

# An assessment of China's participation in polar subregional organizations

SHAN Yanyan<sup>1\*</sup>, HE Jianfeng<sup>1</sup>, GUO Peiqing<sup>2</sup> & HE Liu<sup>3</sup>

<sup>1</sup>Polar Research Institute of China, Shanghai 200136, China;

<sup>2</sup>Ocean University of China, Qingdao 266100, China;

<sup>3</sup>Shanghai University of Political Science and Law, Shanghai 201701, China

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**Abstract** International cooperation is vital for the polar regions. China's past polar cooperation has tended to focus on intergovernmental and bilateral mechanisms rather than regional cooperation. However, regional and subregional cooperation is playing an increasing role in the polar regions with the rapid development of geopolitics and global climate change. Involvement in three subregional polar organizations—the Asian Forum for Polar Sciences (AFoPS), the Pacific Arctic Group (PAG), and the China-Nordic Arctic Research Center (CNARC)—in the last two decades reflects China's improved skills and flexibility in participating in international polar cooperation and represents an exercise in the “win-win” principle under China's Arctic policy. This paper presents a review of the development of polar subregional cooperation, examines China's participation in three of subregional organizations and provides feasible suggestions for China's future engagement with these organizations.

**Keywords** polar, subregional, international cooperation

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## 1 International cooperation in the polar regions

International cooperation is an indispensable tool for carrying out scientific activities in the polar regions, where the challenges for science and logistics are significant. Early scientific research in the polar regions was mainly carried out under the coordination of the World Meteorological Organization (WMO) and the International Council of Scientific Unions (ICSU) through a series of International Polar Year (IPY) activities. Of them, the 3rd IPY (1957–1958, also known as the International Geophysical Year, IGY) was an extraordinary achievement during the Cold War; twelve countries, including Argentina, Australia, Belgium, Chile, France, Japan, New Zealand,

South Africa, the UK, the U.S., and the USSR established 50 research facilities in Antarctica and conducted intense multidisciplinary polar research (Walton et al., 2018).

To further promote Antarctic scientific cooperation following the IGY, in 1958, the ICSU established the Special Committee on Antarctic Research (SCAR), which was subsequently renamed as the Scientific Committee on Antarctic Research. The SCAR has maintained an influential role as an objective and independent scientific organization in the Antarctic region and has grown in membership since its founding (SCAR, 2022). The Antarctic Treaty of 1959 (12 U.S.T. 794, 402 U.N.T.S. 71, 19 I.L.M. 860, 1980) was signed in 1959 and entered in force in 1961 to alleviate territorial disputes and promote peaceful scientific cooperation. The Treaty system has developed new protocols and bodies to deal with new situations. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was

\* Corresponding author, E-mail: shanyanyan@pric.org.cn

established in 1982 with the objective of conserving Antarctic marine life. The Committee for Environmental Protection (CEP) was established in accordance with Article 11 of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) to provide advice and formulate recommendations to the Antarctic Treaty Consultative Meeting (ATCM). The Antarctic Treaty, the Protocol on Environmental Protection to the Antarctic Treaty, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), the Convention for the Conservation of Antarctic Seals (CCAS), along with supplementary measures, forms the Antarctic Treaty System (ATS), which works as the governing and cooperation system for the region. In 1988, the logistics working group was separated from the SCAR to form an independent organization, the Council of Managers of National Antarctic Programs (COMNAP), to facilitate scientific research in the Antarctic Treaty Area among its members (COMNAP, 2022).

The Arctic region consists of the Arctic Ocean and the northern parts of five Arctic littoral states (Canada, Denmark, Norway, Russia, and the United States). In the late 1980s, as the Cold War began to ebb, cooperation was enhanced in the circumpolar North. The International Arctic Science Committee (IASC), established in 1990, promotes and supports cutting-edge interdisciplinary research to foster greater scientific understanding of the Arctic region and its role in the Earth system (IASC, 2022). In 2008, following the structure of the SCAR, the IASC implemented an institutional reform that established working groups of five different disciplines. To cope with the environmental issues brought by rapid global change, the Arctic Council (AC) was officially formed in 1996 by the eight Arctic countries as a leading intergovernmental forum promoting cooperation in the Arctic region. Since the AC's establishment, international cooperation in the Arctic has grown rapidly, with the formation of numerous international organizations in various types of Arctic cooperative arrangements, such as the International Arctic Social Sciences Association (IASSA), the Pacific Arctic Group (PAG), and the University of the Arctic (UArctic) in support of Arctic science cooperation, as well as the Forum of Arctic Research Operators (FARO) (the Arctic equivalent of COMNAP) and the Ny-Ålesund Science Managers Committee (NySMAC) on logistics and operational cooperation in the region. In addition, bipolar organizations have been established to improve cooperation on a larger scale, such as the Association of Polar Early Career Scientists (APECS), the European Polar Board (EPB), and the Asian Forum for Polar Sciences (AFoPS).

Antarctica and the Arctic are two opposite regions of the planet. Other than the ATS and the AC, which constitute the main governmental cooperative regimes in the polar regions, most polar cooperation platforms are nongovernmental in nature, such as the SCAR and the COMNAP in the Antarctic and the IASC and the FARO in

the Arctic. These organizations are critical for preserving peace and stability in the polar regions, as well as promoting scientific research, environmental protection and logistical cooperation.

## 2 The increasing role of polar regional/subregional cooperation

In the context of globalization, the development and effectiveness of regional/subregional cooperation for addressing all kinds of regional and global challenges has been widely discussed by scholars (Hettne and Söderbaum, 2006). The general concepts of “regional” or “subregional” have been extensively analyzed by scholars from many disciplines (Colombo, 2019a). Among them, Mansfield and Solingen (2010) define a “regional” as related to “groups of countries located in the same geographic space”. Although it can sometimes be problematic to draw a line between a “region” and a “subregion”, a “subregion” generally refers to a smaller geographical space and fewer states than a region (Gochhayat, 2014); thus, “subregional cooperation” can be defined as “being constituted by an intensified or structured relationship between geographically adjacent entities to facilitate both interstate and substate cooperation in certain selected issue areas” (Carmen, 2013). Antarctica and the Arctic Ocean are unique in geography and environment. Because some problems occur uniquely in specific regions or are best solved through regional cooperation, the significant role of regional or subregional cooperation in the polar context is reflected in the following three aspects.

### 2.1 The remote and harsh environment of the region

Antarctica and the Arctic Ocean are geographically remote and notable for their harsh environment (USGS, 2022). The logistics capacity of one country alone is insufficient to facilitate research in the polar regions (Colombo, 2019a). Regional or subregional cooperation could conserve resources and improve efficiency (Hettne and Söderbaum, 2006). Regional cooperation could also support large-scale scientific projects that a single country may not be able to undertake independently (MOSAIC, 2022). Regional or subregional groups focus on a particular region for conducting a project, and researchers from the various member countries share an interest in understanding the specific problems in this region. There are many examples of successful multinational regional/subregional cooperative arrangements that have targeted the Arctic and Antarctic regions, including the Central Arctic Ocean Fisheries Agreement (CAOFA) by five Arctic coastal littoral states, together with China, Iceland, Japan, Republic of Korea, and the European Union, and the Dronning Maud Land Air Network (DROMLAN) project among 11 countries with research facilities in Queen Maud Land,

Antarctica. If programs such as these were carried out by a single country, it would be impossible to achieve the same results.

## 2.2 Regional synergies can be formed among nondominant states

According to a study by Colombo (2019a), more than 80% of countries currently conducting scientific research in the Antarctic are members of one of three regional groups: the AFoPS, EPB, or Reunión de Administradores de Programas Antárticos Latinoamericanos (RAPAL). The only five countries that are not members of any of these regional groups are the United States, Russia, Australia, New Zealand, and South Africa (Colombo, 2019a). Nevertheless, the five countries are deeply involved in Antarctic matters and have a sizable Antarctic budget. Australia, New Zealand, and South Africa are also considered gateway states, whose connections to Antarctica have various historical and contemporary linkages. Even though these countries are not part of a regional group, they still engage in cooperation among themselves and with other parties. For example, New Zealand and the United States have worked together in Antarctica for more than fifty years, and South Africa is the only African country that is engaged in Antarctic research, whose cooperation relies on the DROMLAN partnership. Against the backdrop of the complex geopolitics of the polar regions, regional synergies are conducive to the development of scientific research and achieving national interests, especially for countries with less capacity (Colombo, 2019a).

## 2.3 Regional cooperation could eliminate political differences

Since the end of the Cold War, and especially since the beginning of the new century, polar issues have gradually become a central focus of international politics and global governance. With global climate and environmental changes, the important strategic value of both the Antarctic and the Arctic Ocean have made the polar regions once again the focus of geopolitical confrontation. Regional or subregional cooperation could build understanding and mutual trust, eliminate political differences, and eventually foster cooperation to solve urgent global problems and achieve the goal of strengthening global and regional governance and improving human welfare (Heininen and Yang, 2019; Leppäranta et al., 2021).

# 3 China's participation in three subregional organizations

China's participation in international organizations reflects the change and growth of its position in the international system. With its peaceful rise, China's participation in international organizations has shifted from

learning and adaptation to assuming more responsibilities and making greater contributions to global governance. As a late arrival to the polar regions, China is dedicated to making its own contribution to polar knowledge. In addition to actively participating in the existing SCAR and IASC framework and related programs, China has also attached great importance to the construction and activities of polar subregional cooperation. Since 2004, China has been actively participating in three subregional organizations: the AFoPS, the PAG, and the China-Nordic Arctic Research Center (CNARC), which are the only three subregional international organizations cosponsored by China in the polar field. These organizations represent different types of subregional cooperation triggered by the rise of China and Asian countries' participation in polar affairs and other incentives.

## 3.1 AFoPS

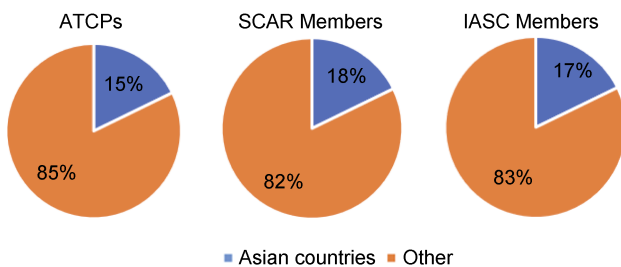
Most Asian countries have neither geographical proximity nor historical links to the Arctic or Antarctic regions. Although Japan was an original signatory to the ratification of the Antarctic Treaty, the Treaty of Peace with Japan, signed at San Francisco on 9 September 1951 (3 U.S.T 3169, TIAS No. 2490, 1951), prohibited Japan's territorial rights to the continent (Hara, 2006). India's early scientific activities were only involved in the Arctic Ocean. It was not until the 1980s (Sarma, 2018) that India organized its first Antarctic expedition. With the exception of Japan, Asian countries were generally late to join polar international organizations (Table 1), and the proportion of Asian countries in polar international organizations remains low.

So far, fifty-five states have signed the Antarctic Treaty. Due to the high cost of research and base building, most Asian states are excluded from polar activities. Conducting substantial scientific research activity in Antarctica, such as the establishment of a scientific station or the dispatch of a scientific expedition, are the means by which a nonclaimant state attains a consultative role in the Antarctic Treaty. Ten Asian states have joined the Treaty thus far (ATS, 2022), of which only China, Japan, Republic of Korea, and India are Antarctic Treaty Consultative Parties (ATCPs) affiliated with the right of ATCM decision-making. These same four states obtained observer status on the AC in 2013 from Asia. Other than the above two governmental mechanisms, the SCAR and the IASC are the major international nongovernmental organizations in the polar regions. Of the forty-five SCAR members, eight are Asian countries (SCAR, 2022). In the Arctic, China, Japan, Republic of Korea, and India are the only Asian states of a total of 23 IASC members (Barr, 2013; IASC, 2022). Asian members constitute less than 20% (Figure 1) of the organizations mentioned above.

To encourage and facilitate cooperation among Asian countries, former directors of the polar research institutes of

**Table 1** Years that AFoPS members joined other polar international organizations

Country	ATCP	SCAR	IASC	AC Observer
China	1985	1986	1996	2013
Japan	1961	1958	1991	2013
Republic of Korea	1989	1990	2002	2013
India	1983	1984	2012	2013
Malaysia	not yet	2008	not yet	not yet
Thailand	not yet	2016	not yet	not yet

**Figure 1** Proportion of Asian countries in major polar international organizations.

China (Zhang Zhanhai), Japan (Okitsugu Watanabe), and Republic of Korea (Yeadong Kim) recognized the need for dialogue when attending the 2003 COMNAP conference in Brest, France (Colombo, 2019b). On 25 May 2004, the three directors met in Shanghai to confirm the establishment of the AFoPS and formulated its Terms of Reference (TOR). The AFoPS is a nongovernmental organization whose members work together to conduct cooperative research activities, to present Asian achievements to international polar communities, and to encourage greater involvement of Asian countries in polar sciences (AFoPS, 2022). The organization consists of a committee, an annual general meeting (AGM), and working groups (WGs). Each member country sends a representative and a coordinator to sit on the Committee. The committee is headed by the Chairperson, who with the Secretariat rotates among the member countries for a two-year term. The AFoPS holds two meetings each year, in spring and autumn. The spring meeting is usually held as part of the Arctic Science Summit Week (ASSW), and the autumn meeting takes place at the AGM, which is held by the nation of the current Chair. In addition, six working groups have been established, namely Earth Science (ES), Life Science (LS), Planetary Science (PS), Glaciological Science (GS), Ocean Science (OS), and Logistics & Outreach (L&O) (AFoPS, 2022). These are responsible for promoting and coordinating science programs and logistic cooperation between the member countries.

At present, the AFoPS consists of six members, China, Japan, Republic of Korea, India, Malaysia, and Thailand, plus the 4 observer countries of Indonesia, Philippines, Sri Lanka, and Vietnam (AFoPS, 2022). The Chair of the AFoPS has been frequently invited by the SCAR, the IASC,

and other international organizations to report on the progress of the organization and explore possible cooperation opportunities on behalf of Asian countries. The country that hosts the Secretariat also submits Information Papers to the ATCM.

As one of the key sponsors of the AFoPS, China has made significant contributions to the establishment and development of the organization. In addition to investing human resources to participate in the annual conference, hosting AFoPS AGMs, and assuming the responsibilities of the rotating Chair and Secretariat positions, China has opened its polar expedition platform and invited Asian scientists, especially those from nonpolar Asian countries, to participate. So far, China has accepted ten Thai scientists to participate in Chinese National Arctic and Antarctic Research Expeditions (CHINARE). China has also accepted postdoctoral fellows from Asian countries to work in relevant Chinese institutions.

### 3.2 PAG

The PAG is a science organization for the Pacific sector of the Arctic Ocean. In the context of global warming, the Arctic is experiencing the most extreme impact. To understand how the Arctic, especially the Pacific sector, responds to climate change and analyze how the ecosystems react under such circumstances, the PAG was created in 2004 by relevant research institutions and individuals from six Pacific countries: China, Canada, Japan, Republic of Korea, Russia, and the United States.

The idea of establishing the PAG was first put forward in 2002. The leading sponsors were Martin Bergmann from the Canadian Ministry of Natural Resources, John Calder from the U.S. National Oceanic and Atmospheric Administration, Jackie Grebmeier from the University of Tennessee, and Zhang Zhanhai from the Polar Research Institute of China. During the 2003 ASSW in Sweden, representatives of the six countries made a proposal to the IASC to establish the PAG, which was later approved. In 2004, the PAG held its first meeting during the ASSW held in Reykjavik, Iceland.

As a subregional organization, the PAG improves understanding of the current situation and future trends of the Arctic system through the sharing and integration of data, information, and resources among member states. The

four principal science themes of the PAG are climate, contaminants, human dimensions, and the structure and function of Arctic ecosystems (PAG, 2022). The PAG Executive Committee is composed of a Chair, a Vice Chair, and project leaders. The Chair is elected for a two-year term. The Secretariat is assigned on a rotating basis between member countries and provides administrative support for the functioning of the organization. The PAG holds two meetings every year. The spring meeting is held during the ASSW, focusing on organizational business, and the autumn meeting, which is hosted by member countries, is focused on scientific issues such as data treatment and preparation for special issues in English-speaking scientific journals.

All six member states conduct annual scientific voyages to the Pacific Arctic sector. From the beginning, countries routinely exchanged their expedition information.

After a series of workshops from 2008 to 2010, the PAG launched its first joint research project—the “Distributed Biological Observatory (DBO)”. By setting a series of standard sections from the north of the Bering Sea to the northeast of the Chukchi Sea, PAG member states collect data to understand the changes in the regional ecosystem.

So far, the PAG has launched three projects, namely the DBO, the Pacific Arctic Climate and Ecosystem Observatory (PACEO), and the Central Arctic Ocean Observatory (CAO) (Table 2). The PACEO aims to carry out climate and ecological observations in the high latitude of the Pacific Arctic sector, which is experiencing the largest loss of sea ice. The CAO is designed to understand the whole ecosystem and the distribution of fishery resources in the central area of the Arctic Ocean. Through joint monitoring and observation, PAG members have obtained valuable scientific data.

**Table 2** PAG projects

Name	Description and aim	Starting year	Responsible country
DBO	Through the annual Arctic survey voyage, a series of standard sections are set up from the north of the Bering Sea to the northeast of the Chukchi Sea. The water samples and sediment data records of the sections are collected and shared with the DBO international network platform to understand the ongoing changes to the ecosystem in the Arctic Pacific sector due to the physical driving factors.	2008	The United States
PACEO	Through resource sharing, this aims to observe the high latitude of the Pacific Arctic sector with the largest loss of sea ice and implement repeated section investigations from the northern slope to the continental shelf, covering multiple disciplines such as physical oceans, biogeochemistry, bioecology, sea ice, atmosphere, remote sensing, and numerical prediction.	2014	Republic of Korea
CAO	With the goal of understanding the whole ecosystem of the central Arctic Ocean, the exchange between continental shelf and basin, and the distribution of fishery resources, the CAO carries out multi-ship joint investigations using acoustic sensors and trawls and international cooperative observations of multiple ecosystems.	2018	Japan

China has participated in the formation of the PAG and has served as the Chair or Vice Chair of the organization ever since its establishment. In the first few years, China took the initiative to assume the work of the PAG Secretariat and website maintenance. In addition, China has participated in PAG projects. From the 3rd Chinese National Arctic Research Expedition (CHINARE) in 2008 to the 9th CHINARE in 2018, China has undertaken the section survey of the DBO project.

### 3.3 CNARC

China-Iceland cooperation in the Arctic was the foundation for China-Nordic cooperation. In April 2012, the Chinese and Icelandic governments signed an MoU on marine and polar science, which initiated bilateral cooperation on Arctic science. To implement the agreements, the China-Iceland Joint Auroral Observatory (CIAO) project was launched at Karholl, north of Akureyri, Iceland (He et al., 2021). In August 2012, the Chinese icebreaker R/V *Xuelong* was invited to visit Iceland during the expedition of the 5th CHINARE to the Arctic Ocean.

Through a series of bilateral seminars, Chinese and Icelandic institutions and researchers quickly established close and friendly ties, and they proposed expanding

China-Iceland cooperation to include other Nordic countries. At the first China-Nordic Arctic Cooperation Symposium held in June 2013, China proposed establishing the CNARC, which was supported by research institutions from all five Nordic countries. On 10 December 2013, ten research institutions (Table 3) or think tanks in the field of Arctic research from China and the Nordic countries signed a cooperation agreement, and the CNARC was officially established.

The CNARC is an open platform and a scholarly network for Arctic social science research. It is committed to improving understanding of the Arctic and its global impact and promoting cooperation between China and the Nordic countries. Its research themes include Arctic climate change and its impacts, Arctic resources, shipping and economic cooperation, and Arctic policy-making and legislation (CNARC, 2022). The CNARC is composed of an Executive Committee, an Assembly of the Representatives of Member Institutes, Directors, and a Secretariat. It undertakes various forms of academic exchange, such as academic symposia, business roundtables, fellowships for visiting scholars, and joint publications. Academic symposia are held once a year and are hosted alternately by member institutions to discuss predetermined

topics related to Arctic research.

Until now, the CNARC has had 18 member institutions (Table 3) and has successfully held 8 academic symposiums and 5 business roundtables, covering topics such as politics, law, security, economy, sustainable development, sea routes, fishery, tourism, and indigenous people. It has funded more

than 20 scholars for international study and exchanges and successfully published one special issue entitled "Arctic Policy and Sustainable Development" on *Advances in Polar Science* (Bertelsen, 2016; Heggelund and Cheng, 2016; Pan and Wang, 2016; Tommasini, 2016; Zhao, 2016) and two monographs.

**Table 3** Member institutions of the CNARC

Founding members	Joined members
Polar Research Institute of China Shanghai Institute for International Studies Tongji University Ocean University of China Icelandic Center for Research Nordic Institute of Asian Studies Arctic Center, University of Lapland Fridtjof Nansen Institute Norwegian Polar Institute Swedish Polar Research Secretariat	Dalian Maritime University Shanghai Jiao Tong University Shanghai Ocean University South China Business College University of Akureyri Arctic University of Norway Nord University Umea University

China was accepted as an AC observer owing to the support of the Nordic states, which held the majority of seats. Since then, Chinese scholars have been cooperating with Nordic countries and have formed the CNARC. Great efforts have been made by China to ensure the smooth operation of the CNARC. First, China employed a Nordic executive secretary, Dr. Egill Thor Nielsson from Iceland, who had worked at the Polar Research Institute of China (PRIC) from 2012 to 2018 and performed professionally as a bridge within the organization. Second, China has actively promoted exchanges and communication between China and the Nordic countries by organizing official visits, holding and participating in symposia, and sending and receiving visiting scholars. Finally, China is dedicated to engaging businesses as well as artists via CNARC Business Roundtables and exchange visits to promote sustainable

commercial and cultural cooperation between China and the Nordic states.

#### 4 An evaluation of the accomplishments of the three organizations

There are numerous criteria to judge the success or effectiveness of an international organization. Xiao Yang (2019) proposed some concrete indicators to assess the success of an international organization, including its performance in fulfilling the objectives, organizational development, and reputational improvement. In this section, we will comparatively analyze the effectiveness and achievements of the three organizations (Table 4) using these criteria.

**Table 4** Comparison of the three organizations

	Operation	Structure	Achievements
AFoPS	(1) Annual meetings (2) Information and personnel exchange (3) Joint publications	(1) Rotating President and Secretariat (2) Website (3) Accept new members	(1) MoU with IASC and SCAR (2) Observers from Australia and New Zealand (3) Leaders in SCAR and IASC (4) Trilateral High-Level Dialogue on the Arctic
PAG	(1) Annual meetings (2) Information exchange (3) Joint publications	(1) Rotating President and Secretariat (2) Website (3) Fixed members	(1) Letter of Agreement with IASC (2) High-quality monitoring and science in the Arctic
CNARC	(1) Executive Committee, academic symposia, and roundtables (2) Joint publications (3) Visiting scholar program	(1) Chinese director and elected vice directors (2) Permanent Secretariat (3) Website (4) Accept new members	(1) Endorsed by China's Arctic Policy (2) Observers from the United States, Canada, and Russia

##### 4.1 AFoPS

In 2008, a special committee was formed to evaluate the performance of the AFoPS. Through a questionnaire survey and a mid-term discussion, the committee completed an evaluation report. According to the report (Kim et al., 2010), the AFoPS has done a good job at developing new

members, publishing joint publications, fostering logistics cooperation, and holding seminars and training (Kim and Jeong, 2015). Since its establishment, the AFoPS has been widely praised for promoting the participation of Asian countries in polar activities. It has helped Asian countries that do not have the resources for setting up their own research facilities and programs to join other Asian

countries' expeditions, train their personnel, and share facilities in both the Arctic and Antarctica (Tang, 2022). However, the report also points out that the AFoPS is deficient in the operation of working groups, proposing joint scientific projects, and enhancing the status of Asian countries as a whole. The AFoPS has discussed organizational reform and development at several meetings, but, unfortunately, there has been a lack of substantive action.

In recent years, the AFoPS has committed to improving its international status. In 2016, it signed a tripartite agreement with the IASC and the SCAR (Colombo, 2019a), indicating that the AFoPS was recognized by the polar community. The unity of Asian states in the AFoPS is a strong voice on behalf of "Asia" in polar affairs and safeguards the legitimate rights and interests of Asian countries (Colombo, 2019b). Asian countries usually make connections on important issues during the AFoPS meeting. With the collective support of AFoPS members, Asian representatives have begun to serve as leaders in major international organizations such as the SCAR and the IASC. This has further enhanced the status of Asian countries and gradually changed the balance of power in the polar science arena. The number of countries or organizations interested in the AFoPS has gradually increased. Recent AGMs have attracted participants from non-Asian countries such as Australia and New Zealand. The EPB and individuals with an interest in polar issues are also often invited. In 2019, during the 4th Trilateral High-Level Dialogue on the Arctic in Busan, Republic of Korea, the AFoPS was included as a possible channel for intergovernmental cooperation (Ministry of Foreign Affairs, Republic of Korea, 2019).

In the future, the AFoPS should take measures to encourage its members to actively participate in working groups, launch joint scientific programs, and continuously support nonpolar Asian countries through education and training as well as research cooperation. It might also be helpful if the AFoPS considers focusing more on young scientists and establishing a permanent secretariat.

## 4.2 PAG

The PAG was originally established under the umbrella of the IASC. In 2008, the IASC began to establish working groups with reference to the SCAR. After consulting with the IASC, the PAG chose to be an independent international organization outside of the IASC, instead of being an IASC working group. In 2009, the PAG and the IASC signed an agreement (PAG, 2022), and the two organizations have since maintained close cooperation.

The PAG has six members and no observers, and cooperates on scientific monitoring and observations in the Pacific sector of the Arctic Ocean. As a small subregional organization (Yang et al., 2015), the PAG has grown steadily by launching a series of scientific projects. The investigation areas of the PAG are relatively concentrated.

There are unified research standards and a well implemented data-sharing policy. After the successful implementation of the DBO and PACEO projects, the development of the CAO project is more closely aligned with international needs. In the context of global warming, the melting of sea ice will make fishing possible in the newly opened Arctic waters in the future. To prevent unregulated fishing activities in the high seas of the central Arctic Ocean, the five Arctic littoral states and other invited parties, including China, Japan, and Republic of Korea, signed the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean on 3 October 2018. The next step is to establish the machinery needed to move this arrangement from paper to practice (Young et al., 2022). At nearly the same time, the PAG started the CAO project, dedicated to improving understanding of the area's ecosystem and fishery distribution. Through the successful implementation of three joint projects, the DBO, PACEO, and CAO, there have been several scientific achievements (Grebmeier et al., 2015). The PAG has become an important source of Arctic knowledge and a provider of high-quality scientific data in the region (Comiso et al., 2022).

However, the PAG is a loose, nongovernmental organization whose members are primarily research institutions (Yang et al., 2015) with little commitment to project implementation. One obvious example has been Russia, whose representatives are silent at the majority of the decision-making meetings and contribute little to the projects. Influenced by the military conflict between Russia and Ukraine, the normal process of Arctic cooperation has been disrupted and will be difficult to recover in the short run. Nevertheless, Young et al. (2022) argues in his recent article that the Arctic is still a "low-tension" region, where challenges with wide global impact require international cooperation. The PAG is an important stakeholder of and contributor to Arctic governance. As Russia has no substantive participation in specific activities in the organization, the impact of the Russia-Ukraine conflict on the PAG is limited. When the international situation eases in the future, the PAG should find a constructive way to mobilize the participation of Russian scientists in PAG projects.

## 4.3 CNARC

The CNARC is the youngest but the most vigorous organization of the three. The establishment of the CNARC has benefited from the development of Chinese social science in the polar field. Before 2007, few Chinese social scientists paid attention to the Arctic. When Russian explorers planted a national flag on the seabed below the North Pole in 2007, a gradual awakening took place among Chinese government officials and social science researchers (Jakobson and Peng, 2012). Since then, Chinese Arctic research has formed a rationally structured research team and recruited a group of mature social scientists. They have provided timely intellectual support for China's effective

initiation and participation in the CNARC (Li and Li, 2020). Well-known representatives, such as Prof. Yang Jian from the Shanghai Institute for International Studies (SIIS) and Prof. Zhang Xia from the PRIC, have served as the first deputy directors of the CNARC. Several other recognized Chinese scholars attended as founding members.

The other factor in the successful establishment of the CNARC is that, with the evolution of the Arctic economy, geopolitics, and environment, all the members at the table are ready and eager to cooperate. Outstanding scholars and researchers from China and the Nordic states gather to discuss Arctic cooperation and how to become responsible partners for the future of the Arctic. CNARC symposia have received extensive attention and participation, scholars have carried out exchange visits under the CNARC umbrella, and high-quality collaborative studies have been published. In addition, the CNARC has provided policymakers with useful suggestions and promoted substantial cooperation within the business community.

CNARC's achievements "in promoting exchanges and cooperation among the stakeholders" were highly praised in China's 2018 Arctic Policy (The State Council Information Office of the People's Republic of China, 2018). The cooperation between the Nordic countries and China within the CNARC has established a model for cooperation between Arctic and non-Arctic countries. The CNARC has promoted the transfer of Arctic knowledge from the Nordic countries to China and formed a network for policy dissemination and information release among member countries. The CNARC academic symposia and business roundtables are important channels for policy coordination, academic exchange, and business cooperation. Furthermore, face-to-face communication helps build a sense of mutual trust, strengthens the awareness of cooperation, and eliminates differences and obstacles.

There are flaws in CNARC's structure, however. In 2017, to solve the dilemma of expanding membership and maintaining an effective decision-making body, the CNARC made its first adjustment by creating an executive committee (Heininen and Yang, 2019). It also lacks criteria for accepting new members. In addition, the CNARC is subject to the influence of future international politics. Affected by the COVID pandemic, CNARC symposia have been moved online, and business roundtables and visiting scholar projects have been postponed or stalled for the time being.

## 5 Benefits and challenges of China's participation in subregional organizations

China has greatly benefited from participating in the three subregional organizations. Participation has promoted China's natural science in moving toward cutting-edge disciplines and international cooperation, and it has

strengthened the connection between science and policy (Heininen and Yang, 2019). It has encouraged a rapid maturity of Chinese social science scholars and the development of a domestic network of social scientists (Heininen and Yang, 2019). It has also trained a number of professionals in international cooperation as well as in promoting China's familiarity with the rules of international organizations.

Although China's participation in polar regional or subregional organizations has made great progress, it still faces some challenges. First, there are deficiencies in the theory and exercise of China's involvement in international cooperative arrangements. This is reflected in flaws in the structures of the established polar organizations, as well as in the underdevelopment in communications and problem-solving. Second, China still lacks a reserve of talent and professional knowledge in scientific research, law, and foreign languages, which are conditions for participation in regional or subregional organizations. Last, with the existing governance structure unchanged, the actual capability of scientific research determines a country's voice and influence in the field of polar international cooperation. China should increase its investment in polar scientific research to improve its research ability.

China's involvement is strongest in the CNARC, followed by the AFoPS and the PAG. In the future, China needs to contribute more to PAG projects and activities. Although active in the AFoPS, China should open more resources and platforms to other Asian countries, especially to those lacking their own research facilities and programs. Finally, it should always be kept in mind that China's robust involvement in the CNARC is changeable and subject to the influence of current and future international politics.

## 6 Conclusion

The AFoPS, PAG, and CNARC are the only three subregional international organizations in the polar field cosponsored by China. Through an in-depth study and analysis of the three subregional international organizations, we found that each organization has a unique background and motivation for its establishment. The organizations also have their own operational advantages and disadvantages. The organizations focus on polar scientific and logistic cooperation, which China has benefited greatly from. They have improved the level of China's natural and social science research, strengthened the connection between science and policy, and trained a number of professionals in international cooperation. Although there is still much room for improvement, China's participation in regional and subregional international organizations reflects China's ongoing transformation in improving its skills in polar international cooperation and of putting into practice the "win-win" principle under China's Arctic policy.



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