Origin and Limitations of the Antarctic Treaty

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INTRODUCTION

As a philosopher and historian of science it strikes me how two mutually opposite kinds of retrospective accounts of the emergence of the Antarctic Treaty have evolved. There is the naive view, according to which the International Geophysical Year (IGY) and the Antarctic Treat (AT) simply succeeded because politics was entirely set to one side. And there is the cynical view, according to which both the IGY and the advent of the AT were a matter of politics all the way. Both of these views are untenable. Instead, I want to argue for a critical realist perspective that focuses on both the science and its geopolitical context.

THE DUAL FUNCTION OF SCIENCE IN THE ANTARCTIC TREATY

As cold war archives have opened, recent scholarship has shown that there was a great deal more politics behind the scenes than we were previously told. However, on some basic issues differences were successfully set aside or frozen, and fundamental principles were agreed upon: the question of claims (sovereign neutrality), the question of carrying out atomic tests (prohibited), demilitarization, and the use of science as a criterion for full participation in the management regime that was set up. It was not because of the application of altruism that this was possible. On the contrary, national interests and agendas were still there, but the extreme cost of the alternative, perpetuating conflict, was too great. Thus, realism, pragmatism, and willingness to compromise on the basis of mutual benefit were the effective principles at work.

The AT involves a mechanism of inclusion/exclusion based on scientific performance. Performing substantial scientific research as an entry ticket for new countries to manifest their presence and participate in the management of the Antarctic continent's future is key. I call this the sublimation of politics in science. Science has a dual function, both advancing new knowledge and manifesting a country's serious interest and presence. Politics in this context is not a bad thing, but rather a good thing, an incentive to do good research that will,

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in turn, give a country clout at the decision-making table. The success of the AT lies in the fact that it gave science a dual function, including its status as a kind of symbolic capital in a political arena, an arm's-length function that reinforced rather than undermined the multinational intergovernmental political management regime.

THREE PRINCIPLES OF SCIENTIFIC INTERNATIONALISM

Even though the science criterion has become more flexible with time, a challenge for the future is still the question of internationalism—how far and what kind. In this respect, three dimensions of internationalism can be distinguished.

1. The *epistemological,* or knowledge, principle states that truth knows no boundaries and scientific results belong to all. This is also called the principle of universality. One way to operationalize it is to measure the frequency of multiauthor, multinational publications to see if this has increased over time and to what extent nontreaty countries are represented.
2. The o*rganizational* principle pertains to the need to cooperate and exchange results. Division of labor helps prevent costly and unnecessary duplication. It is also a matter of what the sociologist of science Robert Merton called the need for "organized skepticism," what we today call peer review, to enhance the quality of research and its results. One can furthermore distinguish a scale of cooperation ranging from simply multilateral coordination of efforts to actual cooperation and, further, to close multinational collaboration in projects and at research stations.
3. The w*elfare* principle involves solidarity and the application of the fruits of science for the benefit of all humankind, including the distribution of its goods. Joseph Needham, the first science director of the United Nations Educational, Scientific and Cultural Organization (UNESCO) called it the periphery principle. He had in mind the dissemination of science from its world centers to the peripheries in the third world. Julian Huxley, the first director general of UNESCO, used it to argue for organizing Antarctic research within an international institute (see Elzinga and Landström, 1996).

When it comes to the epistemological principle, the AT does quite well. Regarding the second principle, it has been unable to live up to the ideals already expressed in the statutes of the International Polar Commission (IPC) of 1908, which Lüdecke (this volume) considers an important episode in the history of Antarctic research and exploration. Representatives of 12 countries (but not the United Kingdom, Germany, and Norway)[1] agreed to establish closer relations between polar explorers; to standardize methods of observation in key fields; to cooperate in the discussion and interpretation of results; to provide advice and assistance to new polar enterprises, with emphasis on scientific criteria; and to provide for the need for continuity in activities by, for example, introducing research bases for a five-year period, with rotation of participating researchers who might come from different countries. This far-reaching ideal of internationalism and planning was eclipsed by World War I and the cold war in science that followed when, under the auspices of the then newly established International Research Council (IRC), the victor countries boycotted research communities in Germany, Austria, the Soviet Union, and some other countries, a situation that only changed (in part) when the IRC was replaced by the International Council of Scientific Unions (ICSU) in 1931.

When the idea of setting up the Special Committee on Antarctic Research (SCAR) emerged in 1957 and was implemented the following year, several countries were, at first, opposed to or dubious concerning a strong internationalist thrust in this context; not least, the Australian government objected because it felt this might lead to acts of occupancy on its claimed territory.[2] This concern is evident, for example, in the actions of Keith Bullen, a seismologist at the University of Sydney who attended SCAR's constitutional meeting in The Hague and was elected its vice-president. On his return to Australia he reported back to government officials that in line with Australian policy, he had succeeded in getting a clause that had proposed that SCAR should directly organize the whole scientific program in Antarctica removed from the draft SCAR constitution. Thus, SCAR shied away from the kind of dirigiste approach to cooperation in science that Henryk Arctowski had advocated for in the old IPC in 1906. In 1958–1959 it was, however, more than just a research management principle that was at issue, it was a matter of politics.

With respect to the welfare principle in internationalism, the AT still has some way to go. Two alternatives to the AT have been suggested; one is the notion of Antarctica as part of the heritage of humankind, from which stems the idea that it should be placed under the auspices of the United Nations. The other is the notion of Antarctica as a world natural park, an idea proposed by international environmentalist nongovernmental organizations. Both of these

concepts have been unsuccessful, but they have contributed to some accommodation of the AT to broader internationalist and environmental conservation principles. In light of these changes it appears that the most viable road for continued and farther-reaching internationalism should involve the introduction of international research stations. This point is briefly discussed at the end of this paper.

THE DECISION NOT TO LET THE COLD WAR SPILL OVER INTO ANTARCTICA

Regarding the negotiations prior to the signing of the AT, first, 60 secret meetings were held, and then the formal conference opened in October 1959, culminating in the signing of the treaty on 1 December. The process was not an easy one. As Ambassador Oscar Pinochet de la Barra recalled at the symposium "On the Future of the Antarctic Treaty" held in Ushuaia, Argentina, on 20–24 March 1995, "some delegates were in favour of freedom of science, others were against it; some supported the freezing of sovereignty, some did not; some wanted a treaty for 30 years, others a more permanent treaty; some said yes and some said no to observers; and so on" (Jackson, 1995:9).

It is a pity that so little is known about the role of the Soviet Union and that so few Russian participants attended the conference on which this volume is based. Russian accounts of the process (e.g., that of Yuri M. Rybakov at the 25th anniversary of the treaty during the Beardmore conference in Antarctica, 1985) maintain that the Soviets pushed to keep atomic tests out of Antarctica and that there were some parties that wanted to allow for experimentation with "non-military atomic blasts" provided prior forewarning was given; of course, it was difficult to draw a line between military and civilian "blasts." (see Rybakov's comments in Polar Research Board report, 1986). It would be useful to know more about this topic.

It is clear that it was ultimately the attitudes, insights, and mutual understanding between the two superpowers that was very important to the decision not to let the cold war spill over into the Antarctic. This understanding was not an expression of altruism but rather an expression of hardheaded realpolitik with mutual benefit and pragmatic considerations as a guiding principle.

THE IMMEDIATE POST-IGY PERIOD

In many recent periodizations of the history of Antarctic exploration and research the IGY 1957/1958 marks a definitive benchmark. Pre-IGY periods are depicted as ones of conflict and tension between countries with political and economic interests in Antarctica, whereas the post-IGY era is mostly portrayed as one of harmony, one where science is able to flourish. This portrayal is also a misconception.

Once the Antarctic Treaty was in place, national interests and rivalries still existed when it came to advancing research projects because by and of itself, the science, or the basic research motive, is not enough to establish new forms of large-scale multinational collaboration within the ATS framework. More often than not, a definitive political will on the part of the participating countries, along with the possibility of significant mutual benefit at economic and political levels, is needed. The role of leading (hybrid) scientific personalities who might act as champions for specific projects with transnational and transdisciplinary collaboration is also important. It may be instructive to consider a visionary proposal for European research collaboration in Antarctica that arose in the early 1970s; ultimately, this proposal failed because even if the will was there in relevant scientific communities, other factors controlled by decision makers at several political levels constituted hindrances.

Generally speaking, in the decade after IGY at least four related factors converged to raise interest in European scientific collaboration in the Antarctic. First, new technological developments made it possible to pursue new research agendas. Second, there was a shift from description and observation to an interest in explaining processes, such as changes in the mass balance of glacial ice sheets. Third, an epistemic differentiation took place on the disciplinary landscape within the sciences, with glaciology becoming more prominent. Fourth, mission orientation of science in the wake of reformulations of economic and environmental motives for research was also important, allowing glaciology to play a special role in advancing the understanding of environmental change.[3]

THE EUROPEAN ANTARCTIC PROJECT OF THE 1970s: A VISIONARY COLLABORATIVE PROJECT

In the early 1970s, several new international research programs were underway (for details and references pertinent to the European Antarctic Project [EAP], see Elzinga, 2009a, and also Stauffer, 2009; for details on the policies of the Netherlands, Belgium, and Germany during 1957–1990, see Abbink, 2009). In May 1969 the United States,

Soviet Union, Australia, and France joined together in the International Antarctic Glaciological Programme (IAGP; with the United Kingdom joining 1972), focusing on East Antarctica, e.g., the Vostok ice dome. In 1970 an ad hoc group within SCAR led by glaciologist J. H. Zumberge set up the Ross Ice Shelf Project (RISP), and later, the Filchner-Ronne Ice Shelf Project (FRISP) was set up, which involved Germany, the United Kingdom, the Soviet Union, and the United States.

The Glaciology of the Antarctic Peninsula project, involving the United Kingdom, Argentina, Chile, and the United States, emerged in 1973 out of a symposium at the Scott Polar Research Institute in Cambridge where airborne radio echo sounding and isotope analysis of ice cores were discussed. Throughout the 1970s, there were significant efforts to standardize methods in glaciology, with the IAGP producing comprehensive standardization guidelines endorsed by SCAR in 1972 for measuring along traverse lines and taking geophysical measurements, including radar, seismic refraction profiles, magnetic profiling, physical and chemical properties of ice, traces of radioactivity. It is in this context that the significance of the idea of a joint European glaciological project may be appreciated.

Initially, the idea for the EAP came up during the SCAR meeting and symposium on Earth sciences held in Oslo in 1970. At that meeting there was discussion not only on geology and mineral deposits but also on the question of environmental change, which might have left traces in the archive of the Antarctic ice sheet. Tony van Autenboer and Hugo Decleir, two veterans of the Belgian IGY expedition to Antarctica, sounded the idea for the EAP out with a French researcher, Jacques Nougier, who suggested the Council of Europe (CoE; created in 1949) might be interested. This discussion led to a preliminary meeting hosted in Brussels (3 November 1970), chaired by Baron Gaston de Gerlache Gomery, who later became the chairman of the "bureau" of a European working group for polar research under the auspices of the Committee on Science and Technology (CST) of the CoE. At the time, it was noted how only two European countries maintained permanent research stations in Antarctica (France and the United Kingdom) and that three other countries (Norway, Belgium, and the Netherlands) had a constant interest but only intermittent activity. West Germany, Italy, Sweden, and Switzerland also expressed interests (for more detail, see Stauffer, 2009).

Increasing sophistication of research and prohibitive costs of logistic and technical support had made it virtually impossible for smaller countries to maintain a permanent effort except as part of a joint European effort. When articulated, the concept was soon linked to environmental interests. A central task was ice core drilling to facilitate studies of past climate change and to predict future change, including the influence of human activities, much along the lines of the European Project for Ice Coring in Antarctica (EPICA) 20 years later.

Such a project, it was decided, might play an important role in providing several additional countries with the possibility of participating in and developing what "would represent a spectacular and significant manifestation of *l'esprit européen*."(Nougier et al., 1971: 115). With travel and hospitality costs funded by the European Council's CST, the Working Party for European Polar Research (WPEPR), consisting of scientists plus a CST representative, held at least 16 meeting in various European cities from 1970 to 1974, with the most intensity in Paris from the autumn of 1972 to the spring of 1973. A draft report was widely circulated. The scientific concept that evolved concentrated on deep drilling, first and foremost in what appears to be the area of present-day Dome Fuji on Dronning Maud Land. Drilling was to be supplemented by several traverses along three types of lines, namely, glacial ice flow lines, dividing lines between major ice field regions, and lines following 2500 m elevation contours. In addition, the plan called for drilling on the ice shelf, a geodetic program, and a radio echo program. Operations were to be during the austral summer seasons over a period of five years.

SCIENTIFIC CHALLENGES AND PRACTICAL HINDRANCES ASSOCIATED WITH THE EAP OF THE 1970s

At the first Paris meeting (1971) of the European polar working group, glaciologists Claude Lorius and Hans Oeschger emphasized the importance of the climatic environment in the world as a factor affecting human life, pointing to the great significance of the Antarctic venture in this context, an argument that made an impact at the CoE. However, intergovernmental consensus was not forthcoming. The main obstacles were the great expense and a failure to come to an agreement with regard to the project's managerial structure and the financial formula for sharing the cost between participating countries. The problem was the larger countries.

Having decided to join the IAGP, the United Kingdom withdrew from the EAP effort by June of 1972, saying that it was prepared to help but did not want to be an official partner since partnership entailed costs that would cut severely into the normal operating budget of the British

Antarctic Survey. The United Kingdom also committed itself to a program for the Glaciology of the Antarctic Peninsula, a venture that was politically more important since it covered the region of British Antarctic territorial claims. Furthermore, the Scott Polar Research Institute had become heavily involved in a very fruitful collaborative effort with U.S. scientists and Danish radio engineers in pioneering activities to successively map bedrock profiles under the Antarctic ice sheet over vast areas of the continent using airborne radio echo techniques (radioglaciology, as it was also called in some scientific and engineering circles at the time; see Dean et al., 2008). For this effort, the U.S. Navy provided the planes and logistical support, and the National Science Foundation in Washington, D.C., was responsible for a major portion of the funding. Collaboration with the United States proved to be simpler and cheaper while yielding substantial scientific payoff.

The West German delegate to the EAP working group meetings, Walther Hofmann, had his sights set upon an expedition to Greenland and succeeded in getting his government to vote against a joint European Antarctic endeavor. Thus, the $3 million it was hoped Germany would contribute also disappeared. France, on the other hand, became all the more adamant as the rightful defender of the European standard. Representatives of smaller countries like Belgium worked hard to revamp the project and, in response to a request in 1974 by the CoE (before a final decision in 1975), scaled it down to a more acceptable level of costs by extending the time frame from five to seven years.

DIFFERENCES OVER PRIORITIES AND RIVAL MODELS OF SCIENTIFIC COOPERATION

It was not only the high cost that constituted a stumbling block. There were also technological difficulties. First, at the time, technology for ice core drilling had not yet been sufficiently developed to meet the requirements of deep drilling at temperatures below –40°C. Second, for logistics purposes in the earlier plan there was a need for a large ski-equipped transport aircraft of the CL-130 type, something only the U.S. Navy possessed.

Some delegates argued that the EAP should be converted to participation in the IAGP instead since there the two superpowers supplied long-distance logistics. French scientists put a lot of energy into trying to shape up the original plan of 1972 to make it acceptable. The West German representative, Walther Hofmann, was particularly strongly opposed to the French rationalist top-down approach. A professor in geodesy who had experience from Greenland, he was, moreover, not interested in Antarctica and pushed for a project on Greenland instead, arguing that it was much closer and less costly, in which case the United States might even be relied on for long-distance transport of equipment.

In opposition to the French "integrated" model, Hofmann introduced an à la carte model of financing and management according to which each country would be responsible on both counts for only a part or parts of the scientific program. His motivation was that it could not be expected that national institutions and funding bodies "promote the means of research work which is carried out and exploited by other countries." (CoE, 1972:2). Large-country chauvinism thus ended up undermining the whole enterprise. Van Autenboer's conclusion, in retrospect, is that the greatest fault all along lay in the failure to do the extensive political groundwork needed for a project like the EAP. Also, the role of individual personalities and their interests proved to be important. Hofmann, for example, turned out to be the wrong man for the role of "delegate" on behalf of West Germany (Van Autenboer in an interview with Peter Abbink; see Abbink, 2009).

POLITICAL GROUNDWORK IN THE 1970s AS A BOON TO EPICA

Despite a good scientific program and a constructive approach to logistics the plan for the EAP came to naught and was abandoned in 1975. The CoE was relieved when Norway offered to finance a European pilot study on Spitsbergen before anything else was done. Substantial parts of the scientific program that was developed did, however, find their way into other international programs. When EPICA came into being, it was largely thanks to much better political groundwork and the fact that two of its major champions, Gotthilf Hempel of West Germany and Claude Lorius of France, acted in unison at the Grand Challenges conference in Bremen in September 1994.

Since little has been written about how the political groundwork for EPICA was prepared, I will provide further detail on this point. The experience in ice core drilling accumulated by European scientists both in Greenland and Antarctica by the early 1990s warranted a return to the old idea of an all-European joint venture in Antarctica. The situation by then was completely different compared to that in the early 1970s when the plan for the EAP had to be abandoned. As Heinz Miller related, a new Antarctic project "was already there in our heads before we started

drilling in Greenland."[4] The scientific arguments for a major Antarctic ice coring program were strong. To avoid the mistake made with the EAP in the early 1970s, leading scientists worked hard to anchor the idea politically. A number of contemporary events converged to make it easier. Within the ICSU the International Geosphere-Biosphere Programme (IGBP) was initiated in 1986, and it soon identified one of its themes as "documenting and predicting climate change." Within the UN framework the idea of an Intergovernmental Panel on Climate Change was implemented in 1988. European scientists were centrally involved in both of these developments. Paleoclimatology based on data from ice cores was important. The Greenland Ice Core Project (GRIP; and the Vostok effort in Antarctica) demonstrated that European expertise in ice core studies was excellent, logistics efficient, and collaboration good. According to reliable assessments, GRIP with its smaller drill and core (4-inch diameter) gave a much better scientific payback per unit cost investment than the core (6-inch diameter) brought up by the U.S. group with its larger and much heavier drill within Greenland Ice Sheet Project 2 (GISP2).[5] The "Antarctic Science–Global Concerns" conference hosted by SCAR in Bremen in 1991 helped bring polar researchers more closely into harmony with the international research programs on global climate change.[6] The linkages with pertinent international programs helped the paleoclimatic community establish credentials when they made their case in their respective countries for a new collaborative ice coring effort on a grander scale.

Generally, some form of institutionalization is invaluable for large-scale projects in order to gain network stability, ensuring better continuity over time. At the European level this occurred with the creation of the European Committee for Ocean and Polar Science (ECOPS) in 1990 as a liaison (existing for five years) between the European Science Foundation and the European Commission's (EC) Directorate General XII (for Science) (DG XII), constituted as an ad hoc joint scientific advisory body at arm's-length from politics.[7] Two important functions were served. First, as a hybrid forum of scientists and policy makers ECOPS became a vehicle for science diplomacy at national and intergovernmental levels. Second, the hybrid forum provided a neutral space where visions and project ideas could be articulated, tested, and gain purchase in the worlds of science and politics simultaneously, allowing for a coproduction of new scientific and political orders.

The ECOPS's influence lay in suggesting and promoting big science projects, immensely helped by the fact that it was an ad hoc committee and had a very dynamic chairman, Gotthilf Hempel, who knew how to cut red tape and lobby politicians. As the committee was ad hoc, Hempel had the mandate to select the committee members via national representative bodies in different countries. Thus, ECOPS could operate quite freely and flexibly as a group of "wise men." It acted from the top down in identifying themes and sketching possible approaches to large-scale European projects and then elicited bottom-up input from scientific communities by broad consultations through workshops to develop special programs and networks around them. The very first workshop (1990) related to the ECOPS Grand Challenges thrust was on Antarctic ice cores.[8]

Still, EC politicians and bureaucrats were not immediately won over. In the very first round when a first phase for EPICA was proposed to the EC DG XII in January 1992, it was rejected. The proposal was met with the argument that Europe is far away from and has nothing to do with Antarctica. Resistance hinged particularly on the extreme cost of the project, 8 million Ecu (European Currency Unit, now called Euro), which was a large amount and would eat into the potential budgets of other areas of European science, for example, oceanography, where there were also plans for new projects. The oceanographic research community was older, better established, and strong in Europe. Thus, EPICA had quite a number of opponents and doubtful friends in the beginning, at least when it came to proceeding from vision to action.

Hempel himself, being an ocean scientist, was at first not in favor of EPICA, but once he came around, he became a strong supporter. Although more or less neutral concerning the four suggested grand challenge projects, his response to the bureaucratic inertia within the EC was important. Further lobbying occurred during the course of the European Ocean and Polar Science symposium he organized in Obernai, France, in October 1992. At that symposium ECOPS met with about 50 chief administrators and scientists of national funding bodies, and a new draft proposal for EPICA was also presented to the EC. The timing was good. It followed the UN conference in Rio that marked an important turning point at the political level. The idea of global change began to take hold with politicians, and countries needed to show that they took it seriously. The GRIP results were coming in, research in Antarctica gained media coverage, and it became clear that uncertainties pertaining to climate change might be reduced by further work on ice cores. Moreover, EPICA promised a much longer time series than what was available from Greenland. A new deep core from Antarctica was needed because the old Vostok one had a different resolution; it was different and lower, making it unreliable to compare with the Greenland ice cores. In fact, two new

Antarctic cores were projected, one from Dome C, where the bottom ice would be very old, and one with a higher resolution and reflecting the influence of the Atlantic sector, obtainable in the Dronning Maud Land sector, where snow accumulation is much higher than at Dome C. For the implementation of EPICA the European conference Ice-Sheet-Climate Interaction in 1993 was also very important, laying the groundwork for a breakthrough a year later in Bremen.

The ECOPS continued to flesh out four major projects. When summarized at the Grand Challenges conference in 1994 (Bremen) organized by the Alfred Wegener Institute (AWI), EPICA stood out as an absolute winner, a model project, well anchored in relevant scientific communities and politically opportune for Europe in the period after Rio. The enthusiasm, scientific prowess, personal persistence, and diplomatic skills of a few leading scientists had paid off: Claude Lorius, the eminent glaciologist of Antarctic Vostok core fame; David Drewry, a leading personality at the British Antarctic Survey; and Gotthilf Hempel, then head of AWI, the man with the political acumen. Resistance still came from the oceanographic community, which had their own grand challenge project competing for extraordinary funding. Years of networking activities orchestrated by EPICA's leading scientists, however, were now revealed to have been instrumental in fostering the bottom-up process of enrollment through the earlier series of European workshops and conferences. The relevant research communities stood sufficiently united, and policy support was forthcoming around a long-term commitment to deep coring in Antarctica. The process was aided by coincidence with specific conjunctures in the upsurge of the global change issue together with integration with existing international research programs, along with other ones stemming from activities under the auspices of SCAR. This concurrence, in turn, made it easier for scientists in the various countries involved to obtain funding from their respective national science councils.

Ultimately, then, changing conjunctures in geopolitics can make or break possible implementation of such collaboration in any individual case. This is a lesson that has to be remembered and viewed in the long-term perspective of the institutionalization of Antarctic polar research. In the long term, one should also not forget that there is always the possibility in future that the Antarctic Treaty will meet strong challenges in the event that forces of economic globalization press for exploitation of Antarctic mineral resources.

At present, the Madrid Protocol on Environmental Protection to the Antarctic Treaty (and therewith as moratorium on minerals prospecting) is in place. The protocol replaced (and incorporated important elements of) CRAMRA, which momentarily existed—on paper—in 1988–1989 after eight years of negotiations but was never ratified. Currently, interest in gas and oil in the seabed is concentrated on the Arctic region, where the melting of ice in tandem with climate change has triggered a lot of scientific activity linked to Arctic rim countries' efforts to get a better picture of the lay of the continental shelf and the Lomonosov Ridge (among others) to make a case for extending their seabed territories, claims that will be reviewed by the Continental Shelf Commission (CSC) of UNCLOS. Looking 30 years into the future, with continued economic globalization and an entirely new generation of technologies being developed, one should not be entirely surprised if strong stakeholder interests try to push the situation in the Antarctic and its surrounding oceans in a similar direction.

IMPORTANCE OF COINCIDENCE BETWEEN POLITICAL AND SCIENTIFIC AGENDAS

In view of the examples above, of the failed European Antarctic Project of the 1970s and the later success of EPICA in the 1990s and also the present quest for minerals exploitation in the Arctic, there are definite historical lessons to be drawn. The historical record suggests that as long as Antarctic research does not represent a political threat, either in content, organization, or logistical support systems, researchers will have complete freedom of choice in the selection of topics, choice of collaborators, and modes of evaluating results. If, on the other hand, the primary interests of governments, politicians, or high-level (leading scientists or hybrid) civil servants become threatened, conditions of cooperation will degenerate. Whether or not research facilitates international cooperation in real terms or only symbolically will depend on the context, vested interests, and political conjunctures. When it works, we see science as the continuation of politics by other means; in the case at hand, it is in and through the IGY and the ATS regime that followed it. To a large extent, knowledge interests of scientists and the symbolic-instrumental interests of politicians have been more or less convergent in Antarctica, which is what made the IGY and the ATS regime that followed it possible in the first place. This convergence was possible because of some very special geopolitical conditions combined with new technological capabilities in the 1950s.

In the Antarctic, because of the treaty, which suspends territorial claims and makes science the ticket into the club

of decision makers, research continued to represent a form of symbolic capital. There was/is a special kind of trade-off with politicians whereby scientists are provided with funds to do research, but in doing this research they also perform a political task, advancing the national interest of their own country in a geographical arena. In doing so, they can influence the growth of science. Crudely put, one might say that politicians in the major nations after the advent of the AT did not need to worry so much about the kind of work their scientists do, as long as they were there in Antarctica and could show a "significant performance of research." The symbolic value lies primarily in the very presence of a country's scientists in this cold continent, but of course, international recognition of high-quality scientific effort enhances the symbolic value of a country's research on the political arena. Probably, with time the latter aspect became more important, but then again, this varied from one country to another depending on the prevailing political climate, the national science policy doctrine, and overriding institutional motives. In some cases a country might desire to join or use its presence in the club to influence the course of international science.

Sometimes the rhetorical import of research activities may be more important to politicians than their actual scientific value. This means not only that projects that are poor from a scientific point of view get endorsed or that the siting of new research stations is based on expediency and the political need to demonstrate a presence (hence the location of so many stations on King George Island, which was easily accessible for new players) but also that scientifically interesting projects and plans for multinational collaboration on a scientific basis get frustrated and are unable to proceed. Thus, the image of letting the scientists more or less follow their own agenda (and hence natural prominence of good-quality basic research) does not always run true.

INTERNATIONAL RESEARCH STATIONS: A SCENARIO OF THE FUTURE?

In principle, once the Antarctic Treaty was in place, there is no reason why, theoretically, nations might not get together to create an international research station, flying the flag of SCAR or perhaps UNESCO in place of a national flag. In practice, of course, such an international station would probably once again open up the issue of sovereignty, both between and within the nations involved. In other cases of multinational European collaboration in science one finds that under certain conditions such collaboration under a common "European" flag is possible. Two examples are nuclear research (European Organization for Nuclear Research, CERN) and astronomy (the European Southern Observatory, ESO, in Chile).

For future research into the history of science it is interesting to clearly identify the factors that made possible far-reaching collaboration in nuclear physics and astronomy but were not present in the 1970s in Antarctic science. Comparisons with the peaceful uses of atomic energy and collaboration in astronomy are particularly instructive if one is interested in teasing out the limits of internationalism and the institutional motives at play behind scientific efforts.

To summarize, first, it is clear that science during the IGY played an important role as a mutual confidence-building measure. Second, the incrementalist character of the treaty, with the possibility of layering one agreement, convention, or protocol over the next, leading to a whole network of imperatives by which participating parties are bound, has been important. Third, the flexibility built into the treaty, allowing for interpretative flexibility of basic concepts in its institutional architecture, for example, the science criterion, is significant. At the same time, for the future this criterion will require further reinterpretation in what some scholars call the postcolonial era. The challenge is to find ways and means of further broadening participation of additional countries in Antarctic research and policy making in line with a more robust form of internationalism.

NOTES

1. Norway and Britain particularly benefitted from the whaling industry that took off in 1905 and brought great wealth to private entrepreneurs and their national treasuries. In science today, we speak of investing 3% of a country's Gross National Product into research and development; if 3% of the profits (a kind of proscience tax) from the lucrative and ecologically questionable whaling industry had been put into Antarctic polar science, continuity in research might have evolved in an entirely different manner than what actually happened. When contemplating the gap between internationalism in words and in deeds, it is sometimes instructive to think counterfactually in this way.

2. The idea was discussed at an ad hoc conference under the auspices of the International Council of Scientific Unions (ICSU) held in Stockholm on 9–11 September 1959. The Swedish glaciologist Valter Schytt, who had been a member of the Norwegian-British-Swedish Expedition to Dronning Maud Land in 1949–1952, served as secretary of the conference and became the first secretary of the Special Committee on Antarctic Research (SCAR; later called the Scientific Committee), doing a lot of the preparatory work. His diary (Schytt, 1957–1958), covering incoming and outgoing letters to the conference organizers in Stockholm, and the first draft of SCAR's statutes for the organization's constitutional meeting in The Hague on 3–5 February 1958 bear witness to a distinctive

internationalist spirit that was subsequently somewhat tempered by political realities of the time. See also Elzinga (2007).

3. For a historical review of changes in the conditions of research, its goals, and epistemological "style" during the course of four international polar years from 1882–1883 to 2007–2009, see Elzinga (2009b).

4. Heinz Miller, AWI, Germany, interview by Carsten Krueck (of the Science and Technology Studies Department at the University of Bielefeld, Germany), 2 November 1998.

5. Bernhard Stauffer, Climate and Environment Physics, Physics Institute, University of Bern, Bern, Switzerland, interview by the author, 26 August 1998.

6. Hempel (1995). An important outcome of the conference was the creation of the Group of Specialists on Global Change and the Antarctic (GLOCHANT), which, in turn, spawned a long-term project with six core projects, one of them on paleoenvironmental records from ice sheets and marine and land sediments.

7. Ibb Troen and Klaus Bruening, European Commission Directorate General XII, Brussels, Belgium, interview by Carsten Krueck and Jutta Borchers (affiliation as above in note 4), 9 June 1998.

8. It was organized by Claude Lorius and held in Grenoble, France, 29–31 October 1990; "Modelling of Dynamics of Large Polar Ice Sheets" was the name of another workshop, one organized by David Drewry and C. Doake in Cambridge, 29 April to 1 May 1991.

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