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Influence of the Agreement on Enhancing International Arctic Scientific Cooperation on the approach of non-Arctic states to Arctic scientific activities

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Abstract As the third legally-binding instrument of the Arctic Council, the Agreement on Enhancing International Arctic Scientific Cooperation was signed in May 2017 and entered into force on 23 May 2018. The Agreement not only reduces obstacles to the international scientific cooperation and promotes the movement of people and equipment across borders for the effective and efficient development of Arctic scientific knowledge, but also provides an improved international Arctic legal environment for conducting Arctic scientific cooperation based on UNCLOS and institutional arrangements. However, the observer states, the NGOs and IGOs, as well as Permanent Participants are rarely mentioned in this Agreement. This article chooses one group, non-Arctic states, as a case in point in order to critically discuss the influence of this new Arctic scientific cooperation agreement. It argues that the non-Arctic states are left behind at the original legal situation and trapped in an inferior status in Arctic science. Under these circumstances, this article suggests that non-Arctic states, especially those with competitive research abilities, should appeal for amendment of the Agreement to allow wider access to research areas and data sharing, especially when cooperating with the eight-member states of the Arctic Council. Also, non-Arctic states should take the Agreement as the reference when signing bilateral agreements with Arctic states so as to safeguard their interests when conducting Arctic scientific activities. Moreover, the active participation in other fora as well as various bilateral scientific projects can assist non-Arctic states to strengthen the relations with the Arctic states and build trust in the Arctic Council.

Keywords **Arctic Council, scientific cooperation agreement, science diplomacy, non-Arctic states, Arctic scientific activities, Sino-Russian cooperation**

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1 Introduction

Over the past decades, continuously rising temperature and accelerated melting of ice in the Arctic have resulted in rising sea levels, thawing permafrost, migrating fisheries and extreme weather events. These go beyond a regional nature and threaten the interests of the international community (Yang, 2018). Developing science is one of the most vital objectives in international governance of Arctic issues. On one side, science can perform the function of exploring the rapid changes in the Arctic. Multidisciplinary scientific programs conducted in the Arctic, like glaciology, ecology, oceanography, and astrophysics, unveil the mystery of the Arctic nature and enhance people's cognition of natural science in this region. On the other side, science can provide essential support to scientific management and policy formulation of international Arctic organizations, such as the Arctic Council (AC) and the International Arctic Science Committee (IASC), to cope with climate and environment threats. What is more, scientific achievement is closely related with the strategic interests of a state,

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especially for non-Arctic states, in the Arctic region. From the perspective of the eight-member states of the AC, the more substantive scientific contribution a non-Arctic state makes, the higher status and greater trust it will gain in Arctic governance. Hence, states from outside the Arctic actively conduct scientific research and join in bilateral or multilateral projects with Arctic states in order to safeguard their substantive involvement in this region

Science diplomacy can be utilized as a political theory to explain the current scientific cooperation situation in the Arctic. It is defined as "the use of scientific collaboration among nations to address the common problems facing Twenty-first Century humanity and to build constructive international partnerships" (Fedoroff, 2009). In the Arctic, scientific expertise and diplomatic negotiation combine prominently. Science aims to monitor and assess the earth system, as well as to act as a determinant of public policy agendas for early warning about future events. Politics and diplomacy want to define the national rights applicable to the region. Science is called in when debates on the new governance of the Arctic are launched. This article centers on one type of science diplomacy named "diplomacy for science", meaning that states seek to promote a national scientific community and to facilitate cooperation with other countries via diplomatic dialogue, with the purpose of sharing costs and risks but also sharing benefits via the participation of their scientists in multinational programs (Ruffini, 2017). In the Arctic region, this process is mainly supported by international scientific and technological networks, bilateral or multilateral scientific agreements to deepen the exchanges and joint actions of stakeholders that address "common Arctic issues," especially sustainable development and environmental protection.

The Agreement on Enhancing International Arctic Scientific Cooperation (the Agreement) is a typical instance of diplomacy for science, which was adopted at the 10th Arctic Council Ministerial Meeting and entered into force on 23 May 2018. This Agreement reflects the common interests of eight stakeholders to develop scientific cooperation in the Arctic, as well as supporting further attention, effort and collaboration between diplomats and scientists to ensure its implementation. It is aimed at promoting the movement of people and equipment across borders as well as to provide access to research facilities and data among eight Arctic Council member states. But few words in the Agreement mention the observer states, the NGOs and IGOs, and Permanent Participants (Arctic Council, 2017a). This article chooses one group, non-Arctic states, as an example to critically discuss the influence of this new Arctic scientific cooperation agreement. Although non-Arctic states do not have territorial sovereignty in this region, they still have a right to conduct Arctic scientific research based on the Svalbard Treaty and the United Nations Convention on the Law of the Sea (UNCLOS). The Svalbard Treaty (1920) was signed on 9 February 1920 and has a total of 46 signatories (including non-Arctic states such as China, Japan, UK and France). It grants all parties equal access to the natural resources, encouraging scientific research and establishing an equitable administrative system on the islands of Svalbard and its territorial waters. The United Nations Convention on the Law of the Sea (1982) set a regime of law and order in the world's oceans and seas, establishing rules governing all uses of the oceans and their resources. Part XIII endows the right of marine scientific research to non-Arctic states for peaceful purposes to increase scientific knowledge of the marine environment for the benefit of all mankind in both internal and territorial seas, and in exclusive economic zones and continental shelves in the Arctic region. Besides these legal bases, changes in the Arctic have profound influences on human beings all over the world and threaten the common interest of mankind. For instance, the frequent extreme weather suffered by East Asian countries is closely allied to the winter Arctic Oscillation and melting Arctic sea ice due to the warming Arctic (Wu et al, 2004).

This article mainly addresses the impact of this new Arctic scientific cooperation agreement on non-Arctic states and argues that non-Arctic States should have universal access to research areas and data sharing like Arctic states, especially when cooperating with Arctic states in joint projects. As well, they should take the Agreement as the reference when signing bilateral agreements with Arctic states. Firstly, this article gives an overview of the Agreement on Enhancing International Arctic Scientific Cooperation, including the historical background, policy-making progress, the motivations of the Parties, as well as its keywords and main provisions. Further, it explores the positive and negative influence of the Agreement on the international Arctic legal environment of Arctic and non-Arctic stakeholders. Also, the subsequent progress after the ratification of the Agreement will be presented to support the argument. In the final part, taking Sino-Russian Arctic scientific cooperation as an example, it puts forward suggestions of how non-Arctic states might safeguard their substantive interests when conducting Arctic scientific research and cooperating with Arctic states.

2 The Agreement on Enhancing International Arctic Scientific Cooperation

This part will first introduce the historical background of the Agreement and the motivations of the Parties when negotiating. Secondly, it will summarize the main content of the Agreement into four key points, including keywords, the provisions of Parties cooperation with non-Parties and the extent of regulatory power over scientific activities.

The Agreement on Enhancing International Arctic Scientific Cooperation is the third legally-binding instrument negotiated under the AC. The prior

legally-binding agreements achieved under AC auspices were the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (2011) and the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (2013). The first was concluded at the Nuuk Ministerial Meeting in 2011 with the purpose of strengthening the cooperation of Arctic states in search and rescue operations in the Arctic, and the Parties commit to build and maintain effective search and rescue services in their respective geographical areas. The second agreement, whose objective is to strengthen assistance in oil pollution preparedness and response in the Arctic so as to protect the marine environment, was adopted at the Kiruna Ministerial Meeting in 2013 (Arctic Council, 2017b). The latest scientific agreement seeks to enhance international scientific cooperation for furthering scientific knowledge about the Arctic and reduce obstacles to international cooperation among the Arctic states, and promotes logistic capacity for cross-cutting knowledge discovery and application. It should be noted that this Agreement takes the AC another step in the direction of being more than a discussion body and facilitates the establishment of legal norms and activities of a regulatory character (Hoel, 2017).

The policy-making process of this Agreement is worth presenting briefly. As one of the legacies of the 4th International Polar Year (2007−2008), in 2008 the senior Arctic officials of the AC discussed ways to promote access for scientists in the Arctic. As a result, the Task Force on Scientific Cooperation (SCTF) was created at the 8th Ministerial Meeting in 2013, with the aim of “working towards an arrangement on improved scientific research cooperation among the eight Arctic States". According to the revised Rules of Procedure of the AC, non-Arctic states and intergovernmental and non-governmental organizations are invited to observe in the SCTF. Then in 2015, the 9th Arctic Council Ministerial Meeting was held and the Iqaluit Declaration acknowledged the significance of scientific cooperation in the Arctic and also decided to extend SCTF to develop a legally-binding agreement. It set the deadline for the task of no later than the next Ministerial Meeting. For this process, SCTF was co-chaired by Russia and the United States (Radio Canada International, 2016). The culmination of the work came at the 10th Arctic Council Ministerial Meeting in 2017 when the Agreement on Enhancing international Arctic Scientific Cooperation was formally signed. During the same period, another Arctic scientific meeting called the Arctic Science Ministerial Meeting was held in Washington, DC on 28 September 2016. This is another example of scientific diplomacy across borders through soft power instead of coercion.

Apart from the historical background, the motivations of different stakeholders during negotiation and finally reaching an agreement should be critically discussed. Russia, one of the major promoters, was negatively influenced in recent years by its deteriorating relationship with USA and with interruption to its energy program investment by Arctic neighbors since the Ukraine crisis (Sorensen and Klimenko, 2017). Therefore, it tended to utilize this opportunity to break the ice and look for new Arctic partnerships, at least firstly in the scientific field. In the discussion of the draft memorandum of the Agreement in 2014, Russia’s delegation positively engaged in the negotiation to emphasize the necessity of the binding character of the Agreement and this was welcomed by other states despite the political tensions (Shibata and Raita, 2017). For the other promoter, USA, difficulties in entering the Arctic region of Russia which brought challenges to pan-Arctic observation and expeditions was the main motivation. For instance, USA submitted 48 requests to Russia for conducting scientific research in its Exclusive Economic Zones (EEZs) between 1990 and 2014, but nearly half of the requests were either denied or elicited no response (Farrell, 2017). Since the sovereign rights of Russia extend over half the Arctic, cooperation with Russian scientists is vital for Arctic sustainable development and diplomatic progress. For the other member states, the common goal during the negotiation was improving the research climate in the Arctic region in order to reduce administrative obstacles for more effective scientific research. In general, USA and Russia play key roles in this international scientific collaboration, which aligns their common interests in spite of geopolitical conflict in Ukraine and Syria. It is a typical process of science diplomacy, building common interests among the eight Arctic states even when their diplomatic relations are unstable, spanning security to sustainability time scales that transcend the geopolitics of today, and balancing national interests and common interests for common Arctic issues, particularly, environmental protection and sustainable development (Berkman et al, 2017).

To enhance Arctic scientific cooperation in order to promote effectiveness and efficiency in the development of scientific knowledge, the Agreement facilitates access by the Arctic States to geographic areas which each state has identified. This includes entry and exit of persons, equipment and materials; access to research infrastructure and facilities; and access to research areas. Moreover, it encourages the Parties to promote education and training opportunities for early career scientists, as well as encouraging the use of traditional and local knowledge from indigenous people. Furthermore, it endows Parties with the discretion to extend benefits to non-Parties, such as observer states of the AC, when they cooperate with Arctic States. Rex Tillerson, US Secretary of State, commented that this document would ease the movement of researchers, scientific equipment and data sharing across the North (Farrell, 2017). In other words, the previous barriers to research, like denied visas, denied access to data, increased cost and slow progress will be gradually removed. A series of concrete improvements should be finished in the near

future since the Agreement entered into force on 23 May 2018. For instance, the procedures to expedite the granting of visas, the digitization of data and shared platforms for searching data located in a variety of repositories, like the Sustaining Arctic Observing Networks (SAON), establishment of monitoring and research partnerships across nations, and the integration of science with indigenous traditional knowledge to solve problems.

The Agreement contains 20 articles and 2 annexes. Four elements are highlighted here.

Firstly, the definition and interpretation of keywords is evaluated. The start of the Agreement lists the eight Arctic states and designates them as the "Parties", meaning that the Agreement is closed and non-Arctic States are not entitled to rights like those of "Parties". Four terms are defined in Article 1. (1) "Facilitate" refers to pursuing all necessary procedures, not only giving considerations but also making decisions. (2) "Participant" means research centers, universities, scientific agencies and other partners acting with or on behalf of any Party or Parties which engage in scientific activities under this agreement. The scope of Participant is not limited to the institutes and agencies of the eight Arctic States, but also includes non-Parties. (3) "Scientific Activities" include three forms of activities: scientific research, monitoring and assessment, with the purpose of advancing the understanding of the Arctic. The text then lists a series of related activities as examples. However, it should be noted that the text uses incomplete enumeration ("these activities may include, but are not limited to …"), which does not specify the exact definition and leaves rooms for the Parties to expand the scopes of "scientific activities". If any other activity meets the requirement to enhance the understanding of the Arctic, it can be identified as scientific activity though it is not mentioned in Article 1. (4) "Identified Geographic Areas" are described in Annex 1, delimiting geographic regions where each state has sovereign rights to carry out Arctic scientific cooperation on the basis of international law. The areas beyond national jurisdiction in the high seas north of 62 degrees north latitude, all exclusive economic zones and continental shelves facing the Arctic Ocean and the Svalbard Islands are included in this annex. Six Arctic states respectively clarify their geographic regions, while only Norway and Sweden present their "Identified Geographic Areas" with specific latitudes. The rest of the Parties prefer to use the ambiguous wording "the adjacent marine areas" instead of a specific description. The main reason for this is in terms of the outer limits of the continental shelf (OCS) beyond 200 nautical miles from the baselines in accordance with Article 76 of UNCLOS. Currently, the OCS territory claims of five Arctic coastal states have multiple overlaps and most of the submissions, except Norway, have not been approved by the Commission on the Limits of the Continental Shelf (Jares, 2012). Therefore, it is quite difficult for most of the Parties to submit accurate geographic areas in the Agreement.

Secondly, the Agreement facilitates access by scientists of the eight Arctic states to Arctic areas. This includes the entry and exit of persons, equipment, material, data and samples (Article 4); the access to research infrastructure and facilities and logistical services (Article 5); and access to terrestrial, coastal, atmospheric and marine research areas in the Identified Geographic Areas (Article 6). Moreover, the Parties shall enhance access to data, for instance facilitating access to scientific information, opening access to scientific data and data products and encouraging published results with minimum time delays (Article 7). The Agreement also promotes education and training opportunities for future generations of Arctic researchers (Article 8) and it encourages the appropriate utilization of indigenous local knowledge when planning and conducting scientific activities (Article 9). The content of Article 8 is closely in accord with one work priority of Finland—education, during its chairmanship from 2017 to 2019, and was written in the Fairbanks Declaration which recognizes the importance of education in fostering sustainable development and building resilience in Arctic communities (Fairbanks Declaration, 2017). Additionally, the Agreement obliges Arctic states to designate their competent national authority for the Agreement, and these are all listed in Annex 2 (Article 13).

Thirdly, regarding cooperation with non-Parties, three provisions will be analyzed in detail. Point 11 of the preamble emphasizes the significant scientific expertise and invaluable contributions made by non-Parties. In Article 12, Arctic Council Permanent Participants and Arctic Council Observers are invited to observe and provide information when the Parties hold a meeting after the entry into force of the Agreement. Also, scientific cooperation with non-Parties should be considered when reviewing the implementation of the Agreement. In Article 17, the Agreement encourages the Parties to continue cooperation with non-Arctic states and institutes. It seems that non-Parties are welcomed to join in this agreement and that future Arctic scientific cooperation between the Parties and non-Parties will not be precluded. However, the other paragraph of Article 17 deliver a different message: "Parties may in their discretion undertake with non-Parties cooperation …; Nothing in the Agreement shall affect the rights and obligations of the Parties under agreements with non-Parties….." It is evident that the Parties hold dominant power in the cooperation while non-Arctic states have a passive status. Most importantly, the so-called benefiting non-Arctic third states are not explicitly identified in the main body of the Agreement, such as in Article 4 and 7, which merely refer to "the Parties" but do not mention "non-Parties" or even" the Participants". Under Article 36 of the Vienna Convention on the Law of Treaties, the Agreement can accord the right to non-Arctic third States when they assent thereto, but it is difficult for the third state to get the benefits when the intent of the Parties is imprecise or uncertain in the relevant provisions. Therefore, the potential

benefits to non-Parties cannot be guaranteed by the Agreement.

Fourthly, the extent of the regulatory powers that the Arctic states have over scientific activities in land and sea areas needs to be clarified. Within land areas, the Arctic states have full sovereignty in their territory to regulate foreign scientific activities and to decide any facilitation of international Arctic scientific cooperation. In sea areas, the Agreement is fully consistent with UNCLOS. In particular, the provisions in Part XIII of UNCLOS on promoting and facilitating the development and conduct of marine scientific research for peaceful purposes is mentioned in the sixth preambular paragraph and in Article 6 of the Agreement. Although UNCLOS endows the right of marine scientific research to all states, regardless of their geographic location, the exercise of such right for marine scientific research is circumscribed by the coastal state's authority to authorize, conduct and consent is different for internal and territorial seas than for exclusive economic zones and continental shelves. In the territorial seas, the coastal states have "complete control over marine scientific research." (Article 245). In the EEZs and on the continental shelf, the states which conduct marine scientific research should comply with specific conditions, such as the provision of the data and samples to the coastal states and the public availability of research results (Article 249). In addition, the coastal states shall make sure that the research projects of applicants are "exclusively for peaceful purpose and in order to increase scientific knowledge of the marine environment for the benefit of all mankind".

3 The influence of the Agreement on Arctic states and non-Arctic states

The scientific research of both Arctic states and non-Arctic states will be significantly affected by the Agreement and its influence will be critically discussed. After that, the subsequent progress in implementation after the 10th Arctic Council Ministerial Meeting will be analyzed.

The ratification of the Agreement has positive influence on the international Arctic legal environment for both Arctic states and non-Arctic states. Considering the impact from a legal perspective, although UNCLOS provides a relatively complete legal environment for marine scientific research, the implementation has not been uniform due to the discretion allowed in those provisions, especially when the coastal states have the discretion to withhold consent for another states' research project in their EEZs and on their continental shelf. Also, the Arctic Ocean Review of 2013 by the AC put forward the need for "an Arctic science instrument" to facilitate marine scientific cooperation beyond what UNCLOS and other related instruments now provide. It is clear that the Agreement is aimed at improving the legal environment for conducting Arctic marine scientific research above that already provided by UNCLOS. But it does not infringe on UNCLOS as mentioned before, instead, it provides a more specific way to implement the obligations and rights already provided in UNCLOS. Additionally, there is a series of arrangements at the institutional level in terms of Arctic scientific research, which have limitations particularly when influencing different governmental and local authorities. Therefore, the Agreement provides a more stable legal environment where these informal agreements or memoranda of understandings can be effectively implemented (Shibata and Raita, 2017).

In terms of Arctic states, the Agreement not only promotes the stability of international research platforms to access previous data and will continuously generate new data to interpret pan-Arctic changes, but it also enhances the capacity of all Arctic states to integrate diverse data into evidence, contributing to the decision-making for Arctic issues. In addition, the cooperation between Arctic states via this Agreement is a successful case of science diplomacy, which minimizes the risks of policy shifts when geopolitical conflict happens, balancing national interests and common interests for future Arctic environmental protection and sustainable development. After the enforcement of the Agreement, a series of concrete improvements will be finished for the effective and efficient development of Arctic scientific knowledge among Arctic states. For instance, entering the EEZs of Russia for conducting Arctic scientific research will be easier based on the Article 4 and 6 of the Agreement. As for the positive effect on non-Parties, according to Article 12 and 17, the cooperative attitude from the Parties in the Agreement may bring further opportunities and potential benefits to non-Arctic states, such as participating in the negotiation of the Agreement.

In spite of the improved environment for conducting Arctic scientific cooperation by legally binding the Arctic states to undertake research with lower hurdles, the Agreement does not provide for freedom of scientific research at the international law level. Instead, the eight Arctic states have a certain degree of agreed-upon control, depending on the size of their territories and water zones, to exercise their sovereignty and jurisdiction to facilitate scientific cooperation. A number of verbs, such as "promote" and "facilitate" in the Agreement, indicates the different levels of improved legal environment offered to Parties. However, non-Arctic states would have no international legal basis to enjoy the improved legal environment when undertaking Arctic scientific research. The facilitation will only apply to the Parties, their nationals and their scientists while non-Parties will be excluded. For instance, scientists from non-Arctic states may encounter difficulties when applying for access to research areas of any Arctic state because they have no legal basis proactively to claim equal treatment to that of the Parties. Non-Parties are limited to making statements, submitting documents, and providing views under discussion (Arctic Council Secretariat, 2013). This legal situation

consequently leads to a two-category system: one for Arctic states which benefit from the improved legal environment while the other is for non-Parties, being left in the original legal situation which resulted in obstacles and delays. These non-Arctic states are in an inferior and passive status in Arctic science and benefit only if the Parties have the need for their cooperation.

Such a two-category system is considered contrary to the "openness and universality" spirit of the Arctic scientific community, and to the "no discrimination" principle of the Svalbard Treaty and UNCLOS. For instance, the "scientific openness" principle of the International Arctic Science Committee encourages any member to participate in decision-making and even to become President of the Council, irrespective of nationality (Shibata and Raita, 2017). Since environmental changes in the Arctic have profound influences on human beings all over the world and threaten the common interest of mankind, non-Arctic states should actively participate in Arctic science and have the right to enter into research areas when cooperating with the AC member states. Additionally, compared with the eight parties at the 10th Arctic Council Ministerial Meeting, representatives participating in the Arctic Science Ministerial Meeting were broader, including 25 countries and the European Union. The scope of data sharing through full and open access agreed to in the Joint Statement signed at the Arctic Science Ministerial Meeting would benefit all Arctic stakeholders, contrasting to the narrower scope of beneficiaries under the Agreement (US Arctic Research Commission, 2016). It has been announced that a second meeting will be co-hosted by Arctic states and non-Arctic states (Germany, Finland and the European Commission) on 25−26 October 2018 (European Commission, 2017). Although the Arctic Science Ministerial Meeting is not an AC event, Finland is still chairing the AC at that time and can guarantee a strong linkage between the Ministerial Meeting and the AC. This may play a key role in promoting further cooperation between Arctic and non-Arctic states when conducting Arctic scientific activities within the AC framework.

Regarding subsequent progress after the signature of the Agreement, the Arctic states have accelerated their scientific cooperation under the leadership of Finland. Compared with the scientific cooperation between non-Arctic states, the cooperation among Arctic states is more united and established on a higher national level under the guidance of the Agreement. This further indicates the existence of a "two-category system". One of the Arctic states, Finland, committed to creating a database on the impact of black carbon emissions in the Arctic during its chairmanship and an Expert Group on Black Carbon and Methane has started to record the data from member states and observer states of the AC since June 2017 (The Arctic, 2017). According to TASS (Russian News Agency), a new maritime seismic agreement with Norway, which has stagnated several times in the past seven years, is likely to be signed in September 2017, and will strengthen cooperation in geological exploration between Russia and Norway in the Barents Sea (Polar and Ocean Portal, 2017a). Furthermore, officials from the eight Arctic states got together in Bethel, Alaska to discuss Arctic biodiversity in September 2017, mainly focusing on protection and management of plants and animals in the Arctic (Polar and Ocean Portal, 2017b). Meanwhile, a number of scientific cooperations between Arctic states and non-Arctic states have continued to develop in spite of the Agreement. A case in point is that Japan's Ministry of Education, Science, Technology and Sport signed a cooperative memorandum with Russia's Ministry of Education and Science in September 2017 and the rational use of natural resources in the Arctic region is one of three priority areas in this (Shiraishi, 2018). Also recently, the International Joint Research Center for Arctic Environment and Ecosystem was co-founded by 11 institutes and universities from China and Arctic states in January 2018 (Harbin Institute of Technology, 2018). In comparison to the national-level of cooperation among the Arctic states, these programs are restricted to the institutional or ministerial level. In addition, such programs, which are either concerned with a specific field like environment and ecosystem, or lack detailed provisions to guide how to conduct scientific research in the future, are not as united and comprehensive as the cooperation between the Parties under the guidance of the Agreement. It seems that non-Arctic states do not get substantial benefits from the Agreement though their contributions to scientific activities was highlighted in the preamble to the Agreement, and their current situation has little improvement compared with that before the ratification of the Agreement. In other words, the Agreement results in a two-category system: On the one hand, the Parties deepen Arctic scientific cooperation and enjoy the convenience of the movement of people and equipment across borders as well as access to research facilities and data in an improved legal environment; on the other hand, although non-Parties try to develop Arctic scientific cooperation with Arctic states at institutional or ministerial level, they can still encounter obstacles and delays in future Arctic scientific research.

Under these circumstances, UNCLOS can be regarded as the most important legal basis for non-Arctic states to claim treatment that is equal to that the Parties enjoy under the Agreement, for marine scientific research in the Arctic Ocean. Firstly, non-Arctic states are parties to UNCLOS and their rights in terms of marine scientific research under UNCLOS should not be infringed on or undermined by other agreements. Article 311 stipulates that when the agreements are compatible with UNCLOS, the Parties of the agreements would not affect the enjoyment by other State Parties or the performance of their obligations under UNCLOS. Secondly, mutual benefits should extend to those states and scientist interested in conducting marine scientific research because all participating parties should

benefit from international cooperation in marine scientific research, and not only the researching states (Article 242). Thirdly, concerning prevention of marine pollution, Article 200 obligates all states to exchange data and information, even if the research is at the regional level, so as to acquire and increase knowledge about marine pollution in the area. To sum up, international marine research cooperation should not discriminate against any state outside the region whose scientists are willing to conduct such research in that region. This also applies to international marine research activities in the Arctic Ocean.

4 Implications for the participation of non-Arctic states in Arctic scientific research activities

In this part, the scientific research ability of non-Arctic states, as well as the current situation of Sino-Russian Arctic scientific cooperation, will be first presented. Then suggestions on the participation of non-Arctic states in Arctic scientific research activities will be put forward, using the Sino-Russian Arctic scientific cooperation as a case study.

Despite having little geographical advantage, some non-Arctic states have put a large amount of investment into Arctic scientific research and have strong scientific research capability. Among these are Japan, the United Kingdom and Germany. Japan's Arctic Policy highlights that Japan should make the best use of its strength in Arctic science and international cooperation. Japan maintains close scientific research links with Arctic states, for instance, the International Northern Sea Route (1993−1999) cooperated with Norway and Russia (Chen, 2015). Arctic scientific researchers in the UK, led by the Natural Environment Research Council Arctic Office, have achieved fruitful results in recent years, producing more than 500 publications and patents in 2011, nearly 5 times the number in 2000. The British government continues to increase investment in this field and Arctic funding increased by 50 million pounds between 2005 and 2015 (Ding, 2015). Germany, as an active and committed member of the International Arctic Science Committee (IASC) for nearly three decades, has successfully hosted three international Arctic conferences and developed Arctic scientific cooperation mechanisms with Demark, Norway and Finland (Xiao, 2015). Currently, Germany leads several bilateral and multilateral Arctic projects. For instance, MOSAiC, with a budget exceeding 140 million dollars, aims to explore the climate system of the central Arctic (MOSAiC, 2018).

Among non-Arctic states, China has rapidly increased its Arctic research capability in recent decades. China is investing heavily in Arctic research logistics, with Yellow River Station opened in Spitsbergen in 2004, and with a new R/V *Xuelong* II icebreaker, due to begin operating in 2019. The R/V *Xuelong* icebreaker has conducted eight Chinese Arctic expeditions since 1999 and it successfully circumnavigated the Arctic rim on its 8th expedition in 2017 (Jia and Shi, 2012). The Arctic research policy of China highlights that the understanding, protection, usage, and management of the Arctic should be based on decision-making informed by rigorous scientific research results. Under the guidance of this policy, China has taken great effort to carry out Arctic research activities, mainly focused on sea ice, ocean acidification and upper ionospheric physics observations. Furthermore, China plays an active role in bilateral and multilateral Arctic scientific programs. China joined IASC in 1996 and hosted the Arctic Science Summit in 2005. It co-founded the Asian Forum for Polar Sciences (AFoPS) with Japan and Korea in 2004. China started to build the China-Iceland Joint Arctic Science Observatory in 2012 and established a China-Nordic Arctic Research Center in 2013. In 2013, China was accepted by the AC as an observer and works to facilitate the cooperation between Arctic and non-Arctic states (XinhuaNET, 2018).

China and Russia have complementary interests in the Arctic and closely worked together for a period, especially after the Ukraine Crisis. Russia is one of the world's largest energy exporters and China is one of the largest energy importers. The Far East and the Arctic region of Russia have abundant energy resources and minerals but lack infrastructure, capital and technology, which are all areas where China can contribute (Sorensen and Klimenko, 2017). However, the major Sino-Russian cooperation is limited to oil and gas and to Northern Sea Route, while scientific cooperation still has vast space to be explored and developed. To date, there have been three main bilateral scientific programs: (1) the Conference of China-Russia Arctic Workshop hosted by the Ocean University of China since 2012; (2) the Russia-China Polar Engineering and Research Center co-founded by the Far Eastern Federal University and the Harbin Institute of Technology in 2016; and (3) the first China-Russia Joint Arctic Expedition in 2016.

Sino-Russian Arctic scientific cooperation has far-reaching significance. It is not only an important way for safeguarding environmental and climate interests of the two countries, but it also serves as a precondition and foundation for other strategic interests. Russia is the closest Arctic state to China, occupies nearly half of the Arctic territory and has a high demand for scientific cooperation. China is a suitable partner which can contribute high-technology, mature research teams and huge investment. The research partnership with Russian scientists is also critical for the geopolitical security and scientific diplomacy of China. 2017-2018 witnessed substantial Arctic progress for both China and Russia. On one hand, China published its Arctic policy in January 2018, pledging cooperative governance and elaborating a vision of the "Polar Silk Road" (XinhuaNET, 2018). On the other hand,

Russian President Putin expressed willingness to support the Belt and Road initiative in May 2017 (Putin, 2017). When Chinese President Xi visited Russia in July 2017, Arctic cooperation was formally included in the China-Russian Comprehensive Strategic Partnership and written into the Joint Declaration, providing an opportunity for further bilateral Arctic scientific cooperation in the near future (Liu, 2017).

Following the analysis above, implications for non-Arctic states in Arctic scientific research activities can be summarized in six points: the Sino-Russian Arctic scientific cooperation will be used as a case study to illustrate several of these. First, it is important for non-Arctic observer states to present their interests and seek an amendment to the Agreement at the level of state-to-state negotiation at the meetings of the AC. UNCLOS and the no discrimination criteria of IASC in admitting members to its Council are useful supporting arguments. For example, at the 2017 Arctic Circle Conference, the head of the United Kingdom Natural Environment Research Council Arctic Office supported amendment of the Agreement to favor of all scientists doing research in the Arctic (Burgess, 2017). Also, when the Agreement is implemented, the observer states need to keep an eye on whether the implementation is fair to their scientists in the improved legal environment, especially when cooperating with Arctic states in joint scientific research.

Secondly, according to Article 17(2) of the Agreement (Parties may in their discretion undertake with non-Parties cooperation described in this Agreement and apply measures consistent with those described in this Agreement in cooperation with non-Parties), the most practical suggestion for non-Arctic states to safeguard their interests is to separately sign bilateral Arctic science and technology cooperation agreements with Arctic states. Taking China and Russia as a case in point, in their further bilateral scientific cooperation agreement, China should request equal rights to those of the Arctic states in the Agreement, such as facilitating access to research infrastructure and data exchange between China and Russia when conducting Arctic scientific research.

Thirdly, non-Arctic states should continue different forms of bilateral and multilateral scientific cooperation in order to strengthen their relations with the Arctic states and build trust in Arctic governance, including the following. (1) scientific research projects. For instance, China can take advantage of the "Polar Silk Road" to promote fundamental and applied research for the industrial development of Northern Sea Route with Russia on the basis of Russia-China Polar Engineering and Research Center. (2) joint exploration and observation stations. The China-Russia Joint Arctic Expedition should be continued, and the establishment of an ocean monitoring station can be included in the future plan. Its operation mode could follow that of the China-Iceland Joint Aurora Observatory. (3) symposiums and roundtables on Arctic geopolitics, international governance and economics, such as Conference of the China-Russia Arctic Workshop. And (4) cultural exchange programs with indigenous people. It is suggested that the Chinese government should enhance interaction with the local people in the north of Russia, in order to make use of their unique traditional knowledge and to motivate cooperation with them.

Fourthly, non-Arctic states should actively participate in other fora and even take the lead in some multilateral platform to enhance their substantial involvement on the international Arctic stage. For instance, Harbin Engineering University hosted a forum in January 2018, attracting nearly one hundred scholars from Russia, Norway, Finland and other Arctic states to discuss the issues about Arctic development (Polar and Ocean Portal, 2018).

Fifthly, cooperation between non-Arctic states cannot be ignored, for instance, the second trilateral talks on Arctic issues among China, Japan and Korea which reached agreement on joint scientific research and exploration for assessing pollution and climate influence in the Arctic (Kyodo, 2017). This is because it is the responsibility of the international community, including Asia, to protect the fragile environment of the Arctic region, and maintain constructive cooperation based on a rule-based maritime order.

Last, but not the least, non-Arctic states should give impetus to the establishment of a more easily-accessible comprehensive Arctic data system. At the present, there are a large number of data systems for this region, such as SAON, GEO (Global Earth Observation) and PAG (Pacific Arctic Group). But all of them are in different formats with low interoperability. Only when a comprehensive management system is established can the data be accessed and shared without any obstacles among all Arctic stakeholders.

5 Conclusion

Although the Agreement improves the legal environment for conducting Arctic scientific research and welcomes non-Arctic states to join in negotiation and future cooperation, it fails to provide universal access to research areas and data sharing to non-Arctic states that is the same as the Parties, thus resulting in a two-category system. On one hand, the eight Arctic states have a certain degree of agreed-upon control, depending on the size of their territories and water zones, to exercise their sovereignty and jurisdiction to facilitate scientific cooperation. On the other hand, the non-Arctic states are left behind at their original legal situation and their scientists can encounter difficulties when applying for access to research areas in the Arctic. Such a two-category system is against the "openness and universality" spirit of the Arctic scientific community. Additionally, compared with the Joint Statement signed at the Arctic Science Ministerial Meeting, the scope of the

Parties in the Agreement is narrow and the benefits for data sharing in the Arctic are mostly limited to the eight Arctic states. The scientific cooperation situation after the signature of the Agreement also demonstrates the existence of a "two category system" with a negative impact on non-Arctic states.

A number of non-Arctic states, such as Germany and China, have strong Arctic research capability and solid policy support despite geographical disadvantage. But they are trapped in a passive and inferior status because of the Agreement. This article has summarized several suggestions for non-Arctic states, using Sino-Russian Arctic scientific cooperation as a case study. The most direct way for non-Arctic states is to appeal for amendment to the Agreement based on UNCLOS, the Svalbard Treaty and the spirit of the Arctic scientific community. This should encourage all scientists doing research towards a better understanding of the Arctic and open better access to research areas and data sharing to the non-Arctic states, especially those in joint projects with the Arctic states. Secondly, taking the Agreement as the reference when signing bilateral agreements with Arctic states is the most useful method for non-Arctic states to maintain their substantive interests in the Arctic regions. Meanwhile, the development of bilateral and multilateral scientific cooperation with Arctic states, as well as active participation in other fora, will assist them to strengthen the relations with Arctic states and enhance their substantial involvement in Arctic governance. Cooperation among non-Arctic states can also assist non-Parties to safeguard their rights when conducting Arctic scientific research based on a rule-based order. Finally, non-Arctic states should contribute to developing a more easily-accessible comprehensive Arctic data system for accessing and sharing data without obstacles among all Arctic stakeholders.

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