

# Chinese Marine Scientific Research in the Arctic

## The History and Legal Framework

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## Oh Buoy

In late February 2022, the Department of National Defence (DND) made the startling announcement that it had – according to the *Globe and Mail* – “found and retrieved Chinese monitoring buoys in the Arctic.”<sup>1</sup> The buoys were spotted by the Canadian Armed Forces as part of Operation Limpid, a continuing effort to provide early detection of threats to Canada’s security. The precise nature and purpose of these devices remain classified, but the very fact that Chinese hardware was appearing in the region gave credence to existing fears that Beijing’s presence in the Arctic was destined to lead to competition. DND added to these concerns by noting as well that it was “fully aware of recent efforts by China to conduct surveillance operations in Canadian airspace and maritime approaches utilizing dual-purpose [civilian/military] technologies.”<sup>2</sup>

Given China’s global challenge to the rules-based international order, and its particularly corrosive behavior closer to home, it is only natural that such a find in the Arctic would be tied into that global competitive framework. Yet, this turn of the events in the Arctic remains far more ambiguous, and far less sudden, than its presentation by the media suggests. In fact, China has been operating its expanding icebreaker fleet in the region since 1999 and, over the twelve Arctic expeditions since then, has routinely deployed and tested an increasingly sophisticated array of buoys, autonomous vehicles, surface gliders, and other technology. What’s more, these exercises have not been secret (even if their full extent *may* have been). In the wake of Canada’s discovery of the Chinese buoy, and to provide the needed legal and historical context to the issue, this article offers a brief overview of China’s marine scientific work in the Arctic, looking at the tools it has been developing, the laws governing these activities, and where that leaves Canada.

### China’s Arctic Operations

The deployment of Chinese technology into the Arctic Ocean, and surrounding seas is nothing fundamentally new.<sup>3</sup> Working in ice-covered waters requires a unique set of technologies and skills and China’s scientists have been developing them for well

over a decade. As early as 2008, the Polar Research Institute of China (PRIC) began deploying what it described as “underwater robots,” which were designed to help predict sea ice changes.<sup>4</sup> Four years later, the icebreaker *Xue Long* [Snow Dragon] advertised its success in deploying buoys in the region for the first time, to observe air-sea interactions in the Norwegian Sea.<sup>5</sup> By 2018, that program of work had expanded considerably. That year, as part of the country’s ninth Arctic expedition, *Xue Long* deployed an “unmanned ice station” on an Arctic floe.<sup>6</sup> The PRIC also boasted of its success in testing underwater gliders, spindle anchors observation platforms, as well as sediment traps.<sup>7</sup> As part of a large scientific program, including five ice stations and 43 different buoys, the Chinese icebreaker trialed submersible devices able to “record the temperature, salinity, current speed and flow data” of the ocean.<sup>8</sup> It also tested the submersible ‘Haiyan’ underwater glider in the Bering Sea. This is an autonomous vehicle “used to monitor the deep-sea environment in vast areas” with temperature, salt, depth, and dissolved oxygen sensors.<sup>9</sup> This glider was actually left in the region during the Arctic expedition and was only scheduled to be retrieved on the return leg, after travelling autonomously for more than 1,111 kilometers.<sup>10</sup> This system was deployed again the following year to observe hydrographic and biochemical data in the Bering Sea.<sup>11</sup> In 2020, three of these devices were deployed simultaneously. This glider system is not Arctic specific technology, having been deployed globally by the Chinese, including 550 days of continuous operation in the East Indian Ocean in 2019. Clearly, Beijing is working to adapt and test its existing systems in an ice-infested environment – and with some success.

Just how threatening these experiments really are remains debatable. Unmanned vehicles are widely used by other Arctic states in the region and have legitimate scientific capabilities. Still, the military applications are also obvious. Because these gliders have no propulsion systems (maintaining momentum by relying on small changes in buoyancy) the acoustic signature is extremely low, making them ideally suited to undersea warfare.<sup>12</sup> The mapping of the region’s seafloor, salinity levels, and water temperature are also all perfectly legitimate scientific pursuits. Indeed, this work is framed in English and

Chinese language discussions as legitimate civilian environmental research, designed to better understand the Arctic region and a changing global climate.<sup>13</sup> Still, this is also the prerequisite work to understanding submarine operations in the Arctic waters, mirroring studies undertaken by the US and Canada in the 1950s and 1960s for that purpose.

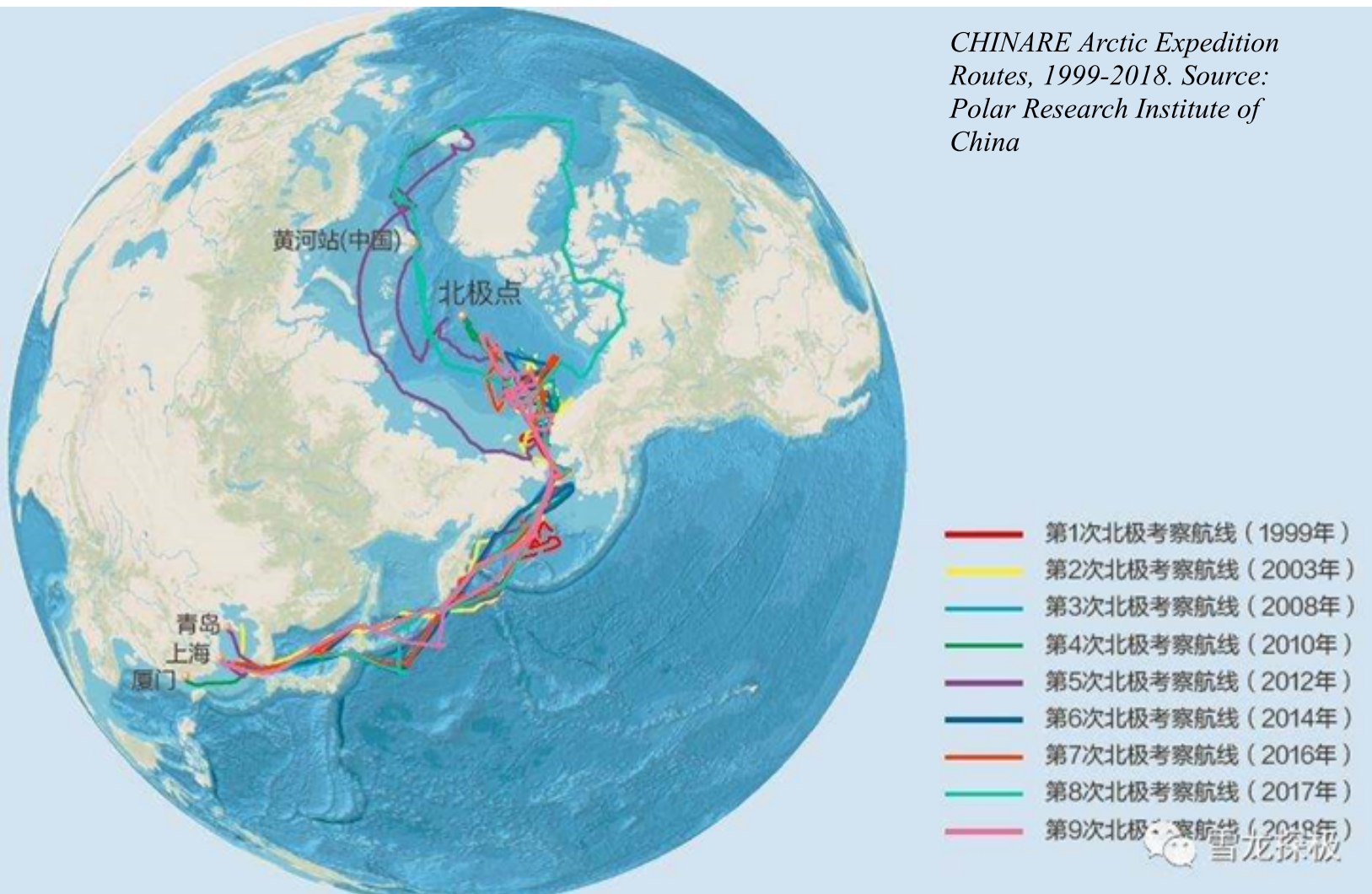
In their detailed analysis, Bryan Millard and Whitney Lackenbauer highlight the “rigorous discipline” that the PRIC showed in its messaging, keeping in line with Beijing’s broader Arctic narrative centered on science and diplomacy. However, the icebreakers’ operations and chosen routes strongly suggest that there is more to these expeditions than pure science.<sup>14</sup>

### Tracing Chinese Operations

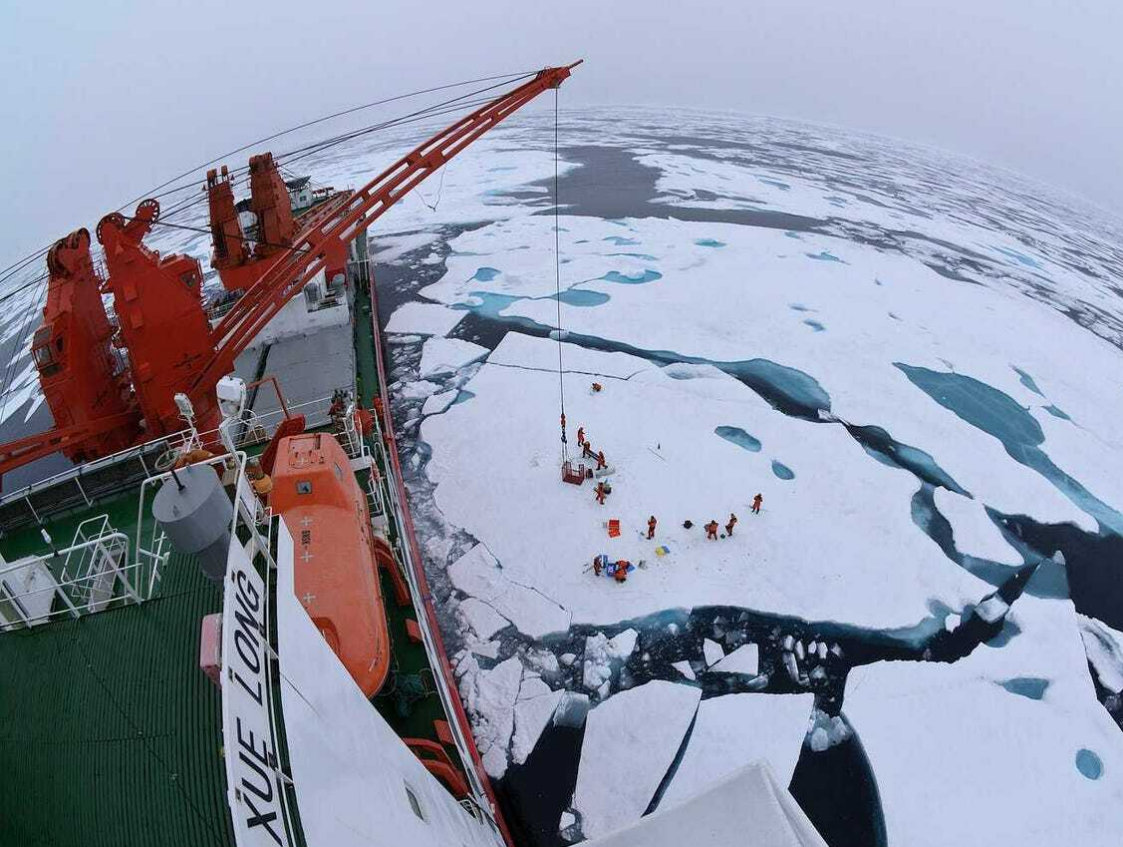
There has been a clear geographical focus in Chinese Arctic expeditions since 1999. For the most part, these activities have been concentrated within the Bering, Chukchi, and Beaufort Seas. Over the years, they have consistently pushed further north,

attempting to make high latitude records and gain the national prestige of reaching the North Pole (90°N). *Xue Long 2*’s summer 2021 voyage north of Russia’s New Siberian Islands and Severnaya Zemlya, across the North Pole, and then through the Greenland Sea (which separates Greenland from Svalbard), is a case in point.<sup>15</sup>

The fifth expedition in 2012 and the eighth in 2017 represent notable exceptions to China’s concentrated activity. Both of these expeditions circumnavigated the Arctic, but with different return routes, with the ship returning via the Transpolar Route in 2012 and through the Northwest Passage in 2017. The official report of the fifth expedition emphasized how it set various new records, representing the first Chinese scientific expedition to transit the Arctic Ocean as an “Arctic seaway” and thus opening a “new chapter in China’s maritime history” and “laying a material foundation” for “China’s Arctic sea-related assessment work.”<sup>16</sup> The report on the 2017 expedition is more sparse, but highlights “crossing the Arctic Central Channel and the Northwest Passage for







Alaska. In particular, the focus has been on the Chukchi Plateau and Northwind Ridge. These areas are thought to be particularly mineral rich. In 2019, Chinese investigations included “the formation mechanism of polymetallic nodules,” which primarily consist of iron oxyhydroxides and manganese oxides, onto which strategic metals such as nickel, cobalt, copper, titanium, and rare earth elements attach.<sup>19</sup> In 2020, *Xue Long* conducted core sampling on Northwind Basin at a depth of 1,870 meters.<sup>20</sup>

the first time,” detailing how “the regional scope and content of China’s Arctic marine environmental operational surveys have made positive contributions to building China’s Arctic operational survey system, Arctic environmental assessment and resource utilization, and Arctic frontier scientific research.”<sup>17</sup> Noting that the ship deviated from its original plan to spend more time in the central Arctic Ocean, Chinese news agency CGTN tied the voyage to China’s desire “to play a bigger role in Arctic development.”<sup>18</sup>

Given China’s well-understood global search for natural resources to fuel its industrial development, there is a widespread assumption that these operations are an attempt to develop those future resources. While resource exploration is not the explicit objective of Chinese icebreaker operations, it is a persistent secondary task. Surveying research topics coming out of Chinese polar maritime research agencies, reveals two overarching themes used to frame this research: the first is the interaction of polar oceans, atmosphere, glaciers, biology, earth and geophysics; and the second is the use of polar resources.

The routes taken by the *Xue Long* certainly indicate an interest in deep seabed mining and highlight certain key areas. Every Chinese Arctic Expedition (save the fifth) placed considerable emphasis on surveying and studying the continental shelf north of

This work took place on the US continental shelf, though was not in violation of existing US regulations concerning maritime scientific research at the time. It did however cause sufficient concern that the Trump administration changed US policy to require US permission for future core sampling.<sup>21</sup> Under US law, marine scientific research only includes “those activities undertaken in the ocean to expand knowledge of the marine environment and its processes.” Hydrographic surveys – including those for military purposes – and resource exploration, which China’s research fleet is known for, are instead considered “marine data collection,” and are therefore not considered “marine scientific research” under the updated policy.

Despite having the lions’ share of the Arctic coast, Russia has rarely seen Chinese operations on its continental shelf, including beyond 200 nautical miles. In 2020, however, that changed. That year, China announced the inaugural research program for *Xue Long 2*’s maiden Arctic voyage, which centred on a survey of Gakkel Ridge. This area of seafloor is suspected of containing massive sulfides, rich in copper, zinc, and other minerals and there. The Chinese project, focused on such a strategic sector directly abutting Russia’s continental shelf, prompted an official Russian reaction. Following the announcement of *Xue Long 2*’s route, Russia submitted an Addendum to the Commission on the

Limits of the Continental Shelf (CLCS) in 2021, which incorporated the Gakkel Ridge area into its extended continental shelf claim. A Canadian government representative working on the continental shelf file highlighted this shift as a clear reaction to China's activities and presence there.<sup>22</sup>

## Legal Considerations

China's marine scientific research in the Arctic has certainly expanded in recent years, both in the technologies being tested and in the geographic scope of the work. While the precise nature of that research, and its dual use potential remains hazy, we can still analyse the important legal considerations that arise. Are these operations permissible, or has China been violating Arctic States' sovereign rights and/or jurisdiction? How are China's rights to conduct research balanced against the Arctic state's legitimate and broad security concerns?

The Introduction to UN Convention on the Law of the Sea (UNCLOS) refers to a "ubiquitous concept" that pervades the Convention – the "balance of rights and duties."<sup>23</sup> In his introductory remarks as President of the Third Law of the Sea Conference, Tommy Koh refers to this important achievement, specifically as it relates to Part XIII of the Convention: "The Convention contains new rules on marine scientific research which strike an equitable balance between the interests of research States and the interests of the coastal States in whose economic zones or continental shelves the research is to be carried out."<sup>24</sup>

At the heart of those interests are the sovereign rights which Articles 56 and 77 afford coastal States over the natural resources of the EEZ and continental shelf. It is noteworthy that the official Introduction to the Convention refers to the protection of these coastal States' rights as the essential underpinning of the new marine scientific research regime: "The Convention also includes provisions to ... encourage the conduct of marine scientific research. *The inclusion of such provisions was dependent on the establishment of adequate safeguards for the holders of the rights concerned*" [italics added].<sup>25</sup>

The equitable balance celebrated by Koh is referred to in the first provision of Part XIII of UNCLOS: "All

States ... and competent international organizations have the right to conduct marine scientific research *subject to the rights and duties of other States* as provided for in this Convention" (Article 238) [italics added]. Article 240 then lists "general principles" that apply to the conduct of MSR and stipulates at paragraph (a) that it "shall be conducted exclusively for peaceful purposes."<sup>26</sup>

The actual mechanics of the compromise are set out in Article 246, which provides in paragraph 3 that coastal States "shall, in normal circumstances, grant their consent for marine scientific research projects in their EEZ or on their continental shelf ... To this end, coastal States shall establish rules and procedures for ensuring that such consent will not be delayed or denied unreasonably."<sup>27</sup>

Paragraph 5 of Article 246 adds that coastal States "may *in their discretion* withhold their consent" if the proposed project in the EEZ or on the continental shelf of the coastal State:

- (a) is of direct significance for the exploration and exploitation of natural resources, whether living or non-living;
- (b) involves drilling into the continental shelf, the use of explosives or the introduction of harmful substances into the marine environment;
- (c) involves the construction, operation or use of artificial islands, installations and structures;
- (d) contains information communicated pursuant to article 248 regarding *the nature and objectives* of the project which is *inaccurate* or if the researching State or competent international organization has outstanding obligations to the coastal State from a prior research project [italics added].

Paragraph 6 of Article 246 adds another layer of direct relevance for the Arctic coastal States.

"Notwithstanding the provisions of paragraph 5, coastal States may not exercise their discretion to withhold consent under subparagraph (a) of that paragraph in respect of marine scientific research projects to be undertaken in accordance with the



provision of this Part on the continental shelf, beyond 200 nautical miles ... outside those specific areas which coastal States may at any time publicly designate as areas in which exploitation or detailed exploratory operations focused on those areas are occurring or will occur within a *reasonable period of time*. Coastal States shall give reasonable notice of the designation of such areas, as well as any modifications thereto, but *shall not be obliged to give details of the operations therein* [italics added].”

Thus, a coastal State has different arguments at its disposal to refuse its consent to an MSR project by other States or organizations in its EEZ or on its continental shelf. Within 200 nm from its baselines, the coastal State can claim that the proposed project is of “direct significance” for the exploration and exploitation of natural resources, whether living or non-living” in its EEZ and/or on its continental shelf (Article 246(5)(a)). The criterion is simply that the

project is of “direct significance”; the coastal State does not need to allege that significant harm or damage would or could result. And in exercising its discretion to refuse the project on this ground, it cannot be challenged through the binding dispute resolution mechanisms under Part XV of the LOSC.<sup>28</sup>

Beyond 200 nm, the coastal State need only designate specific areas and assert that “exploitation” or “detailed exploratory operations” in those areas will occur “within a reasonable period” to invoke Article 246(5)(a) and withhold its consent on the basis that the foreign project is of “direct significance” for those operations. The coastal State is not obliged to give details of those “exploitation or detailed exploratory operations.” Furthermore, it can be anticipated that the “within a reasonable period” constraint will be interpreted more generously given the difficulties of conducting any operation beyond 200 nm in the Arctic Ocean.

*Xue Long 2 (Photo given to author)*



Subparagraph (b) and (c) also provide the coastal State with clear reasons to refuse its consent – where the foreign project involves drilling or the use of installations and structures. The reference in subparagraph (b) to consent being withheld because the project involves the “introduction of harmful substances into the marine environment” could be interpreted very broadly by a coastal State, particularly the word “harmful.” Paragraphs (b) and (c) are not caught by the special rules in paragraph 6 for areas beyond 200 nm and the compulsory dispute resolution mechanisms.

Article 246(5)(d) might offer the widest discretion of all. As noted above, a coastal State may withhold its consent if it considers that the description provided by the researching State contains inaccurate information regarding the nature and objectives of the project. Thus, a coastal State which considers that all of the objectives of a project have not been fully disclosed could assert that the information provided is “inaccurate” and on this basis, withhold its consent. Furthermore, this justification for withholding consent is not caught by the special rules in paragraph 6 of Article 246 for areas of the continental shelf beyond 200 nm. Once again, this exercise of discretion could not be subjected to compulsory dispute settlement.

Even where consent is granted, a foreign State or entity has the duty to comply with a number of important obligations. Article 248 not only demands that the researching State provide the coastal State with a “full” description of the nature and objectives of the project (paragraph (a)) but also, “the method and means to be used, including name, tonnage, type and class of vessels and *a description of scientific equipment*” (paragraph (b)) [italics added]. The researching State must also ensure the right of the coastal State, if it so desires, to participate in the project, provide the coastal State with preliminary report as well as final results and conclusions and provide access to all data and samples (see the full list of obligations in Article 249).

## Canadian Options

China’s Arctic operations over the past twenty years have certainly expanded and may now be exploring dual-use military/civilian technology. That is not to say that China is about to expand its naval operations into the Arctic; the strategic rationale for threatening North American from the region is questionable at best.<sup>29</sup> However, within the context of a growing, global great power competition, any Chinese military research must be viewed as potentially problematic.

From a Canadian perspective, the presence of Chinese hardware in our waters also raises political and security questions. Observers should, however, be cautious on this point given how little is publicly known about what DND fished out of Canadian waters. China (like other states) has spent years deploying buoys into the Arctic waters and what Canada found *may* have been a civilian buoy drifting in from international waters. This would be very different from an anchored buoy within Canadian territorial waters, or within the EEZ. Canada’s reaction to this incident, and to China’s future research will rest on what we found, and what our security agencies think these Arctic expeditions are seeking to accomplish.

While Part XIII of UNCLOS was intended to promote marine scientific research and the dissemination of information. Within this system, however, Coastal States retain significant control over that research in their EEZ and continental shelves, given the discretion

afforded to them by Article 246. Withholding Canadian consent is possible but would likely spark a broader political controversy and invite economic and diplomatic retaliation. It might also provoke a reciprocal denial of Canadian or other Western research projects in the Chinese EEZ, or on its continental shelf. Still, this may be a fight worth picking if it is deemed necessary to limit Beijing’s dual purpose research (if that approach can be demonstrated). If nothing else, this form of legal pushback would, shine a light on Chinese misbehaviour (again, if that misbehaviour can be demonstrated) and push back on Beijing’s persistent narrative that its role in the Arctic is a cooperative ‘win-win’ venture.

## Notes

<sup>1</sup> Steven Chase, “Canadian military found Chinese monitoring buoys in the Arctic,” *Globe and Mail* (February 21, 2023).

<sup>2</sup> Ibid.

<sup>3</sup> For a more detailed overview see: Bryan J.R. Millard and P. Whitney Lackenbauer, “Trojan Dragons: Normalizing China’s Presence in the Arctic,” CGAI Paper (June 2021).

<sup>4</sup> “‘水下机器人’再赴北极科考” [‘Underwater Robots’ Go to the Arctic for Scientific Expeditions to Conduct under-Ice Process Observations], 中国新闻网 [ChinaNews], July 5, 2010.

<sup>5</sup> “中国北极科考队布放首个极地大型海洋观测浮标” [The Chinese Arctic Scientific Research Team Deploys the First Large Polar Ocean Observation Buoy], 中华人民共和国中央人民政府 [The Central People’s Government of the People’s Republic of China], August 5, 2012.

<sup>6</sup> “雪龙船 破冰归来” [The Xuelong Returns from Breaking Ice], 新华网 [Xinhua], September 27, 2018.

<sup>7</sup> Retrieved from: China begins 9th Arctic expedition to help build ‘Polar Silk Road’.  
<https://www.globaltimes.cn/content/1111706.shtml>

<sup>8</sup> Retrieved from: 69天！中国第九次北极科考圆满完成：创多个中国之最. 69 days! China's ninth Arctic scientific research successfully completed."  
<https://m.gmw.cn/baijia/2018-10/14/31699019.html>

<sup>9</sup> 我国第十次北极科考：我国首次实现水下滑翔机在北极海域组网观测, [China's Tenth Arctic Scientific Research: China's First Underwater Glider in the Arctic Waters Group Network Observation],  
[https://www.sohu.com/a/344517633\\_726570](https://www.sohu.com/a/344517633_726570)

<sup>10</sup> Chinese sources were not clear if it actually *was* recovered. Retrieved from: 国产水下滑翔机首次应用于北极科考。Domestic underwater glider used for the first time in the Arctic scientific research.

<sup>11</sup> Retrieved from: 我国第十次北极科考：我国首次实现水下滑翔机在北极海域组网观测。China's tenth Arctic scientific research: China's first underwater glider in the Arctic waters group network observation.  
[https://www.sohu.com/a/344517633\\_726570](https://www.sohu.com/a/344517633_726570)

<sup>12</sup> 兵工科技》2016年第19期杂志抢鲜看 [Ordinance Industry Science and Technology] (2016).

<sup>13</sup> Adam Lajeunesse and Tim Choi, “Here there be Dragons? Chinese Submarine Options in the Arctic,” *Journal of Strategic Studies* (July 2021).

<sup>14</sup> Millard and Lackenbauer, 19.

<sup>15</sup> CGTN, “China's Xuelong 2 sets sail for new Arctic expedition,” CGTN (July 13, 2021).

<sup>16</sup> “China’s 5th Arctic (Arctic Ocean) Scientific Expedition,” from Millard and Lackenbauer, 19.

<sup>17</sup> “China’s 8th Arctic (Arctic Ocean) Scientific Expedition,” from Millard and Lackenbauer, 19.

<sup>18</sup> Gong Zhe, “Chinese ice breaker Xuelong crosses central Arctic during rim expedition,” CGTN, 18 August 2017, from Millard and Lackenbauer, 19.

<sup>19</sup> <http://news.bandao.cn/a/286657.html>

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[http://www.xinhuanet.com/english/2020-09/17/c\\_139376451.1](http://www.xinhuanet.com/english/2020-09/17/c_139376451.1)

<sup>21</sup> US Federal Register, “Revision to United States Marine Scientific Research Policy,” (September 18, 2020),  
<https://www.federalregister.gov/documents/2020/09/18/2020->

<sup>22</sup> Commentary given to one of the authors.

<sup>23</sup> United Nations, *The Law of the Sea – United Nations Convention on the Law of the Sea with Index and Final Act of the Third United Nations Conference on the Law of the Sea* (New York: United Nations, 1983) p. xxv.

<sup>24</sup> T.T.B. Koh, “A Constitution of the Oceans” in *ibid.*, at p. xxxiii.

<sup>25</sup> *Supra*, note 4, p. xxvii.

<sup>26</sup> Although the requirement that research be conducted for “peaceful purposes” seems to suggest that research serving military objectives is prohibited, Article 240(a) repeats a formula found in other articles of the Convention, such as Article 88 which provides that the high seas “shall be reserved for peaceful purposes”. According to Rothwell and Stevens, “[r]ather than imposing a blanket ban on the use of the oceans for military purposes, the effect of these provisions is to apply the general prohibition on the use of force except in self-defence, or where authorised by the UN Security Council under its Chapter VII powers.” D.R. Rothwell & T. Stephens, *The International Law of the Sea* (Portland, OR: Hart Publishing, 2010) at 325.

<sup>27</sup> Paragraph 4 of Article 246 specifically provides that “normal circumstances” may exist “in spite of the absence of diplomatic relations between the coastal State and the researching State”.

<sup>28</sup> See Article 297(2) of UNCLOS.

<sup>29</sup> On this see: Adam Lajeunesse and Tim Choi, “Here there be Dragons? Chinese Submarine Options in the Arctic,” *Journal of Strategic Studies* (July 2021).