-10) to measure snow accumulation and other glaciological parameters such as density and temperature. In addition to the snow pit,

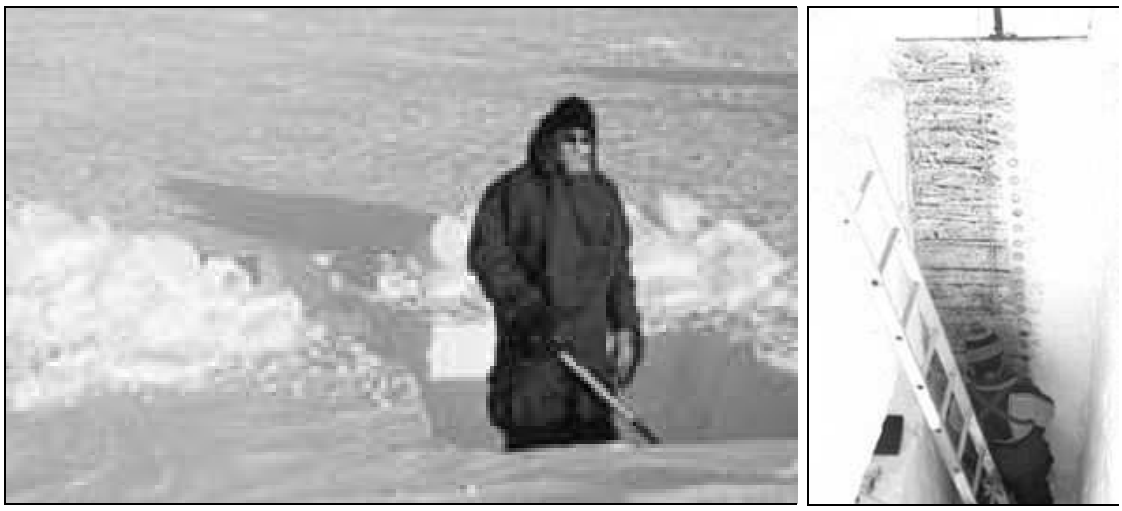


Figure 6-9 (left): Walker digging snow pit on traverse for glaciological measurements (Photograph by John Behrendt).
Figure 6-10 (Right): Hiro Shimizu measuring snow stratigraphy for accumulationdetermination in piton Antarctic Peninsula Traverse (1961-62). Note thermometers at 10-cm intervals in pit wall (Photograph by John Behrendt).

they would hand drill a hole 9 m deep and place an electric-resistance temperature probe on a cable in the bottom. This would come to equilibrium "overnight" and the average annual temperature of the surrounding area was obtained. This is possible because the winter-temperature cold waves and the alternate summer-temperature warm waves damp out essentially to a constant tempe-

rature at that depth after several years.The mean annual temperature was measured this way to an accuracy of about 0.1^{o} C at intervals of 40-50 km on thousands of kilometers of oversnow traverses crossing Antarctica. If repeat measurements were made at some of these locations today, any global warming greater than about a half a degree during the intervening 40-50 years could be detected.

Figure 6-11: Sno-Cats approaching Dufek Massif (Photograph by John Behrendt).

After many crevasse problems, we climbed and crossed Berkner Island, and arrived at the Dufek Massif on 9 December, 1957 (Figs. 6-2 and 6-11). We spent six days making geologic observations and exploring the range, before heading northwest across what is now named the Ronne Ice Shelf. Our farthest point just northwest of Korff Island was reached on 1 January, 1958. Because we were beyond the range of the single engine Otter aircraft supporting our party, we retraced our route several hundred kilometers. During one 24-hour period we drove the Sno-Cats 224 km, which may still be a record for a tracked vehicle in Antarctica. We were evacuated by air to Ellsworth on 17 January, leaving the vehicles and equipment for the men who would replace us.

6.7 Accomplishments

The main scientific accomplishments of the 2100-km Filchner Ice Shelf traverse[5] were to a first approximation:

(1) Mapping of the surface and bedrock topography of the Filchner-Ronne Ice Shelf area including the 1200-1700-m-deep Thiel Trough beneath the Filchner Ice Shelf; our results showed that the Filchner-Ronne Ice Shelf area (Figs. 6-2 and 6-3) is >400,000 km^2 in contrast to the ~80,000 km^2 shown on the earlier maps (Fig. 6-1); Berkner and Korff Islands and Henry Ice Rise were crossed and approximately delineated (Fig. 6-2);
(2) Measurements of snow accumulation, mean annual temperature and other glacial parameters; and

[5] E.g. Neuburg et al. 1959; Behrendt 1962, and many other reports.

(3) A geological reconnaissance of the Dufek Massif, part of a large mafic intrusion; there are "dry valleys" and melt ponds containing algae (which were sampled and identified).

In 1990 the Antarctic Treaty Consultative Meeting approved Special Reserved Area (SRA) and Special Protected Area (SPA) status for the dry valley (Davis Valley) and ponds (Forlidas Ponds), respectively as a result of my submission of a draft management plan.

The other U.S. IGY traverses and those of other countries produced similar results. In six years, the approximate snow surface and bed contour of Antarctica were mapped (Figs. 6-12 and 6-13).

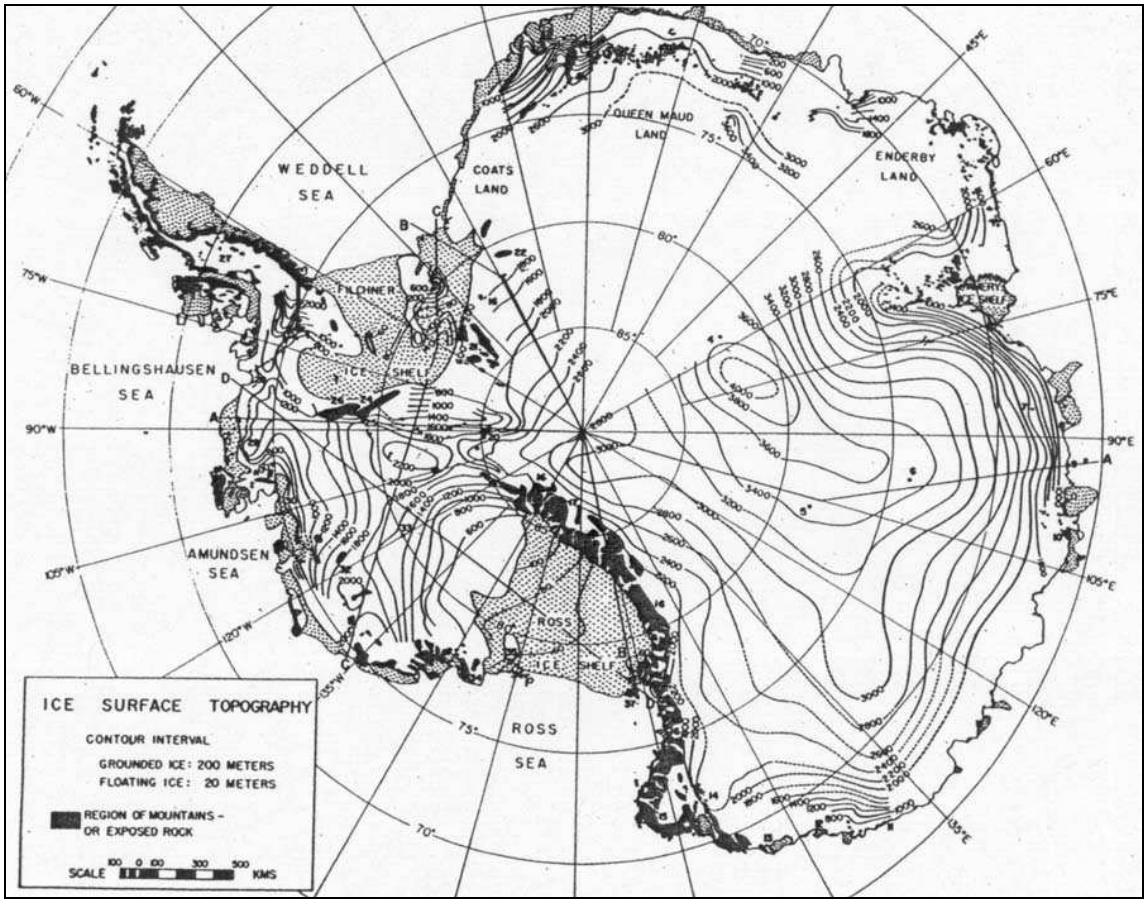


Figure 6-12: Map of Antarctic ice-surface topography as known in 1962 (from Bentley 1964).

6.8 Opportunities for Young Scientists in ÍGY

Although we scientists who went to Antarctica, in the IGY, were certainly "innocents," as I have suggested[6], I admit to being somewhat disingenuous when I also used that term to apply to the scientific planners of the oversnow traverse

[6] Behrendt 1998.

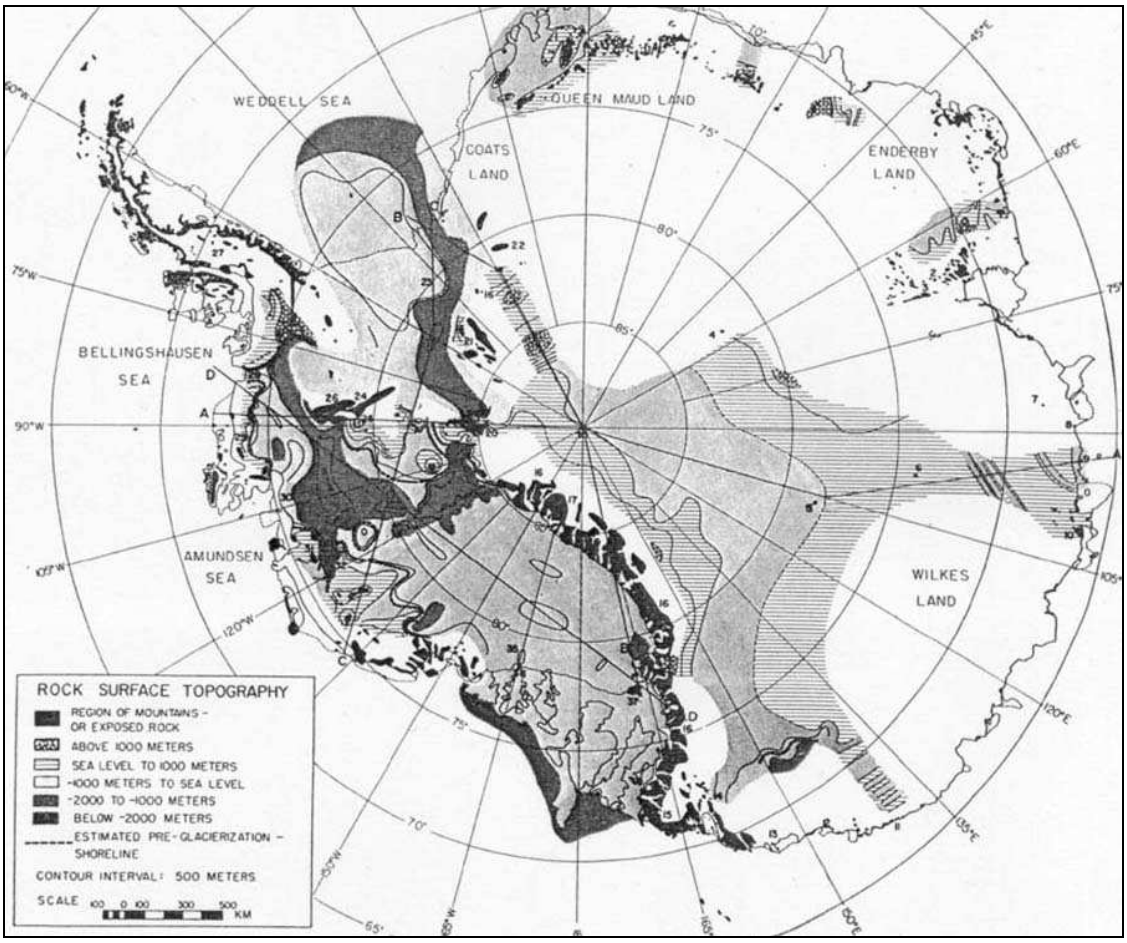


Figure 6-13: Map of rock-surface elevations as known in 1962 (from Bentley 1964).

program. They had no Antarctic experience, but were seasoned researchers who had recently come through the applied research programs of World War II, working with the military and using the inductive approach had, not serendipitously, made great scientific advances. They took us young Ph.D.s and graduate students and threw us to the wolves; they expected us to manage without supervision for a year and produce results. We did.

Because we "innocents," who headed south in 1956, were born during the Great Depression and were part of a generation few in number, in contrast to the baby-boomers who followed, we had a tremendous advantage in starting our careers just as large increases in research funding were made after World War II, particularly as a result of Sputnik and the Cold War. We advanced rapidly in our careers in the 1960s, not because we were better than today's young scientists but because we were one or two orders of magnitude fewer (with an order of magnitude more money for research compared with pre-IGY times). Nevertheless, what I miss now as an Antarctic scientist is not primarily the money, but the sense of excitement that can only come when a scientist is among the first to investigate a vast unknown area without restriction or inhibition.

6.9 Conclusions

Over the course of my scientific career (since the International Geophysical Year), I have come to realize how much the research methods I learned half a century ago established the pattern I have followed ever since. What we geophysicists and glaciologists set out to do in the IGY in the oversnow traverse program had only the very general objective of determining the three-dimensional configuration of the Antarctic ice sheet and, ultimately, of discovering whether it was increasing or decreasing in size. As broad and unfocussed as our research might seem by today's standards, we found many scientifically significant and interesting results through inductive reasoning. That is, we looked around Antarctica in a general way to see what we could find. This method had inspired the establishment of the U.S. Geological Survey in 1879. George Woollard used inductive reasoning in making and interpreting a gravity map of the U.S. in the 1950s and 1960s and so did Maurice Ewing when he set out to study the ocean floor.

The inductive method has probably resulted in the greatest geological and geophysical discoveries, but it is no longer in fashion[7]. Now we mostly use the deductive method, which begins with a specific hypothesis or question and then searches -- not broadly, but narrowly -- for evidence to support or reject the hypothesis. In the current climate the deductive method is necessary for writing scientific proposals to funding agencies for expensive research programs with shrinking funds.
Sadly, the inductive approach to research planning appears to be no longer viable. Because of the large number of excellent scientists competing for limited resources for work in Antarctica and elsewhere, careful attention must be paid to the specific problem being investigated and its importance relative to competing, and more or less equally significant proposals. Perhaps there is no other way, but much of the excitement of heading into the unknown which we experienced in the IGY, is missing today. I am referring not just to the fact that Antarctica was still largely unexplored then, but also to the attitude of seeing and sampling and mapping *everything*. Although sharply focussed research is possible today because of our results 50 years ago, still, for example, much geophysical "exploration" is still necessary using modern techniques to define the crustal geology beneath the ice.

Because of hidden agendas related to the Cold War, U.S. (and possibly Soviet) scientists felt that Antarctic research was a duty rather than the privilege it is considered today. The U.S. air program averaged 3.8 deaths per year from 1955-61 in contrast to 0.1 deaths per year since 1970. At least three U.S. scientists died in the early period of the U.S. program, (including Edward Thiel, co-leader of the Filchner Ice Shelf raverse, who died with four others while making airborne geophysical measurements in 1961). When, if ever, do the ends justify the means? It is one thing if mature individual researchers, professional technicians, aviators, and others take risks with full awareness of the hazards. But it is quite another thing if relatively naive graduate students and new Ph.D.s looking for adventure, such as my colleagues and I in the 1956-1962 period, are sent

[7] Behrendt 1998, Oliver 1998.

into harm's way without knowing specifically what they will face. Ambitious senior researchers pursuing their personal scientific objectives, even though these may be of vital national and international importance, have traditionally used younger scientists that way. I have worked both sides of this street in the past 50 years. Field science has always been risky even before Darwin set out on the *Beagle* and likely will continue to be so. I have been one of those willing to take these risks, but I have lost a number of friends and colleagues to research in Antarctica and elsewhere. I am not so sure I could recommend this path to others. I think it is essential that graduate students and other young assistants be well informed of the risks they *will* be taking. Then they can decide whether the results are worth it.

The International Polar Year (2007-08) is commencing and again there will be great opportunities for young researchers and students. However, Antarctic research today is relatively mature and there are a much greater number of young scientists. In contrast the U.S. IGY oversnow traverse program had to recruit from abroad to fill a couple of dozen positions. Substantially more effort will be needed to insure opportunities for those inspired by the outreach programs sponsored by the U.S. Antarctic Program, in the U.S. and comparable programs integrated within the overall international effort. It is apparent from my observations of Antarctic studies in the last decade that many excellent young scientists educated through Antarctic research activities, must search elsewhere to find fulfilling careers. Because of the rigorous demands of Antarctic research, they will be well prepared for alternative careers in science or science related fields.

Acknowledgements

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7 RUSSIA IN THE ANTARCTIC

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In 1820, the Russian expedition headed by Faddey Faddeevich Bellingshausen (1778-1852) and Mikhail Petrovich Lazarev (1788-1971) onboard the sloops *Vostok* and *Mirny* discovered the Southern polar continent after circumnavigating it. The Russian sailors directly approached the shores of the unknown land nine times. It is quite natural that limited information about the new continent available at the beginning of the nineteenth century did not allow F.F. Bellingshausen and M.P. Lazarev to make the conclusions about the scale of their geographical discovery. Recognition of this scientific and seafaring deed came much later when the British explorer John Murray (1841-1914) proposed the name of the southern polar continent – Antarctica In his report presented in 1886 at the session of the Scottish Geographical Society, he combined the routes of different national expeditions to this Earth's area, which served as a basis for the first mapped contours of the Antarctic continent. In this work, the achievement of Russian seamen clearly demonstrated their enormous contribution and priority.

During preparation of the Second International Polar Year (IPY) 1932-33 Soviet investigators proposed the program of the USSR Antarctic expedition, its aim including organization of the polar station on Peter I Island and oceanographic studies of the Ross Sea from board the *Aleut*, one of the ships of the Soviet whaling fleet. However due to some organizational causes, this section of the Second IPY program, was not realized.

The USSR started regular Antarctic studies in 1956 when the logistics and methodological preparation for a grandiose research program – the International Geophysical Year (IGG) (1957-58) - began. On July 13, 1955, the USSR Council of Ministers issued a Decree about the organization of a Complex Antarctic Expedition (CAE) of the USSR Academy of Science. The USSR Academy of Science was entrusted with supervision of the expedition studies, and the Main Administration of the Northern Sea Route of the USSR Ministry of Marine Fleet was made responsible for the logistics support. The Arctic Research Institute whose staff had a very rich experience of organizing studies on the coast, islands and drifting ice of the Arctic Ocean was in the structure of the latter. This fact determined the appointment of the known polar explorer Hero of the Soviet Union the AARI Deputy Director Mikhail Mikhailovich Somov (1908-1973) to the position of the Head of the first CAE by the Presidium of the USSR Academy of Science.

On November 30, 1955, the diesel-electric ship *Ob* departed from Kaliningrad for its first Antarctic cruise. A known polar navigator Ivan Alexandrovich Man (1903-1982) was the ship's master. On January 5, 1956, the ship approached the Davis Sea coast where on February 13, the first Soviet Antarctic station

called by the name of the sloop of the Russian expedition of 1819-1821 *Mirny* was opened. In 1956-1958, the CAE personnel opened Oasis station in the Bunger Oasis and the inland stations - Pionerskaya, Komsomolskaya, Sovetskaya, Pole of Inaccessibility and Vostok, (Fig. 7-1). The main task of these stations was to provide national studies in Antarctica and support the participation in forthcoming IGY. Actually they had the same scientific program. Mirny was the biggest one. The latter had an amazing destiny: it was to become the center of geophysical studies in the vicinity of the South Geomagnetic Pole. On

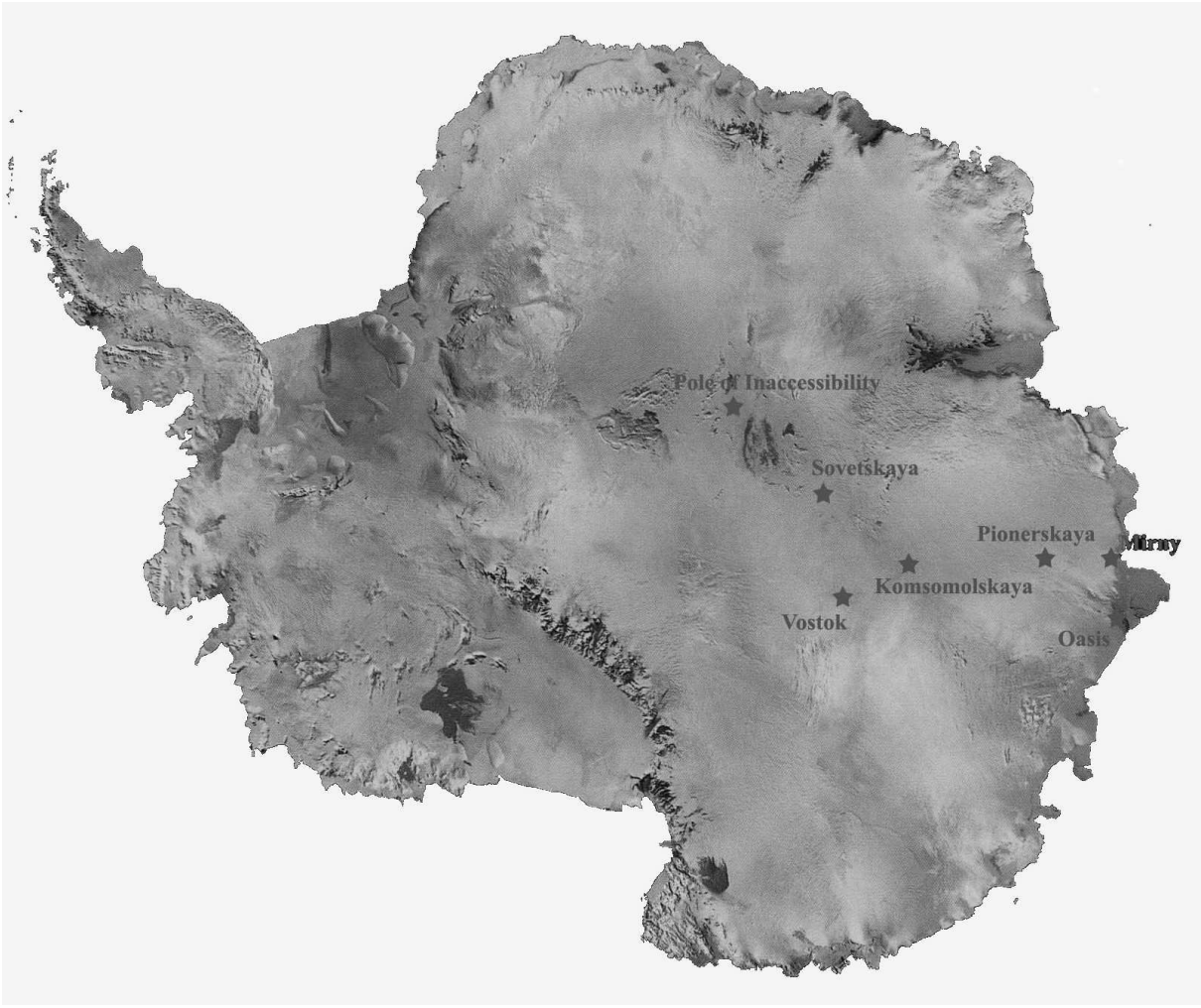

Figure 7-1: Antarctic stations and field bases of the USSR 1956 –1958.

July 21, 1983, the absolute minimum surface air temperature of -89.2° C was recorded here. Later, the deepest in the world ice borehole of 3623 m was drilled at Vostok station (1999), and directly beneath the station, the largest sub-glacial lake was discovered that received the same name.

The IGY period has become the beginning of the regular and multi-profile Soviet studies of the ice continent and the Southern Ocean seas washing it. At the end of the twentieth century the Antarctic investigations of the Soviet Union and at recent time of Russia were not stopped even for a day. For the past 50 years, the work magnitude changed but its character remained the same: the

national Antarctic expedition carried out research studies at permanently operating stations, seasonal field bases, in sledge-caterpillar traverses, by means of aviation and during the voyages of research vessels.

After completing the IGY Program, the expedition changed its name from the Complex to the Soviet Expedition, and on June 19, 1959 by the Decree of the USSR Council of Ministers the supervision of the expedition was passed from the USSR Academy of Science to the USSR Ministry of Marine Fleet with the Arctic Institute being in its structure. From this time onward the institute was called the Arctic and Antarctic Research Institute (AARI), and the Soviet Antarctic Expedition (SAE) has become one of its divisions preserving its interagency purpose. Specialists of different research and scientific-production organizations participated traditionally in the expedition work: Hydrometeorological Service, Ministry of Geology, Ministry of Defense, Ministry of Education, Cartographic Service and the Academy of Science. By the decision of the USSR Council of Ministers of May 18, 1963, the AARI together with the Soviet Antarctic Expedition was transferred to the Main Administration of the Hydrometeorological Service under the USSR Council of Ministers. On August 7, 1992 by the Decree of the President of the Russian Federation the Soviet Antarctic Expedition was renamed to the Russian Antarctic Expedition (RAE), and its supervision and control was assigned to the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet).

The 50-year period of regular national studies in the Antarctic can be divided into 3 stages. The first stage (1955-69) was a reconnaissance one. The main aspect at that time was investigation of natural objects and processes in the Southern Polar Area. After the end of the IGY, the Oasis, Pionerskaya, Komsomolskaya and the Pole of Inaccessibility stations were closed and instead of them Novolazarevskaya (1961), Molodezhnaya (1963) and Bellingshausen (1968) stations were opened. (Fig. 7-2).

A large volume of glaciological, geomagnetic , seismic, gravimetric and meteorological studies in the central areas of Antarctica was carried out by means of special logistics and research sledge-caterpillar traverses, the methodology for their conduct and the technical equipment being developed exactly during the first expedition period. A large number of Russian geographical names of mountains, capes, bays, inlets, coasts, lakes and other objects appeared on the maps. The outstanding achievements of this period include the discovery of the sub-glacial Gamburtsev Mountains in the area of the Pole of Relative Inaccessibility and of a vast mountainous plain in the bedrock relief of the continent – the IGY Valley.

An important result of this stage was the Atlas of the Antarctic in two volumes (1966 and 1969) that was awarded the USSR State Prize. The expeditional activity in Antarctica during the first stage are closely connected with international collaboration and the political-legal issues of activity in the Antarctic. In 1959, 12 countries (Australia, Argentina, Belgium, Great Britain, New Zealand, Norway, the USSR, the USA, France, Chile, South African Republic and Japan) signed the International Antarctic Treaty that determined the basis for interstate relations in the region.

The second stage of the studies (1970-90) was mainly devoted to investigations of the natural Antarctic resources. On March 9, 1966, the Decision of the USSR Council of Ministers "On measures for further development of the Soviet studies in the Antarctica" appeared that determined the strategy of activity of the state in the region for a multiyear perspective. New stations were established in the Pacific Ocean sector of Antarctica: Leningradskaya (1971) and Russkaya (1980). The number of the year round operating national stations in the Southern Polar Area comprised eight stations (Molodezhnaya, Mirny, Vostok, Novolazarevskaya, Bellingshausen, Leningradskaya, Progress and Russkaya), and

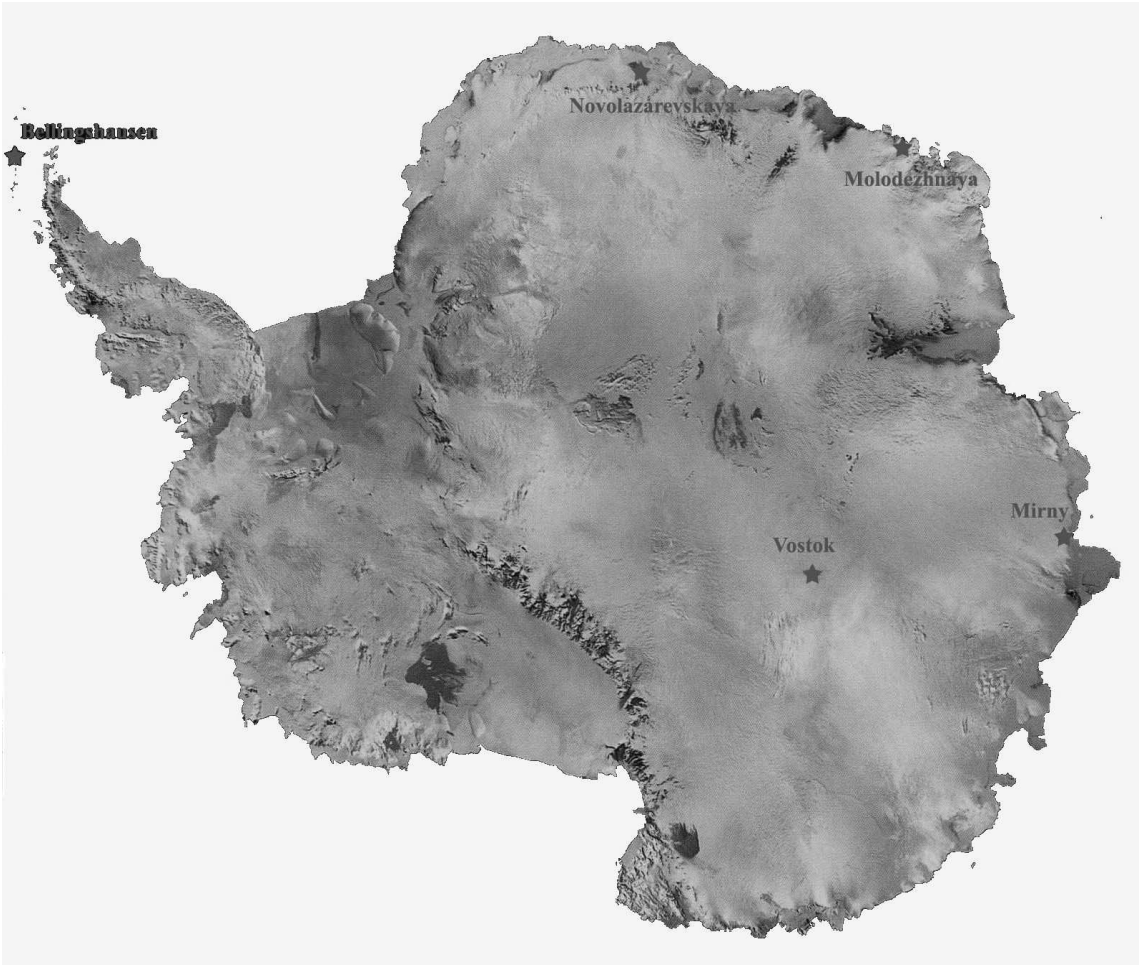

Figure 7-2: Antarctic stations and field bases of the USSR 1959-1969.

their location allowed obtaining information practically from the entire continent (Fig. 7-3). No other country at that time possessed such an infrastructure in Antarctica.

In 1975, a research-expedition vessel was built at the Kherson shipyard (Ukraine) for marine studies in the Antarctic and for support of the expedition. It was named *Mikhail Somov* after the Head of the first national expedition to the Antarctic. In the late 1960s, the traditional areas of commercial fishery in the World Ocean were significantly restricted, therefore many states including our country, paid attention to the biologically rich waters of the Southern Ocean.

Arrival of the Soviet fishery fleet to the Antarctic necessitated special oceanographic and biological studies, and higher quality hydrometeorological and hydrographic support for shipping. For this purpose, methods for receiving satellite images of the ocean and the continent surface were introduced at the Soviet Antarctic stations, and a complex of upper-air sounding was supplemented with launches of upper-air geophysical rockets at Molodezhnaya station. All national stations and ships operating in the Antarctic transmitted information on the state of weather and ice conditions to this station, which served as a basis for operational forecasts with different periods (from several

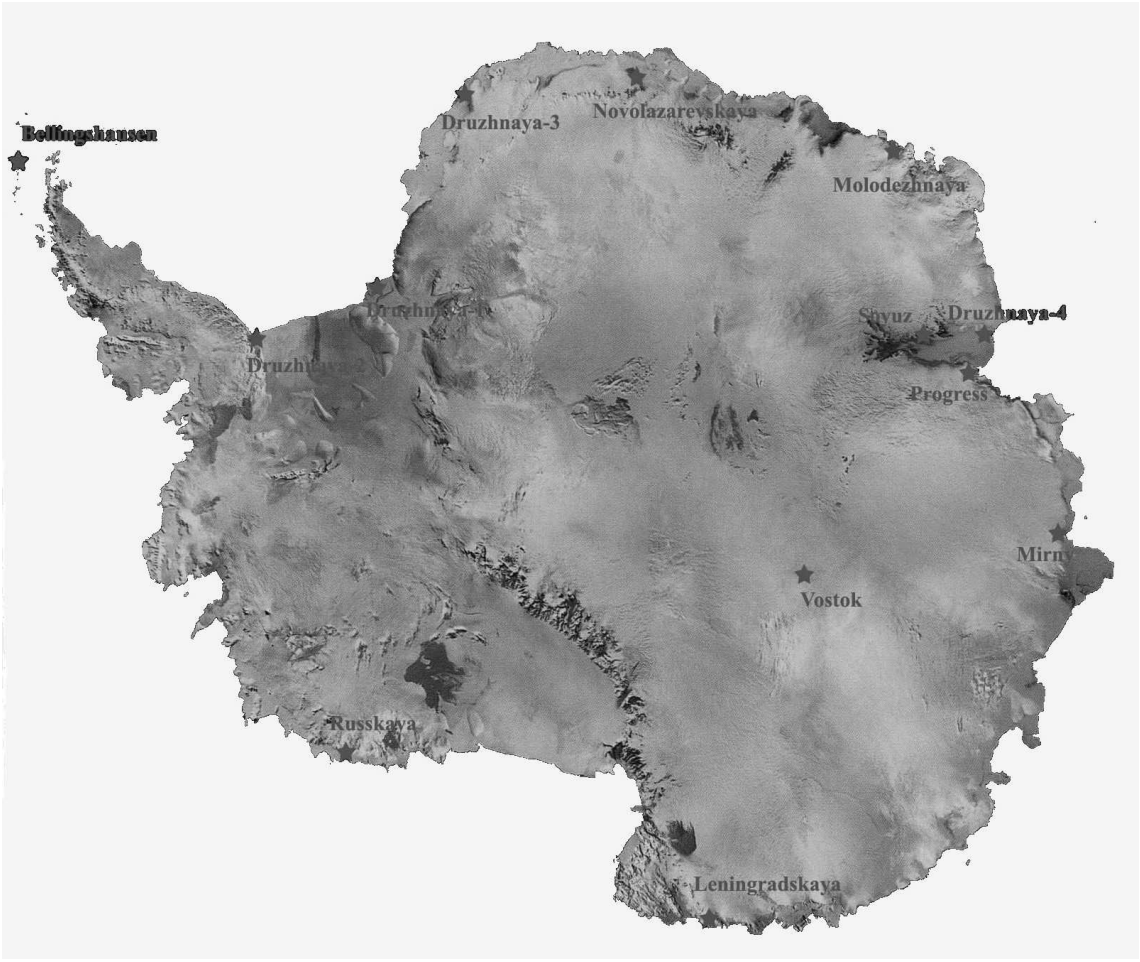

Figure 7-3: Antarctic stations and field bases of the USSR 1970-1990.

hours to one or two days or more depending on the request) in advance. These data together with current information were disseminated to the national and foreign users.

From 1982, equipment of the Soviet Antarctic stations with satellite communication systems began expanding significantly the possibilities of information transmission from Antarctica to any Earth's region. In these years, the Soviet naval hydrography specialists prepared a large number of navigation charts and manuals for ensuring safety of shipping in the Southern Ocean where the Soviet vessels operated.

Specialized fishery studies were made by VNIRO (Vsesouzniy Nauchno-issledivatelskiy Institute Rybnogo khoziaistva I Okeanographii - Soviet Research Institute for Fisheries and Oceanography) specialists onboard the R/V "Akademik Knipovich" and also by specialists of Atlant VNIRO (Atlanticheskiy Nauchno-issledivatelskiy Institute Rybnogo khoziaistva I Okeanographii - Atlantic Research Institute for Fisheries and Oceanography), AzCherNERO (Azovsko-Chernomorskiy Nauchno-issledivatelskiy Institute Rybnogo khoziaistva I Okeanographii – Southern Research Institute for Fisheries and Oceanography) and TINRO (Tikhookeanskiy Nauchno-issledivatelskiy Institute khoziaistva I Okeanographii - Pacific Research Institute for Fisheries and Oceanography) onboard the ships of their organizations. The oceanographic studies of Antarctic waters were supplemented by the annual voyages of the R/V *Professor Viese* and the *Professor Zubov* of the AARI (1974 to 1988) under the POLEX-SOUTH Program.

A leading role during the second expedition stage belonged to specialists of the USSR Ministry of Geology and the Main Administration of Geodesy and Cartography under the USSR Council of Ministers. From 1972 the Soviet geological-geophysical studies were made at large seasonal field bases that were organized in different regions of West and East Antarctica: Druzhnaya-1 (1975-1985), Druzhnaya-2 (1982), Druzhnaya-3 (1986), Druzhnaya-4 (from 1987-up to present) and Soyuz (1982-1988) (Fig. 7-3). Using seasonal field bases, many areas of the mountain rock outcrops above the ice sheet surface were investigated and their perspectives for minerals were determined. From 1986, marine geophysical studies of the sedimentary rock strata in the marginal seas of Antarctica began. Taking into account a large significance of resource studies of the Antarctic region, this direction of SAE activity was officially stressed in 1985 by the Decision of the USSR Council of Ministers "On measures for intensification of geological-geophysical activity in the Antarctic and strengthening of the logistics base for this activity". For conducting the field geological exploration operations, a permanent Progress Base was established in East Antarctica (1988). Practically all geological activities were performed by specialists of the Leningrad scientific-production association "Sevmorgeologiya". The Leningrad enterprise "Aerogeodesiya" was commissioned with the cartographic support for this work.

Expansion of seasonal operations of geologists and geodesists on the continent resulted in the need for a significant increase of the fleet of ships performing transport expedition operations. In some years their number comprised 7 vessels when the scientific-expedition vessel was supplemented by two ice-strengthened dry cargo transport ships, a tanker, two passenger vessels and a research ship. In 1987, for providing the SAE activity, a new research-expedition vessel the Akademik Fedorov was built at the Finnish shipyard – the best equipped ship at that time among special Antarctic vessels. It could move unescorted in ice up to 1.5 m thick, had large holds, a helicopter pad and a hangar and two powerful 50-ton cranes. The ship could accommodate 250 people including 75 crew members.
In 1980, construction of the snow-ice air strip suitable for receiving heavy transport wheeled aircraft IL18 was completed at Molodezhnaya station. Later a similar ice air field was built at Novolazarevskaya station. In 1986, the IL76 TD

aircraft made its first flight to Antarctica from Moscow. The air strips were constructed from compacted snow using a unique national technology developed by specialists of the design institute “Lenaeroprojekt”. Regular flights of aircraft IL18 and IL76 TD from our country to Antarctica continued until 1991. The use of transcontinental flights significantly extended the possibilities of conducting seasonal field work of the expedition and allowed investigation of the structure of geophysical fields in the central regions of Antarctica. Specialists of the USSR Ministry of Geology began to actively use the flying geophysical laboratory at the base of aircraft IL18D. In the 1980s, the SAE wintering team comprised 320 people and the seasonal team - 350 without taking into account the crews of marine ships. During this period, active work in the Antarctic was undertaken by specialists of Goskomhydromet, Ministry of Geology, Ministry of Fishery, Ministry of Defence, the Main Administration of Geodesy and Cartography, Ministry for Education, and the USSR Academy of Science. International cooperation of Soviet scientists with their colleagues from other countries has significantly increased. Whereas at the first stage of the studies it consisted predominantly in exchange of specialists who worked in the Antarctic Programs of other states, joint specialized projects and full-scale experiments were carried out at the second stage.

One of the most important projects of that time was deep drilling of the ice sheet that was made at Vostok station jointly with the scientists of France and the USA. Ice drilling was carried out by specialists of the Leningrad Mining Institute using technology and equipment, which they have specially developed. Comprehensive analyses of the ice core from the borehole allowed a detailed investigation of the paleo-climatic changes over four glacial-interglacial cycles throughout 420 kyr and by the general recognition of the world scientific community it was the outstanding achievement of the late twentieth century in the study of our planet. Other important international projects at this stage included the Russian-American oceanographic activities of the R/V *Mikhail Somov* in the recurring polynya of the Weddell Sea in 1981 and the study of the Weddell Sea Gyre in the Antarctic winter of 1989 from aboard the R/V *Akademik Fedorov* and the German vessel *Polarstern.*

The development of the Antarctic Treaty continued with new acts of the international law appearing on its basis. In 1972, the Convention on the Conservation of Antarctic Seals was adopted and in 1980 – the Convention on the Conservation of Antarctic Marine Living Resources. The need for these documents was dictated by the concern of the international community in regulating the use of Antarctic resources. The problem was connected not only with the biological resources of the Southern Ocean, but also with the minerals potential of the region. In 1988, the Convention on the Regulation of Antarctic Mineral Resource Activities was adopted. However, the Convention never came into force due to refusal of the authorities of Australia and France to ratify it, technological capabilities of more developed western countries and the USSR, and on the other hand, due to a significant increase of the nature protection process in many democratic countries characteristic of the second half of the 1980s. This resource problem has considerably increased the number of the countries accessing the Antarctic Treaty from 15 in 1970 to 42 in 1990.

As the major results of the second period of activities of the national Antarctic Program, one can consider revealing the perspectives for minerals in many regions of Antarctica, investigation of paleo-climate for more than 400 kyr, discovery of the phenomenon of anabiosis of microorganisms in the Antarctic ice cores, determination of new integral indicators of the perturbation of geo-magnetic fields in the "polar caps" of Antarctica and the Arctic and development and introduction of the construction technology of snow-ice air strips in Antarctica for receiving heavy transport wheeled aircraft.

Many of these results could be obtained only after the new technologies for conducting the expedition operations were introduced, which include: construction and introduction into operation of special scientific-expedition vessels; regular transcontinental flights of transport airplanes; introduction of remote-geophysical methods of investigating the continental bedrock, ice sheet and the sedimentary mantle of the seas; introduction of satellite technologies for receiving-transmitting different types of information at the Antarctic stations, creation of a large-scale observation network in all strategically important regions of Antarctica.

The third – current stage of the national Antarctic studies that began in 1991 can be conventionally characterized as investigation of the role and place of the Antarctic in the global natural and social processes. For our country it was inseparably connected with the cardinal changes in the political and economical mechanisms of the state. Russia has become the successor of the Soviet Union in all issues of Antarctic studies. On August 7, 1992, this fact was officially registered by the Decree of the President of the Russian Federation B.N. Yeltsin.

The late 1980s – early 1990s were marked by a sharp decrease of the budget capabilities of the state. Three Antarctic stations had to be closed: Russkaya in 1990, Leningradskaya in 1991 and Molodezhnaya in 1998 and the expedition personnel and the logistics support of the stations were significantly reduced. Only two ships going to the Antarctic were left - the R/V *Mikhail Somov* and the *Akademik Fedorov*, rather than a fleet of ships. In 1991, the IL76 TD airplane made its last transcontinental flight to Antarctica. The number of participants of the winter and seasonal expedition decreased to 240 people.

The situation has drastically changed in 1997 when the decision of the Russian Federation Government "On the activity of the Russian Antarctic Expedition" was published. It envisaged some minimum level of the expedition activity below which it could not fall.

The main indicators of the RAE activity were determined: numbers of the seasonal team - 80 people, wintering team - 90; the year-round operating stations – Mirny, Vostok, Novolazarevskaya, Progress and Bellingshausen, seasonal field bases – Druzhnaya-4 and Molodezhnaya (Fig. 7- 4); the expedition vessels – the R/V of Roshydromet the *Akademik Fedorov* and the R/V of the Ministry of Natural Resources of Russia the *Akademik Aleksander Karpinsky*; the aviation support for the expedition was provided by 2 airplanes and 2 helicopters:

From 1998, the RAE activity is being financed by a separate line in the Federal Budget of Russia. Measures that were undertaken allowed stabilizing the situation. In 1999 and 2001, the government again addressed the issues of providing support for the activity of the state in the Antarctic.

The decision of the Russian Federation Government of September 24, 2001 "On measures for provision of interests of the Russian Federation in the Antarctic and the activity of the Russian Antarctic Expedition in 2002-2005" determined a multiyear perspective of the expedition activity. In 2002, its financing has achieved the 1998 pre-crisis level. Renewal of the expedition transport infrastructure began; the flights of aircraft IL-76 from South Africa to Novolazarevskaya station where the snow-ice air field was reconstructed were resumed. In 2005, the RAE resumed independent aviation flights from its coastal stations to the inland Vostok station. The social issues of the expedition personnel were drastically improved from July 1, 2002 with the salaries of polar explorers in Antarctica being increased by 5-6 times.

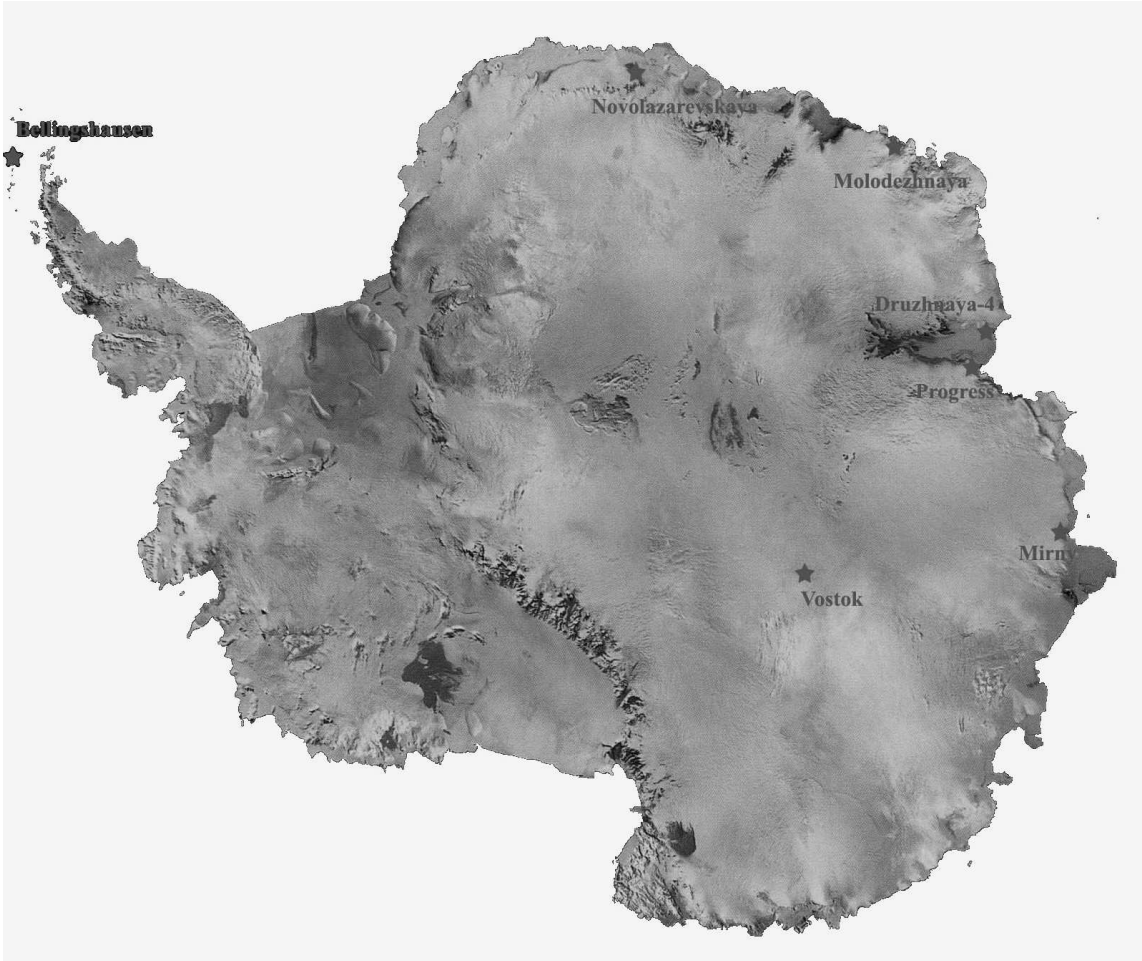

Figure 7-4: Antarctic stations and field bases of Russia 2001-2005.

Since 1998, the national scientific studies in the Antarctic are being conducted in the framework of the subprogram "Study and Research of the Antarctic" of the Federal Program "World Ocean". It includes 5 directions: basic studies of the Antarctic; scientific-applied studies and developments; environmental moni-

toring of the Southern Polar Area; environmental protection; and logistics-technical support for the activities and research.

The most complicated transient period of the RAE activity in the 1990s has not resulted in the catastrophic outcome. This has become possible due to the enormous reserve of safety of the Antarctic infrastructure, accumulated in the preceding years and efficient organization measures undertaken at different levels of the Federal executive power.

Stabilizing of the economy of Russia that began in the new century allowed us to reconsider the previous parameters of RAE activity set up in 1997. On March 10, 2005, the Russian Federation Government considered again the perspectives of activity of our country in the Antarctic in 2006-2010. As a result, on June 2, 2005 the order of the Government of Russia was published determining the optimal parameters of the expedition activity for the next 5 years.

Measures that were undertaken were aimed to preserve and strengthen the positions of the Russian Federation in the Antarctic, fulfill the international obligations of our country in the framework of the Antarctic Treaty and the Protocol on Environmental Protection to the Antarctic Treaty, expand the perspective research in the region, ensure safety of activity of the personnel of Russian Antarctic stations and transport operations in the expedition, renew and upgrade the infrastructure and the logistics base of the Russian Antarctic Expedition.

The forthcoming 5-year cycle of RAE activity includes measures for preparation and holding of the International Polar Year (2007-2008.). This fact has changed in many respects the traditional arrangement of RAE operations formed in recent years. It is planned to continue service of the following year-round operating stations – Mirny, Vostok, Novolazarevskaya, Progress and Bellingshausen and reactivate the earlier closed Molodezhnaya, Leningradskaya and Russkaya (Fig. 7-5) stations transforming them to a category of seasonal field bases. Modern automated weather and magnetic-variation stations will be installed at these bases, which will allow us to take again under control the situation practically over the entire perimeter of the Antarctic continent. Introduction into operation of the aforementioned bases will change to a considerable extent the arrangement of the RAE ship operations and increase the role of aviation transportations. With this aim it is planned in addition to the snow-ice air field at Novolazarevskaya station to construct a similar runway for wheeled aircraft IL76 at Progress station and undertake special exploration for a possible construction of a similar runway at Vostok station. The numbers of the expedition will increase up to 120 people in the seasonal team and up to 110 people in the wintering team.

In spite of a reduced program of Antarctic studies, a series of outstanding scientific results were obtained in the 1990s. This primarily concerns the discovery of a vast sub-glacial lake located in the vicinity of Vostok station. The water table area of this lake comprises more than 15 thousand km^2 (equal to the area of Lake Ladoga), the lake length is 270 km and its maximum width is about 70 km.

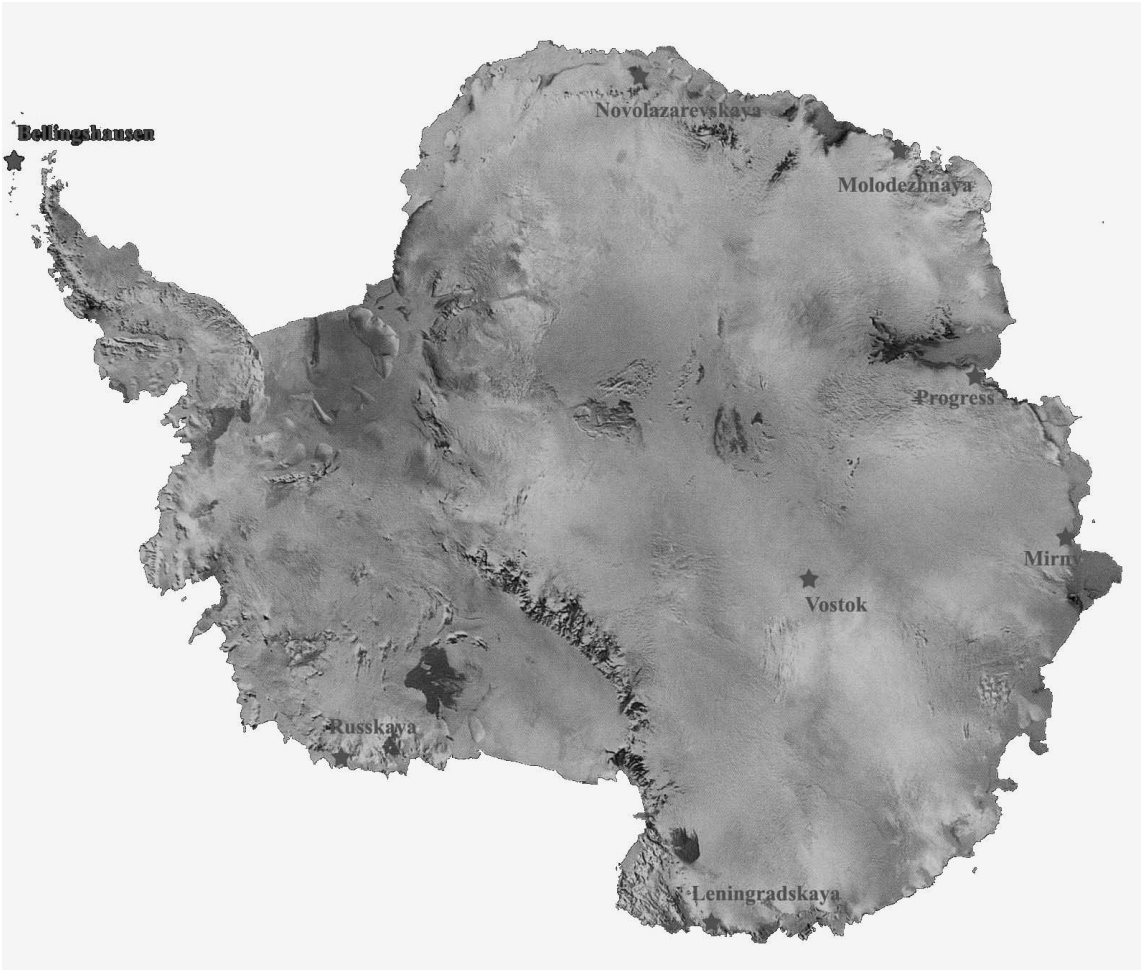

Figure 7-5: Antarctic stations and field bases of Russia 2006-2010.

The water layer thickness comprises 1200 m with the southern lake area being deep and on the contrary the northern area being shallow. The lake is located beneath the ice with a thickness of 3700 to 4200 m. The discovery of the lake has become possible due to a joint analysis performed by the international team with participation of Russian investigators. The Russian Antarctic Expedition has been investigating the lake since 1995. Detailed information on the coastline configuration, the spatial non-uniformity of the ice, water and bottom sediment thickness was obtained. These studies were supplemented by geochemical, isotopic and microbiological studies of the ice core from the deep borehole at Vostok station. The process of the borehole drilling was completed in 1999 at a depth of 3623 m. It turned out that below the 3543 m horizon ice is formed directly from the frozen lake water. This ice is very clean from the biological viewpoint, however using the molecular biology methods it was possible to detect in it the DNA molecules of thermophilic bacteria inhabiting the hydrothermal vents. This discovery allows a new view of the geological nature of the trough where Lake Vostok is situated.

Investigation of the variability of geology still remains among the possible objectives of Antarctic studies. Current variability of climate in Antarctica does not have a clear trend. While warming and the retreat of glaciers are noticeable

in the Antarctic Peninsula area, there is cooling, on the contrary, in the eastern and central areas of Antarctica.

The processes of climate variability are closely connected with the studies of the "ozone hole" phenomenon discovered in the Antarctic in 1985. Investigations of the total ozone at Russian Antarctic Mirny, Vostok and Novolazarevskaya stations that began in 1975, showed that at the beginning of the twenty-first century, the process of the "ozone hole" expansion has practically stopped and the "hole" will probably begin to fill in during the next years. This conclusion suggests a natural rather than an anthropogenic cause of this phenomenon, which is probably determined by the peculiarities of the general atmospheric circulation.

Introduction of new digital measuring complexes into the observation network of the Russian Antarctic stations allows now a continuous registration of the occurring helio-geophysical processes and establishment of conjugated geomagnetic perturbations in the northern and southern "polar caps" of the planet.

A great deal of attention during the third period of the national Antarctic studies and activities was given to international cooperation, not only with respect to conducting the specific scientific experiments, but also to full-value cooperation in the area of logistics support for the Antarctic Programs. Among such projects one should mention the Russian-American drifting station "Weddell-1" organized in 1992 in the western Weddell Sea, completion of the Russian-American-French program of joint drilling operations at Vostok station and publication of the Russian-German "Oceanographic Atlas of the Southern Ocean" (1992).

In recent years the Russian Antarctic Expedition using its ship the *Akademik Fedorov* repeatedly delivered the cargos and personnel of Antarctic stations of the national expeditions of the South African Republic, Sweden, Finland, Norway and Germany. Joint studies of the sedimentary mantle structure of the Earth's crust of the Antarctic seas were carried out by specialists of Russia and Norway onboard the R/V *Akademik Aleksander Karpinsky*. In 2002, the international "DROMLAN" Project was implemented where the snow-ice air field of Novolazarevskaya station plays the main role. The national Antarctic programs of Great Britain, Germany, Norway, Finland, Sweden, Netherlands, Belgium, South African Republic, India, Japan and Russia participate in this Project. On the other hand, during the period 1992 to 2003 the aviation support of the Russian Vostok station was carried out with assistance of airplanes of the U.S.Antarctic Program, via their main McMurdo station.

Expansion of the international cooperation corresponded to the changes in the Antarctic Treaty structure when realization of narrow national resource interests was replaced by a new nature protection "wave" on a global scale. In 1991 in Madrid, the Protocol on Environmental Protection to the Antarctic Treaty was adopted that declared the Antarctic to be the world natural preserve in the territory of which all human activities should be subjected to strict regulation and management. Our country ratified this international law act by the Federal Law of May 24, 1997 on December 11, 1998. The Decision of the Russian Federation Government adopted "the Order of consideration and issuance of permits

for the activity of Russian individual persons and legal entities in the Antarctic Treaty area".

Thus any activity of Russian individual persons and legal entities including the national Antarctic expedition is carried out in strict compliance with the international and national law standards. This fact allowed Russia to significantly strengthen its positions in the Antarctic Treaty structure. As of June 2005, 45 nations joined the Antarctic Treaty with 28 of them having the status of the Consultative Parties (Australia, Argentina, Belgium, Bulgaria, Brazil, Great Britain, Germany, India, Spain, Italy, China, Netherlands, New Zealand, Norway, Peru, Poland, Russia, the USA, the Ukraine, Uruguay, Finland, France, Chile, Sweden, Ecuador, South African Republic, South Korea and Japan). This status provides a possibility for decision-making or interposing a veto on any issue discussed in the Antarctic Treaty structure.

Among the new expedition technologies introduced into the practice of RAE activities at the third stage, one should note organization of the first drifting scientific station in the Southern Ocean, introduction of new modern digital measuring systems for registration of meteorological, oceanographic and heliogeophysical parameters at all Russian Antarctic stations and transportation vehicles and provision of all expedition facilities with tele-medicine equipment.

A 50-year history of national Antarctic studies is closely connected with the development of our country, its economical state and foreign policy. Coming to Antarctica in 1956, our state has strongly and with confidence secured its place there fulfilling comprehensive scientific programs for the benefit of human progress.

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8 Georg von Neumayer (1826–1909) - a Pioneer of Antarctic Research

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How could Georg von Neumayer[1], who had never set foot on the Antarctic continent in his lifetime, pave the way for Antarctic research? Was he just a theorist who promoted Antarctic research from his house and home in the Rhineland? This impression would be completely wrong. From early years to far beyond his 40th year of life Neumayer was determined to contribute to the exploration of the planet, a goal he pursued with great commitment. From the 1870s onwards, led by outward circumstances, he started to concentrate on the organisation of science.

As a child and as a youth Neumayer had the privilege of growing up in an environment of unusual intellectual freedom. Without compromise he decided to study science[2] and enrolled at the Polytechnikum[3] in Munich in 1847. Neumayer had been assistant to the famous astronomer and geophysicist Johann von Lamont (1805–1879) for half a year, when he abruptly quit this occupation in April 1850 – for reasons unknown. Maybe patriotism played a role in the decision. Until then Neumayer had tried to get into the German, the Dutch or the American Navy – but without success.[4] After quitting his assistantship, he signed up on a cargo ship bound for Brazil. On returning from this journey, he managed to acquire his commission from the navigation training college in Hamburg within a few weeks of lessons. He turned down the offer to join his old crew as second mate. He still wanted to enter the Navy.

At that time the Austrian Navy was being extended. Neumayer travelled to Trieste hoping to get his opportunity there. He worked as a navigation instructor. But after he had spent six months on the coast of the Adriatic Sea without getting a position which suited his interests he went back to Hamburg. There he was welcomed by C.C.L. Rümker (1788–1862), head of the navigation training college and the observatory, and employed as an instructor. Only a few weeks later, in April 1852, Neumayer was sailing again, this time as an ordinary seaman on a sailing-ship bound for Australia owned by the shipping company Godeffroy. When the ship finally arrived in Sydney (Port Jackson) all members of the crew deserted – except Neumayer. He managed to properly sign off after several journeys along the coast. He immediately joined his friends in the Bendingo Gold Fields. Here happened what every adventurer dreams of: Neumayer's group found a vein of gold. Before they ev*en managed to work it, the mining pit was flooded and washed away by a great thunder* storm. This

[1] Born June 21 1826 Kirchheimbolanden, Palatinate - dead May 24 1909 Neustadt, Palatinate.
[2] Neumayer openly reflected his personal development and wrote about his adolescence in great detail in several essays. Also see (Krause 2001: 197, and footnote 2)
[3] The Polytechnikum was an institution for teaching technical and physical academics. It was the forerunner of the Technical University.
[4] It is obvious, that Neumayer's wish to join the navy is to be seen in connection with his patriotic basic position. The blockade of German ports by the Danish and the resulting surrender of the Prussians was seen as a humiliation by many Germans.

incident was like a shock for Neumayer: he decided to end his career as a gold-digger. Before he set on his homeward journey, he roamed the area near the river Murray for several months. Then, in January 1854, he put to sea on the clipper *Sovereign of the Seas* in Melbourne. Enthusiastically he said: "I can hardly describe, how much influence this journey had on my development as a seaman."

Figure 8-1: Neumayer 1852. By permission of Bundesamt für Seeschiffahrt und Hydrographie (Source: Federal Maritime and Hydrographic Agency, BSH).

Neumayer's first adventure in Australia, which lasted two years, obviously triggered a process of maturation. His scientific ambitions became clearer. He did not think about the navy any more. Later he was to condemn the navy as unproductive. From now on Neumayer was only interested in nautical physics, meteorology and geomagnetism. One of the scholars that made a large impression on Neumayer was the American Matthew Fontaine Maury (1803–1873). Neumayer claimed to have spread the ideas of Maury as early as spring of 1852, during his short period of teaching in Hamburg (Neumayer 1909). This would be very remarkable, because the book which made Maury famous – "*The Physical Geography of the Sea and its Meteorology*" – did not come out before 1855. Maury had published the first sheet of his "*Wind and Current Charts*" in 1847 though, but his "*Explanations and Sailing Directions to Accompany the Wind und Current Charts*" were brought out in 1851[5] . Maury propagated a new

[5] For a detailed history on the publication of *Wind and Current Charts* and *The Physical Geography ...* see the introduction by John Leighly from 1963 in Maury (1861: IX–XXX).

kind of navigation based on his own experience, the systematic evaluation of ship's logs as well as the use of scientific methods and new findings. He aimed at shortening the duration of sailing journeys by choosing a certain course and thus making passages safer. He appealed to everyone to observe with standardized oceanographic and meteorological methods for collecting data when aboard and to hand over these findings to the respective research institutes for evaluation.

Maritime traffic was growing dramatically at that time, spreading mainly towards the less travelled southerly seas due to transport to Australia. Because of this increase, experts worldwide welcomed Maury's initiative. The first international conference on this topic was held in Brussels in 1853[6]. It is worth mentioning, that Maury agreed with Humboldt in this question[7]: Under whatever circumstances Neumayer may have become familiar with Maury's ideas, he was one of the first and most committed supporters of Maury's system[8]:

Back in Europe Neumayer had long since set up a plan, which he pursued persistently and skilfully: He wanted to return to Australia as soon as possible to found an institute there, which was to serve practical seafaring as well as science – a Central Station for Meteorology, Navigation and Terrestrial Magnetism[9]. He hoped to obtain the required funds in Germany. On the recommendation of the chemist Justus von Liebig (1803–1873) the Royal Bavarian Cabinet granted Neumayer the considerable sum of 3232 Gulden for the acquisition of equipment[10]:

To secure the support of British authorities for his plans in Melbourne he visited the congress of the British Association for the Advancement of Science (August 1856). Summing up Neumayer wrote: "Men like Whewell, Airy, Faraday acknowledged the relevance of the plan which I presented to them so that I – provided with their recommendation – could set my great undertaking in motion"[11]. Neumayer's cleverness also shows in another aspect: He succeeded in getting the Hamburg ship owner Johann Caesar Godeffroy (and his brother,

[6] Maury 1855/56: 4.
[7] Maury is referred to in Humboldt's *Kosmos* – with a work on astronomy though. See Humboldt 1845, vol.3: 569. In Wiederkehr und Schröder (1988: 6) it is said without reference, that Humboldt heard about Maury from Rümker in 1849. This is supported by Kortum und Schwarz (2004: 170), where it is written that Maury had his just completed *Wind and Current Charts* sent to Alexander von Humboldt through Rümker. Here (p.158) it is also to be read that Maury met Humboldt in Berlin after attending a earlier mentioned conference in Brussels in 1853. During this encounter the title for Maury's main work was set up.
[8] From the obituary, which Neumayer wrote for Maury, it can be presumed that Neumayer read about Maury's ideas aboard the *Sovereign of the Seas* (Hydrographische Mitteilungen 1873: 49–51). According to Wiederkehr (1987, footnote 12) Neumayer knew about Maury's work as early as 1849.
[9] Wiederkehr und Schröder 1988: 1.
[10] It is a non trivial undertaking to give an idea of how much 3232 Gulden means in modern currency. Around 1850 the minimum income of a four headed family was said to be around 200 Gulden. A house with garden was between 1000 and 2000 Gulden. A value of about 200.000 Euro may be reasonable.
[11] Neumayer 1901: 11.

the Senator Gustav Godeffroy) to pay attention to his project.[12] The shipping company Godeffroy, which was increasingly engaged in transport to Australia, was certainly interested in getting nautical-meteorological assistance for their ships in Melbourne. The Senate of Hamburg added to Neumayer's resources by another 600 Mark Banco[13]:

In 1858 Neumayer opened an institute in Melbourne: the Flagstaff Observatory. It flourished enormously under Neumayer's rule until he returned to Germany in 1864[14]. The foundation of the institute became the main pillar of the institutionalization of Australian academic life. Today, therefore, Georg von Neumayer is as famous in Australia as he is in Germany[15].

His success partly results in the fact that he dealt with ocean shipping (nautical physics), which was extremely important to Australia's growth. While he was working in Australia, Antarctica already played a vital role in Neumayer's work. This was inherent to the fact that the great circle courses, which Neumayer propagated for the passage from South Africa to Australia, reached very high southerly latitude[16]: It was an imperative to explore the meteorological and geomagnetic conditions (declination) of this region. Furthermore, the relatively high magnetic latitude of Australia called for a localization of the magnetic pole. Neumayer described his "Agitation for South Polar Research" in detail[17].

The famous geographer and editor of *"Petermanns Geographische Mitteilungen"* (PGM), August Petermann (1823–1878), reported in 1863 that "Dr. Georg Neumayer, Director of the Flagstaff Observatory in Melbourne" had written a letter to the Imperial Academy of Sciences in Vienna to propose an expedition to the Antarctic regions. Here it says: "May this vigorous man succeed in putting his plan to action"[18].

It is not known, why Neumayer left Australia and returned to Europe in 1864. He himself – being very concerned about weaving a legend around his person – never wrote about it personally.

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[12] This memorandum "Denkschrift/der Brief an den Hamburger Senat/Gustav Godeffroy" is preserved (Wiederkehr 1987: 15). Here Neumayer points out that he followed the instructions of the Bavarian King and that he had the recommendation of famous British scientists.

[13] 20.000 Euro may be a reasonable modern equivalent for this amount.

[14] The foundation did face problems. For details see Home and Kretzer (1991). A long letter which Neumayer sent to Justus v. Liebig in September 1857 is very informative (Home and Kretzer 1991: 232–238). In connection with this Neumayer's agitation for a magnetic survey of Australia is very interesting, so are his reasons. He wrote: "[…] that there exists a relation between the productiveness of a tract of land and the values of the magnetic constants. Further there exists a relation between the same quantities and some geological formations, for instance the coal beds as I have shown in Palatine. […] auch Goldadern (auriferous land) soll man mit Hilfe magnetischer Vermessungen leichter finden könne." (Home and Kretzer 1991: 230).

[15] Home and Kretzer 1991.

[16] At a great circle course between Cape Agulhas and middle of Bass Strait φ max 58°15'S is attained at λ 75°39'E. The distance is 5326 nm. On great circle voyages from Australia to Cape Horn a φ max of 63°S is reached!

[17] Neumayer 1901: 12.

[18] Petermanns Geographische Mitteilungen, 1863: 428. Petermann had never believed in an Antarctic continent, instead he maintained that the south pole was situated in a "south polar sea".

The first meeting of geographers in Germany was held in Frankfurt on July 23, 1865[19]: Here Neumayer promoted the exploration of the Antarctic although Petermann had wished to mainly discuss the exploration of the Arctic[20]. Important to Neumayer were a systematic hydrography, application of science to practical seafaring etc., installation of a nautical meteorological hydrographical institute – a Naval Observatory (the German word "Seewarte" was created by Otto Volger) –, carrying out of great sea expeditions, exploration of the *Antarctic Regions*. In his view no other scientific project had the same relevance as an expedition to the south polar regions. At a gathering of natural scientists in Innsbruck in 1869 (Versammlung der Gesellschaft Deutscher Naturforscher und Ärzte) he publicly spoke about Antarctic research again.

In 1871 he provided the first international Geographic Congress in Antwerp with a memorandum on Antarctic research including a map of the Antarctic[21]. Since spring 1870 Neumayer had been in contact with the Command of the Austrian Navy which was planning a south polar expedition combined with the observing of the transit of the Venus – an idea based on Neumayer's report. According to Neumayer he was granted the supervision of the expedition in 1871. The plan of the expedition was brought to a halt during the German-French War but was not cancelled. But this was done soon after the unexpected death of Admiral Wilhelm von Tegetthoff (1827 – Apr. 4, 1871), the protagonist of this enterprise. Finding out that the Austrian Antarctic expedition would not be carried out struck Neumayer deeply. In October 1871 he moved to Berlin trying to get in contact with the Command of the Navy. He was 46 years old but without a task.

A single talk on compass deviations, held in Berlin on February 3, 1872, ended Neumayer's struggle for a career[22]. The compass problem was highly explosive for the Command of the Navy. Especially the deviation problem – that is the error of the compass caused by the temporally and spatially variable field components produced by the ship itself – was a relatively new one which was only understood in full by very few persons at that time, one of those being Neumayer. Albrecht von Stosch (1818–1896; Head of the Admiralty, State Secretary, plenipotentiary of the Bundesrat) recommended Neumayer become a member of the Hydrographical Bureau of the Imperial Admiralty, which he did on July 1, 1872. On December 24, 1872 he was promoted to Hydrographer of the Admiralty. Neumayer used his new position for activities in research politics. He was the driving force and the scientific mentor of the group, orienting the expedition to the seas of the southern hemisphere with the *Gazelle* (1874–1876). Thus he was tempted to equal the oceanographic journey of the British *Challenger*.

The expedition of the *Gazelle* was a first step towards south polar research, but Neumayer could not continue his involvement with it because he had to take

[19] The yearly gatherings known as Deutscher Geographentag (Convention of the German Geographic Society) only began in 1881.
[20] Amtlicher Bericht 1865: 54.
[21] Neumayer 1901: 369.
[22] Wiederkehr und Schröder (1988: 19) state that the influence of the astronomer Wilhelm Foerster (1832-1921), who knew Neumayer, on vov Stosch was decisive for the employment.

over the head position of the Reichsinstitut Deutsche Seewarte (German Naval Observatory) at the beginning of 1875. He would hold this position until 1903. He transformed the Naval Observatory into an internationally acknowledged institute, which was well-known for its technical and scientific innovations. Neumayer provided many interesting improvements on technology of navigation, meteorology and geomagnetism himself and in addition to that he acted very stimulatingly in this field. In this way, Neumayer proved that he was also a very competent theorist.

Besides the commitment at the Naval Observatory the year 1875 brought about another important event: the conference of a group of 14 scientists summoned by the Imperial Chancellory to discuss future polar research in general. Neumayer was one of the most influential members of this commission. A basic evaluation of polar research had become necessary because of an initiative of the Verein für die deutsche Nordpolarfahrt in Bremen (German Society for Arctic Exploration in Bremen), which had conducted the German East-Greenland expedition (1869/70) under the guidance of Carl Koldewey (1837–1908). The Bremen scientists had appealed to the Bundesrat with a petition in order to set up another East-Greenland expedition which was supposed to be closely linked with a planned English West-Greenland expedition[23]. At the same time the coordinator of the Austro-Hungarian North Pole Expedition (1872–74) Carl Weyprecht (1838– 1881) supported the plan of setting up a ring of research stations around the Arctic instead of organizing new polar expeditions. The idea behind this was: Observatories instead of expeditions.

Neumayer discarded parts of his initial ideas concerning polar research and together with Weyprecht and others tried to realize the installation of circumpolar stations with international participation. But when Neumayer finally achieved an international consensus (9 states, 12 stations) , it became obvious that the German government was not willing to provide any funds for polar research.

At the last minute the German government agreed to participate in the first International Polar Year (IPY) and to take its share in polar research. This spared Neumayer and German polar and marine research a great humiliation[24]. Hence the holding of the IPY 1882-1883 is inextricably linked with the name of Neumayer. It is his greatest success as an organizer of science – an achievement which deserved and received international respect, a merit which ennobles German marine and polar research until today[25]. It is noteworthy that Neumayer vehemently stood up for integrating the Antarctic into the Polar Year. Apart from a number of cooperating minor stations in the southern hemisphere Germany and France started expeditions to Antarctic regions (South Georgia and Straits of Magellanes). Germany also held a station in the north.

[23] The protocols of these meetings and other documents remained. For background information on the conference see Krause (1992).
[24] The Imperial Chancellor Bismarck personally started this change of policy. For further details and excerpts of Bismarck's letter see Krause 2001, footnote 36.
[25] The 2nd International Polar Year 1932/33 was mainly set up by Johannes Georgi (1888–1972). Compared to the first Polar Year German involvement was very little, which is to be seen in connection with the bad economic situation in Germany.

As for the results of the IPY: No summarizing work came out, no circumpolar synopsis, which had been the focus of the whole concept – at least regarding meteorology and geophysics. The works on the different expeditions were published in the official languages of the respective research teams. The main work of the German expeditions (Collection of meteorological and geophysical data) was published in September 1886. But the volumes on Descriptive Natural Sciences and the Historical Part were not brought out before 1890/91[26]. Acknowledgements of the 1st IPY which came out later agree in the fact that the scientific outcome was considerable. Critical statements were not uttered[27].

The 4th International Polar Conference was held in Vienna on April 17 to 24, 1884. This was the last international convention under the roof of the first IPY. Almost half a century passed before the idea of a Polar Year was taken up again. With the conclusion of the IPY Neumayer's efforts to further polar research did not come to an end. His favourite idea – Antarctic research – had not been tackled seriously so far. So he used every opportunity to remind others of starting to work on it. In 1865 he had described the exploration of the "Antarctic regions as a nautical-geographical problem which remained to be solved by our century". With these explorations he expected to find data to better understand meteorology and for the theory of geomagnetism. It was a "gathering of material for theoretical research". 130 years ago Neumayer had already phrased the very principle which is still the motivating force of today's polar research. When the 5th Deutsche Geographentag (Covention of the German Geographic Society) was held in Hamburg, Neumayer used this opportunity to vehemently promote Antarctic research. Here he also fulfilled an obligation which had its origin in a petition by Friedrich Ratzel (1844–1904) the year before[28]. A morning of lectures by Neumayer, Ratzel, Albrecht Penck (1858–1945) and Carl Friedrich Wilhelm Peters (1844–1894) was dedicated to Antarctic research. Neumayer's talk[29] was not characterized by restraint – on the contrary. Some of his statements could not have been clearer. The following phrases show his position:

"[…] for more than 40 years nothing has happened to extend our geographic field of vision towards the Antarctic regions […] without a thorough exploration of the physical conditions in the Antarctic it is absolutely impossible to get a full understanding of the natural phenomena of our Earth […] without this [Antarctic] research we cannot even think of a development of the geophysical science […] it seems to me that the necessity of scientific treatment of the south polar regions should be seen as an unchallengeable ethical law"[30], to quote but a few. The quotations where he bitterly and cynically talks about "general philosophical principles and the logical element in geophysical research" have been left out.

At the end of February 1874 Neumayer had already "examined the geographical problems within the polar regions and their interrelation" in a lectures in the

[26] For details on plans for publications of the IPY as regards content and schedule see Neumayer (1885: 173).
[27] 19 out of 25 persons of the American expedition lost their lives (position: Fort Conger, west of Hall Basin).
[28] For details see Neumayer (1885: 174). Even the drafts for a new polar research ship were presented. (Neumayer 1885: 196).
[29] For title see Neumayer (1885).
[30] Neumayer 1885: 176-177.

Society for the Exploration of Central Africa. In his talk Neumayer had emphasized that the most pressing questions of geophysics could only be solved by intensive polar research[31]. It was not until the 1st IPY 1882-1883 that new motion came in this field. But in general the massive efforts and the agitation were in vain.

In the opening speech of the 11th Convention of the German Geographic Society in Bremen in 1895 Neumayer expressed his exhaustion in promoting south polar research. He had only agreed to speak at that opening because he was asked to speak on the same matter at the 6th International Geographic Congress in London. In London Neumayer commented on the objectives and tasks of the exploration of the south polar regions in more detail than in Bremen. He mainly quoted works and opinions of German scientists and explained that the range of scientific questions was reaching far beyond those of geomagnetism and meteorology.[32] At the end of his speech he stressed that it would be most desirable to carry out research through international cooperation. He had in mind the participation of three nations[33]: Following an invitation by the Royal Society Neumayer took part in a discussion meeting on Antarctic science in London in February 1898. “If any one event can be taken as signalling the beginning of Antarctic science as a coherent field this discussion surely was it.”[34] It was interesting to see that the British who had a long tradition in polar research were struggling hard to set up a new south polar expedition even though the project had two famous advocates in Sir Clements Robert Markham (1830–1916) and Sir John Murray (1841–1914).[35] Only the Belgians with Adrien de Gerlache (1866–1934) acted with determination and started an expedition to the Antarctic continent in the summer of 1897. Other nations were to follow four years later with Germany taking on a leading position[36].

When choosing the destination of the German expedition Neumayer was able to use his authority and pushed through a long favoured idea. He wanted a landfall at 90° E, even though influential voices preferred th e area of the Weddell Sea[37]. Erich von Drygalski (1865–1949), leader of the German expedition, missed the Amery Basin (around 70° E) so that his geographic discove ries remained minor compared to those of the British who worked in the Ross Sea. This shortcoming discredited the expedition especially in the eyes of the Emperor Wilhelm II. This strongly hindered the further development of German Antarctic research. Neumayer who had devoted his life to establish Antarctic research was confronted with the negative effects resulting from his geographical agenda. It was not before 1911/12 that Wilhelm Filchner (1877-1957) with the vessel *Deutschland* discovered the interior of the Weddell Sea[38].

[31] Neumayer 1874 Neumayer 1874.
[32] See Fogg (1992: 108). For details on the congress see Petermanns geographische Mitteilungen (1895: 208).
[33] He did not mention a particular nation.
[34] Fogg 1992: 116.
[35] Many details are to be found in Markham (1902).
[36] See Krause 1996: 150.
[37] Lüdecke 1991, 1995.
[38] This expedition was financed privately although it had some official support.

Neumayer's life according to one of his colleagues was qualified as an "art-work". Indeed Neumayer had shared his energy between contributing to the general development of marine- and polar research[39], as well as in establishing a capable national institution for the support of shipping and in the creation of international organisations. Not only is this reflected in the fact that several places on the globe and even a crater on the moon bears his name.

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[39] Neumayer has not only published scientific papers mainly in the field of geomagnetics, but was also very creative in the improvement of nautical equipment.

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Table 9-1: Historical and cultural events related with Neumayers live – a time table.

	1800-1810	1810-1820	1820-1830	1830-1840	1840-1850	1850-1860	1860-1870	1870-1880	1880-1890	1890-1900	1900-1910
Neumayer live data			Birth: June 21 1926	Youth in Palatinate	1845-1850 Student	Sailor, adventurer, scientific plans.	1857-64 in Australia 1865 Europe	1872 Hydrog. 1876 Dir. „Seewarte“, IPY	Expansion of Institution „Seewarte“, IPY	Antarctic research propaganda	1903 retired, death: May 24 1909
Technic Science Culture	Invvention of stationary steam eng. in England, beg. of industriell revol. 1804 death Kant, 1805 Schiller	Printing tech. Rapid press. 1819 Oersted shows correl. between electr. and magnetism	1830 Gauss computed pos. of magn. Poles. 1827 death Beethoven	1835 Railw. in Germ. 1831-36 Darwin on Beagle	1841 Photogr. Lyell: Principles of Geology, Humboldt Cosmos. Liebig: Agric. chemistry	1856 Atlantik Telegraph. Iron shipbuilding. 1851 Maury Sailing Dir. 1853 Brussels Conf.	1869 trans Am. railw. 1864 Maxwell - equations. 1869 in print: The Idiot. 1863 Brahms in Vienna	Evol. of electric machines; illumin. by gas, petroleum 1877 in print: Anna Karenina	1882 Koch proved Tuberkelbacteria. 1882-83 IPY 1888 Herz EM-waves 1881 death Dostojewski	1895 x-rays, first movies 1899 Valdivia Exp. 1895 6. Intern. Geogr. Congr. London	1905 wireless transmission US-EU., Einstein th. of relativity. 1910 death Tolstoi. 1901 7. Intern. Geogr. Congr. Berlin
Events Policy	1805 Napoleon attacks Germ. 1905 Battle of Trafalgar. 1906 „Continental ban.“.	1812-1815 war UK-USA 1815 Water - loo; Vienna Congr. Found. of German Federation	Start of independence of South Am. States. 1821 –29 Greek struggle for freedom	1832 Hambach, „Vormärz“ 1834 „Zollverein“ 1840 Revol. in France.	1848 Revolution in Europe 1849 Calf. gold rush.	Crimean War 1853-57 Europeans emigrate to US, Australia etc.	1862 Bismarck prussian chancellor, 1866 North Germ. Fed. 1861-65 US Civil War	1870-71 German-French War. 1871 „Deutsches Reich.“. „Gründerzeit“ boom	Imperialism, social darwinism, formation of workers, sozialists, demokrates. 1883 death Marx	Change of governm. in many EU countries. 1899 Haager Peace Conf.	Germ. on the way to become the leading industriell power in the world. 1904-05 Russ.-Japanese War
Polar-research Arctic	1806-1813 Giesecke‘s mineralogical survey of Greenland.	1815-18 Kotzebue reaches Alaska N. coast, 1819 Parry r.112° W, 1919-22 Franklin r. Coron.Gulf.	1824 Parry‘s attempt to r. the pole via boat sledge. 1820-23 Wrangell in N. Sib.	1829-33 J. C. Ross f. magnetic North Pole. 1838-40 La Recherche-expedition series.	1845-48 loss of Franklin Exp. Search Exp.:Moore, Richardson, Rae, J.C. Ross. Rinks Greenld. Exp.	Several Franklin searchexp. 1852-54 Belcher 1853-55 Kane 1853-54 Rae	1858-1864 Hall, Hayes. W. Greenld, Grinnell Ld. 1868-1870 Germ Exp. to Greenl. Eastc. r. 77°N	1872-1874 Weyprechts Fr.J.Ld. disc. 1874 Nares Expedition. 1878 /79 Nordenskiöld NE-Passage	1879-1882 Jeanette Exp., 1888 Nansen Greenland crossing. Germ.an IPY Exp. to Baffin Land	1893-1896 Nansen‘s Fram drift 1898-1902 Peary Exps.	1898-1908 Murman Exp. 1909 Peary claims North Pole achievement
Polar-research Antarctic	After the voyage of Cook 1772 the Terra Australis nondum cognita was proved as not existing in the size predicted.	1819 Smith, South Shetland Islands seen. Sealing west of Antarct. Penninsular	1820-22 Bransfield, Palmer, Davis Bellingshausen, 1823 Weddell	1831 Biscoe finds Enderby Land	1840 D‘ Urville finds Adelie Land, 1840 Wilkes, 1841 J.C. Ross reaches shelf ice border	Although land was seen several times and landings were achieved important geographer were convin-	ced that only islands had been developped and predicted an Antarctic Ocean.	1872/76 *Challenger* 1872/74 *Gazelle* 1873/74 Dallmann	1882/83 Germ IPY Exp. to South Georgia	1897-99 *Belgica* Expedition 1891-95 Larsen‘s whaling exploration	Borchgrevink Bruce, Charcot, Drygalski, Nordenskiöld, Scott, Shackleton

9 The Norwegian-British-Swedish Expedition (NBSX) to Antarctica 1949-52 - science and security

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9.1 Introduction

> "Experience has shown that we cannot emphasise strongly enough firstly, that the expedition has no interest whatsoever in the fairly unimportant South Pole; secondly, that it has no political aims. It starts out with a definite and minutely prepared scientific programme."[1]

In the late 1980´s I did research on the South American politics towards Antarctica and it was a pleasure to visit the various archives in Santiago, Buenos Aires, Montevideo, Washington and Cambridge. In all places scientists and polar officials expressed their esteem and recognition of the Norwegian-British-Swedish Expedition (NBSX) of 1949-52. They underlined the quality of the science produced as well as the expedition as a role model for the international cooperation to come during the International Geophysical Year (IGY) 1957-59. Since then, as a political scientist, I have sensed a growing urge to know about why Sweden at all would support an expedition to Antarctica during the years immediately following the Second World War. This article is about the possible political motivations behind the Swedish participation in the NBSX 1949-52. The diplomatic efforts by the Swedish Foreign Minister Östen Undén to create a Scandinavian Defence Alliance, this as an alternative to Norwegian and Danish membership in NATO, constitutes one tentative political connotation of the NBSX. The emerging international strategic importance of meteorology provides another.

The most frequent way of summarizing the story of the NBSX may be illustrated by the following few paragraphs. Shortly after the Second World War had ended Norway took a leading role in organising the first international expedition to Antarctica. Norway was in charge of meteorology and surveying, Great Britain was responsible for geology and Sweden was entrusted with glaciology. The British RAF assisted in air operations 1949/50 with five officers (in finding a landing place for the expedition as well as for meteorological investigations, one officer remained as radio operator), the Norwegian Wideröe Company assisted in 1950/51 (air surveying) and the Swedish Air Force in 1951/52, with 6 officers (originally for reconnaissance of ice conditions as well as being prepared for emptying the base). The Norwegian sealer *Norsel* landed the party and the whaler *Thorshövdi* assisted as well for transport of dogs aircraft and weasels. For general overviews and details of the scientific achievements, logistics and perspectives of international cooperation there are several works available[2].

[1] Hans Ahlmann for Svenska Dagbladet, translated into an article in The Anglo-Swedish Review, December 1949: 231-232.
[2] See Swithinbank 1999; Liljequist 1993; Giaever 1952, 1954.

The account is almost always written in an apolitical spirit, accentuating success and the story of NBSX as an experiment of international cooperation with a remarkable scientific outcome[3]. The purpose of the present paper is therefore also to challenge the received view, or at least to problematize it by introducing a different, albeit complementary perspective that highlights the political context of the expedition and the issues of foreign policy, security and to some extent territorial claims. My proposition is that if we, at least as a hypothesis consider the NBSX in terms of a "political performance" we will gain further understanding both in history of science and in the field of international relations. In addition to studying the organisational arrangements of the expedition itself the general political climate at the time also calls for the need to examine the expedition within a general foreign-and security political framework, in the post-war years, formative for the security arrangements for the western hemisphere for decades ahead. In this perspective the polar areas are located within the overall security doctrines of the western hemisphere at the time of the build-up of the cold war. It is true that a recent work on Norwegian Polar History has contributed to an analysis of the security dimensions of the polar areas as well as clarified several aspects of the Norwegian participation in the NBSX, including its interest in whaling and territorial issues[4]. However, there is still much to be said when it comes to Swedish representations of the NBSX as well as about Swedish foreign policy with regard to Polar Areas at the time. After a brief historical background with regard to security matters in Scandinavia shortly after the Second World War, the following sections will illustrate my hesitations to accept the representations of "pure" science and "true international cooperation". The "purity" is questioned and the "international cooperation" is shown to be more "international" both in quantity and quality than usually stated. Then I will proceed to present alternative representations of the NBSX.

9.2 Post-war Scandinavian relations

In late 1945 Helge Ljung, High Commander of the Försvarsstaben (Defence Staff had addressed the Foreign Minister as well as the Defence Minister, urging them to initiate negotiations with Norway and Denmark regarding arms sales. Swedish army equipment and rifles were competing with British supplies, something that would damage present security arrangements[5]. After a few turbulent years the arms sales issues were settled in a satisfactory way but, in security political terms, the degree of cooperation between the three countries still was somewhat of an unfinished business[6]. At the same time scientists and high-level officials prepared for the NBSX in Sweden, Norway and Great Britain.

In 1948 the Swedish Foreign and security policy on both the operational and political level signified a move towards the other Nordic countries, in particular Norway and Denmark. But frequent relations were also upheld with Bonn, London and Washington. Communication lines, both personal and material

[3] Illingworth 1949, Roots 1952, Swithinbank 1999 Illingworth 1949, Roots 1952, Swithinbank 1999.
[4] Friedman 2004.
[5] Ljung 23 December 1945.
[6] Grafström 22 January 1947.

were important. Information on general defence ability was communicated, in particular on air communication systems and weather reports. Preparations were made for closer cooperation in times of crisis. In spring 1948 the Swedish foreign minister presented a proposal for a Scandinavian Defence Alliance with far reaching commitments towards Norway and Denmark. In May 1948 a political division between Norway and Sweden became clearly noticeable. The issue concerned the degree of alignment with other alliances – read the relation between Sweden, Norway and the Atlantic pact respectively. Despite increasing tensions, in September-October 1948 the stage was set for examining the prerequisites for a Scandinavian Defence Alliance, while the parties promised that no one would join any other alliances. The option of a three-country neutral group still figured although the negotiators recognised a dependence on U.S. supplies such as arms and high technology (in electronics and radio communication). In January 1949 Sweden offered a far-reaching concession of military assistance to Norway and Denmark, neither awaiting the decision of the parliament, nor the earlier required strengthening of the armed forces in the two-neighbour countries. Further, Sweden did not wait for the concessions from the U.S.to deliver arms to Sweden that were meant to boost the Scandinavian Defence Alliance. Issues of the commitment of the western alliance now had become acute since both Norway and Denmark had been invited to participate in negotiations in Washington. They accepted and from spring 1949, Sweden stood alone, outside the western pact and without open access to the most modern military technology, Sweden and Norway thereafter developed a considerable degree of cooperation with regard to security issues, on the operational level, especially for defence of seaborne trade, intelligence and aviation[7]. But the cooperation on the political level was restrained. This had some effects on Swedish policies on the rhetorical level. In the first years of the 1950´s, the government was anxious not to present a too close cooperation with the west, although operational policies were more permissive.[8] The lines of communication went via Norway, then with the British and lastly, if not possible to avoid, directly to the U.S.NATO-officers. Sweden did not wish to openly antagonize the USSR, something that was the rationale for the subsequent and long-lasting policy of neutrality until the early 1990´s.

Although the alliance never was realised, in the event of a great power conflict, these discussions, not to speak of an alliance as such, would have had far reaching consequences for the Swedish national interest. Modern research has since confirmed many decades of rumours with regard to the kind, and degree, of Swedish cooperation with the Northern Atlantic Treaty Organisation. Therefore it is fairly well established that the areas of cooperation defined during the negotiations for a Scandinavian Defence Alliance between Norway and Sweden in 1948/49 – protection of civilian sea transports, air defence and intelligence – actually were accomplished outside any formal agreements. This state of affairs ought to be kept in mind when studying the planning for the NBSX, although there are other ingredients of the pre-history of the NBSX.

[7] Peterson 2003.
[8] Ekekrantz 2003.

9.3 Hans Ahlmann the instigator of the NBSX

In the 30´s and in 1943/44 geologist Johan Gunnar Andersson corresponded with glaciologist Hans Ahlmann on reviving the unrealised plans of an Anglo-Swedish expedition from 1911-14 to the Antarctic Peninsula[9]. Andersson proposed that Norwegian whaling vessels would offer the means of transportation and he urged Ahlmann to continue the proud tradition of Swedish polar research. Andersson stated

”No one will be in better position than you to get a positive response from the Norwegians”[10]. Here Andersson was referring to the fact that Ahlmann had developed extensive both professional and private ties with Norway. The so far generally accepted view of the prehistory of the NBSX is that within short the destination mentioned in this correspondence became obsolete. The presentation of the Nazi-German air surveying of the area Neu-Schwabenland (1938/ 1939) in scientific publications reaching Ahlmann in 1942/1943, seemingly had led Ahlmann to redirect his scientific interest, from the peninsula to other parts of the continent. The photos indicated the possibility of interesting glaciological research, with a possible contribution to the investigations of climate change[11]. Ahlmann certainly had a long record of cooperation in polar research with distinguished Norwegian scientists, and was engaged in the resistance movement during the German occupation of Norway. He had also been proposed as a mediator between Denmark and Norway in resolving the issue of Eastern Greenland in 1940 and was a well-known personality amongst Swedish and Norwegian elites. His main field was studies of the interaction of glaciers and the atmosphere. On several occasions Ahlmann had worked closely with Harald Ulrik Sverdrup and he was directly involved in bringing Sverdrup back from the US to head the newly organised Norwegian Polar Institute in 1946. In 1945 he was appointed by the Swedish government to advise on how to strengthen the meteorological infrastructure in Sweden, considering new professorships and other institutional arrangements. Meteorologist C.G. Rossby was one of the first to be contacted in this connection. Ahlmann himself viewed this advisory work as belonging to the realm of higher diplomacy[12]. And indeed it was. As will be shown meteorology was closely related to both the NBSX and the security planning at the time. But firstly, the next section will illustrate the ambivalence during the preparations of the NBSX. There had been several destinations and participant countries involved.

9.4 Science and politics – a two way relationship

If one takes as one’s point of departure in the analytical level of the impact of individuals in the Swedish history of science certainly Ahlmann and his scientific motives to a great extent may be seen as driving forces behind the planning and implementation of the NBSX. Still, I would like to add the focus of studying the political settings that enabled this particular polar expedition, in which

[9] Lewander 2002.
[10] Andersson 5 June 1944.
[11] Elzinga 2001.
[12] Ahlmann 12 April 1945.

Ahlmann, the skilled diplomat negotiator and hybrid politician must be foregrounded.

Already on 23 December 1944 Hans Ahlmann wrote to the board of the Society for Geography and Anthropology (SSAG) asking for a statement in support of a planned Swedish-Norwegian-British or possibly Swedish-Norwegian-Danish-Icelandic-British expedition, destined for Graham Land. He mentioned that he had already corresponded with professor Wordie, since 1943, and therefore knew that the British would not contribute financially, nor would the Norwegians, towards such an expedition. Despite earlier plans for a Swedish-British expedition including certain promises regarding Swedish governmental funds Britain was hesitant. Thus, Ahlmann was prepared to raise the funds himself in Sweden[13]. However, after the summer of 1945 the British attitude had changed. They were now prepared to provide the necessary funds as well as an aircraft, and possibly the Norwegians would contribute sea transport. Further, in Norway, the shipping industry planned the construction of a new type of vessel for use in polar areas - for the whaling industry. This vessel could possibly be placed at disposal of the expedition, for two seasons. The destination was no longer Graham Land, now it was Dronning Maud Land.

During the war Ahlmann stayed in touch with colleagues and science administrators in the Scandinavian/Nordic countries (also Denmark and Iceland) and Britain. In the event the war would soon end, the expedition was foreseen to depart already in 1946. It was not until 11 February 1947 that Ahlmann received a supporting statement from the SSAG. In the meantime governments in three countries, Sweden, Norway and Great Britain had reached agreements with regard to funding, transports, logistics and division of labour, in part due to Ahlmann´s skills as a lobbyist. The Anglo-Argentine-Chilean territorial disputes on the Antarctic Peninsula may have provided an additional pressing concern on behalf of Britain. Further, the US had launched large-scale operations in Antarctica, by means of Operation High Jump 1946-47.

Why then would Ahlmann as late as December 1944 discuss the destination of Graham Land rather than the piece of Antarctica claimed by Norway and threatened by the Nazi-government in Germany? As a result of this threat Norway had made its claim to Queen Maud Land on 14 January 1939. Ahlmann did open up for other destinations in his letter, but without specifying these. This is only one example that neither the choice of scientific issues, nor the question of international cooperation was the result of clear-cut deliberations from a well-defined beginning to the end. To what extent it was inconvenient at the time to openly suggest Queen Maud Land to SSAG may be discussed but it appears that political motives certainly were prominent. The most obvious concerned the ambitions of Nazi-Germany with regard to Antarctica, but also the positioning of Sweden in relation to the Norwegian claims in Antarctica?

In 1950, rather hastily Ahlmann was called upon to become the Swedish ambassador in Oslo (1950-56). Most sources state that although Ahlmann had been an active planner and even initiator of the NBSX, his diplomatic career

[13] Ahlmann 23 December 1944.

impeded his direct participation, on the ice. Geographers in Sweden have even been described as shocked when Ahlmann left for Oslo[14]. Nevertheless, his relocation from Stockholm to Oslo meant that he continued to be centrally located for the political management of the expedition. Further, to judge from his correspondence, he had a longstanding, wide network of contacts in both Swedish and Norwegian political and economic spheres. This fact should not be underestimated. With a slight speculative overtone I suggest that Hans Ahlmann was at the time "Mr Right". The exactly right person needed to restore Swedish-Norwegian relations, including Swedish relations with Great Britain, a person endowed with a great amount of competence, confidence and good will. Ahlmann, as scientist *and* diplomat was now to stage the NBSX for its political performance in the insecure years of the gradual build-up of the Cold War. In the recent Norwegian work on Polar History the reader is also informed about the deep anxiety felt by Hans Ahlmann because he had become alarmed by the scale of Soviet polar research and feared the possible intrusion upon Norwegian interests, in the Arctic as well as in the Antarctic. It was in that context that Ahlmann began to work for a Norwegian Polar Institute, to be led by his friend Sverdrup, later leader of the NBSX[15]. By strengthening the organisational infrastructure of the Norwegian polar policy at the time, Ahlmann also advocated a strong, but indirect, support for the Norwegian claim on Dronning Maud Land[16]. Likewise he supported the Norwegian presence and concerns in the Arctic, while the Swedish government at least indirectly, gave its silent consent for the Norwegian cause.

Ahlmann as an individual scientist represented a new type of scientific entrepreneurship. Rather than advocating traditional, generalist "polar science" Ahlmann underlined the necessity of highly specialised knowledge, in glaciology as well as in geology. Consequently, the NBSX became known for its concern with the subject of global climate change, of great interest for Ahlmann[17]. In line with this there is much to be said for NBSX as a science-driven effort, an image that coincides with the received view. In my opinion, this scientifically interesting subject does not suffice to explain the willingness from Norwegian, Swedish and British authorities to co-fund the expedition in the tough period of economic and political recovery from the Second World War.

9.5 The possibility of complementary representations

The first hand accounts and popular travel reports by expedition members, from 1950 until this very day repeat, almost as a mantra, the scientific importance and achievements of NBSX in terms of international cooperation, in particular for the later to come International Geophysical Year 1957/58 (IGY). Although previous Swedish operations in both polar areas had involved other countries, the NBSX on the rhetorical level indeed became a trendsetter for international research expeditions to come. However, some contemporary sources reduced the international cooperation to the literal presence of Norwegians, Swedes and

[14] Helmfrid 2003: 79.
[15] Friedman 2004.
[16] Ahlmann 14 January 1939.
[17] Sörlin 1997, Elzinga 2001.

Brits on the ice and descriptions of so called cultural differences among men of science born in different countries. An article in *The Times* illustrated this by reporting on the stoical calm and professionalism shown by the British as compared to the brutish and even Hispanic violent temperament of the Scandinavians[18]! Less has been written about the extensive diplomatic efforts and institutional arrangements that preceded the departure of the expedition in 1949.

Squadron leader Kenneth Ullyett (F.R. Met S.) felt prompted to underline the non-warlike matters to be carried out by RAF[19]. But in what way may we explain the efforts in the British pre - expedition correspondence to secure the presence of USA, Australia, New Zealand and South Africa army officers as observers to the expedition? The answer relates to the need of more, internationally coordinated, knowledge in the field of meteorology and general systems. Meteorology as well as the security political settings are equally prominent as explanatory factors for the NBSX as the individual motives by committed scientists. This is clearly illustrated by one of the expedition members. In January 1949 the young scientist Gösta Liljequist produced a promemoria of the meteorological investigations during the NBSX. Synoptic meteorological measurements were planned to complement other international studies on weather systems. On the one hand results were of immediate interest for the NBSX, on the other hand these same results were of great importance for all modes of transport in the southern hemisphere, civilian or military. Liljequist wrote that such results would be counted as the most important results from the entire expedition[20]. C.G. Rossby had provided the tools of analysis[21]. Liljequist´s expectations were seconded by Ahlmann in 1951, when he described the potential results as the most important for the *two* polar areas, not only the Antarctic[22]. This may constitute one important explanation for the Swedish willingness to contribute financially to the NBSX in times of scarce resources.

Then, what about the history of territorial claims in Antarctica? In what way would the intensification for this particular period relate to NBSX? Several works have analysed the politics of Antarctica, although Swedish non-activity with regard to claims largely remained a non-issue. In 1938 Nazi-Germany claimed and named Neu-Schwabenland; the Norwegians on January 14, 1939 declared its claim to Dronning Maud Land between the 45 0 E and 20 0 W. In 1946, the United Kingdom undertook Operation Tabarin to further manifest its interests and foothold on the Antarctic Peninsula, with corresponding reactions from Argentina and Chile. U.S.demonstrations of military capability in 1946/47 and 1947/48 were followed by various attempts to introduce a new political order for Antarctica, with or without UN-trusteeship. Archival studies also reveal the degree of preparedness of the U.S.Navy to facilitate U.S.territorial claims 1946-48. (Similar types of instructions were issued also in relation to the U.S. activities for IGY). Thereupon, after these attempts, followed the moves of the former Soviet Union in 1949 to demand its participation in every settlement of affairs with regard to Antarctica. Increasing political and strategic activities thus

[18] The Times 5 December 1950.
[19] Ullyett 1949.
[20] Liljequist 1949.
[21] Later on he was a main figure in the planning of the IGY .
[22] Ahlmann 12 November 1951.

followed a 1946 whaling fleet manoeuvre. In addition South Africa and Australia expressed an increased interest in the area and France was prompted to send an expedition to Terra Adelie to consolidate its claim via science[23].

These utterances and firm expressions of foreign policy were not irrelevant for the context of the 1949-52 NBSX. Some authors have expressed in one sentence that the expedition had a few political connotations, but with few exceptions this theme has not been developed in any length until its elaboration in a recent work on Norwegian polar history[24]. Skagestad (1971), a Norwegian political scientist in his unpublished thesis already noted that the NBSX was exclusively driven by the wish of Norway to strengthen its Antarctic presence and thereby indirectly its title[25]. He also noted that Norway did not support the U.S.1948 initiative for a condominium, due to fear of upsetting the Soviet Union and thereby unsettling the delicate Norwegian-Soviet relations in the Arctic. Swedish glaciologist Liljequist, participant of the expedition, stated in one sentence the political motives with regard to the territorial claims of Norway, but without further details[26]. Sweden had a low-profile approach with regard to territorial claims in Antarctica, possibly due to lack of interest[27]. Nevertheless, in my opinion it is necessary to examine the actual relations between the three participating countries i.e. Norway, Sweden and Great Britain. Neighbours, trading partners and possible partners in security alliances construed the agenda for cooperation in the late forties and Hans Ahlmann showed great skills in being sensitive to this agenda. Science and global climate change was not always uppermost in his mind. There were several other stakeholder interests to consider.

9.6 Norway and Sweden – the revival of fraternity

In a letter dated 26 October 1945, Ahlmann wrote to JG Andersson, that Norwegian whaling interests would have an interest in supporting a Norwegian-Swedish expedition but it would have to be destined towards Crown Princess Märthas Kyst/Neu-Schwabenland. Air surveys were seen as necessary and the specific area would then be chosen for practical reasons. Seemingly the scientific reasons were of secondary importance, or rather loosely defined? Ahlmann also stated that the Swedish Air Force already had indicated its interest for an Antarctic expedition, and likewise with the Norwegian Air Force.

In a letter dated 1 November 1945, Hans Ahlmann wrote to professor Olof Holtedahl that he intended to offer 50.000 Swedish crowns to realise a “Swedish-Norwegian” or “Norwegian-Swedish” enterprise in order to investigate Schwabenland from the ground. This if it would be possible to use parts of the Norwegian whaling fleet to transport two small planes (one for surveying and one for landing). The letter ended with the sentence, “As you might realise I am more interested in a Swedish-Norwegian enterprise than in a possible Swedish-

[23] Hanessian 1959, Quigg 1983, Beck 1986, and Lewander 1990.
[24] Friedman 2004.
[25] Skagestad 1971.
[26] Liljequist 1993: 499.
[27] Jacobsson 2004: 318.

British*".*[28] This formulation may be interpreted in different ways. On the one hand it might indicate that he, personally, still had his main priorities firmly grounded in his own scientific interest of climatic fluctuations. At the same time he knew about the Norwegian urge for mapping the area. Ahlmann´s plans for an expedition to Graham Land had been abandoned, but apparently the destination was not that important, nor the question of the tripartite international cooperation. On the other hand he might have intended to plant a seed of "worry" within the Norwegian polar establishment, in order to stimulate an increased level of activity. What if Great Britain and Sweden, but not Norway would visit an area claimed by Norway in the Antarctic?

By May 1946 Ahlmann had progressed to the point of being able to present his proposal for an expedition in Oslo and in London at the Royal Geographical Society. Subsequently, on 28 January 1947 formal notes were sent to the respective foreign ministries. Included were, for the first time a rather lengthy description of the scientific values of the expedition[29].

From his appearance at the Royal Geographical Society in London, he reported that polar scientists, the Navy and the Air Force had been present and that Britain was about to acknowledge the Norwegian claim to parts of Antarctica. Scientists, the Navy and the Air Force, attended the corresponding meeting in Norway. The main concern was to show Norwegian scientific efficiency in the Antarctic after the political recognition of the Norwegian claim[30]. However, were there shortages as to scientific staff? Parliamentary records from Norway show that a probation tour was planned for the season 1946/47 as well as the purchase of the vessel *North Star*. The alleged purpose was to train young Norwegian scientists that they would not lag behind the Swedes and the British scientists. From the Norwegian perspective the meteorological and oceanographical results were held to be of great importance. Preparation would occur before the main NBSX -expedition, scheduled for 1948. Norwegian whaling interests were supposed to finance parts of the expenses[31]. The probation tour was cancelled.

By mid November 1946 Ahlmann had informed the Swedish Foreign Minister Östen Undén about the possible expedition, now scheduled for 1948, and referred to the need for a Swedish contribution of 500.000 crowns. However, only 50.000 had been secured from the government and the remaining sum expected from Wallenberg Foundation had been withdrawn from the project[32]. Meanwhile, he laid the groundwork for the participation of the Swedish Air Force. Other records show that by late 1946 the Swedish Air Force was firmly rooted in the operative parts of the NBSX-expedition. As mentioned above, already since 1945, Ahlmann had been convinced of the fact that the Swedish Air Force would take an interest in joining an expedition to Antarctica[33]. His main contact was general B. Nordenskiöld, General of Command of the

[28] Ahlmann 1 November 1945.
[29] Ahlmann 1948.
[30] Ahlmann 23 May 1946, 23 May 1946.
[31] Norwegian Parliament St prop nr 2, till nr 21, 24 October 1946.
[32] Ahlmann 11 November 1946.
[33] Ahlmann 5 April 1946.

Swedish Air Force, a person known for his independent actions in strengthening the air force vis à vis the navy and the army.

On 28 January 1947 the Norwegian government informed the Swedish government of the Norwegian state involvement in the expedition, firmly stating the requirements for Norwegian leadership, rather than a Swedish one. In December 1947 it was stated that the expedition would be postponed until 1949. Records show that the expedition was delayed at least two years, due to financial problems and other scarce resources in Norway and Great Britain. Although a first tripartite meeting was held in Oslo on 27 November 1946, the national committees had still not entered their final form by May 1948. Only in October 1949 had the picture clarified; the composition of the committees was far from "purely" scientific. High-level civilian as well as military officials were represented in the three countries. Leader of the expedition was H.U. Sverdrup and leader of the wintering party was Captain John Giaever, of the Norwegian Air Force; both persons were close friends of Hans Ahlmann[34].

The planning of the air survey operations translated the tripartite efforts just described into the organisational landscape of the NBSX. There was a rather late settling of the logistics for landing the party as well as for the air surveys. According to RAF reports, in 1948 the Norwegians still foresaw the use of a Catalina with the use of British flying personal[35] and a budget of some 5 million Norwegian crowns[36]. Later revised and perhaps more realistic plans instead included the use of Norwegian Norseman planes – for all three Antarctic summer seasons, but it was still an open issue exactly how to engage the Swedish Air Force. It might be argued that the military "only" represented the logistic dimension but in the following sections it will be shown that the military was actively engaged for foreign policy purposes, far beyond the implementation of the logistic demands of glaciological and geological science. To conclude this section - all in all the military presence was as important as the civilian one, and foreign and security policy issues were as much present as scientific issues. Further, the whaling industry had also a firm interest in the expedition.

9.7 Swedish military goes abroad – but not for vacation

Although the Defence Ministry, itself by 10 November 1950 had decided that the Swedish Air Force would participate in a mission outside Sweden's borders, the government delayed its formal decision until summer 1951. Already in the Antarctic summer season of 1950/51 Captain Reinhold von Essen participated as an observer on the NBSX, since already earlier, unspecified when but presumably since 1945-46, there had been "talk of" participation of the Swedish Air Force[37]. The existence of this observership in 1950/51 has been mentioned, but not explained at any length in Swedish writings on the expeditions.

[34] Some of the correspondence located in the Ahlmann collection, held at Royal Academy of Science, gives evidence of the degree of personal friendship.
[35] Walford 1950.
[36] Norwegian Parliament St prop nr 1 till nr 16, 21 May 1948.
[37] von Essen 1952, Svenska Dagbladet 30 May 1951.

According to Swedish press the Swedish Air Force ordered the study of logistics and procedures of the flights carried out by the Norwegian company Wideröe in that same summer season. As for the next season 1951/52 the mission for the Swedish Air Forcewas twofold, firstly to act as a safety measure, to fly out the expedition members if embarking by sea were to be impossible. Secondly, the Swedish Air Force was tasked to make 24 over flights in Antarctica for air surveying and mapping purposes, partly to assist the Norwegians, partly for testing wireless and radio communication equipment. After discussions back and forth, in the end Ahlmann and Sverdrup had made a formal request to the Swedish Air Force to participate in the season of 1951/52[38]. The expedition would cover the costs for travels, fuel, equipment etc[39]. Nevertheless an additional sum of money would be requested from the parliament (195.000 Swedish crowns). According to the Department of Ecclesiastics the total sum of 300.000 crowns already had been granted to the expedition, but not for the coverage of the Swedish Air Force expenses. The sum of 195.000 and the personnel was granted by a government decision 9 June 1951.

Due to sparse experience and little knowledge about radio communication and navigation in cold areas the Swedish Air Force during summer 1951 had also taken contacts with Air Force men from Norway, Great Britain and the United States who were located in various places in the Arctic. This was only one example of the increasing operative cooperation between neutral Sweden and the Western Allies. As part of the effort 1951/52 Sweden sent six men from the Swedish Air Force, under the leadership of von Essen to assist the NBSX for the up-coming summer season. The group brought two aircrafts, a Beech craft 18-R and a small SAAB Safire as well as field equipment for radio communication. Details of the mapping activities are covered elsewhere[40].

In an interview von Essen claimed that the main task for the Swedish Air Force was to test equipment in cold weather. The interview was made after his tour as observer but before the actual Swedish operation. He stated that it is evident that the Air Force did not provide resources for the sole purpose that six flying men would get abroad on a far away trip. The Air Force also expected good value for money by testing equipment[41]. In the formal report following the first visit of von Essen, i.e. from his observership in 1950/51, the reason for the Swedish Air Force participation in the expedition for the next season becomes even more clarified.

The original plan for von Essen in 1950 was to join the *Norsel*, in Göteborg Sweden on 16 November 1950, visit Maudheim and then proceed to Halifax, still aboard the ship. From there he would fly back home, at the expense of the Swedish Air Force. Additional knowledge on planes and flights, radio communication and air surveys were to be sought from the Canadian Air Force. However, the schedule for *Norsel* made a visit to Halifax impossible and von Essen stayed on at Maudheim. Instead *Norsel* left for Newfoundland and von Essen cabled back home to ask whether he could join. He urged his superiors to give

[38] Ahlmann 6 April 1951.
[39] Svenska Dagbladet 12 April 1951.
[40] Liljequist 1993: 509.
[41] Malmö Tidning 16 October 1951.

their permission for him to get in touch with the Air Force men that were at work surveying areas north of Hudson Bay. Apparently, he was not granted a tour to Canada (von Essen 1950 from *Norsel*, Cape Town).

The missions for the Swedish flying squadron for 1951/52 were rather well defined with one exception – the participation in air surveying. Records show quite clearly that Ahlmann and Sverdrup well in advance of 1950, before the Norwegian flights, had foreseen the air surveying led by von Essen, although it was not very clear on what distances they would fly. Nevertheless, in the von Essen report from March 1951 it is evident that the Norwegian flights were not too successful. Weather conditions had been difficult and flights had not been prepared in a proper way. Much work had to be undertaken anew and by now it was possible to state that the Swedish Air Force had been called upon! In 1950 von Essen further reported on planes and equipment and evaluated their functioning. He also mentioned the necessity of social competence due to the international character of the expedition, in particular on its way home aboard the ship. Von Essen concluded the necessity for him to undertake a trip to Canada before the next season to consult experienced persons with regard to flights in cold, desolate areas. The observations of the Wideröe operations had not been sufficient to guarantee safety and perfect positions (navigation) in relation to the planned air surveys. Finally von Essen reported on the testing of cold weather garments, including survival dress and goggles. Also he in a short passage mentioned the system of weather reports. Maudheim received information from Graham Land, from the subantarctic island and from the Norwegian whaling fleet. From all this it is clear that the Swedish Air Force, apart from assisting the NBSX also had its own rationale and agenda for participation. There was a military goal of gaining knowledge and experience relating to the operations in extreme conditions as well as an increasing wish for closer insights to the process of military build-up in the Arctic. In this regard, firstly, the intensified work on weather system and lines of communications took place in both polar areas. Secondly, the actual militarization of the Arctic was a fact[42].

All in all operations were quite successful and afterwards the two planes were put on *Norsel*, so by 15 January 1952 the planes as well as the members of the NBSX -expedition were on their way back to Europe. The party left the ship on Canary Island took another vessel and arrived in Southampton on 18 February 1952. In relation to the arrival to and departure from Antarctica one may take note of the fact that the status of the Swedish flying squadron was not totally clarified – the Swedish Air Force themselves described the unit as travelling under civilian conditions, however requiring certain assistance from South African authorities when landing the planes in Cape Town for further transport towards Antarctica[43].

Most historiography on the NBSX-expedition, including media reports from expedition members including von Essen himself claim (von Essen 1954) that it was the international status of the expedition that led to the respective nationalities of the air units. This argument is somewhat of a simplification considering

[42] Wedin 1967, Claesson 1982.
[43] Kungl. Flygförvaltningen 8 September 1951.

all the planning efforts and political deliberations preceding the expedition. As argued above these international features were not at all evident in the initial stages of the expedition since the *all* Norwegian, or *all*-Scandinavian concept actually existed as the first option. For instance Ahlmann had been convinced of the Swedish Air Force participation well in advance of any British or Norwegian flights. Swedish literature on the NBSX does not tell in what manner it was seen as suitable for the Swedish Air Force to participate in this international event at these turbulent times. Further, there is no account of what preparations had been made in order to plant the idea in von Essen of a Swedish officer doing intelligence work up in the high North.

9.8 To secure security – Great Britain

In 1950, as von Essen had been an observer and wanted to join *Norsel* for Halifax and later on Newfoundland, he had good reasons for his request to go north. Perhaps his reasons were far too good for Swedish foreign policy concerns?

In the season of 1950/51 B Roberts and HU Sverdrup were aboard the *Norsel* to prepare for the expedition to Maudheim. Sverdrup also visited Johannesburg to inform himself on the weather report systems connecting the whaling fleet with Antarctica and subantarctic islands. Aboard the very same *Norsel*, a lieutenant Forster from the British navy undertook a long trip, from Europe to the Antarctic, then he proceeded to the Arctic . Neither his existence, nor his observership is often mentioned, but his mission was to study ice-navigation. For one scarce piece of information see Sverdrup in *The Norwegian Whaling Gazette* (1951). Thus, while von Essen flew back home; Forster actually continued to Newfoundland and the Arctic to learn about ice conditions and ice navigation.

This reconnaissance tour further strengthens the argument of locating the NBSX within a wider foreign-and security policy framework. A report from Forster himself clearly formulates the positive opportunity to, in a discrete way, study conditions aboard a civilian ship in the Arctic without being too visible (Forster 1951). In the end von Essen had been excluded and the reasons for this remain for future research.

Commonwealth politics added further political dimensions to the NBSX and required time-consuming correspondence for the British and the Norwegian organisers. So did the development of the transatlantic relations. The accessible correspondence reveals that several Commonwealth countries were asked to join with a military representative to the expedition. Roberts corresponded with authorities in South Africa, Australia and New Zealand. The two first mentioned countries sent observers 1949/ !)50 to study landing procedures, transports and equipment such as instruments for investigation phenomena of the upper atmosphere. The U.S.abstained from sending a person. It is interesting to note that the Swedish foreign ministry also felt inclined to inform its legations in South America of the observers joining the NBSX[44].This was presumably due to the

[44] 2 December 1949 UD.

coordination of the weather services of South Africa, Argentina, Chile, and Great Britain at FIDS, France at Adelie Land as well as with ships in whaling fleets scheduled for the summer seasons of the NBSX. Financial means for this synoptic weather analysis had been provided by Norway[45].

So, how come that RAF, the Swedish Air Force and Norwegian government collectively in times of economic crisis, would lend resources, men and machines to such a scientific enterprise as the NBSX? I do not mean to diminish the importance of all scientific concerns mentioned in former books and articles on the NBSX. Rather my argument is that there were other, parallel concerns. Glimpses of the build-up of an international weather reporting system, cooperation on the operational level with regard to intelligence systems related to the Arctic and general foreign- and security policy concerns have been presented.

9.9 The general foreign-and security policy framework – Sweden and Polar Areas

In 1945 there were rumours that the U.S.was about to buy Greenland, this Captain J Giaever wrote to his friend Ahlmann[46]. Iceland and Greenland were becoming the location of U.S.bases and air strips. Later sources bear witness to the profound militarization of the Arctic[47]. Apart from planning the NBSX Hans Ahlmann planned a visit to Greenland, asking U.S.authorities (War and Navy Departments) for permission. In his letter to Rear Adm. H Smith he requested permission to visit Greenland as well as to enter an American plane. Ahlmann referred directly to the important information he had gained in Moscow and from the Arctic Institute in Leningrad[48]. Colonel Yates, Air Corps Chief of the Air Weather Service of the Army in a confidential letter several months later warmly welcomed the visit and research of Hans Ahlmann:

> "With the added emphasis, which is being placed on the development of scientific programs in the Polar Regions, I feel that your visit to Greenland is very timely. As chief /…/ I am extremely interested in all research programs and scientific explorations pertaining to the meteorological field which are presently being conducted and are contemplated for the arctic area. I would be very pleased to receive any reports, which you might render after the completion of your visit to Greenland."[49]

The two letters clearly show the unavoidable intimacy of science and militarization and provide short portraits of two scientists working within the build-up of a global Cold War. Science was far from "pure" and results were far from internationally available. Within the domain of the Ministry of Defence, and Foreign Affairs the Cold War produced attempts at solving the security issues, at that moment questions of an overriding importance. Meanwhile, in 1946, Harald

[45] Roberts 1950.
[46] Giaever 9 September 1945.
[47] Wedin 1967, Claesson 1984, Johnson Theutenberg 1984.
[48] Ahlmann 4 January 1946.
[49] Yates 24 June 1946.

Sverdrup, later to become leader of the NBSX, was on his way back home to Norway from La Jolla, and the Oceanographic Institute in California still hesitating to take on a leading role of reorganising the Norwegian Polar Institute. Ahlmann had tried to recruit him and asked him to guide "geophysics" in Norway. Sverdrup had recently turned down an offer to participate in the atomic tests in the Pacific Ocean in favour of going to Norway[50].

Turning southwards once again, in the Antarctic, the U.S.had plans for Operation High jump II, scheduled for 1949-50. Here the question of experience at high latitudes in the context of the Cold War was significant. Preparations included Australia, New Zealand, Chile, Argentina and South Africa. Diplomatic work aimed at facilitating air operations as well as access to seaports. Between the various U.S.actors there were still internal discussions as to an actual U.S. claim on parts of the Antarctic, based on the use of the concept of effective occupation. The navy-planning group was hesitant whether it would do any good to anyone to "run a show with a slogan of scientific research as a banner". In the discussion within the navy, in order to convince the State Department and the Treasury for additional funds the following motivations were given: Firstly, High jump II would occur in order to strengthen the position of the U.S.(the wording of occupation was crossed out), secondly the operation (including three bases) was motivated by training of personnel and thirdly, possible/ probable scientific accomplishments were foreseen. It was also stated that all ships, men and material could be redestined to the Arctic in case of deterioration in international relations[51]. Still in March 1949 discussions were held along the same lines but in a diminished scale. In April 1949 plan Charlie was emphasized a giant, unrestricted training operation in cold weather operations due to the "sensitivity of foreign governments to our Arctic operations". In addition the (possible) acquisition of scientific information was to be highlighted *"as the basic story"* to the general public – whilst the issue of claims should be put in the closet[52]. Although High jump II ultimately was cancelled, the last preparations for the NBSX took place in a shivering period of time.

9.10 NBSX – science for security and security cooperation

The Norwegian Parliament in 1948, for the longer term foresaw a network of meteorological stations connecting Maudheim with British and Argentine stations on the peninsula. Also it acknowledged the importance of international efforts of exploring the "free atmosphere" as well as the benefits for national interests of air surveying. The close links between the western system of defence and the build-up of international competence for meteorological knowledge required a large research effort per se. Given that general background the present short article on the NBSX permits at least initial conclusions on science as politics with other means. In my view, one of the most important rationales for the performance of the NBSX was the emerging need for increased knowledge of weather systems by defence organisations worldwide. This explains most of its international content, much better than does reference to some less

[50] Sverdrup 31 January 1946.
[51] Dufek December 1948.
[52] Dufek April 1949.

well defined internationalism due to good will held by a few individuals. Hereby I further question the thesis that the NBSX is a (remarkably) early example of some radical small state foreign policy of independence, where both Sweden and Norway ran a preview of their respective policies established in late 50´s[53]. On the reverse, the two Nordic countries were within, or in the case of Sweden closely tied to, the western alliance, although each country had its specific location and assignments.

At last it is also necessary to broach the question to what extent the Swedish support of the NBSX was related to the (unsuccessful) negotiations of a Scandinavian Defence Alliance. Although somewhat speculative I would like to state that general good will on behalf of Sweden could be demonstrated in a rather inexpensive way, both towards Norway and Great Britain in times of official and publicly shown bitterness, after the strategic "split" on the political level in the spring of 1949. This when Norway was on its way into NATO and Sweden remained outside and the post-war security pattern were established in northern Europe. Further, indirect support for Norwegian Antarctic claims could be shown, and indirectly for Norwegian interests in the Arctic, without full scale legal acts of recognitions. Useful knowledge could be gained without upsetting the USSR. Further, valuable contacts could be upheld with regard to access to know-how in cold regions despite a lack of closer formal cooperation with NATO -countries.

On the strategic level both Sweden and Norway were strongly influenced by the strategic conceptions of a possible third world war. The scenarios assumed during negotiations for a Scandinavian Defence Alliance in 1948/49 survived for several decades and the destinies of Norway and Sweden were seen as closely related. The prime concern of Sweden was to stay outside a war and to secure vital supplies, such as fuel and certain high technology goods. Science in polar areas ensured an increased degree of security.

There are still answers to be sought in primary sources external to the official travel reports and expedition accounts as well as outside the contemporary press reports. Because the questions simply have not been dealt with, in documentation by persons participating in the expedition. Nor has later research in Sweden highlighted these dimensions. The complementary representations presented here suggest that Security and Foreign policy was a primary concern, in Sweden, in Norway and in Great Britain.

The intricate European-U.S.relations visible already during the NBSX became apparent during the planning of the International Geophysical Year for 1957-58. The Norwegians had been slightly slow in elaborating the results from the NBSX and Ahlmann made a summary of already well-established concerns:

> "Missing maps are delaying geological results, but it is also a shame if American planes should fly over the area and put their names on mountains and glaciers or their icebreakers map the "unmapped" coast of Queen Maud Land and put in such names as Byrd Bay etc"[54].

[53] See for instance Sörlin 1997 and Friedman 2004 advocating such a thesis.
[54] Undated draft copy of letter to Larry Kirwan from Hans Ahlmann June 1957 KVA.

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10 Swedish non-participation in the Antarctic leg of IGY 1957/58

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10.1 Introduction

Over one hundred years ago the Swedish geologist Otto Nordenskjöld led what at the time was called the Swedish South Pole Expedition[1]. Despite difficulties and the loss of the expedition vessel the enterprise brought home much valuable data and generated a large series of important scientific publications. Roughly five decades later Swedish scientists participated in what is often regarded as the first truly international Antarctic expedition, one that according to some accounts served as a model for cooperative efforts during the IGY. It was the Norwegian-British-Swedish Expedition (NBSX), also referred to as the Maudheim expedition[2]. As Lisbeth Lewander argues in another chapter in this volume transformation in the geopolitical situation in the post-World War II world and the inception of the Cold War were primary background factors and stimuli for the venture. Wartime technological developments were also important. Investigations were made in several fields of science.

At the individual level, the driving-force behind the new Antarctic project was the renowned Swedish glaciologist Hans W:son Ahlmann. Although not a participant in the expedition, it was his vision and scientific prowess, excellent contacts with Norwegian partisans during World War II and politicians afterwards, combined with diplomatic skills in negotiating with the British that helped facilitate the venture. Many of the participants later became internationally renowned researchers. For Sweden's part the focus was mainly on glaciology and meteorology, with Valter Schytt and Gösta Liljequist respectively as the principal investigators in these two fields.

Sometimes it has been speculated that on the basis of its excellent scientific record in Antarctica, Sweden might have succeeded in joining the founding nations of the Antarctic Treaty, had there been sufficient political and scientific will to do so. A strong case might have been made on the basis of the country's earlier merits, but there was no one to press the case in connection with the meetings in Washington D.C. 1959 and the conference that shaped the treaty. Marie Jacobsson, attributes this inactivity to political naïvity on the part of Sweden[3].

Swedish scientists actually played an internationally recognized instrumental role at the birth of the Special Committee on Antarctic Research, later (in 1961) called the Scientific Committee (the acronym in both cases being SCAR). Valter Schytt was even the first person to be appointed its secretary. The Swedish

[1] Elzinga et.al. 2004.
[2] For a recent account by one of the participants, see Swithinbank (1999). Maudheim was the name of the base on an ice shelf near Cape Norvegia (by the much larger Riiser Larsen Ice Shelf) just off Dronning Maud Land, Antarctica.
[3] Jacobsson 2004: 319.

government and the country's scientific community however chose a low profile. The main reasons were political. First of all Sweden's main interests and efforts during the IGY had been in the Arctic, particularly on Svalbard. Secondly Sweden lacked a policy of territorial acquisition, both 1900-05 and in the 1950s[4]. Thirdly, after World War II Sweden put a lot of faith in the United Nations. This was not so strange considering that Dag Hammarskjöld became UN General Secretary (1953-61). Faith in the UN-system probably included belief in its role in creating a broad intergovernmental regime for managing affairs in Antarctica. This was a stance that deviated sharply from almost all the countries that had a stake in the future of the icy continent. Finally, Sweden was an avowed adherent to a policy of active neutrality that had kept her out of World War II. During the period of the Cold War that followed it implied a determination – officially - to side with neither the US nor the USSR.

The purpose of the present paper is to review the situation and to consider some personal, institutional and political factors that led to Sweden's non-participation in the Antarctic leg of the IGY and the subsequent decision to abstain from accession to the Antarctic Treaty, at least until 1984.

An interesting paradox in the Swedish historical account is that when attitudes began to change, both within the scientific community and in governmental circles, the spark came from a massive activity in the Arctic. An expedition called *Ymer 1980* with and icebreaker and 114 participants, led by Valter Schytt, commemorating the event one hundred years earlier of the famous *Vega* expedition through the Northeast Passage had an important spin-off effect. Several young scientists in various disciplines developed polar interests. The government for its part, in the wake of the Oil Crisis and the period of negotiations of an Antarctic Minerals Convention plus the perceived possibility that a review of the Antarctic Treaty in 1991 might close the door permanently to any future participation, suddenly stirred to life and rapidly developed a strategy to get Sweden into the club.

10.2 Conceptual frame

The conceptual framework that guides the present study involves distinctions between three levels of activity that are mutually interlinked. These "levels", already indicated in the previous section, may be characterized by three different key words: policy, institutions and individuals (see Fig. 10-1). At a micro-level, individual scientists are viewed as driven by personal and professional interests. Ahlmann was a case in point. As a professor of geography at Stockholm högskola during the 1940s he was embedded in an institutional arrangement that allowed him to mobilize economic and infrastructural resources to achieve his aims. Large-scale resources of the kind needed for an Antarctic expedition after World War II for the most part was one where patronage had to involve economic backing and political authorization from above. National subsidies were decided at the macro-level of politics and policies.

[4] Jacobsson (2004) gives a critical analysis of the historical record, arguing that historically the lack of such a policy regarding Antarctic territory was not – as is often claimed – the result of a moral principle (altruism) but simply due to inaptitude.

Even though science policy did not formally emerge as a specific policy domain until later,[5] one can nevertheless say that a country's commitment to the IGY was prototypical of research done under the auspices of a country's science policy.

Subsidies at the national level were mostly motivated with a mix of scientific institutional, economic and foreign policy as well as a matter of national prestige. Symbolic as well as material activities tend to merge as indicators of agency at the three levels of our analysis[6].

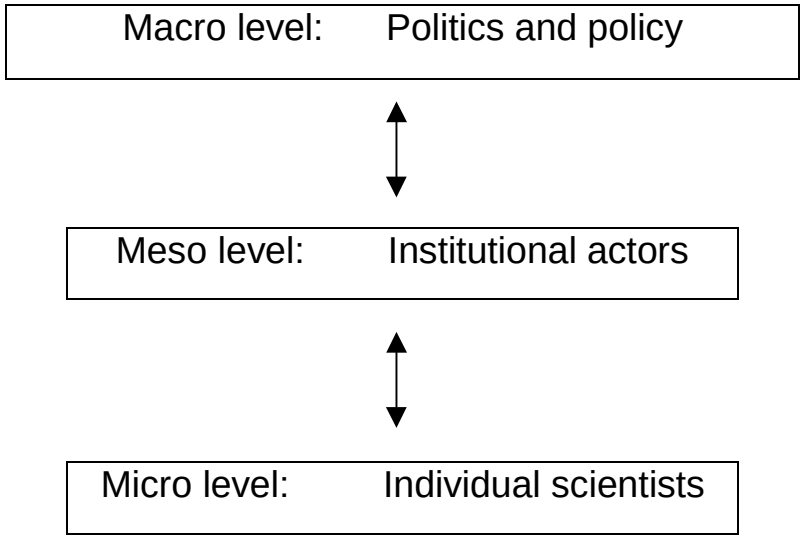

Figure 10-1: Conceptual schematism showing three interacting levels of agency.

The institutional level may be understood as one where the interests of individual scientists and those of state policy meet. When positive resonance obtains between interests at the micro- and macro-levels the efforts of individual scientists are collectivized and organizationally facilitated (as well as constrained in various ways), and intentions get translated into plans and support out of the public purse. This allows individuals to develop networks and enrol others for their cause, other scientists as well as politicians and high-level civil servants. Strong individual actors become champions who define strategic scientific orientations or re-orientations. Institutions are therefore the nodes where funding and other resources needed for infrastructural and logistical support are brought together and canalized.

With the foregoing schematism in mind I also want to pinpoint some necessary and sufficient conditions needed for a country to launch Antarctic activities for

[5] Cf. Elzinga & Jamison 1995: 584-587.

[6] Elsewhere we use the concept of "institutional motives" (i.e., basic research, economic, military, legal, environmental protection motives, etc.) to address the question of how polar research can be a continuation of politics by other means (Elzinga and Bohlin 1989). For an important distinction between the *practical-instrumental* and *symbolic-instrumental* uses of science see Bohlin (1988), and also ∅streng (1989). Bohlin (1991) has an incisive discussion on the various combinations and tensions between "institutional motive", see also Elzinga (1993).

the IGY. To do this I shall briefly contrast the Swedish and Belgian situations (Table 10-1). Sweden did not launch an Antarctic expedition whereas Belgium did. The comparison of the two cases can be used to highlight several factors at the three analytical levels of my conceptual frame. These coincided in the one case for the Antarctic (Belgium) but not in the other (Sweden). In the Swedish case individual scientific interests, institutional changes and national state policies conjoined readily in a plan for an IGY venture in the Arctic, thereby excluding the possibility of an Antarctic leg of the IGY.

Table 10-1: Factors with a bearing on IGY efforts in Sweden and Belgium.

	IGY 1957/58		
Requisite conditions	**Sweden in Antarctic**	**Belgium in Antarctic**	**Sweden in Arctic**
Individual scientists motivated?	no	yes	yes
A champion came forward?	no	yes	yes, several
Country politically motivated?	no	?	yes
Possibility to mobilize earlier track record?	yes (not done)	yes	yes
Possibility to mobilize national prestige?	yes (not done)	yes	yes
Possibility to attain a critical scientific mass?	yes (not done)	yes	yes
Possible to go alone?	yes	yes	yes

In Belgium by contrast, Baron Gaston de Gerlache de Gomary, the son of Adrien de Gerlache the driving spirit of the *Belgica* expedition 1898, took up the Antarctic cause. During World War II he became a hero in his own right as a fighter pilot with the British Royal Air Force. He was able to use symbolic capital, as his father before, to mobilize a large number of sponsors, including the Belgian Royal family. He also collected money via private subscription campaigns. Two Norwegian vessels were rented[7]. The expedition left Antwerp 12 November 1957, arriving 26 December to set up King Baudouin base on King Leopold Bay. In all de Gerlache in the mid-50s raised the equivalent of one million U.S.dollars, enough for Belgium to go alone to Dronning Maud Land. The presence of a strong nationalist heritage rhetoric paid off when mobilized by a highly visible champion for the Antarctic cause. This contrasted sharply with the Swedish situation where Otto Nordenskjöld's name could never trigger the same kind of resonance and response in similar circles. Another difference was that in Belgium, as distinct from Sweden there was a clear political will,

[7] See further Van Antenboer 2001.

perhaps influenced by the tradition of a colonial past closely linked to the fortunes of large mining companies and the Royal family.

The two cases are also interesting because they reveal something of the pre-conditions required in 1959 for a country to become a party to Antarctic affairs. Poland applied to become a Treaty member but was told it would have to place a station in Antarctica. Belgium got in at a late hour with an expedition, setting up and running an over-wintering station.

10.3 A door closed in 1959[8]

During the 1930s J. Gunnar Andersson, a member of Otto Nordenskjöld's Antarctic expedition thirty years earlier, was one of the few persons in Sweden to advocate a second south polar venture. He noted how a Swedish-British Antarctic expedition with a five year wintering station near Nordenskjöld's original site had been cancelled in 1914, falling victim to World War I, whence Sweden lacked political aspirations in this direction and concentrated wholly on the Arctic[9]. Ironically, he added: "Among Swedish polar scientists there has since fifty years ago existed an arrogant habit of looking down on those who were motivated by the setting of polar records of little scientific value. I myself belonged to that group of narrow minded critics, but now heartily want to admit that I have changed my view regarding these exploits that are so highly praised by the public at large."[10] Competition, he now found, was a driving force in the development of new technologies; apart from science (meteorology, glaciology, geology, etc.) it might yield economic benefits (for whaling and mineral resources)[11]. In official Sweden, however, there was no visible resonance for the latter line of reasoning[12]. The successful Maudheim expedition 1949-1952 apparently did nothing to change this widespread apathy.

Ambassador Bo Johnson Theutenberg, Legal Adviser to the Swedish Foreign Ministry, and representing Sweden in Antarctic affairs in the early 1980s, commented on Sweden's missed opportunity when he shortly after the country's accession to the Treaty reviewed the paradoxical historical record. "While several nations see the Antarctic Treaty as a sort of starting point for something new in the field of international cooperation and scientific research", he noted,

[8] For more detail on events relating the closure see Lisbeth Lewander's Licentiate dissertation of May 1990, *Kontroller over Antarktis. Suveränitetsanspråk och traktatreglering 1940-1982*, in Lisbeth Lewander *Polariseringens politik. Studier av politik och kön* (Karlstad: Karlstad University Studies 2004: 51), del II, Artikel 1: 18-20.

[9] Andersson 1945: 373.

[10] Andersson 1945: 422.

[11] Andersson 1945: 438. In a later book he gave the German Schwabenland expedition particularly good coverage - Andersson 1954.

[12] Observers in other countries found the Swedish position rather odd, at least if one judges by what a Chilean wrote in 1986. "Sweden is the only country that after having conducted an Antarctic expedition has not become interested in the area and has not recognized the Treaty. The Swedes effectively mounted an Antarctic expedition in 1901-03 /.../ This expedition could have provided a basis for a Swedish claim. In 1950-52 Sweden took part in an important joint expedition. /.../ But the Swedes never showed any interest in either the political or territorial problems of Antarctica, or in taking part in scientific research programs that were being conducted on that continent." Cited from Merico 1987: 72.

”the coming into being of the Treaty in 1959 brings, for some reasons, something of an end to Swedish scientific involvement in Antarctica /…/ the Washington conference in 1959, in which Sweden did not participate, and the wording of the Antarctic Treaty, did not permit any more substantial Swedish activities in Antarctica. It is an open question whether, perhaps, a more decided Swedish policy in the period preceding the important Washington Conference could have brought Sweden, with its longstanding Antarctic and polar scientific interests, displayed by several substantial activities, such as expeditions, into the Treaty System from the very beginning in some capacity or another.”[13] Apart from involvement of some individual scientists after 1959 Swedish activities in Antarctica more or less faded.

Theutenberg noted how, since ”the only way for promoting state-interest in general with regard to Antarctica lies, since 1959, within the Treaty System”, the promotion of Swedish scientific and other interests had become complicated[14]. The scientific society in Sweden had not sought government support for research in Antarctica during the IGY or afterwards, despite ”the very obvious fact that the Swedish scientific foundation in this respect must be considered very strong, especially during the 50s. Such governmental support in 1959, when the Treaty was established, could perhaps have led Swedish scientific activities in another and more positive direction as regards Antarctica and polar research more generally. The governmental position, on the other hand, was obviously that Sweden did not want to become a non-consultative member of the Antarctic Treaty, particularly considering its longstanding traditions and activities in Antarctica. So the whole thing was dropped.”[15]

10.4 Cold War roots of the IGY

The IGY was originally conceived of as a third polar year, breaking the custom of a fifty-year interval between polar years. Research technologies and modes of polar transportation had developed rapidly in the 1930s and particularly during the Second World War. Rocketry provided a possibility of launching artificial satellites. Radar had found many uses in navigation, and small tracked army vehicles (Weasels) were already being used in polar regions (NBSX and French expeditions between 1949 and 1952 to wit - and Australians were using amphibian vehicles to land scientists in the sub-Antarctic). Cosmic ray recorders, spectroscopy, and radio-probe balloons in the upper atmosphere all provided possibilities of much broader scope of investigations than ever before. Developments in electronics brought with them computer aided numerical analysis especially useful in meteorology and also in other geosciences.

A new geopolitical conjuncture prompted US military operations in polar regions to test new technologies, clothing and materials under extreme conditions. Operation Nanouk in te Arctic 1946 was followed by Operation High Jump in the Antarctic in 1947, and its smaller follow up, Operation Windmill, in 1948. These events, together with the discovery of uranium in Antarctica, and Soviet whaling

[13] Theutenberg 1985: 70.
[14] Theutenberg 1985: 71.
[15] Theutenberg 1985.

fleets visiting that continent, spurred several nations, among them Argentina, Australia, Chile, France, Norway and the UK to visibly consolidate their territorial claims. Scientific expeditions were used to signal national sovereignty - science became a continuation of politics by other means[16].

With the outbreak of the Korean War 1950 Research and Development funding for military research moreover increased enormously and continued on an upward curve. Sydney Chapman in his book, *IGY: Year of Discovery* (1959) notes how the U.S. alone under its IGY rocket program for the study of the upper atmosphere launched no less than 116 rockets during the first twelve months of the eighteen month period of the IGY[17].

A significant part of the IGY involved a focus on the ionosphere. This had to do with attempts to map and determine the cause of the worldwide pattern of electron distribution, in height and geographical position - all over the earth by day and night and in different seasons during quiet and disturbed periods. Patterns in the polar regions, aurora, were especially interesting, with findings significant for both military and civilian technologies (a policy for what is nowadays called dual-use research and technology). ”Ionospheric irregularities caused by an aurora can modify electromagnetic waves, thereby affecting communications with satellite systems and affecting utilization over-the-horizon detector radars for defence against strategic transpolar bomber attack. Additionally, currents induced during geomagnetic storms in long conductors such as telephone cables, power lines, or pipelines can cause damage or serious failure.”[18] Improvement of radio communications and weather forecasting in the Arctic were of great importance to the nations surrounding it, a need augmented by Cold War military escalations. In 1954, for example, 40 Defence Early Warning (DEW) stations began to be built from Alaska, across northern Canada, and on Greenland as part of a huge system to meet the USSR head on across the North Pole in case of war[19]. The DEW Line became officially operational 31 July, 1957. Radio physics and meteorology along side rocket science were important Cold War disciplines.

Considering the foregoing context it is not surprising that there was a lot of suspicion around, and much second-guessing in both Washington and Moscow as to what the other side was up to and intended to do behind the screen of the IGY. Discussions on the use of missiles to carry nuclear warheads or spy behind enemy lines were not uncommon. In all this Sweden came to play an

[16] All this jockeying took place in a new era of geopolitics marked by Truman’s doctrine of containment (1947) and the advent of the Cold War. In Europe a group of nations signed the Brussels Treaty (March 1948) agreeing to develop a common defence system with five countries to ”meet the Soviet threat”. A year later Canada and the U.S. joined them to form the North Atlantic pact (later NATO) which also roped in several other nations, including both Denmark and Norway, leaving Sweden isolated in its earlier parallel attempt to form a Scandinavian Defence Alliance on more neutral grounds (see further Lewander in this volume). The U.S. for its part found Sweden’s post-war neutrality objectionable and the idea of a technological boycott was even entertained.

[17] Chapman 1959:57. For lists of all the rockets sent up by both the US and USSR see Wilson (1961)

[18] Osherenko and Young 1989: 27, citing Bradley and Winakur.

[19] Cf. Wedin 1967.

important role as a place where scientists from various countries could meet on neutral ground.

10.5 Sweden's stake in the IGY

When the International Council of Scientific Unions (ICSU) first issued its call for a new international Polar Year, Sweden was quick to respond. The national Geodesy and Geophysics Association created a national committee, at the time called the Polar Year Committee (the PYC was created as early as 28 Oct 1952). The meteorologist Carl-Gustaf Rossby was made chairman, physcist Nicolai Herlofson, Laborator at the Swedish Institute of Technology in Stockholm , Vice Chair, and Bert Bolin Secretary[20].

Due to economic constraints, Sweden was unable to intensify its efforts in all areas of the geosciences. Strict priorities had to be set. Cosmic physics and meteorology were singled out as the primary focal points. There was a certain increase of activity at the Swedish solar observatory on Capri, Italy, but the major thrust consisted in launching an expedition to Spitsbergen, an effort that turned into a joint venture together with Finland and Switzerland – hence it is referred to as the Swedish-Finnish-Swiss expedition of 1957/58 58 at Murchison Bay, Kinnvika, Nordaustlandet on Spitsbergen.

Sweden sent specialists in cosmic physics, auroral studies, earth magnetism, meteorology and atmospheric chemistry. Finnish scientists made observations of the air and tidal changes, while the Swiss measured electricity and radioactivity in the atmosphere. The Swedish focus reflected the interests of the two leading personalities that headed the PYC, meteoreological work and geocosmic physics (cosmic rays, aurora and geomagnetism).

Herlofson was interested in aurora, electronics and geocosmic physics. Rossby had been recruited back to Sweden from the USA to establish a world-class institute for meteorological research. Bolin, who was to become his successor in Stockholm, is the same person who in our own time became a renowned meteorologist and climate researcher, the influential first chairman of the Intergovernmental Panel on Climate Change (IPCC). He was Rossby's assistant and more or less took over the latter's academic duties whenever Rossby was away[21]. Stockholm University's Department of Meteorology provided a small room to those involved in planning and operations of the Swedish IGY effort.

It was Bolin who on the advice of the "Polar Year Committee", and with input from Liljequist, wrote the draft of the Swedish IGY programme[22]. It carried the imprint of Rossby's and Herlofson's scientific interests. Rossby was at that time

[20] Liljequist 1993.

[21] When Rossby suddenly died in 1957 Bolin officially took over, becoming Full Professor in 1961 (at the age of 36).

[22] The cost estimate was for 2 million SEK to cover the years 1954/55 until 1960. The detailed programme and budgetary plan was sent in to parliament 18 Aug 1954, whence the budget for the preparatory year 1955/56 was definitely settled and the framework for subsequent years approved.

already concerned with atmospheric chemistry and the circulation of the atmosphere. He wanted to set up a meteorological station on Svalbard to measure trace gas contents in the atmosphere to determine possible transport of impurities from industrial regions in the north[23].

Leader of the Swedish atmospheric chemistry project became Erik Eriksson. He studied the regional distribution of CO_2 content as well as the presence of dust and salt particles in the air[24]. The Arctic was a suitable zero reference point to study air pollution. Eric Dyring was put in charge of cosmogeophysic. Observation of earth magnetism fitted nicely alongside the aerological studies along a line near the tenth meridian of longitude that skirted Svalbard. All this in turn fitted into the international design of a global network of IGY observations posts. Not unimportant for the Swedes was that their IGY effort also followed a certain tradition. Spitsbergen had also been the site of Swedish research stations during the two earlier polar years.

Already in 1954 a decision was taken to make Gösta Liljequist leader of the expedition to Murchison Bay, Kinnvika[25]. If Liljequist felt slighted before, he now during the IGY, thanks to Rossby and the emphasis on meteorology and atmospheric problems, could pride himself on being a step ahead of Schytt and gaining an opportunity to demonstrate his own leadership qualities. Liljequist's wintering party counted 13 persons: 8 Swedes, 3 Finns and 2 Swiss.

Tacked onto the expedition, but not part of the official Swedish IGY programme was an ad hoc enterprise led by Valter Schytt, a glaciological expedition that set up Ahlmann station and made several traverses[26]. Liljequist, who became professor in Uppsala during the IGY, has written a major volume on Swedish polar research. In it he recalled: "When Schytt came home to Sweden, preparations

[23] At first a site near Longyearbyn was considered, but there a mountain slope interfered with the air-flow. Lloyd Berkner on behalf of IGY's Executive had constantly been urging the Norwegians to set up a large station at Cape Linné near a Soviet outpost in order to counterbalance Russian efforts. Originally this was to involve a joint Norwegian-Swedish expedition, but the Swedes pulled out of this venture in 1955. The official reason given was magnetic interference caused by Norway's Isfjord Radio. Unofficially the reason was political. Neutral Sweden did not want to antagonize the Soviets and therefore opted instead for cooperation with Finland on an expedition to Nordaustlandet. Finland for its part had a friendship pact with the Soviet Union (Friedman 2004: 388).

[24] Liljequist 1993: 544.

[25] Liljequist was a meteorologist who had participated in the NBSX whence he had to defer to his colleague Schytt who was five years younger. Schytt had been Ahlmann's protege and as such had been selected by the older glaciologist as leader of the Swedish contingent in NBSX, where he actually was second in command, directly under the Norwegian John Giaever, and with Gordon de Q. Robin representing Britain as third in command. Liljequist (1960) gives a popular account of the Swedish IGY effort.

[26] Schytt had been in the US as a guest professor at Evanston Illinois since the autumn of 1953, spent March 1954 in Canada's North West Territories and thereafter during the summer did some glaciological work on the Greenland ice sheet near the US military base Thule. In the course of these activities he developed important contacts with American glaciologists. However his absence from Stockholm meant that he was not there when the final decision on Sweden's IGY effort was made. It might be added that at the time he also lacked academic clout, still being in the process of writing up his PhD thesis on the basis of field work carried out in the Antarctic during the NBSX of 1949-52. It was first in April 1958 that he successfully defended his thesis, and by May he was off to Svalbard for the second season of his own glaciological expedition that he had succeeded in tacking onto the official IGY expedition.

for the International Geophysical Year 1957-58 were going on, but there was no place for glaciology. However, he started to prepare an expedition of his own and, though the means for such an enterprise were missing to begin with, a possible solution emerged".[27] Schytt got funding from the research council and private donors. A Finnish colleague who was interested helped obtain Finnish funding. But everything hung in the air until finally the Swedish Army provided two weasel over-snow track vehicles. Schytt's add-on-expedition comprised 6 Swedes, 2 Finns and an American[28]. Well in advance of his Spitsbergen expedition Schytt had the good fortune of receiving an invitation from a leading Soviet scientist to join the icebreaker Ob on its tour into the Arctic and was able to visit the site of his planned expedition and do some reconnaisance work in August 1956[29]. The invitation was received during the course of an IGY Arctic Conference held May 22-25, 1956 at Saltsjöbaden.

10.6 Saltsjöbaden 1956 – a neutral site for an Arctic conference

The Swedish national committee had been asked by the international committee to host a special Arctic conference[30]. The Arctic conference was probably prompted by the vigorous Soviet preparations already afoot in that region, something that worried Lloyd Berkner who was to become President of ICSU 1955-1958[31]. A letter from the Bureau of the Comité Speciale de l'Année Geophysique Internationale (CSAGI), signed by Lloyd Berkner, reads as follows: "Since the Brussels meeting /of the CSAGI 1955/ there has been demonstrated a very considerable need for an Arctic Conference similar to the Antarctic Conference that was held under the sponsorship of Ing. Gen. Georges Laclavère in Paris last year /i.e., 6-10 July 1955/. This need has become especially prominent since the publication of the rather complete plans of the Soviet Union, which now discloses certain inadequacies in the total planning of various nations concerned. So far as I know, the nations interested in Arctic research are the following: Canada, Denmark, Finland, France, Iceland, Norway, Sweden, Switzerland, U.S.A, and the USSR"[32].

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[27] Liljequist 1993: 544.

[28] The latter, Weston Blake, was from the Department of Geology at Ohio State University, Columbus Ohio. Schytt had gotten to know him well during the glaciological excursion on the Greenland ice sheet 1954. Blake was later to pursue further glaciological work on Svalbard.

[29] Actually three Scandinavian scientists joined the Ob on its way to pick up researchers from Soviet polar ice floe stations. Besides Schytt there was Erik Eriksson and the Norwegian metereologist and NBSX-veteran Nils Jørgen Schumacher.

[30] This was something similar to the Antarctic conference held in Paris in 1955 where the Soviet scientists had suddenly shown up, and the position then taken by the organizer Colonel G.R. Laclavère was to keep politics and economics out of it all in order to create a space for science. It was a position especially underlined in supportive declarations by Argentinian and Chilean delegates; cf. Laclavère 1961: 159-160.

[31] The Soviets had in 1937 initiated a pioneering effort in establishing a nine-month scientific drifting station on a large ice floe at the North Pole. They proceeded to set up a large network of meteorological stations on islands north of Siberia and subsequently, especially after World War II increased the number of drifting stations. To catch up the US began their own studies by occupying ice islands from 1952 onward. Such islands were floating airfields and mobile bases for mapping undersea terrain, studying oceanography, meteorology, and climate and for radio communication and radar detection purposes. For an early account of the Soviet head start see Seidenfaden 1938: 184-190 and 197-206.

[32] Berkner 9 January 1955.

The ambition was to obtain a balanced coverage of the Arctic and suitable coordination, and probably from the West to counterbalance Soviet operations. In spite of the IGY the Arctic never became a demilitarized zone. Under the ice nuclear submarines, like the *Nautilus* (first to cross underwater to and surface at the geographic North Pole), plied the waters as demonstrations of military strength[33]. Nevertheless the IGY facilitated some scientific cooperation in the Arctic across the Cold War divide, which in itself became a spur to scientific competition, especially in the Antarctic.

In the charged and suspicious atmosphere that existed at the time, Sweden was a natural choice as a site for an Arctic IGY conference. Senior Swedish scientists had excellent international reputations and Stockholm afforded a neutral ground for East-West interactions. Ahlmann and Rossby moreover had cultivated many fruitful contacts and interchange with Soviet colleagues. Ahlmann for his part, in recognition of the scientific work and the incidental support of one of these colleagues, saw to it that Professor Mikail Mikailovitj Somov in April 1959 received the prestigeous Vega medal[34]. Somov was head of the Antarctic division of the famous polar research institute in Leningrad, leader of Soviet IGY efforts in Antarctica, and later a SCAR delegate. In Stockholm, in a lecture at the Physical Geography Department of the university he presented preliminary results of his country's polar research programmes[35].

In the next section it will be shown how academic institutional trajectories, personal interests and contacts intertwined and had a bearing on the fortunes of several actors, not least the two central Swedish figures of the NBSX, Liljequist and Schytt. As a meteorologist Liljequist's career was in tune with Rossby's ascendence while Schytt and glaciology in Stockholm had to struggle to find a niche, particularly since Ahlmann's role as active senior partner had ended a few years after Rossby came to Sweden.

10.7 Ahlmann interests and his departure from academe

In 1931 Ahlmann had led the Swedish-Norwegian expedition to Nordaustlandet, Spitsbergen, assembling valuable information about the accumulation of inland ice. It was the first study ever of the metereological factors to which the Spitsbergen glaciers owed their existence. In 1934, jointly with Harald Ulrik Sverdrup he led another expedition to Spitsbergen, where data on firn stratification was obtained. Further work was done on a glacier in Iceland. The continental nature of northeast Greenland was studied in 1939. During the war data analysis and emphasis on the role of the circulation of the earth's atmosphere occupied Ahlmann. In reading the 1939 German Antarctic Schwabenland expedition's report and studying the accompanying photographs in 1942 he was much taken. Here

[33] It should also be remembered that in the case of space research, another part of IGY, the US and USSR started a race to launch the first ever artificial man-made earth circulating satellite, a race won by the Sputnik 1957. The Americans had two failures before they too got their first satellite in orbit. These programmes were in part geared to developing technologies to carry intercontinental ballistic missiles with nuclear warheads.
[34] Ahlmann 1960: 250-255.
[35] Somov 1960: 241-255.

was something that fitted in with his glaciological concerns. There appeared what to him were telltale signs of either remnants of an earlier ice age or else evidence of the retreat of glaciers also in the Antarctic. Ahlmann developed his own interpretation using changes in the glacial landscapes of Spitsbergen and Greenland as analogues[36]. The pictures taken by the Schwabenland expedition and its accompanying report helped Ahlmann to launch an Antarctic expedition, the NBSX. It was Ahlmann's last great project, ultimately predicated on the belief that there might be global characteristics of to the climate warming problem (at the time it was referred to as climate improvement)[37].

In 1950 Ahlmann's resigned from the geography professorship at Stockholm högskola. He had been there 21 years. The move was at the request of the government to help patch up strained relations with Norway..[38] His new post was Swedish ambassador to Norway where he remained until early 1956. For his junior academic colleagues the move came as a shock. For some of them it implied a loss of opportunities and a substantially weakened geography department. Schytt's absence from Stockholm so soon after his return from NBSX and the Antarctic was a further disadvantage for the glaciologists when it came to setting agendas for IGY (Table 11-2).

Table 11-2: Interplay of interests and motives at three different levels.

Political level	Establishment of the International Metereological Institute and interests in the Arctic
Institutional level	Geography Department: Ahlmann leaves academe, Meteorological Department: Rossby's scientific regime expands
Impact on individual career and research opportunities for a younger generation	Liljequist, Wallén, Schytt, Eriksson, Bolin

It was not until 1954 that a new professor was installed on the geography chair in Stockholm, Gunnar Hoppe, whose speciality became glacial morphology and glacial geology. Hoppe however came in too late to influence the IGY effort,

[36] "As far as I am aware", he wrote, "these conditions are the first more certain indications in interior Antarctic of a relatively late warm period", even if one did not know when. "However there is nothing that tells against the assumption that it constituted something similar to the postglacial warm period on other parts of the globe." (Ahlmann 1948: 251). For further detail see Swithenbank (1999) and for the broader context Elzinga (2001: 192-200).

[37] Although mainly Norwegian financed, it was widely regarded as the first real international scientifically oriented expedition. Later writers, like Albert P. Crary, a leading geophysicist-glaciologist in the US during and after the IGY, commented that this particular expedition which included no more than fourteen men laid a foundation. What he had in mind was its role as a precurser to a mode of organization with the first major traverses into the interior as well as its apparent transnational spirit (Kirwan et.al. 1949: 11-13; Ahlmann 1948: 241-267). This also became the received view, an internalist scientific one that ignores external driving forces at macropolitical and institutional levels. For a corrective see Lewander in the present volume.

[38] Compare footnote 16, above.

since the key decisions had already been made. At a later stage Hoppe became involved in a controversy on whether or not a large ice-sheet had covered NW Europe, including Svalbard and the Barentz Sea region. This was a hypothesis he favoured, and it prompted a series of expeditions directly promoted by Stockholm University, among them a major one to Svalbard in 1966.

In Stockholm in the early and mid-fifties it was cultural geography that was in fashion, a discipline on the rise after the war. It was in line with political developments of the post-war Swedish welfare state and the need for mandated research into regional and urban planning. An indication of this shift in the balance of power in geography was the creation of a new chair at Stockholm University 1955 devoted specially to cultural geography, a vital subject with some powerful academic and political actors. At the same time the older chair held by Gunnar Hoppe was renamed Physical Geography. In the interim, from 1950 when Ahlmann left, until 1954 when Hoppe was appointed, physical geography had lost momentum[39].

10.8 Rossby's entry and American style entrepreneurialism

The Rossby era of meteorology on the other hand was a success story for all concerned. Like Sverdrup in Norway, Carl-Gustaf Rossby was recruited back to Scandinavia shortly after World War II, in his case in 1947. He was by then a renowned scientist with a wide net of international and especially US contacts that he used to advantage in Sweden.

Originally born in Sweden, he did his PhD at the famous Bergen school of meteorology in Norway. He came to the US on a scholarship and remained there, becoming a naturalized citizen. He became professor first at MIT where he started a meteorology department, and then for a time he was Vice Director of the U.S. Weather Bureau, leading that organization's research. In 1941 he was called to Chicago as professor with the special task of training a large number of military meteorologists needed for the war effort. His theoretical work developed in tandem with this, giving rise to the Chicago school of meteorological research that drew worldwide attention.

After the war he was instrumental in promoting computer-aided numerical analysis for weather prediction (and hopes for future weather control), training members of a new generation of theoretically minded meteorologists. He also negotiated substantial grants from the Office of Naval Research and successfully lobbied the Pentagon to fund research into global warming. Being a member of one of the panels of the military's Joint Research and Development Board (which existed until 1953) he participated in the foresight-like exercises in which

[39] The professorship was vacant, and the head of the department (Prefect) for a while was one of Ahlmann's favourite students, the Icelander Sigurdur Thorarinson, whose heart however was set on research in his home country. Ahlmann's favouring the Icelander probably upset a younger student, Carl Christian Wallén who completed his doctorate in 1949 with a thesis on glacial meteorology. Wallén never became a professor. Instead he came to pursue a non academic career, first with the Weather Bureau, Svenska Meteorologiska och Hydrologiska Institut, and then internationally, ending up as a high ranking scientist-cum-civil servant at the WMO in Geneva.

scientists in different fields joined together with military men to negotiate appropriate future research agendas. Such panels existed for oceanography, meteorology, terrestial electricity and magnetism plus seismology, earth measurements and volcanology[40].

After coming back to Sweden after the war he continued his pioneering work and continued to rely on military funding, among other U.S.Air Force grants, now careful however - as he used to say - to ”decontaminate” the money because Sweden was neutral country[41] A year after his arrival he founded *Tellus*. Bert Bolin was the first executive editor of the new journal that soon became an important organ for publishing research results from countries both East and West.

Rossby was at the peak of his powers in Sweden when he presided over the Swedish IGY committee. When he proposed his priorities for the IGY he not only had a lot of international scientific contacts and power, but he also had forged strategically significant bonds with the Swedish Natural Sciences Research Council and with the country’s social democratic government. The former included Torsten Gustafsson the physicist in Lund who was close to Prime Minister Tage Erlander. In addition he cultivated close contacts with the Under-secretary for Research and Higher Education, Ragnar Edenman, as well as Rikard Sandler the senior member of the First Chamber of Parliament and former Foreign Minister. It was Sandler who headed the commission that in 1954 reviewed the prospects of establishing and recommended permanent core funding for IMI, the International Metereological Institute that began 1 Jan. 1955 in Stockholm. The Swedish government has since that time provided annual core funding for IMI. Opening its doors in 1955 with Unesco recognition the institute still is a platform for international research and training[42].

10.9 The Stockholm Conference 1957 - the beginnings of SCAR

September 9-11, 1957 an ad hoc meeting of ICSU was held in Stockholm. It was convened to ”examine the merits of further investigations in Antarctica, covering the entire field of science,and to make proposals to ICSU on the best way to achieve such a programme.”[43] Originally Lloyd Berkner had contacted Hans Ahlmann, Sweden’s nestor in polar research. Ahlmann however declined, probably because he had been away from active academic life since 1950[44]. Out of the meeting came the recommendation and later decision to set up a permanent Scientific Agency for the coordination of Antarctic research, later called SCAR. It was in early August that professor Carl-Gustaf Rossby had

[40] Doel 2003: 640.
[41] Harper 2003: 686.
[42] Bolin 1999.
[43] Stockholm Promemorium (1957). The host was Nicolai Herlofson, a professor in electronicsat the Royal Institute of Technology, replacing Rossby who in the meantime had died (19 August 1957).
[44] Ahlmann had just moved back to Stockholm in 1956, but was tied up with other duties. During his absence from Stockholm University Rossby had become the strongman, so the request was passed on to him as head of the Swedish IGY. When Rossby suddenly died the task became Herlofson’s.

agreed to convene the meeting of all twelve countries that were planning to do research in Antarctica (Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, UK, US, USSR). Australia, Belgium, New Zealand and South Africa were unable to send delegates. Of these three, South Africa was the only country that clearly agreed to continue activities after the IGY, whereas the other two declared that they were either financially fatigued or would have enough data to keep busy for quite some time. Of the countries that attended the conference several expressed similar concerns.

The idea of polling countries active in Antarctica during the IGY had already arisen early on ICSU's special committee (CSAGI) responsible for Antarctic research. Some scientists felt it would be useful to continue after IGY, others thought it was desirable to stop at the end of 1958. ICSU's Executive Board therefore June 28, 1957 endorsed the view that the matter should be probed. Apart from being a neutral country Sweden was a good site for such a conference given the substantial contributions its scientists historically had made to Antarctic science. The conference was held at the Grand Hotel at Saltsjöbaden just outside Stockholm.

Despite Ahlmann's absence there was nevertheless a certain continuity in the Swedish Antarctic legacy, in as far as his student Valter Schytt was engaged as secretary for the project, and it was he who carried much of the actual burden of organizing the conference and its follow up, at least until late April 1958[45].

Schytt early on became a leading authority on glaciology. His studies at Maudheim already attracted considerable attention amongst experts. Those in charge of the U.S. glaciological programme under IGY sought his comments and constructive criticism early 1956. Responding to a letter he made detailed suggestions to improve the U.S. programmes, particularly the one relating to studies in the Northern Hemisphere. Regarding the U.S.glaciological component in Antarctica he remarked: "Reading the Antarctic program made me feel very small. I thought, we had a rather big glaciology component in our expedition, and it certainly kept me busy as a bee. However, what you are planning to do is of quite another order of magnitude."[46] One can imagine that Schytt may have been a bit envious. However there is no indication that he at the time wished to get back to Antarctica. His mind was set on making his expedition near Murchison Bay, Spitsbergen a reality. At the same time he kept himself well informed about UK, New Zealand, US and USSR) operations, particularly when it came to glaciology in Antarctica, writing an important review article on the subject in Swedish in the semi-popular scientific journal *Ymer*[47].

The turning point for continuing research cooperation in the Antarctic after 31 Dec 1958 came in August 1958 when it became clear that both the US and the USSR) intended to carry on. For fear of losing in credibility regarding its claims to sovereignty even smaller countries like Norway felt hard pressed to follow suit, which they did. Consequently 1959 was designated the year of Internatio-

[45] This is evident from the diary covering incoming and outgoing letters to the conference and thereupon SCAR "secretariat" starting 6 August 1957 (Schytt 1957-1958).
[46] Schytt 28 February 1956.
[47] Schytt 1959: 63-67.

nal Geophysical Cooperation (IGC) to oversee a tapering-off program for the original IGY programmes. Three special ICSU committees were created for continued coordination of oceanographic, Antarctic and space research, respectively: SCOR[48], SCAR and COSPAR[49]. It was in Moscow that SCAR was formally constituted with 12 participant nations and four institutional members (IUBS, IGU, IRS, IUGG[50]) plus WMO. ICSU ratified SCAR in Oct. 1958[51].

A reading of Schytt's logbook as SCAR secretary indicates that he essentially ended his organizational work for SCAR towards the end of April 1958, shortly after he defended his doctoral thesis, and before heading off to Spitsbergen. Schytt probably intended to continue his secretarial duties in the Fall, but upon his return from the glaciological expedition it appears that he had developed some health problems which forced him to resign. Naclavère the head of CSAGI and the first president of SCAR expressed his regrets regarding this decision[52]. Gordon de Q. Robin (another NBSX veteran) took over and continued as SCAR secretary until 1970, also serving as editor of the *SCAR Bulletin* that regularly appeared in *Polar Record*. This was another step in the institutionalization of SCAR. It was with Schytt's departure for Spitsbergen and his subsequent resignation from SCAR that the Secretariat in effect moved from Stockholm to the Scott Polar Research Institute (SPRI) in Cambridge.

10.10 Conclusion

A combination of factors contributed to Sweden concentrating its IGY efforts in the Arctic, while no initiatives were afoot to participate in the Antarctic. Ahlmann's departure from Stockholm in 1950 implied a relative decline in the position of physical geography at SU. At the same time with the arrival of Rossby on the scene research in meteorology began to flourish. The prospects of an expedition to Spitsbergen fitted well into his and Herlofson's agendas. The idea of an expedition to Antarctica never seems to have come up, neither amongst scientists nor politicians. An expedition to Svalbard was far less expensive and it was easy to gain the politicians' ears. The Royal Swedish Navy and the Air Force were commanded to lend logistic support. Important for conservative circles was the fact that the Arctic was associated with a long string of illustrious nineteenth century names of like Otto Torell, Adolf Erik Nordenskiöld and Ga-

[48] SCOR: Scientific Committee for Oceanic Research.
[49] COSPAR: Committee on Space Research.
[50] UUBS: International Union of Bilogical Sciences, IGU: International Geographical Union IRS: International Union of Radio Science, IUGG: International Union of Geodesy and Geophysics.
[51] When Herlofson was asked to organize the project to get SCAR started at its first meeting in the Hague 3-5 February 1958, it was Schytt who did a lot of the practical work. The SCAR constitution that had been worked out was adopted at the Hague and a preliminary plan for future coordination of activities and national research agendas was set up. Formally Schytt was the representative of IGU, one of the four institutional members of SCAR, but he was elected SCAR secretary for three years and formally continued in this capacity until the third SCAR meeting in Canberra 1959, when Gordon de Q. Robin and by then the Director of SPRI in Cambridge was elected for the remaining two years. In practice Robin had become Acting Secretary already at the second SCAR meeting in Moscow 4-11 August 1958, since Schytt was away on his own glaciological expedition to Spitsbergen. Bert Bolin substituted for Schytt as IGU representative at the Moscow meeting.
[52] SCAR Bulletin 1958-59: 591.

briel Nathorst, providing a lot of symbolic capital[53]. The turn of the century had seen the Swedish-Russian Arc of the Meridian Expedition, as well as the lost North polar balloon enterprise of the polar hero August Salomon Andrée 1897 still captured the public memory, especially since its remains had been found and corpses brought back for public burial in Stockholm in 1930.

Compared to this Antarctic expeditions were fewer and lacked pondus. Otto Nordenskjöld's expedition 1901-03 was carried out in defiance of the negative recommendations of the three-man review panel at the Swedish Royal Academy of Sciences. The panel saw to it that no state funding was given, causing Nordenksjöld a lot of grief, both during and long after the expedition[54]. Nordenskjöld was obviously an outsider who did not fit into the mould of the Stockholm elite. Moreover his base was in Göteborg from where his ship *Antarctic* sailed and where he got most of his private subsidies.

The NBSX expedition for its part was largely associated with Norwegian political interests, and a new joint venture with the Norwegian Polar Institute was not in the cards in the mid-50s. Norway was politically intent on doing her own thing in Antarctica and even on Spitsbergen, even though Norwegian officials were helpful when needed. Ahlmann for his part liked to play up internationalism.

The Swedish state navigated between the two Cold War power blocks, signaling neutrality at the United Nations and playing up the lack of a colonial past. When the Indian delegate to the UN in February 1956 tabled a proposal to include "The Question of Antarctica" as an item on the agenda of the Eleventh General Assembly in the autumn, Sweden indicated its interest[55]. Further developed in 1958, but again withdrawn, the Indian proposal implied a far-reaching form of internationalization of Antarctica under the auspices of the UN. It was a stance not appreciated by the claimant countries and the US had abandoned this idea earlier, favoring direct control by a consortium of the nations actively involved in research[56].
Among the twelve nations active in Antarctica during the IGY the seven claimant countries had their specific interests to protect and did so with research in Antarctica. The US and the USSR translated superpower politics into scientific cooperation and competition. Japan and South Africa had their special interests. The only anomaly was Belgium. Her participation in the Antarctic leg of the IGY rested on national prestige. In Sweden on the contrary there was no champion who came forward. Ahlmann, for example, definitely disapproved of

[53] Wråkberg 1999.
[54] Cf. Lewander 2002, and also Elzinga 2004.
[55] Hanessian 1960: 451, also Lewander 2004, del II, Artikerl 1: 19. India however decided not to press the issue. The proposal was finally withdrawn largely because of opposition in Chile and Argentina and the lack of support from the US and the UK.
[56] As Admiral Dufek put it, for the IGY the US had invested about 250 million dollars just to put it scientists in business (cited in Lewis 1965: 451). Heating and operating the 18 man South Pole station alone cost 250,000 dollars in 1959. Altogether the US spent double that amount in Antarctica during the IGY (Peterson 1988: 230, who cites A.P. Crary who was in charge of the overland traverse program and second in command of the US scientific effort in Antarctica.). Dufek strongly advocated the use of nuclear power reactors as was done at the American military base Camp Century with its secret little "city" built like a honeycomb under the Greenland icecap (see pictures in Dufek 1962: 713-714). A reactor was actually put in place at McMurdo base in 1962, but ended up in a mess that had to be cleaned up ten years later.

the kind of patriotic overtones that had surrounded Swedish polar research in an earlier era dominated by A.E. Nordenskiöld, Torell and Nathorst. He and Rossby belonged to a new generation that emphasized science and international cooperation. In the 1960s and early 1970s Ahlmann expressed explicit concern over neo-colonialism and worked actively to help plan development aid to Third World countries. This was in line with a Social Democratic tradition in which internationalism was consciously advocated to replace the old-time conservative ideology of nationalism and patriotism. Internationalism had indeed become a substitute (*ersatz*) for the oldtime nationalism that was associated with conservatism and what some scholars nowadays refer to as reactionary modernism[57]. It would have required different political and ideological as well as institutional scientific and personal circumstances and interests in Stockholm for Sweden to try to play her cards differently at the diplomatic table prior to the Washington conference.

It took 25 years before momentum picked up again, eventually leading to consultative party membership in the Treaty System and SCAR membership, both in September 1988. Since the late 1980s Sweden has been cooperating logistically with Norway and Finland, so that the three countries take turns on an annual basis in organizing transportation to Dronning Maud Land. Usually scientists and equipment came by ship. Nowadays however scientists fly in via Cape Town and Blue Ice One near a Russian research station to continue on by Twin Otter to their respective countries' bases. For the new international Polar Year Sweden is planning a joint operation with the Japanese, a traverse to leave the Kohnen EPICA[58] ice coring site to meet up with a Japanese traverse coming to Dome Fuji.

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[57] Cf. Elzinga et al. 1998.

[58] EPICA: European Project for Ice Coring in Antarctica

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11 Antarctica in the 1980s: subject of international politics

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Abstract

This article gives an overview of the developments in the most complex and dynamic period in the history of the Antarctic Treaty System (ATS), the international governmental regime based on the Antarctic Treaty of 1959. The article is the result of extensive literature research and interviewing of relevant actors. Four parallel developments were characteristic of the ATS in the 1980s. These developments were: the intensifying debate among the Consultative Parties within the ATS; the attack on the ATS by a group of developing countries which were outside the ATS; the increasing support for the ATS from countries outside and inside the ATS; and the growing concern about the conservation of Antarctica in the ATS, initiated by the environmental movement. The catalyst of these four developments was the prospect of mining in the Antarctic region. It made politicians, policymakers and environmentalists aware of Antarctica. It is not unlikely that the political debate about Antarctica will revive in the near future, in which the arguments of the 1980s will be heard again.

11.1 Introduction

"…Antarctica exists on the margins of popular perceptions. It is simply there, and is treated generally as a remote and obscure region to be viewed from afar…"[1] As the historian Peter J. Beck aptly put it in the above quotation, Antarctica is not an important issue for politicians and policymakers. This was not always the case. During the period between the two World Wars, more and more countries were interested in the Antarctic region[2]. These countries had whaling interests and they had a strategic or historic stake in the exploration and development of Antarctica. It was the intention of the governments of these nations to claim parts of Antarctica. In the 1950s seven countries had claims in Antarctica. These were Argentina, Australia, Chile, France, New-Zealand, Norway and the United Kingdom. The claims of Argentina, Chile and the United Kingdom overlapped, which gave rise to a potentially discordant situation.

However, in 1959 twelve countries signed the Antarctic Treaty: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the Soviet Union, the United Kingdom and the United States.[3] Among them were the seven claimant states, as well as the two superpowers of the Cold War. By means of the Antarctic Treaty territorial claims were frozen, the problems of sovereignty were neutralised. But, as a matter of fact, the claims of the seven claimant states remained up to this very day – including the overlapping claims

[1] Beck 1992: 1.
[2] Martin 1996: 192.
[3] Suter 1991: 19.

of Argentina, Chile, and United Kingdom . The signatories have agreed to use Antarctica only for peaceful purposes, especially for international scientific cooperation. So Antarctica stood aloof from international affairs for twenty years. International politics were dominated by the Cold War, decolonisation and conflicts in the Middle East.

In the 1980s Antarctica became an important topic again in international politics. This period was the most dynamic period in the history of the Antarctic Treaty System (ATS). The number of countries which had signed the Antarctic Treaty of 1959 had reached 22 in 1980 and almost doubled to 40 in the subsequent ten years[4]. Antarctica attracted the personal attention of world leaders, George Bush Sr., Mikhail Gorbachev and Margaret Thatcher. What happened in that period?

In the 1980s there were four parallel developments which were related to the ATS. The first development was *the intensifying debate among the countries which were Consultative Party at the Antarctic Treaty* (the CP's).This debate was to a large extent about a future minerals regime in the Antarctic region. The second development was *the attack from the outside on the ATS*. The attack was spearheaded by countries which wanted either to replace the ATS or to reform it drastically. The third development was *the increasing support for the ATS*, which took shape in the rapid increase in ATS membership. The fourth development was *the growing concern about the conservation of Antarctica*. International environmental organizations lobbied for Antarctica to be declared a "world park". How can these developments be explained? Why did these developments take place in the 1980s? Do these developments interrelate and, if so, how?

Much has been published about the developments in the 1980s. However, the bulk of these publications and the most influential ones were published in the same period, and thus miss the total perspective.[5] More recent publications are devoted to either Antarctic science or the juridical aspects of the ATS; the historical and political dimension is often neglected. This article will focus on these dimensions.

The first section of this article is devoted to the ATS: genesis, method of working and development until the 1980s. This section gives the background information needed to understand the developments in the 1980s. The second section is about the intensifying debate within the ATS. The third section deals with the attack on the ATS, while the fourth section deals with the increasing support for the ATS. The subsequent section is devoted to the growing concern about the conservation of Antarctica. The final section consists of concluding remarks.

It is not unlikely that Antarctica will be in the spotlight again in the near future, just as it was during the 1980s. The International Polar Year, to be held in 2007-2008, will attract a renewed attention of politicians and policymakers for the

[4] Antarctic Treaty Secretariat website.
[5] See for example: Quigg 1983; Beck 1986.

Antarctic region.[6] For example, the phenomena of climate change – a topic which is re-entering policy agendas – can be studied best in the Antarctic region. Current booming oil prices might provoke a renewed interest in the oil resources of the Antarctic region. This article will provide a comprehensive historical insight of the major developments in the 1980s, which makes it easier to place possible future developments in a historical context.

11.2 The Antarctic Treaty System

The cornerstone of the Antarctic Treaty System (ATS) is the Treaty of Washington, which came to be known as the Antarctic Treaty (AT).[7] The key elements of this treaty are: the exclusively peaceful use of the Antarctic region; scientific cooperation; the neutralization of territorial claims. The Antarctic Treaty was signed in 1959 by the twelve countries mentioned before. These countries are the 'original signatories'. After the ratification processes in the individual countries, the treaty entered into force in 1961. These countries were involved in Antarctic science during the third International Geophysical Year (IGY) of 1957-1958. The IGY was a major scientific and political success. The twelve countries wanted to prolong the fruitful cooperation by means of the Antarctic Treaty. These countries are the original signatories.

The Antarctic Treaty is essentially a disarmament treaty.[8] The seven claimant states agreed not to uphold their territorial claims in Antarctica by military means. Although the Antarctic Treaty did not *solve* the conflict of sovereignty (especially of Chile, Argentina and the UK), the treaty took the sting out of it by neutralising the issue. There is another important thing: the Antarctic Treaty was drafted and signed in the midst of the Cold War by the United States and the Soviet Union. A complete continent became isolated from the worldwide arms race during the Cold War.

There is a section of the Antarctic Treaty which is relevant for the developments in the 1980s: section XII.[9] Subsection a of this section stated that thirty years after the entering into force of the Antarctic Treaty, the Treaty *might* be reviewed if one or more of the twelve original signatories wanted to do so. In that case a conference would be organized to review the treaty. Many policymakers and politicians thought that the Antarctic Treaty would expire after thirty years, which was not true.[10]

How does the ATS work? The ATS consists of different types of member countries: Consultative Parties (CP's) and non-Consultative Parties (NCP's)[11]. The CP's lay down the law. They decide on a regular basis about the management of Antarctica at so called *Antarctic Treaty Consultative Meetings* (ATCM's). ATCM's are closed meetings. Until 1983 even non-Consultative

[6] International Polar Year website.
[7] Quigg 1983: 147.
[8] Beeby 1991: 5.
[9] Quigg 1983: 224.
[10] Trolle-Andersen 1987: 62.
[11] Bos 1991: 335-341.

Parties were not allowed to attend those meetings. Decisions are made by consensus. The group of CP's can be subdivided into two groups: the 'original signatories' and the 'new Consultative Parties'. The 'original signatories' have an unconditional Consultative Status. The Consultative Status for other countries is subject to certain conditions. Such a country has to 'demonstrate […] its interest in Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the despatch of a scientific expedition' (Antarctic Treaty, article IX). What is meant by 'substantial scientific research' is not clearly defined, although a poor reference is made to a scientific station and a scientific expedition. Important is that the CP's decide together, on the basis of consensus, behind closed doors, whether a country fulfils this condition.

Non-Consultative Parties are countries which have signed the Antarctic Treaty, but they do not have any influence in the management of Antarctica. Every member state of the United Nations may sign the Antarctic Treaty, without any conditions. Until 1983, NCP's did not have any rights in the ATS. Since that year they have observer status at ATCM's. Countries that did not sign the Antarctic Treaty do not play a role in the ATS: they are shut out completely. For example, no Arab country and no African country except South Africa have any role in the ATS, because they have never signed the Antarctic Treaty.

In the period prior to the 1980s the ATS developed gradually. In 1976 – fifteen years after the entering into force of the Antarctic Treaty – Poland was the first country which became Consultative Party[12]. So at the beginning of the 1980s there were 13 CP's. In the time span of 1961-1979 nine countries became NCP[13]. However, the ATS is not only a group of consultative and non-consultative parties. The ATS evolved in that period into an interlinked network of agreements, agreed recommendations, agreed measures and additional instruments which have been concluded pursuant to the Antarctic Treaty.[14] The CP's signed the *Agreed Measures for the Conservation of Antarctic Flora and Fauna* (1964) and the *Convention on the Conservation of Antarctic Seals* (1972). The *Agreed Measures* and the *Seals Convention* were meant to fill gaps in the Antarctic Treaty. They are both characteristic for the pre-emptive management of the CP's with regard to Antarctica; the Antarctic flora and fauna and the Antarctic seals were thought to be not threatened in 1964 and 1972 respectively.

In the same sense of pre-emptive management, the CP's started negotiating about the conservation of the Antarctic Marine Living Resources, especially krill, in 1975[15]. Krill is a shrimp, which has a central position in the fragile Antarctic ecosystem. Krill is very protein rich. In the 1970s and 1980s the general assumption was that krill might play an important role in solving the global food problem. Japan and the Soviet Union already fished commercially for krill. The negotiations resulted in 1980 in the *Convention on the Conservation of Antarctic Marine Living Resources* (CCAMLR), also known as the Krill-convention.

[12] Beck 1986: 195.
[13] Poland excluded, which was not a NCP anymore in 1980. Antarctic Treaty Secretariat website.
[14] Chaturvedi 1996: 10.
[15] Orrego Vicuña 1991: 25-36.

CCAMLR, which was meant to prevent damage to the Antarctic ecosystem from krill catching, came into force in 1982. Although CCAMLR deals with all living resources in the Antarctic region, whaling is primarily discussed in another forum: the International Whaling Commission. CCAMLR provides for a close monitoring system of krill catches. A commission and a permanent secretariat oversee compliance with the convention. The fishery of krill has always been far below the catch limits defined by CCAMLR: there are technical, environmental and economical factors which limits the catch[16]. The production of krill is expensive and it competes with other products with greater revenues.

Despite shortcomings of the system, such as the closed decision making process, the merely 'neutralising' of the sovereignty conflict and the non-involvement of many countries, the ATS can be considered a major success. It worked well. The peace on a whole continent was maintained because the CP's complied with the Antarctic Treaty. Antarctica was exclusively used for peaceful purposes. The success of the ATS, however, depended heavily on the willingness of the CP's to cooperate with each other. Every single CP could frustrate the decision-making process if it considered that to be in its interest. However, every CP felt that the cooperation in the ATS was the best way to serve their interests in the remote Antarctic region. Who would benefit from a very expensive competition while economic and/or strategic profits are expected to be very low? In the 1980s the ATS faced new challenges.

11.3 Intensifying debate within ATS

In the period from 1961 till now (October 2005), there were 28 sessions of *special* ATCM's[17]. These special meetings of the Consultative Parties were meant either to discuss topics more deeply then on the *regular* ATCM's, or to give states Consultative Status. A considerable majority of these sessions – 19 of the 28 – were held in the 1980s. The bulk of the 1980s sessions of the special meetings took place in the period of 1982-1988 and they were devoted to negotiations about a minerals regime in the Antarctic region. The prospect of mining in the Antarctic region was the catalyst of the intensifying debate.

Mining in the Antarctic region was repeatedly on the agenda of the ATCM's in the 1970s, but was not discussed thoroughly. Negotiations on a minerals regime only began in June 1982. Why didn't this happen before 1982? On the face of it, this is quite surprising. In 1972, ten years before the official negotiations started, the American research vessel *USS Glomar Challenger* discovered traces of natural gas under the Ross Sea in the Antarctic region[18]. In the same year, the Club of Rome reminded the world of the exhaustibility of our natural resources[19]. In 1973-74 the Oil Crisis exposed the dependency of Western economies on oil. From then on, oil prices accelerated rapidly. New mineral resources – especially oil resources – were very welcome. In 1974 a U.S. Geological Survey Report came out which stated that there were large oil

[16] Hansom et al. 1998: 217-218.
[17] Antarctic Treaty Secretariat website.
[18] Suter 1991: 49.
[19] Meadows 1972.

reserves in the Antarctic region[20]. This report was on front page news, all over the world. However, this report was based on thin air: it was extremely speculative.

One of the two main reasons why a minerals regime was not discussed earlier was the fact that there were no large reserves found. The other reason was that the CP's were afraid that this very touchy subject might regenerate sovereignty disputes. The CP's were only too aware of the risks of future mining in the Antarctic region. However, in the late 1970's and early 1980s there were increased efforts by countries and some enterprises to find mineral resources in the Antarctic region. They operated in a vacuum in the ATS. The CP's realized that action was needed. The CP's had taken the first step on resource management in 1980 by signing CCAMLR, which regulated exploitation of *living* resources. The CP's realized that the time was ripe to discuss a minerals regime[21].

Discussions between CP-delegates took place behind closed doors, like all ATCM's, despite attempts of outsiders to get involved in the discussions[22]. The CP-delegates felt it was easier to reach consensus about the minerals regime in their own circle. They were inclined to discuss in private even more, given the sensitivity of the topic. It was clear to the negotiators that economic profits were uncertain, but that mining in that area could pose serious political and environmental threats. Mining could pose a threat for the political stability in the region. In 1982, the year that the negotiations about a mineral regime started, two consultative parties, Argentina and the UK, fought against each other in the sub-Antarctic region in the Falklands/Malvinas[23]. Although this war was fought essentially for military strategic considerations, it would not be illogical if there were also links with a future exploitation of minerals in the Antarctic region.

There are also environmental risks involved in mining in the Antarctic region[24]. The Antarctic ecosystem is very fragile, given the harsh climatic circumstances. Oil spills would hit the flora and fauna very hard. Moreover, the chance of environmental disasters is very high in the Antarctic region, due to storms and the risk that icebergs could collide with ships or drilling platforms. A very important issue was the liability aspect. Who should be held responsible for environmental damage? Who should pay for the damage: the oil companies, the insurance companies, or the governments?

The exploitation of minerals in the Antarctic region could also be a threat to the ATS itself. Due to internal as well as external pressures, the system could collapse like a house of cards. For example, the seven "claimant states" felt they should have more rights in the minerals regime than the other CP's without territorial claims in Antarctica, the "non-claimant states ". Because of this, it was already difficult for the CP's to conclude a minerals regime in their own small circle. They had to create, on the one hand, a regime with adequate

[20] Beck 1986: 241.
[21] Suter 1991: 52-53.
[22] Suter 1991: 53-55. I will elaborate on the attempts to open up the discussion in the following paragraph.
[23] Coll and Arend 1985.
[24] Rigg 1990: 69.

environmental safeguards (i.e. regulations), but, on the other hand, a regime which would not put off commercial enterprises because of these regulations. The regime had to compromise on the positions of both claimant and non-claimant CP's.

Despite all these difficulties, after six years of negotiations the CP-delegates concluded the *Convention on the Regulation of Antarctic Mineral Resource Activities* (CRAMRA) on the 2nd of June 1988[25]. All issues – except the very important issue of liability, which was to be postponed for later discussions – were addressed in the convention. CRAMRA was open for signature and ratification. However, CRAMRA was vetoed by Australia in May 1989, soon followed by a French veto in June 1989. Other countries joined the veto. The Australian veto can be partly explained by concerns of the Australian government that other states' exploration or exploitation activities in the vast Australian Antarctic Territory would undermine the Australian claim. The growing concern for protection of the Antarctic environment was the most important explanation, which will be discussed in section five.

11.4 Attack on the Antarctic Treaty System

In December 1982, six months after the start of the private CP-negotiations on a minerals regime, the *third United Law of the Sea Conference* (UNCLOS-III) was concluded about the use of the oceans and ocean bed.[26] UNCLOS-III was a major victory for developing countries because of the central position of the principle of common heritage of humankind in the final text[27]. The objective of this principle of international law is that unclaimed areas should be managed in the interest of all human beings. UNCLOS-III defined the interest of all human beings as equal sharing between poor and rich countries in the economic profits of these unclaimed areas. Inspired by the success of UNCLOS-III, the Malaysian Prime Minister, Mr. Mahathir Bin Mohamad, pleaded to enlarge the scope of the common heritage principle to include Antarctica. This heralded the start of an attack on the ATS.

Just after UNCLOS-III, during the 38th session of the General Assembly of the United Nations (UN) in 1983, Malaysia and other developing countries launched the attack on the ATS[28]. The Malaysian government and like-minded governments criticised the ATS for its closed, in their view *elitist*, character. In their view the ATS was an outdated, colonialist system. They also criticised the ATS because South-Africa, with its apartheid regime, was a member and was even a Consultative Party. The attackers wanted to replace or at least to open up the ATS; they wanted an Antarctic regime under the umbrella of the UN. The attackers wanted to participate in the management of Antarctica.

[25] Joyner 1996: 153, 164.
[26] Safronchuk 1991: 328; Suter 1991: 69.
[27] Interview Bos (29 April 2005), 4. Adriaan Bos was deputy leader of the delegation of the Kingdom of the Netherlands at UNCLOS-III.
[28] Suter 1991: 76-77.

Malaysia and other developing countries argued in the General Assembly at the UN Headquarters, New York, that the common heritage principle did not only apply to the ocean and ocean bed, but also to Antarctica[29]. However, this group of countries was not only referring to the principle for economic profit: they wanted an Antarctic regime to be meticulous about the Antarctic environment. They considered that careful management of the Antarctic environment was in the interest of humankind. At that very time, the CP's were negotiating behind closed doors about a minerals regime, and Malaysia and other countries were suspicious. These countries were not primarily driven by commercial interest, but by 'political' motives to open up a closed system. The ATS was never under attack by a primarily commercial driven government – neither of Malaysia and other developing countries nor of any other, economically stronger country.

Nevertheless, the critique on the ATS was harsh and fundamental. However, the CP's of the ATS had strong defensive arguments[30]- They pointed out that the Antarctic Treaty had always been open for signature by every member state of the UN. The ATS served international law and order by preserving the peace on a whole continent since it came into being. The ATS had proven to be a dynamic and practical arrangement, designed to avoid conflicts. It was very doubtful if a UN-based regime for Antarctica would do better.

The annual debates since 1983 in the United Nations General Assembly resulted in resolutions about Antarctica and the ATS[31]. The resolutions of 1983 and 1984 were adopted by consensus. In the resolution of 1983 the Secretary General (SG) of the UN, Javier Perez de Cuellar, was asked to write a report about Antarctica. It was finished just before the next session of the General Assembly in 1984, so it was resolved to discuss the report the next year. The heated discussions in 1985 and the subsequent years led to questioning the advantages and disadvantages of the ATS. New resolutions were adopted concerning: an update of the report of the SG; informing the SG about the negotiations on a minerals regime; excluding South-Africa from the ATCM's; a moratorium on the negotiations about a minerals regime. Since 1988 onwards a resolution was adopted about a moratorium on mining itself.

These resolutions were adopted by vote, but the countries which supported the ATS boycotted the vote. The average voting pattern of the resolutions since 1985 was as follows: 95 states were in favour; none were against; 12 were neutral; 40 were absent in the vote. Such a large boycott was unprecedented in the history of the United Nations.

However, the attack by resolutions of the General Assembly of the UN was actually toothless: unlike resolutions of the UN Security Council, these resolutions are not binding. The supporters of the ATS could ignore the resolutions with impunity and they did so. There was no replacement or fundamental change of the ATS which resulted in more influence of the attackers in the management of Antarctica.

[29] Thomassen December 1983. The influential politician Wim Thomassen (1909-2001) was for decades the most important advocate for Dutch involvement in Antarctica.
[30] Beck 1986: 184-185.
[31] Suter 1991: 80-83.

Nevertheless, the countries which supported the ATS, especially the NCP's, obtained observer status in the ATCM's in 1983, and since 1985 they may even attend the meetings on the minerals regime, also as observers[32]. There was also an increasing willingness by the CP's to give Consultative Status to NCP's. In some cases there was even an erosion of the price tag for Consultative Status, namely substantial Antarctic research.[33] While West-Germany had to build a wintering station in Antarctica to become CP in 1981, India only had to build a summer station in Antarctica to become CP in 1983. The ATS opened up, but only for its supporters.

The attack of Malaysia and other developing countries on the ATS is still going on; from 1983 to 1996 the 'question of Antarctica' was a yearly agenda point at the meetings of the UN General Assembly. Since 1996 the question of Antarctica is a triennial agenda point[34]. However, there is no real progress in the discussions. Both the attackers and the defenders have used essentially the same arguments for twenty-two years. Antarctica drifted back to the margins of international affairs in the past decade.

11.5 Growing support for the Antarctic Treaty System

The growing support for the ATS manifested itself in the clearest way by the increasing membership of the ATS (Fig. 11-1). This development weakened the attack on the system.

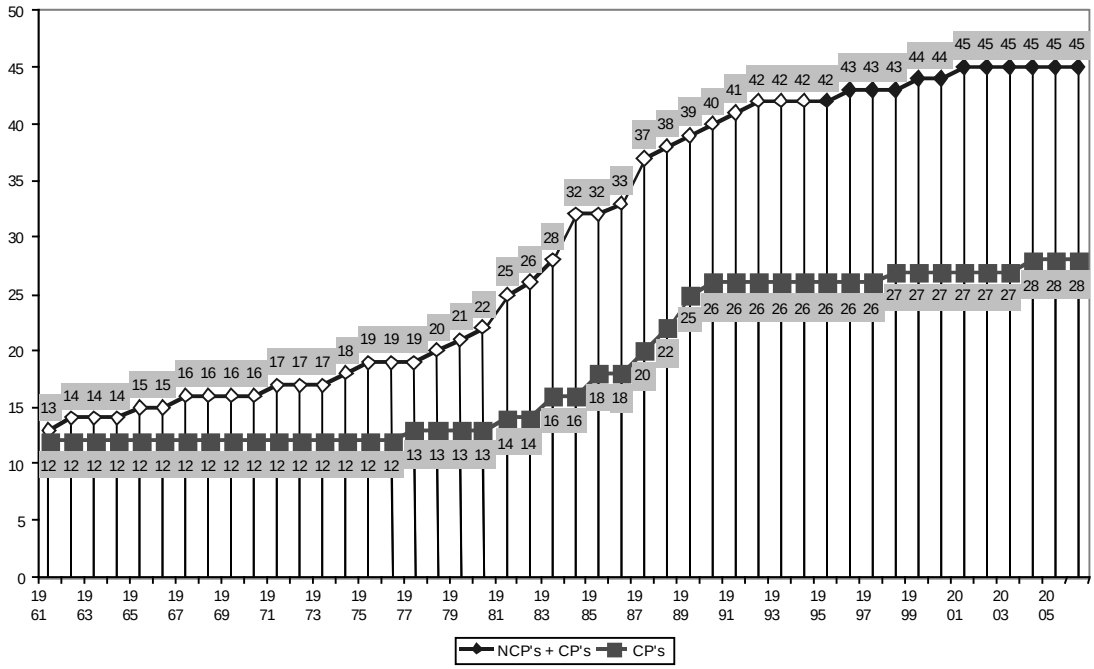

Figure 11-1: Number of ATS member countries. Source: Antarctic Treaty Secretariat, source: www.ats.aq.

[32] Bos 1991: 340.
[33] Beeby 1991: 14.
[34] Beck 2004; Agenda of the sixtieth session of the General Assembly 2005.

The inclusion of the large and populous developing countries Brazil and India in 1983 and of China in 1985 as CP's made the accusation that the ATS was an elitist, colonialist and closed system very hollow[35]. In the dynamic decade of the 1980s, the number of signatory countries, as well as the number of CP's, almost doubled.

Why did countries want to obtain Consultative Status in the ATS, despite the considerable cost of the prerequisite of this status, substantial Antarctic research? Partly, they wanted influence on the minerals regime negotiations to defend their interests[36]. Similar to the intensifying debate in the ATS and the attack on the ATS, the most important catalyst for the increasing support for the ATS was the prospect of mining in the Antarctic region. Politicians and policy-makers were beginning to take note of Antarctica. Some of them had economic motives: if mining claims in the Antarctic region were to be distributed in the future, they didn't want to be sidelined[37]. Others wanted to express their concerns about the risks involved in mining in the Antarctic region. Countries which wanted to become CP also wanted influence on a possible review process of the ATS in 1991. Other motives to become CP were: to prevent the break-up of the ATS due to the attack in UN-circles; to conduct Antarctic research to find answers for policy issues. In this respect, finding answers for environmental issues became increasingly important. For example, the Netherlands were (and still are) very interested in research on the rise of the sea level[38].

11.6 Growing concern about the Antarctic environment

In the 1970s Antarctica came to the attention of the environmental movement, although Antarctica was not yet a major issue. In 1972 the *International Union for the Conservation of Nature and Natural Resources* (IUCN), the world's largest and most important conservation network, had pleaded for Antarctica as a natural reserve.[39] In 1977, environmental organisations from all over the world founded the *Antarctic and Southern Ocean Coalition* (ASOC).[40] This umbrella organisation had the task of coordinating actions of its member organisations with regard to the Antarctic region. ASOC was founded at the time that the CP's were negotiating about a regime on living resources.

In the 1980s the environmental groups intensified their activities with regard to Antarctica. In 1980 the IUCN adopted the *World Conservation Strategy*, with the assistance of the *World Wide Fund for Nature* (WWF) and the *United Nations Environmental Program* (UNEP)[41]. Antarctica was one of the major issues in this most important policy document for the international environmental movement. Environmentalists were very concerned about future mining in the Antarctic region, especially when the CP's started to discuss a minerals regime in

[35] Beeby 1991: 14.
[36] Dodds 1997: 135.
[37] Wilder 1992: 93-94.
[38] Bergman 1983: 57-58.
[39] Quigg 1983: 180.
[40] Barnes 1988: 242.
[41] IUCN 1980: section 18.

1982. The aim of the environmental organisations was to reach a ban on mining in the Antarctic region; they wanted a protected status of Antarctica.

There was also an increasing concern for the Antarctic environment among large sections of the population all over the world, including politicians, as a result of a general increase in environmental awareness. This increasing environmental awareness is typical of the 1980s. In 1985 Antarctica was in the centre of interest: the gap in the ozone layer was discovered. The gap was for a large part caused by human activities, such as the development of chlorofluorocarbons (CFC's)[42]. This global environmental problem manifested itself above Antarctica.

However, during the meetings of the CP's the gap in the ozone layer was not on the agenda. They discussed this topic in other broader forums, such as the United Nations.[43] The debate in the 1980s was to a large extent devoted to a minerals regime. In this debate, environmental concerns played an important role. As a result, CRAMRA stated that no Antarctic mineral resource activity should take place until it is judged that this activity would not cause damage to Antarctica's environment[44]. However, CRAMRA did open the way for mining in the Antarctic region.

The signing of CRAMRA was a major setback for the environmental movement.[45] Environmental organisations had lobbied for years to prevent mining in the Antarctic region. All their efforts seemed to be in vain after the signing of CRAMRA. However, some environmental organisations like *Greenpeace* worked to influence the ratification processes of CRAMRA in the individual countries; this tactic worked well.

Australia vetoed CRAMRA in May 1989[46]. In Australia the environmental movement had a very strong position. The country's public opinion was strongly in favour of the conservation of Antarctica and strongly against mining. Just before the Australian veto two dramatic events took place. In January 1989 the Argentinean supply vessel *Bahia Paraiso* crashed into the coast of the Antarctic Peninsula, resulting in oil spills[47] .The second event was the accident of the oil tanker *Exxon Valdez* in Prince William Sound in Alaska. This was one of the biggest ever eco-catastrophes. These two events were exactly what environmentalists had warned about. In the world press the two events were widely accepted as relevant projections of the Antarctic in a CRAMRA future[48]. The Australian veto was not only motivated by the environmentalist minded public opinion, but also because the Australian industry showed little interest in mining in the Antarctic region, and by the political concerns of the Australian government mentioned in section two.

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[42] In 1974, scientist already discovered that the ozone layer was threatened by the increasing amount of CFC's (Suter 1991: 118-119).
[43] Suter 1991: 120-121.
[44] Suter 1991: 56.
[45] Interview Drieman 25 June 2004. Geert Drieman is former Director of *Greenpeace-Netherlands*.
[46] Herr and Davis 1996: 350.
[47] Suter 1991: 109.
[48] Herr and Davis 1996: 354.

The lack of interest of the Australian industry in mining in the Antarctic region was not unique: world-wide there were only a few companies interested in mining in the Antarctic region. The market leader Shell was not interested[49]. Exploitation in the Antarctic was (and still is) very expensive, risky and the profits were very uncertain. More important: there were still no exploitable reserves found in the Antarctic region. The oil and mining companies had many other cheaper, easier accessible reserves at their disposal. In other words, mining in the Antarctic region was economically unprofitable. The disinterested oil and mining industry kept the road open for the environmental lobby.

In June 1989 France sided with Australia by vetoing CRAMRA too. The French veto was quite remarkable, given the country's bad record on environmentalist issues those days[50]. There were three issues. The first issue was that France began to build an air strip in Antarctica in 1983. They used explosives and this killed some penguins and destroyed eggs. The photos of the dead penguins were widely publicized by *Greenpeace*. The second issue is that there were rumours of possible French nuclear testing in the Sub-Antarctic region in the future. The last issue was the bomb attack conducted by the French Secret Service on the Greenpeace ship, the *Rainbow Warrior* in Auckland, New Zealand, on 10 July 1985. The French veto was a charm offensive, especially directed to Australia. However, this was not the only explanation of the French veto: as in Australia, there was a strong environmentalist lobby in France.

The growing concern about the Antarctic environment had an enormous impact on the ATS, blocking a minerals regime. In 1991 the CP's signed the *Protocol on Environmental Protection to the Antarctic Treaty*. According to this protocol the CP's agreed on a mining moratorium for fifty years. The protocol designates Antarctica as a "natural reserve devoted to peace and science".

11.7 Conclusion

Four developments made the 1980s the most dynamic decade in the history of the ATS. These developments were: the intensifying debate among the CP's within the ATS; the attack on the ATS; the increasing support for the ATS; and the growing concern about the conservation of Antarctica.

The prospect of mining in the Antarctic region was the catalyst development of all four developments. The CP's realized that they had to discuss this touchy issue. Countries with no Consultative Status in the ATS, as well as environmental organisations wanted to have influence in the management of Antarctica. To obtain this goal, some countries attacked the ATS, while others supported the ATS aiming for Consultative Status. Environmental organisations lobbied to achieve their objective: a ban on mining in the Antarctic region.

[49] Dutch Foreign Affairs Department, May 1982, Antarctica, verslag bijeenkomst d.d. 25 mei 1982 ['Report of meeting of 25 May 1982']: Archives Dutch Foreign Affairs Department, File 'correspondentie n.a.v. antartica verdrag', code 8 / 1975-1984 / 04134.
[50] Suter 1991: 100-108.

The attackers of the ATS were unsuccessful; they did not obtain more influence in the management of Antarctica. On the other hand, supporters of the ATS succeeded in obtaining more influence: many of them became CP. The big winner was the environmental movement. CRAMRA, the document that opened the way for mining in the Antarctic, was blocked in 1989 and the CP's established a mining moratorium in 1991 instead. Since that moment, the ATS is back in smooth waters.

Today, the observer may wonder if CRAMRA is dead indeed, or if it has only been put on ice. Technology has continued to develop since the late 1980s. For the time being, all CP's respect the mining. However, mining in the Antarctic region could be economically profitable one day, although in the more distant future. The discovery of large exploitable mineral reserves in the Antarctic region would be a major challenge for the ATS. In that case, it could revive the developments which were characteristic of the 1980s, but probably with a different outcome.

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12 Dutch involvement in Antarctic research

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Abstract

Dutch involvement in Antarctic research is relatively recent. After some words about Dutch discoveries in the seveteenth century and Dutch whaling expeditions after World War II, the deliberations which led to the start and the end of Belgian-Dutch cooperation at the King Baudouin Base from 1963 to1967 are described.

In the 1980's interest of some Dutch scientists increased and a lobbying campaign with much support from the International Union for the Conservation of Nature and Natural Resources (IUCN) and other organizations for the conservation of nature and from influential politicians succeeded in 1985 to earmark a small budget for pilot Antarctic projects in ecology, glaciology, geology and oceanography. The support of many countries, notably (West)Germany, but also Australia, United States, France and the United Kingdom was essential in the pilot phase.

The Committee for Antarctic Research, under the umbrella of the Council for Sea Research, succeeded to increase the budget manifold. In 1989 the Netherlands applied for Consultative Status, which was granted a year later. There are no plans to establish a Dutch base on Antarctica. The variety of the Dutch scientific programs needs flexibility and is better served by paying for the use of logistics from other countries.

12.1 Introduction

During the preparation of the first workshop on the history of Antarctic research, the organizers asked the participants to concentrate their talks on how and why different countries became engaged in research programs in this remote area; how and why it continued (or was discontinued). Elaborations on the leading persons who secured earmarked funding were also asked. In my paper I will comply with this set-up and give a narrative on the multiple starts of Antarctic research by Dutchmen, rather than on the scientific results. The consequence of such a choice is that the attention mainly goes to science organizers, meeting each other without the hardships endured by the people actually working in the hash climate of Antarctica.

12.2 Discoveries

In the seventeenth century two Dutch expeditions appreciably reduced the magnitude of the then postulated Antarctic continent, the Terra Australis nondum

cognita (not yet known Southern Continent). The first expedition was by Willem Schouten and Jakob Lemaire in 1616, the second by of Abel Tasman in 1642. Discoveries were not the most important purpose of these endeavours; establishing trading relationships was more important to the financiers.

Figure 12-1: The voyage in 1616 by Schouten and Lemaire around Cape Hoorn, reconstructed by R. van den Bos. In Hazelhoff Roelfzema 2001.

Schouten and Lemaire circumnavigated the real southern tip of South America, which they named Cape Hoorn after the city of Hoorn, the home port of their ships. Figure 12-1 gives a reconstruction of the itinerary[1]. Previously it was thought that Tierra del Fuego was part of the supposed southern continent. Jacob's father, the merchant Isaac Lemaire had a conflict with the then almighty "*Verenigde Oostindische Compagnie* (VOC)" (Dutch East India Company) and sought alternative shipping routes to avoid the monopoly of the VOC.

Tasman circumnavigated the continent that was later named Australia, made landfall at the island that now bears his name, and sighted New Zealand. He named this land "Statenland" after the "Staten-Generaal ", the Government of the Republic of the Seven United Provinces. Interestingly, the name "Statenland" had also been given to the land - now Staten Island - sighted by Schouten and Lemaire. Apparently, Schouten, Lemaire, and Tasman still had a firm belief that a vast southern continent existed. In fact, the main purpose of Tasman's expedition, supported by the VOC, was to discover the unknown southern continent. Shortly afterwards, Tasmans´ Statenland was renamed "Nieuw Zeeland", after Zeeland, together with Holland, the most important of the seven united provinces.The Z in New Zealand still shows the Dutch origin of its present name.

[1] Hazelhoff Roelfzema 2001.

12.3 Antarctic Whaling

For more than ten years, starting in the season 1946/1947 a Dutch company took part in Antarctic whaling. They bought the Swedish tanker Pan Gothia and converted the ship into a whale processing factory, named Willem Barendsz. The underfed Dutch population, starved during the last year of the German occupation (1940-45) welcomed the fat from the big butter dish from the deep south. Press coverage was enormous, stressing the new initiative, in line with the glorious past of Dutch expeditions to many remote regions. The results were somewhat disappointing; after 1950 the catch diminished.

In itself this is no reason for including this episode in this paper about research, but several scientists were employed by the Whaling Company and got some facilities on board during the first two seasons. Vervoort published several papers on copepods from the Southern Ocean, while more in line with fisheries the chemist Feltman and the biologists published on the fat content of blue and fin whales[2].

12.4 Belgian-Dutch cooperation in research at the King Baudouin Base

From 1964 to 1967 three teams of Dutch scientists and technicians over wintered at the King Baudouin Base, 70° 26´ S; 23° 19´ E, on the Princess Ragnhild Coast half way between the Japanese base Siowa and the Russian base Novolazarevskaya. Belgium had operated the King Baudouin base from 1958 to 1960, afterwards it had been deserted. Reopening (and rebuilding) the base was proposed especially through activities of Gaston de Gerlache de Gomary, son of the famous explorer Adrien de Gerlache. To lighten the burden of the maintenance cost, cooperation was sought from other nations, notably the Netherlands but also Italy. Early in 1962, a formal request was sent through diplomatic channels, asking if the Netherlands could in any case bear one third of the money necessary for the expedition 1963/64, and hopefully for two more years. This would mean Dfl 600,000 for the first year just for transportation and maintenance of the base. Six Dutchmen would be part of the over wintering crew; because of financial setbacks, only four actually went. It was also made clear, that if the Netherlands refused, there would be no Belgian expedition.

The total expenditure would mean a rather large amount of money. With respect to cost effectiveness Antarctic research is expensive, because of the logistics involved. Much more results could be obtained in less remote and hostile environments. Nevertheless, the Netherlands Organisation for the Advancement of Pure Research (ZWO) made a preliminary reservation for Dfl 650,000, the requested sum plus 50,000 for preparations, on the condition that the Royal Dutch Academy of Sciences (KNAW) would give a positive advice on the science to be carried out.

Three conditions were formulated:

1. A possible Dutch contribution should be of great scientific interest.

[2] Vervoort 1951; Feltman, Slijper and Vervoort 1948.

2. The Dutch contribution(s) should be recognizable as independent parts of the program.
3. Emphasis should be on geophysics.

The question posed by the Dutch government whether or not the Netherlands should strive for membership of the Antarctic Treaty was also considered by the KNAW. The answer was negative; an interesting argument was that all results of Antarctic investigations would be freely available to all nations, so there was no advantage to be gained. Moreover, there was hardly any "polar research tradition" in the Netherlands, but there was a strong interest in global observations on geo- and astrophysics. Belgium, as one of the founding nations of the Antarctic Treaty did have a polar tradition, but less so in astrophysics.

This inequality hampered the Belgian-Dutch cooperation. Despite this fact and despite the failure to start scientific discussions on equal footing, the board of the KNAW made a step forward by establishing in March 1963 a Dutch Antarctic Committee for Antarctic Research within the Academy. It consisted of Cornelis Jacobus Warners, general director of the Royal Dutch Meteorological Institute (KNMI) as chairman, Wijnand Langeraar, chief hydrographer of the Navy as secretary, and members the meteorologist Wouter Bleeker, the geophysicist Jan Veldkamp (both at KNMI) and the astronomer C. de Jager. Bleeker, Veldkamp, and Cees De Jager were professor at Utrecht University. Time was pressing but who would set the ball rolling. According to De Jager[3], Warners played a key role in breaking the stalemate, while also Langeraar was active in the preparation of logistics.

It is noteworthy that science administrators and not active scientists took this decision. Both, Warners and Langeraar were very keen on seeking Dutch membership of international organizations and SCAR was their target, rather than membership of the Antarctic Treaty. Bleeker had visited a SCAR meeting and was told that assisting for a year in programs of a Treaty member, even with an independent program would not be considered as sufficient to be admitted to SCAR. Between the lines it could be read that a long-term commitment was what mattered.

The results of the Belgian-Dutch expeditions in the 1960s were useful, but they were mainly routine observations, published in meteorological yearbooks. A full list is given in SOZ (1989); a different example is the study of ozone[4]. This paper showed the seasonality of the ozone inventory of Antarctic air, with a minimum in early austral spring. In those days this phenomenon was studied as a tracer for atmospheric circulation, while the reason for the variability was thought to arise from natural processes. Twenty years later the minimum (the "ozone hole") was more pronounced and related to the increasing use of chlorofluorocarbons.

After three years of over wintering, the scientists and the members of the Academy Committee felt, that if the cooperation was to continue, more emphasis

[3] De Jager personal communication.
[4] Wisse and Meerburg 1969.

should be put on science. Again there were difficulties to start cooperation with the appropriate Belgian Committees. The Dutch committee members had to conclude that there were differences in opinion between De Gerlache and his co-workers on one hand, and the "official" bodies in Belgium, like the SCAR committee and the Academy of Sciences. When the members of the 2nd and 3rd expeditions were not happy with the cooperation on the base, the difficult decision not to continue Antarctic research in this framework was a logical one[5]. As a kind of afterthought, the Netherlands acceded to the Antarctic Treaty in 1967.

However, the Dutch (Academy) Committee for Antarctic Research was disbanded. The Committee for Sea Research, also accommodated at the KNAW agreed to serve as a "lookout" for Antarctic matters. The chairman of this Committee was Jenne Johan Zijlstra (Fig. 12-2), director of the Netherlands Institute for Sea Research (NIOZ) at Texel. He greatly stimulated participation of NIOZ scientists in ocean-going research programs.

Figure 12-2: J.J. Zijlstra (1926-1989). Director of the Netherlands Institute for Sea Research, showing a plankton torpedo, one of the important tools in biological oceanography

12.5 A new - this time multidisciplinary - start

A possibility came into view of the lookout in 1980, when Gotthilf Hempel, director of the newly established Alfred Wegener Institute for Polar Research (AWI) in Bremerhaven, West Germany, told Zijlstra that a Dutch scientist would be welcome on board an upcoming expedition to Antarctic waters. Besides ex-

[5] Archives KNAW.

tending a friendly gesture - Hempel and Zijlstra knew each other quite well; in previous jobs they both had worked on herring in the North Sea - Hempel also hoped to arouse interest among the Dutch scientific community to renew involvement in Antarctic research. He assumed that involvement by the Netherlands would be science-oriented and he thought that in the upcoming renewal of the Antarctic Treaty, scientific matters should be decisive.

Hempel´s invitation was passed on to me and I was eager to accept. My research subject was the silica cycle (in which the Southern Ocean plays a key role) and I was also interested in the concentration of aluminium in sea water. For this element a new sensitive method had become available and virtually nothing was known about Aluminium in the Southern Ocean.

The voyage to the western Weddell Sea with the research vessel Meteor and visits to the British base at Signy Island and the Argentine base Esperanza were an unforgettable experience. The lectures on board, organized by Hempel as chief scientist and as director of the AWI, gave me a quick introduction to the fascinating possibilities of the southern part of the world ocean, for natural science and as a geopolitical playground. Being in the Antarctic environment, both on land and at sea is addicting, many people underwent this experience and I was no exception. So I did want to go again, of course mainly for scientific reasons but there were other factors: the grandiose environment and working in an international team, to name some important considerations. Hempel´s plea for a renewal of Dutch interest into Antarctic research asked for reconnaissance of the political attitude towards Antarctica.

Soon, I discovered that a keen interest in Antarctica existed. The Dutch division of the International Union for the Conservation of Nature and Natural Resources (IUCN) - the world's largest and most important conservation network - hosted a Working Group since 1980 with politicians, scientists of different disciplines and members from various international conservationist organisations. Conservationist organisations had a strong position in the Netherlands. Antarctica had been a prime target in IUCN´s world conservation strategy[6].

An invaluable contribution to "Antarctica-awareness" was made by Wim Thomassen (Fig. 12-3), an influential Member of Parliament. He was not a scientist but had an encyclopaedic knowledge of the history of Antarctica and of the functioning of the Antarctic Treaty. Repeatedly he had addressed the Dutch Government with pleas that the Netherlands should aim for consultative membership[7]. In 1982 he joined the IUCN Working Group and we realized that if our country had Consultative Status in the Antarctic Treaty, problems would be a lot easier. The voice of nature conservation would be heard at the right tables, the nation would gain some prestige and last but not least, there would be earmarked money for research.

Although the Antarctic Treaty was subject to change (Abbink, this volume) and the criteria to obtain Consultative Status became less strict, a Dutch application

[6] IUCN 1991.
[7] Thomassen 1983.

for Consultative Status was of course not yet possible. Anyhow the Netherlands Committee for Sea Research commissioned a reconnaissance study about the scientific interests in relation to the financial consequences[8]. The study concluded that there was enough support to start a small research group, with an annual budget of Dfl 900,000 (about 400,000 €) earmarked for Antarctic research.

The search for money was rather disappointing; only three Ministries, Science and Education, Agriculture (through its nature conservation division) and Economic Affairs (through its interest in the negotiations about mineral exploitation, however remote) were willing to contribute a total of Dfl 300,000 annually for a period of three years.

Nevertheless, the director-general for science policy of the ministry of science and education, E. van Spiegel, thought it wise to accept these commitments. Otherwise, the momentum created by Thomassen and others would be lost and the offers by other nations, notably West-Germany to host Dutch scientists might be withdrawn. In the autumn of 1984 van Spiegel commissioned a triumvirate of directors from the research institutes, managed by the three paying ministries to draw outlines of a limited scientific program. Zijlstra from the NIOZ was chairman, the National Geological Survey (under Economic Affairs) and the Institute of Ecology were members.

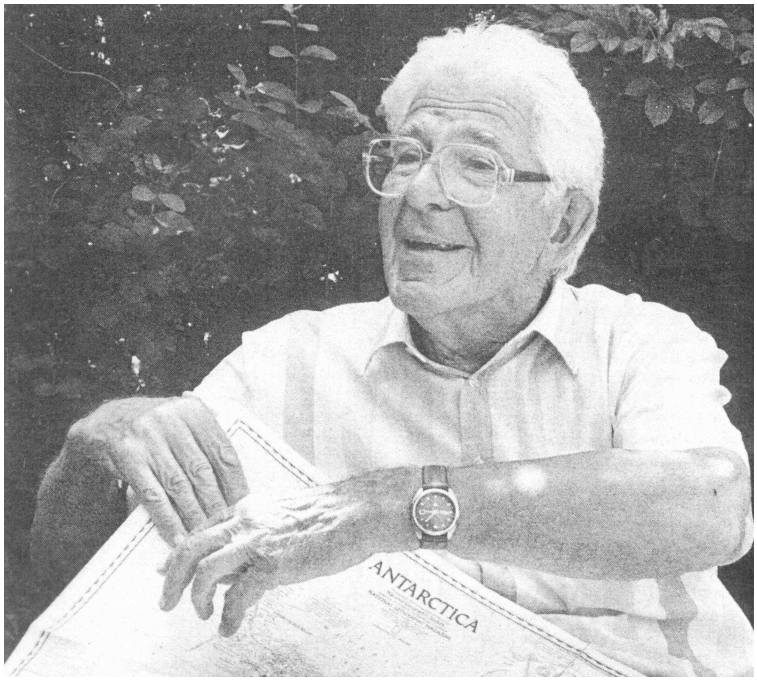

Figure 12-3: W. Thomassen (1909-2001). An indefatigable advocate of Antarctica, who played a decisive role in the mid 1980´s, when the Netherlands embarked on the road towards Consultative Status.

In the meantime, the IUCN Antarctic Committee thought it timely to organize a symposium, where politicians and scientists would present their plans. At this

[8] Bergman 1983.

symposium, November 1, 1984 Van Spiegel announced the above result. The small amount of money was less than expected, but all Committee members were happy with this breakthrough: An important hurdle had been taken: the lobbying had secured at least a budget and we expected the budget to stay and to grow. The choice for contributions by different Ministries had the advantage of earmarked money, but the money involved in all meetings during this period and its preparations might well be similar to the budget for science.

Subsequently it was decided that a managing committee of Antarctic projects would be established at the Stichting Onderzoek der Zee (SOZ)[9]. There were few organisations with experience in managing multidisciplinary research, and the SOZ had successfully organized the logistics of the *Snellius II* expedition in Indonesia. In 1985 SOZ Antarctic Committee started its work; many difficulties were met, but its members succeeded in increasing the budget manifold. In the pilot phase, implementation of the projects heavily depended on the hospitality of many countries, notably (West) Germany, but also Australia, USA, France and the UK.

Regularly symposia were held to report about the results. In 1991 the international cooperation, typical for Antarctic research, was stressed to honour our foreign hosts. Fig. 12-4 shows some of organizers of this symposium.

Figure 12-4: Some of the lobbyists for Dutch Antarctic Research in. From left to right: A. Bijlsma (SOZ) L. van Brederode (secretary of the IUCN Antarctic Committee); J.H. Stel (secretary of the SOZ Antarctic Committee) and the author in 1991.

[9] Foundation for Sea Research, see SOZ 1989.

12.6 Epilogue

In 1989 an application for Consultative Status of the Netherlands was submitted to the ATS meeting in Paris and was not accepted unanimously. This had never happened before in the history of the Antarctic Treaty. Some delegates argued that cooperation with other countries was not sufficient to comply with art IX(2), requiring "demonstration of interest in Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the despatch of a scientific expedition". So, a crash program was organized; in the 1989/1990 season the Polish base Arctowski was rented for a Dutch expedition. As a result Consultative Status was obtained at a special ATS meeting in 1990 in Santiago de Chile.

Nevertheless, the Dutch position remains that the quality of the science is more important than the presence in a region where already many stations exist. The multidisciplinary nature of the Dutch research projects requires flexibility rather than a permanent station.

Why was the Belgian-Dutch cooperation in the 1960´s not continued and why did the pilot program in the 1980´s lead to a long-term presence in Antarctica? Many factors contribute; in my opinion the globalization of many scientific and political issues make Antarctica an important part of the planet, rather than a remote playground. Moreover, in this 20 years period, many Dutch research institutions became more and more interested in global issues. The network of international organizations for the conservation of nature could ensure press coverage and hence a political basis. It should not be forgotten that chance factors plays a role; the combination of the right people at the right time.

Acknowledgements

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13 The History of Astrophysics in Antarctica

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13.1 Abstract

Astronomy, in the early days of Antarctic exploration, has played a negligible role apart from its use as a navigational aid. Although the first proposal for an Antarctic telescope was made as early as 1912 by Admiral R.E. Peary, the beginnings were of a much simpler nature: A meteorite was discovered by Mawson in 1912, laying on top of the ice, initiating the *Era of Astrogeology*. As the foundations were laid for cosmic ray science, Geiger counters were brought to Antarctica, and the *Era of High Energy* Astrophysics emerged in the 1950's. Yet again decades later in the 1970's-1990's, the advantages of the high and exceedingly dry climate of the Antarctic Plateau were established and a number of projects exploring the sky in the infrared and sub millimetre ranges of the electromagnetic spectrum provided spectacular results, giving birth to the *Era of Photon Astrophysics.* Science results in all astronomical specialties keep coming in from Antarctica. A number of large scale projects are in progress today, bringing in spectacular results, and many more are planned[1].

13.2 The Dawn, and into Astrogeology

The Australasian Antarctic Expedition, led by Sir Douglas Mawson and lasting from 1911 until 1914, was investigating the stretch of Antarctic coast between the then known boundaries in the west of "Terra Nova", which was mapped by Scott's British Antarctic Expedition in 1910, and "Gauss" to the east, which was charted by the German Antarctic Expedition in 1902 (Mawson 1915). A base camp had been set up at Cape Denison in Commonwealth Bay, Adelie Land. It included a transit telescope and hut, whose purpose was for determining the longitude of Cape Denison through measurement of the transit times of stars across the local meridian. However no astronomy appears to have been done with the telescope. From the base camp, field trips spanning several weeks and extending significant distances were executed. On one of these excursions, Frank Bickerton led a sledging party and on the third day of the expedition, they found a black object partially buried in the snow (see Fig. 13-1).

This chance find, discovered at 12:35 on 1912 December 5, turned out to be a stony meteorite, about 5 inches long by 3 inches (13×7 cm) across[2]. It was the first meteorite to be discovered in Antarctica, and the first astronomical observation of significance on the new continent. Bickerton's diary entry for the day

[1] The Author would like to draw your attention to his much more complete account on the "History of Astrophysics in Antarctica" published in *Publications of the Astronomical Society of Australia*, 2005, 22, 1–18. http://www.publish.csiro.au/journals/pasa.
[2] Bayly & Stillwell 1923.

gives a detailed description of the appearance of the meteorite, and makes it clear that they immediately recognised it for what it was:

Figure 13-1: The Adelie Land Meteorite. Picture: Michael Burton 2002, with acknowledgment to the Australian Museum, Sydney.

> "...meteorite ... covered with a black scale, internally of a crystalline structure, most of its surface rounded except in one place which looks like a fracture, iron is evidently present in it."[3]

It had been speculated since the Amundsen and Scott expeditions to the South Pole in 1911 that the dry and high altitude climate on the Antarctic plateau might be of advantage to astronomical observations. The U.S.Navy's Rear Admiral Robert E. Peary, who had led the first successful expedition to the North Pole in 1909, addressed his ideas in a letter to the director of Yerkes Observatory, Edwin B. Frost, suggesting that continuous observations during the course of a year could yield valuable results[4]. Frost however was not enthused and denied feasibility, mainly based on the argument that precise enough timing would not be available to provide useful observations.

Almost half a century later, the next significant astronomical discovery was made by Russian geologists operating out of the Lazarev Station (called Novolazarevskaya today), with a number of meteorites found and collected from the Lazarev region in 1961[5]. The astrogeological importance of Antarctica, however, did not become evident until 1969, after a Japanese group of geologists established the first formal meteorite search programmes based on geological and glaciological evidence. They successfully retrieved many different kinds of meteorites including enstatite chondrites, hypersthene achondrites, type III carbonaceous chondrites, and bronzite chondrite in the Yamato region[6]. It was

[3] Quotation supplied by Frank Bickerton's biographer, Stephen Haddelsey. Bickerton's diary is held by the Scott Polar Research Institute in Cambridge, UK.
[4] Peary and Frost 1912.
[5] Tolstikov 1961; Ravick & Revnov 1965.
[6] Nagata 1975.

improbable that this accumulation of different meteorite types in the same location happened by chance, thus driving the development of theories explaining how meteorites falling in Antarctica could be transported by the moving ice sheets so as to be accumulated in a few particular locations — ablation zones in blue ice fields—where they could be easily found[7].

13.3 High Energy in Antarctica

Modern astrophysics was not practiced in Antarctica until the 1950s. The first astronomical research programme was conducted by Australian scientists and developed from cosmic ray experiments carried out by the Physics department of the University of Melbourne, initiated by Professor Leslie Martin[8]. In 1947 and 1948, stations were constructed on Heard and Macquarie Islands and ion chambers installed by way of sea transport with the ship *Wyatt Earp*, which continued to Antarctica. Measurements were made using the third ion chamber that remained on the boat, sometimes in the most difficult of circumstances given the frequent storms of the Southern Ocean. While not actually taking place on the continent, this was the first experiment explicitly designed for astrophysical purposes to be conducted in Antarctica.

In 1954, Mawson Station, Australia's first Antarctic station, was established and a cosmic ray observatory built in 1955. This was the first Astrophysical experiment to take place on the continent, and they heralded the start of the Mawson cosmic ray programme which still continues today. The IGY of 1957/58 finally saw another cosmic ray detector installed at McMurdo by the USA team around Martin A. Pomerantz, followed by South Pole in 1964. A number of projects were initiated in the 1980's among them SPASE and SPASE-II (South Pole Air Shower Experiment), GASP (Gamma Astronomy at the South Pole) and last but not least, AMANDA (Antarctic Muon and Neutrino Detector Array), the largest Cherenkov radiation detector on earth, built into the clear ice in the Dark Sector at South Pole. Eventually, AMANDA will be superseded by ICE (IceCube), a 1 cubic kilometre detector currently under construction.

13.4 Photon Astronomy

In 1979 the first optical research programme was undertaken at the South Pole. Eric Fossat, Gerard Grec (both of the Observatoire de Nice), and Martin Pomerantz (Bartol Institute) coupled a sodium vapour cell to a small telescope and obtained an unbroken run of over 120h of observations measuring solar oscillations (Fig. 13-2).

These data allowed about 80 harmonics of solar eigenmodes to be discovered, with periods ranging from about 3 to 8 min[9]. In the 1981-82 summer an array detector was added to provide increased angular resolution for the solar

[7] Yoshida et al. 1971; Shima & Shima 1973.
[8] Law 2000.
[9] Grec, Fossat, and Pomerantz 1980, 1983; Fossat et al. 1987.

observations, allowing features as small as 10 arcsec to be resolved[10]. The careful measurements from all these experiments of the oscillations caused by resonating sound waves within the Sun have directly lead to the detailed knowledge we now have of the temperature, composition, and motions in the Sun's interior, a first truly spectacular result only possible by observing from Antarctica.

Figure 13-2: The solar telescope used at the South Pole in December 1979. Picture: Gerard Grec.

In the 1980s, the first projects were envisaged with an initial goal of observing the galactic infrared emission. Measurements of water vapour content in the atmosphere made with a site-testing meter in the summer of 1974 had shown that it was lower than at Mauna Kea, the world's premier infrared observatory[11]. The first experiment to attempt to take advantage of this characteristic was a US-France collaboration that took place in 1984 - 1985[12]. They used a 45-cm sub millimetre telescope named EMILIE (Emission Millimetrique, see Fig,.13-3), which had been designed to work on the 3.6-m Canada-France-Hawaii Telescope on Mauna Kea, Hawaii.

It was by far the most ambitious and logistically difficult astronomical programme then undertaken in Antarctica, as it required the transport of liquid helium to Antarctica all the way from the USA. This essentially was the first in a series of Cosmic Microwave Background Experiments that ultimately would lead to the Boomerang experiment, which combined with the earlier South Pole data, provided the best evidence at the time that the geometry of the Universe was indeed flat (i.e. Euclidean). As with the DASI (Degree Angular Scale Interferometer) result two years later, these measurements also made the front cover of *Nature*, in April of 2000.

[10] Pomerantz, Wyller, and Kusoffsky 1981; Pomerantz, Harvey, and Duvall 1982; Harvey 1989.
[11] Westphal 1974.
[12] Pomerantz 1986.

In 1986, a year-round observatory at the South Pole was established by CARA (Center for Astronomical Research in Antarctica), with telescopes planned to operate in the infrared, sub millimetre, and microwave bands. A special “Dark Sector”, where anthropogenic interference was to be kept minimal, was set aside 1 km away from the Pole. These have been centred around the MAPO Building (Martin A Pomerantz Observatory (Fig. 13-4), named in honour of Pomerantz's many pioneering contribution to the development of astrophysics in Antarctica. In addition to supporting several telescopes, MAPO also contains a fully-equipped workshop, which has proved to be invaluable in maintaining the observatory.

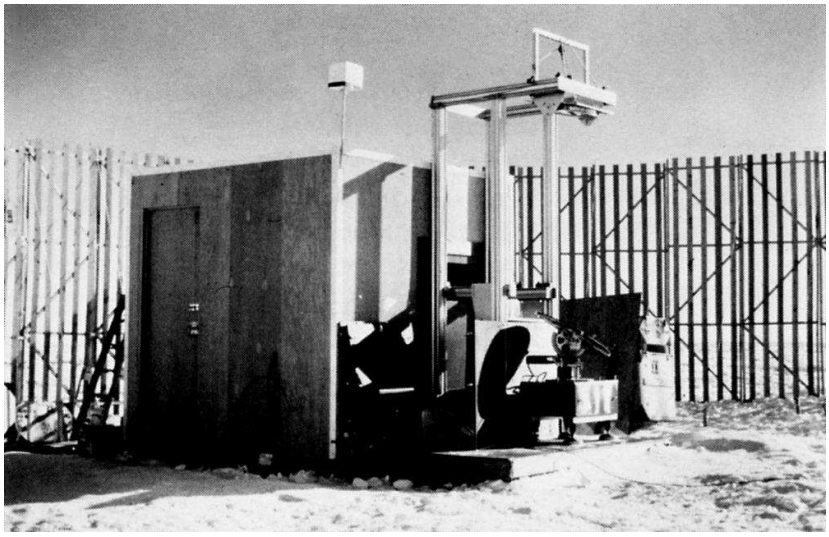

Figure 13-3: EMILIE, the first Millimetre wavelength telescope in Antarctica. Picture Glenn Grant.

Figure 13-4: The MAPO Building. SPIREX and later DASI to the left, to the right is the Viper telescope, a 2.1-m off-axis telescope which hosted the ACBAR and SPARO instruments, used for CMBR studies and for mapping polarization at sub millimetre wavelengths, respectively. Image provided by the Office of Polar Programs, National Science Foundation.

A programme was also begun to evaluate the transparency, darkness, water vapour content, and stability of the Antarctic sky from infrared to millimetre

wavelengths, for comparison with astronomical sites at temperate latitudes. As expected, Antarctica was found to be far superior to any temperate latitude site.

13.5 SCAR and Antarctic Astrophysics

At the 21st General Assembly of the International Astronomical Union (IAU), held in Buenos Aires in 1991, a working group chaired by Peter Gillingham was established to the development of Antarctic Astronomy. Seventeen papers were encourage presented at the meeting[13] and a resolution encouraging international collaboration in Antarctic astronomy was drafted and adopted by the General Assembly. At the 1994 IAU General Assembly in the Hague, a full-day session was held on the topic, with the chair of the working group passing to Michael Burton. A couple of weeks later in Rome a special session on Antarctic Astronomy was held at the 22nd SCAR (Scientific Committee for Antarctic Research) meeting. This meeting was organized under the auspices of STAR, the Solar Terrestrial and Astrophysical Research working group of SCAR, with John Storey (also of the University of New South Wales) becoming the vice-chair with responsibility for astrophysics within STAR. SCAR also passed a resolution recognising the scientific value of Antarctic astronomy and calling for the development of the field. Antarctic astronomy meetings have been regular features of IAU and SCAR meetings ever since. STAR has since been reorganized as the Standing Scientific Group on Physical Sciences (SSG/PS), with both an expert group (AAA - Antarctic Astronomy & Astrophysics) and an action group (PASTA - Plateau Astronomy Site Testing in Antarctica), providing it with input.

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[13] See Gillingham 1992.

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14 Karl Maria Herrligkoffer's private „German South Pole Expedition" 1957/58: A failed initiative

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Abstract

When the medical doctor Karl Maria Herrligkoffer (1916-1991), already well-known for his famous expedition to Nanga Parbat (1953), planned a German South Pole Expedition to take place during the International Geophysical Year (IGY,1957-58), his attempt deviated from the governmental decision not to participate with any expedition to Antarctica due to unfavourable financial conditions. Instead an expansion of routine measurements was planned. A negative recommendation of the German Geographer's Day at Hamburg in August 1955 not to support the highly disputed Herrligkoffer served as an excommunication. Herrligkoffer asked the leader of the second German Antarctic expedition (1911-1912) Wilhelm Filchner (1877-1957) to take over the scientific leadership or at least the patronage. The nearly 79 years old Filchner had already been warned and received instructions to prevent Herrligkoffer from inserting his expedition in the official frame of the IGY. However, Herrligkoffer argued that Germany with its long tradition in Antarctic research had to be included amongst other nations. He expected America and Russia were preparing to make territorial claims after the IGY, therewith dividing supposed rich mineral resources like uranium among themselves. In the end, political and scientific decisions in Germany prevented him from realising his private contribution to the IGY. He was definitely the wrong man at the wrong time to promote a German Antarctic expedition. Nevertheless, in retrospect it is interesting to note how many of his items were later fulfilled by the establishment of the German Georg von Neumayer Station at Atka Bay east of the Weddell Sea and the construction of the research icebreaker *Polarstern*.

14.1 Introduction

In the early twenteth century Antarctica became the focus of the international geographical community, which initiated its exploration in several periods. Erich von Drygalski (1865-1949), leader of the first German South Polar Expedition (SPE, 1901-1903) aboard "Gauss", wanted to answer the questions, whether Antarctica was an atoll or a continent or whether there was an ocean current connecting East Antarctica at 90 °E with the Weddell Sea [1]. At the same time, when the race to the South Pole took place, Wilhelm Filchner (1877-1957) aboard *Deutschland* wanted to investigate whether East and West Antarctica were divided by an inlet filled with ice during the second German Antarctic Expedition (GAE 1911-12)**.** The task of the third German Antarctic Expedition (GAE 1938/39) under the leadership of Alfred Ritscher (1879-1963) aboard

[1] Headland 1993 reprint.

Schwabenland mapped an unknown area east of the Greenwich meridian using aerial photogrammetry. The region later became known as Neu-Schwabenland.

Richard Evelyn Byrd's (1888-1957) proof of the existence of uranium during his third Antarctic expedition (1939-1941) triggered a new race to Antarctica. After World War II, he trained 4700 soldiers during his "Highjump campaign (1946-1947) for later operations in the Arctic in context of the Cold War. Due to investigation of the mountain region of Neu-Schwabenland by the Norwegian-British-Swedish Antarctic Expedition (1949-52), Antarctica became visible again in headlines of German newspapers. Articles, for instance written by Johannes Georgi (1888-1972), leader of Station "Ice Centre" during the Alfred Wegener expedition to Greenland (1930-31), focussed on the valuable German results, which became a base for Herrligkoffer's new enterprise[2].

In 1951, when the proposal of a third International Polar Year was accepted by the International Council of Scientific Unions (ICSU), the Comité Speciale de l'Année Geophysique Internationale (CSAGI) was established to plan the scientific program for the so-called "International Geophysical Year" (IGY)[3]. Deadline for submissions of proposals for various projects was May 1954.

Referring to this initiative, the German Foreign Ministry officially published a list of 84 new place names in the *Bundesanzeiger* (*Federal Advertiser*) of 12 July 1952. It provided a summary of the new names introduced onto the map in connection with the discovery of "Neu-Schwabenland" during the 3rd GAE 1938/39[4]. More and more information was disseminated and picked up by journalists. On 31 January 1953 a German magazine took up arguments about the South Pole and the political interests in Antarctica under the headline "Dispute about the South Pole"[5]. It also described political interests in Antarctica and possible German territorial claims, based on the already mentioned three expeditions. These claims were seen as very important with respect to whaling and global fat production, an argument originally given for the 3rd GAE[6]. The discussion of the IGY might have influenced Karl Maria Herrligkoffer (1916-1991), who was just organising an expedition to Nanga Parbat in the same year.

14.2 Karl Maria Herrligkoffer

Karl Maria Herrligkoffer was a medical doctor and specialist of anatomy in Munich (Germany), when he started his career as mountaineer. In 1953, he led his first expedition to Nanga Parbat (Himalayas – at 8125 m)[7]. Although his expedition was successful in reaching the top, nasty rumours were spread in German newspapers about Herrligkoffer before and after his expedition portraying him as a bad leader."[8]

[2] Georgi 1949, Hamburger Freie Presse 1950.
[3] Fogg, 1992: 168pp.
[4] Hallstein 1952.
[5] Frankfurter Illustrierte, 31.1.1953.
[6] Lüdecke 2004.
[7] Herrligkoffer 1953. Herrligkoffer's biography is given by Höfler and Messner (2001).
[8] Herrligkoffer 1953: 2, 155.

After a failed attempt to climb the Broad Peak (Himalayas – 8047 m) in 1954[9], Herliggkoffer was looking for a new challenge. He planned an Antarctic expedition which would coincide with the IGY. In 1954, the IGY was already widely discussed in the German media, although the event would start three years later[10]. Antarctica was gaining strategic interest and attention, not least because the shortest flight route between Australia, South Africa, and South America crosses the sixth continent, see figure 14-1. Furthermore there seemed to be promise of rich mineral resources, although the practicality of their actual exploitation was still highly problematic[11].

Figure 14-1: Map of Antarctica depicting Neu-Schwabenland in comparison with the area of the Federal Republic of Germany (Sponsel 1954).

[9] Herrligkoffer 1989: 128.
[10] Sponsel 1954.
[11] Frankfurter Allgemeine Zeitung 17.3.1955.
[13] Bartels 1955.

14.3 Plans for IGY

Plans for IGY included a network of scientific stations in Antarctica for meteorological, magnetic, and cosmic observations as well as geodetical, glaciological, and oceanographical investigations at a period, when the solar activity would be culminating[13]. As no official polar expedition could be planned in Germany, because the Deutsche Forschungsgemeinschaft (German science foundation) only had a limited amount of money at its disposal, various observations were to be intensified and performed at different German institutions and universities. Only two German research vessels *Anton Dohrn* (27 February – 22 April and 4 August – 27 September 1958) and *Gauss II* (6 March – 7 May and 29 July – 25 September 1958) took part in the investigation of the polar front in the Northern Atlantic Ocean[14].

In this context Georgi explained Germany's non-participation in the "Antarctic co-operation" with reference to Alfred Wegener's death on the ice cap of Greenland due to which all interest in scientific polar research was lost[15]. Later he reported from the International Antarctic Conference in Paris (6-10 July 1955)[16]. Besides a description of the most important topics, he mentioned a recommendation that the Antarctic Conference strictly dis-associated itself from all non-scientific enterprises. "The collaboration in the frame of the IGY must be sufficient for the highest scientific standard far removed from any sensational or other secondary intention."[17] In effect this entailed Herrligkoffer's future excommunication from the polar community.

In the meantime Herrligkoffer had founded a "Deutsches Auslandsinstitut" (German Institute of Foreign Affairs) to facilitate sponsorships and the organisation of his expeditions alongside his job as physician. His idea was to continue the German investigation of Neu-Schwabenland, which had been interrupted by World War II. All his arguments neglected totally the fact that the Norwegian-British-Swedish expedition (1949-52) already had worked in Neu-Schwabenland.

14.4 Searching for support

By 1955 Herrligkoffer had managed to establish a committee consisting of politicians, scientists, and the leader of the last German Antarctic expedition (1938/-39) Alfred Ritscher (1879-1963) to support his new German South Pole Expedition. His next move was to start a letter campaign to obtain financial support. The first argument for his expedition to Princess Martha Coast in the Norwegian sector of Antarctica was that the Norwegian government had already given permission for his undertaking[18]. Curiously he also in his letter mentioned that the equipment had to be tested on the icefields of the Karakorum west of the Himalayas during in the coming year (1956). If he had chosen Alpine glaciers

[14] Böhnecke und Bückmann 1959.
[15] Georgi 1955a.
[16] Georgi 1955b.
[17] Georgi 1955b: 339.
[18] Delp und Herrligkoffer August 1955.

for this purpose probably no one would immediately have become suspicious of his plans.

His proposal definitely deviated from the governmental decision not to send any German expedition to Antarctica, but to concentrate on an IGY at home. Strictly following the recommendation of the Antarctic Conference concerning the participation of non-scientific expeditions, the 30th German Geographers Day at Hamburg (1-5 August 1955) warned against Herrligkoffer and his plan to set up a German Antarctic expedition in the framework of the IGY[19]. The scientific community saw his efforts as driven by a need for admiration and obsession with the setting of sporty records. This became apparent during the examination of his proposal by the Deutsche Forschungsgemeinschaft and the German IGY Commission for . They concluded that Herrligkoffer lacked specialised knowledge for such an expensive enterprise and that his expedition would harm the reputation of German science. He was already infamous due to earlier newspaper reports regarding personal troubles after the Nanga Parbat expedition; he certainly did not stand out as an exemplar for good leadership, on the contrary. The ban issued by the two official committees discouraged other scientists from lending him further support.

At a press conference Herrligkoffer maintained that he still stuck to his plan, and went on to explain his ideas to the journalists[21]: His argument was that, for him, it was important that at least one German expedition participate in the "scientific large-scale attack of the South Pole region". Otherwise no future political or economic claims could be made regarding vast mineral resources. He also gave the first detailed information of what he intended: 30 scientists were to establish several stations along a distance of 500 km towards the Pole, while a permanent base station should established and maintained even after the IGY. The expedition was expected to cost 2 - 3 Million D-Mark. This sum excluded coverage for the ice-breaker, helicopters and long-range aircraft that he wanted to charter.

Further information was provided in a newsletter of 10 September[22]. Scientific tasks were to include geodetic, geological, geophysical, and chemical programmes, meteorological and oceanographic measurements, as well as biological, zoological, and physiological investigations. The results of these investigations, he said, would prove to be of economic and political significance.

Still further detail was provided in a press release ten days later. This time he published the co-ordinates of the planned base camp to be located at 100 °W and 71,5 °S, where a magnetic station would also be installed[23]. Then he went on to name all those that he saw as his opponents, German professors who wanted to block his efforts. They were Julius Bartels (1899-1964), director of the Geophysical Institute at the University of Göttingen and chair of the German

[19] Entschließung 1955, Osnabrücker Tageblatt 8.8.1955.
[21] Osnabrücker Tageblatt 9.8.1955.
[22] Delp 10.9.1955
[23] DIA 1955.
[26] DIA 1955: 2.

IGY commission, Max Kneißl (1907-1973, president of the German National Committee of the International Union of Geodesy and Geophysics (IUGG), and the professors of geography Erich Otremba (1910-1984), Carl Troll (1899-1975), and Herbert Wilhelmy (1910-2003). Herrligkoffer also felt hurt by the negative behaviour by Max Grotewahl (1894-1958), the director of the Archive of Polar Research at Kiel. For Herrligkoffer himself the expedition symbolised a national enterprise, since he was sure that after the IGY all participating nations would divide Antarctica among themselves. If Germany were absent, the first three historical expeditions would have been in vain. In his view "it would be national blindness if the importance of the present moment were overlooked due to internal German quarrels about competence."[26]

At the same time it must be noted that Herrligkoffer also had his fans and supporters. Herbert Bruns (born 1908), a former electro-engineer of the 3rd GAE (1938/39) who also lived in Munich said he could not understand why the Deutsche Forschungsgemeinschaft did not support Herrligkoffer's plan to continue German polar research after World War II, a venture he himself also wished to endorse[28].

A memorandum to all representatives of the German Bundestag from 22 October repeated the main facts regarding the expedition as presented in the newsletter of the 20th September[29]. It turned out that the president of the German Bundestag Dr Eugen Gerstenmaier (1906-1986) and professor for ethnology Dr Martin Heydrich (1889-1969) in the meantime had withdrawn their names from the original committee since they no longer appeared on the letterhead. This was an indication that the warning issued during the Geographers Day in Hamburg was already having an effect.

Early in January 1956 a regional German newspaper described a large-scale attack of Great Britain, the United States and Russia on the South Pole[31] Four months later the same newspaper contained a report about the "first villages at the South Pole". The article included a map showing the locations of two British and one American station in the neighbourhood of Vahsel Bay in the southern Weddell Sea, the area originally discovered by Filchner[32]. A dynamic chart depicted military-like advance of various nations towards the South Pole (see figure 14-2).

In his survey article on the IGY, published in a newspaper in June 1956, Georgi once more explained why Germany did not participate in this huge scientific enterprise33. As Bartels of the German IGY commission had stated, the establishment of an Antarctic station would cost several million D-Mark. This could not be afforded at a time when German science still had to recover from World War II. Georgi also argued that a less costly operation would not do either.

[28] Bruns 15.10.1955.
[29] Delp and Herrligkoffer 2.10.1955.
[31] Osnabrücker Tageblatt 13.1.1956.
[32] Osnabrücker Tageblatt 23.5.1956
[33] Georgi 1956.

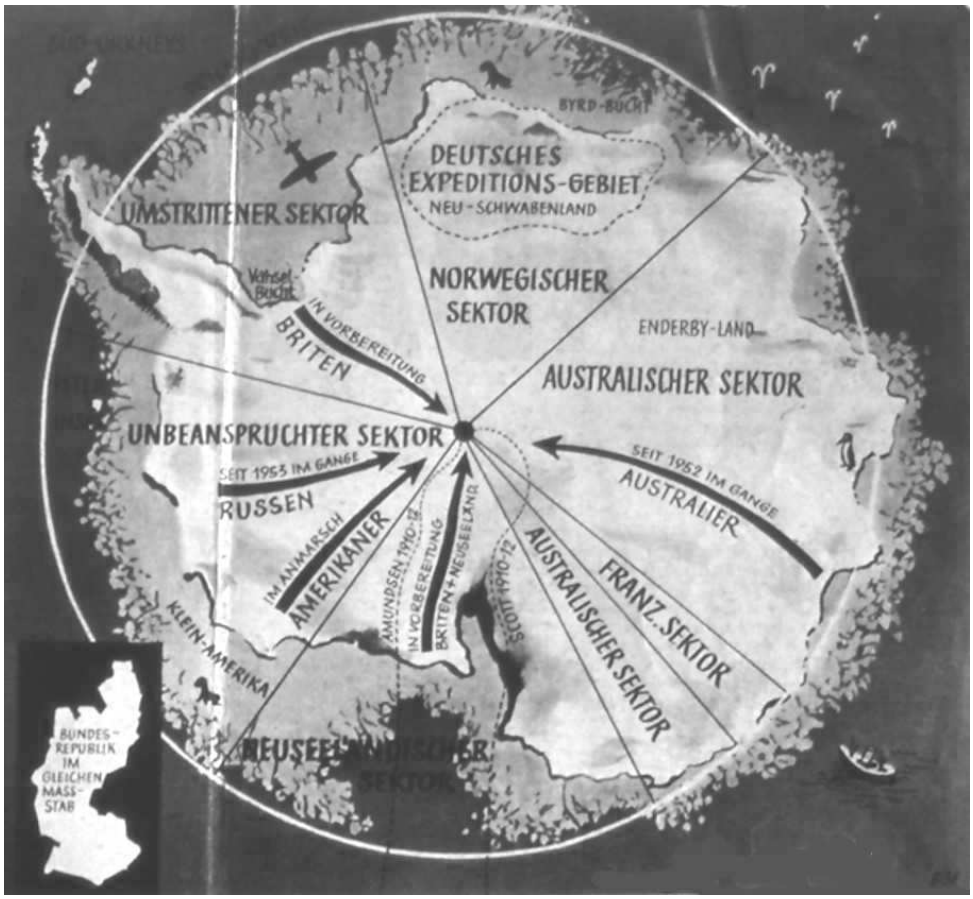

Figure 14-2: Advance to the South Pole during the IGY 1957/58 (Neue Post 1956).

A lesson from Alfred Wegener's (1880-1930) last expedition to Greenland had already shown how attempts to economise might endanger and even be fatal for expeditions members[34].

14.5 Wilhelm Filchner's role

Seeing increasing resistance pitted against his plan, Herrligkoffer desperately looked around for authoritative support. Perhaps he was in panic when he asked the nearly 79 year old Wilhelm Filchner to take over the scientific leadership. The idea was to continue research at Neu-Schwabenland, east of the Weddell Sea, where Filchner had overwintered 1911-12[36]. Filchner apparently did not respond. Four months later, on the 1st of May 1956, Herrligkoffer's friend, the retired ministry official Dr Friedrich Fetzer, contacted Filchner and asked him to take over patronage of the new German Antarctic expedition 1957, saying that his good reputation in Germany and among the international scientific community would help the organisation.[38]. When nothing happened, Herrligkoffer himself again approached Filchner, now asking him to write a

[34] Lüdecke 2000.
[36] Herrligkoffer 31.1.1956.
[38] Fetzer 12.5.1956.

foreword or at least a congratulatory address that might be included in a promotional brochure for a German South Pole Expedition[39]. He also wanted to include portraits of Drygalski, Filchner, and Ritscher in his ancestral portrait gallery of German Antarctic researchers. Both letters came back to their senders, because Filchner's address in Zürich had been wrong, so Fetzer sent the letters off again. This time Filchner wrote a friendly answer, which prompted Herrligkoffer to propose to visit him in Zürich together with Fetzer[40].

Filchner was not sure what to do, so he consulted his colleague professor C.F. Baeschlin, president of the Swiss National Committee of the IUGG. The latter in turn informed professor Kneißl in Munich about Herrligkoffer's intentions. After Kneißl's answer, Baeschlin urgently warned against supporting Herrligkoffer's expedition, since it was not an official IGY contribution. Baeschlin wrote that the expedition had already been rejected by German scientific organisations[41]. Before he got Baeschlin's letter, Filchner had already written a long letter to Herrligkoffer outlining his bad experiences during the course of his own Antarctic expedition (1911-12), adding that he would prefer not to get involved in any polar matter again[42]. Consequently he could not take over a patronage or write anything for the advertising brochure. At the same time he excused his harsh answer regarding Herrligkoffer's kind offer, saying he did not want to offend him personally. Instead he suggested he might work for him behind the scene. How this might best be done would have to be discussed later.

When Filchner learnt that Baeschlin recommended to do nothing without consulting Bartels and him and that professor Kneißl in Munich would also back him up in this decision, he aligned himself with the IUGG and Filchner replied negatively to Fetzer[43]. He had thought that Herrligkoffer's expedition would be an independent undertaking. If Fetzer or Herrligkoffer wanted more information he suggested they turn to professor Kneißl in Munich. In effect Filchner withdrew his earlier suggestion because he did not want to interfere with the business of the and German IUGG committees[44]. Herrligkoffer was disappointed but nevertheless tried to arrange a meeting with Filchner, finding it crucial to get Filchner on his side[45]. The meeting was to take place between Zürich and Munich at on Schloß Moos close to Lindau/Lake of Konstanz, where Dr. Fetzer lived[46]. After the meeting Filchner reported to Baeschlin that the outcome was a declaration that Herrligkoffer would refrain from undertaking his expedition in the name of the IGY. [48]

Filchner expected that Herrligkoffer would withdraw his plan of a new Antarctic expedition. However, this was not the case. Fetzer hoped that the declaration was already underway, because Herrligkoffer wanted to start off on another

[39] Herrligkoffer 22.5.1956
[40] Herrligkoffer 2.6.1956.
[41] Baeschlin 25.6.1956.
[42] Filchner end of June 1956a.
[43] Filchner 26.6.1956.
[44] Filchner end of June 1956b.
[45] Herrlingkoffer 7.7.1956.
[46] Fetzer 12.7.1956.
[48] Filchner 27.7.1956.

expedition to the Himalayas (on 27 July 1956).[50] In the meantime governmental offices tried to intervene in his plans of an Antarctic expedition[51]. Obviously Herrligkoffer must have changed his plans and did not travel, because his declaration was not dispatched from Munich until 14 August[53]. When he got it in his hands, Filchner saw it did not match his expectations; Herrligkoffer only admitted to not promoting an expedition in the name of the IGY, but he did not terminate his plans[54].

When Filchner did not respond Herrligkoffer became very uncertain[55]. He wrote to Filchner once more to explain how he on a short notice had to postpone his expedition to the Himalayas to next year. When they had met at Lindau the brochure, which he included in his letter, was already in print, but he could change the things having to do with the declaration over the phone. Filchner should not attach too much importance to it, he said, since the whole thing was only meant to instil public understanding of the importance of a German Antarctic expedition. In the end he emphasised that everything depended on what Filchner and his friends could do for the cause. He still hoped that Filchner might come around.

14.6 Promotional brochures

Herrligkoffer was supported by Bruns of the "Schwabenland" expedition, who in May 1956 published a serious brochure on the demand for a "Deutsche Südpol-Expedition 1956/58" to promote national claims[56]. On the basis of the 3rd GAE (1938/39) he outlined the scientific programme and listed needed equipment like an ice-breaker, which had to be built and caterpillars. The name of the expedition leader was not mentioned at all.

In his own promotional brochure distributed August 1956, Herrligkoffer recalled German pioneering work and the need to continue during the International Geophysical Year 1957/58. Then he addressed strategic gaps in a possible future war, Antarctica as potential base for missiles, and expected American and Russian territorial claims after the IGY. Antarctica would serve as resource of raw material for the future, among which uranium would be the most important. Referring to a paper published in the Czechoslovakian journal "New Technology" (1956) he described a Russian experiment in Antarctica, where an atomic explosion went off in October 1955 to melt snow and to raise the air temperature. This new method could be used to remove the icecap for prosperous mining of the supposed rich mineral resources among which uranium was the most interesting. Then he outlined the tasks of the planned German

[50] Fetzer 31.7.1956.
[51] Fetzer 7.8.1956.
[53] Herrligkoffer 14.8.1956:
[54] Baeschlin 21.8.1956.
[55] Herrligkoffer 23.8.1956.
[56] Bruns 1956.

expedition with thirty scientists involved in a framework with other participating nations.

The expected results, he emphasised, would be of great economic and political importance. He listed seven general questions and problems to be solved by the expeditions going south.

1. Does Antarctica influence the climate change?
2. Is there a connection with the melting pack ice in the Russian sector of the Arctic?
3. Are the warm oases in Antarctica caused by volcanoes or by uranium?
4. Will it be possible to exploit coal, oil and minerals?
5. Is Antarctica the land of uranium of the future?
6. Will Antarctica be of strategic importance in the future - as aircraft base, missile base, or control area for the southern oceans?
7. Can Antarctica serve as a gigantic refrigerator for conserving the U.S. American food surplus?

Finally, Herrligkoffer argued that Germany with its long tradition in Antarctic research had to be included amongst the nations making Antarctic claims, when different parts of the sixth continent were to be portioned out. He repeated his view that if his expedition would not be financially supported the first three German Antarctic expeditions would have been totally worthless.

The promotional brochure was widely disseminated and considered by various journalists. Herrligkoffer's plan was very positively reviewed in a newspaper on 6 September 1956[57]. In contrast to economic and strategic oriented expeditions of about twelve other participating nations Herrligkoffer's expedition would only focus on pure scientific tasks (see map in Figure 14-3). In summary the article portrayed his expedition as an official German official contribution to the IGY. It would be a „legitimate right" to be considered in connection with the partition of Antarctica. At that time a dispute about the ice-cream gateau filled the German newspapers.

Hermann Pörzgen's article of 18 September reacted negatively explaining that Herrligkoffer in correspondence with scientific bodies created the impression that most of the organisational work relating to his expedition had already been done[58]. What was in doubt was his scientific aptitude. The journalist's conclusion was:

> "Misplaced bustle with political ulterior motives might not be useful for trustworthy joint ventures of other states with the Federal Republic."[59]

Still without any reaction from Filchner, Herrligkoffer supposed that the latter might have changed his attitude due to the brochure[60]. Due to the importance of

[57] Rhein Zeitung 1956.
[58] Pörzgen 1956.
[59] Pörzgen 1956.
[60] Herrligkoffer 15.10.1956:

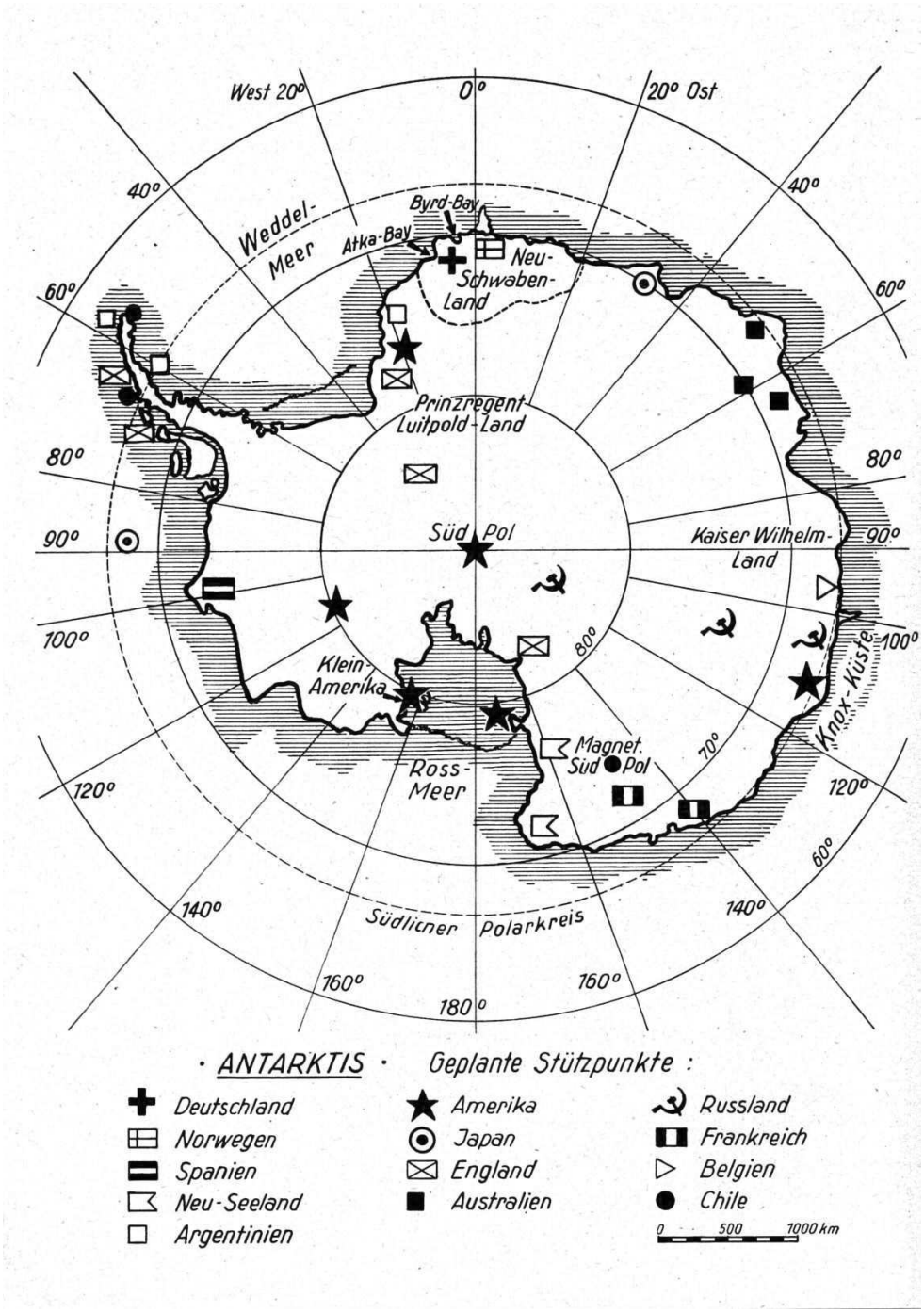

Figure 14-3: Herrligkoffer's map of planned stations during the IGY (Herrligkoffer 1956: 4)**.**

Filchner, he offered to meet him in Zürich. Now Filchner answered with the help of Baeschlin that he indeed had changed his mind since the brochure broadcast political programmes at the South Pole, which according to him would harm German interests[62]. He also underlined that Pörzgen's article made the reader

[62] Filchner 20.10.1956. Baeschlin had given him material to answer Herligkoffer, which Filchner used partly word for word (Baeschlin 20.10.1956).

aware of the imminent dangers of the expedition. In the end he was against a new face to face discussion.

Ultimately Herrligkoffer's non-governmental expedition never got off the ground. Financial support for such a venture was not forthcoming, neither during the IGY nor in the early sixties. This was a direct consequence of the political and scientific decisions already taken in 1955.

14.7 New agendas

In February 1978 the German Minister for Research Hans Matthöfer explained to journalists why the German government wanted to join the "Antarctic Club" as soon as possible, when territorial claims were still frozen[64]. He described the importance of joining the Antarctic Treaty in connection with the race for mineral resources in Antarctica. 90 Mio D-Mark were needed for a permanent station and a polar research vessel, which was a huge amount of money. A view to the German Democratic Republic showed that in eastern Germany a first step to become a member of the Antarctic Treaty had been already made in 1975 (see table 14-1).

Table 14-1: Single steps of joining the Antarctic Treaty. GDR: German Democratic Republic, FRG: Federal Republic of Germany.

Time	Action
1975	GDR acceded to the Antarctic Treaty
1978	FRG admitted as a member of SCAR
1980	FRG Foundation of the Alfred Wegener Institute for Polar Research
1981	FRG admitted Consultative Status
1981	GDR admitted as a member of SCAR
1987	GDR admitted to Consultative Status

In 1981 Matthöfer's plan was finally realised with the establishment of the permanent German station Georg von Neumayer at Atka Bay and the construction of the research ice-breaker "Polarstern". In principle these were goals already included on the agenda outlined by Bruns and Herrligkoffer in 1956.

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[64] Bergdoll 1978.

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14.9 Appendix

List of Herrligkoffer's expeditions (1953-1986), after Herrligkoffer (1989).

1953	Nanga Parbat: Hermann Buhl reached the summit at 8125 m on 3 July.
1954	Broad Peak: return at Camp III in 6500 m on 6 November. One death.
1961	Nanga Parbat: reached .Diamir flank at 7500 m on 22 June.
1962	Nanga Parbat via Diamir flank: reached the summit at 8125 m on 23 June.
1963	Exploration of the Rupal flank of Nanga Parbat in June/July.
1964	Nanga Parbat winter expedition up to 6000 m at the end of March.
1966	Climb of 34 summits in NE Greenland in July/August.
1968	Nanga Parbat: return at 7100 m on 9 July.
1970	Nanga Parbat: Reinhold and Günther Messner reached the summit on 27 June as well as Felix Kuen and Peter Scholz on 28 June. One death (Günther Messner).
1971	Rakaposhi (7788 m): return at camp III in 6000 m on 21 September.
1972	Mount Everest: return at camp VI in 8350 m.
1973	Rakaposhi (7786 m): return at camp IV in 6500 m at the end of September.
1974	Unsuccessful attempt of mountaineering in the Watkins-Bjergen (East Greenland) in August.
1976	Several climbs of summits in the Staunings Alps in East Greenland in August/September.
1977	Several climbs in the Klosterbjergen (East Greenland) in August.
1978	German-French expedition to Mount Everest: sixteen expedition members reached the summit on 14 and 15 October.
1980	Kanchenjunga: Schorsch Ritter and three Sherpas reached the summit on 15 May.
1981	Nanga Parbat south west ridge: return at camp IV in 7450 m in June.
1982	East pillar of Nanga Parbat (8042 m) reached by Ueli Bühler on 17 August:
1986	Broad Peak climbed by seven expeditions members in June. K2 climbed by four expedition members in July. One death.

15 Appendices

15.1 Agenda of the 1st SCAR Workshop on the History of Antarctic Research

Thursday 2 June 2005

8: 30-9:00 Registration

09:00-09:15 Workshop Welcome and Opening
Ludwig **Braun**, Commission of Glaciology, Bayerische Akademie der Wissenschaften, Munich
Cornelia **Lüdecke**, President of SCAR Action Group History of Antarctic Research, Munich
Aant **Elzinga**, Department of History of Ideas and Theory of Science, Göteborg, Sweden

09:15-13:00 Session I

09:15-10:15 ***The dawn of Antarctic scientific consciousness***
Jorge **Berguño**, Chilean Antarctic Institute, Santiago, Chile

10:15-10:30 ***Poster Presentation***

Changes to Antarctic Identity Rhetoric
Jason **Davis,** The Ohio State University, USA

History of Antarctic Research: The Australian Context
David Michael **Dodd,** Royal Society of Victoria / University of Melbourne, Melbourne, Australia

10:30-11:00 Coffee Break - Poster Session

11:00-12:00 ***Argentine Scientific Interests in Antarctica, 1946-1959***
Adrian **Howkins**, University of Texas at Austin, USA

12:00-13:00 ***The U.S. Antarctic Oversnow Geophysical-Glaciological Research Program of the International Geophysical Year (IGY) 1957-58 from the View of a Research Scientist Participant***
John C. **Behrendt**, Institute of Arctic and Alpine Research, University of Colorado, USA

13:00-14:00 Lunch

14:00-18:00 Session II

14:00-15:00 ***The Political Dimensions of the NSB - Expedition to Antarctica 1949-52***
Lisbeth **Lewander**, Department of Gender Studies, Göteborg, Sweden

15:00-16:00 ***The Swedish non-participation in the Antarctic leg of the IGY***
Aant **Elzinga**, Department of History of Ideas and Theory of Science, Göteborg, Sweden

16:00-16:30 Coffee Break - Poster Session

16:30-17:30 ***Russia in the Antarctic***
V.M. **Kotlyakov,** Maxim Yu. **Moskalevsky**,Institute of Geography Russian Academy of Sciences, Moscow, Russia
V.V. **Lukin, and** A. V. **Klepikov**, Arctic and Antarctic Research Institute of the Roshydromet, St. Petersburg, Russia
cancelled

17:30-18:00 ***Discussion on next SCAR workshop***

19:00 Optional dinner on private expenses

Friday 3 June 2005

9:00-12:30 Session III

09:00-9:10 ***Welcome*** by Horst **Hagedorn** Chairman of the Commission on Glaciology, Bayerische Akademie der Wissenschaften, Munich

09:10-10:00 ***Antarctica in the 1980s: increasing interest in the remote continent***
Peter **Abbink**, Arctic Centre, University of Groningen, The Netherlands

10:00-11:00 ***The start of Dutch involvement in Antarctic research***
Johan **van Bennekom,** retired from Royal Netherlands Institute for Sea Research, Texel, The Netherlands

11:00-11:30 Coffee Break - Poster Session

11:30-12:30 ***The History of Astrophysics in Antarctica***
Balthasar **Indermuehle**, University of New South Wales, Australia

12:30-13:30 Lunch

13:30-15:30 Session IV

13:30-14:30 ***Karl Maria Herrligkoffer's private „German South Pole Expedition" 1957/58 – a failed initiative***
Cornelia **Lüdecke**, Centre for the History of Science, University of Hamburg, Germany

14:30-15:30 ***Final discussion***

End of Workshop 15:30

15.2 List of Participants of the 1st SCAR History Workshop in Munich, Germany

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Each paper went through a peer review process whereby two persons selected from the roster of participating speakers were asked in each case to scrutinize and provide critical comments. Aant Elzinga contributed by suggesting further corrections and revisions in the final round, while Cornelia Lüdecke is responsible for the layout and related changes introduced in this latter connection.

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