

Extremes

*Oceanography's Adventures
at the Poles*

KEITH R. BENSON
AND
HELEN M. ROZWADOWSKI
EDITORS

Science History Publications/USA
Sagamore Beach
2007

CHAPTER 10

China Goes to the Poles

Science, Nationalism, and Internationalism in Chinese Polar Exploration

ZUOYUE WANG

Even India has established an independent station [in Antarctica]. China, as such a major power, should also have its own [station]; it would serve as a foothold [for us] in the struggle for the control of Antarctica in the future. One problem is funding Another problem is: What practical role will [the program] play in our Four Modernizations drive? People might question whether it's appropriate to spend so much money in Antarctica while we have so many places at home not yet developed.

*Hu Qili, Executive Secretary of the Chinese Communist Party
Central Committee, April 26, 1984¹*

In the heroic age of Western polar exploration in the 19th and early 20th century, China, despite its glorious history of ocean-faring, sent not a single expedition to either the Arctic or Antarctica. Geographical distance probably explained some of the indifference, and lack of resources also limited the ruling Qing government's freedom of action. Instead, it was preoccupied with both internal turmoil and external threat.² In 1925, the warlord government, for some reason, did manage to sign the 1920 Spitsbergen Treaty, which gave

Norway sovereignty over the disputed Arctic island while allowing citizens of the signatories to freely enter and leave the territory. No Chinese, however, exercised that privilege for more than half a century.³ Translations of several popular western accounts of the poles did appear in the 1920s and 1930s but no Chinese explorer went there in this period.⁴

Yet, the poles maintained a powerful hold on the Chinese imagination as they did in other countries. The Chinese dream of going to the poles lay dormant until it was pursued vigorously in the 1980s. In a space of two decades, China caught up in a hurry, trying to compress the Western polar experiences of two centuries. By the end of the 20th century, it indeed became a significant player in both Arctic and Antarctic exploration and research. What happened and why would the Middle Kingdom care about the ends of the earth? As unique places on earth, the poles were both symbols of the unknown waiting to be explored and, later, as continents with scientific, economic, and eventually geopolitical importance to China and the rest of the world. Several forces were at work in driving China to the poles. There were scientists who understood that the poles exerted powerful influences on the Chinese climate; they, like their colleagues abroad, also wanted to join international cooperative research projects on the polar regions and make them models of scientific internationalism. For its part, the Chinese government, like its counterparts in other countries, could be expected to give more weight to arguments about international prestige and domestic political and economic considerations.

What held the potential to unify both the scientists and the politicians was a strong sense of nationalism that derived largely from years of humiliation at the hands of foreign powers. Even though China was never, like India, completely colonized by any one single country, its modern history since the 1840s **Opium Wars** with Great Britain was filled with invasions, humiliations, and **threats** by western powers and Japan. Yet, at the same time, the development of modern Chinese science and technology depended to a great extent on international cooperation, in the form of education of its scientists and engineers abroad as well as cross-national technological exchanges, especially in the late twentieth century when China's polar research took place in earnest. This paper explores the Chinese journey to the South and North poles, examining the dynamics of nationalism and internationalism in China's drive to the poles, the roles of various groups, as well as the impact of polar exploration on Chinese science, politics, and, finally, popular culture, where nationalism, romantic heroism, and scientific exploration made a potent mix.

CHINA AND THE IGY

The first serious attempt to launch a Chinese polar research program followed the establishment of the People's Republic of China (PRC) in 1949 when the communists drove the Nationalist government to Taiwan. Geophysical and oceanographic research took a great leap forward in China especially when it geared up for the International Geophysical Year (IGY) in the early 1950s. Zhu Kezhen, a Harvard-trained meteorologist and vice president of the Chinese Academy of Sciences, headed China's National Committee on the IGY. In 1957, perhaps in the context of China's expected participation in the IGY, Zhu Kezhen called for China's participation in polar research: "China is a large country and we have to study the polar regions. The earth is an integrative whole; the formation and evolution of China's natural environments took place in the context of that of the earth. China is intimately affected by the existence and evolution of the polar regions."⁵

China's hope to rejoin the international scientific community through IGY was, however, dashed when Taiwan, which had not responded to the IGY invitation until it saw the active participation of PRC scientists in IGY preparatory conferences, demanded and was allowed to join the IGY in 1957. Zhu Kezhen, citing the PRC's principle of avoiding the creation of two Chinas in any international forums, withdrew the Chinese participation most reluctantly.⁶ Under Zhu's leadership, the Chinese IGY National Committee nevertheless continued its work and greatly expanded geophysical and oceanographic research in China.⁷ For example, at the 7th meeting of the National Committee that was held on September 21, 1957, the first one held after China's withdrawal from the IGY, it was agreed that the committee would rename itself the National Geophysical Committee, a Chinese Geophysical Year Documentation Center would be established, and the collection of data would continue in preparation for the 2nd IGY.⁸ By 1962, enough research had been conducted on meteorology, geomagnetism, seismology, and ionospheric activities that internal publications on these subjects were planned.⁹ Meanwhile, newspapers were filled with reports about the experiences and findings of the Soviet Antarctic expeditions before, during, and after the IGY, lending the Chinese public a vicarious sense of adventure. The official *People's Daily*, the most influential of the Chinese newspapers, carried no fewer than fifty articles on the Soviet endeavor between 1955 and 1962.¹⁰ Translations of Soviet popular writings on Antarctica and especially the Arctic also became very popular.¹¹

Apparently discouraged by the IGY episode, China did not agitate to join the discussion of the Antarctic Treaty that started in 1959 in Washington, DC. Taiwan, seeing that the PRC was not represented and lacking interest or resources to conduct research in Antarctica, likewise stayed away from the proceedings. Even if it had acceded to the treaty, Taiwan would not have been allowed to participate in the policy-making meetings of the Consultative Countries. Thus neither government claiming to represent China, either in the mainland or Taiwan, figured much in the discussion that led to the Antarctic Treaty in 1959–1961.¹²

Meanwhile, in China, a National Conference on the General Oceanographic Survey was held in May 1959 in Guangzhou to plan for the first comprehensive survey of the waters near the Chinese coast. Among the suggestions that came out of this conference was that the Chinese Academy of Sciences ask the Soviet Union to arrange for 3–5 Chinese scientists to participate in a Soviet expedition to the Antarctic. It was further hoped that China would be able to send its own Antarctic expedition in 1963 and establish its own research station there. Nothing came out of these ideas because of the deteriorating relationship between the two countries.¹³ That year, however, saw the birth of another idea that would play an important role in China's long march to the poles: at a meeting of the Panel on Oceanography of the State Science and Technology Commission (SSTC), which later became the Ministry of Science and Technology, twenty-nine members, including C. K. Tseng, a US-trained marine biologist who was also one of the pioneers of Chinese oceanography, proposed to the government that it establish a State Oceanic Administration (SOA) to coordinate all activities related to the ocean in the country. The agency, approved and established by the governing State Council the next year, would carry out its mandates with the assistance of the SSTC, the Navy, and the Central Bureau of Meteorology. It would form the organizational basis for the early efforts toward Chinese polar research.¹⁴ Among its goals were “surveys of the Arctic and Antarctic oceans in the future.”¹⁵

SETTING THE STAGE

The polar dreams of Zhu Kezhen and other Chinese scientists were put on hold during the turbulent Cultural Revolution (1966–1976). With the death of Mao and the end of the Cultural Revolution in 1976, China entered into a new era of reform and opening up, after a quarter century of relative isola-

tion, to the outside world, under the pragmatist leader Deng Xiaoping. The new political climate raised again scientists' hope of going to the poles. In May 1977, for example, the Communist Party Committee of the State Oceanic Administration proposed, as its ambitious mission, to "thoroughly understand the China seas, march into the three major oceans, and land on Antarctica." This was the first time that a responsible government agency put Antarctica on its agenda.¹⁶ In 1978, Tseng, newly rehabilitated after suffering from persecution during the Cultural Revolution and now director of the Qingdao Institute of Oceanology of the Chinese Academy of Sciences, the most prominent oceanographic institution in China, made another move on behalf of Chinese scientists' Antarctic dream. He wrote a letter to Fang Yi, then vice premier in charge of science and technology as well as president of the Chinese Academy of Sciences:

The next International Geophysical Year will be conducted in 1982, with emphasis on Antarctic research. China, as a large country with one quarter of the world's population, should actively participate in this project to create conditions for the development and utilization of Antarctic resources in the future.¹⁷

The letter apparently resulted in the State Council's directive to the State Oceanic Administration to prepare for China's participation in Antarctic research. On October 10, 1978, the agency sent its plan of implementation to the State Council and received the green light shortly after, thus setting the stage for the launching of China's Antarctic program.¹⁸

China's Antarctic program should start small, argued Zhao Dongwan, a deputy director of the SSTC, in early 1979:

Based on our country's economic situation and technical conditions, it will be very difficult to buy or build boats and organize our own Antarctic expeditions in the next few years. I tentatively agree with the proposal that we first send several specialists abroad to collaborate with friendly foreign countries; they can go to study the Antarctic by boarding their ships. This way, the cost will be minimum but experience will be gained.¹⁹

In the same month, the Foreign Ministry, the SSTC, and the Oceanic Administration proposed to the State Council that in view of the existence of disputes over territorial claims and mineral rights, China should consider joining the Antarctic Treaty, with the stated goal of "understanding and learning about Antarctica, as well as making contributions to the peaceful

utilization of Antarctica by human kind." In addition, participation in the Antarctic regime would also allow China to engage in scientific exchange and cooperation with other countries.²⁰

Accordingly, two Chinese scientists, Dong Zhaoqian of the Second Institute of Oceanography of the State Oceanic Administration and Zhang Qingsong of the Institute of Geography of the Chinese Academy of Sciences, were sent by the State Oceanic Administration to join the Australian Antarctic expedition from December 29, 1979, to March 20, 1980. As the first Chinese scientists to land in Antarctica, they conducted research at Australia's Casey station and visited three stations operated by other countries: McMurdo (US), Scott (New Zealand), and Dumont D'urville (France). Their data-collection resulted in the first Chinese scientific publications on Antarctica. Films shot by Dong were later issued as the first Chinese documentary on Antarctica. Perhaps more importantly, their observations of the operations of research stations by other countries assisted in the planning of China's own Antarctic expeditions.²¹

The pattern of Chinese scientists joining foreign, especially Australian, Antarctic research programs continued for the next several years. In late 1980, both Dong and Zhang returned to Antarctica as part of the Australian research effort: Dong worked on oceanographic research while Zhang spent the winter at the Davis station.²² In the next three years, nine more Chinese scientists spent more than a year at various Australian Antarctic installations, collecting data, analyzing them, and writing up their results for publications. Soon the host countries expanded to include New Zealand, Chile, Argentina, and Japan.²³ These early Chinese Antarctic scientists were often drawn from two main sources: geoscientists in the Chinese Academy of Sciences who were involved in the studies of glaciers and the Tibetan plateau, and oceanographers from the State Oceanic Administration. Once they returned from their Antarctic visits with foreign stations they would become leaders of China's own efforts in Antarctica, and later, in Arctic exploration and research.

Meanwhile, China established in 1981 an inter-agency National Antarctic Research Committee to coordinate activities in this field.²⁴ Chaired by Wu Heng, one of the few party veterans with training in science (geology) and another deputy director of the SSTC, the Antarctic Committee included representatives from the Foreign Ministry, the State Oceanic Administration, the Chinese Academy of Sciences, the Navy, and a dozen other departments. Immediately after its founding, the Antarctic Committee undertook an intensive round of diplomatic contact with countries actively engaged in

Antarctic research in preparation for launching its own program. It exchanged a large number of delegations of Antarctic administrators and scientists with Japan, Australia, New Zealand, the United States, and Argentina. These visits familiarized the Committee and its staff with the entire process of organizing Antarctic research, especially sending expeditions to the Antarctic, setting up research stations there, and running them. The Committee also sent several delegations to attend international Antarctic scientific and diplomatic conferences.²⁵ In early 1982, it produced a proposal for Antarctic research during the Sixth Five-Year Plan (1981–1985) that included the building of a summer research station on the icy continent.²⁶ An advisory group of 34 scientists was established to advise the Antarctic Committee on scientific planning, mainly in regard to the selection and deployment of scientists to conduct research at stations operated by other countries.²⁷

THE DECISION TO GO

The year 1983 marked a turning point in China's Antarctic program. In June, China signed the Antarctic Treaty. In the summer, a major exhibit on China's Antarctic research in Beijing attracted 120,000 visitors, including some of the top party and government leaders. Then, in September, China sent its first delegation to the Twelfth Antarctic Treaty Consultative Meeting held in Canberra. Apparently not realizing fully the difference in the status between a treaty signatory country and a consultative country, the Chinese delegates, which included Guo Kun, director of the Antarctic office at the State Oceanic Administration, were shocked when they were politely asked to leave the conference room whenever important decisions were discussed and voted on by the consultative countries.²⁸ Humiliated, Guo resolved that he would never attend such a meeting before China built its own Antarctic station.²⁹ As one report later put it:

For a major country with one billion people, the embarrassment and cold reception suffered by the Chinese delegation at Canberra was intolerable. Among the five permanent members of the UN Security Council, only China was not a Consultative Member Country of the Antarctic Treaty. In Antarctic affairs, China still had no voice or policy-making role, whereas, by 1983, India, Brazil, and several other countries had already [acquired consultative status].³⁰

The Canberra incident probably helped push the Chinese government to quicken the pace of its preparation for the first Antarctic expedition.³¹

The first major step in preparation for an expedition to Antarctica was the location for China's first Antarctic station. In late 1983 and early 1984, a delegation of the Antarctic Committee joined Argentina's 1983–1984 summer expedition to the Antarctic, surveying possible sites. As a result of their investigation, they recommended that China launch its first Antarctic expedition to establish a research station in western Antarctica.³² Soon the choice further narrowed to King George Island in the South Shetland Islands. King George was only part of Antarctica in the general sense; it was outside of both the Antarctic circle and continental Antarctica. Yet, to move further south from King George would require an ice-breaker that China did not possess or could not afford at the time. Besides its milder climate, King George also had the advantage of being the home to several stations from other countries that could facilitate the building and running of the Chinese station.³³

Paralleling the bureaucratic initiative, scientists launched their own push for Antarctic research. In February 1984, thirty-two winners of the Zhu Kezhen Awards for Field Scientific Work—including Sun Honglie, Shi Yafeng, and Mao Hanli, all leaders in Chinese geoscience and oceanography—sent an appeal to the Party Central Committee and State Council advocating “A March on Antarctica.” Specifically, they urged the building of a year-round research station there and the establishment of relevant scientific institutions at home.³⁴ Lacking a formal channel of regular communication with the policy-makers at the highest level, equivalent to the US President's Science Advisory Committee, writing letters became a favorite, and often effective, means for Chinese scientists to communicate with top leaders and offer their science policy advice. Tseng had done so in 1978, and scientists involved in the strategic weapons programs would later follow suite in their appeal to Deng Xiaoping to launch a large-scale high-tech program, code-named “863,” two years later.³⁵

The thirty-two scientists' letter apparently stirred more action at the top than the initiative from the Antarctic Committee. Fang Yi, then vice premier, immediately gave his approval and passed it on to Hu Qili, at the time executive secretary of the Chinese Communist Party Central Committee and a standing member of the party's top Political Bureau. Hu's note to vice premier Li Peng, on April 26, revealed much about China's motivations for, as well as concerns about, going to the poles:

Even India has established an independent station [in Antarctica]. China, as such a major power, should also have its own [station]; it would serve as a foothold [for us] in the struggle for the control of Antarctica in the future. One problem is funding. Scientists estimated that it will cost 110 million yuan [about US\$47 million] in ten years, averaging about 10 million yuan annually. I have no idea whether this number is realistic. If it is, then it might be worth our consideration. Another problem is: What practical role will [the program] play in our Four Modernizations drive? People might question whether it's appropriate to spend so much money in Antarctica while we have so many places at home not yet developed.³⁶

In other words, international prestige and national interest played a major role in China's decision-making on Antarctic research, balanced by a cost-benefit analysis that valued more the practical than scientific results.³⁷ As papers by Vera Schwach and Cornelia Lüdecke in this volume indicate, the Chinese drive to the poles very much paralleled those of Norway, Germany, and other countries.

In May 1984, Zhao Ziyang, the premier, gave the program his general approval, even though he had vetoed a similar proposal two years before and still had some misgivings about the cost of the program. A delegation went to Finland, Denmark, and Western Germany to survey different models of boats suitable for the Antarctic voyage. Within the year, a China Polar Institute was approved and located in Shanghai, a program in polar meteorology was set up in the Chinese Academy of Meteorological Science, and a training base for Antarctic personnel was established in the Heilongjiang Province in North-east China. In September, China sent a delegation to the 18th Conference of the Scientific Committee on Antarctic Research (SCAR) in Bremen, Germany, where it also formally applied for SCAR membership.³⁸

THE FIRST EXPEDITION AND STATION

Finally, in late 1984, China launched its first expedition to Antarctica with great fanfare. There was a reception by the vice premier Wan Li and Hu Qili in the Great Hall of the People in Beijing; Deng Xiaoping gave his stamp of approval when he executed a calligraphy for the planned Chinese research station, named "Great Wall." It pronounced the goal of the Chinese program

as “making contributions to the peaceful utilization of Antarctica by human kind.” Departing from Shanghai on November 20, 1984 after a send-off ceremony, the expedition consisted of two boats, the *Xiang Yang Hong No. 10* oceanographic vessel and the *J121* naval salvage ship. The 591 members were all male, including dozens of scientists, more than 300 naval personnel, and reporters from the Chinese Central TV and other outlets. As the first such adventure in modern Chinese history, the two-month voyage across the Pacific to Antarctica drew widespread public attention.

The ships arrived at the King George Island by the end of the year, and the first major decision was to choose a location to build the station. It just so happened that a week before their arrival, Uruguay had built a station on the site that Chinese scientists had originally preferred. Now the choice was between a site near the Uruguay station or one on the Fildes Peninsula on the island. Concerned that crowding together with the Uruguay station might create “inconvenience” in the future, the team, after exploring the island, chose the Fildes site for its technical advantages: relatively enclosed, it had a large flat area with a wide shoreline, which could facilitate construction and access, and, perhaps more importantly, it had three lakes of fresh water. It was also close to the Chilean station, which had the only airport on the island. Scientists liked the site because its location lent itself to scientific research in a variety of disciplines.³⁹ Once so decided, the team marched formally on shore on December 31, 1988, with an emotional Guo Kun holding the national flag and leading the way (Fig. 1). The image, captured by more than a dozen journalists in the group, soon graced the front pages of newspapers and led the newscasts in China.⁴⁰

The opening ceremony of the *Great Wall* station was held on February 20, 1985, the day of the Spring Festival, perhaps the most important of all Chinese holidays, thus generating much publicity at home. Wu Heng, chairman of the Antarctic Committee, led a governmental delegation and flew to the station to mark the occasion. Wu read a statement from the State Council that praised the station as filling a gap in China’s scientific enterprise in general and polar research in particular, setting a milestone in China’s effort at international scientific exchange and cooperation, as well as laying the foundation for China’s goal of the peaceful utilization of Antarctica for the benefit of the whole humankind. Guo Kun, as director of the station, announced that the station would welcome scientists from other countries and especially from Hong Kong and Taiwan to participate in its scientific activities. The ceremony also reinforced the masculine nature of the undertaking



FIGURE 1. Chinese Antarctic expedition landing on King George Island, January 1984. From Chinese Arctic and Antarctic Administration, *Chinese Arctic and Antarctic Expeditions* (Beijing: Ocean Press, 2000).

when expedition members bellowed out a new team song that praised “close comrades, loyal partners, we expedition members are good sons of China, good sons of China.”⁴¹ Upon their insistence, and with Wu Heng’s approval, eight members of the expedition stayed behind at the *Great Wall* for the austral winter, apparently a rare feat during the first year of any station.⁴²

In the unique environment of Antarctica, national pride and international cooperation seemed to coexist harmoniously. The Chinese expedition invited scientists from Chile, Argentina, Uruguay, the US, Soviet Union, Poland, and East Germany to attend the founding ceremony. Afterwards, Chinese scientists also visited the neighboring Soviet and Chilean stations. The *Great Wall* soon became a member of the Antarctic scientific community. Indeed there were scientists from countries such as Japan and Australia who joined later Chinese expeditions.⁴³ In contrast to its international relations in other fields, such as high energy physics, China received assistance in Antarctic affairs not only from developed countries such as the US, Japan, and Australia, but also from developing countries, especially Chile and Argentina, whose technicians served as guides on the first Chinese Antarctic ex-

pedition. At the same time, as was the customary practice of establishing sovereignty in Antarctica, a Chinese post office was opened on the same day at the station.⁴⁴ More generally, in the Antarctic Treaty regime, China likewise tried to strike a balance between supporting the demand of some Third World countries in gaining a voice on Antarctic policy and maintaining the status quo.⁴⁵

The return of the rest of the expedition to China in spring 1985 triggered further publicity for the Antarctic program, including both government-sponsored celebrations and genuine expression of pride by ordinary citizens. Perhaps to the government's surprise, the most potent dividend of the Antarctic program turned out to be nationalism, rather than material benefits. At a widely-publicized ceremony, this time held in the Zhongnanhai compound, headquarters of the Chinese Communist Party Central Committee, the government bestowed awards to many of the participants of the Antarctic expedition. Li Peng, the vice premier, told the group that "your victory very greatly inspired the Chinese people of all different ethnicities in our striving toward the Four Modernizations." In his speech, Wu Heng counted the "firsts" scored by the expedition: the first time the Chinese flag was erected at Antarctica, the first time geographical and geological sites there were named by the Chinese, the first time interdisciplinary research and collection of scientific specimens were carried out there by Chinese scientists. It also set the Chinese record for the length of wireless communication and for the duration of a naval voyage. The Communist Party's official *Red Flag* journal issued a laudatory and influential editorial entitled "Ode to the Antarctic Spirit," which was characterized as full of perseverance, self-sacrifice, and discipline. Even though the editorial mentioned the virtues of collectivism as reflected in the operation of the expedition, patriotism was highlighted as the most important guiding principle for the expedition and by extension for the whole country.⁴⁶

Thus the Antarctic adventure, which was launched largely as a result of the government's concern for national prestige in the international arena, turned out to have considerable domestic benefits as well. It became a rallying point for Chinese techno-nationalism both abroad and at home. Amidst a "crisis of faith," a general questioning of Communism at the end of the disastrous Cultural Revolution, the government turned to nationalism, based on a vision of Chinese unity, strength, and prosperity through technological modernization, as the new ideology to rally the people. Most of the post-Mao leaders had some technical training or leaned toward a technocratic style of government, and they acted quickly to capitalize on the popular enthusiasm for the Antarctic expedition. Between January 1, 1984 and December

31, 1985, the *People's Daily*, for example, carried 135 articles with "Antarctic" in their titles, while only 38 pieces had "Communism" appearing in their titles.⁴⁷

On the heels of the success of the first expedition and station, China's Antarctic program entered into a golden era in the mid and late 1980s. At the Thirteenth Antarctic Treaty Consultative Meeting in Brussels in October 1985, China was unanimously accepted as a consultative member. In 1986, at its 19th conference in San Diego, California, SCAR admitted China as a full member.⁴⁸ In the summer 1985, the State Council approved the purchase of a used, ice-strengthened (but not ice-breaking) cargo-ship from Finland at the cost of \$1.7 million, and renamed it *Jidi*(polar). After undergoing extensive renovations, it was put to use during the third expedition to Antarctica in 1986–1987 and enabled Chinese scientists to carry out oceanographic research in the nation's first around-the-world cruise.⁴⁹ With the improved capabilities of *Jidi*, preparations were underway for a second Chinese Antarctic station to be located on the Larsemann Hills in Prydz Bay in East Antarctica. The *Great Wall*'s location was thought to be not authentically Antarctic. The State Council approved this second station in 1988 "in order to defend our national rights and interest in the international struggle [for the Antarctic], benefit the future generations, and expand the fruits of our scientific research."⁵⁰

Surviving a nearly catastrophic ice-breaking incident in the bay, the fifth annual Antarctic expedition on board *Jidi* built the station in early 1989. It was named *Zhongshan* in honor of Sun Zhongshan (Sun Yet-sen), the leader of the 1911 republican revolution that overthrew the Qing dynasty and also the first president of the Republic of China.⁵¹ The naming carried further political undertones because Sun Zhongshan was also considered to be the founder of modern China by the ruling Chinese Nationalists in Taiwan, which China considered part of its own territory and which China was actively seeking to reunite peacefully with the mainland.

These activities in Antarctica were accompanied by a great boom in related institutional building at home. At the Antarctic Committee, an earlier, somewhat informal advisory group was upgraded and institutionalized as the Chinese Academic Committee on Antarctic Research in 1985 to advise the ARC on scientific research at the new *Great Wall* station and elsewhere.⁵² The Academic Committee, under the leadership of Sun Honglie, an internationally known soil expert and ecologist and vice president of the Chinese Academy of Sciences, made it clear that it intended Chinese Antarctic research to be fully integrated into world science. "In Antarctic research, there is only one standard, and it's the international state of the art," Sun

said.⁵³ The Chinese Academy of Sciences established new programs dealing with polar research in its Institute of Geography in Beijing (1985), Institute on Research on Glaciers and Frozen Soils in Lanzhou (1985), Institute of Geophysics (1987), and Institute of Atmospheric Physics (1987). Similar programs were also created in other parts of the government research complex such as the Chinese Academy of Meteorological Science (1984), the No. 22 Institute of the Ministry of Electronics (1986), the Chinese Academy of Geological Science (1987). The construction of the China Polar Institute in Shanghai, which was approved in 1984, went into high gear in the afterglow of the success of the first expedition.⁵⁴ An exhibit on Antarctica, with artifacts collected during the expedition, opened in Shanghai in the summer of 1985 and attracted 43,000 visitors.⁵⁵ Annual expeditions to Antarctica continued to generate widespread publicity for the program.

CAPITALIZING ON THE ANTARCTIC SPIRIT

No single event in the subsequent history of the Chinese Antarctic program captured the national imagination as did the participation of Qin Dahe, a Chinese glaciologist, in the epic, six-member International Trans-Antarctic Expedition of 1989–1990. It made Qin an instant national hero and put a human face to Chinese exploration of Antarctica. Taking place against the backdrop of a most turbulent period in Chinese political history that centered on the Tiananmen incident of June 4th, 1989, Qin's feat brought together the several strands in political and cultural symbolism that were at the heart of the Chinese drive to the south pole.

As director of the *Great Wall* station in 1988, Qin learned of the Trans-Antarctic Expedition during a phone conversation with an Antarctic administrator in Beijing in May of that year. "I was overwhelmed by the news," he later recalled, "and took it to be a once-in-a-lifetime opportunity."⁵⁶ Growing up in an intellectual family in Lanzhou in northwestern China, Qin spent several years doing physical labor in the countryside during the Cultural Revolution after graduating from college with a major in geography and geology. Inspired by an article on glaciers in the early 1970s, he switched fields and managed eventually to get a position as a researcher in the Chinese Academy of Sciences' Institute on Glaciology in Lanzhou. There he worked with Shi Yafeng and Xie Zichu, the authors of the article and later leading scientists advocating Chinese participation in Antarctic research. Qin made his first visit to Antarctica in 1983–1984, when he spent a fruitful year at the *Casey*, the

Australian Antarctic station.⁵⁷ His combination of glaciological and Antarctic experiences made him well suited for the expedition. Thus, even though informed that the Antarctic Commission had already picked someone else as the Chinese participant, Qin applied for the position anyway. His persistence paid off when the first choice, a non-scientist, withdrew due to ill health, and he was picked as the Chinese representative to the first Trans-Antarctic expedition in history conducted without mechanical transportation and along the longest possible route.⁵⁸

The expedition was organized by two polar explorers, the American Will Steger and the Frenchman Jean-Louis Etienne, who met when their separate Arctic journeys intersected each other in 1986. Relying on private and corporate—especially Gore-Tex—funding, totaling more than \$10 million, the private effort received no official endorsement from the US government but soon generated worldwide publicity—hundreds of schools in America, Britain, France, and Australia followed its progress—and cooperation as an effort to call attention to the need to protect the Antarctic environment.⁵⁹ Besides Steger, Etienne, and Qin, the international team included Geoff Somers, a British carpenter and Antarctic explorer who served as the navigator for the group, Keizo Funatsu of Japan, who was an expert dog trainer, and Victor Boyarsky from the Soviet Union, whose profile paralleled in many ways that of Qin—they were the only scientists on the team and both had backgrounds in glaciology and Antarctic research. Although the expedition was designed primarily as a spectacular adventure, Qin and Boyarsky were expected to conduct some scientific research along their perilous route.⁶⁰ Qin spent about a month in the US in February–March 1989 for training with other team members; he also took the time to have ten teeth extracted to prevent possible dental problems in Antarctica.⁶¹

Tragic and near-tragic circumstances, however, threatened Qin's participation in the enterprise even before the journey started. On the morning of June 3, 1989, just days before he was to depart for the expedition, his wife, Zhou Qinke, a physician, was hit by a truck and suffered serious injury.⁶² Qin, informed that if he gave up, China would withdraw from the project, was torn. Waking up from her coma, Zhou, who evidently had initially opposed Qin's participation in the project, now persuaded her husband to proceed on the mission. "This matter concerns not just myself, or my family, but China," she told her husband, according to his recollection. "If you, Dahe, don't go, there won't be a Chinese flag among the six national flags."⁶³ Meanwhile, a national tragedy and chaos unfolded in Beijing on June 4, the day after Zhou's traffic accident, when government troops cracked down on students and

residents who were staging protests against official corruption in Tiananmen Square. In the charged post-Tiananmen political climate, Qin's participation in the expedition gained new significance beyond enhancing China's international prestige. "[Your] continued participation in this activity after the unrest demonstrates that our country's policy of reform and opening up to the outside has not changed," Wang Ren, a geophysicist and a deputy director of the China National Natural Science Foundation, which supported Qin's research, told Qin at a send-off for him on June 28 in Beijing.⁶⁴

When Qin arrived in the US for pre-expedition preparations on June 29, he heard reports critical of his inclusion in the project in the aftermath of the June 4th incident. Why would you cooperate with a representative of the Chinese government, some French critics demanded of Etienne. He replied that Qin's participation was in keeping with the expedition's mission to promote peace and cooperation. Project staff promised to fend off inquiring American journalists. For his part, Qin made few public comments on the Tiananmen incident. Privately, he explained to the staff that he had been pre-occupied with his wife's injury in Lanzhou and that all he knew was what he heard and saw on the Chinese media. "As a representative of the Chinese government and people, what I am very interested in is Antarctica and scientific explorations."⁶⁵

Starting on July 27, 1989, at Seal Nunataks at the northwestern point of the Antarctic Peninsula and ending more than seven months later on March 3 at the Soviet station *Mirny* (peace) in the south of the continent, the Trans-Antarctic Expedition was a truly heroic undertaking. Relying on about forty dogs pulling three sledges carrying their food and equipment between supply caches dropped by plane, the six members of the expedition had to ski 3,741 miles while trying to survive in some of the most dangerous natural conditions on earth, including extreme cold, severe wind and snow storms, and perilous crevasses. Compared with his teammates, Qin had the additional challenge of mastering skiing at the outset of the journey.⁶⁶ Furthermore, Qin, sometimes aided by his teammates, also carried out research on snow and ice by methodically digging a hole in the ground at the end of the day to collect samples at different depths. At one point, facing the need to lighten the load on the dog-sledge, he abandoned some of his clothes and supplies in order to preserve his precious samples and equipment. The ice from the so-called area of inaccessibility in the harsh interior of the continent had never been sampled before. Analysis of these specimens for oxygen isotopes and chemical analyses by Qin and others in laboratories in France, China, and the

US after the expedition would yield new insights into the formation and properties of the Antarctic surface as well as climate change.⁶⁷

Not everyone looked at the Trans-Antarctic expedition with enthusiasm. The enterprise received much support from the Chinese, Chilean, and especially the Soviet Antarctic stations but team members were warned beforehand that they should expect a cold reception at the South Pole from the National Science Foundation-run Amundsen-Scott base. Official NSF policy discouraged non-governmental activities in the region, making no exception for Qin's group even though it was the first team to arrive at the pole on ski and sledge since Roald Amundsen, leader of the Norwegian expedition, beat the rival British team led by Robert Scott to the pole in 1911. At one point, Qin's group learned that the personnel at the base were not even allowed to talk to members of the expedition or they would risk losing their jobs. "They wouldn't even let us have a shower," complained Somers, "they just gave us a cup of coffee and we had to leave and pitch our camp away from the permanent buildings."⁶⁸ Finally, the Soviet government intervened on behalf of Boyarsky and the expedition, which resulted in a softening of the NSF stand. In the end, despite the official constraints, the staff at the station gave the men an enthusiastic welcome.⁶⁹

At the South Pole, with a French TV crew filming, every member of the expedition read this statement in his native language for transmission back to his home media:

On the route of the longest traverse of Antarctica, we are today at the South Pole. From this place where the world comes together we say to everyone that beyond nationalities and cultures people can live together, even in the most difficult circumstances. May the spirit of the Trans-Antarctic expedition be an encouragement for a better world.⁷⁰

Finally, making their triumphant return from the Antarctic, members of the expedition were met by President Francois Mitterrand of France on March 22, 1990, by President George Bush, notwithstanding the NSF attitude, on March 27, by Japanese Prime Minister Toshiki Kaifu on May 7, Chinese President Yang Shangkun on May 9, and Foreign Minister Eduard Shevardnadze of the Soviet Union on June 16.⁷¹

In China, Qin became the new symbol of Chinese national pride and the locus of a post-Tiananmen national campaign of patriotism, nationalism, and

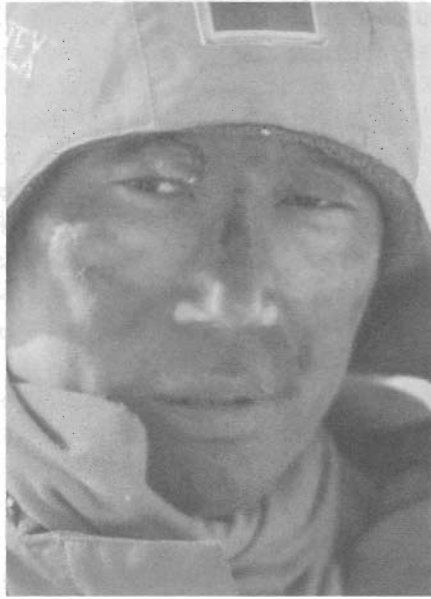


FIGURE 2. Qin Dahe's ultra-violet scarred face. From *Chinese Arctic and Antarctic Expeditions*.

scientific modernization, aimed especially at students. In a commentary entitled "Qin Dahe represented China," the official Xinhua News Agency celebrated Qin's achievements:

We congratulate Qin Dahe for his successes, and praise the creative labor of Qin Dahe and of thousands and thousands of outstanding sons and daughters of China like him, especially their determination to devote themselves to science and to win honor for the motherland To revitalize the Chinese nation and to achieve the grand enterprise of the Four Modernizations, it requires that we each redouble our efforts at our own respective posts, making proper contributions. It requires us to learn from Qin Dahe his courage to explore and his striving to win honor for China.⁷²

At a banquet welcoming him back on April 7, several leading scientists and Antarctic officials not only lauded his achievements, especially his scientific contributions, but also pointed out their broader significance and implications. As he recorded in his journal:

During the dinner several leaders talked about the need to promote the Antarctic spirit and greatly publicize the Antarctic [experience of China]. This would serve as a very good, concrete education for the young people, in a form that was palatable to them.⁷³

The overwhelming reception given to Qin, and later his expedition teammates, in Beijing and Lanzhou seemed to indicate that the campaign to capitalize on the Antarctic spirit was succeeding. Qin was mobbed everywhere by reporters and students.⁷⁴ Everyone was shocked and impressed by the scars still on his face weeks after the end of the expedition when he went to give a speech on his Antarctic experiences on April 11, 1990 at Beijing University, the place where the Tiananmen protest had originated the previous year (Fig. 2). After hearing Qin's talk, many students praised him for his bravery, his devotion to science, and his patriotism, with at least one student comparing him to the heroic and tragic Scott. Indeed, to many, Qin became the Amundsen, Scott, and (another early British Antarctic explorer) Ernest Shackleton all rolled into one. His ultra-violet scarred face became a new icon in the Chinese media.⁷⁵ It symbolized a unique combination of Chinese nationalism, scientific internationalism, and romantic individualism. The Qin Dahe phenomenon, though orchestrated in part by the government, nevertheless filled a void in the still tense Chinese society less than a year after the Tiananmen incident. Finally there was a hero that was genuinely attractive to the younger generation and was also safe for the government to embrace. Qin was soon promoted to high positions in Chinese science and technology policy, becoming head of the Chinese Meteorological Administration in 2000. Undoubtedly, the Chinese Antarctic program, too, benefited from the Qin phenomenon and its positive association with the patriotism drive of the central leadership of the government.

The Qin Dahe phenomenon further stimulated the already intense interest in Antarctica and heated it up into an "Antarctic fever." Polar exploration occupied a powerful presence in Chinese popular culture in this period as market-oriented reform and globalization continued to transform Chinese society. A play based on Qin's experience was written and performed in 1996, winning a government-sponsored award that year.⁷⁶ A large and growing number of books and TV documentaries and even dramas and other programs on Antarctica and Chinese exploration appeared to meet an apparently insatiable public appetite, especially in the form of scientific popularization and literature for juvenile readers. A mini TV drama series, *The Great Wall Extends to the South*, was shot on location with the perilous Chinese Antarctic

expedition in 1988–1989 to establish the *Zhongshan* station. Unfortunately, Jin Naiqian, a veteran actor and a cast member, died of a heart attack on the return trip, marking the first, and so far the only, fatality suffered by the Chinese Antarctic program.⁷⁷

But Jin's death did not deter other artists, journalists, and writers from making the Antarctic pilgrimage amidst an explosive expansion of both print and visual media at home, which drove and sometimes financed these Antarctic tours. In 1991, Zhejiang TV crews went on locations and started the production of three separate series of documentary shows on "the three poles" (in China the Himalayas were known as the third pole of the world). The series on Antarctica consisted of three mini-series: *Antarctica and Human Kind*, *Journey to Antarctica*, and *Feeling for Antarctica*.⁷⁸ In 2000–2001, a group of humanities scholars, with much publicity and funding from a publisher, spent several months at the Chinese *Great Wall* Antarctic station to reflect on the future of the continent and the world, while Chen Yadan, a woman painter, daughter of the well-known geologist and explorer Chen Zongqi, spent more than a month there in 1986–1987.⁷⁹ In the late 1990s and early 2000s, the Antarctic fever was further spread by the emergence and widespread use of the internet.

Increasing participation of Chinese women scientists and other professionals in Antarctica drew attention from the media. The first Chinese woman to land in the icy continent was Li Huamei, a geochemist from the Chinese Academy of Sciences' Institute of Geochemistry in Guiyang, who spent a month in 1983–1984 at New Zealand's Scott station to conduct geochemical research on the surrounding region, including Ross Island.⁸⁰ Another female scientist, Jin Qingmin, a mineralogist from the Chinese Ministry of Geology and a mother of three, joined the third Chinese Antarctic expedition in October 1986 on board the *Jidi* and spent more than two months at the *Great Wall* station conducting geological research as well as making maps of the Fildes area (Fig. 3). She returned to Antarctica in 1988 as part of a six-member Sino-American team—three Chinese and two American climbers with a Canadian guide—to climb Mount Vinson, the highest peak of Antarctica. Even though Jin did not get to the peak—her two male compatriots, Li Zhixin and Wang Yongfeng, did—she discovered a large iron ore mine in the area. On her return, she wrote an article about her experiences, which was designated as a supplemental reading for elementary school students in the country.⁸¹ Further publicity accompanied two Chinese women, Lin Qing, a physician, and Zhao Ping, a staff member



FIGURE 3. Chinese woman geologist Jin Qingmin in Antarctic. From <http://www.yanlingnet.com/jingqingmin.htm>.

at the Antarctic Administration, who joined the wintering team at the *Great Wall* in 2000–2001.⁸²

FINALLY, THE NORTH POLE

The flourishing of the private sector and civil society in China by the end of the 20th century also helped to pave the way for the beginning of Chinese exploration of the Arctic. In 1995, the first Chinese Arctic expedition was

organized not by the official Chinese Antarctic Committee but by a group of Chinese scientists and explorers under the leadership of the geologist Wei Menghua of the Chinese Academy of Sciences. Wei was among the first Chinese scientists to go to the Antarctic in 1982, as a member of an American team during his stay in the US as a visiting scholar. That visit triggered both an intense interest in the polar regions and a strong sense of nationalism when he saw that China lagged far behind other countries in polar exploration. In 1991, he scrambled together some funds from several agencies and ventured into the Arctic circle by flying into Barrow, Alaska, where he, after some difficulties, eventually made connections with the NSF-run Barrow Arctic Science Consortium and the local Inuit population.⁸³ After his return to China in 1992, he wrote letters to the party-state leadership to ask for its support of a national program in Arctic research and exploration, which eventually led to approval of his 1995 expedition.⁸⁴ In his public appeal for support of Arctic research, Wei also cited the military importance of the Arctic, e.g., as an ideal shield for submarines to hide under.⁸⁵

Wei's 1995 group, with four scientists and three TV journalists, went under the banner of the semi-official Chinese Association of Science and Technology and with private funding. They first flew to Canada, then walked and skied on the ice for fifteen peril-filled days to reach the north pole.⁸⁶ Little scientific research was conducted, but the expedition received wide publicity as a patriotic endeavor, although it received a cold reception from the administrative establishment that had been in charge of China's Antarctic exploration.⁸⁷ Four years later, Wei's effort was finally followed by the first official Chinese Arctic Expedition, this time sponsored by the Chinese Arctic and Antarctic Administration of the State Oceanic Administration, which had superseded the Antarctic Committee.⁸⁸

In contrast to the all-male cast in the Wei group in 1995 and the first Antarctic expedition in 1984–1985, the 1999 expedition, which sailed on the new Ukraine-built icebreaker *Xuelong* (snow dragon), included eight women in its membership of 124. Among them was Li Leshi, a photographer and explorer from Hong Kong, who was known as the first woman to have been to all “three poles”: she was on the second Chinese Antarctic expedition in 1985, climbed Mount Everest in 1992, and visited the North Pole in 1993.⁸⁹ During the 1999 Arctic expedition, she further impressed her male colleagues when she joined several of them for a quick swim in the icy Arctic sea.⁹⁰ The 1999 Arctic expedition acquired additional political, symbolic meaning because for the first time scientists from Taiwan and Hong Kong joined colleagues from the mainland to conduct research.⁹¹ As usual, there were a large



FIGURE 4. The opening ceremony of China's *Yellow River Arctic* station at Svalbard, Norway, 2004. From: <http://tech.sina.com.cn/other/2004-07-28/1535394522.shtml>.

number of journalists (about twenty) from many media outlets on board to report back to their vast audience anxiously tracking the progress of the expedition.⁹²

Why was there a one-and-a-half-decade lag in exploring the North Pole after the start of the Antarctic expedition in 1984? After all, China is located in the northern hemisphere and its climate is affected much more by the Arctic region than the Antarctica. Apparently, it was more difficult for China to establish research stations in the Arctic than in Antarctica. In contrast to the situation of open ocean surrounding land in the case of Antarctica, the Arctic is an ocean surrounded by land already claimed by other countries. To conduct research in the Arctic, China would have to negotiate with these countries to set up stations on land, or to sail to the Arctic aboard a capable icebreaker, which was not feasible until the purchase of *Xuelong* in 1994.⁹³ The slow pace of the Arctic program probably also derived from the absence of territorial claims in that region. By the turn of the 21st century, however, it became

increasingly clear that the Arctic ice was shrinking, probably due to global warming. It made the exploitation of the natural resources in the region—oil, natural gas, and fisheries—more feasible and economic than ever. In addition China, along with many other countries, looked to the Arctic as a possible transport route for oil and natural gas to fulfill its rocketing demand for energy amidst an economic boom.⁹⁴ Thus, despite its late start, China, after joining the International Arctic Scientific Committee in 1996, began to examine seriously the possibility of establishing a research station on Spitsbergen, also known as Svalbard. The efforts reached fruition in 2004, when the *Yellow River* station was built on the Norwegian island (Fig. 4).⁹⁵ China had finally conquered “the three poles of the world”.⁹⁶

SCIENTIFIC RESEARCH

Scientifically, China’s contributions to polar research were initially admittedly limited but later grew to be substantial and significant.⁹⁷ In Antarctica in the early 1990s, Chinese scientists carried out biological studies on the shrimp *Euphausia superba* Dana common in the region (Fig. 5). They also examined the interactions of four ecosystems (territorial, freshwater, tidal zone, and shallow-sea) using isotope analysis and other technologies, carried out geological and paleontological studies of Larsmann Hills and Prydz Bay in east Antarctic, made analysis of pollutants in the air, water, and soil near the *Great Wall* and *Zhongshan* stations, modeled the Antarctic climate and its effects on Chinese and global weather, conducted research on solar wind and Antarctic geomagnetism, and undertook physiological and psychological investigations on humans in Antarctica.

In the late 1990s, some of the earlier research continued, but a new emphasis was put on global change, especially the effects of the interactions between the ocean, sea ice, atmosphere, ice, and snow on the Antarctic and global climate. One innovative project established the time coordinates of the deposits, including the bird droppings, at the bottom of Antarctic lakes and concluded that the climate they recorded showed a warming trend in the last one hundred years or so. Local maps were made of the Grove mountains and surrounding area, affording a welcome opportunity for the Chinese to name geographical features of Antarctica.⁹⁸ Qin Dahe returned to the inland ice sheet to lead a project that collected and studied ice core and snow samples in the Dome A area, the highest and most hard-to-reach region in Antarctica.⁹⁹

In late 2004 and early 2005, with increased government and corporate funding, the twenty-first Chinese Antarctic expedition launched a new ambitious effort to march into Dome A to study the ice sheet and to establish a temporary station in preparation for a permanent station there in the near future. Scientifically, it was potentially the most original of all Chinese Antarctic research, because Dome A and the surrounding Gamburtsev range had never been systematically studied before.¹⁰⁰ Characteristically, in the Chinese press, it was billed as a project to seize the last of the four significant “spots” in Antarctica: The US had taken the South Pole, the French the magnetic pole, the Russians the coldest spot, now the Chinese would occupy the highest point on the ice sheet, dubbed “the commanding height” of Antarctica.¹⁰¹

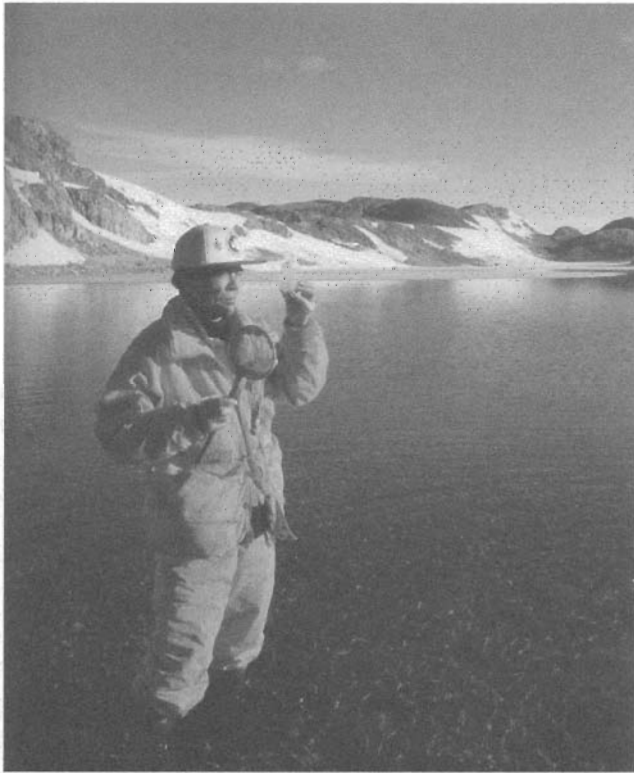


FIGURE 5. Chinese scientist collecting plankton in an Antarctic lake. From: *Chinese Arctic and Antarctic Expeditions*.

Among all the scientific activities, the collection and examination of meteoroids found in Antarctica probably garnered the most public attention. From the discovery of the first meteoroid by a member of the Chinese expedition in January 1999, the size of the collection grew rapidly.¹⁰² By 2004, Chinese scientists had found more than 4800 meteoroids in the Grove Mountains region in east Antarctica, including two from Mars. It made the area a new site for meteoroid hunting and China the third in the world in terms of its Antarctic meteoroid collections, just after Japan and the US.¹⁰³

Chinese Arctic research, while sharing many characteristics with its Antarctic program, naturally put more emphasis on oceanography and marine biology. During the 1999 expedition, for example, research was conducted on ice and snow, on gravitation and geodesics, and the Arctic climate—its role in global change, and its effects on Chinese climate. But the expedition also focused attention on the ocean currents in the Arctic and Pacific, their interactions, and their impacts on the China seas and climate. It also conducted research on fishery and marine biology in the Bering Sea. The economic benefits of such studies were obvious—China had come increasingly to rely on its fishery catches in the North Pacific.¹⁰⁴

CONCLUSION

This survey of China's Antarctic and, much more briefly, Arctic research indicated some of the features of the politics of big science in post-Mao China. Like other endeavors in big science, such as high-energy physics and space programs, polar research involved both huge expenditures and high stakes in national and international politics. At home, Antarctic research was promoted as a symbol of the new government's commitment to modern science and technology, which emerged in the last two decades of the twentieth century to compete with **Communism and Marxism** as the reigning ideology of modernization of the Chinese **Communist Party**. Internationally, China pursued its polar programs both to gain prestige and to establish its claims to any possible territorial or natural resource rights. These programs also served to demonstrate China's commitment to international scientific cooperation. Chinese scientists played a key role in pushing for both Antarctic and Arctic programs, not only because of their own strong sense of nationalism, but also because of the opportunities for scientific research they afforded. As global climate change increasingly became a major concern in the international

scientific community, polar research moved from the periphery to the center of the Chinese science policy, as it did in many other countries. Consequently, Chinese scientists were able to fashion research programs to capitalize on their growing capabilities in the polar regions to address many aspects of this most complex issue.

In China, polar research also enjoyed a special status that strongly resembled the heroic age of exploration in the west: it became a rally point for Chinese nationalism. Backed by the government and embraced by the media, Antarctic and Arctic research came to enjoy a popularity that was usually reserved for winning Chinese sports teams in the world. Thus, even though the government was concerned with the costs involved in initiating the enterprise, it came to realize the political benefits of such an undertaking and provided sustained support. In the later period, when the novelty of the Antarctic program gradually wore off, it came to be routinized and bureaucratized, while bureaucratic politics, in terms of resource allocation and turf conflict, has intensified. But intense scientific interest related to global climate change and a vibrant popular culture in an economically and socially liberalized country began increasingly to infuse vitality into the program. Thus, driven by a creative tension between Chinese nationalism and scientific internationalism, polar exploration has become and will remain a fascinating window for tracking the development of science and society in post-Mao China.

ACKNOWLEDGMENTS

*I am grateful to the organizers and participants at the fourth Maury Workshop on the History of Polar Oceanography, especially Helen Rozwadowski and Keith Benson, for stimulating discussions and helpful comments, to Zhang Li, Zhang Jiuchen, and Guo Tao for assistance and hospitality during my research in Beijing in 2004.

NOTES

1. China State Oceanic Administration, "Zhongguo jidi kaocha dashiji: 1984" (chronicles of China's polar research: 1984), accessed online in 2004 at <http://www.soa.gov.cn/jdsy/jddsjsj/1984.htm>. First proposed by Premier Zhou Enlai in 1965, the Four Modernizations covered agriculture, industry, national defense, and science and technology.

2. Interestingly, what motivated many of the Western explorers was the desire to find an Arctic route to China. See Bernard Saladin d'Anglure, "The Route to China: Northern Europe's Arctic Delusions," *Arctic* 37, no. 4 (1984): 446–452. See also Marijke Spies, *Arctic Routes to Fabled Lands: Oliver Brunel and the Passage to China and Cathay in the Sixteenth Century*, Myra Heerspink Scholz, trans. (Amsterdam: Amsterdam Univ. Press, 1997).
3. Chinese Arctic and Antarctic Administration, *Chinese Arctic and Antarctic Expeditions* (Beijing: Ocean Press, 2000), 224–226.
4. For example, William S. Bruce, *Polar Exploration* (London: Williams and Norgate, 1911) was translated as *Liangji tanxianji* (adventures at the two poles), trans. Liu Huru (Shanghai: Commercial Press, 1934).
5. Quoted in Wu Heng, *Keji zhanxian wushinian* (fifty years on the science and technology front) (Beijing: China Science and Technology Documentation Press, 1992), 546.
6. Walter Sullivan, *Assault on the Unknown: The International Geophysical Year* (New York: McGraw-Hill, 1961), 36–44.
7. Zhu Kezhen diary entry on April 26, 1957, in Zhu Kezhen, *Zhu Kezhen riji* (diaries of Zhu Kezhen), v. 4, 1957–1965 (Beijing: Science Press, 1989), 48.
8. Zhu Kezhen diary entry for September 21, 1957, in *Zhu Kezhen riji*, v. 4, 103.
9. Zhu Kezhen diary entry for April 1, 1962, in *Zhu Kezhen riji*, v. 4, 607.
10. Based on searches conducted in 2004 at the *People's Daily* website: <http://202.108.59.115:957/web/index.htm>.
11. For recollections of the influence of Soviet polar writings, see Jin Tao, *Baofengxue li de xiatian* (a summer with wind and snow storms) (Changsha: Hunan Education Press, 1999) and a TV interview with the geologist and polar explorer Wei Menghua in "Bingtian xuedi de shiye: Wei Menghua de liangji tanxian zilu" (an enterprise on the ice and in the snow: the paths of Wei Menghua's polar adventures), transcript of an interview on Beijing TV, October 22, 2004, accessed at <http://tech.sina.com.cn/d/2004-10-22/1554445241.shtml> in 2005.
12. Poland had acceded to the treaty in 1961 but was not invited to the first meeting of the Consultative Countries in Canberra because it did not conduct research in Antarctica. And, apparently to the surprise and relief of the Americans, the Soviets did not push for Polish representation at the Canberra meeting. A post-meeting memo to McGeorge Bundy, President Kennedy's national security advisor, reported that, "The attitude of the Soviet delegation was friendly and cooperative throughout. This is in keeping with the generally cooperative attitude they have shown in Antarctica since the days of the IGY." Lucius D. Battle to Bundy, July 28, 1961, in US Department of State, *Foreign Relations of the United States*, Kennedy series, v. 25, document 455, accessed online in 2004 at: <http://www.state.gov/t/pa/ho/frus/kennedyjfk/xxv/6027.htm>.
13. Wu Heng, *Keji*, 235–236.

14. Wu Heng, *Keji*, 239–242. On Tseng, see Peter Neushul and Zuoyue Wang, “Between the Devil and the Deep Sea: C.K. Tseng, Mariculture, and the Politics of Science in Modern China,” *Isis* 91 (no. 1) (March 2000): 59–88.
15. Yuan Li, “Fang guojia haiyangju jidi kaocha bangongshi zhuren Chen Liqi” (interview with Chen Liqi, director of the Office of Polar Research of the State Oceanic Administration). *Beijing qingnian bao* (Beijing youth news), March 30, 2003. State Oceanic Administration, “Chronicles of China’s Polar Research: 1964–1978,” accessed online at <http://www.soa.gov.cn/jdsy/jddsjsj/64-78.htm> in 2004.
16. Wu Heng, *Keji*, 543.
17. Wu Heng, *Keji*, 543. See also Yuan Li, “Interview.”
18. Wu Heng, *Keji*, 543. State Oceanic Administration, “Chronicles of China’s Polar Research: 1964–1978.”
19. State Oceanic Administration, “Chronicles of China’s Polar Research: 1979,” <http://www.soa.gov.cn/jdsy/jddsjsj/1979.htm>.
20. Wu Heng, *Keji*, 544.
21. State Oceanic Administration, “Chronicles of China’s Polar Research: 1979.”
22. State Oceanic Administration, “Chronicles of China’s Polar Research: 1980,” <http://www.soa.gov.cn/jdsy/jddsjsj/1980.htm>.
23. State Oceanic Administration, “Chronicles of China’s Polar Research,” 1980–1984, <http://www.soa.gov.cn/jdsy/jddsjsj/index.html>. Gao Dengyi, an atmospheric scientist from the Chinese Academy of Sciences who joined Japan’s 26th Antarctic expedition in 1984–1985, wrote about his experiences in *Nanjiqian li zhi tianming* (learning about one’s destination within the Antarctic circle), accessed at <http://kepu.llas.ac.cn/antarctica/diary/index.html> in 2005.
24. It was called a committee instead of a commission to give it a more academic profile. See Qin Dahe journal entries for May 8, 1989, in Qin Dahe, *Qin Dahe Hengchuan nanji riji* (Trans-Antarctic journal of Qin Dahe) (Beijing: China Science Popularization Press, 1993), accessed on the web at <http://www.tibet-web.com/ziran/qdh/hcnjrj/01-3.htm>, in 2005.
25. State Oceanic Administration, “Chronicles of China’s Polar Research,” 1980–1983, <http://www.soa.gov.cn/jdsy/jddsjsj/index.html>. Wu Heng, *Keji*, 543–546.
26. State Oceanic Administration, “Chronicles of China’s Polar Research: 1982,” <http://www.soa.gov.cn/jdsy/jddsjsj/1982.htm>.
27. Wu Heng, *Keji*, 564.
28. On the exhibit and the Canberra meeting, see State Oceanic Administration, “Chronicles of China’s Polar Research: 1983,” <http://www.soa.gov.cn/jdsy/jddsjsj/1983.htm>. See also Zhongguo jidi yanjiu zhongxin (Chinese Polar Research Center), “Nanji bushi meng” (Antarctica is not a dream), at <http://www.polar.gov.cn/shenqidalu/nanjibushimeng.htm>, accessed in 2004.
29. Jin Tao, “*Baofengxue*.”

30. Chinese Polar Research Center, "Antarctica."
31. Interview with Qu Tanzhou, director of the Chinese Arctic and Antarctic Administration, by Zuoyue Wang, Beijing, July 8, 2004.
32. State Oceanic Administration, "Chronicles of China's Polar Research: 1983."
33. Chen Hong, "Zongshu: Zhongguo nanji kekao 20 nian" (review: 20 years of Chinese Antarctic research), *Chaijing Shibao* (financial and economic times), October 23, 2004, accessed at <http://tech.sina.com.cn/it/2004-10-23/0834445417.shtml> in 2005.
34. Wu Heng, *Keji*, 546–547. State Oceanic Administration, "Chronicles of China's Polar Research: 1984," <http://www.soa.gov.cn/jdsy/jdds/1984.htm>.
35. On the 863 high-tech program, see Evan A. Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age* (Stanford: Stanford University Press, 2003), 153–158.
36. State Oceanic Administration, "Chronicles of China's Polar Research: 1984." The four modernizations referred to the modernization of agriculture, industry, defense, and science and technology.
37. In an interview in 2004, Qu Tanzhou, director of the Chinese Arctic and Antarctic Administration, pointed out that even though the US and the Soviet Union/Russia had not staked territorial claims to the Antarctic, they placed their stations in strategic positions in the continent to help them thwart anyone who might: the US placed its Amundsen-Scott station at the North Pole itself and the Soviet Union/Russia located its several stations in different parts of the continent. Qu Tanzhou interview by Zuoyue Wang, July 8, 2004, Beijing.
38. Qu interview.
39. Jin Tao, chapters on "Chufang nanjizhou" (first visit to the Antarctica) and "Nihao, qiaozhi dao" (greetings, King George Island), *Baofengxue*. Jin was a journalist from the *Guangming Ribao* (enlightenment daily) who was with the expedition. See also Wu Heng, *Keji*, 547–548, 554, and Chinese Arctic and Antarctic Administration, "Nanji kaocha pian" (chapter on Antarctic exploration), accessed at <http://www.chinare.gov.cn/njp/kcp.htm> in 2005.
40. Jin Tao, "Xinnian ziyè" (new year's eve), *Baofengxue*. Meanwhile, *Xiangyang-hong* took other scientists to nearby regions in the Antarctic ocean for oceanographic and marine biological studies, during which it barely survived a huge storm. *Ibid.*
41. Wu Heng, *Keji*, 553.
42. Wu Heng, *Keji*, 551.
43. State Oceanic Administration, "Chronicles of China's Polar Research: 1991," <http://www.soa.gov.cn/jdsy/jdds/1991.htm>.
44. Jin Tao, "Linli zhijian" (between neighbors), *Baofengxue*.
45. Wei-chin Lee, "China and Antarctica: So Far and Yet So Near," *Asian Survey* 30, no. 6 (June 1990): 576–586.

46. Wu Heng, *Keji*, 555–556.
47. Based on searches conducted in 2004 at the *People's Daily's* website <http://202.108.59.115:957/web/index.htm>.
48. State Oceanic Administration, "Chronicles of China's Polar Research: 1985," <http://www.soa.gov.cn/jdsy/jdds/1985.htm>.
49. *Chinese Arctic and Antarctic Expeditions*, 34. The text is in both Chinese and English.
50. Wu Heng, *Keji*, 558.
51. Wu Heng, *Keji*, 558–562.
52. Wu Heng, *Keji*, 564–565.
53. Wu Heng, *Keji*, 565.
54. State Oceanic Administration, "Chronicles of China's Polar Research: 1985," <http://www.soa.gov.cn/jdsy/jdds/1985.htm>.
55. State Oceanic Administration, "Chronicles of China's Polar Research," 1985–1991, <http://www.soa.gov.cn/jdsy/jdds/index.html>.
56. Qin Dahe, *Wo shi Qin Dahe* (I am Qin Dahe) (Lanzhou: Gansu Children's Press, 1990).
57. Ibid.
58. Qin Dahe journal entries for May 19–20, June 28, 1989, Qin, *Qin Dahe hengchuan nanji riji*.
59. Alan Franks, "After Trudging 2,000 Miles through Antarctic Wastes to the Pole, They Were Refused Even a Hot Shower," *The Times*, February 3, 1990.
60. Ruth Gledhill, "Race against Time to Finish," *The Times*, January 30, 1990.
61. Qin Dahe journal entries for February 25, 1989, in Qin Dahe, *Qin Dahe hengchuan nanji riji*.
62. Qin, *Wo shi Qin Dahe*. Zhang Jimin, *Tanxianjia zhaji* (notes by an explorer) (Guangzhou: Guangdong People's Press, 2000), 222–223.
63. Qin, *Wo shi Qin Dahe*. Will Steger and Jon Bowermaster, *Crossing Antarctica* (New York: Knopf, 1991), 152.
64. Qin Dahe journal entries for June 28, 1989, in Qin Dahe, *Qin Dahe hengchuan nanji riji*.
65. Qin Dahe journal entries for July 1, 1989, in Qin Dahe, *Qin Dahe hengchuan nanji riji*.
66. Qin Dahe, *Qin Dahe hengchuan nanji riji*. Steger and Bowermaster, *Crossing Antarctica*.
67. Xinhua News, "Scientific Book Sheds More Light on Antarctic Glaciology," November 5, 1995, accessed at Lexis-Nexus database. Boyarsky measured the ozone level three times a day slightly above ground. Steger and Bowermaster, *Crossing Antarctica*, 40–41.
68. Franks, "After Trudging 2,000 Miles." Steger and Bowermaster, *Crossing Antarctica*, 194–207.

- (Wei Menghua: the most attractive projects to me lie at the ends of the earth), *People's Daily* overseas edition, November 29, 2000.
85. "Bingtian xuedi de shiye."
 86. "Bingtian xuedi de shiye."
 87. "Bingtian xuedi de shiye." On the difficulties of conducting research during the 1995 expedition, see the interview with Zhao Jinping, one of the scientists on the expedition, by Bai Shanshan, in the latter's *Beiji canbai de taiyang* (the pale sun of the north pole) (Chengdu: Sichuan Juvenile Press, 2000), 95–96.
 88. The most detailed accounts of the 1999 Arctic expedition are *Chinese Arctic and Antarctic Expeditions*, 158–197, and Li Wenqi, *Laizi beiji quan de dianxun: Zhongguo shouci beiji kexue kaocha sanji* (messages from within the Arctic circle: notes on the first Chinese Arctic scientific expedition) (Shanghai: Shanghai Science and Technology Press, 2000).
 89. Chang Hong, "Li Leshi: diyiwen tazhu 'sanji' de Zhongguo nuxing" (Li Leshi: the first woman to land on the 'three poles'), <http://www.people.com.cn/GB/shenghuo/1094/2038116.html>, August 26, 2003, accessed on in 2005.
 90. Li wenqi, *Laizi beiji quan*, 288.
 91. Li wenqi, *Laizi beiji quan*, 325–328.
 92. *Chinese Arctic and Antarctic Expeditions*, 158.
 93. *Chinese Arctic and Antarctic Expeditions*, 142–146, 158.
 94. See Clifford Krauss and others, "The Big Melt: As Polar Ice Turns to Water, Dreams of Treasure Abound," *New York Times*, October 10, 2005.
 95. "Yellow River Station Opens in Arctic," *China Daily*, July 29, 2004.
 96. In October 2004, Chinese premier Wen Jiabao used the "three poles" expression in describing the achievements of Liu Dongsheng, a leading Chinese geologist. Qin Jie, "Zhongguancun li hua kexue" (talking about science in Zhongguancun), *People's Daily*, November 3, 2004, 4.
 97. Xie Weiqun, "Nanji kekao qunyingpu" (heroes of Antarctic research), *People's Daily*, March 25, 2003, 5.
 98. *Chinese Arctic and Antarctic Expeditions*, 138. On giving locations Chinese names, see Zhang Jimin, *Jujiaw nanji* (Antarctica in focus) (Beijing: Social Science Documentation Press, 2004), 60–61.
 99. *Chinese Arctic and Antarctic Expeditions*, 92–139.
 100. Yang Jianxiang, "China Takes Bold Steps into Antarctic's Forbidding Interior," *Science* 306, no. 5697 (October 29, 2004): 803–804.
 101. Li Bin and Wu Jingjing, "Zhongguo kekaodui tingjin nanji binggai zi dian" (Chinese Antarctic team moves to the top of the Antarctic ice sheet), *People's Daily*, December 19, 2004, 2.
 102. Li Bin and Wu Jinyou, "Wo kexuejia zai nanji faxian 'tianwai lai ke'" (our scientists found 'extraterritorial guests' in the Antarctic), *People's Daily*, January 25, 1999, 5.

69. Qin Dahe did manage to take a bath at the base. Qin Dahe diary entries for December 7, 9, 14, 1989, in *Qin Dahe hengchuan nanji riji*. Steger and Bowermaster, *Crossing Antarctica*, 202–207.
70. Qin Dahe diary entry for December 10, 1989, in *Qin Dahe hengchuan nanji riji*.
71. See journal entries for those dates in *Qin Dahe hengchuan nanji riji*. President Bush, who had served as the de facto ambassador to China in 1974–1976, surprised Qin in the reception at the Rose Garden outside the White House by greeting him in Chinese.
72. Xinhua, “Qin Dahe daibiao le zhongguo” (Qin Dahe represented China), March 3, 1990, in *Qin Dahe hengchuan nanji riji*.
73. Qin Dahe journal entries for April 7, 1990, in Qin Dahe, *Qin Dahe hengchuan nanji riji*.
74. *Qin Dahe hengchuan nanji riji*.
75. Zhang, *Tanxianjia zhaji*, 174–176.
76. Wu Shoufeng, “Suzao minzu linghun de jiazuo” (excellent works on shaping the national soul), *People’s Daily*, February 24, 1996, 4.
77. “Chushi weijie shen xianshi: daonian biaoyan yishujia Jin Naiqian” (death before mission accomplished: in memorial of the performance artist Jin Naiqian), *People’s Daily*, April 7, 1989, 4.
78. “Jidi xilie ziyi—nanji pian” (Polar series: the Antarctic), www.cztv.com/zhuanti/sanji/nanji/ accessed in 2005.
79. Huang Ziyi, “Chen Yadan: Cong nanji dao Luobupo de feifan zhilu” (Chen Yadan: an unusual journey from the Antarctic to Lopnur), accessed at <http://www.xinchang.com/human/mryxc/4.html> accessed in 2005.
80. “Li Huamei: Zhongguo diyige dao nanji kaozha de nu kexuejia” (Li Huamei: The first woman scientist to conduct research at the Antarctic from China), available at: <http://www.prc.net.cn/items/we/kxjy/kxdr2.htm> accessed in 2005. See also Shi Lihong, “Woman Geologist [Li Huamei] Takes a Hard Look at Life,” *China Today* 45, no. 6 (June 1996): 13–15.
81. “Jin Qingmin: Zhongguo diyige pandeng ‘wensenfeng’ de nu kexuejia” (Jin Qingmin: China’s first woman scientist to climb Mount Vinson,” available at: <http://www.prc.net.cn/items/we/kxjy/kxdr1a.htm>, accessed in 2005. Wang Haozheng, *Weixian de jiaobu* (dangerous steps) (Beijing: Social Science Press, 2002), available at <http://book.sina.com.cn/liter/dangerousstep/> accessed in 2005.
82. “Zhongguo nuxing yuedong nanji” (Chinese women wintering in Antarctica), *Beijing Youth Daily*, March 9, 2001, 15.
83. Transcript of the TV program *Licheng* (journey) on “Aisijimoren de shengcun zimi” (the secrets for the survival of the Eskimos) on March 8, 2004, accessed at <http://www.cctv.com/program/lc/20040308/100355.shtml> on in 2005.
84. Gao Yanfang, “Wei Menghua: zui xinyi de shiye dao diqiu de dingduan qu”

103. Chen Hong, "Zongshu: Zhongguo nanji kekao 20 nian" (Review: 20 years of Chinese Antarctic research), *Chaijing Shibao* (financial and economic times), October 23, 2004, accessed at <http://tech.sina.com.cn/it/2004-10-23/0834445417.shtml> in 2005.
104. *Chinese Arctic and Antarctic Expeditions*, 158–197.