China in the Arctic

Implications of China's Arrival in an Ice-Free Arctic

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Abstract

This research paper assesses the People's Republic of China's (PRC's) long-term interests and activities in the Arctic. It is aimed at assessing China's interests in the Arctic, its current activities, and its motivation for allocating increased resources for high Arctic research. This includes a thorough review of Beijing's potential geostrategic interests in the Arctic.

This research paper also supports two Defence Research and Development Canada (DRDC) Applied Research Projects (ARPs). It supports ARP 10aa15, "Arctic Security and Sovereignty Assessment," and ARP 10aa16, "The Rise of China: Strategic Assessment and Implications for Canadian Security."

The research paper assesses China's interests and activities in the Arctic by analyzing existing data, research, and literature on China's preparations for a climate changed and potentially ice-reduced Arctic. Research is based on an analysis of open source literature, electronic sources, published and unpublished reports and papers, and interviews.

The major conclusions to be drawn from this study are that China's activities in the Arctic have not been of the military variety, nor does it appear China will become militarily involved in the Arctic in the near-term. China's involvement in the Arctic is focused on the scientific, environmental, and climatic consequences of melting sea ice, as well as the commercial and economic benefits of melting Arctic sea ice.

This will also be the first time in the contemporary period that a major non-circumpolar power with global interests and aspirations will enter the Arctic region. Over the long term, this has the potential to not only affect the circumpolar balance of power, but also the strategic thinking of all states involved. As such, circumpolar states such as Canada must be prepared to prevent the potential exploitation of the Arctic by non-circumpolar states.

Thus, circumpolar states, including Canada, must think about the Arctic as a strategic region. The Canadian Forces, for its part, should maintain its multi-purpose combat capabilities. A versatile and flexible military that can respond to challenges across a spectrum of non-combat and combat roles, including in the underwater environment, will serve the Canadian government best in addressing the challenges envisaged in the Arctic as non-circumpolar states enter the region.

Résumé

Ce document de recherche évalue les intérêts et les activités à long terme de la République populaire de Chine (RPC) dans l'Arctique. L'étude vise à examiner les intérêts de la Chine dans l'Arctique, ses activités en cours et les raisons qui la poussent à consacrer davantage de ressources à la recherche dans le Grand Nord. Le dossier comprend une analyse en profondeur des intérêts géostratégiques potentiels de Beijing dans l'Arctique.

Ce document de recherche soutient également deux projets de recherche appliquée (PRA) de Recherche et développement pour la défense Canada (RDDC). Le premier est le PRA 10aa15, « Évaluation de la sécurité et de la souveraineté dans l'Arctique », et le deuxième est le PRA 10aa16, « la montée de la Chine : évaluation stratégique et incidences sur la sécurité du Canada ».

Le document évalue les intérêts et les activités de la Chine dans l'Arctique en analysant les données, la recherche et la littérature existantes sur la préparation de la Chine à un changement climatique et à une réduction de la glace en Arctique. La présente recherche est fondée sur une analyse de la littérature, des ressources électroniques, des rapports et des travaux publiés et non publiés, et des entrevues de source ouverte.

Les principales conclusions à tirer de cette étude sont que les activités de la Chine en Arctique ne sont pas de nature militaire, et il ne semble pas que la Chine s'engagera militairement dans l'Arctique dans un avenir rapproché. L'engagement de la Chine dans l'Arctique se concentre sur les conséquences scientifiques, environnementales et climatiques de la fonte des glaces en mer, de même que sur les avantages économiques et commerciaux de ce phénomène dans la mer Arctique.

Il s'agit également de la première fois dans la période contemporaine qu'une des principales puissances non circumpolaires ayant des aspirations et des intérêts mondiaux entrera dans la région de l'Arctique. À long terme, cette situation a le potentiel d'influer non seulement sur l'équilibre du pouvoir circumpolaire, mais également sur la pensée stratégique de tous les États touchés. Ainsi, les États circumpolaires comme le Canada doivent réaliser qu'il est possible que l'Arctique soit exploité par des États non circumpolaires, et doivent l'empêcher.

Les États circumpolaires, notamment le Canada, doivent donc considérer l'Arctique comme une région stratégique. Les Forces canadiennes, pour leur part, devraient maintenir leurs capacités de combat polyvalent. Des forces militaires souples et polyvalentes pouvant aborder les enjeux en adoptant une variété d'approches allant du non-combat au combat, notamment dans l'environnement sous-marin, pourront au mieux aider le gouvernement du Canada à relever les défis pressentis à la suite de l'intervention dans l'Arctique d'États non circumpolaires.

Executive summary

China in the Arctic: Implications of China's Arrival in an Ice-Free Arctic

Kyle D. Christensen; DRDC CORA TM 2011-196; Defence R&D Canada – CORA; November 2011.

Background: As the current strategic environment continues to evolve, so too does the possibility that the Arctic will become an important geostrategic region. One underlying assumption of this assessment is that climate change will make the Arctic more accessible for longer periods, and this accessibility may bring with it a variety of new challenges. One new challenge may be increased activity by non-circumpolar states in the region.

One non-circumpolar country that has become increasingly active in the Arctic has been the People's Republic of China (PRC). This research paper assesses China's long-term interests and activities in the Arctic. It is aimed at assessing China's interests in the Arctic, its current activities, and its motivation for allocating increased resources for high Arctic research. This includes a thorough review of Beijing's potential geostrategic interests in the Arctic.

The research paper assesses China's interests and activities in the Arctic by analyzing existing data, research, and literature on China's preparations for a climate changed and potentially ice-reduced Arctic. Research is based on an analysis of open source literature, electronic sources, published and unpublished reports and papers, and interviews.

Results: This report offers a number of important findings. Overall, climate change has the potential to make the Arctic more accessible for longer periods, and this accessibility will bring with it a whole host of potential challenges. These developments increase the likelihood that non-circumpolar states will become active in the region.

Beijing is well aware that, as a rising global power, its activities in the Arctic might be cause for alarm among circumpolar states. China, therefore, has taken a cautious approach to its involvement in the Arctic. To date, China's activities in the Arctic have not been of the military variety. Therefore, it does not currently pose a significant challenge or threat in the Arctic, particularly in the traditional military and security sense.

For the time being, China's involvement in the Arctic is focused on the scientific, environmental, and climatic consequences of melting sea ice, as well as commercial and economic benefits of melting Arctic sea ice. Beijing, however, does have, and will likely maintain, long-term aspirations in the region that could eventually pose a security challenge. The release of China's 12th Five Year Plan, which was approved by the PRC National People's Congress on March 14, 2011, included a commitment to continue polar and oceanic scientific investigation activities. In addition, the use of the term "polar regions," for the fist time in a Chinese National Defense White Paper, suggests that Chinese officials are attributing an increasing level of importance to the polar regions not only from a scientific and research point of view, but from a security and defence perspective as well.

Significance: The major conclusions to be drawn from this study are that China's activities in the Arctic have not been of the military variety, and it does not appear that it will become militarily involved in the Arctic in the near-term. China's involvement in the Arctic is focused on the scientific, environmental, and climatic consequences of melting sea ice, as well as commercial and economic benefits of melting Arctic sea ice.

Beijing wants to ensure that it is not forced into a passive position in the Arctic; that it is an active power in the development of Arctic affairs; and that it retains access to the Arctic. Beijing, therefore, will continually and persistently affirm its rights and accessibility to the Arctic.

China's involvement in the Arctic will also be the first time in the contemporary period that a major non-circumpolar power with global interests and aspirations will enter the Arctic region. This has the potential to not only affect the circumpolar balance of power, but also impact the strategic thinking of all states involved. Circumpolar states such as Canada must be prepared to prevent the potential exploitation of the Arctic by non-circumpolar states.

Circumpolar states, including Canada, must think about the Arctic as a strategic region. Operations in the Arctic are not all about monitoring economic activities, protecting hydrocarbon reserves, or preventing environmental pollution. They may increasingly becoming more about limiting the exploitive use of the Arctic by non-circumpolar states. Thus, the Canadian Forces should maintain its multi-purpose combat capabilities, and that an effective Arctic ASW capability should be developed in order to influence events that may challenge Canada's sovereignty. A versatile and flexible military that can respond to challenges across a spectrum of non-combat and combat roles, including in the underwater environment, will serve the Canadian government best in addressing the challenges envisaged in the Arctic as non-circumpolar states enter the region.

Sommaire

China in the Arctic: Implications of China's Arrival in an Ice-Free Arctic

Kyle D. Christensen; DRDC CORA TM 2011-196; R & D pour la défense Canada – CORA; Novembre 2011.

Contexte: L'environnement stratégique actuel continue d'évoluer, tout comme la possibilité que l'Arctique devienne une région géostratégique importante. Une des hypothèses fondamentales de cette évaluation avance que le changement climatique rendra l'Arctique plus accessible pendant de plus longues périodes, et cette accessibilité pourrait entraîner une variété de nouveaux enjeux. L'un de ces changements serait l'augmentation de l'activité dans la région par les États non circumpolaires.

La République populaire de Chine (RPC) fait partie de ces États dont l'activité ne cesse de croître. Ce document de recherche évalue les intérêts et les activités à long terme dans l'Arctique. L'étude vise à examiner les intérêts de la Chine dans l'Arctique, ses activités en cours et les raisons qui la poussent à consacrer davantage de ressources à la recherche dans le Grand Nord. Le dossier comprend une analyse en profondeur des intérêts géostratégiques potentiels de Beijing dans l'Arctique.

Le document évalue les intérêts et les activités de la Chine dans l'Arctique en analysant les données, la recherche et la littérature existantes sur la préparation de la Chine à un changement climatique et à une réduction de la glace en Arctique. La présente recherche est fondée sur une analyse de la littérature, des ressources électroniques, des rapports et des travaux publiés et non publiés, et des entrevues de source ouverte.

Résultats: Le rapport fait état de nombreuses découvertes importantes. En résumé, le changement climatique pourrait rendre l'Arctique plus accessible pendant de plus longues périodes, et cette accessibilité entraînera toute une gamme d'enjeux potentiels. Ces changements en Arctique augmentent la probabilité que des États non circumpolaires deviennent actifs dans la région.

Étant donné qu'elle est une puissance mondiale émergente, Beijing sait très bien que ses activités dans l'Arctique peuvent alarmer les États circumpolaires. Ainsi, la Chine a adopté une approche prudente dans son engagement en Arctique. Jusqu'à maintenant, ses activités ne sont pas de nature militaire. Elles ne constituent donc pas un problème ou une menace pour le moment, en particulier en ce qui a trait aux forces armées et à la sécurité comme on les entend au sens traditionnel.

Pour l'instant, l'engagement de la Chine dans l'Arctique se concentre sur les conséquences scientifiques, environnementales et climatiques de la fonte des glaces en mer, de même que sur les avantages économiques et commerciaux de ce phénomène dans la mer Arctique. Toutefois, Beijing a actuellement, et maintiendra sûrement, des aspirations à long terme dans la région qui pourraient poser un problème de sécurité. Le lancement du 12e plan quinquennal de la Chine, approuvé par le Congrès national populaire de la RPC le 14 mars 2011, comprend un engagement à poursuivre les activités de recherche scientifique dans le Nord et dans l'océan Arctique. De

plus, l'utilisation pour la première fois par la Chine du terme « régions polaires » dans un Livre blanc sur la défense nationale laisse croire que les autorités chinoises attribuent de plus en plus d'importance à cette partie du globe, non seulement du point de vue scientifique et de la recherche, mais également dans une perspective de défense et de sécurité.

Importance: Les principales conclusions à tirer de cette étude sont que les activités de la Chine dans l'Arctique ne sont pas de nature militaire, et ne devraient pas le devenir dans un avenir rapproché. L'engagement de la RPC se concentre sur les conséquences scientifiques, environnementales et climatiques de la fonte des glaces en mer, de même que sur les avantages économiques et commerciaux d'une telle fonte dans la mer Arctique.

Beijing veut s'assurer de ne pas être forcée de jouer un rôle passif dans l'Arctique, de faire partie prenante des questions entourant l'Arctique, et de conserver son accès à l'Arctique. Beijing continuera donc d'affirmer avec persistance ses droits dans l'Arctique et son accès à cette région.

Il s'agit également de la première fois dans la période contemporaine qu'une des principales puissances non circumpolaires ayant des aspirations et des intérêts mondiaux entrera dans la région de l'Arctique. À long terme, cette situation a le potentiel d'influer non seulement sur l'équilibre du pouvoir circumpolaire, mais également sur la pensée stratégique de tous les États touchés. Ainsi, les États circumpolaires comme le Canada doivent réaliser qu'il est possible que l'Arctique soit exploité par des États non circumpolaires, et doivent l'empêcher.

Les États circumpolaires, notamment le Canada, doivent donc considérer l'Arctique comme une région stratégique. Les opérations dans l'Arctique ne se limitent pas à la surveillance des activités économiques, à la protection des réserves en hydrocarbures, ou à la sauvegarde de l'environnement. Il se pourrait qu'elles consistent davantage à limiter l'exploitation de l'Arctique par les États non circumpolaires. Les Forces canadiennes devraient donc, pour leur part, maintenir leurs capacités de combat polyvalent, et assurer une capacité de lutte anti-sous-marine dans la région afin d'influer sur les événements qui pourraient menacer la souveraineté du Canada. Des forces militaires souples et polyvalentes pouvant aborder les enjeux en adoptant une variété d'approches allant du non-combat au combat, notamment dans l'environnement sous-marin, pourront au mieux aider le gouvernement du Canada à relever les défis pressentis à la suite de l'intervention dans l'Arctique d'États non circumpolaires.

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1 Introduction

As the current strategic environment continues to evolve, several developments have required defence planners to assess the importance of the Arctic. The *Canada First Defence Strategy*, for instance, stipulates that climate change will make the Arctic more accessible for longer periods, and this accessibility may bring with it a variety of new challenges from distant shores such as increased activity by non-circumpolar states.[1]

One non-circumpolar country that has shown an interest in the Arctic, and that has become increasingly active in the region, has been the People's Republic of China (PRC). In recent years, China has been paying increasing attention to the potential consequences of melting sea ice in the Arctic as a result of climate change. The prospect of the Arctic becoming increasingly navigable during summer months, the potential for shorter shipping routes between Asia and other regions of the world, and access to untapped natural resources – particularly energy resources – has prompted China to devote more attention to Arctic research and activities. To accomplish these goals, Beijing has begun conducting Arctic research projects, and embarked upon a comprehensive project to develop its Arctic capabilities.

This research paper assesses China's long-term interests and activities in the Arctic. It is aimed at assessing China's interests in the Arctic, its current activities, and its motivation for allocating increased resources for Arctic research. This includes a thorough review of Beijing's potential geostrategic interests in the Arctic. While the paper will address the implications of these interests from a general circumpolar perspective, it will highlight specific implications to Canada where applicable.

This research paper supports two Defence Research and Development Canada (DRDC) Applied Research Projects (ARP). The first is ARP 10aa15, "Arctic Security and Sovereignty Assessment." The aim of the Arctic Security and Sovereignty Assessment is to develop a Canadian force employment strategy for Arctic sovereignty and security. By considering the Arctic as a strategic operational theatre, this research paper will help facilitate and advance the knowledge and understanding in determining force posture and force readiness requirements for the Arctic.

The second ARP this research paper supports is 10aa16, "The Rise of China: Strategic Assessment and Implications for Canadian Security." This project is aimed at conducting extensive research into key issues, areas, and factors that will influence and shape China's re-emergence as a key global power. Since China's rise as a great power will undoubtedly affect Canada, this research paper explores potential scenarios under which Canada's interests may be affected by China's activities in the Arctic.

This research paper assesses China's interests and activities in the Arctic by analyzing existing data, research, and literature on China's preparations for a climate changed and potentially ice-reduced Arctic. Research is based on an analysis of open source literature, electronic sources, published and unpublished reports and papers, and interviews. The research contained in this

[1] Department of National Defence, *Canada First Defence Strategy* (Ottawa: Government of Canada, 2008), 6.

report has been limited largely to secondary source material due to resource constraints. This paper, and all other papers prepared in ARP 10aa16, are constrained by a lack of access to primary source material (including Mandarin language sources and/or translation services), as well as a lack of opportunity for in-country research. Consequently, while every effort has been made to ensure that the present work meets acceptable scholarly standards, these constraints impose inescapable limitations that cannot be overcome without the provision of additional resources. Therefore, the results of this study should only be regarded as the best judgement of the author based upon the research material at hand.

The research paper assesses China's interests and activities in the Arctic in eight sections. The first section provides a general overview and background description of the impact of climate change in the Arctic, the driving logic of Arctic involvement. Reducing sea ice cover, the result of climate change, is the primary motivator behind increased activity in the Arctic. The second section will briefly investigate China's economic and commercial interests in the Arctic. This will include an assessment of access and use of potential transit routes as well as resource development and extraction activities (particularly non-renewable resources such as hydrocarbons and minerals). The third will tie China's potential economic and commercial interests in the Arctic together with the use of transit routes and the potential impact of climate change in the region. It will highlight that several distinct challenges exist to extracting and exploiting resources in the region. The fourth section reviews China's research activities in the Arctic. It will highlight past expeditions, capability acquisitions, and research and development (R&D) initiatives. The fifth highlights China's current thinking on the geopolitics of the Arctic and what appears to be an internal debate taking place within China over the future direction of its Arctic research activities and involvement. It also investigates China's potential evolving research thrusts and interests in the Arctic. The sixth will investigate China's interests in the Arctic from a geostrategic point of view. While the geostrategic implications of China's use of the Arctic may appear improbable, the scenarios are not so much about the likelihood of China using the Arctic as a geostrategic operational area, than about the ability of circumpolar states to prevent the exploitive use of the Arctic by non-circumpolar states. The seventh will investigate China's involvement in the Arctic from a legal position, particularly through the use of the United Nations Convention on the Law of the Sea (UNCLOS). It will investigate the exploitive use of the Arctic by a non-circumpolar state from a legal/legislative point of view. It will investigate Beijing's claim that it has "rights" in the Arctic that need to be protected. The final section will offer some concluding remarks and recommendations on the strategic implications of China's activities in the Arctic.

The major conclusions to be drawn from the study are that China's activities in the Arctic have not been of the military variety, nor does it appear China will become militarily involved in the Arctic in the near-term. China's involvement in the Arctic is focused on the scientific, environmental, and climatic consequences of melting sea ice, as well as commercial and economic benefits of melting Arctic sea ice. Beijing also wants to ensure that it is not forced into a passive position in the Arctic; that it is an active power in the development of Arctic affairs; and that it retains access to the Arctic. Beijing, therefore, will continually and persistently affirm its rights and accessibility to the Arctic.

China's involvement in the Arctic will also be the first time in the contemporary period that a major non-circumpolar power with global interests and aspirations will enter the Arctic region. This has the potential to not only affect the circumpolar balance of power, but also impact the strategic thinking of all states involved. As such, circumpolar states such as Canada must be

prepared for, and possibly prevent, the potential exploitation of the Arctic by non-circumpolar states.

2 Climate Change: Logic of Arctic Involvement

The potential impact that climate change will have on the Arctic is by far the single greatest driver of whether countries such as China will become increasingly involved in the region.[2] This is largely because climate change has the potential to influence the degree, prevalence, and likelihood of other changes, challenges, and opportunities taking place in the north. It is anticipated that as climate change alters global weather patterns, the Arctic will experience a reduction in sea ice and a commensurate increase in activity. If Arctic sea ice recedes, there is a greater probability that hydrocarbons and other natural non-renewable resources could be exploited, or that Arctic passages could be used as international straits. There is also a chance that Canada and other circumpolar countries could face challenges to their Arctic sovereignty due to these activities.

While it is not the intent of this paper to determine which elements of climate change science are correct, the intent is to review current data on climate change in the Arctic, thereby highlighting the underlying motivating factor for China's recent increased interest and activity in the region.

2.1 Climate Change, Sea Ice and Arctic Shipping

Over the last two to three decades, changes in the Arctic have been observed in terms of rising temperatures and decreasing sea ice extent. In fact, the most visible effect of climate change in the Arctic has been the apparent reduction of observable sea ice. Figure 1 is a satellite image from the *Arctic Climate Impact Assessment* that shows the observed decrease of Arctic sea ice in 1979 and 2003.

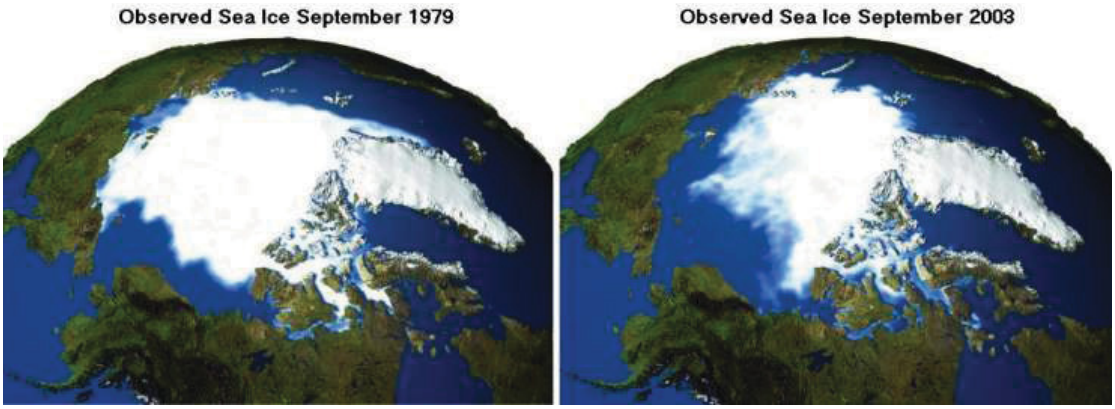

Figure 1 Observed Minimum Arctic Summer Sea Ice, 1979-2003[3]

[2] Current thinking is that climate change will result in increased accessibility and exploitation of the Arctic. This increased accessibility will bring with it a variety of challenges that circumpolar states will be required to respond to in the future.

[3] Figure 1 shows a comparison of composite satellite images of the Arctic from 1979 (left), and 2003 (right). National Aeronautics and Space Administration, "Dwindling Arctic Sea Ice," *Earth Observatory*,

Figure 1 leaves little room to challenge the notion that climate change is impacting the Arctic region. On the surface, it appears temperatures have risen, sea-ice is thinning, Arctic sea ice cover is shrinking, and warming is greater in the polar areas than in the equatorial regions. More importantly, there has been a significant reduction in multi-year sea ice and ice volume in the Arctic.[4] According to Figure 2, climate change has been observed in the north since at least the mid-1950s, with a pronounced warming trend since the 1970s. According to climate change statistics and Figure 2, the temperature in the Arctic has risen by 2 degrees Celsius (3.6 degrees Fahrenheit) in the last century – twice the average rate experienced worldwide.[5]

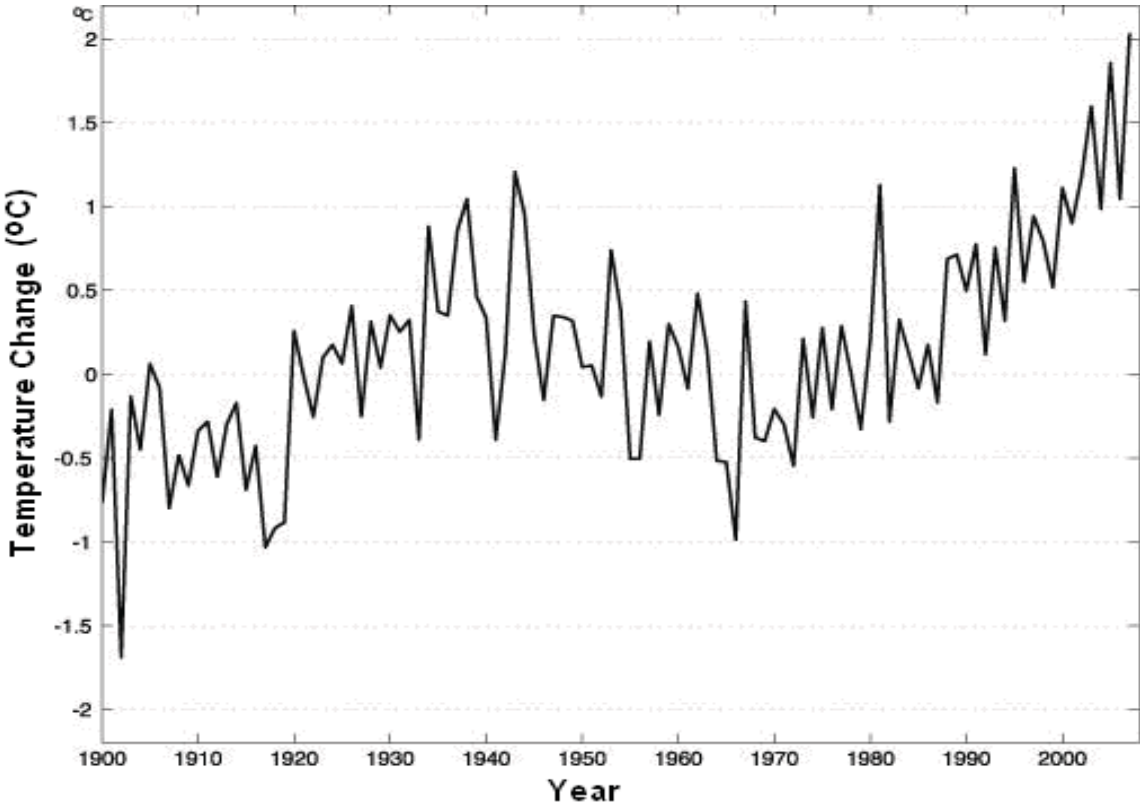

Figure 2 Arctic Temperature Change, 1900-2010[6]

Image of the Day, October 24, 2003, http://earthobservatory.nasa.gov/IOTD/view.php?id=3900 (Accessed: January 7, 2011).

[4] IPCC, *Climate Change 2007: Synthesis Report* (Geneva, Switzerland: IPCC, 2007), 30 and 33.

[5] Canada Geographic, "Climate Change," *The Canadian Atlas Online*, http://www.canadiangeographic.ca/Atlas/themes.aspx?id=climate&lang=En (Accessed: February 13, 2010).; and J.C. Falkingham, "Sea Ice in the Canadian Arctic in the 21st Century," *The State of the Arctic Cryosphere During the Extreme Warm Summer of 1998: Documenting Cryospheric Variability in the Canadian Arctic*, Final Report (Ottawa: Environment Canada, Canadian Ice Service, 1998), 2-3.

[6] Figure from National Aeronautics and Space Administration, *GISS Surface Temperature Analysis*, Goddard Institute for Space Studies (GISS), http://data.giss.nasa.gov/gistemp/graphs/ (Accessed: February 13, 2010).; and J. Overland, M. Wang, and J. Walsh, "Atmosphere," *Arctic Report Card: Update for 2009*

The importance of warmer temperatures in the Arctic has been the observed retreating of Arctic sea ice. On average, Arctic sea ice cover shrinks by 70,000 square kilometers (27,027 square miles) each summer. Hidden amongst these annual fluctuations, however, has been an overall decline in the overall size of Arctic sea ice cover. For instance, minimum Arctic sea ice extent has decreased at a rate of three to three and a half percent per decade since the early 1970s.[7]

Figure 3 shows the general and accelerating trend of diminishing average yearly Arctic sea ice for September 1979 to 2009. From 1979 to 1994, the Arctic sea ice cover shows a moderate reduction in its inter-annual sea ice minimum. During that period Arctic sea ice cover shrank from a high of almost 8,000,000 square kilometers (3,000,000 square miles) in 1980 to just over 6,000,000 square kilometers (2,000,000 square miles) in 1995. However, sea ice cover has shrunk from a high of 8,000,000 square kilometers in 1996 to a low of just over 4,000,000 square kilometers (1,500,000 square miles) in 2007. In other words, sea ice cover shrank almost twice as much in the 11 years from 1996 to 2007, as it did in the 21 years from 1979 to 1996.

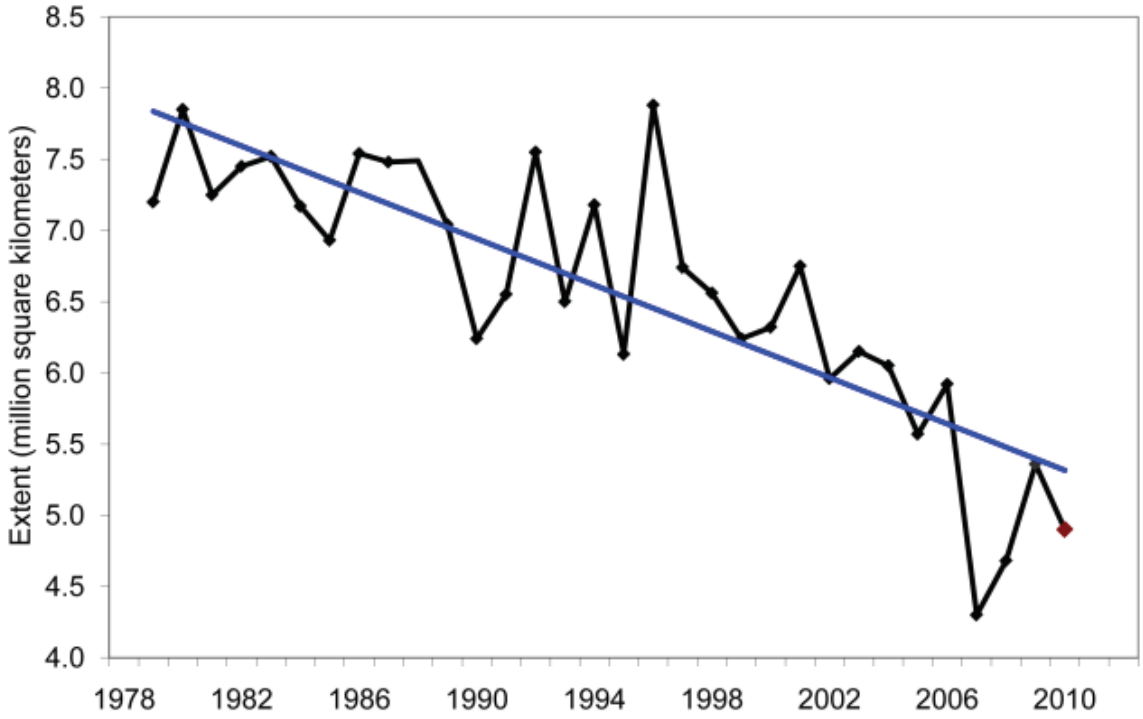

Figure 3 Average Yearly Sea Ice Minimum, September 1978-2010[8]

To illustrate this point further, space based satellites have been used to monitor and measure the melting of Arctic sea ice cover. As a result, space based satellites have proved helpful in

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(National Oceanic and Atmospheric Administration, 2009), http://www.arctic.noaa.gov/reportcard/atmosphere.html (Accessed: June 1, 2009).

[7] Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, 2nd Printing (Tromsø, Norway: 2009), 28.

[8] Graph from National Snow and Ice Data Center, "Arctic Sea Ice News & Analysis," *Sea Ice Index, Sea Ice Data at NSIDC*, http://nsidc.org/arcticseaicenews/index.html (Accessed: August 22, 2010).

monitoring changes in Arctic sea ice. Figure 4, for instance, shows a satellite image of Arctic ice coverage in the summer of 2007. In 2007, satellites recorded the Arctic's minimum summer ice extent at 4,300,000 square kilometers. This was the greatest reduction in summer sea ice ever recorded. At the record minimum in 2007, the extent of Arctic sea ice was 39 percent below long-term averages from 1979 to 2000, and 50 percent below conditions that existed in the 1950s to the 1970s.[9] The 2007 summer retreat was particularly pronounced in the East Siberian Sea, the Laptev Sea, the Beaufort Sea, and the Canadian archipelago.

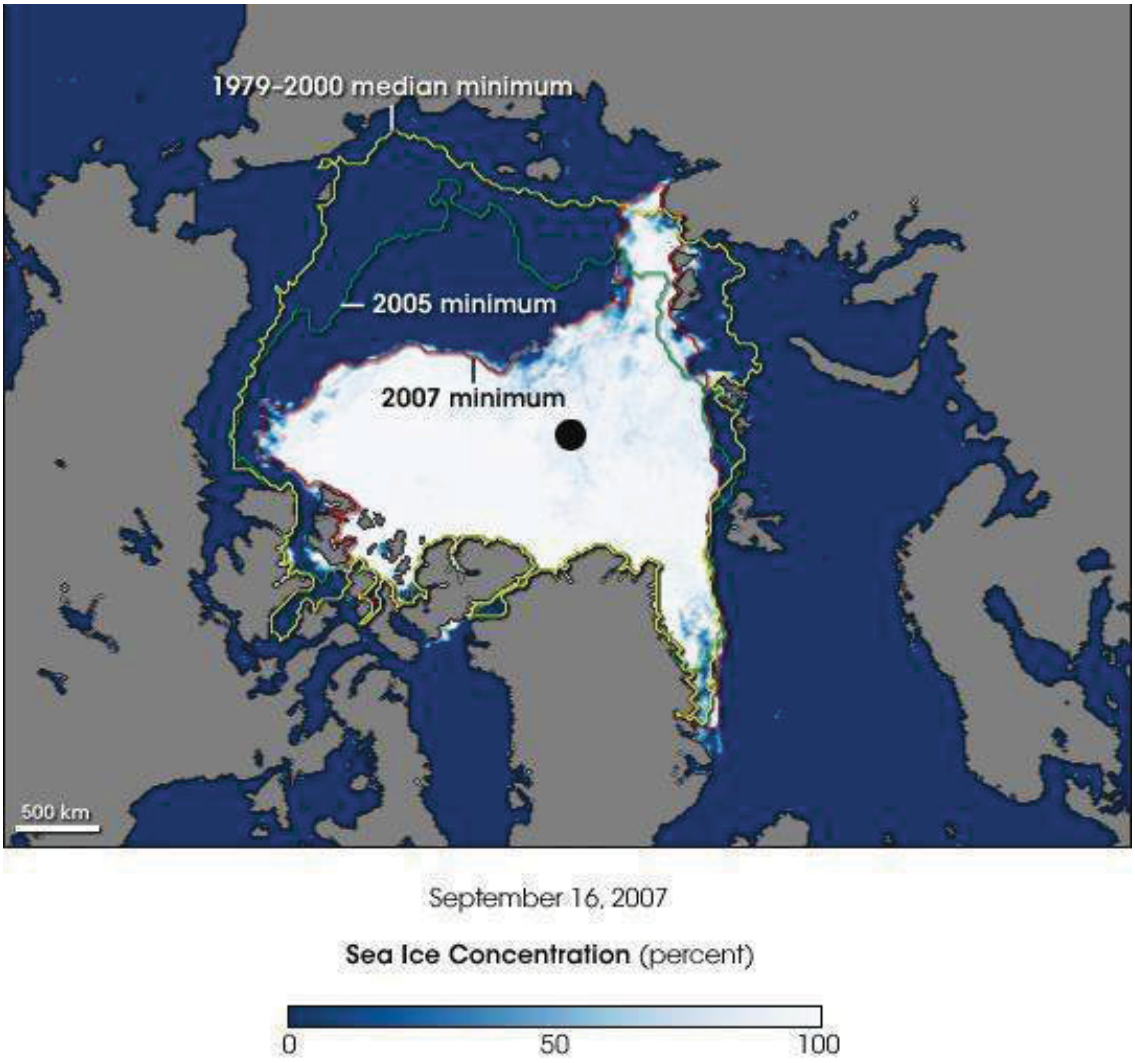

Figure 4 Minimum Arctic Sea Ice Coverage, September 2007[10]

[9] For comparison purposes, the average monthly ice extent for March and September, 1979-2000, is 12,000,000 and 6,000,000 square kilometers (4,600,000 and 2,300,000 square miles) respectively.
[10] This image shows the Arctic as observed by the NASA AMSR earth orbiting satellite on September 16, 2007. See National Aeronautics and Space Administration, "Record Sea Ice Minimum," *Earth*

What is most striking about the reduction of sea ice in 2007 was that it was well outside of modeled forecasts. According to Figure 5, the extent of Arctic summer sea ice was outside of the mean model forecast by as much as 3,000,000 square kilometers. Trends such as these prompted scientists and environmentalists to conclude that, not only was climate change occurring, but also that it was accelerating.

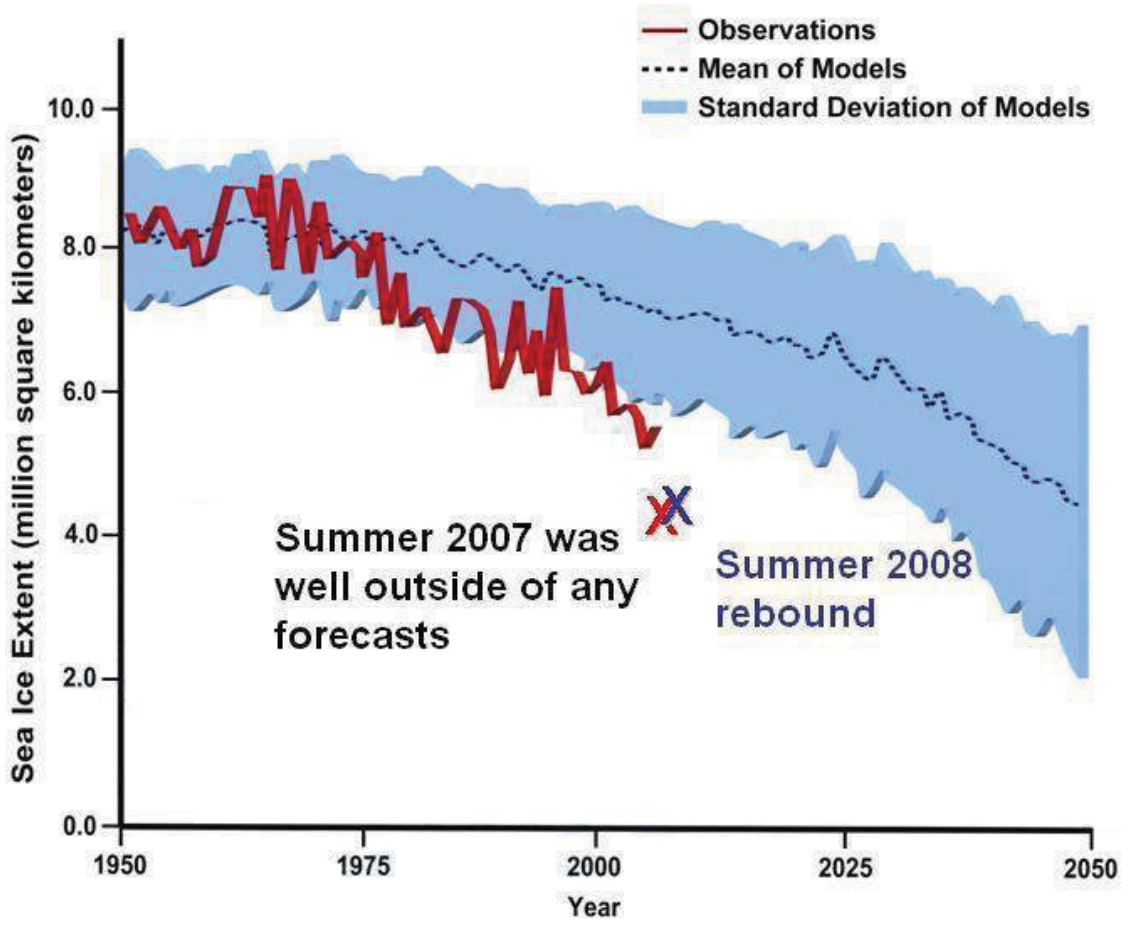

Figure 5 Arctic Summer Sea Ice Extent: Observations vs. Modal Runs[11]

Nevertheless, in 2008 and 2009, the National Snow and Ice Data Centre (NSIDC) reported a rebound in the Arctic's minimum summer sea ice coverage (see Figure 6). The minimum sea ice extent for 2008 was 400,000 square kilometers (154,440 square miles) higher than it was in 2007, and in 2009, it was approximately 1,000,000 square kilometers (291,553 square miles) – or roughly 25 percent – greater than it was during the 2007 minimum.[12]

Observatory, Image of the Day, October 13, 2007, http://earthobservatory.nasa.gov/IOTD/view.php?id=8126 (Accessed: November 3, 2009).

[11] Figure derived from J. Stroeve et al., "Arctic Sea Ice Decline: Faster Than Forecast," *Geophysical Research Letters* 34 (2007): L09501, doi:10.1029/2007GL029703.

[12] Arctic ROOS, "Ice Extent," *Arctic Ice Area and Extent from SSMI* (NERSC), http://arctic-roos.org/observations/satellite-data/sea-ice/observation_images/ssmi1_ice_ext.png (Accessed: January 10,

In 2010, Arctic sea ice coverage experienced fluctuating levels of variability. While Arctic sea ice extent peaked in April,[13] it reached some of its lowest levels on record since 2005 between late May and early July. By mid July, however, Arctic sea ice extent had returned to the same level as 2008-2009, and appeared to be on course for a typically average minimum sea ice extent.[14]

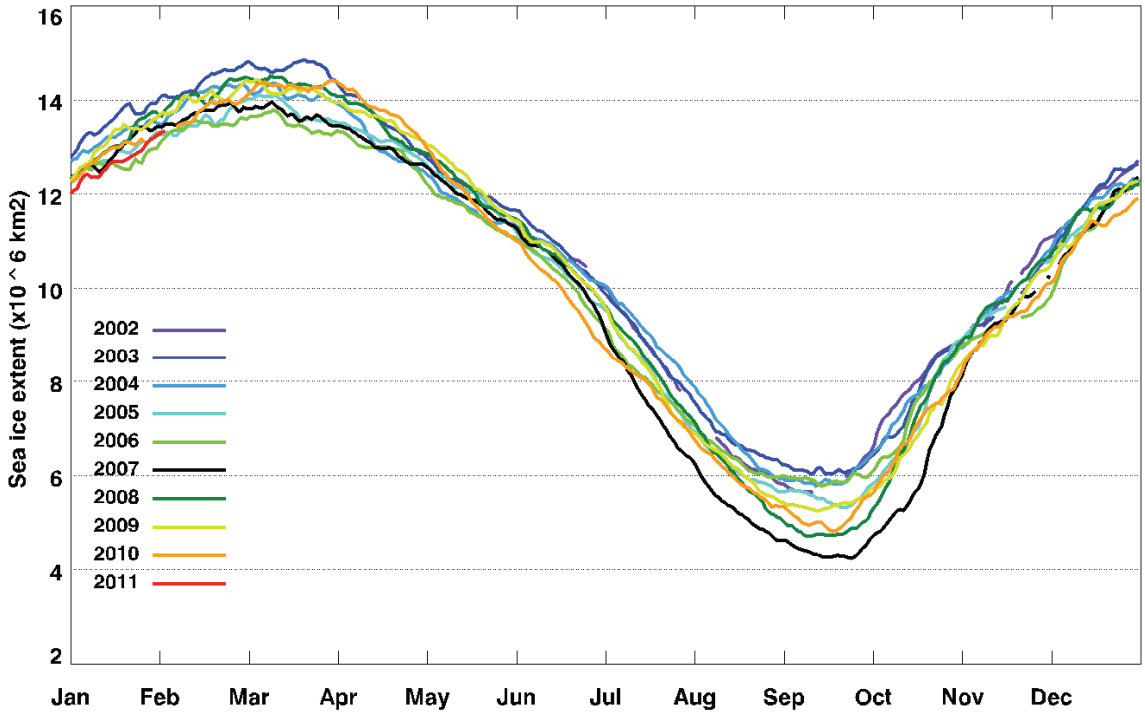

Figure 6 Arctic Monthly Sea Ice Extent, 2002-2011[15]

Adding to the complexity of assessing sea ice extent in the Arctic has been an apparent reduction in sea ice volume in recent years. While there has been a rebound in the Arctic's minimum summer ice coverage in 2008, 2009, and 2010, there has been an apparent decrease in Arctic sea

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2011).; and University of Illinois, "Latest Regional Sea Ice Coverage and Anomalies," *The Cryosphere Today*, http://arctic.atmos.uiuc.edu/cryosphere/ (Accessed: January 10, 2011).

[13] The 2010 Arctic sea ice melt season – which began on March 31, 2010 – was the latest beginning to a melt season since records have been kept, since 1979. National Snow and Ice Data Centre, "Cold Snap Causes Late-Season Growth Spurt," *Arctic Sea Ice News & Analysis*, April 6, 2010, http://nsidc.org/arcticseaicenews/2010/040610.html (Accessed: January 10, 2011).

[14] It is also important to note that temperatures above 80 degrees north latitude were below normal for the entire 2010 summer season. Consequently, at higher latitudes, sea ice extent exceeded 1979-2006 averages. See Arctic ROOS, "Ice Extent."; T. Ball, "Wide Fluctuations in Arctic Temperatures Common," *Frontier Center for Public Policy*, November 20, 2004, http://www.fcpp.org/main/publication_detail.php?PubID=872 (Accessed: January 10, 2011).; O.M. Johannesen et al., "Recent Ice-Sheet Growth in the Interior of Greenland," *Science* 310 (2005): 1013-1016.; and University of Illinois, "Latest Regional Sea Ice Coverage and Anomalies."

[15] Figure 6 shows sea ice extent as determined by an AMSR-E satellite. IARC-JAXA Information System, "AMSR-E Sea Ice Extent," *Data of Sea Ice Extent*, http://www.ijis.iarc.uaf.edu/en/home/seaice_extent.htm (Accessed: February 1, 2011).

ice volume and thickness over the same period. According to papers published in *Geophysical Research Letters*, total multi-year sea ice volume in the winter has experienced a net loss between 2005 and 2009. The primary changes in the overall thickness and volume of Arctic sea ice are attributable to the thinning and reduction of multi-year sea ice coverage.[16] According to the *Geophysical Research Letters* paper, the larger loss of multi-year sea ice volume has not been compensated for by the positive increase in first-year sea ice coverage.[17] In effect, the volume stored in multi-year sea ice during the winter is lower than that stored in first-year sea ice. Instead of covering just over half of the Arctic Ocean in 2003, multi-year sea ice covered only a third of the Arctic Ocean during the winter of 2008.[18] As a result, seasonal sea ice, having surpassed that of multi-year sea ice in terms of winter area coverage and volume, became the dominant ice type in the Arctic.

The simultaneous thinning of multi-year sea ice and declining multi-year sea ice coverage has resulted in a reduction of the Arctic's total sea ice volume. This is particularly important over the long-term as sea ice volume is what is related to the energy required to melt it. The energy required to melt first-year sea ice is less than that of multi-year sea ice. If the reduction of Arctic sea ice volume coincides with the apparent increase of first-year sea ice cover, it raises the likelihood that the central Arctic could become ice-free during summer months.

Nevertheless, some assessments suggest that the Arctic's sea ice thickness remains "within the bounds of natural variability."[19] Whether minimum summer sea ice coverage, thickness, and type return to modeled expectations, remain constant, or fall outside of normal averages is yet to be determined. Therefore, while the overall extent of sea ice coverage in the Arctic is trending downwards, the region will likely experience significant inter-annual sea ice variability where there will be years with light ice cover interspersed with years with heavy ice cover.

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[16] C. Haas et al., "Reduced Ice Thickness in Arctic Transpolar Drift Favors Rapid Ice Retreat," *Geophysical Research Letters* 35 (2008): L17501, doi: 10.1029/2008GL034457.; and R. Kwok et al., "Thinning and Volume Loss of the Arctic Ocean Sea Ice Cover: 2003-2008," *Geophysical Research Letters* 114 (2009): C07005, doi:10.1029/2009JC005312.

[17] At the same time, the thickness of first-year sea ice cover has not changed significantly. Kwok, "Thinning and Volume Loss of the Arctic Ocean Sea Ice Cover."

[18] *Ibid*.

[19] C. Haas et al., "Synoptic Airborne Thickness Surveys Reveal State of Arctic Sea Ice Cover," *Geophysical Research Letters* 47 (2010): L09501, doi:10.1029/2010GL042652.

3 The Potential/Emerging Economic Importance of the Arctic

The potential impact that climate change may have on the Arctic is one of the greatest motivating factors for increased interest in the region by both circumpolar and non-circumpolar states alike. From an economic perspective, if Arctic sea ice continues to recede, there is a greater probability that Arctic sea lanes may be used to reduce transit times/distances between key geostrategic/economic regions of the world. From a resource/commercial perspective, the Arctic offers the opportunity to extract untapped natural resources.

For a country with as productive an economy as China has, with an insatiable appetite for natural resources, access to critical Arctic areas could be considered a strategic interest for Beijing. This section will investigate China's interests in the Arctic primarily from a commercial/economic perspective. Specifically, it will investigate China's potential interest in the Arctic in terms of natural resource exploitation (primarily of hydrocarbons) and Arctic transit routes. These can be considered Beijing's primary strategic interests in the region.

3.1 Economics and Transportation: Potential Time and Distance Savings

3.1.1 Economics

The importance of Arctic transit routes is linked to the burgeoning economic conditions of the Asia-Pacific. As it currently stands, by almost any unit of measure – commercial maritime shipping, sea travel, energy and raw resource flows, port and infrastructure development, shipbuilding, and maritime growth and competition – the Asia-Pacific is the geostrategic centre of global economic activity.[20] More importantly, much of this demand and growth has been led by China. It is estimated that China consumes half the world's cement, a third of the world's steel, a quarter of the world's copper, and a fifth of the world's aluminum.[21]

Of the top 20 ports in the world by calls, 13 are in the Asia-Pacific.[22] Of the top 20 ports in the world in terms of total cargo volume handled, 15 are in Asia, and over half – nine – are in China. The two largest ports in the world in terms of tonnage handled, Singapore and Shanghai, are both located in Asia. Finally, of the top 20 ports in the world in terms of throughput of twenty-foot equivalent container units (TEUs), 12 are in Asia, with over half – seven – in China. In fact, the top six ports in the world in terms of throughput of TEUs are all located in Asia, with three of

[20] J. Boutilier, "Ships, SLOCs, and Security at Sea," in *Canadians and Asia-Pacific Security*, Vimy Paper 2008, ed. B. MacDonald (Ottawa: The Conference of Defence Associations Institute, 2008), 57-70.
[21] P.S Goodman, "Booming China Devouring Raw Materials," *Washington Post*, May 21, 2004, http://www.washingtonpost.com/wp-dyn/articles/A43765-2004May20.html (Accessed: June 7, 2008).
[22] However, only three are located in China. See also Annex A: World's Busiest Ports, 2008-2009.; and Lloyd's MIU, "Top 20 Ports – Number of Port Calls for 2009," *Lloyd's MIU*, http://www.lloydsmiu.com/lmiu/lmiustats.htm?action=graph16 (Accessed: February 10, 2010).

them in China.[23] By 2005, East Asian ports were handling nearly half of the world's container trade throughput.[24] Intra-Asian container trade is now the second largest container trade in the world, trailing only trans-Pacific trade, and trans-Pacific trade is three and a half times greater than trans-Atlantic trade.[25] As one Asia-Pacific scholar notes, "This is 'ground zero' in the world of global commerce."[26]

All of this trade transits key maritime sea lanes. Overall, it is estimated that approximately 85 percent of China's overall trade is carried by sea.[27] Thus, with approximately 85 percent of the China's imports and exports closely linked with its coastal areas, it is estimated that nearly half of China's total gross domestic product (GDP) is dependent on the ocean shipping industry.[28] More importantly, estimates predict that China's demand for natural resources will continue to grow, meaning China's economic growth will result in it becoming increasingly dependent on seaborne resources and sea lines of communication (SLOCs) that transit key geostrategic regions.

3.1.2 Transit Routes

While a substantial portion of China's trade remains intra-Asian container trade,[29] there are specific instances where commercial gains can be made if shipping routes between East Asia and different regions of the world (primarily Europe and to a lesser extend the east coast of North America) can be shortened. Globally, the only place this may be possible is in the Arctic where emerging transit routes may be able to shorten transit times between major ports during the summer months each year. As Li Zhenfu of Dalian Maritime University notes, "Whoever has control over the Arctic route will control the new passage of world economics and international strategies."[30]

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[23] Singapore, Shanghai (China), Hong Kong (China), Shenzhen (China), Yingkou (China), Busan (South Korea) are the six largest ports in the world in terms of TEUs handled per year. In 2005, Singapore was the busiest port in the world handling 23,129,000 TEUs. Shanghai handled 5 million fewer TEUs per year than Singapore. By 2007, however, Shanghai was handling 26,152,400 TEUs, less than 2 million fewer than Singapore. Thus, Shanghai is poised to become the largest port in the world in terms of container traffic. Boutilier, "Ships, SLOCs, and Security at Sea," 63.

[24] S. Snyder, B. Glosserman, and R.A. Cossa, *Confidence Building Measures in the South China Sea*, Issues & Insights No. 2-01 (Honolulu: Center for Strategic and International Studies, 2001), 4.

[25] G. Ji, *SLOC Security in the Asia-Pacific*, Occasional Paper Series (Honolulu: Asia-Pacific Center for Security Studies, 2000), http://www.southchinasea.org/docs/Ji%20Guoxing-SLOC%20Security%20in%20the%20Asia%20Pacific.htm (Accessed: March 10, 2008).

[26] Boutilier. "Ships, SLOCs, and Security at Sea," 63.

[27] S. Singh, "Continuity and Change in China's Maritime Strategy," *Strategic Analysis* XXIII, no. 9 (1999), http://www.ciaonet.org/olj/sa/sa_99sis01.html (Accessed: February 5, 2011).

[28] W. Gao, "Development Strategy of Chinese Shipping Company Under the Multilateral Framework of WTO," *Speech at the International Maritime Forum*, October 30, 2003, http://www.cosco.com/en/pic/forum/654923323232.pdf (Accessed: April 10, 2010).

[29] The US-China Business Council, "US-China Trade Statistics and China's World Trade Statistics," *Reports, Analysis and Statistics*, Table 7: China's Top Trade Partners 2009; Table 8: China's Top Export Destinations 2009; and Table 9: China's Top Import Suppliers 2009, http://www.uschina.org/statistics/tradetable.html (Accessed: February 5, 2011).

[30] L. Jakobson, "China Prepares for an Ice-Free Arctic," *SIPRI Insights on Peace and Security* (Solna, Norway: Stockholm International Peace Research Institute, 2010), 6.

There is also the added benefit that Arctic transit routes could circumvent pirate infested waters, such as those in parts of Southeast Asia, and attacks attributed to Somali pirates.[31] According to the International Maritime Bureau (IMB) Piracy Reporting Centre, the number of pirate attacks against ships has risen every year since 2006.[32]

In the Arabian Sea and surrounding bodies of water, for instance, 219 piracy attempts were attributed to Somali pirates between January and December 2010.[33] Hijackings off the coast of Somalia accounted for 92 percent of all ship seizures. In Southeast Asia, the number of attacks in the Malacca Strait has dropped since 2005 due to an increase in the number of aggressive patrols by the littoral states. However, Indonesia saw its highest level of piracy attacks since 2007, and the South China Sea even experienced 31 incidents, more than double the previous year.[34]

For its part, China has long regarded economic growth as vital to its stability. As noted earlier, though, much of this trade transits key sea lanes and chokepoints such as the Malacca Strait, the Red Sea/Gulf of Aden, Arabian Sea, and wider Indian Ocean. As a result, in 2008, Beijing dispatch a People's Liberation Army (PLA) Navy task group consisting of two warships and one supply ship to the Gulf of Aden to participate in anti-piracy operations.[35] This deployment came about as a result of a series of attacks and attempted hijackings on Chinese vessels by Somali pirates in the Gulf of Aden. Thus, if Beijing were to secure safe and reliable passage of its ships through Arctic waterways, it would alleviate the requirement to participate in anti-piracy operations.

According to Figure 7, there are four possible shipping routes through/around the Arctic. The four possible routes are the Northwest Passage through the Canadian Arctic archipelago, the Northeast Passage (the Northern Sea Route) along the northern coast of Russia, the Transpolar Route that crosses directly over the North Pole, and the Arctic Bridge that runs from Murmansk to Churchill. If climate change models prove to be accurate, the first and most likely shipping route through the Arctic will be along the Northeast Passage, with the Transpolar Route and the Northwest Passage becoming increasingly navigable shortly thereafter. According to Arctic Council, it is possible that the Arctic Ocean could become ice-free for a short period in the summer as early as 2040.[36] The Arctic Bridge is less a transpolar route than a potential intra-Arctic maritime link between the interiors of Russia and North America.

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[31] Southeast Asian waters of concern include the Malacca Strait, the Singapore Strait, Indonesian waters, Malaysian waters, and even parts of the South China Sea. In addition to conducting attacks in Somalia's territorial waters, Somali pirates have been associated with attacks in the Red Sea, the Gulf of Aden, the Arabian Sea, the Gulf of Oman, and the wider Indian Ocean.
[32] ICC International Maritime Bureau, *Piracy and Armed Robbery Against Ships*, Annual Report (London: ICC International Maritime Bureau, 2011), 23.
[33] *Ibid*., 19.
[34] *Ibid*., 23.
[35] See A.S. Erickson and J.D. Mikolay, "Welcome China to the Fight Against Pirates," *Proceedings Magazine* 135, no. 3 (2009).
[36] Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, op. cit., 25.

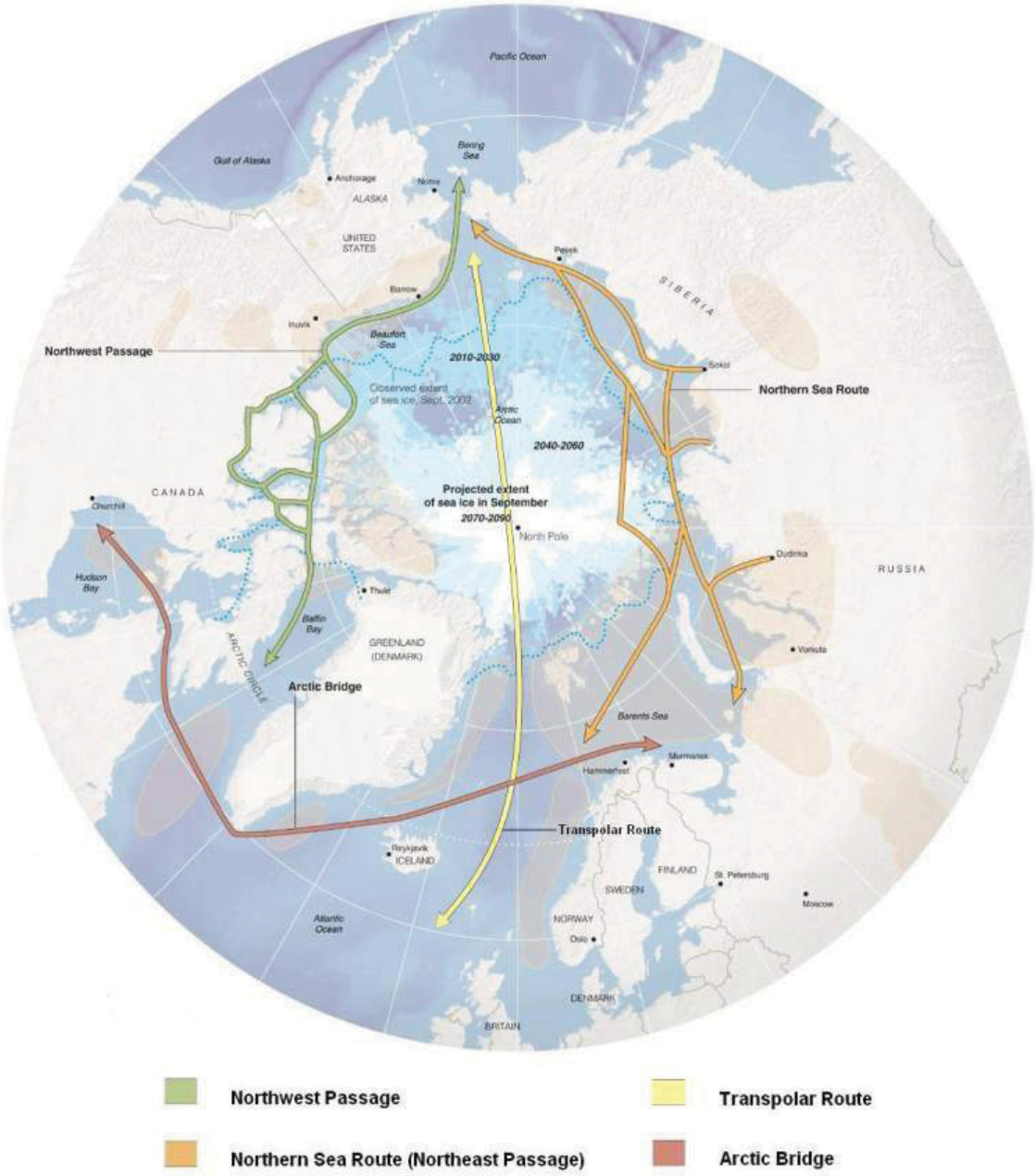

Figure 7 Possible Arctic Transit Routes[37]

[37] Figure derived from the Arctic Council, the United States Arctic Research Commission, the ACIA, NOAA, and UNEP. Found at C. Krauss et al., "As Polar Ice Turns to Water, Dreams of Treasure Abound," *The New York Times*, October 10, 2005, http://www.nytimes.com/2005/10/10/science/10arctic.html?_r=1&pagewanted=1 (Accessed: February 21, 2010).

The utility of these shipping routes is measured in terms of the reduction they could have on international long haul shipping distances, if only during the summer months. If northern passages can be used as viable shipping routes, significant savings could be made in terms of shipping times/distances between regions such as Europe, North America, and Asia.[38] The distance from Shanghai to New York/New Jersey using the Panama Canal is about 20,130 kilometers (12,508 miles). Using Figure 8 as a reference, the distance from Shanghai to New York using the Northwest Passage – which runs through Canada's northern archipelago – is about 16,165 kilometers. On average, that is a 3,965 kilometer reduction in transit distance.

Figure 8 Chinese View of the Northwest Passage[39]

The distance between Europe and Asia using northern sea routes can result in even greater savings. The distance from Shanghai to Rotterdam using the Suez Canal is about 19,904 kilometers. According to Figure 9, the distance from Shanghai to Rotterdam using the Northern

[38] See Annex B for specific savings between various ports in Asia, Europe, and North America.
[39] The map captions show Shanghai, New York, and the "North West Sea Route" (the Northwest Passage). Maps purchased and customized by the author for academic and scientific purposes only. Reproduction, re-distribution, or re-selling of the maps for commercial purposes is prohibited. Copyright © 2010 www.mapsofworld.com.

Sea Route would be approximately 14,846 kilometers. That is a 5,058 kilometer reduction in the distance using the Northern Sea Route rather than the Malacca Strait and Suez Canal.[40]

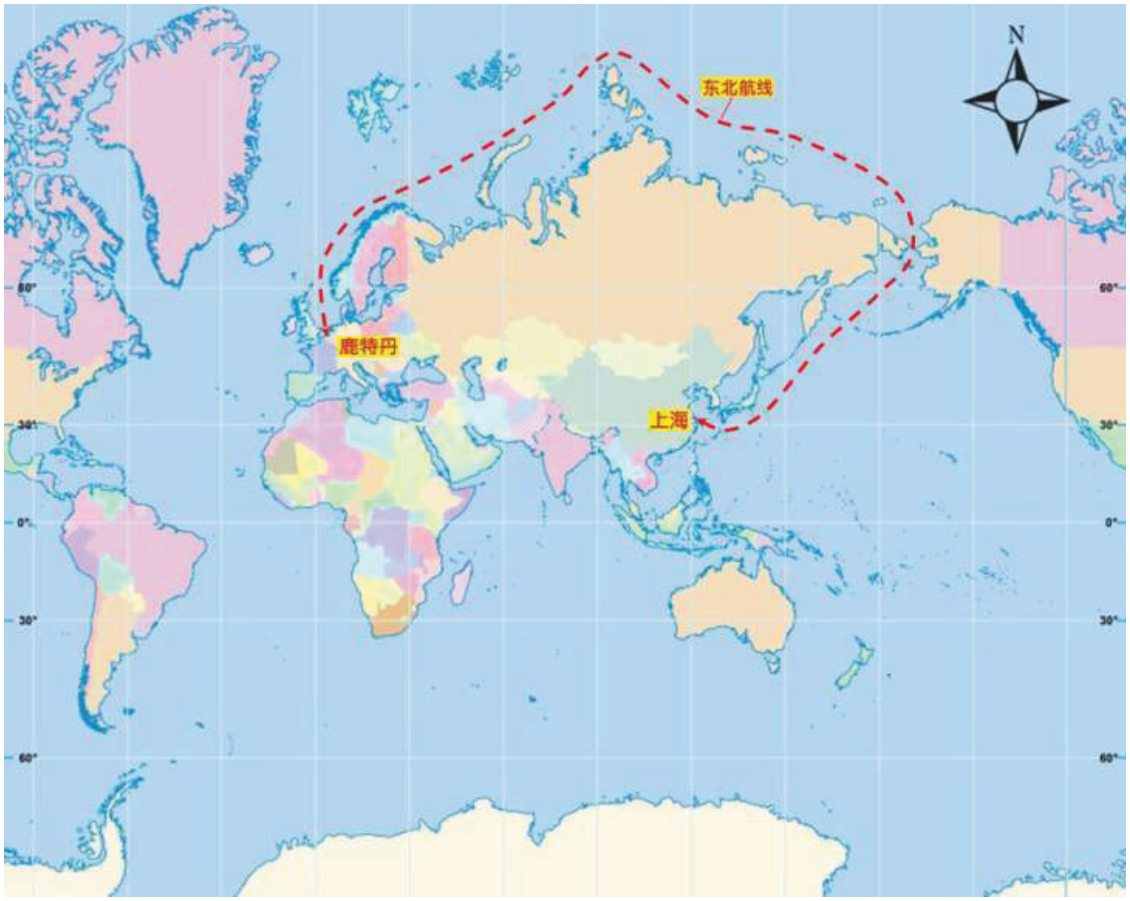

Figure 9 Chinese View of the Northeast Passage[41]

While some climate models predict that navigable opportunities in the Arctic may appear as early as 2025, but most probably not until the mid-2060s or later, there is still no certainty on when, and for how long passages in the Arctic will stay open or closed each year.[42] Nevertheless, as one

[40] Several scholars have noted this observation in recent articles. R. Huebert, "The Shipping News Part II: How Canada's Arctic Sovereignty is on Thinning Ice," *International Journal* 58, no. 3 (2003): 301.; and A. Mitchell, "The Northwest Passage Thawed," *Globe and Mail*, February 5, 2000, http://131.134.98.172/NewsCanada/0002/000205/GM/000205bd.htm (Accessed: February 17, 2000).

[41] The map captions show Shanghai, Rotterdam, and the "North East Sea Route" (the Northeast Passage). Maps purchased and customized by the author for academic and scientific purposes only. Reproduction, re-distribution, or re-selling of the maps for commercial purposes is prohibited. Copyright © 2010 www.mapsofworld.com.

[42] Ships entering the Arctic are at the mercy of ice conditions that can change from moment to moment and from season to season. More frequent and random extremes in weather could make navigation through some Arctic passages problematic. The opening and closing of passages could shift from year to year, or sections of a passage may be shut down in the middle of the shipping season. These types of variations

scholar notes, taking into account canal fees, fuel costs, and other variables that determine freight rates, these transit routes could cut the cost for a single voyage by a large container ship by at least 20 percent. In terms of financial benefits, it is estimated that these transit routes could result in savings of approximately $14 million to $17.5 million per trip,[43] and shipping companies have already started to take advantage of shipping opportunities through the Arctic. The successful voyage of two German commercial vessels from Ulsan, South Korea to Rotterdam using the Northern Sea Route in the summer of 2009 serves as a good example.[44] Savings would be even greater for some of the largest transport ships in the world that cannot transit either the Panama Canal or the Suez Canal, and have to sail around the Cape of Good Hope, South Africa or Cape Horn, Chile. Thus, with Asia's large and rapidly growing markets, its demand for natural resources, and savings of this magnitude, there is motivation to utilize these shipping routes.

3.2 Natural Resources: An Untapped Asset

The Arctic contains an abundance of non-renewable resources. With the increasing accessibility of the Arctic due to climate change, along with increasing demands for natural resources globally, it is becoming increasing likely that the Arctic's natural resources could soon be exploited and brought to market. This section will investigate potential mineral and hydrocarbon resources in the Arctic.

3.2.1 Minerals

The Arctic is considered rich in minerals,[45] however, these minerals have not been extensively exploited due to their inaccessibility and the harshness of the Arctic environment. Overall, the Arctic contains chromium, coal, copper, diamonds, gold, lead, manganese, nickel, silver, titanium, tungsten, and zinc. The general outlay of these resource deposits are outlined in Figure 10.

The Arctic areas of Russia are considered the most developed of all the Arctic resource regions. As Figure 10 highlights, Russia's northern areas, especially Western Siberia and Timan Pechora, have a number of mineral developments. These regions contain deposits of copper, coal, diamonds, gold, nickel, tungsten, and uranium. The resources in these regions became extremely

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occur as wind, climatic changes, seasonal changes, and global weather patterns interact and combine to move ice about in an unpredictable fashion. Thus, a shipping 'season' in the Arctic does not necessarily mean consecutive shipping weeks.

[43] S.G. Borgerson, "Arctic Meltdown: The Economic and Security Implications of Global Warming," *Foreign Affairs*, March/April 2008, 69-70.

[44] Beluga Shipping took advantage of a short two-month window of opportunity between August and September 2009, to transport cargo from Ulsan to Rotterdam. According to Beluga Shipping officials, the MV *Beluga Fraternity* and the MV *Beluga Foresight* used the Northern Sea Route and cut approximately 6,110 kilometers off the usual 20,371 kilometer trip using the Suez Canal. The transit also took 23 days rather than the usual 32 days. E. Kirschbaum, "German Ships Navigate Northeast Passage – But is it a Good Thing?" *Reuters*, September 9, 2009, http://blogs.reuters.com/environment/2009/09/09/german-ships-navigate-northeast-passage-but-is-it-a-good-thing/ (Accessed: February 15, 2010).

[45] Data from Natural Resources Canada, "Key Facts," *Canada's Minerals and Metals*, April 17, 2008, http://www.nrcan.gc.ca/mms/video/keyfacts_e.htm (Accessed: October 15, 2008).

important to Moscow after the breakup of the Soviet Union in 1991.[46] Containing less than eight percent of its total population, Russia's northern regions account for approximately 20 percent of its GDP.[47] As a result, areas such as Western Siberia and Timan Pechora have become some of the country's leading "hard-currency" regions.[48]

The North American Arctic (consisting of the North Slope of Alaska, the Beaufort Sea region, the Sverdrup Basin, and Canada's northern territories) contains copper, iron, lead, nickel, uranium, zinc, and more recently diamonds. Specifically, Canada's north contains diamonds, gold, lead, silver, tungsten, uranium, and zinc.

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[46] In addition to the mineral resources listed, hydrocarbons, particularly gas, became extremely important to Moscow after the breakup of the Soviet Union in terms of earning hard currency.

[47] Department of Foreign Affairs and International Trade, *The Northern Dimension of Canada's Foreign Policy* (Ottawa: Communication Bureau, 2000), 14.

[48] Timan Pechora is also known as the Yamal-Nenets Autonomous District. Northwest Siberia, stretching from the Ural Mountains in the west to Novosibirsk in the south, produces 78 percent of the Russia's oil and 84 percent of its natural gas. The Yamal-Nenets Autonomous District includes the Yamal Peninsula, which juts out into the Kara Sea above the Arctic Circle and holds Russia's largest known untapped gas reserves. N. Chance and E. Andreeva, "Gas Development in Northwest Siberia," *Arctic Circle at the University of Connecticut*, http://arcticcircle.uconn.edu/NatResources/gasdev.html (Accessed: October 12, 2004).

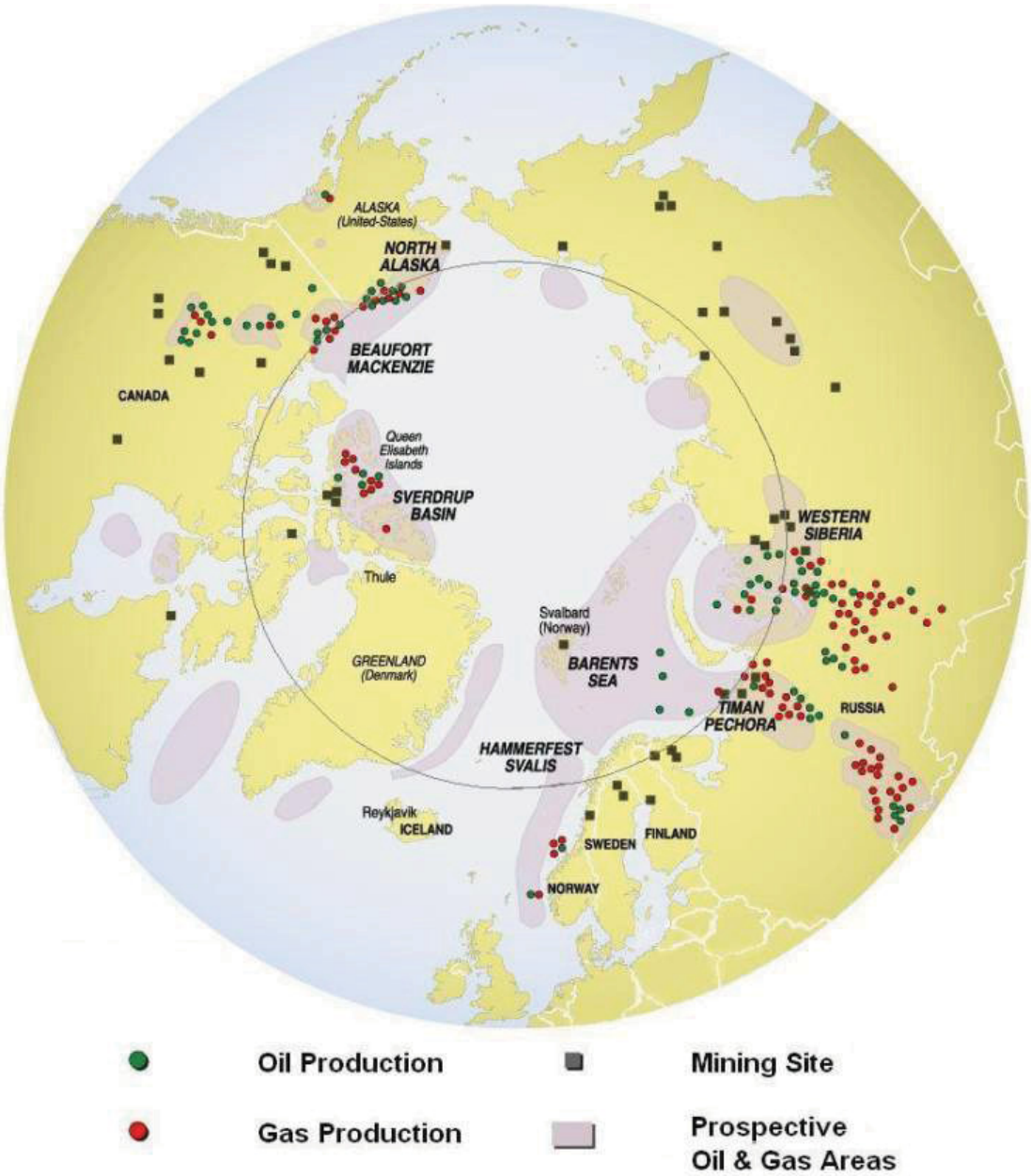

Figure 10 Location of Mineral and Hydrocarbon Resources in the Arctic[49]

The most revealing feature of Figure 10 is that there is a near absence of mineral deposits located above 70 degrees north latitude. Indeed, some mineral deposits are located on the Norwegian archipelago of Svalbard; the Russian areas of Timan Pechora, Western Siberia, and the Laptev Sea; and Canada's Queen Elizabeth Islands (Victoria Island, Somerset Island, Baffin Island, and

[49] Map derived from UNEP/GRID-Arendal, "Fossil Fuel Resources and Oil and Gas Production in the Arctic," *UNEP/GRID-Arendal Maps and Graphics Library*, http://maps.grida.no/go/graphic/fossil-fuel-resources-and-oil-and-gas-production-in-the-arctic (Accessed: April 14, 2010).

Bathurst Island). However, these discoveries have been fewer in number compared with the deposits located further south.

Traditionally, the major impediments to recovering Arctic resources above 70 degrees north latitude have been the region's lack of infrastructure development and remoteness, technological limitations, market volatility, and lack of accessibility due to ice cover. The challenge for natural resource companies has been gaining access to ice-covered areas. Even if natural resource companies can gain access to these regions, keeping mines operational and profitable in the Arctic has been a challenge. The volatility of natural resource prices as well as the costs associated with operating in an austere and harsh environment has usually forced mining companies to either reduce production or close completely. However, with China's growing demand for natural resources, the current elevated price of many natural resources, and the potential increase in access to the Arctic as a result of climate change, the feasibility of extracting resources from the high Arctic is increasingly being viewed as economically and commercially profitable.

3.2.2 Hydrocarbons

While the economic potential of mineral resources in the Arctic is thought to be substantial, hydrocarbon extraction holds out the greatest promise for the region. According to the US Geological Survey, up to 25 percent of the world's remaining undiscovered hydrocarbons are estimated to be located in the Arctic.[50] While the US Geological Survey estimates that the Arctic contains up to 13 percent of the world's undiscovered oil resources,[51] natural gas is likely the most abundant hydrocarbon resource. Most of the hydrocarbon fields explored in the Arctic region contain natural gas, not oil. In fact, undiscovered natural gas is three times more abundant than oil in the Arctic. The US Geological Survey estimates that the Arctic contains up to 30 percent of the world's undiscovered gas.[52]

Figure 11 highlights areas where large hydrocarbon deposits have been found throughout the Arctic. While large oil and gas deposits have been discovered in the Beaufort Sea, the Mackenzie Delta, the North Slope of Alaska, and the Sverdrup Basin, Western Siberia and the Barents Sea have the largest known energy reserves in the Arctic. By 2007, more than 400 oil and gas producing wells had been developed north of the Arctic Circle, mostly in West Siberia and the North Slope of Alaska.[53]

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[50] Much of these hydrocarbons are expected to be located either offshore or along Russian territories. P. Budzik, *Arctic Oil and Gas Potential* (Energy Information Administration, Office of Integrated Analysis and Forecasting, Oil and Gas Division, 2009), http://www.eia.doe.gov/oiaf/analysispaper/arctic/pdf/arctic_oil.pdf (Accessed: May 10, 2010).; and ECON, *Arctic Shipping 2030: From Russia with Oil, Stormy Passage, or Arctic Great Game?* Report 2007-070 (Oslo, Norway: Norshipping, 2007), 4 and 10.

[51] D. Gautier et al., "Assessment of Undiscovered Oil and Gas in the Arctic," *Science* 324 (2009): 1175-1179.

[52] *Ibid*.

[53] *Ibid*.

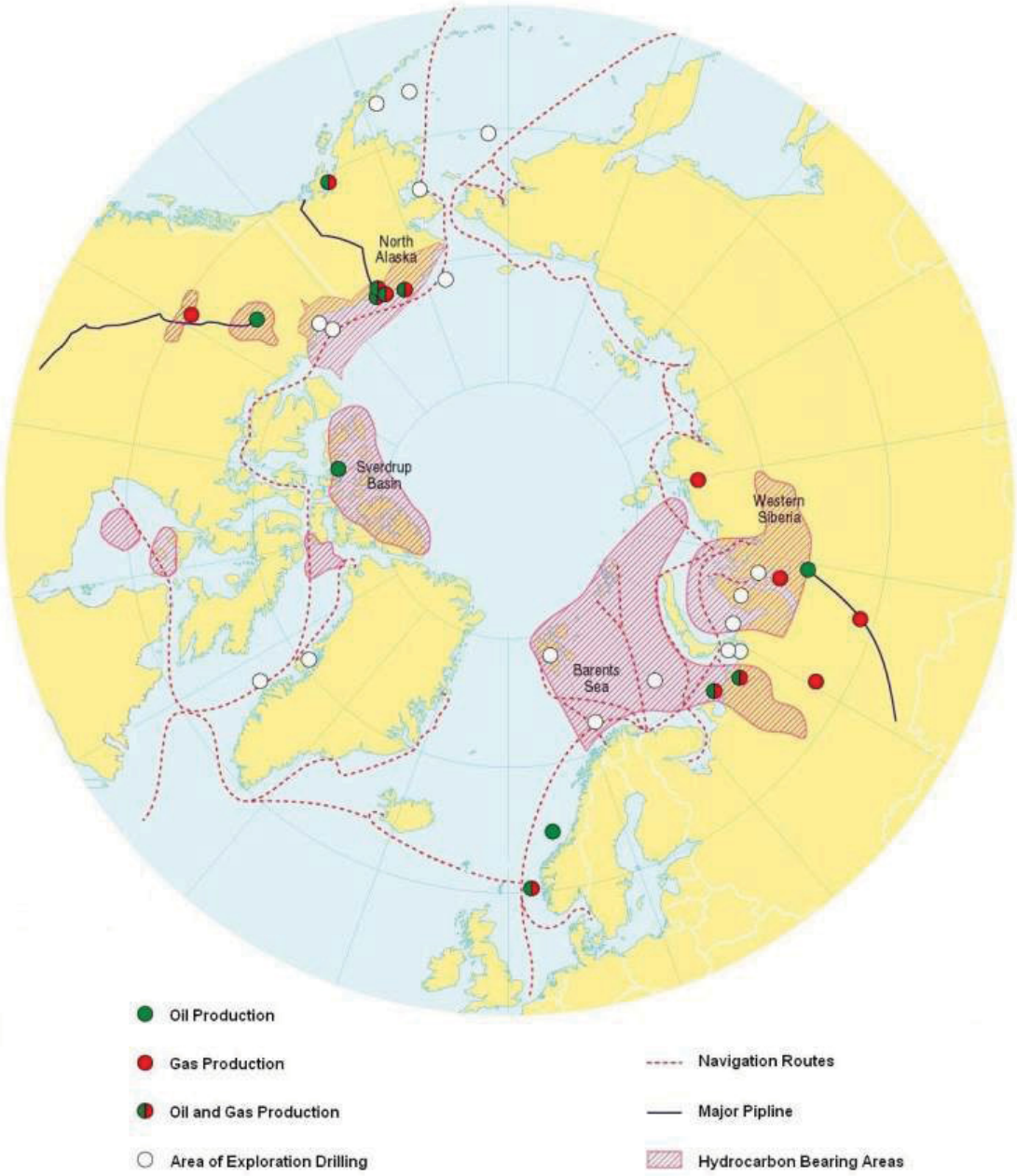

Figure 11 Location of Known Hydrocarbon Reserves in the Arctic[54]

In terms of Russia's hydrocarbon potential, the *Oil and Gas Journal's* 2008 survey notes that Russia holds the world's largest natural gas reserves, with 1,680 trillion cubic feet of natural

[54] Figure derived from Arctic Monitoring and Assessment Programme, "Petroleum Hydrocarbons," *Arctic Pollution Issues: A State of the Arctic Environment Report* (Oslo, Norway: Arctic Monitoring and Assessment Programme, 1997), 147.

gas.[55] The Russian Ministry of Natural Resources also estimates that its territories could contain as much as 586 billion barrels of oil.[56] However, the most abundant discoveries have yielded natural gas rather than oil. Thus, by 2006, Russia was not only the world's largest natural gas producer, it was the world's largest natural gas exporter.[57]

Sizable discoveries in these regions have yielded the prospect of extracting Arctic hydrocarbons and bringing them to market in the south.[58] Consequently, the economic potential for hydrocarbon extraction from the Arctic has been recognized by the oil and gas industry globally. Gazprom in Russia, Norsk Hydro in Norway, Statoil in Norway, Royal Dutch Shell, and Ente Nazionale Idrocarburi (Italy) have all recognized the potential for hydrocarbon extraction from the Arctic and have been actively pursuing access to potential oil and gas rich areas.[59]

Since the early 1990s, the oil and gas transport industry has also shown a serious interest in exploiting Arctic hydrocarbon resources by using ice-capable tankers.[60] The Finnish company Kvaerner-Masa Shipyards has developed an effective propeller and hull design that allows its tankers to operate along the Northern Sea Route. Fortum Shipping ordered new double-hull tankers from Sumitomo Heavy Industries in Japan. Built to Finnish/Swedish specifications, these ships will enable year-round operations in the Pechora Sea. Lukoil added ice-capable tankers to its fleet after acquiring Murmansk Shipping Company (MSCo.). Finally, Gazprom, Norsk Hydro, and Statoil have been active in the southeast Pechora Sea since at least 1998.

The significance of these oil and gas reserves is not placed into context until the energy requirements of Asia are taken into consideration. In terms of hydrocarbons, natural gas usage among Asian countries is expected to increase by about 4.5 to 7 percent annually through 2025 – faster than any other fuel – with almost half of that increase coming from China alone.[61] If these growth rates are maintained, demand will exceed 21 trillion cubic feet of natural gas per year by 2025, nearly triple current consumption levels.[62]

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[55] Russia's natural gas reserves are nearly twice the size of the next largest country's reserves, Iran, which stand at 1,045 trillion cubic feet. Energy Information Administration, "Iran," *Country Analysis Briefs*, January 2010, http://www.eia.doe.gov/EMEU/cabs/Iran/pdf (Accessed: March 10, 2011).; and Energy Information Administration, "Russia," *Country Analysis Briefs*, November 2010, http://www.eia.doe.gov/EMEU/cabs/Russia/pdf (Accessed: December 11, 2010).

[56] For comparison purposes, all of Saudi Arabia's current proven oil reserves – which excludes unexplored and speculative resources – amounts to 260 billion barrels. Borgerson, "Arctic Meltdown," 67-68.; and Energy Information Administration, "Saudi Arabia," *Country Analysis Briefs*, January 2011, http://www.eia.doe.gov/EMEU/cabs/Saudi_Arabia/pdf (Accessed: February 21, 2011).

[57] Russia produced 23.2 trillion cubic feet of natural gas, and exported 6.6 trillion cubic feet of it. Energy Information Administration, "Russia."

[58] Energy Information Administration, "United States of America," *Country Analysis Brief*, http://www.eia.doe.gov/countries/country-data.cfm?fips=US (Accessed: August 2, 2004).

[59] R. Tyson, "High Arctic: Industry's Last Oil and Gas Frontier," *Petroleum News* 12, no. 41 (2007), http://www.petroleumnews.com/pntruncate/922979807.shtml (Accessed: December 20, 2009).

[60] All information from L.W. Brigham, "The Northern Sea Route, 1998," *Polar Record* 36, no. 196 (2000): 19-24.

[61] With a seven percent growth rate, natural gas usage could quadruple by 2020. Snyder, *Confidence Building Measures in the South China Sea*, op. cit., 5.

[62] Energy Information Administration, "South China Sea," *Country Analysis Briefs*, March 2008, http://www.eia.doe.gov/cabs/South_China_Sea/Background.html (Accessed: May 10, 2008).

In the past two decades, oil consumption in Asia has also climbed nearly three percent per year on average.[63] If this trend continues, demand for oil in Asia's growing economies will increase from 12 million barrels of oil per day in 2000 – almost the daily output of Kuwait, Saudi Arabia, and the United Arab Emirates (UAE) combined – to more than 29.8 million barrels of oil per day by 2030.[64] China's oil imports alone are expected to increase from 6.2 million barrels of oil per day in 2004, to 12.7 million barrels of oil per day by 2020.[65] More than 80 percent of China's oil already comes by sea, 60 percent of which comes from the Middle East.[66]

As a result, much of this additional demand will have to either travel over continental hydrocarbon pipeline networks, or transit key maritime sea lanes from other regions. As long as the benchmark price of oil and gas remain at a sufficiently high level,[67] the feasibility of exploiting Arctic hydrocarbons will be viewed as economically profitable. Thus, from Beijing's point of view, an ice-free Arctic holds significant economic and geostrategic potential and importance. For circumpolar states, Arctic marine shipping is about the potential involvement of trade through ice-free shipping lanes, and linking the Arctic's natural resources to the rest of the planet.

3.3 Arctic Transit Routes and Resources: The Commercial/Economic Link

The challenges of operating in the Arctic have meant resource exploration, development, and extraction has progressed at a gradual pace. The notion of extracting resources from the Arctic, however, is not a recent one. As early as July 1985, the ice-strengthened tanker MV *Arctic* took oil from Little Cornwallis Island near Resolute, Nunavut, to Montreal. And in July 1986, the tanker *Gulf Beaufort*, loaded with 320,000 barrels of oil, shipped its cargo to markets outside

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[63] Snyder, *Confidence Building Measures in the South China Sea*, 5.

[64] Kuwait produces 2.6 million barrels of oil per day, while Saudi Arabia produces 10.5 to 11 million barrels of oil per day, and the United Arab Emirates produces 2.5 million barrels of oil per day. Energy Information Administration, "Kuwait," *Country Analysis Briefs*, May 2010, http://www.eia.doe.gov/EMEU/cabs/Kuwait/pdf (Accessed: July 21, 2008).; Energy Information Administration, "Saudi Arabia."; and Energy Information Administration, "United Arab Emirates," *Country Analysis Briefs*, January 2011, http://www.eia.doe.gov/EMEU/cabs/UAE/pdf (Accessed: February 21, 2011).

[65] E. Avery-Chanlett, *Rising Energy Competition and Energy Security in Northeast Asia: Issues for US Policy*, CRS Report for Congress No. RL32466 (Washington, D.C.: Congressional Review Service, 2005), 9.; and B. Vaughn and W.M. Morrison, *China-Southeast Asia Relations: Trends, Issues, and Implications for the United States*, CRS Report for Congress No. RL32688 (Washington, D.C.: Congressional Review Service, 2006), 20.

[66] Avery-Chanlett, *Rising Energy Competition and Energy Security in Northeast Asia*, 9.

[67] For reference purposes, the benchmark price of oil reached a peak of $147.00 USD per barrel in July 2008. Theage.com.au, "Oil Prices Top 147 US Dollars Per Barrel," *The Age*, July 12, 2008, http://news.theage.com.au/world/oil-prices-top-147-us-dollars-per-barrel-20080712-3dvb.html (Accessed: October 17, 2008).

North America (from north of Tuktoyaktuk, Northwest Territories to Japan in this case).[68] This was only the second time Arctic crude had been shipped from the north to outside markets.

Nevertheless, there are several distinct challenges when assessing the validity of utilizing Arctic transit routes to transport natural resources. First, there is some debate as to how and why climate change is affecting different areas of the Arctic in different ways. Second, while there is agreement that there will be significant ice cover in the Arctic in the winter,[69] there is less agreement about how much inter-annual ice variability there will be in the Arctic in summer months.

There are also differing opinions on when sea lanes in the Arctic will become regularly and reliably navigable. While some climate models predict that regular and sustained navigable opportunities in the Arctic may start to appear within the next few decades, but probably not until later in the 21st century,[70] there is still no certainty on when, and for how long Arctic passages will stay open or closed each year. For international shipping interests, the unpredictable accessibility of Arctic waterways for commercial use means ships entering these passages are at the mercy of ice conditions that can change from moment to moment and from season to season. The potential impact of climate change, while creating opportunity in terms of increased accessibility, also creates uncertainty over the mid-term.

One scholar has noted that on average the Arctic's shipping season has increased from five weeks in 1970, to seven weeks in 2000, and could be more than eight weeks long by 2030.[71] The Arctic Council similarly noted in its *Arctic Climate Impact Assessment* that the navigation season for the Northern Sea Route could increase from 20-30 days per year in 2004, to 90-100 days per year by 2080.[72] That would mean that by 2080, almost 1/3rd of the year might be suitable for navigation by non-ice-strengthened ships through some of the Arctic's passages.

Zhang Zhanhai, director of the Polar Research Institute of China (PRIC) in Beijing, predicted in 2005 that, by 2080, Arctic sea ice might disappear completely during the summer months if current melting trends remain unchanged. He also noted that an ice-free Arctic was "good news" for long haul shipping, as it would cut the journey from Asia to the Atlantic Ocean by one-third by using the "Bering Strait/Arctic Ocean Gateway."[73] Similarly, the Intergovernmental Panel on

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[68] J. Honderich, "Arctic Gushers," *Arctic Imperative: Is Canada Losing the North?* (Toronto: University of Toronto Press, 1987), 55-56.; R.J. McCalla, *Sovereignty and Shipping in the Canadian Arctic Archipelago: Water Transportation in Canada* (Halifax: Formac Publishing Company Limited, 1994), 218.

[69] As one scientist at the Canadian Ice Service notes, the Canadian Arctic will never be "ice-free year-round." The lack of radiant solar energy ensures that there will always be ice in the Arctic, at least during the winter. F. Griffiths, "The Shipping News: Canada's Arctic Sovereignty Not on Thinning Ice," *International Journal* 58, no. 2 (2003): 260.

[70] Arctic Council, *Impacts of a Warming Arctic: Arctic Climate Impact Assessment* (Cambridge, United Kingdom: Cambridge University Press, 2004), 83.

[71] This idea is extrapolated from a paper written by F. Griffiths, "New Illusions of a Northwest Passage" (Paper presented to the *Conference on International Energy Policy, the Arctic and Law of the Sea*, St. Petersburg, Russia, June 23-26, 2004), 2-6. The navigation season is defined as the number of days or weeks per year that navigable conditions persist, which means conditions with less than 50 percent sea ice concentration.

[72] Arctic Council, *Impacts of a Warming Arctic*, 83

[73] China.org.cn, "Arctic Icecap to Melt Completely by 2080," *Xinhua News Agency*, April 20, 2005, http://www.china.org.cn/english/scitech/126424.htm (Accessed: March 18, 2010).

Climate Change (IPCC) noted in its *Climate Change 2007: Synthesis Report*, that if Arctic sea ice continues to melt at the rate experienced in the summer of 2007, by the end of 21st century there may be no more summer sea ice in the Arctic.[74]

Therefore, there is considerable incentive to utilize these transit routes if they should become reliably and regularly navigable. For instance, China currently receives hydrocarbon exports from Russia (and Kazakhstan) via rail and pipeline networks.[75] While China's integration with these oil and gas networks is fragmented, the government plans to construct 23,174 kilometers (14,400 miles) of new pipelines between 2009 and 2015. One such example is the Eastern Siberian-Pacific Ocean (ESPO) pipeline, which stretches from Eastern Siberia in Russia to the Pacific Ocean, and will have a spur allowing for a significant increase in hydrocarbon exports to China's northeast cities of Harbin and Daqing.[76]

If climate change models and hydrocarbon estimates prove to be accurate, it may be feasible within the next few decades to supplement Beijing's pipeline shipments with shipments made by very large icebreaking-capable ships operating year-round through the Arctic, or at least with ice-reinforced ships operating for extended periods in the summer.

From this point of view, it is not a question of *if* resources will flow to southern markets, but *when*.[77] A warming Arctic, the result of climate change, will make the Arctic more accessible to the international community.[78] In addition, the exploration, development, and extraction of resources in the Arctic will likely increase as the price of natural resources increases. The melting of Arctic sea ice will only accelerate the extraction of these resources.

Viewed from a geostrategic perspective, Russia holds the greatest potential to benefit from northern hydrocarbon extraction. Sizable hydrocarbon reserves exist in the Western Siberia region, the Timan Pechora region, and the Barents Sea region north of Novaya Zemlya. Not only are they located close to European and North American markets, but they are also located close to potential SLOCs that can deliver them to booming Asian markets.

In terms of transport distances, Figure 12 shows a potential savings of 11,320 kilometers by bringing Russia's northern hydrocarbon resources to market in Asia using the Northern Sea Route compared to transiting the Suez Canal and Malacca Strait.

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[74] IPCC, *Synthesis Report*, op. cit., 46.

[75] For instance, the Central Asian Gas Pipeline (CAGP). See Energy Information Administration, "China," *Country Analysis Briefs*, November 2010, http://www.eia.doe.gov/EMEU/cabs/China/pdf (Accessed: February 11, 2011).

[76] The Russia-China Oil Pipeline spur delivered its first oil to China in November 2010. It is estimated that the pipeline project will deliver 300,000 barrels of oil per day to China by the end of 2010, and continue to move 15 million metric tons of crude from Russia to China each year until 2030. Energy Information Administration, "Russia," op. cit.

[77] See R. Huebert, "Climate Change and Canadian Sovereignty in the Northwest Passage," *ISUMA: Canadian Journal of Policy Research* 2, no. 4 (2001).

[78] Huebert, "The Shipping News Part II," op. cit., 295.

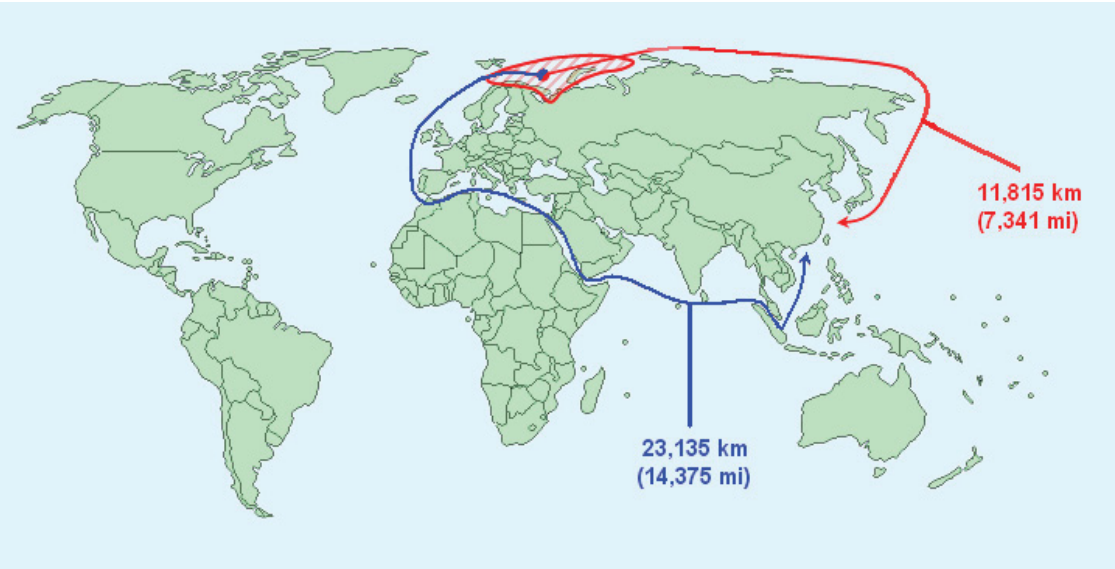

Figure 12 Comparison of Hydrocarbon Transportation Distances[79]

If sea ice decreases and commercial vessels are increasingly able to work in the Arctic during summer months, economic pressures and market competition may push industries to begin operating in the Arctic, and establish a market influence sooner rather than later. Arctic marine shipping is about potential trade routes and linking Arctic natural resources to the rest of the planet. Symptomatic of this trend, some petroleum companies have already started to move out into deeper water to recover or claim marketable oil resources. Moreover, Russia recently commissioned the building of 11 ice-capable tankers to facilitate the transport of Arctic resources.[80] As such, if there is a willingness by resource/transport companies to accept the challenges of operating in the Arctic, they may gain a competitive advantage in certain instances.

Since China became the second largest oil consuming country in the world, behind only the United States, after surpassing Japan in 2003, its interest in the Arctic is as clear as the transit route connecting the Barents Sea region to Shanghai.[81] China's interest in opening up the Arctic is to ensure it has access to these reserves of energy and other natural resources that its economy increasingly requires. Beijing's interest in joint ventures in the Arctic, where its capital is used to

[79] Map derived from the NATO Defense College, "Security Prospects in the High North: Geostrategic Thaw or Freeze?" (Presentation given to Academic Roundtable of the Institute of International Affairs, University of Iceland, Reykjavik, Iceland, January 29-30, 2009), Slide 7.
[80] This is in addition to Murmansk Shipping Company's (MSCo.) fleet of eight ageing but capable icebreakers. At present, MSCo. operates eight nuclear-powered icebreakers and one nuclear-powered bulk container ship. Bellona, "Nuclear Icebreakers, Murmansk Shipping Company," *Factsheet*, http://www.bellona.no/imaker?id=12667&sub=1 (Accessed: August 3, 2004).; and Office of Naval Research, *Naval Operations in an Ice Free Arctic*, Final Report (Arlington, Virginia: Naval Ice Center, Oceanographer of the Navy and the Arctic Research Commission, 2001), p.11.
[81] A. Andrews-Speed, L. Xuanli, and R. Dannreuther, *The Strategic Implications of China's Energy Needs*, Adelphi Paper No. 346 (London: International Institute for Strategic Studies, 2002), p.12.

fund the development of offshore hydrocarbon sites,[82] can also procure the experience it needs in its own deep-water drilling projects. This is particularly relevant to Beijing in terms of exploiting potential hydrocarbons in the South China Sea.[83] As one scholar points out, Norway, with its deep-sea drilling expertise, may be a prime target of Beijing's diplomatic and investment activities if it wants to forge unique circumpolar relationships.[84]

[82] It is generally assessed that Russia, which controls many of the resources in Arctic waters, lacks both the technology and the capital needed to extract them. When Russia's state-owned oil company Rosneft announced plans to develop 30 offshore hydrocarbon sites on Russia's continental shelf in 2009, industry experts determined the company would not have sufficient capital to develop them. This may have opened the way for joint ventures between Beijing and Moscow in Russian waters, using Chinese capital and Russian expertise. Jakobson, "China Prepares for an Ice-Free Arctic," op. cit., 9.

[83] The fact that some areas of the South China Sea are considered to be rich in oil and gas deposits has led to speculation that it could be an untapped oil-bearing region located near some of the world's busiest sea lanes. Optimistic Chinese estimates of the South China Sea's hydrocarbon potential place oil reserves as high as 213 billion barrels of oil, and natural gas reserves as high as 2,000 trillion cubic feet. One Chinese report goes as far as to claim that the area could be a "second Persian Gulf." It must be pointed out, however, that estimates of the South China Sea's hydrocarbon resources vary widely and are not necessarily shared by non-Chinese assessments. Energy Information Administration, "South China Sea," op. cit.

[84] Jakobson, "China Prepares for an Ice-Free Arctic," 13.

4 China in the Arctic

In recent years, there has been an increasing level of interest in the Arctic by non-circumpolar states. From Europe to Asia, states have indicated an interest in the Arctic for scientific, economic, and/or defence planning purposes.[85] As the preceding sections note, interest in the Arctic stems from the potential impact that climate change may have on the region in terms of increased accessibility, as well as potential trade routes that would link the Arctic's natural resources to the rest of the world. China's interests in the Arctic stem from these very same factors. Consequently, China has become increasingly active in the region in recent years. This section will overview China's Arctic operations, expeditions, capability acquisitions, and R&D interests/activities/institutes.

4.1 Arctic Expeditions

At the scientific and R&D level, China did not become involved in Arctic research until 1995.[86] In 1995, without government financial backing, the Chinese Association for Science and Technology (CAST) conducted an Arctic expedition. The 25-member team studied oceanographic, ice, snow, atmospheric, and environmental phenomena with remote sensing devices in the Arctic.[87]

China's first state sponsored Arctic research expedition took place in June-September 1999, aboard the icebreaker *Xuelong* (*Snow Dragon*).[88] More than 50 Chinese scientists participated in the research project that covered surveys on the ocean, biological species, the atmosphere, geological conditions, and oceanic ice in the areas of the Bering Sea, the Chukchi Sea, and the Canadian basin of the Arctic Ocean.[89]

In 2003, China's second Arctic research survey expedition was carried out in the same areas as the 1999 Arctic research expedition. The National Bureau of Oceanography (NBO) sponsored the

[85] In addition to the United Kingdom and NATO showing an interest in the Arctic, Japan and South Korea have shown a particular interest in the region as well. See for example, JAMSTEC, *About JAMSTEC*, http://www.jamstec.go.jp/e/ (Accessed: November 2, 2010).; KOPRI, "Korean Research IceBreaker," *Stations and IceBreaker*, http://www.kopri.re.kr/index_eng.jsp (Accessed: November 2, 2010).; Ministry of Defence, *Ministry of Defence Climate Change Strategy* (UK: Safety, Sustainable Development and Continuity Division, 2008).; Ministry of Defence, *Ministry of Defence Sustainable Development Strategy* (UK: Safety, Sustainable Development and Continuity Division, 2008).; Ministry of Defence, *The DCDC Global Strategic Trends Programme 2007-2036*, Third Edition (Swindon, UK: Development Concepts and Doctrine Centre, 2007).; and NIPR, *Homepage*, http://www.nipr.ac.jp/english/ (Accessed: November 2, 2010).

[86] See Annex C for a complete chronology of China's polar research activities.

[87] Z. Lhi, "Chronology of China's Arctic Expedition," *Xinhua News Agency*, January 16, 2010, http://news.xinhuanet.com/english2010/database/2010-01/16/c_13138300.htm (Accessed: April 10, 2010).

[88] China.org.cn, "Retrospect of China's Arctic Study," http://www.china.org.cn/english/features/40960.htm (Accessed: March 14, 2010).

[89] China.org.cn, "China's First Arctic Expedition," http://www.china.org.cn/english/features/40958.htm (Accessed: March 14, 2010).; and Chinese Arctic and Antarctic Administration, "Science and Data," *Projects of Chinese Polar Scientific Research*, http://www.chinare.gov.cn/en/index.html?pid=science (Accessed: March 14, 2010).

research expedition.[90] Although the expedition included 115 scientists and staff from seven countries, most scientists were from China, Finland, and the United States. All of the Chinese scientists were from the Chinese Academy of Sciences (CAS).[91] The expedition focused on mechanisms of Arctic circulation, processes of Arctic sea ice change, interactions between the north Pacific and Arctic Oceans, and mechanisms of Arctic climate variability and their influence on the climate in China.[92]

In July 2008, the China conducted its third Arctic research expedition as part of International Polar Year. Aboard *Xuelong* was an international team of scientists charged with the goal of gaining a better understanding of the Arctic's physical, geological, biological, and chemical processes, as well as studying the Arctic's ocean-sea ice-atmosphere interaction/interface in the face of climate change.[93] One of the key missions of the expedition was to conduct sea ice observations using remote sensing devices – the first time China had used such devices – and deploy autonomous sea ice buoys.[94]

China's fourth Arctic research expedition took place aboard the *Xuelong* in the summer of 2010.[95] The main task was to investigate the atmosphere, sea ice, and melting sea ice in the Arctic. It conducted research in the Bering Sea, the Bering Strait, the Chukchi Sea, the Beaufort Sea, the Canada basin of the Arctic Ocean, and the Mendeleev Sea Ridge. The Arctic expedition team consisted of more than 125 scientific research personnel, logistical staff, media reporters, and crew. Scientists from the US, France, Finland, Estonia, and South Korea were represented.

In the summer of 2011, the Chinese government intends to deploy *Xuelong* to/from Iceland via both the Northeast Passage and the Northwest Passage.[96] *Xuelong* will transit the Northeast Passage along the north coast of Russia and Norway on its voyage to Iceland, and will return via the Northwest Passage, sailing through the Canadian Arctic archipelago and along the north coast of Alaska. The expedition will result in four firsts for China: the first time a Chinese icebreaker transits the length of the Northeast Passage; the first time a Chinese icebreaker transits the length of the Northwest Passage including Canada's Arctic archipelago; the first time a Chinese icebreaker circumnavigates the Arctic Ocean; and the first time a Chinese ship sails between the world's two largest oceans (the Pacific and Atlantic Oceans), using Arctic passages, in a single season.

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[90] China.org.cn, "Scientists to Start Expedition to North Pole," *Xinhua News Agency*, September 2, 2003, http://www.china.org.cn/english/MATERIAL/74022.htm (Accessed: April 10, 2010).
[91] China.org.cn, "China Launches Second Scientific Expedition to North Pole," *Xinhua News Agency*, July 16, 2003, http://www.china.org.cn/english/scitech/70005.htm (Accessed: April 10, 2010).
[92] Chinese Arctic and Antarctic Administration, "Science and Data."
[93] J. Pommereu, "Chinese Antarctic Expedition: *Xuelong* (*Snow Dragon*)," *International Polar Foundation*, November 14, 2008, http://www.sciencepoles.org/articles/article_detail/chinese_antarctic_expedition_xue_long_snow_dragon/ (Accessed: March 21, 2010).
[94] L. Jiping, "The 3rd Chinese Arctic Research Expedition – Sea Ice Measurements," *LASG*, July 11, 2008, http://www.lasg.ac.cn/english/2008/9/ofcpuof0mm.htm (Accessed: March 14, 2010).
[95] China Daily, "China to Begin Fourth Scientific Expedition to North Pole," *Xinhua News Agency*, June 26, 2010, http://www.chinadaily.com.cn/china/2010-06/26/content_10024635.htm (Accessed: September 20, 2010).
[96] Arctic Portal, "Chinese Icebreaker to Reach Iceland Over the Arctic," *Arctic Portal News*, April 14, 2011, http://arcticportal.org/news/arctic-portal-news/chinese-icebreaker-to-reach-iceland-over-the-arctic (Accessed: April 18, 2011).

4.2 Infrastructure and Facilities

At the political and diplomatic level, China has been active in the Arctic since 1972. China established its first Arctic embassy in Reykjavik, Iceland, and assigned its first resident ambassador to the island in 1979. Between 1983 and 1995, however, the Chinese Ambassador in Denmark was responsible for Iceland. In 1995 – after Iceland set up its first embassy in Beijing and assigned its first resident ambassador to China – China resumed the practice of sending resident ambassadors to Iceland.[97] Of particular note is that China's embassy in Reykjavik is the largest foreign embassy in the capital.[98]

Whereas China has had polar research stations in Antarctica since 1985, its first permanent Arctic research station was only established in 2004. The Huanghe (Yellow River) research station is located in Ny-Ålesund, Spitsbergen, part of Norway's Svalbard archipelago (see Figure 13).[99] China is the eighth state to establish a research facility on Spitsbergen.

The station is a two-story building that has a total floor area of 500 square meters (5,381 square feet). It has laboratories, an observatory, offices, reading rooms, storerooms, and dorms that can accommodate 20 to 25 people.[100] The PRIC and the Chinese Arctic and Antarctic Administration (CAA) administer the research station. It conducts research in a variety of areas including monitoring glaciers around Ny-Ålesund; monitoring and assessing the atmospheric environment around Ny-Ålesund; conducting Arctic GPS research; investigating ionosphere scintillations in the Arctic region; observing biological, ecological, and environmental changes in the Arctic region; conducting eco-geological investigations in the ice-free areas of the Arctic; and winter observation of the aurora borealis.[101]

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[97] Embassy of the People's Republic of China in the Republic of Iceland, *China and Iceland*, http://is.china-embassy.org/eng/zgybd/t98175.htm (Accessed: April 15, 2010).

[98] The reestablishment of closer relations between Reykjavik and Beijing has been viewed as anticipation of Iceland becoming a major trans-Arctic shipping hub in the future. Jakobson, "China Prepares for an Ice-Free Arctic," op. cit., 13.; and W. Underhill, "China Eyes Investment in Iceland," *Newsweek*, March 18, 2010, http://blog.newsweek.com/blogs/wealthofnations/archive/2010/03/18/china-eyes-investment-in-iceland.aspx (Accessed: March 18, 2010).

[99] China.org.cn, "China Sets up First Station in Longyearbyen for Arctic Exploration," *People's Daily*, July 31, 2002, http://www.china.org.cn/english/features/40942.htm (Accessed: April 2, 2010).; China.org.cn, "China Steps Up Arctic Study," *People's Daily*, June 26, 2002, http://www.china.org.cn/english/features/40932.htm (Accessed: April 2, 2010).; and China.org.cn, "North Pole Station Due Soon," July 10, 2003, http://www.china.org.cn/english/scitech/69473.htm (Accessed: April 2, 2010).

[100] China's Polar Research, *Polar Stations*, http://www.china.org.cn/english/features/PolarResearch/168065.htm (Accessed: April 6, 2010).

[101] Chinese Arctic and Antarctic Administration, "Science and Data."

Figure 13 Norway's Svalbard Archipelago[102]

Domestically, China began construction of a permanent Arctic Research Base in Shanghai in 2006. The project has two phases. The first phase, completed in 2007, involved the construction of a permanent dock for *Xuelong*, and establishing a polar logistics park.[103] The park provides logistic support for polar expedition teams. The second phase, to be completed in 2010, involves the construction of a polar training hall. This will allow researchers to prepare for polar

[102] Figure derived from Mapsof.net, "Norway Svalbard Location Map," *Maps of the World*, http://mapsof.net/norway/static-maps/png/norway-svalbard-location-map (Accessed: April 22, 2010).
[103] China.org.cn, "Construction of First Polar Research Base," *Xinhua News Agency*, March 25, 2006, http://www.china.org.cn/english/scitech/163377.htm (Accessed: April 2, 2010).

expeditions in Shanghai instead of travelling to northern China. The hall will simulate the real climatic conditions of Antarctica and the Arctic, including extreme temperatures, low atmospheric pressure, powerful hurricanes, and aurora borealis.[104]

4.3 Polar Research Ships

Since beginning polar research in 1984, China has commissioned the use of three support and research vessels. While not all of the vessels have been ice capable, what is noteworthy is the quick evolution of this capability.

4.3.1 *Xiangyanghong 10*

Xiangyanghong 10 was China's first quasi-polar research vessel. It was an oceanographic survey/communications ship constructed in the late 1970s to support China's intercontinental ballistic missile (ICBM) test program. Design of *Xiangyanghong 10* began in 1971, with construction commencing in 1975. The ship was officially delivered in 1979.[105] The *Xiangyanghong 10* was used for only one polar expedition – to assist in the building of China's first Antarctic research station in 1985 – because it was not constructed to sail in ice infested waters.[106] In 1998, *Xiangyanghong 10* was converted back to a communications/tracking platform used to support China's manned space program.[107]

4.3.2 *Jidi*

China purchased its first ice-going vessel, *Jidi*, from Finland in 1985. Made by Rauma Shipyard of Finland in 1971, *Jidi* was originally a cargo ship ice-strengthened to Class 1A standards. The vessel could navigate in an ice field, but it was not an icebreaker. China invested 7.5 million yuan in refitting it into an Antarctic research vessel. Since her maiden voyage to Antarctica in 1986, *Jidi* completed six cruises (all to Antarctica) and retired from active service in 1994.[108]

4.3.3 *Xuelong* (*Snow Dragon*)

In 1993, Beijing purchased *Xuelong* from Kherson Shipyards of Ukraine. China spent 31 million yuan converting the ship into a transport/polar research vessel for Arctic and Antarctic research expeditions.[109] It replaced *Jidi* in 1994, and has remained in active service ever since. The ship is 167 meters long, with a displacement of 21,025 tonnes, and is ice-strengthened to Class B1/A2

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[104] *Ibid*.
[105] Chinese Arctic and Antarctic Administration, "R/V Polar," *Stations and Vessels*, http://www.chinare.gov.cn/en/index.html?pid=stations&st=vessels (Accessed: March 14, 2010).
[106] China.org.cn, "Icebreaker *Snow Dragon*," May 19, 2006, http://www.china.org.cn/english/features/CPR/168828.htm (Accessed: April 2, 2010).
[107] Chinese Arctic and Antarctic Administration, "R/V Polar."
[108] *Ibid*.
[109] China.org.cn, "Icebreaker *Snow Dragon*."; Chinese Arctic and Antarctic Administration, "A Brief Introduction of R/V *Xuelong*," *Stations and Vessels*, http://www.chinare.gov.cn/en/index.html?pid=stations&st=xuelong (Accessed: March 14, 2010).

standards. The vessel is the world's largest (non-nuclear) icebreaker.[110] It has seven laboratories with a total area of 200 square meters, contains three operational boats, and a helicopter for transportation and research purposes.

By some accounts, *Xuelong* is the most famous ship in China.[111] It is easily identifiable due to the distinctive shape and colour of its hull. It is even used to advertise China's rise as a superpower. In much the same way that Chinese 'taikonauts' (astronauts) are promoted as propelling China to the edges of the earth, *Xuelong* and its scientists are promoted as propelling China to the edge of the earth's Polar regions.

4.3.4 Future Polar Maritime Capabilities

In 2009, the State Council of the PRC initiated discussions on the future requirements of China's polar research needs.[112] After months of deliberations, it was determined that *Xuelong* alone would not meet the demands of China's expanding research requirements, particularly China's research expeditions to both the Arctic and the Antarctic. Deliberations took place over whether to purchase another second-hand foreign vessel, or build a vessel in China. The State Council ultimately approved the building of a new high-tech research icebreaker. The new vessel, expected to be operational by 2013, will be co-designed by Chinese and foreign partners, but built in China. It is projected that the polar research icebreaker will cost two billion yuan. It will be smaller than *Xuelong*, with a displacement of only 8,000 tonnes, and will be non-nuclear.[113]

The most important aspect of the State Council's decision to build a new icebreaker is that it will complement *Xuelong* not replace it. The decision to build a follow on icebreaker was made not to cover off current polar research demands, but rather because *Xuelong* is not expected to be able to handle China's future polar research growth and requirements. Thus, the decision to build a new icebreaker will take some of the expedition load off *Xuelong*, and/or facilitate simultaneous Arctic/Antarctic expeditions. The decision also emphasizes growth and progress of China's polar maritime capabilities, and a continual commitment to expand polar research activities.

4.4 Research Activities

Internationally, Chinese researchers and academics have been actively engaged in a number of research activities. Chinese polar experts worked on International Polar Year, joined the International Arctic Science Committee (IASC) – a non-governmental organization that aims at facilitating multidisciplinary research on the Arctic region – and applied to be granted permanent observer status on the Arctic Council.[114] Domestically, a variety of government departments,

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[110] For comparison purposes, Canada's largest icebreaker, *Louis S. St-Laurent*, is 119.8 meters long with a displacement of 11,441 tonnes. The United States Coast Guard's largest icebreaker, *Healy*, is 130 meters long and displaces 16,000 tonnes. Russia's largest nuclear-powered icebreaker, *NS 50 Let Pobedy* (50 Years of Victory) is 159.6 meters long and displaces 25,840 tonnes.
[111] Pommereu, "Chinese Antarctic Expedition," op. cit.
[112] Jakobson, "China Prepares for an Ice-Free Arctic," op. cit., 3.
[113] *Ibid*.
[114] China has already participated as an ad hoc observer in two Arctic Council ministerial meetings, in 2007 and 2009. *Ibid*., 9.

government and non-government research institutes, universities, and organizations are involved in polar/Arctic research. The following is a brief description of those organizations.

4.4.1 State Oceanic Administration (SOA)

The State Oceanic Administration (SOA) is an administrative agency under the Ministry of Land and Resources, headquartered in Beijing.[115] It is tasked with supervising and managing the use of sea areas, including regulating China's coastal zone. This includes islands, internal seas, neighboring seas, its contiguous zone, its continental shelf, its exclusive economic zone (EEZ), and other areas under its jurisdiction. The SOA also organizes and regulates marine scientific surveys and research activities, including in the Polar regions. Areas of focus include marine environmental protection; safeguarding national maritime rights and interests according to laws and regulations; and organizing and carrying out marine scientific and technical research.[116]

Other agencies that are subordinate to the SOA, and that have a direct stake in polar research include:[117]

- China Institute of Polar Research, Shanghai;
- Office of Polar Expedition, Beijing;
- China Institute for Marine Affairs, Beijing; and
- Institute for Ocean Development Strategy, Beijing.

4.4.2 Chinese Arctic and Antarctic Agency (CAA)

The CAA, which is affiliated with the State Oceanic Administration in Beijing, is responsible for organizing and coordinating China's Arctic and Antarctic scientific research and exploration program(s).[118] This includes logistic support to Arctic and Antarctic expeditions[119]; administering China's Arctic research station in Ny-Ålesund; organizing the Arctic scientific cruises conducted by *Xuelong*; and overseeing the design and construction of China's future scientific research icebreaker.[120]

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[115] Gov.cn, "State Oceanic Administration," *The Central People's Government of the People's Republic of China*, December 29, 2009, http://www.gov.cn/english/2005-10/01/content_73182.htm (Accessed: February 18, 2010).
[116] *Ibid*.
[117] Gov.cn, "Subordinate Bodies of the SOA," *The Central People's Government of the People's Republic of China*, December 29, 2009, http://english.gov.cn//2005-09/29/content_73189.htm (Accessed: February 18, 2010).
[118] Chinese Arctic and Antarctic Administration, *Welcome to CAA*, http://www.chinare.cn/en/index.html (Accessed: March 14, 2010).
[119] This includes 23 Antarctic expeditions, and four Arctic expeditions to date.
[120] Chinese Arctic and Antarctic Administration, *Welcome to CAA*.; Jakobson, "China Prepares for an Ice-Free Arctic," 3.

4.4.3 Polar Research Institute of China (PRIC)

The PRIC was founded in Shanghai in 1989. It coordinates Chinese polar research activities, makes state infrastructure and resources available for polar research, is in charge of coordinating polar research expeditions involving the *Xuelong*, conducts comprehensive studies of the Polar regions, and assists in the administration of the Huanghe Arctic research station in Ny-Ålesund. Research at the PRIC focuses on polar glaciology, polar oceanographic science, polar upper atmospheric physics, and polar biological science.[121] It also carries out international cooperation and academic exchange activities.

4.4.4 Chinese Academy of Sciences (CAS)/Institute of Oceanology, Chinese Academy of Sciences (IOCAS)

Founded in Beijing in 1949, the CAS is a leading academic institution and comprehensive research and development center in the natural sciences, technological science, and high-tech innovation in China. The CAS conducts government-assigned projects with regard to key S&T problems, provides scientific data to government, and advises the central governmental on S&T decision-making.[122] The Institute of Oceanology (IOCAS) is a CAS institute located in Beijing. Since its establishment in 1950, the Institute has focused its research on China's marine requirements in oceans science around the world, including in the Polar regions.[123]

4.4.5 Chinese Association for Science and Technology (CAST)

The CAST is China's largest quasi-governmental supervisory organization of S&T research, headquartered in Beijing.[124] Formed in 1958 with the merger of the All-China Federation of Natural Science Societies, and the All-China Association for Science Popularization[125], the CAST's objectives are to: promote the advancement and popularization of S&T; provide advisory and consulting service on S&T related issues; promote international cooperation; and sponsor and organize international S&T exchanges.[126] The CAST conducted China's first Arctic research expedition without government financial backing in 1995.[127]

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[121] Polar Research Institute of China, *Brief Introduction*, http://www.pric.gov.cn/enindex.asp (Access: March 9, 2010).
[122] Chinese Academy of Sciences, *About CAS*, http://english.cas.cn/ACAS/ (Accessed: April 7, 2010).
[123] Institute of Oceanology, Chinese Academy of Sciences, *Introduction*, http://www.qdio.ac.cn/English/Index.asp (Accessed: April 4, 2010).; and Institute of Oceanology, Chinese Academy of Sciences, *Introduction to IOCAS*, July 24, 2009, http://english.qdio.cas.cn/au/bi/ (Accessed: April 4, 2010).
[124] Jakobson, "China Prepares for an Ice-Free Arctic," 7 note 24.
[125] The Chinese Association for Science and Technology, *About Us*, http://english.cast.org.cn/n1181872/n1257426/47099.html (Accessed: May 4, 2010).
[126] The Chinese Association for Science and Technology, *The Objectives and Tasks of CAST*, http://english.cast.org.cn/ (Accessed: May 4, 2010).
[127] Lhi, "Chronology of China's Arctic Expedition," op. cit.

4.4.6 Other Research Centres

The following research centres have minor Arctic-related research projects, or more narrowly defined Arctic research areas:[128]

- Chinese Antarctic Centre of Surveying and Mapping, Wuhan University, Wuhan;[129]
- Research Centre for Marine Developments of China, Qingdao;[130]
- Ocean University of China, Qingdao;
- Dalian Maritime University, Dalian;
- Xiamen University, Xiamen;
- Fudan University, Shanghai; and
- Tongji University, Shanghai.

Taken together, China has one of the largest polar scientific research programs in the world. The number of institutes and government departments conducting polar research is potentially larger and more extensive than those of many of the circumpolar states. This gives China the ability to have influence in a number of polar and Arctic issue research areas. Although there has been an increase in the number of Chinese researchers investigating the climatic, environmental, economic, and commercial consequences of melting sea ice in the Arctic, Beijing does also have long-term aspirations in the region that requires the attention of circumpolar states.

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[128] Jakobson, "China Prepares for an Ice-Free Arctic," 4-5.

[129] Wuhan University is directly under the administration of the Ministry of Education of the PRC. It is regarded as one of the best and most selective universities in China. Its history dates back to 1893, making it one of the oldest higher learning institutions in China. Wuhan University, "A Surveying of Wuhan University," *About Wuhan University*, http://w3.whu.edu.cn/en/about/index.html (Accessed: February 21, 2010).

[130] The Research Centre for Marine Developments of China was established in 2006. The Centre's primary role is to conduct "prospective, strategic and macroscopic research concerning China's major maritime problems and provide consultative services for the State Oceanic Administration (SOA)." Jakobson, "China Prepares for an Ice-Free Arctic," 5.

5 China's Evolving Research Thrusts and Interests in the Arctic

Beijing has been very cautious when formulating its views and interests on the Arctic. However, since it does not yet have an agreed upon Arctic strategy, there appears to be a discussion going on in China over the country's future involvement in the Arctic, and about how best to position itself for an ice-free Arctic. This discussion is taking place among Chinese academics, researchers, and officials. It is largely strategic in nature, and is aimed at influencing government decision makers. In essence, some Chinese researchers are encouraging the government to take a much more active role in Arctic affairs, to expand China's scientific exploration activities, and to be prepared to take advantage of an ice-free Arctic to establish China's geostrategic position in the region.

The possibility of a major non-circumpolar power with global interests and aspirations entering the Arctic has the potential to affect not only the circumpolar balance of power, but also the strategic thinking of all circumpolar states. This section reviews a number of Chinese perspectives on the geopolitics of the Arctic, as well as developments that have the potential to influence China's future interests and activities in the region.[131] It will conclude with a review of the current challenges when assessing China's intentions in the Arctic.

5.1 Beijing's Current Thinking on the Arctic

China currently does not have a formal strategy or policy on the Arctic. Due to China's size and status as a rising global power, Beijing is well aware that its activities might be cause for alarm among circumpolar states. Decision makers in Beijing, therefore, have advocated taking a cautious approach to China's involvement in the Arctic. What can be gleaned from China's interest in the circumpolar region usually comes from statements made by government officials and the participation of Chinese Communist Party (CCP) officials at international conferences.

Chinese Assistant Foreign Minister Hu Zhengyue's remarks while attending an Arctic conference in Norway in June 2009, forms one of the most thorough and comprehensive statements of China's thinking on the geopolitics of the Arctic. Hu stressed that China's Arctic research activities remain primarily focused on the scientific, environmental, and climatic consequences of melting sea ice, as well as the commercial and economic benefits of melting Arctic sea ice in terms of potential access to resources and transit routes. Hu also noted that Beijing looks on the Arctic Council as the most important regional organization in the Arctic, and looked forward to

[131] A report by SIPRI in March 2010 generated much attention over its detailing of China's growing attention, interest, and desire to position itself as an Arctic power. However, it was limited on two fronts. First, although the report addressed some strategic/security issues, it focused primarily on Beijing's scientific, economic, commercial, and research and development interests in the Arctic. Second, although the report addressed the implications of China's activities in the Arctic from a circumpolar perspective, it did not address these implications from any one state's perspective in particular, specifically Canada's. See Jakobson, "China Prepares for an Ice-Free Arctic."

having its application for permanent observer status be decided at the Seventh Ministerial Meeting of the Arctic Council in May 2011, in Nuuk, Greenland,[132]

While Hu's statements are generally reassuring, there are some areas for concern. For instance, Hu's remarks about commercial, economic, and scientific interests in the Arctic are accompanied by distinctive statements about China's 'rights' in the region. Hu acknowledged that while the Arctic is mainly a circumpolar regional issue, there were wider international issues at stake. Thus, Beijing would like to see Arctic states recognize the interests and rights of non-Arctic states, such as China, in the region.[133] As Hu stated:

> When determining the delimitation of outer continental shelves, the Arctic states need to not only properly handle relationships among themselves, but must also consider the relationship between the outer continental shelf and the international submarine area that is the common human heritage, to ensure a balance of coastal countries' interests and the common interests of the international community.[134]

Hu also expressed China's support for Arctic countries' sovereign rights in the circumpolar region, but noted that some articles in UNCLOS may need to be updated due to the impact of climate change and increasing levels of activity in the Arctic. Hu, however, did not elaborate as to which articles Beijing was referring to, or why certain articles required updating. Nevertheless, it can be expected that Beijing will continue to affirm its rights in the Arctic, and persist with the notion that circumpolar issues require non-circumpolar state involvement.[135]

5.2 Future/Evolving Research Thrusts and Interests

There appears to be a discussion going on in China about how best to define and pursue its future interests, involvement, and activities in the Arctic. A group of Chinese researchers have been publicly encouraging the Chinese government to prepare for the commercial and strategic opportunities of an ice-free Arctic, and focusing research in a more strategic direction. This discussion is largely absent of any political/party rhetoric, and appears to be aimed at influencing the decision-making of senior leaders.

Some Chinese researchers have encouraged the government to position China to take advantage of the commercial and strategic opportunities of an ice-free Arctic. Guo Peiqing of Ocean University of China notes that China should not remain neutral or stay clear of Arctic affairs. According to Guo, "Any country that lacks comprehensive research on Polar politics will be excluded from being a decisive power in the management of the Arctic and therefore be forced

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[132] Neither Beijing, nor any other country, was granted permanent observer status at the Arctic Council Ministerial Meeting on May 12, 2011. Arctic Council members did, however, agree on criteria that would allow non-Arctic states to become permanent observers in the council. Arctic Council, *Nuuk Declaration* (On the occasion of the Seventh Ministerial Meeting of the Arctic Council, Nuuk, Greenland, May 12, 2011), 2.
[133] Jakobson, "China Prepares for an Ice-Free Arctic," 9-10.
[134] *Ibid*., 10.
[135] According to Jakobson, "The notion that China has rights in the Arctic can be expected to be repeated in articles by Chinese academics and in comments by Chinese officials until it gradually begins to be perceived as an accepted state of affairs." *Ibid*.

into a passive position."[136] Guo has even raised the possibility that Arctic states may one day form an alliance, thereby limiting China's access to the region.

In another example of this type of thinking, Li Zhenfu, along with a team of other specialists, conducted an assessment of the advantages and disadvantages of China successfully entering the Arctic (see Table 1).[137] Of particular note is that the strengths, weaknesses, opportunities, and threats (SWOT) assessment assumes China's access to and use of Arctic sea routes. In other words, it is not a question of *if* China should be active in the Arctic, only *how* it should be active in the region.

Table 1 Chinese SWOT Assessment of Arctic Sea Routes[138]

Strengths	• China's status as a major export country • Elevation of China's global status • Enhancement of China's Arctic exploration and research capacity • Strengthening of Chinese shipping companies
Weaknesses	• China does not have an "absolute right" to speak in global affairs • China's cultural elements (most international laws are based on Western culture) • China is not an Arctic Ocean coastal/littoral state • China's vessel-building technology and logistic planning techniques are not the most advanced globally
Opportunities	• The logistic costs of shipping companies will be reduced • Asia's high latitude ports will become new centres for international shipping • Arctic shipping has high tourist value • Global trade and shipping patterns will change in a way that favours China
Threats	• Current international laws are not favourable to China's interests in Arctic shipping • Potential disputes between Arctic states such as Russia and the United States, and between Arctic and non-Arctic states as well • Chinese shipping companies will face fierce competition • Negative effects on China's ports in lower latitudes

It appears from assessments such as these that Beijing views the Arctic as a geostrategic region where it has national interests. Beijing being actively engaged in Arctic affairs is a way of ensuring that it does not become excluded from the region. As Li points out, the Arctic also has significant military value, but China's research on the Arctic has not been conducted in a comprehensive or strategic manner. Therefore, China's ability to speak out and protect its rights in the region is limited. As Li asserts, "Whoever has control over the Arctic route will control the new passage of world economics and international strategies."[139] In other words, Li's comments

[136] *Ibid*., 7.
[137] *Ibid*., 6.
[138] *Ibid*.
[139] *Ibid*.

suggest there is a recognized military/strategic link between China's interests in the Arctic and its ability to protect those interests.

Chinese officials have, therefore, started to think about what kind of policies, strategies, and capabilities would benefit China best in a seasonally ice-free Arctic. This has included assessing the commercial, political, legal, economic, and security implications of a seasonally ice-free Arctic. In September 2007, for example, the CCP Central Committee requested researchers to undertake a systematic study of Arctic issues considered important to China. In 2008, researchers conducting the study received funding from the SOA to carry out the initiative. Although reports by the Arctic Issues Research project were not made public, expert scholars and officials from around China involved in the project – including Guo and Li – identified ten areas relevant to China's future interests in the Arctic. These areas are:

- Arctic and human society;
- Arctic resources and their exploitation;
- Arctic scientific research;
- Arctic transportation;
- Arctic law;
- Arctic politics and diplomacy;
- military factors in the Arctic;
- China's Arctic activities;
- the Arctic's geostrategic position; and
- China's Arctic policy and recommendations.[140]

This project directly resulted in the creation of the Research Center on Polar Policies and Laws at the Ocean University of China in 2010. The Center, which is meant to be a platform for academic exchanges and research, generally consists of about 20 members, including professors, associate professors, and graduate students. The Center has regularly contributed articles to the Journal of Ocean University of China (social sciences edition).

More importantly, a review of the topics identified by the Arctic Issues Research project suggests that Beijing is viewing the Arctic in largely strategic terms. Of the ten areas identified by the Arctic Issues Research project, nine can be considered strategically oriented.[141] In other words, the research conducted in those areas can be geared toward maximizing China's position in the Arctic vis-à-vis other circumpolar states. This includes becoming more involved in Arctic affairs as China transitions from a regional power to a global power. The importance of gaining access to these vital strategic sea routes/chokepoints, and not being forced into a passive position, can be considered a vital long-term strategic interest for Beijing.

While it is unclear whether China's future Arctic research interests will actually focus on the strategic elements of these research areas, the recommendations and advice contained in the

[140] *Ibid*., 5.
[141] Only Arctic and human society does not appear to have a significant strategic focus to it.

Arctic Issues Research project reports have the potential to influence the highest levels of Chinese leadership (and consequently the scope and direction of China's future Arctic activities). Specifically, two events will take place in China over the next two years that will have the potential to define and/or alter China's future Arctic activities.

The first was the scheduled release of China's 12th Five-Year Plan on March 14, 2011. Not only did the Five-Year Plan affirm a continuing commitment to rapid economic growth, market reform, and integration with the global economy, but it included a commitment to continue polar and oceanic scientific investigation activities.[142] Although the actual content of polar research and expedition targets is not controversial or of concern for circumpolar states, this is the first time that a Five-Year Plan has contained references about Polar research activities. This suggests that the Polar regions are increasing in importance for China's leaders, and this should be of interest to circumpolar states.

Second, the leadership change at the 18th Party Congress, scheduled for October/November 2012, has the potential to influence China's evolving Arctic research interests and activities. Due to term restrictions, Hu Jintao must step down as the General Secretary in 2012. While the 18th Central Committee will likely elect Xi Jinping as Hu's replacement,[143] most of the rest of the Politburo Standing Committee members, their party and state positions, and their political views are not clearly known at this time.

As a result, the leadership change provides an opportunity to develop and/or shift the focus of China's Arctic interests and activities. This is even more likely if the statements made by Guo and Li are any indication of the type of recommendations and advice contained in the Arctic Issues Research project reports. As China's leaders set the various goals, objectives, and ambitions for the country – including for the Polar regions – they may be influenced by the advice contained in the Arctic Issues Research project reports.

More importantly, while most open statements about the direction of China's future Arctic research interests and activities, including associated criticisms of the government – which are generally rare in China – have been made by academics, some PLA officers have echoed similar sentiments. Senior Colonel Han Xudong, for instance, has warned that due to the complex sovereignty disputes in the Arctic, the possibility of the use of force in the region cannot be ruled out.[144] Rear Admiral Yin Zhuo has also noted, "The current scramble for the sovereignty of the Arctic among some nations has encroached on many other countries' interests." China, therefore, "must play an indispensable role in Arctic exploration as we have one-fifth of the world's population."[145]

Thus, there exists in China a distinct group of academics and officials trying to influence leaders to adopt a much more assertive stance in the Arctic than has traditionally been the case. This is despite the fact that China is neither an Arctic Council member state with the right to participate

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[142] Jakobson, "China Prepares for an Ice-Free Arctic," 11.
[143] Xi Jinping is currently Vice President of the PRC, the sixth ranked member of the Politburo Standing Committee, the Vice-Chairman of the Central Military Commission, and Principal of the Central Party School.
[144] Jakobson, "China Prepares for an Ice-Free Arctic," 7.
[145] G.G. Chang, "China's Arctic Play," *The Diplomat*, March 9, 2010, http://the-diplomat.com/2010/03/09/china%E2%80%99s-arctic-play/ (Accessed: October 14, 2010).

in discussions about Arctic policies, nor an Arctic littoral state with sovereign rights to underwater continental shelf resources.[146] Beijing has persisted in arguing that because it is located in the Northern Hemisphere, it is one of the most important non-Arctic countries nearest to the North Pole. As such, it can be expected that Beijing will continually and persistently reiterate that is has rights in the Arctic, and that the Arctic should be accessible to all. The aim of this will be to ensure that Beijing is not forced into a passive position in the Arctic, that it is a central actor in the management of Arctic affairs, and that it retains access to the Arctic. This could ultimately bring China into disagreement with circumpolar states in a variety of issue areas, and alter security and sovereignty relationships in the circumpolar region.

5.3 Challenges Monitoring China's Arctic Activities

The Arctic region is growing in importance as a result of the potential impact of climate change. These developments raise the likelihood that non-circumpolar states such as China will become increasingly active in the region. Although China's current activities remain focussed on the scientific, environmental, and climatic consequences of melting sea ice, the CCP Central Committee's examination of Arctic issues highlights the extent to which China is thinking about the region in strategic terms.

There is no question that China will be more active in the polar regions. The inclusion of a polar research commitment in the 12th Five-Year Plan will guarantee that. The issue for circumpolar states will be to gauge whether the remarks made by academics, researchers, and other officials are a reflection of the broad ambitions shared by China's leaders. This is because the remarks made by academics and other officials appear to be aimed at influencing discussions in China about its level of involvement in the Arctic, and about how best to position itself in the region. Thus, the upcoming leadership change in 2012 will signify one of the most important developments in China in terms of determining the extent of its future interests and aspirations in the Arctic. If circumpolar states are unprepared, the outcome of these events have the potential to create and/or alter security challenges in the region.

This means that circumpolar states must be prepared to monitor and assess the development of China's interests in the Arctic. However, several challenges make it difficult to ascertain the overall direction and intentions of China's evolving Arctic policy. First, there is a lack of transparency and a high degree of secrecy associated with the CCP. By its very nature as a communist state, China possesses a system of government in which the state plans and controls the economy, and a single authoritarian party holds power. Although China is somewhat more open than it was during the Cold War, the government closely controls access to and release of information. As a result, China's messages and statements concerning the Arctic are generally deliberate, consistent, and scripted. To be sure, it is common for key elements of a state's security and defence policy to be classified, and China is no exception, but the high degree of secrecy and general lack of transparency in China makes it extremely difficult to accurately assess Beijing's intentions in the Arctic.

Second, not only are there a lack of statements made by party officials on the Arctic, there is a lack of Arctic statements in official publications and documents. This is particularly true of the security and defence realms. For example, in all of China's Defence White Papers from 1998 to

[146] Jakobson, "China Prepares for an Ice-Free Arctic," 1.

2008, the term 'north' is used only to refer to either regions such as northeast Asia or northwest Asia, or to describe the widening economic gap between the north and the south. The words 'Arctic' and 'polar' are not used once.[147] However, in *China's National Defense in 2010*, it states:

> Major powers are stepping up the realignment of their security and military strategies, accelerating military reform, and vigorously developing new and more sophisticated military technologies. Some powers have worked out strategies for outer space, cyber space and the *polar regions* [italics added], developed means for prompt global strikes, accelerated development of missile defense systems, enhanced cyber operations capabilities to occupy new strategic commanding heights.[148]

This is the first time the word 'polar' has been used in a Chinese Defence White Paper – other than to refer to a multi-polar international system – and suggests that Chinese officials are attributing an increasing level of importance to the polar regions from a security and defence perspective.

Third, what writing does exist on Chinese Arctic strategic thinking is usually in Mandarin, or is verbally transmitted. Without a robust and active translation capacity in any of the circumpolar states, most of what is being written by Chinese analysts and academics is being missed. More importantly, what can be gleaned from Chinese statements usually comes from the participation of Chinese officials in international conferences, and those messages are usually closely scrutinized, well thought out, and pre-scripted. Hu's speech serves as a good example. Until these challenges can be overcome, circumpolar states will be faced with an inadequate understanding of China's intentions and aspirations in the Arctic.

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[147] See *China's National Defense in 1998* (Beijing: Information Office of the State Council of the People's Republic of China, 1998).; *China's National Defense in 2000* (Beijing: Information Office of the State Council of the People's Republic of China, 2000).; *China's National Defense in 2002* (Beijing: Information Office of the State Council of the People's Republic of China, 2002).; *China's National Defense in 2004* (Beijing: Information Office of the State Council of the People's Republic of China, 2004).; *China's National Defense in 2006* (Beijing: Information Office of the State Council of the People's Republic of China, 2006).; and *China's National Defense in 2008* (Beijing: Information Office of the State Council of the People's Republic of China, 2009).

[148] *China's National Defense in 2010* (Beijing: Information Office of the State Council of the People's Republic of China, 2011), 3.

6 Geostrategic Considerations

The idea that the Arctic can be exploited as a strategic operational environment is not new. During the Cold War, the Arctic was considered an important geostrategic area. Military planners and strategic analysts assessed it as the area where the Soviet Union's bombers and cruise missiles – and later ballistic missiles – would transit in the event of an attack, and/or where the Soviet Union's bombers and submarines would launch their nuclear payloads when attacking North American targets. Neither the United States nor Canada viewed the Arctic as a strategic place to be protected; rather it was viewed as the direction from which an attack would emanate – an exposed flank – that had to be defended. For the North Atlantic Treaty Organization (NATO), the Arctic and North Atlantic provided strategic depth, early warning, and if necessary, areas of primary engagement for an impending attack by the Soviet Union.

In the current strategic environment, this situation has somewhat reversed itself. The Arctic is viewed less as a direction from which an attack will emanate, but rather as a region to be protected. More importantly, climate change and the arrival of major powers such as China in the Arctic, brings with it significant strategic challenges. In effect, if assumptions about climate change prove to be accurate, the Arctic may be more accessible for longer periods, and this increased accessibility will bring with it a whole host of potential challenges.

In one example, this section assesses a scenario whereby the Arctic is considered a geostrategic operational area to be exploited by non-circumpolar states. Specifically, China exploits the Arctic in order to create geostrategic options and freedom of action in a crisis vis-à-vis the United States. While the exploitation and use of the Arctic in such a scenario may appear highly unlikely,[149] it raises the prospect that non-circumpolar states may view the Arctic as a region from which to conduct operations. More importantly, it highlights that circumpolar states must consider the Arctic as a geostrategic region, and be prepared to prevent the exploitive use of the Arctic by non-circumpolar states.

6.1 The Arctic as a Strategic Operational Area

According to Rob Huebert of the University of Calgary, the Arctic states of Canada, Denmark (Greenland), Finland, Iceland, Norway, Russia, and the United States have all released defence policy statements on the Arctic and begun to rebuild their Arctic military capabilities.[150] Arctic states have also noted that they will take the necessary steps to defend their interests by conducting training exercises and operations in the Arctic. The impetus for these actions appears

[149] The following discussion is speculative in nature. While the scenario focuses on capabilities and requirements that would allow China to project security challenges and nuclear threats from the Arctic, there is no evidence to suggest Beijing is actively pursuing such a course of action. The lack of any apparent ice capability in any of the PLA Navy's submarine classes, and the absence of any Arctic/ice training by PLA Navy sailors currently precludes this scenario from being implemented. In addition, in order for a submarine to conduct Arctic/ice operations, three capabilities are required: (1) upward looking sonar, (2) diving planes that can be retracted into the hull or rotated 90 degrees, and (3) an ice-hardened sail. Currently, no Chinese SSBN has any of these capabilities. R. Huebert, *The Newly Emerging Arctic Security Environment* (Calgary: Canadian Defence & Foreign Affairs Institute, 2010), 20.
[150] *Ibid*., Executive Summary.

to be recognition by these states that the Arctic is a region to be protected, and is critically important to their interests. According to Huebert, "In this way, an arms race may be beginning."[151]

These developments may have prompted academics such as Li to call attention to the military significance of the Arctic; and Guo to raise the possibility of Arctic states forming an alliance to limit China's access to the region.[152] It is within this context that Beijing may view the Arctic as a geostrategic operational region, and deem that it is in its interest to exploit its use. In this scenario, the Arctic is either exploited for objectives in the Arctic (such as its resources or transit routes), or for objectives elsewhere. It is primarily this last scenario that is of interest to this assessment, particularly when combined with Chinese nuclear powered ballistic missile submarine (SSBN) operations.

6.1.1 Nuclear Powered Ballistic Missile Submarine Operations

In recent years, China has increasingly developed the economic, technical, and military capacity to expand, explore, and protect its vital interests. While security concerns such as Taiwan and control of waters close to China will remain important, China has begun to consider its interests more broadly, and this includes the Arctic. China is articulating an expanding view of its interest and defence requirements, and the PLA Navy will be a central player in the pursuit and protection of those interests.

In terms of China's SSBN capabilities, the PLA Navy can either keep its SSBNs close to territorial waters and assemble capabilities to protect them, or it can deploy them out to sea to conduct deterrence patrols. This former doctrine was developed by the former Soviet Union. During the Cold War, elements of the Soviet armed forces were utilized to protect "bastions" within geographically restricted seas, which sought to ensure that SSBNs could carry out their mission.[153] This strategy sought to turn unfavourable geography into an advantage, as well as compensate for the inferiority of the Soviet Union's submarines.

There are two areas where the PLA Navy can employ a bastion strategy. The first would be to operate SSBNs in the protected bastion of the Bohai Sea just north of the Yellow Sea and Qingdao (see Figure 14). There are already major SSBN bases at Huludao and Qingdao, which are surrounded mostly by Chinese territory. However, because SSBNs armed with the long-range *Julang*-2 (JL-2) submarine launched ballistic missile (SLBM) are estimated to have a range of between 7,500 and 9,656 kilometers – and probably more closer to 7,500 kilometers – they would not have sufficient range to strike targets throughout the continental United States if launched from the Bohai Sea (see Figure 15).[154] In addition, in the offshore areas near Chinese territory, the

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[151] *Ibid*.
[152] *Ibid*., 7 and 12.; and Jakobson, "China Prepares for an Ice-Free Arctic," 7.
[153] A.S. Erickson and A.R. Wilson, "China's Aircraft Carrier Dilemma," *Naval War College Review* 59, no. 40 (2006): 16.; and L.J. Goldstein, "Cold Wars At Sea," *Armed Forces Journal*, April 2008, http://www.armedforcesjournal.com/2008/04/3373649 (Accessed: July 4, 2008).
[154] The JL-2 has yet to enter service. *Jin*-class SSBNs armed with the JL-2 SLBM would only have sufficient range to put US forces in the western Pacific (Alaska, Guam, Hawaii, Japan, and Okinawa) under threat. C. Cox, *US National Security and Military/Commercial Concerns With the People's Republic of China*, Volume 1 (Report of the Select Committee on Defense, United States House of Representatives,

Bohai Sea and Yellow Sea are rarely deeper than 50 meters. It drops to 100 meters closer to the Korean peninsula, but this is somewhat shallow for SSBN operations.[155]

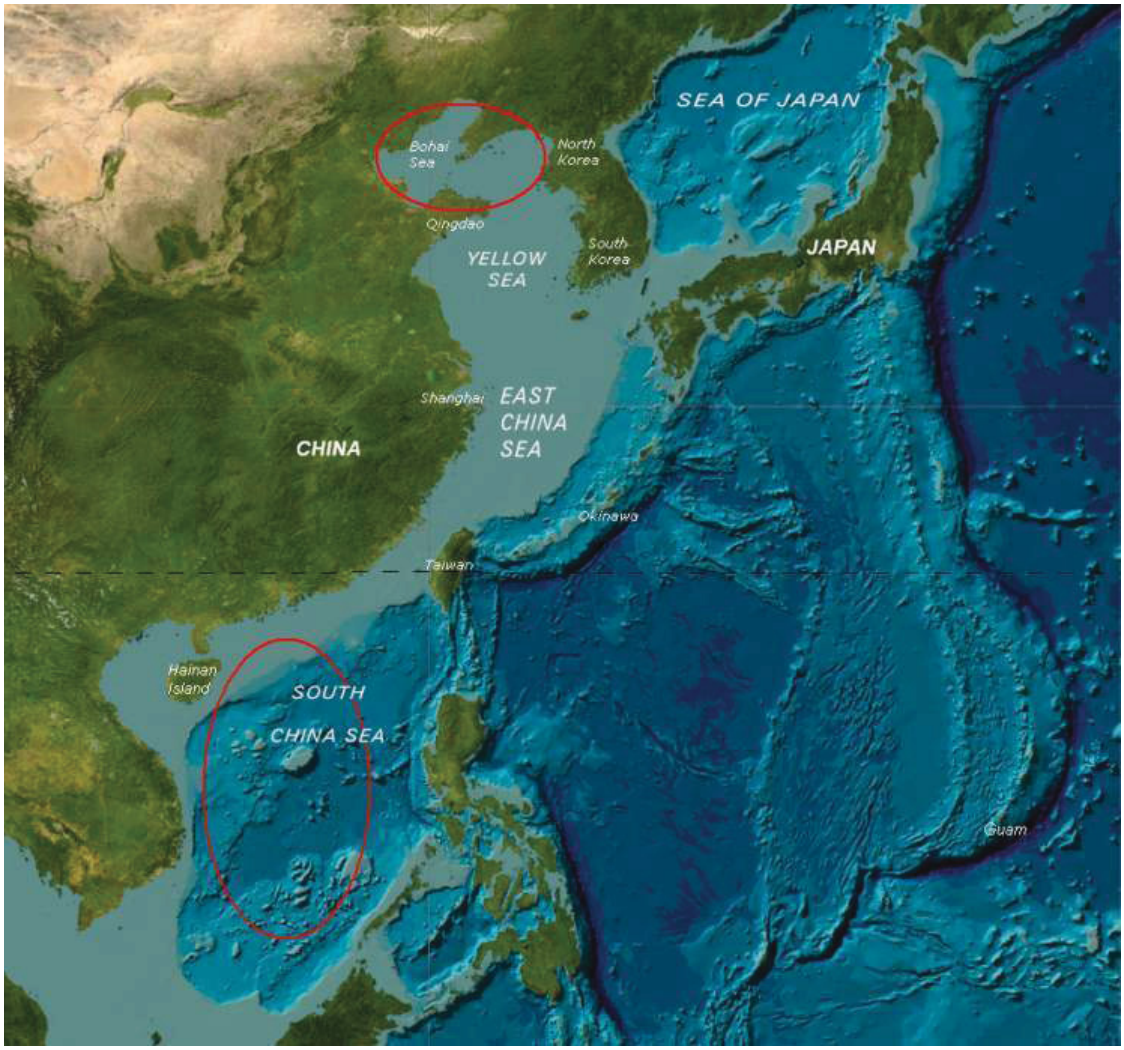

Figure 14 Bathymetry of Potential Chinese SLBM "Bastions"[156]

1999), http://www.access.gpo.gov/congress/house/hr105851/index.html (Accessed: April 12, 2010).; Department of Defense, *The Military Power of the People's Republic of China*, 2008 Annual Report to Congress (Washington, D.C.: Office of the Secretary of Defense, 2008), 26. and GlobalSecurity.org, "JL-2 (CSS-NX-4)," *Weapons of Mass Destruction (WMD)*, June 19, 2005, http://www.globalsecurity.org/wmd/world/china/jl-2.htm (Accessed: November 21, 2008).

[155] R.D. Fisher, "Developing US-Chinese Nuclear Naval Competition in Asia," *International Assessment and Strategy Center*, January 16, 2005, http://www.strategycenter.net/research/pubID.60/pub_detail.asp# (Accessed: May 17, 2008).

[156] Map from GEBCO, "GEBCO World Map," *The General Bathymetric Chart of the Oceans (GEBCO)*, June 5, 2008, http://www.gebco.net (Accessed: July 20, 2008).

The second area would be to operate SSBNs in the South China Sea, east of Hainan Island (see Figure 14). The PLA Navy has already begun construction of a second SSBN base at the existing submarine base at Yulin, near Sanya, on Hainan Island.[157] Sailing east from Hainan Island, SSBNs would quickly gain access to waters that have depths beyond 1,000 meters.[158] Although this would offer better ocean bathymetry for SSBN operations, as well as greater security from threatening US anti-submarine warfare (ASW) forces, Chinese JL-2 SLBMs would not have sufficient range to strike targets throughout the United States, or even Alaska (see Figure 15).

[157] Fisher, "Developing US-Chinese Nuclear Naval Competition in Asia."; and J. Varner, "The Chinese Navy: South by Southwest," *Canadian Naval Review* 3, no. 1 (2007): 19.
[158] Fisher, "Developing US-Chinese Nuclear Naval Competition in Asia."

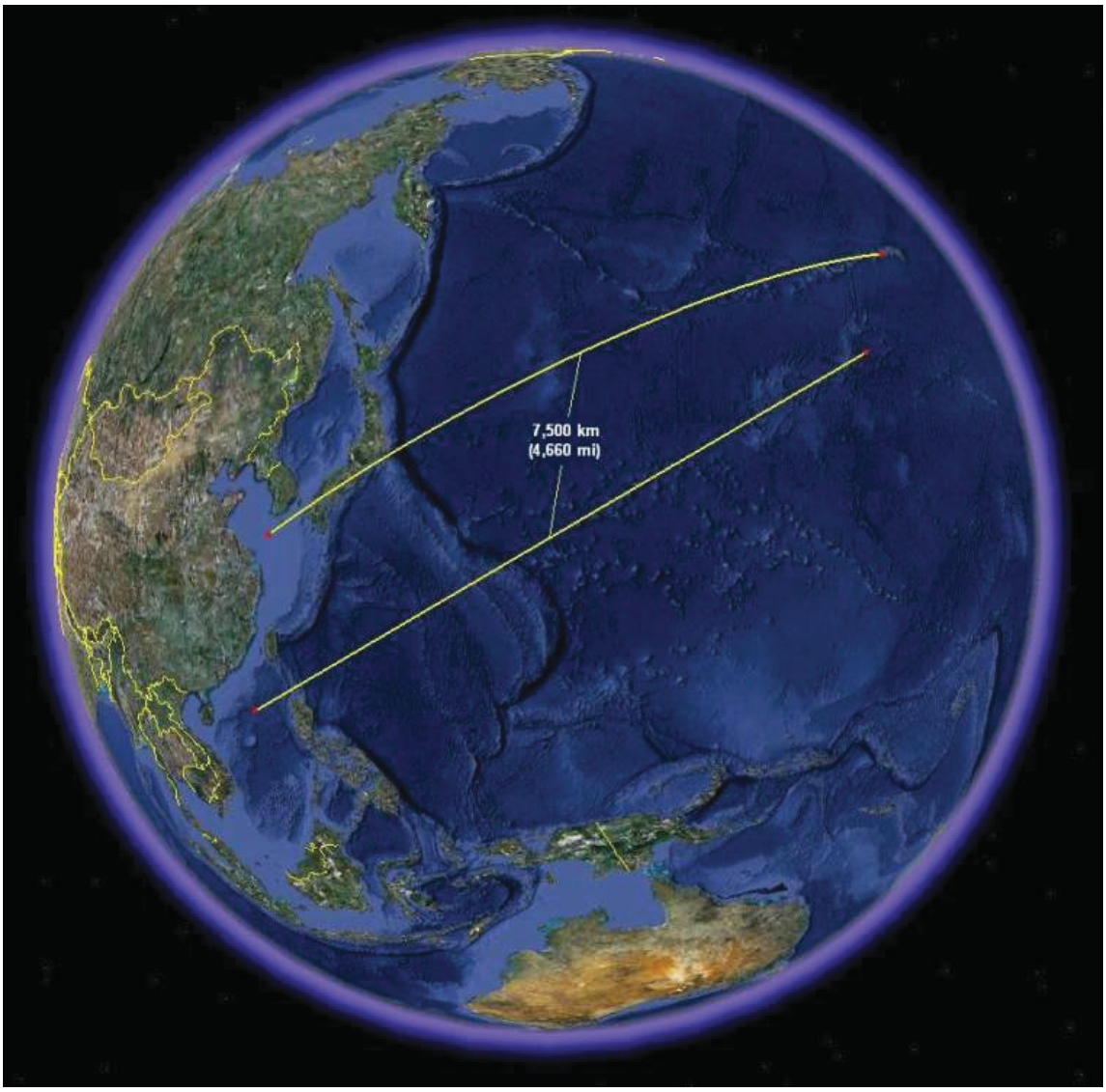

Figure 15 JL-2 Launch Distances from the Western Pacific[159]

Consequently, the prospect of deploying SSBNs out to sea to conduct deterrence patrols appears to be the likely course of action for the PLA Navy if the intent is to place all US forces in the Pacific, as well as Alaska and the mainland United States, under threat. More importantly, once this happens, the bathymetry of the western Pacific Ocean and the strategic relevance of the Arctic may come into play.

[159] Map derived from Google Earth, *Google Earth*, kh.google.com (Accessed: March 10, 2010).

6.1.2 The Washington, D.C. Scenario

In this scenario, the ability of the PLA Navy to exercise a sufficient level of sea control and sea denial within the first and second island chains serves to gain access to the deeper waters of the western Pacific,[160] and helps facilitate Chinese SSBN deterrence patrols. Once Chinese SSBNs transit the Bohai and Yellow Seas and reach the Okinawa Trough, they could head northeast along the Ryukyu Trench, along the east coast of Japan (the Japan Trench), and the Kuril Trench to the southern Aleutian Island Chain. From locations further north, Chinese SLBMs would eventually be able to put all United States forces in the Pacific, as well as Alaska and the mainland United States – including Washington, D.C. – under threat (see Figure 16).

[160] The first island chain begins south of the Japanese island of Kyushu, runs through the Ryukyu Islands, Taiwan, the Philippine archipelago, to Malaysia (Borneo) and Indonesia. The second island chain runs from Japan, through the Bonin Islands, the Mariana Islands, Guam, Palau, and the Caroline Islands, to Indonesia. Jane's, "Navy: China and Northeast Asia," *Jane's Sentinel Security Assessment*, February 7, 2008, http://sentinel.janes.com/public/sentinel/index.shtml (Accessed: July 14, 2008).; and Office of Naval Intelligence, *China's Navy 2007* (Washington, D.C.: Office of Naval Intelligence, 2007), 26.

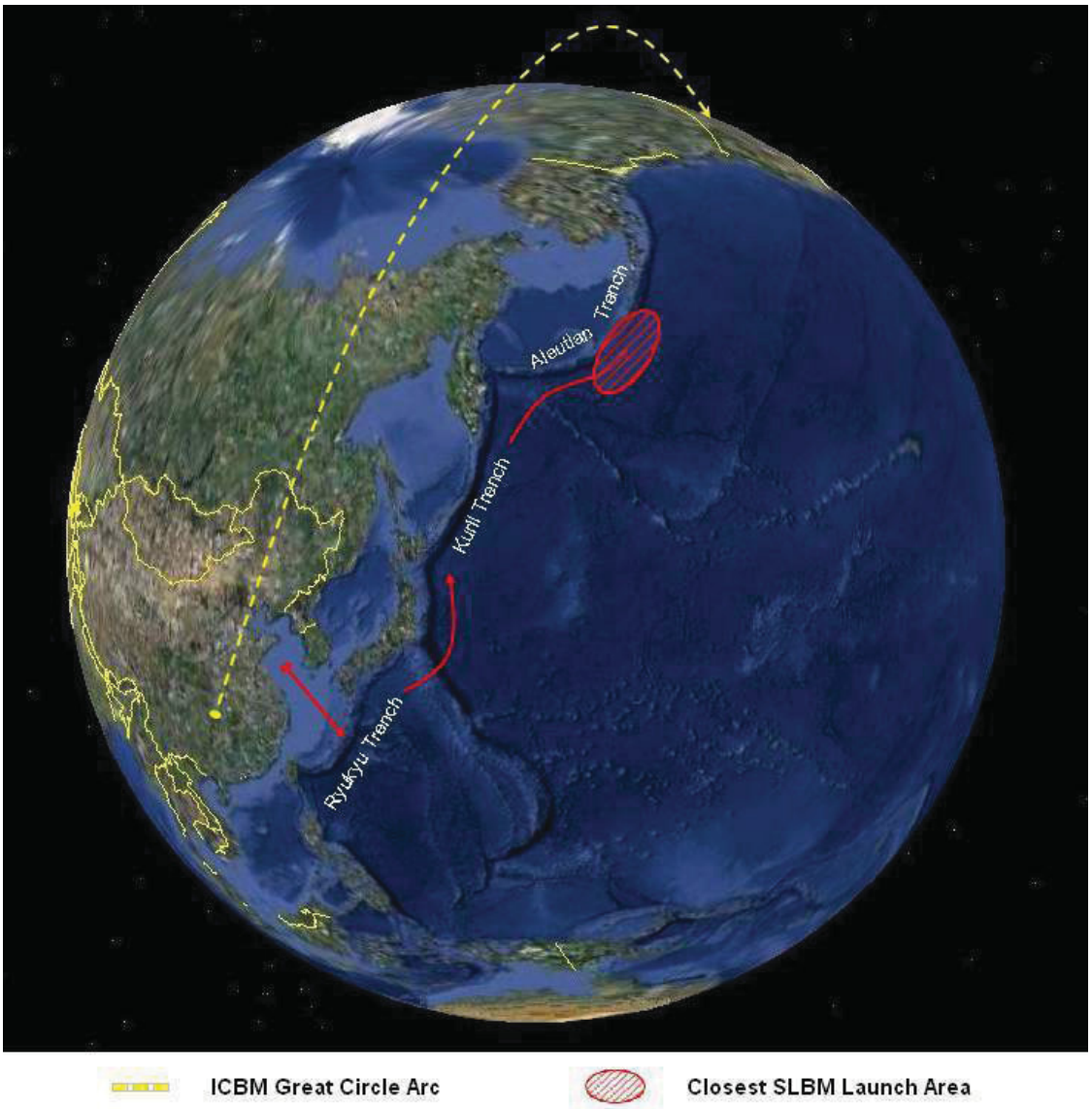

Figure 16 Possible Chinese SSBN Transit Route North[161]

The preference for Chinese SSBNs to head northeast once they reach the deeper waters of the western Pacific Ocean is driven by geometric factors. It is a fact of geometry that ballistic missile trajectories from China to the continental United States follow a great circle arc over the circumpolar region.[162] Because the JL-2 only has a range of about 7,500 kilometers, it would not have sufficient range to strike targets throughout the continental United States if launched from

[161] Map derived from Google Earth, *Google Earth*.
[162] Ballistic missiles tend to travel the shortest distance, or in a great circle arc, from their launch site to their intended target. The great circle arc, or orthodromic distance, is the shortest distance between any two points on the surface of a sphere.

within the first island chain or even most of the second island chain.[163] Chinese SSBNs would have to provide the extra 'legs' for SLBMs to reach their intended targets in the continental United States.[164] It therefore makes strategic sense to follow the great circle arc as closely as possible to the JL-2's closest launch area. In this case, the shortest and fastest route to follow would be in a northeasterly direction. In essence, deploying Chinese SSBNs in a northeasterly direction places more of the United States under threat more quickly than if Chinese SSBNs were to deploy to any other location in the Pacific Ocean.

Once PLA Navy SSBNs had arrived at their forward operating location in the north Pacific, they would have several strategic options. They could continue to place US forces throughout the Pacific and the mainland United States under threat, or they could reduce their strategic strike distance – and open up a wider geostrategic angle of attack vis-à-vis Washington – by deploying north through the Bering Strait into the Arctic Ocean.[165] The Center for a New American Security noted in a December 2008 working paper, *Uncharted Waters: The U.S. Navy and Navigating Climate Change*, that melting arctic sea ice may "facilitate new azimuths for submarine launched ballistic missiles (SLBMs), creating new opportunities and risks for the United States."[166] As Figure 17 illustrates, the further north PLA Navy submarines travel, the more they reduce their strategic strike distance and open up a wider angle of attack vis-à-vis Washington.

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[163] Department of Defense, *Military and Security Developments Involving the People's Republic of China 2010*, Annual Report to Congress (Washington, D.C.: Office of the Secretary of Defense, 2010), 35.
[164] For comparison purposes, depending on the version(s), the Chinese DF-5/DF-5A ICBM has an estimated range of 8,460 to 13,000 kilometers. The DF-31/DF-31A ICBM has an estimated range of 7,250 to 12,000 kilometers, but most probably closer to 11,270 kilometers. The experimental DF-41 ICBM is estimated to have a range of 12,000 to 14,000 kilometers. A.H. Cordesman and M. Kleiber, *Chinese Military Modernization: Force Development and Strategic Capabilities* (Washington, D.C.: Center for Strategic and International Studies, 2007), 169.
[165] This is if transiting the Bering Strait was considered strategically feasible. The Bering Strait has an average depth of 30 to 50 meters, which would make it problematic for SSBNs to transit effectively.
[166] S.E. Burke et al., *Uncharted Waters: The U.S. Navy and Navigating Climate Change*, Working Paper (Washington, D.C.: Center for a New American Security, 2008), 19.

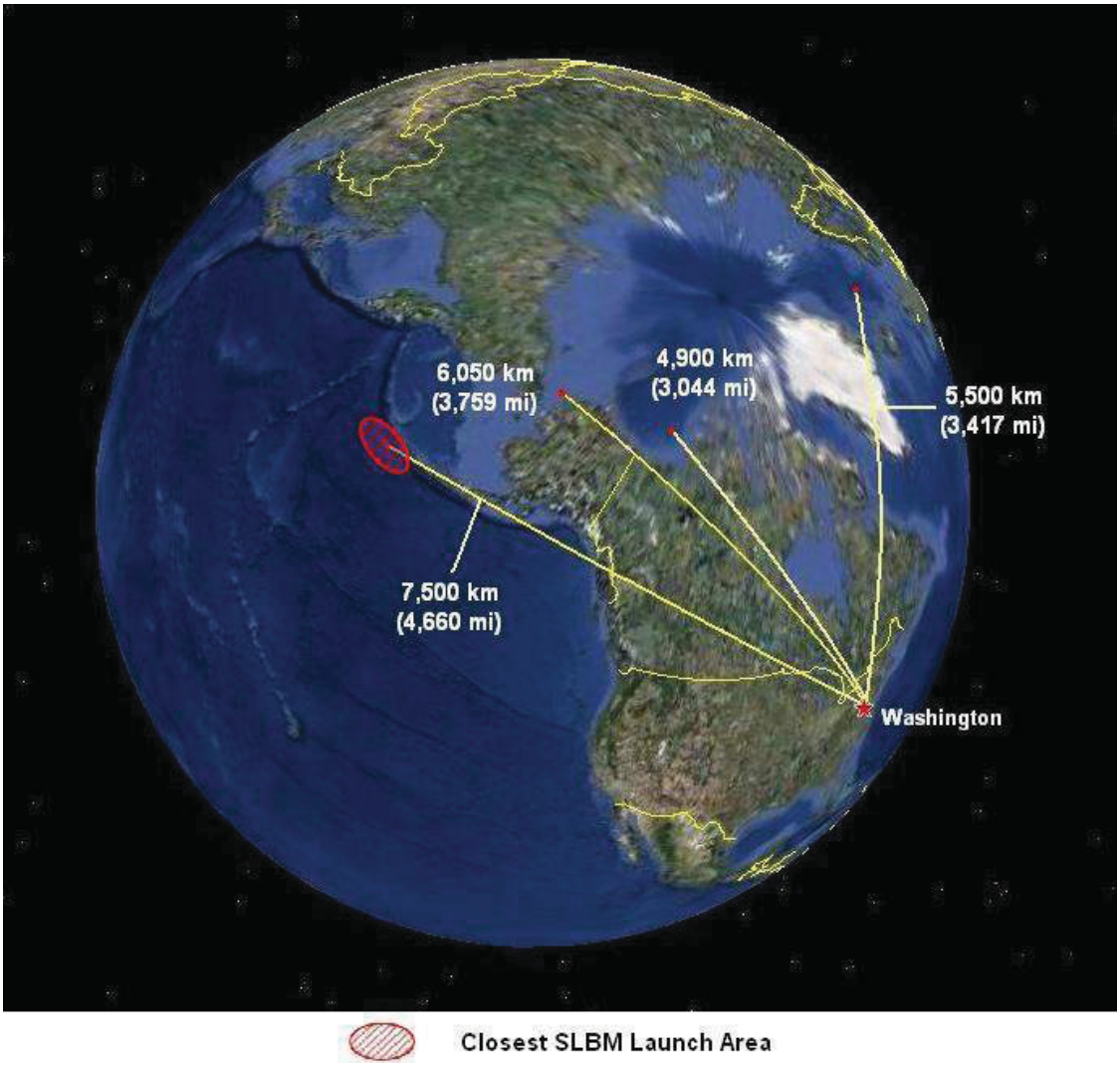

Figure 17 Potential JL-2 Arctic Launch Locations vis-à-vis Washington[167]

Exploiting the Arctic region as a SSBN operational area would result in an exposed flank – a direction from which an attack could emanate, tantamount to the geostrategic stalemate that Washington and NATO found itself in during the Cold War. Except, whereas during the Cold War the Soviet Union attempted to limit NATO's freedom of action in Europe by threatening an attack over the North Pole, Beijing may attempt to limit Washington's freedom of action in the western Pacific, particularly in a Taiwan scenario, by threatening an attack from the polar region.

China's goal in any conflict involving Taiwan would be to present the world in general and the United States in particular, with a *fait accompli*. The aim would be to prevail, and to prevail quickly, gaining physical control over Taiwan by establishing the forces and capabilities necessary to dominate the island and prevent the United States from using its expeditionary forces

[167] Map derived from Google Earth, *Google Earth*.

to retake it. In doing so, Beijing would attempt to deter any subsequent military operations by the United States.

Strategic surprise, therefore, is an essential prerequisite in any Taiwan scenario, and this could include opening up and exploiting a strategic flank in the Arctic. Exploiting the Arctic in this way may not result in China successfully retaking Taiwan, and it may not even change the eventual outcome of the crisis. However, it requires Washington to address the impending threat immediately. Exploitation of the circumpolar region in this way requires that Washington assess and consider its options and actions. Countering a Chinese SSBN threat in the Arctic may divert vital resources away from Washington's original strategy, require it to abandon its original strategy, or require it to develop an entirely new strategy. Most importantly, regardless of Washington's course of action, it would be faced with the reality that it may have a strategic vulnerability. All of these responses take time and resources, thus creating options, time, space, and freedom of action for Beijing to pursue strategic objectives elsewhere. This would ultimately work in Beijing's favour in a Taiwan scenario, allowing it time to establish the forces necessary to dominate Taiwan and present the United States with the *fait accompli* it so desires.

6.2 Canadian/Circumpolar Strategic Implications

To be sure, there are a variety of obstacles that preclude the above scenario from taking place, not the least of which include political, economic, and strategic issues; technological limitations; operational and training limitations; and geographic and bathymetric challenges. Nevertheless, as a function of defence planning, there are important strategic implications for Canada and other circumpolar states to take into account should Beijing or another non-circumpolar state decide to exploit the Arctic for its own strategic purposes.

If China's intentions are to exploit the circumpolar region in order to create time, space, and freedom of action to pursue strategic objectives elsewhere, it is assumed it would not have any moral or ethical misgivings about launching its attack from US territorial waters. However, the situation becomes significantly more complicated if a third country's waters are exploited. For example, Beijing could place Washington under threat from Russian Arctic waters. However, given the political and military response such an attack would likely generate, it is unlikely Beijing would attack Washington from Russian waters.[168] Of all the circumpolar states, only Russia and the United States have the Arctic training, Arctic warfare, polar icebreaking, underwater warfare, and ASW capabilities to challenge Beijing in the underwater environment.[169] Therefore, the possibility of an unintended yet overly assertive response from Moscow would likely dissuade Beijing from threatening an attack on Washington from Russian waters.

Therefore, it would be in Beijing's interest to exploit the waters of a country that had an apparent lack of Arctic warfare, polar icebreaking, underwater warfare, and ASW capabilities. From Beijing's point of view, the country that most closely meets those requirements after crossing through the Bering Strait into the Beaufort Sea would be Canada (see Figure 18).

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[168] T. Grove, "Analysis: Russia Turns Military Gaze East to Counter China," *Reuters*, March 1, 2011, http://www.reuters.com/article/2011/03/01/us-russia-china-military-idUSTRE72027S20110301 (Accessed: March 1, 2011).

[169] See Annex D for a complete review of military developments in the Arctic, in particular Russian and United States Arctic capabilities.

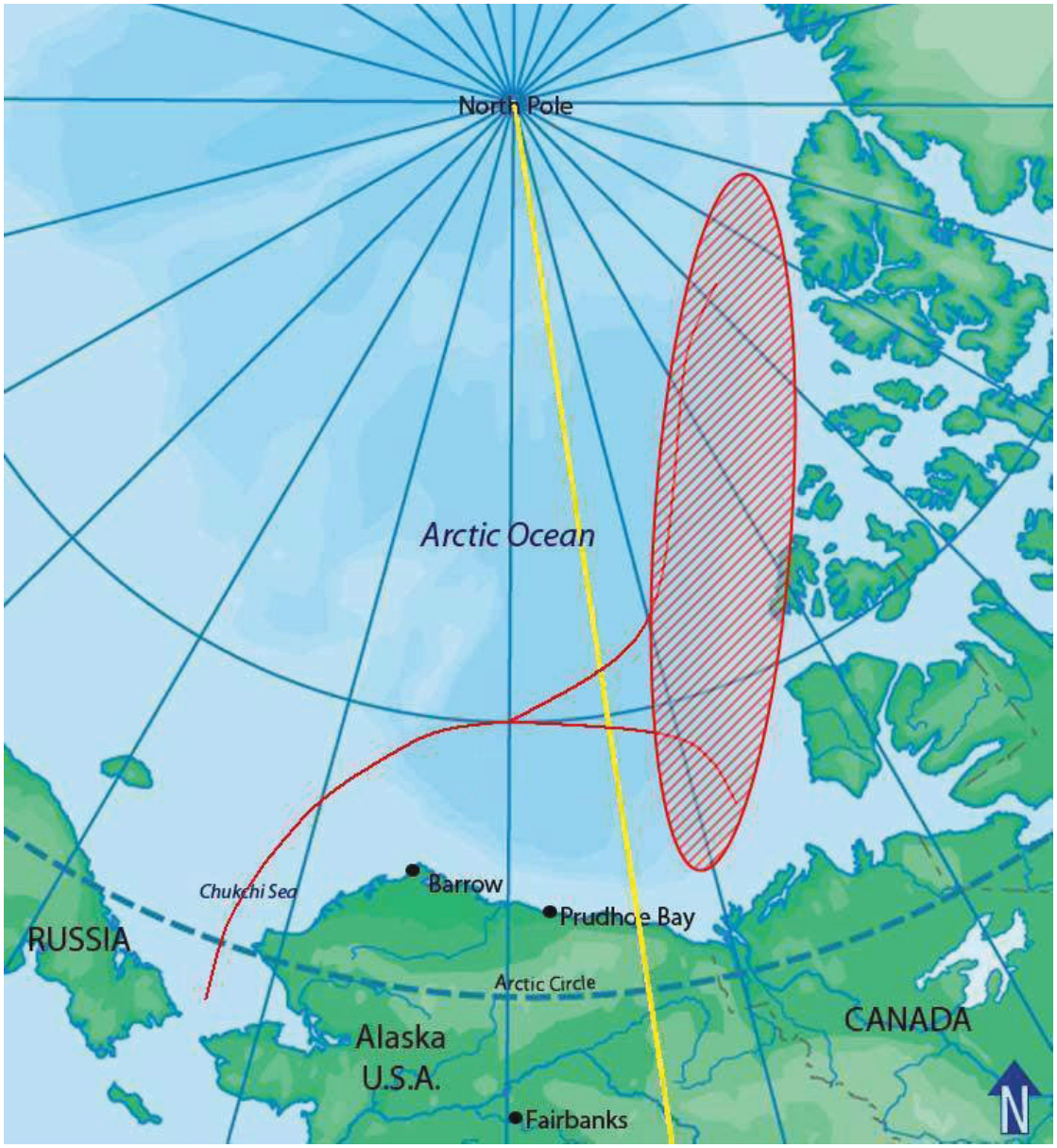

Figure 18 PLA Navy Exploitation of Canadian Arctic Waters[170]

This is not to suggest that Canada does not currently have an effective Arctic capability, or that the government's plans to improve its Arctic capabilities are insufficient. However, as one scholar notes, contracts for the Arctic/Offshore Patrol Ship (A/OPS), for a new polar icebreaker, long-range patrol aircraft, and the proposed ice-strengthened Joint Support Ship (JSS) project have either been postponed, or not signed.[171] This could eventually result in a situation, incorrectly

[170] Map derived from Google Earth, *Google Earth*.
[171] As Huebert asserts, "[The Harper Government]…has developed a good plan of action, but seems unable to implement it." Huebert, *The Newly Emerging Arctic Security Environment*, op. cit., 23.

perceived or otherwise, that Canada lacks an apparent Arctic warfare capability vis-à-vis other states. This is not necessarily a serious concern from a circumpolar point of view,[172] but it takes on a much greater significance when a non-circumpolar state such as China is introduced into the circumpolar balance of power.

It should, therefore, raise some concern that all four of China's Arctic expeditions have involved research in the Canadian basin of the Arctic Ocean. This is an area that is close to the area highlighted in Figure 18. This is not to suggest that there is a covert intelligence collection aspect to China's Arctic research expeditions. However, this possibility cannot be ruled out. At the very least, it would be in Ottawa's interest to monitor what type of research Beijing is conducting in Canada's offshore areas, and the nature of its possible use.

If Beijing places east coast targets under direct threat of nuclear attack from the Arctic using SSBNs, and if it exploits Canadian waters to do so, Ottawa would be drawn into a conflict between Washington and Beijing. More importantly, it would require that Canada have the capabilities to counter, if not eliminate, any such threat emanating from its waters. Otherwise, this would place Washington in a position of having to act unilaterally. This may result in forces from the United State operating within Canadian claimed areas of responsibility. To be sure, Ottawa may be able to accommodate this situation within existing defence architectures and agreements between Canada and the United States, such as the North American Aerospace Defence Command (NORAD) or other defence agreements. However, Ottawa's response to such a unilateral deployment of American forces would have to be well thought out and carefully implemented.

More importantly, while investments in the Joint Arctic Warfare Training Centre at Resolute Bay, Nunavut, the creation of a deep-water resupply facility in Nanisivik, Nunavut, and the acquisition of A/OPS and long-range patrol aircraft will provide the Canadian Forces with more robust Arctic capabilities, they are not sufficient in preventing the exploitive use of the Arctic by non-circumpolar states in the above-noted scenario. Regardless of the likelihood of that scenario, the arrival of a major non-circumpolar power in the Arctic brings with it significant strategic challenges. At a minimum, circumpolar states such as Canada must now think about the circumpolar region in geostrategic terms.

[172] In large part, this is because all circumpolar states have downplayed concerns about conflicts in the Arctic, and have reiterated that they will work together to maintain peaceful cooperation in the region.

7 Legal Considerations

As a non-circumpolar state, China is faced with several challenges when it comes to influencing events in the Arctic. As one scholar notes: "China is at a distinct disadvantage because it is neither an Arctic littoral state…nor an Arctic Council member state."[173] Nonetheless, this has not deterred China from making statements about its legal 'rights' in the region. Hu's speech while in Norway specifically emphasized Beijing's interest in having circumpolar states recognize the interests of non-Arctic states, such as China, in the region.

There are three concerns with Beijing's claims and interpretations of legal agreements in the Arctic. The first has to do with Beijing's notion that the rights of non-circumpolar states need to be protected in the Arctic. The second has to do with Beijing's notion that certain aspects of the UNCLOS agreement need to be refined and developed due to melting Arctic sea ice. The third has to do with China's interpretation of several UNCLOS articles, and how they might relate to the Arctic. These three issues will be assessed in this section.

7.1 China's "Rights" and the Arctic

China's stance on the Arctic is that it, as a non-circumpolar state, has 'rights' in the Arctic that need to be protected. However, Beijing believes its ability to protect its rights in the Arctic is limited.[174] As a result, Beijing would like to have circumpolar states recognize the interests and rights of non-circumpolar states in the Arctic, and ensure that the Arctic remains accessible to all.

The reality is, however, that this situation already exists. To be sure, it has become common for circumpolar states to regard the Arctic as an area of special stewardship. Canada has been no exception to this. The Canadian government has worked at the international level – including at the Arctic Council – as well as enacting legislation domestically in order to ensure the preservation and protection of the Arctic. The provisions and regulations enacted regulate where and when vessels can enter Canadian Arctic waters; environmental, pollution, and waste compliance regulations; as well as construction and operational safety standards.[175] In effect, the regulations allow the Government of Canada to regulate and enforce shipping standards in fragile Canadian Arctic waters.[176] These provisions do not ascribe to Canada, or any other country, territorial sea rights in areas where territorial sea rights are not recognized. Rather, they allow

[173] Jakobson, "China Prepares for an Ice-Free Arctic," op. cit., 1.
[174] This mostly has to do with the fact that China is neither an Arctic littoral state nor an Arctic Council member state.
[175] See Annex E for a full discussion of Canada's legislative involvement in protecting and regulating the Arctic.
[176] "Canadian Arctic waters" as defined in Section 2 of the *Arctic Waters Pollution Prevention Act* means: "…the internal waters of Canada and the waters of the territorial sea of Canada and the exclusive economic zone of Canada, within the area enclosed by the 60th parallel of north latitude, the 141st meridian of west longitude and the outer limit of the exclusive economic zone; however, where the international boundary between Canada and Greenland is less than 200 nautical miles from the baselines of the territorial sea of Canada, the international boundary shall be substituted for that outer limit." Department of Justice, *Arctic Waters Pollution Prevention Act*, R.S., 1985, A-12 (Ottawa: Minister of Justice, 1985), 2.

Canada to exercise a greater level of control/enforcement in areas where its sea rights are already recognized. In other words, they are not 'extra territorial', they are 'extra regulatory'.

More importantly, China is permitted to enter the Arctic provided it adheres to the various construction standards, environmental protection and waste managements standards, and entrance and transit dates set out by the various legal conventions of circumpolar states. To be sure, these legal conventions do not confer any rights on China, but exactly how China's access to the Arctic is hindered or not guaranteed under these provisions is not clearly articulated or defined by Beijing. In fact, it is entirely plausible that China's rights and access to the Arctic are strengthened under existing domestic and international legal agreements rather than curtailed. It has already been noted that Beijing considers its ability to protect its rights in the Arctic as limited. This is all the more pertinent in the Arctic where Beijing would have to confront powerful circumpolar states such as Russia and the United States.[177] As such, any review or re-negotiation of current domestic or international legal conventions could potentially leave China with fewer access rights to the Arctic than it already has.

7.2 United Nations Convention on the Law of the Sea (UNCLOS)

7.2.1 Article 234: the "Arctic Exception" Provision

China's contention that the UNCLOS agreement needs to be refined is based on the notion that melting Arctic sea ice has made certain articles of the agreement outdated. In other words, environmental events have overtaken the original intent of the document. The problem is that Beijing has made this claim, but not why it believes it to be the case, nor which articles of UNCLOS it believes need updating. It is assumed that one article Beijing is referring to is Article 234, Ice-Covered Areas, otherwise known as the "Arctic exception" provision.

Canada was successful at having the 'Arctic exception' provision included in the UNCLOS agreement.[178] This provision recognizes, at the international level, the jurisdiction of states in ice-covered areas to implement measures relating to shipping, environmental protection, and transportation in the Arctic. Specifically, the 'Arctic exception' provision stipulates:

> Coastal States have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance. Such laws and regulations

[177] Jakobson, "China Prepares for an Ice-Free Arctic," 7.
[178] United Nations, *United Nations Convention on the Law of the Sea*, Article 234. Ice-Covered Areas, http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm (Accessed: August 19, 2010).

> shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific evidence.[179]

While Article 234 notes the presence of sea ice, going as far as to maintain that coastal states can adopt and enforce non-discriminatory laws and regulations where particularly severe climatic conditions exist, Article 234 falls broadly under Part XII of UNCLOS, "Protection and Preservation of the Marine Environment."[180] In other words, while the aim of Article 234 is to protect the fragile marine environment and prevent marine pollution in the Arctic, Part XII of UNCLOS applies to all maritime areas generally, including the Arctic.

Even if the most extreme predictions with regards to climate change turn out to be accurate, the disappearance of Arctic sea ice will not make the Arctic environment any less hazardous, less austere, or less severe. The disappearance of Arctic sea ice does not in and of itself also remove the requirement to preserve and protect the fragile Arctic ecosystem. Pollution of the Arctic marine environment would still cause "major harm" and an "irreversible disturbance of the ecological balance" even in the absence of Arctic sea ice.[181] As a result, there is currently no reason to renegotiate or develop Part XII of UNCLOS.

7.2.2 Other UNCLOS Articles

At the international level, UNCLOS sets out a legal classification system for ocean spaces and establishes the limits of various maritime zones. It regulates all activities in the world's oceans and divides the sea floor and ocean spaces into zones of national and international jurisdiction. This includes a state's 12 nautical-mile territorial sea, 200 nautical mile EEZ, and outer edge of its continental shelf margin.

While the involvement of non-circumpolar states in the Arctic could become a geostrategic concern for circumpolar states, China involvement raises several specific concerns. This primarily has to do with Beijing's interpretation and use of UNCLOS articles and how that might affect its interactions with circumpolar states. In its offshore maritime areas, such as in the South China and East China Seas, China has interpreted various UNCLOS provisions in a manner not consistent with established international law.[182] China has interpreted elements of UNCLOS – such as the definition of drawing baselines; the definition of an island; archipelagic state rights; the delimitation of economic zones; and the right of states to impose navigation restrictions within their territorial waters – in ways that challenge others' understanding of the agreement. This has increased tensions, left room for misunderstandings, and raised the potential for conflict in both the East China and South China Sea.

The concern with some of China's interpretations of UNCLOS is that it is attempting to ascribe itself territorial sea rights in areas where territorial sea rights are not recognized. There are concerns by littoral states in the South China Sea, for instance, that China's drawing of

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[179] *Ibid*.
[180] This allows coastal states the right to adopt and enforce laws and regulations within the limits of their EEZ. *Ibid*., Part XII, Protection and Preservation of the Marine Environment.
[181] *Ibid*., Article 234.
[182] At times, Beijing has even interpreted the same UNCLOS articles differently in both the South China Sea and the East China Sea.

archipelagic baselines around the Paracel Islands – which is not in accordance with UNCLOS – will result in it drawing archipelagic baselines around the Spratly Islands as well. This would run the risk of making vast areas of the South China Sea the territorial waters of China. If China were able to enforce this claim, or treat the region as an area where it exercises preferential rights, it could severely inhibit transit passage and freedom of navigation on the high seas.

The worry for circumpolar states would be if Beijing interprets various articles of UNCLOS in the Arctic in a manner that is not consistent with established international norms. The following list shows a number of UNCLOS articles that China has interpreted in a questionable manner in the South China Sea, and that that may also be applicable in the Arctic:

- Article 2, Legal Status of the Territorial Sea, of Air Space and of its Bed and Subsoil;
- Article 7, Straight Baselines;
- Article 19, Meaning of Innocent Passage;
- Article 22, Sea Lanes and Traffic Separation Schemes in the Territorial Sea;
- Article 33, Contiguous Zone;
- Article 47, Archipelagic Baselines;
- Article 76 (5), Definition of the Continental Shelf;
- Article 77, Rights of the Coastal State Over the Continental Shelf;
- Article 78, Legal Status of the Superjacent Waters and Air Space and the Rights and Freedoms of Other States;
- Article 89, Invalidity of Claims of Sovereignty Over the High Seas; and
- Article 121, Regime of Islands.

This is not to suggest that Beijing will indeed interpret and utilize UNCLOS articles to further its interests in the Arctic. It is even less clear if these articles would even come in to play in the Arctic. However, what is also apparent is that circumpolar states are unaware of Beijing's interpretation of articles that are clearly applicable to the Arctic. As noted, Article 234 of the UNCLOS establishes the right of Arctic littoral states to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction, and control of marine pollution in ice-covered areas.[183] While this interpretation is fairly common for circumpolar states, there has been no indication from Beijing as to how it interprets Article 234.

Therefore, in light of Beijing's previous interpretations and uses of UNCLOS articles in its offshore maritime areas, there is little reason to believe it would not utilize UNCLOS articles for pursuing its own interests in the Arctic. Consequently, the likelihood for legal challenges, misunderstandings, disagreement, and at worst, conflict in the Arctic region cannot be ruled out over the longer term.

[183] UNCLOS, Article 234.

7.2.3 Access to and Exploitation of Arctic Fishing Grounds

Changes in the fishing industry and access to fish stocks is one example of the type of disagreement Canada could face in the Arctic vis-à-vis China. Current research suggests that climate change, shrinking Arctic sea ice, and overfishing may facilitate changes in the fishing industry. According to the World Trade Organization (WTO), China is the second largest importer of food in East/Southeast Asia, and fourth largest in the world.[184] Consequently, fisheries in China's offshore areas are an important form of economic activity and food security.

The South China Sea, for example, is known to be rich in fish stocks, and in many cases provides a relatively cheap source of protein.[185] The South China Sea accomplishes this from the abundant supplies of numerous fish species contained in its waters. Fishing in the South China Sea constitutes 23 percent of the total catch in Asia, and 10 percent of the total catch of all fisheries worldwide.[186] In the Spratly Islands alone, there are 314 fish species, of which 66 are commercially significant stocks.[187] One report notes that for every square kilometer of Spratly Islands water area, there are approximately 7.5 tons of harvestable fish.[188] Since the region also straddles the path of yellow fin tuna migration, it accounts for at least eight percent of the world's yellow fin tuna catch.[189]

Thus, fishing is a major industry for littoral states in that region. However, fishing in some areas has become extremely contentious. Countries such as China, the Philippines, and Vietnam, have all scrambled to occupy islands in the region to capture and exploit these resources. This has also resulted in fishermen being involved in several incidents and clashes, as littoral states position themselves for greater control of regional resources. A review of the incidents in the South China Sea alone suggests that fishermen are on the front line.[190] Many of the incidents in the South China Sea involve alleged incursions by one state's fishermen into the fishing areas of another state. Of the 36 incidents since 1971, 14 have involve fishermen and/or disputes over fishing rights. With a potential for 7.5 tons of fish to be harvested in every square kilometer of Spratly Islands water area, states in the region are not averse to using force to protect and enforce their claims. States in the region are not even averse to overfishing the fish stocks for financial and/or economic gain.

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[184] World Trade Organization, "Table II.20. Leading Exporters and Importers of Food, 2007," *International Trade Statistics 2008* (Geneva: WTO Publications), 56.
[185] It is estimated that the South China Sea provides up to 25 percent of the protein needs for over 500 million people in the region. Snyder, *Confidence Building Measures in the South China Sea*, op. cit., 19.
[186] C.Y. Chin, "Potential for Conflict in the Spratly Islands," (Submitted in partial fulfillment of the requirements for the degree of Master of Arts in Security Studies, Monterey, California: Naval Postgraduate School, 2003), 31.
[187] This was reported in a briefing paper by the Philippine Office of Strategic and Special Studies of the Armed Forces of the Philippines, as quoted in C.C. Joyner, "The Spratly Island Dispute in the South China Sea: Problems, Policies, and Prospects for Diplomatic Accommodation," in *Investigating Confidence Building Measures in the Asia Pacific Region*, Report No. 28, ed. R. Singh (Washington, D.C.: Henry L. Stimson Center, 1999), 67.
[188] The Spratly Islands cover approximately 410,000 square kilometers. *Ibid*.
[189] Chin, "Potential for Conflict in the Spratly Islands," 31.
[190] For a full list, description, and discussion of the disputes in the South China Sea, see K.D. Christensen, *The South China Sea: Its Importance in the Future Security Environment and China's Claims in the Region*, DRDC CORA TM 2009-35 (Ottawa: Defence R&D – CORA, 2009).

Compounding these territorial challenges, a United Nations Environment Programme (UNEP) report notes that at least three quarters of the world's key fishing grounds, including those in the East and South China Seas, may become severely and negatively affected by overfishing and climate change.[191] These regional and environmental pressures may require fishermen to relocate and exploit fish stocks further north. A warming Arctic brings with it the potential of opening up new fisheries in remote parts of the Arctic usually covered by ice for much of the year. According to one official, as the climate changes and ice recedes, one should expect and anticipate major commercial fisheries to open north of the Bering Strait, in the Barents Sea, and the Beaufort/Chukchi Sea regions.[192]

The theory, then, is that higher ocean temperatures will cause the northward migration of some fish and shellfish species, as well as a change in their migration habits. There may also be an expansion of their feeding areas and increased growth rates. In some regions, local diversity is projected to increase as new species migrate northward. However, rising temperatures will likely exceed the tolerance level of native species. The end result will be a decrease of species diversity.[193] In general, the species added to the Arctic will be from lower latitudes, while those lost will be from northern latitudes.

The problem, however, is that Arctic waters are already subject to significant amounts of illegal, unreported and unregulated (IUU) fishing. According to a World Wildlife Fund (WWF) report, about 70 percent of the world's total whitefish supply comes from Arctic waters.[194] The combined catch of Atlantic cod and Alaska pollock, which makes up 20-30 percent of the global whitefish supply, is exported mostly to international markets. As a result, IUU fishing in the Arctic has been an increasing issue for circumpolar states for a number of years. According to a recent report by *Polar Biology*, the amount of fish caught in the Arctic has been has been dramatically under-reported for decades, making the Arctic appear more pristine than it really is.[195] In another similar example, in the late 1980s, vessels from China, Japan, Poland, Russia, South Korea, Spain, the US, and other nations, officially caught more than 1,400,000 tonnes of pollock from a region known as the "Donut Hole."[196] The fishery collapsed in 1992, was

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[191] See C. Nellemann, S. Hain, and J. Alder, eds., *In Dead Water: Merging of Climate Change with Pollution, Overharvest, and Infestations in the World's Fishing Grounds*, Rapid Response Assessment (Norway: United Nations Environment Programme, 2008).

[192] Statement by D.A. Balton, Deputy Assistant Secretary for Oceans and Fisheries in the Bureau of Oceans and International Environmental and Scientific Affairs, United States Department of State. Canada.com, "B.C. Important Base in Drift-Nets Search," *The Vancouver Sun*, April 18, 2008, http://www.canada.com/vancouversun/news/story.html?id=4827c435-0f17-435b-baa5-4a867b862fa5&k=67431 (Accessed: January 12, 2010).

[193] Green Facts, *Scientific Facts on Arctic Climate Change*, http://www.greenfacts.org/en/arctic-climate-change/l-3/8-regional-changes.htm (Accessed: December 12, 2009).

[194] World Wildlife Fund, *Illegal Fishing in Arctic Waters: Catch of Today – Gone Tomorrow?* (Oslo, Norway: WWF International Arctic Programme, 2008), iv.

[195] D. Zeller et al., "Arctic Fisheries Catches in Russia, USA, and Canada: Baselines for Neglected Ecosystems," *Polar Biology* 34 (2011): doi:10.1007/s00300-010-0952-3.

[196] The "Donut Hole" was a fishery in the Central Bering Sea outside the EEZ of both Russia and the US, and was rich in pollock. While it was not an Arctic waters fishery, it is symptomatic of what could happen to Arctic fish stocks if the sea ice recedes, and IUU fishing outside the EEZ of the circumpolar states occurs.

subsequently closed under the Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea in 1994, and has yet to recover.[197]

Cooperation between circumpolar states to manage fishing in northern waters has been increasing for several years. Cooperation between Norway and Russia in the Barents Sea region, and between Canada and the US serve as good examples. However, the challenge will be to contend with outside actors who have economic interests in northern fishing stocks. China, for instance, emerged as a major seafood processor in the 1990s. China became the main supplier of whitefish to the world's largest seafood consumer, the European Union. By 2006, China's processing capacity was supplying the EU with 58 percent of its Alaska pollock fillets, and 42 percent of its cod fillets.[198] This increase in processing capacity has greatly expanded the global marked for frozen, unprocessed fish, and has affected the global demand for whitefish, which will ultimately affect northern fish stocks.

In the final analysis, it is difficult to predict the direct impact that climate change will have on the fisheries industry because numerous other factors are involved. For instance, fisheries policies, market demands, prices, harvesting practices, and technologies may all affect fisheries. In addition, states such as China may interpret and implement various articles of UNCLOS in a manner that is not consistent with established international law, and that would advance its interests in the region. Therefore, the ability of Arctic to withstand increased IUU fishing by non-circumpolar states is limited. As a result, circumpolar states may be required to act sooner rather than later to protect their northern fisheries.[199] If Arctic states do not act quickly to protect their waters, rogue fishermen from other countries may begin unregulated fishing in waters that are already overfished.

7.3 Domestic Arctic Related Legislation

Another concern is that Beijing may not only interpret UNCLOS articles in a non-conventional fashion, but that it may interpret various pieces of domestic legislation in a non-conventional fashion as well. For example, vessel operators in the Arctic are subject to a variety of additional legal frameworks, provisions, and regulations that are monitored and enforced by various departments and agencies in Canada.

The *Canada Shipping Act, 2001*, for example, is the principal legal framework governing safety of marine transportation in Canada.[200] It applies to all Canadian vessels operating in Canadian waters, as well as to all foreign vessels entering Canadian waters. It applies to everything ranging

[197] A committee consisting of at least one representative from each of the six signatory parties (China, Japan, Poland, Russia, South Korea, and the US) meets each year to discuss the fishery. The moratorium that was put in place in 1992 has not been lifted because pollock levels have yet to return to sustainable levels.
[198] Total Chinese export of fillets reached 715,000 tonnes in 2005. World Wildlife Fund, *Illegal Fishing in Arctic Waters*, 20.
[199] Canada.com, "B.C. Important Base in Drift-Nets Search."
[200] Department of Justice, *Canada Shipping Act, 2001*, S.C., 2001, c. 26 (Ottawa: Minister of Justice, 2009).

from canoes and kayaks to cruise ships and tankers.[201] In addition, other provisions and regulations such as the *Arctic Shipping Pollution Prevention Regulations* and the *Arctic Waters Pollution Prevention Act* allow the Government of Canada to regulate, control, and enforce environmental, pollution, waste, and shipping standards in Canadian Arctic waters to an extent not normally found in other maritime areas. In effect, they generally view the Arctic as a fragile ecosystem.[202]

The quandary for Ottawa is that there has been no indication from Beijing as to how it interprets these various pieces of legislation. Not only do differences of interpretation when it comes to constructions standards or piloting requirements potentially threaten the Arctic ecosystem, but the absence of clarity on these issues increases the potential for disagreement between Ottawa and Beijing.

Most importantly, differences of interpretation over regulations outlined in the *Oceans Act*, where Canada has outlined the drawing of straight baselines around its Arctic Archipelago, is an area where disagreement between Ottawa and Beijing may also occur.[203] Straight baselines are measured from the low-water mark along the coast, islands, rocks, and even low-tide elevations as indicated on large-scale charts officially recognized by the coastal state. All maritime areas on the seaward side of the baseline are considered "offshore," while all maritime areas on the landward side of the baseline are considered "internal waters." There has been no indication from Beijing as to how it interprets Canada's drawing of straight baselines.[204] If it disagrees with Canada's drawing of straight baselines around the Arctic Archipelago, or other regulations stipulated in the *Oceans Act*, there would be a probable disagreement between Ottawa and Beijing.

7.4 Likelihood of Potential Legal Challenges in the Arctic

Disagreements between circumpolar states have generally been resolved or dealt with in a diplomatic and cooperative fashion.[205] In Ottawa's disagreement with Washington over the status

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[201] Amongst other things, the *Canadian Shipping Act* covers shipping/boating safety; the protection of the marine environment; a shift from an "inspection-based regime" to a "compliance-based" regime; new methods of punishment and enforcement; administrative monetary penalties/regulations; personnel regulations; the prevention of pollution from ships; and environmental response regulations.

[202] The *Arctic Shipping Pollution Prevention Regulations*, for instance, contain fuel and water requirements (i.e., is there enough of both on board before a vessel enters/transits a zone?) for ships operating in the Arctic. The *Arctic Waters Pollution Prevention Act* places mandatory standards for construction, manning, piloting, navigation, environmental protection, and icebreaking assistance for vessels operating in the Arctic.

[203] Department of Justice, *Oceans Act*, S.C., 1996, c. 31 (Ottawa: Minister of Justice, 1996), 4.

[204] Currently, the United States and European Union disagree with Canada's drawing of straight baselines around the Arctic Archipelago.

[205] According to Huebert, all Arctic states have proclaimed that they intend to work together to maintain peaceful cooperation in the region. The best example of this cooperative diplomatic framework is the Ilulissat Declaration signed in Ilulissat, Greenland by Canada, Denmark (Greenland), Norway, Russia, and the United States on May 28, 2008. The chief goals of the Ilulissat Declaration are the blockage of any "new comprehensive international legal regime to govern the Arctic Ocean," and a pledge for the "the orderly settlement of any possible overlapping claims" in the Arctic. Danish Minister for Foreign Affairs, *The Ilulissat Declaration of the Five Arctic States* (Ilulissat, Greenland: Arctic Ocean Conference, 2008),

of the Northwest Passage in 1985, for instance, Canada and the United States resolved to preserve their respective positions on the issue while permitting cooperation on the use and transit of the Northwest Passage.[206] In the signing the 1988 Arctic Cooperation Agreement, nothing prejudices either the United States' position – including submarine operations – in the Arctic, or Canada's position concerning the status of the Northwest Passage or Canada's sovereignty claim over those waters.

The issue for Ottawa and other circumpolar states is that non-circumpolar states such as China may not be so accommodating, and will exacerbate legal disagreements in the Arctic to pursue their own interests in the region. As such, Beijing may determine at some point that it is in its interest to challenge Canada's position concerning the status of the Northwest Passage, or Ottawa's drawing of straight baselines around its Arctic archipelago. The exploitive use of the Arctic in this scenario may be a way or method for China to ensure that it is not forced into a passive position in the Arctic; that it secures its 'rights' and access to the Arctic; and strengthens its position as an important actor in the development of Arctic affairs.

As it currently stands, it appears unlikely that Beijing will actively exacerbate legal disagreements and maritime disputes between circumpolar states. Its interest in the Arctic appears to be focused primarily on the climatic, environmental, and commercial consequences of melting Arctic sea ice. However, it bears recalling that one of the research areas highlighted by the Arctic Issues Research project, commissioned by the CCP Central Committee in 2007, was Arctic law.[207] David Curtis Wright of the University of Calgary also contends that China will, "in principle," respect the territorial sovereignty of circumpolar states, and their 200 nautical mile EEZ, "but will likely oppose, dispute, or decry extended continental shelf claims," including Canadian and Russian claims to sovereignty over Arctic transit routes.[208]

As such, it is clear that Beijing is at least assessing the Arctic from a strategic and legal point of view. Beijing appears to be more sanguine about creating a comprehensive Arctic Treaty that would iron out inconsistencies between different pieces of Arctic legislation,[209] or even see the creation of a Svalbard type treaty that would resolve controversies over the legal status of Arctic sea areas.[210] While the feasibility of such an Arctic-wide treaty may be questionable, at a minimum, Beijing's legal assessments would seem likely aimed at advancing its interests in the Arctic in terms of access to fish stocks and other natural resources.

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http://www.oceanlaw.org/downloads/arctic/Ilulissat_Declaration.pdf (Accessed: May 3, 2010).; and Huebert, *The Newly Emerging Arctic Security Environment*, op. cit., 1 and 22.

[206] Canado-American Treaties, *Agreement Between the Government of Canada and the Government of the United States of America on Arctic Cooperation*, CTS 1988/29, http://www.lexum.umontreal.ca/ca_us/en/cts.1988.29.en.html#Section_1 (Accessed: December 8, 2009).

[207] Jakobson, "China Prepares for an Ice-Free Arctic," op. cit., 5.

[208] D.C. Wright, *The Panda Bear Readies to Meet the Polar Bear: China and Canada's Arctic Sovereignty Challenge* (Calgary: Canadian Defence & Foreign Affairs Institute, 2011), 2.

[209] Wright notes that Mei Hong and Wang Zengzhen of the School of Law and Political Science at the Ocean University of China, Qingdao, highlight the Svalbard Treaty and UNCLOS as an example of where inconsistency between two treaties can be a problematic obstacle and source of disagreement. *Ibid*.

[210] The Svalbard Treaty of 1920 recognises the full and absolute sovereignty of Norway over the arctic archipelago of Svalbard. The exercise of sovereignty is, however, subject to certain stipulations. For instance, all signatories are given equal rights to engage in commercial activities (mainly coal mining and fishing) on the islands. Originally, there were 14 signatory parties, now there are over 40.

It is the finding of this study that investments in the Joint Arctic Warfare Training Centre at Resolute Bay, the creation of a deep-water resupply facility in Nanisivik, and the acquisition of A/OPS and long-range patrol aircraft, are only somewhat effective at preventing the exploitive use of the Arctic by a non-circumpolar state. The utility of these capabilities in the face of potential legal disagreements and challenges appears to be limited. Therefore, it is in the interest of circumpolar states – in particular Canada in this case – to assess the impact that various legal and maritime disputes in the Arctic may have on the region.

8 Analysis and Conclusion

The Arctic region appears to be growing in strategic significance. The reason for the region's increasing significance has to do with the potential impact of climate change. Climate change is by far the single greatest driver for potential increased activity, exploration, and exploitation in the Arctic. This is because the continuation or abatement of climate change has the potential to influence the degree, prevalence, and likelihood of other changes, challenges, threats, and opportunities faced by Arctic states.

The typical assumption is that climate change will result in diminishing Arctic sea ice and a corresponding increase in accessibility and exploitation of the Arctic. This mostly has to do with the extraction of Arctic natural resources, particularly hydrocarbons, and the commercial potential that can be achieved if circumpolar transit routes become reliably navigable. This increased accessibility will bring with it a variety of challenges that circumpolar states, such as Canada, will be required to respond to in the future. As a result, Arctic states are expressing a desire to take the necessary steps to defend their interests in the Arctic if required, and have begun to rebuild their military forces and capabilities in order to do so.

Part of the reason for rebuilding Arctic military capabilities involves a certain degree of anxiety among circumpolar states over the intentions of other circumpolar states. However, there are also concerns about the long-term intentions of non-circumpolar states as well,[211] and the non-circumpolar state that has the greatest potential to affect the geostrategic architecture of the Arctic is China. In fact, the arrival of a major non-circumpolar state in the region marks the first time in the contemporary period that a non-circumpolar power may be involved, at a significant level, in the potential makeup and maintenance of the geostrategic architecture of the Arctic. This has enormous implications for Arctic states and the region as a whole.

To date, Chinese decision makers have advocated taking a cautious approach to their involvement in the Arctic, largely for fear of causing alarm among circumpolar states. China is well aware that its size and its position as a rising major power may provoke concerns in other states. However, getting a clear statement from Beijing concerning its interests and aims in the Arctic has been somewhat challenging. As noted, Hu's comments while in Norway forms one of the most comprehensive official statements of China's thinking on the Arctic.[212] While Hu's statements were reassuring, they offered insight into some areas for concern. For instance, Hu stressed that Beijing would like to see circumpolar states recognize the interests of non-circumpolar states, such as China, in the Arctic.

Additionally, China is well aware that it has growing global interests that need to be protected, and the Arctic is no exception. Beijing therefore has been increasingly thinking about the Arctic in strategic terms. Of the ten areas of research identified by the Arctic Issues Research project in 2007, nine are strategically oriented. In other words, they can be geared toward maximizing China's position in the Arctic vis-à-vis the various circumpolar states.

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[211] Huebert, *The Newly Emerging Arctic Security Environment*, 23.
[212] Information from Jakobson, "China Prepares for an Ice-Free Arctic," 9-10.

The release of the 12th Five-Year Plan on March 14, 2011, and the upcoming leadership change in 2012, will signify the most important developments in China in terms of determining China's future interests and aspirations in the Arctic. The recognition of "polar regions" in China's most recent national Defence White Paper suggests that Chinese officials are already attributing an increased level of importance to the Arctic from a security and defence perspective.

The issue for circumpolar states will be to gauge whether the remarks made by academics, researchers, and other officials are a reflection of the broad ambitions shared by China's leaders. This is because the remarks made by academics and other officials appear to be aimed at influencing discussions in China about its level of involvement in the Arctic, and about how best to position itself in the region in the future. If circumpolar states are unprepared, the outcome of these developments have the potential to create and/or alter security challenges in the region.

Beijing has also been active in developing Arctic capabilities. China already has one of the largest polar scientific research programs in the world – larger than many of the circumpolar states. Beijing operates the world's largest (non-nuclear) icebreaker, and its embassy in Reykjavik is the largest embassy in the capital. In addition to the four research expeditions it has conducted to the Arctic, and the permanent Arctic research station it has opened in Ny-Ålesund, China has organized 26 expeditions to the Antarctic and established three research stations on the Antarctic continent. Beijing is also completing construction of a permanent Arctic research and simulation facility in Shanghai.

While Beijing has articulated an interest in the Arctic, less clear is exactly what its overall agenda or strategy for the region will be.[213] As a result, determining China's Arctic policy, and China's exact thoughts on the Arctic has been somewhat challenging for circumpolar analysts. Due to the nature of China's system of government, its message(s) with regards to the Arctic has indeed been scripted, deliberate, consistent, and in typical Chinese fashion, sufficiently ambiguous on key points. Despite Beijing's proclamation that its interests in the Arctic remains focussed on the climatic, environmental, and commercial consequences of melting Arctic sea ice, in the absence of a clearly articulated Arctic strategy, and transparency on issues of mutual concern, circumpolar states will have to approach China's interests in the Arctic with a degree of caution.

This research paper assessed two scenarios – Beijing's potential exploitive use of the Arctic for geostrategic purposes, and its interpretation and use of international laws and agreements – to highlight the potential exploitive use of the Arctic by a non-circumpolar state. This method is utilized because it illustrates potential areas of concern related to China's involvement in the Arctic.

In the first scenario, it is the finding of this research paper that in extreme circumstances a state could exploit the Arctic for geostrategic advantage. Specifically, Beijing may develop a strategy that considers the Arctic a geostrategic operational region for SSBN operations. China's current strategic force modernization appears aimed at creating a more flexible nuclear deterrent/response. The successful deployment of the JL-2 aboard the new Type 094 *Jin*-class SSBN will make China's nuclear deterrence force more robust, more responsive, and less

[213] While the release of the 12th Five-Year Plan in March 2011 included a commitment to continue polar and oceanic scientific investigation activities, it will probably not be until after the leadership change in 2012 that China's Arctic research interests will become clear.

vulnerable. With this added flexibility, Beijing may opt to open up and exploit a strategic flank in the Arctic in a crisis with Washington, and/or create options and freedom of action in the pursuit of strategic objectives elsewhere. Taken together, these may entice Beijing to develop a limited nuclear war-fighting strategy that would involve exploiting the Arctic.

It has been noted that this scenario is most unlikely for a variety of strategic, technical, operational, and political reasons. However, the issue is not so much about the likelihood of China using the Arctic as a geostrategic operational area, but rather about the ability of circumpolar states to prevent the exploitive use of the Arctic by a non-circumpolar state. To be sure, China's current Arctic research activities remain focussed primarily on the climatic and environmental consequences of melting Arctic sea ice from a commercial perspective. However, there is a fine line between conducting research and acquiring intelligence. The dual use nature of such information makes determining their intended use difficult to assess from a security and defence planning point of view.

In the second scenario, China's interpretation and use of international laws and agreements, such as UNCLOS, is a potential area for concern, disagreement, and dispute. The concern for circumpolar states is that Beijing's interpretation and use of UNCLOS articles may create disagreements and disputes in the Arctic in much the same way that China's interpretation and use of UNCLOS articles in the East China and South China Seas has generated disagreements and disputes.

The outcome could range from minor diplomatic disagreements between Beijing and various circumpolar states, to direct legal challenges, to outright legal disputes occurring in the Arctic. In a worst-case scenario, Beijing may interpret various UNCLOS articles in such a way as to ascribe itself certain rights in areas where these rights are not traditionally recognized. Although legal disagreements and disputes have already occurred between circumpolar states (between Canada and Denmark over Hans Island, for example), this would be the first time in history that disagreement occurred between a non-circumpolar state and circumpolar state in the Arctic. The strategic effect that this would have could be enormous.

In the final analysis, the arrival of a major non-circumpolar power in the Arctic brings with it significant strategic challenges. Whether Beijing exacerbates legal disagreements in the Arctic to facilitate its interests, or utilizes the Arctic as a strategic operational area to place Washington under threat, Arctic states are now required to think about the circumpolar region in geostrategic terms.

8.1 Implications for Canada as a Circumpolar State

From a strategic planning perspective, the mission of the Canadian Forces is to remain relevant, effective, and valued in the attainment of Canada's national policy objectives not only internationally but domestically as well, and that includes in the Arctic. This requires that the Canadian Forces plan, generate, and maintain the combat forces required to meet Canada's current and future defence objectives. With growing evidence that the Arctic is becoming more accessible, potentially more exploited, and more active to shipping of all types, it is expected that the operations and deployments of the Canadian Forces will increase in scope, duration, and tempo in the future.

In the future, the involvement of a major non-circumpolar power such as China raises several special concerns and fundamentally alters the geostrategic architecture of the Arctic. The concern for Canada is whether it has the capabilities to prevent the exploitive use of its Arctic archipelago by non-circumpolar states. If Beijing's intentions are to create time, space, and freedom of action to pursue strategic objectives elsewhere, it may also be in Beijing's interest to exploit the geography of a country that would offer it the best chances of allowing it to implement and maximize its nuclear deterrent capability. Thus, does Canada's geography and perceived lack of capabilities in the Arctic, compared to Russia and the United States, draw non-circumpolar actors into Canadian waters rather than deter them?

Planned investments in new capabilities such as a the Joint Arctic Warfare Training Centre at Resolute Bay, the acquisition of long-range patrol aircraft, and the expansion and modernization of the Canadian Rangers, will provide the military with a presence and surveillance capability in assisting with search and rescue in remote, isolated, coastal communities in the Arctic. Establishing a deep-water berthing, resupply, and fueling facility in Nanisivik, and investing in new A/OPS capable of sustained operations in first-year ice will facilitate the Canadian Navy's ability to patrol the length of the Northwest Passage during the navigable season. In addition, *Polar Epsilon*, the Department of National Defence's space-based wide area surveillance and support program, will use RADARSAT 2 to provide the Canadian Forces with greater capacity to monitor Canada's northern maritime boundary.[214]

Whether these capabilities are effective at addressing the potential security challenges envisaged in the preceding sections depends on the nature of the threat. In other words, these capabilities are only somewhat more effective in a situation where Beijing tries to exacerbate legal disagreements in the Arctic than if Beijing were to utilize the Arctic as a strategic operational area for SSBN operations. In the latter scenario, a clear ASW capability would be essential.

Therefore, it is the finding of this paper that the Canadian Forces should maintain its multi-purpose combat capabilities, and that an effective Arctic ASW capability should be developed in order to influence events that may challenge Canada's sovereignty. A versatile and flexible military that can respond to challenges across a spectrum of non-combat and combat roles, including in the underwater environment, will serve the Canadian government best in addressing the challenges envisaged in the Arctic as non-circumpolar states enter the region. In addition, circumpolar states, including Canada, must think about the Arctic as a strategic region. Operations in the Arctic are not all about monitoring economic activities, protecting hydrocarbon reserves, or preventing environmental pollution. They may increasingly becoming more about limiting the exploitive use of the Arctic by non-circumpolar states.

8.2 Conclusion

As it currently stands, China's involvement in the Arctic is focused on the scientific, environmental, and climatic consequences of melting sea ice. However, it is also interested in the economic and commercial benefits of an ice-free Arctic. Thus, one can expect that Beijing will

[214] Department of National Defence, *Polar Epsilon*, Project Charter, Project #: 625, Version 4.0 (Ottawa: Chief of Force Development, 2008).; and Department of National Defence, *Radarsat 2: Ground Moving Target Identification Technology Demonstration Project*, Project Charter, Project #: 15EG, Version 2.0 (Ottawa: ADM (S&T) and Deputy Chief of the Defence Staff, 2003).

continually reaffirm its rights in the Arctic, including that these rights need to be protected, and persist in arguing that the region should be accessible to all, regardless of whether or not they are a circumpolar state. The aim of this will be to ensure that Beijing is not forced into a passive position in the Arctic; that it is active in the management of Arctic affairs; and that it retains access to the Arctic.

That being said, it is also clear that Beijing is assessing the Arctic from a strategic perspective. Thinking about the Arctic in strategic terms is a fundamental first step from a force planning and operational readiness point of view. Therefore, it is in the interest of all circumpolar states to assess the impact that various strategic challenges in the Arctic may have on the wider circumpolar region. While it is more probable that a non-circumpolar state will exacerbate legal disagreements in the Arctic rather than utilize it for strategic operational reasons, the concern for circumpolar states is that non-circumpolar states such as China may not be so accommodating, and will exacerbate legal disagreements and strategic opportunities in the Arctic in order to advance their interests elsewhere.

Annex A World's Busiest Ports, 2008-2009

Table 2 World's Busiest Ports, 2008-2009[215]

	PORT CALLS (Number of Calls)			TOTAL CARGO VOLUME (Thousands of Tonnes)			CONTAINER TRAFFIC (Twenty-Foot Equivalent Container Units – TEUs)		
Rank	***Port***	***Country***	***Calls***	***Port***	***Country***	***Tonnes***	***Port***	***Country***	***TEUs***
1	Singapore	–	67,889	Singapore	–	515,415	Singapore	–	29,918,200
2	Rotterdam	Netherlands	28,907	Shanghai	China	508,000	Shanghai	China	28,006,400
3	Hong Kong	China	26,405	Rotterdam	Netherlands	421,136	Hong Kong	China	24,494,229
4	Busan	South Korea	23,448	Tianjin	China	365,163	Shenzhen	China	21,416,400
5	Shanghai	China	19,443	Ningbo	China	361,850	Los Angeles/Long Beach	USA	14,200,110
6	Kaohsiung	Taiwan	16,077	Guangzhou	China	347,000	Busan	South Korea	13,445,693
7	Antwerp	Belgium	13,761	Qingdao	China	278,271	Dubai Ports	UAE	11,827,299
8	Hamburg	Germany	11,825	Hong Kong	China	259,402	Ningbo	China	11,226,000
9	Yokohama	Japan	11,752	Qinhuangdao	China	252,000	Guangzhou	China	11,001,400

[215] American Association of Port Authorities, "World Port Rankings, 2008," *Port Industry Information*, http://aapa.files.cms-plus.com/Statistics/WORLD%20PORT%20RANKINGS%2020081.pdf (Accessed: February 10, 2010).; and Lloyd's MIU, "Top 20 Ports – Number of Port Calls for 2009," op. cit.

10	Jakarta	Indonesia	11,525	Dalian	China	246,000	Rotterdam	Netherlands	10,783,825
11	Port Kelang	Malaysia	11,057	Busan	South Korea	241,683	Qingdao	China	10,024,400
12	Fujairah Anchorage	UAE	10,973	Nagoya	Japan	218,130	Hamburg	Germany	9,737,110
13	Ulsan	South Korea	10,955	Shenzhen	China	211,000	Kaohsiung	Taiwan	9,676,554
14	Algeciras	Spain	10,706	South Louisiana	USA	203,157	Antwerp	Belgium	8,662,891
15	Incheon	South Korea	9,322	Houston	USA	192,473	Tianjin	China	8,502,700
16	Jabel Ali	Dubai	9,189	Antwerp	Belgium	189,390	Port Kelang	Malaysia	7,937,579
17	Qingdao	China	8,806	Ulsan	South Korea	170,279	Bremen/ Bremerhaven	Germany	5,448,189
18	Barcelona	Spain	8,670	Chiba	Japan	165,143	Tanjung Pelepas	Malaysia	5,466,191
19	Surabaya	Indonesia	8,559	Port Hedland	Australia	159,391	New York/New Jersey	USA	5,265,058
20	Nagoya	Japan	8,032	Port Kelang	Malaysia	152,348	Laem Chabang	Thailand	5,128,057

Annex B Distances Between Major International Ports

Table 3 highlights some of the specific transit time/distance savings that could be achieved if Arctic shipping routes become consistently and reliably navigable for a significant portion of the year.

Table 3 Distances Between Major Ports (International)[216]

ROTTERDAM TO SHANGHAI	
• ***via Northern Sea Route***	14,556 kilometers (9,044 miles)
• ***via Northwest Passage***	16,278 kilometers (10,115 miles)
• ***via Suez Canal***	20,004 kilometers (12,430 miles)
• ***via Panama Canal***	25,488 kilometers (15,838 miles)
• ***via Cape of Good Hope***	25,905 kilometers (16,096 miles)
• ***via Cape Horn***	31,867 kilometers (19,801 miles)
NEW YORK TO SHANGHAI	
• ***via Northwest Passage***	16,107 kilometers (10,047 miles)
• ***via Northern Sea Route***	19,551 kilometers (12,148 miles)
• ***via Panama Canal***	20,578 kilometers (12,787 miles)
• ***via Suez Canal***	23,350 kilometers (14,509 miles)
• ***via Cape of Good Hope***	27,727 kilometers (17,229 miles)
• ***via Cape Horn***	32,397 kilometers (20,130 miles)
VANCOUVER TO ROTTERDAM	
• ***via Northwest Passage***	13,725 kilometers (8,528 miles)
• ***via Panama Canal***	16,705 kilometers (10,380 miles)
• ***via Suez Canal***	29,804 kilometers (18,519 miles)
LOS ANGELES TO ROTTERDAM	
• ***via Panama Canal***	14,644 kilometers (9,099 miles)
• ***via Northwest Passage***	14,920 kilometers (9,271 miles)
• ***via Suez Canal***	30,799 kilometers (19,137 miles)
LONDON TO TOKYO	
• ***via Northern Sea Route***	12,937 kilometers (8,038 miles)
• ***via Northwest Passage***	14,371 kilometers (8,930 miles)
• ***via Suez Canal***	21,049 kilometers (13,079 miles)
• ***via Panama Canal***	23,486 kilometers (14,539 miles)

[216] Northwest Passage transits determined using the Baffin Bay, Lancaster Sound, Barrow Strait, Viscount Melville Sound, Prince of Wales Strait, Amundsen Gulf, Beaufort Sea route. All distances derived from Google Earth, *Google Earth*, op. cit.

ROTTERDAM TO TOKYO	
• ***via Northern Sea Route***	12,669 kilometers (7,871 miles)
• ***via Suez Canal***	22,313 kilometers (13,865 miles)
• ***via Panama Canal***	23,741 kilometers (14,503 miles)
• ***via Cape of Good Hope***	27,027 kilometers (16,794 miles)

■ Significant Savings

■ Similar Distance

■ Significantly Longer

Annex C Chronology of Chinese Polar Activities

- 1925: China signed the Svalbard Treaty, which stipulates that citizens of all signatories are entitled to free access to the Svalbard Islands within the Arctic Circle.
- 1950: Gao Shiliu, a Chinese student at the University of Toronto went to the Arctic region to do scientific research. In the following year, he reached the magnetic pole, becoming the first Chinese citizen to reach this location.
- 1958: Li Nan, a Xinhua News Agency correspondent, went to the Arctic to interview a group of Soviet scientists, and became the first Chinese citizen to reach the North Pole.
- 1972: China established an embassy in Reykjavik, Iceland, and assigned its first resident ambassador to the island.
- 1979: China's first quasi-polar research vessel, *Xiangyanghong 10*, was officially delivered.
- 1984: China became officially involved in polar research in 1984, when it conducted its first polar research expedition to Antarctica. Since 1984, China has not only organized 23 expeditions to the Antarctic, but it has established three research stations on the continent.
- 1985: China's first Antarctic research station, the Great Wall Station, located at King George Island, west Antarctica, was established in February 1985. The *Xiangyanghong 10* , which was used for only this mission, assisted in the building of the station.
- 1985: China purchased its first ice-going vessel, *Jidi*, from Finland.
- 1989: China's second Antarctic research station, Zhongshan (Sun Yat-Sen) Station, was set up in January. It is situated on the Larsemann Hills in east Antarctica.
- 1993: China purchased the *Xuelong* from Ukraine.
- 1994: *Jidi* completed it last research cruise and was retired from active service. China also began conducting polar research expeditions aboard the research vessel *Xuelong*. It remains in active service.
- 1995: With non-government financial backing, CAST set up an Arctic expedition team with the participation of scientists and journalists. The 25-member team left for the Arctic at the end of March and reached the North Pole in May. The research team studied oceanographic, ice, snow, atmospheric, and environmental phenomena with remote sensing devices.
- 1995: China resumed the practice of sending resident ambassadors to Iceland after Iceland set up its first embassy in Beijing and assigned its first resident ambassador to China. The Chinese embassy in Iceland is the largest foreign embassy in Reykjavik.
- 1996: China joined a non-government international Arctic scientific committee formed by the circumpolar states, consisting of Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States.
- 1999: China initiated its first government-sponsored Arctic research expedition. It took place aboard the *Xuelong* icebreaker from June to September 1999. The 71-day voyage covered 26,261 kilometers.

China finished the mapping for its third scientific exploration station in the Antarctic. The Kunlun Station will be built in one of Antarctica's highest ice cap zones, and will be a summer only station. The new station signifies an evolution of China's research efforts from Antarctica's rim zones to the interior zones.

- 2001: China's Arctic Research Team announced the decision to locate China's first Arctic scientific research station in Ny-Ålesund, Norway. The announcement coincided with the start of a three-year Arctic research program that would culminate in the opening of the Arctic research station in 2004.[217]
- 2002: Liu Shaochuang, a Chinese scientist, plants the Chinese flag at the North Pole after successfully completing a 56-day trek to become the first Chinese citizen to reach the North Pole alone on foot.[218]
- 2003: China's second Arctic research survey expedition was carried out in the same area(s) as the 1999 Arctic research survey expedition.
- 2004: China established its first permanent Arctic research station, Huanghe, in Ny-Ålesund.
- 2005: The *Annual Report on Polar Exploration* was released. This was the first report on polar research and exploration released by China since it began polar research in 1984.[219]
- 2006: China began construction of a permanent Arctic Research Base in Shanghai. The project was completed in 2010. The base comprises a logistics park, a berth for *Xuelong*, and a polar training hall.
- 2007: The Central Committee requested an examination of Arctic issues of Chinese importance, thereby initiating the Arctic Issues Research project.
- 2008: As part of International Polar Year, China conducted its third Arctic research expedition aboard *Xuelong*.
- 2009: The State Council initiated discussions on the future requirements of Chinese polar research needs and approved the construction of a new high-tech Chinese-built polar research icebreaker.
- 2010: China's fourth Arctic research expedition took place aboard *Xuelong* in the summer of 2010.
- 2011 (planned): The Chinese government intends to deploy the *Xuelong* to Iceland in the summer of 2011, and will end up circumnavigating Arctic Ocean when it transits the

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[217] China.org.cn, "Arctic Expedition Heats Up," *China Daily*, July 24, 2002, http://www.china.org.cn/english/features/40939.htm (Accessed: April 2, 2010).; China.org.cn, "China, Norway Sign Agreement on Arctic Academic Cooperation," *Xinhua News Agency*, October 29, 2001, http://www.china.org.cn/english/features/40906.htm (Accessed: April 2, 2010).; and China.org.cn, "China's First Arctic Research Station Located," *Xinhua News Agency*, http://www.china.org.cn/english/features/40910.htm (Accessed: April 2, 2010).

[218] China.org.cn, "Chinese Explorer Succeeds in Solo Trip to North Pole," *People's Daily*, April 29, 2002, http://www.china.org.cn/english/features/40921.htm (Accessed: April 2, 2010).

[219] China.org.cn, "Annual Report on Polar Exploration (2005)," *Xinhua News Agency*, February 11, 2006, http://www.china.org.cn/english/scitech/157690.htm (Accessed: April 2, 2010).

Northeast Passage on its voyage to Iceland, and than sails through the Canadian Arctic archipelago on its way back to Beijing.

Annex D Recent Military Developments in the Arctic

Table 4 highlights recent military developments on the part of circumpolar states from a policy statement, capability acquisition, and operational activities/deployments point of view.

Table 4 Circumpolar Military Developments[220]

COUNTRY	POLICY STATEMENTS	CAPABILITIES	DEPLOYMENTS/ ACTIVITIES/ OPERATIONS
Canada	• *Canada's Northern Strategy: Our North, Our Heritage, Our Future* (July 2009). • *Canada First Defence Strategy* (2008).	• Deepwater resupply port at Nanisivik, Nunavut, on Baffin Island.[221] • Joint Arctic Warfare Training Centre at Resolute Bay, Nunavut.[222] • Arctic/Offshore Patrol Ships (A/OPS). • Proposed acquisition of Joint Supply Ships (JSS).[223] • Construction of a large icebreaker for the Canadian Coast Guard. • Creation of a Northern Reserve Unit. • Expansion of the Northern Rangers. • Proposed acquisition of long-range patrol aircraft. • Development of an	• Operation Nanook (2002-2010) 700-1,000 troops. Operation Nanook has traditionally been a joint exercise between the Canadian Navy and the Canadian Coast Guard to train for disaster and sovereignty patrols in the central Arctic archipelago. Unlike in previous years, foreign militaries participated in 2010.[225]

[220] Unless otherwise cited, all information from Huebert, *The Newly Emerging Arctic Security Environment*, op. cit.; and Jakobson, "China Prepares for an Ice-Free Arctic," 7 note.26.
[221] Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, op. cit., 178.
[222] The Joint Arctic Warfare Training Centre is considered essential to preparing the Army, Navy, Air Force, and Rangers for cold weather operations. The Joint Arctic Warfare Training Centre will serve as a liaison for Joint Task Force North (JTFN) deployments, support Royal Canadian Mounted Police (RCMP) and CCG initiatives, and coordinate military/reconnaissance operations in support of disaster missions in the high Arctic. It will also establish a permanent Canadian Forces and other government departments (OGDs) facility to maintain a constant military presence along the Northwest Passage.
[223] The JSS statement of operational requirements outlines an essential requirement to operate in *Arctic Shipping Pollution Prevention Regulations* (ASPPR) Type E (open water/grey ice – up to 15 cm thick) conditions, and a desirable requirement to operate in ASPPR Type C (thin first-year (stage 1) – up to 50 cm thick) conditions. Department of National Defence, *Joint Support Ship: Statement of Operational Requirements*, Project 00002673, Version 5.5 (Ottawa: ADM (Mat), 2009), vii.

		indigenous surveillance capability.[224]	
Denmark (Greenland)	• *Danish Defence Agreement 2010-2014* (June 2009).	• *Thetis* class frigates.[226] • *Knud Rasmussen* class offshore patrol vessels. • *Flyvefisken* class patrol vessels.[227] • *Absalon* class command and support ship.[228] • Deployed F-16 *Fighting Falcons* to Greenland.[229] • F-35 *Lightening II* Joint Strike Fighter (planned acquisition).	• Approved a plan to establish an Arctic Task Force and Arctic Military Command by 2014.
Finland[230]			
Iceland[231]			
Norway	• *Norwegian Defence 2008* (June 2008). • The Soria Moria Declaration on International Policy (April 2007).	• *Fridtjof Nansen* class frigates.[232] • *Svalbard* Norwegian Coast Guard icebreaker. • F-35 *Lightening II* Joint Strike Fighter (planned	• Moved its centre of military operations from Jåttå, in the south to Reitan, in the north. • Cold Response (2006-2010) 7,000-10,000

[224] This includes the Northern Watch Technology Demonstration Project, RADARSAT 2, Polar Epsilon, and the Persistent Arctic Surveillance in Exclusive Economic Zone (PASE) project. See Department of National Defence, *Northern Watch Technology Demonstration Project*, Project Charter, Original Version (Ottawa: Government of Canada, 2007).; Department of National Defence, *Radarsat 2*, op. cit.; Department of National Defence, *Polar Epsilon*, op. cit.; and Department of National Defence, *Persistent Arctic Surveillance in Exclusive Economic Zone*, Project Charter, Version 3 (Ottawa: ADM (S&T), 2009).
[225] The Royal Danish Navy and the United States Navy participated in Operation Nanook in 2010.
[226] These vessels are able to travel through ice up to one meter (3.2 feet) thick and are armed with 76 mm guns. They are also capable of taking on extensive advanced weapon systems such as the AGM-84 *Harpoon* anti-ship missile, the RIM-7 *Sea Sparrow* surface-to-air missile (SAM), and have space for ASW torpedoes. Huebert, *The Newly Emerging Arctic Security Environment*, 10.
[227] Although not currently armed with, these vessels are designed to quickly accept a 76 mm gun, a RIM-7 *Sea Sparrow* SAM, and ASW torpedoes. *Ibid*., 11.
[228] Although it is not known if these vessels are ice capable, they are armed with advanced weapon systems such as the AGM-84 *Harpoon* anti-ship missile, the RIM-7 *Sea Sparrow* SAM, *Eurotorp* ASW torpedoes, two close-in weapon systems, and a 127 mm gun. *Ibid*.
[229] This is something the Danish Air Force had not previously done with this aircraft. *Ibid*., 10.
[230] Finland has not pursued an active Arctic policy, and has been one of the least active states in the region in terms of military developments.
[231] Although Iceland participates in Arctic security through closer cooperation with NATO, it has limited military capabilities in the region.
[232] These vessels are outfitted with the advanced *Aegis* combat system. Huebert, *The Newly Emerging Arctic Security Environment*, 13.

	• *The Norwegian Government's High North Strategy* (December 1, 2006).	acquisition).	troops. Cold Response takes place in northern Norway, and simulates efforts to stabilize a lawless country following a natural disaster. The exercise has the added challenge of doing this under harsh winter weather conditions. All NATO and Partnership for Peace countries are invited to participate.[233]
Russia	• *Principles of State Policy in the Arctic to 2020* (September 2008). • Russian State Rearmament Programme (2007-2015).	• Nuclear powered icebreaker NS *50 Let Pobedy* (*50 Years of Victory*) completed in 2006.[234] • Plans for 5-6 aircraft carrier battle groups in its Northern and Pacific fleets by 2030. • Proposed development of new strategic bombers. • Plans to acquire 5-8 (most probably 6) *Borey* SSBNs (project 995). • Plans to acquire 2 *Yasen* SSNs (project 885).	• Announced the landing of paratroopers at the North Pole in 2010. • In 2009, two Delta IV SSBNs, escorted by SSNs, tested fired SLBMs from Arctic waters (July 2009). • Resumed strategic bomber flights/patrols[235] (August 2007). • Planted a Russian flag underwater at the North Pole (August 2007). • Resumed surface naval patrols in the Barents Sea between Russia and Norway.
Sweden[236]			• Loyal Arrow (2009) 3,000 troops. Loyal Arrow was a major NATO exercise held in Northern Sweden in June 2009. Ten NATO and non-NATO countries

[233] Canada, Denmark, Estonia, Finland, France, Latvia, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK, and the US have participated in Cold Response exercises.
[234] This is the largest and most powerful nuclear icebreaker in the world.
[235] Russia has claimed that it can double these sorties if necessary. RIA Novosti, "Russia Could Double Number of Bombers on Strategic Patrols," December 22, 2009, http://en.rian.ru/russia/20091222/157325197.html (Accessed: April 12, 2010).
[236] Sweden has not pursued an overly active Arctic policy, but has engaged other circumpolar states through closer cooperation with NATO.

			participated in the exercise.[237]
United States	• *United States Navy Arctic Roadmap* (October 2009). • National Security Presidential Directive 66 (NSPD-66) (January 2009).[238] • Global Posture Review (GPR)[239] "Strengthening U.S. Global Defense Posture" (September 2004). • *2001 Quadrennial Defense Review*.[240]	• *Los Angeles*, *Sea Wolf*, and *Virginia* class SSNs.[241] • Anti-Ballistic Missile (ABM) capability/sites in Alaska. • USCG *Polar* and *Healy* class icebreakers.[242] • Deployed F-22 *Raptors* to Elmendorf Air Force base near Anchorage, Alaska.	• Northern Edge/Alaska Shield (1993-2009) 8,000-10,000 troops. • Northern Edge/Alaska Shield exercises typically take place over the waters of the north Pacific/Gulf of Alaska, and along the Pacific Alaska Range Complex (PARC) near Fairbanks. The exercise focuses on a variety of homeland defense scenarios, and typically emphasizes joint operations. • ICEX (2009) two *Los Angeles* class SSNs participated in the exercise. The aim of ICEX is to test submarine operability and underwater war-fighting capabilities in the Arctic.

[237] Finland, Germany, Italy, Norway, Poland, Portugal, Sweden, Turkey, the UK, and the US participated in Loyal Arrow.
[238] "Arctic Region Policy," *NSPD-66/HSPD-25* (Washington, D.C.: The White House, 2009), http://www.fas.org/irp/offdocs/nspd/nspd-66.htm (Accessed: April 12, 2010).
[239] The GPR resulted in, amongst other things, a significant portion of the F-22 *Raptor* fleet being deployed to Elmendorf Air Force base near Anchorage, Alaska. Despite announced cutbacks in the total number of F-22 *Raptors* to be produced, the US Air Force will deploy 20 percent, or 36, of these aircraft to Alaska. Huebert, *The Newly Emerging Arctic Security Environment*, 21. Aside from geostrategic reasons, other reasons that have been cited for the GPR include easing an overextended military, and responding to increasing anti-American sentiments in some countries. M. O'Hanlon, *Unfinished Business: U.S. Overseas Military Presence in the 21st Century*, The Future of the U.S. Military Series (Washington, D.C.: Center for a New American Security, 2008), 5.
[240] Secretary of Defense, *Quadrennial Defense Review Report* (Washington, D.C.: Department of Defense, 2001), 25.
[241] It was originally believed that *Virginia* class SSNs were not ice-capable. However, in November 2009, the US Navy announced that a *Virginia* class SSN had reached the North Pole, thus demonstrating that all three classes of US nuclear attack submarines are capable of operating in the Arctic.
[242] The USCG *Polar Star* and USCG *Polar Sea* comprise the *Polar* class icebreakers, while USCG *Healy* is a larger, more modern design, and constitutes an entirely different polar class icebreaker.

Annex E Protecting the Arctic Environment

The Government of Canada has worked at the international level, as well as enacting legislation domestically, to protect the fragile Arctic ecosystem from pollution and contamination. It has also created operational requirements that have to be adhered to before ships can enter specific Canadian maritime zones of the Arctic.

The following acts, orders, legal documents, regulations, and standards govern Canada's maritime approaches and all of Canada's maritime areas of jurisdiction. They aim to promote cooperation, reduce pollution, as well as decrease the risk of major incidents at sea. The conventions and standards address issues such as ship construction, training, the qualification of crews, and safety and navigation standards.

E.1 UNCLOS

E.1.1 Arctic-Related UNCLOS Provisions

Although numerous UNCLOS articles are relevant to the Arctic environment, four are particularly important for Canada within the context of the Arctic. The first has to do with customary notions of a state's territorial sea. What UNCLOS does is codify a common concept of a state's territorial sea. Prior to UNCLOS, interpretations of the limits of territorial waters caused ambiguity and disputes among states. Some states used a three nautical mile limit while others observed a 12 nautical mile limit.

UNCLOS defines a country's territorial sea as an offshore area up to 12 nautical miles from its baseline.[243] All of a state's sovereign rights apply within its territorial sea. For example, jurisdiction extends to the airspace over the territorial sea, as well as to the seabed and subsoil. A state may also require that ships obtain approval before transiting the area, and may impose sea-lane and traffic separation schemes limiting routes through the area.[244]

There is no provision for the overflight, launching, or recovery of foreign aircraft within a state's territorial sea, and submarines must make such transits while surfaced.[245] This is important in the Arctic where Canada claims the Northwest Passage as its internal waters. In effect, this would either prevent the passage of ships through the Northwest Passage, or require them to operate according to the regulations and limitations stipulated in Articles 19 and 20.[246]

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[243] Except where otherwise provided in UNCLOS, a normal baseline is the low-water line along a state's coast. UNCLOS, Article 7, Straight Baselines, op. cit.
[244] *Ibid*, Article 22, Sea Lanes and Traffic Separation Schemes in the Territorial Sea.
[245] In addition, radars and intelligence collection instruments must be turned off, or not pose a threat to the peace, territorial integrity, or political independence of the coastal state. Essentially, foreign military ships, submarines, and aircraft must not show hostile intent or aggressive action. *Ibid*, Articles 19 and 20, Meaning of Innocent Passage, and Submarines and Other Underwater Vehicles.
[246] Article 19 stipulates: "Passage is innocent so long as it is not prejudicial to the peace, good

The second area addresses a state's contiguous zone.[247] The contiguous zone extends an additional 12 nautical miles beyond a state's territorial sea, or 24 nautical miles from a state's baseline. The agreement notes that states do not possess full sovereignty within the contiguous zone, but can exercise a level of authority necessary to control, prevent, and/or punish infringement of its customs, fiscal, immigration, and/or environmental/sanitary laws. This is important because it gives authority to the various laws and regulations enacted by circumpolar states to affect shipping, environmental protection, and transport in the Arctic.

The third area defined by UNCLOS is a state's EEZ (see also section E.1.2).[248] The EEZ is a resource-related zone beyond a state's territorial seas extending no more than 200 nautical miles from its baseline. As the name implies, the central purpose of the EEZ is economic. The coastal state may exercise full economic jurisdiction in the zone for the purpose of exploring, exploiting, conserving, and managing living and non-living natural resources.[249] This is particularly important in the Arctic where overlapping EEZ claims could cause disagreements and potential disputes between states.

The fourth area addressed by UNCLOS is the right of states on their continental shelf.[250] This comprises the seabed and subsoil of the submarine area that extends beyond a state's territorial sea to a maximum of 350 nautical miles from its baseline. Again, the central purpose of the continental shelf is economic. States do not have any legal rights on the water surface, subsurface, or airspace above the water, but they do have limited economic rights over the continental shelf for the purpose of exploring and exploiting living and non-living natural resources.[251] Due to the potential vast resources and largely unexplored area of the Arctic, establishing extended continental shelf claims is a high priority for circumpolar states.

Thus, the four areas of maritime rights all measured from a state's baseline are (see Figure 19 for a graphic representation of these areas):

- a 12 nautical mile territorial sea in which a state exercises full legal sovereignty;
- a 24 nautical mile contiguous zone in which the state exercises limited legal sovereignty;
- a 200 nautical mile EEZ in which the state exercises full economic sovereignty; and
- a 350 nautical mile maximum continental shelf zone in which the state exercises limited economic sovereignty.

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order or security of the coastal State. Such passage shall take place in conformity with this Convention and with other rules of international law." Article 20 stipulates: "In the territorial sea, submarines and other underwater vehicles are required to navigate on the surface and to show their flag."

[247] UNCLOS, Article 33, Contiguous Zone.

[248] *Ibid*, Part V, Exclusive Economic Zone.

[249] *Ibid*., Articles 60-62, Artificial Islands, Installations and Structures in the Exclusive Economic Zone, Conservation of the Living Resources, and Utilization of the Living Resources.

[250] A state's continental shelf does not automatically extend to 350 nautical miles. It is subject to technical definitions based on gradient and seabed composition. *Ibid*., Article 76, Definition of the Continental Shelf.

[251] *Ibid*., Article 78, Legal Status of the Superjacent Waters and Air Space and the Rights and Freedoms of Other States.

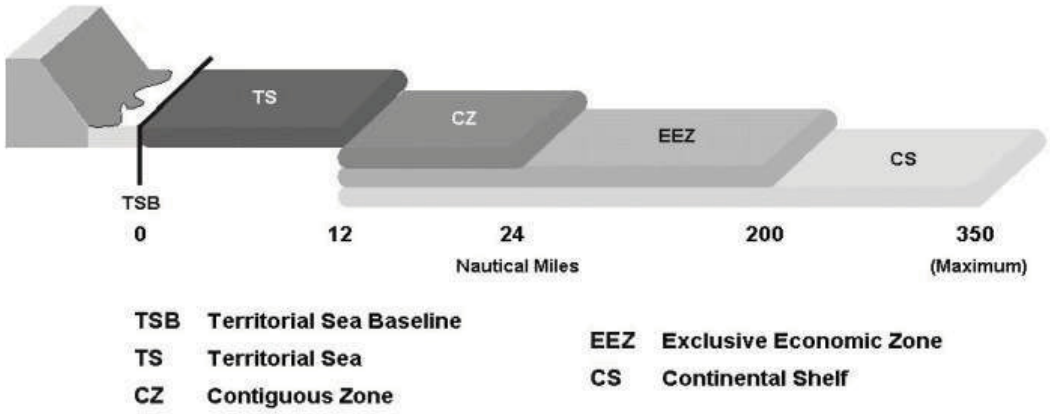

Figure 19 UNCLOS Maritime Zones[252]

E.1.2 Extended Continental Shelf Claims

In terms of potential Arctic resource development and exploitation, establishing an extended continental shelf claim is important to all circumpolar states. Upon ratification of UNCLOS, a state has up to ten years in which to make an extended continental shelf claim. A coastal state may claim an extension beyond its 200 nautical mile EEZ if it can prove the ocean floor is a physical extension of its continental shelf. According to Article 76, a state's extended continental shelf claim "shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured or shall not exceed 100 nautical miles from the 2,500-meter isobath, which is a line connecting the depth of 2,500 meters."[253]

The reason for making an extended continental shelf claim is the prospect of exploiting natural resources such as oil, gas, and minerals in this vast and relatively unexplored area above 70 degrees north latitude. If a state's claim is approved, it gives it economic rights to resources on and/or below the seabed floor.[254] With its vast and largely untapped natural resources, Arctic coastal states (Canada, Denmark, Norway, and Russia) are currently mapping the ocean floor to collect evidence for their claims.[255] While some of this work has been done cooperatively, Canada, like other circumpolar states, has potential overlapping claims with its neighbours.[256]

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[252] Australia, Parliamentary Library, *Border Protection Bill 2001*, Bills Digest No. 41 (Canberra: Department of the Parliamentary Library, 2001-02), http://www.aph.gov.au/library/pubs/BD/2001-02/02bd041.htm (Accessed: August 10, 2008).
[253] UNCLOS, Article 76 (5), Definition of the Continental Shelf.
[254] Article 77 of UNCLOS stipulates coastal states exercise sovereign rights over the continental shelf for the purpose of exploring and exploiting its natural resources. This refers to mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species that are either immobile on or under the seabed floor, or are unable to move except while in constant physical contact with the seabed or subsoil.
[255] Norway ratified UNCLOS in 1996, Russia in 1997, Canada in 2003, and Denmark in 2004. As such, Canada has until the end of 2013 to submit its extended continental shelf claim. The United States, which

After a state has collected all the relevant scientific and technical information, such as charts, bathymetric, seismic, and geodetic data, permanently describing the outer limits of its continental shelf, it submits its claim to the Commission on the Limits of the Continental Shelf (CLCS). The role of the CLCS is to make recommendations to coastal states on matters related to establishing the limits of their continental shelf claims.[257] This includes alerting states to exaggerated submissions, overlapping claims, and helping to legitimize reasonable claims.[258] In considering a state's submission, however, the CLCS does not make a final decision whether a state's claim is legally valid, only whether a state's submission is reasonable from a scientific standpoint. If claims overlap, the states themselves must negotiate a mutually satisfactory agreement, or take their dispute to arbitration.

From Canada's standpoint, multiple and overlapping claims create the potential for disagreement and disputes in the Arctic.[259] One area for concern is in the eastern Arctic where a three-way delimitation problem may develop between Canada, Denmark, and Russia (see Figure 20 – red circle). In this region, if the Lomonosov Ridge is proven to link Siberia and Canada's Ellesmere Island near the North Pole, Russia would stand to acquire the potential vast resources of the high Arctic's continental shelf. However, both Canada and Denmark stand to benefit if the Lomonosov Ridge is a natural prolongation of the North American continent. So far, Canada and Denmark have conducted joint expeditions north of Ellesmere Island to investigate whether the Lomonosov Ridge is a geological extension of the North American continent. It is hoped that collaborative exercises of this kind can help avert disputes before they arise.

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has signed but not ratified the agreement, has been conducting scientific work and collecting evidence largely in accordance with UNCLOS in anticipation of future ratification.

[256] The extent of the continental shelf beyond 200 nautical miles could potentially add up to 1,750,000 square kilometers, almost the area of Alberta, Saskatchewan, and Manitoba combined. Statistics Canada, *Land and Freshwater Area, By Province and Territory*, http://www40.statcan.ca/l01/cst01/phys01.htm (Accessed: June 22, 2008).

[257] UNCLOS, Article 77, Rights of the Coastal State Over the Continental Shelf.

[258] Russia, the first country to officially make a submission to the CLCS in December 2001, claimed the Lomonosov Ridge as a natural prolongation of the Eurasian land mass. The CLCS responded to Russia's submission by recommending that it collect additional scientific data and revise its claim. Russia's exploration of the North Pole and its placing of a Russian flag at the bottom of the Arctic Ocean, both of which were highly publicized in the summer of 2007, are believed to be attempts to buttress its claim. W. Rompkey and E.M. Cochrane, *Rising to the Challenge: Report on the Canadian Coast Guard* (Ottawa: Report of the Standing Committee on Fisheries and Oceans, 2009), 20.

[259] For a full list, description, and discussion of potential northern disputes, see K.D. Christensen, *Arctic Maritime Security and Defence: Canadian Northern Security Opportunities and Challenges*, DRDC CORA TR 2005-01 (Ottawa: Defence R&D – CORA, 2005).; R. Dufresne, *Canada's Legal Claims Over Arctic Territory and Waters*, PRB 07-39E (Ottawa: Parliamentary Information and Research Service, 2007).; R. Dufresne, *Controversial Canadian Claims Over Arctic Waters and Maritime Zones*, PRB 07-47E (Ottawa: Parliamentary Information and Research Service, 2008).; R. Huebert, "Northern Interests and Canadian Foreign Policy" (Unpublished paper, Canadian Defence & Foreign Affairs Institute), http://www.cdfai.org/PDF/Northern%20Interests%20and%20Canadian%20Foreign%20Policy.pdf (Accessed: May 17, 2010).; and Rompkey, *Rising to the Challenge*.

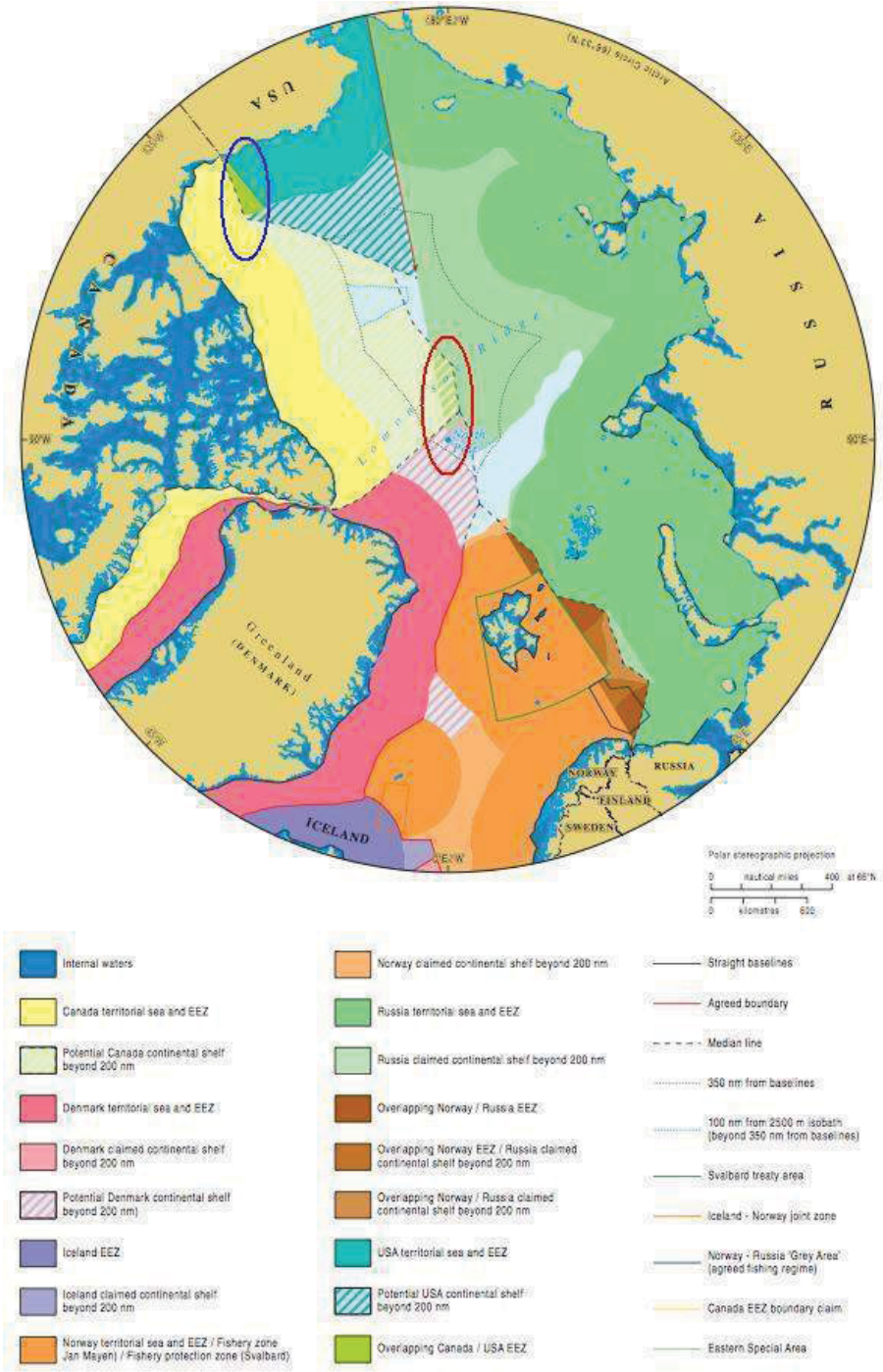

Figure 20 Maritime Jurisdiction and Boundaries in the Arctic Region[260]

[260] Map from Durham University, *Maritime Jurisdiction and Boundaries in the Arctic Region*, May 4, 2010, http://www.dur.ac.uk/resources/ibru/arctic.pdf (Accessed: June 5, 2010).

Another area for concern is in the western Arctic in the Beaufort Sea, where a dispute between Canada and the United States exists (see Figure 20 – blue circle). The area in dispute is the boundary line off the coast of Alaska and the Yukon in the Beaufort Sea. Canada argues that a straight baseline should be drawn out in a direct line following the Alaska-Yukon border along the 141st meridian. The United States argues that the line should be drawn out at a 90-degree angle from the coastline, along a path equidistant from the coasts of both Canada and the United States (i.e., not following the Alaska-Yukon border).[261] The result is a wedge of maritime territory in the Beaufort Sea, measuring 21,436 square kilometers, rich in oil and gas.

More importantly, both countries have been active in exploration and exploitation of hydrocarbon resources in the region. In 2005, Washington awarded Royal Dutch Shell exploration and drilling rights to plots in the disputed area of the Beaufort Sea.[262] In 2007, Ottawa awarded Imperial Oil Limited and Exxon Mobil Canada exploration licences for areas about 100 kilometers north of the Mackenzie Delta in the Northwest Territories. In 2008, Ottawa awarded BP Exploration Company Limited, ConocoPhillips Canada Resources Corporation, MGM Energy Corporation, Phillips Petroleum Canada Limited, and Phillips Petroleum Resources Limited exploration leases in the Beaufort Sea.[263] Due to the fact that the United States has signed, but not ratified UNCLOS, no settlement has been reached. If Washington were to ratify UNCLOS, the dispute could find, in certain circumstances, its way to an international tribunal.

E.2 Canadian Legislation

In addition to UNCLOS, vessel operators in the Arctic are subject to a variety of additional legal frameworks, provisions, and regulations in Canadian Arctic waters. As noted, the *Canada Shipping Act, 2001*, is the principal legal framework governing safety of marine transportation in Canada, and replaces the *Canada Shipping Act, 1985*.[264] It applies to *all* vessels operating in Canadian waters, and it applies to everything ranging from canoes to cruise ships to tankers. Canada's legal documents generally view the Arctic as a fragile ecosystem. Not only are environmental, pollution, and waste compliance regulations more stringent, so too are construction and operational safety standards. In effect, the regulations, agreements, and laws allow the Government of Canada to regulate and enforce environmental shipping standards in Canadian Arctic waters to an extent not normally permitted in other maritime areas.

E.2.1 Arctic Waters Pollution Prevention Act

Domestically, the *Arctic Waters Pollution Prevention Act* aims to prevent pollution in Canadian Arctic waters. The unapproved transit of the commercial tanker SS *Manhattan* through the Northwest Passage prompted discussions in Canada about sovereignty and environmental protection, and eventually resulted in the passage of the *Arctic Waters Pollution Prevention Act* in

[261] Dufresne, *Controversial Canadian Claims Over Arctic Waters and Maritime Zones*, 11-12.
[262] Ottawa's response was to protest diplomatically.
[263] Rompkey, *Rising to the Challenge*, 17.
[264] Department of Justice, *Canada Shipping Act, 2001*, op. cit.

1985.[265] The *Arctic Waters Pollution Prevention Act* is a 'zero discharge' act, which states that, "no person or ship shall deposit or permit the deposit of waste of any type in the Arctic waters."[266] *The Arctic Waters Pollution Prevention Act* describes offences and punishments; and outlines the powers that may be given to Pollution Prevention Officers so that they may enforce the Act. The Act also places mandatory standards for construction, manning, piloting, navigation, environmental protection, and icebreaking assistance in the Arctic.[267] These provisions are to be adhered to by any ship that sails in, or within 185 kilometers of the Canadian Arctic archipelago.

E.2.2 Arctic Shipping Pollution Prevention Regulations

Navigation in coastal waters within Canadian jurisdiction north of 60 degrees north latitude is governed by the *Arctic Shipping Pollution Prevention Regulations*, which came into force in 2001. The *Arctic Shipping Pollution Prevention Regulations* falls under the *Arctic Waters Pollution Prevention Act*. The Regulations deal with the construction of ships (certain construction requirements for different navigation zones); bunkering stations; Arctic Pollution Prevention Certificates; ice navigator issues (any vessel planning to use the Arctic Ice Regime Shipping System); fuel and water concerns (having enough of both on board before entering a zone); sewage deposit; and oil deposit mishaps. The *Arctic Shipping Pollution Prevention Regulations* stipulate that every tanker must have a qualified ice navigator on board, and proper procedures to follow in the event of a discharge of pollutants in the Arctic.[268]

All vessels above 100 tons that navigate Canadian Arctic waters must comply with these regulations, including reporting requirements. Ship owners may request an 'Arctic Pollution Prevention Certificate' for vessels that carry more than 453 cubic meters of pollutants (including all oil, fuel, and lubricants).

E.2.3 Arctic Ice Regime Shipping System

The Arctic Ice Regime Shipping System is a regulatory standard currently in use as a requirement of the *Arctic Shipping Pollution Prevention Regulations*. It was established in 1996. Visibility, vessel speed, manoeuvrability, the availability of an icebreaker escort, and the knowledge and experience of the crew must be considered when applying the Arctic Ice Regime Shipping System. The System is intended to minimize the risk of pollution in Arctic waters due to damage of vessels by ice; to emphasize the responsibility of the ship owner and master for safety; and to provide a flexible framework for decision-making. It requires accurate information for voyage planning, timely ice-charts, and consistent observation of ice conditions. The Arctic Ice Regime

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[265] The SS *Manhattan* investigated the feasibility of extracting oil from the north and bringing it to market in the south. During the transit, the SS *Manhattan* did not carry any cargo (its tanks were filled with water to simulate a load of oil). It did pick up one symbolic barrel of oil in Alaska and returned it to New York.
[266] Department of Justice, *Arctic Waters Pollution Prevention Act*, op. cit., 4.
[267] See also Fisheries and Oceans Canada, "Vessel Traffic Reporting Arctic Canada Traffic Zone (NORDREG)," *Marine Communications and Traffic Services*, http://www.ccg-gcc.gc.ca/cen-arc/mcts-sctm/mcts-services/vtrarctic_e.htm (Accessed: January 5, 2005).
[268] That includes the unavoidable deposit of pollutants to save a life, or from damage to a ship from stranding, collision, or foundering if all reasonable precautions have been taken.

Shipping System is used in conjunction with the Shipping Safety Control Zones Order (see below).

E.2.4 Arctic Waters Pollution Prevention Regulations

The *Arctic Waters Pollution Prevention Regulations* came into effect in 2001, and applies to the deposit of waste in Arctic waters; the deposit of waste by ships in Arctic waters; or in any location on the mainland or islands of the Canadian Arctic; and the liability for such deposits. The Regulations apply to the deposit of domestic and industrial waste in Arctic waters and on land in the Arctic, and the deposit of waste by ships in Arctic waters. The Regulations also describes the limits of liability in the *Marine Liability Act*. This Act applies to areas north of 60 degrees north latitude. In the event of an inconsistency between the provisions of the *Arctic Waters Pollution Prevention Act* (or any regulation that fall under it) and the *Marine Liability Act*; the *Marine Liability Act* prevails to the extent of the inconsistency.

E.2.5 Marine Liability Act

The *Marine Liability Act* places absolute responsibility and liability for safety, damages, and pollution on the owners and/or operators of vessels; and on owners of docks, canals, and ports, and came into effect in 2001. Vessel owners and operators are responsible for such things as the safety of their crew and passengers, their cargo, and any pollution created. The *Marine Liability Act* provides a uniform method for establishing liability that balances the interests of ship owners and passengers, and is applicable to all incidents governed by Canadian maritime law. As noted above, the *Marine Liability Act* applies to areas north of 60 degrees north latitude. In the event of an inconsistency between the provisions of the *Arctic Waters Pollution Prevention Act* (or any regulation that fall under it) and the *Marine Liability Act*; the *Marine Liability Act* prevails to the extent of the inconsistency.

E.2.6 Shipping Safety Control Zones Order/Arctic Ice Regime Shipping System

Navigation in coastal waters within Canadian jurisdiction north of 60 degrees north latitude is governed by the Shipping Safety Control Zones Order, which was established in 2001 under the *Arctic Waters Pollution Prevention Act*. The Shipping Safety Control Zones Order is also known as the Zone/Date System. The Shipping Safety Control Zones Order divides and classifies different areas of the Canadian Arctic into different ice zones. These ice classifications ultimately translate into areas and dates where permissible operations/transits can be conducted in the Arctic. The Order establishes 16 zones (see Figure 21) of ice severity in the north with opening and closing dates of operation for each zone and class of ship.[269]

[269] Department of Justice, *Arctic Waters Pollution Prevention Act*, C.R.C., c. 353 (Ottawa: Minister of Justice, 1978), http://laws.justice.gc.ca/en/A-12/C.R.C.-c.353/fulltoc.html (Accessed: November 21, 2006).; and Department of Justice, *Shipping Safety Control Zones Order*, C.R.C., c. 356 (Ottawa: Minister of Justice, 1978), http://lois.justice.gc.ca/en/A-12/C.R.C.-c.356/index.html (Accessed: November 11, 2006).

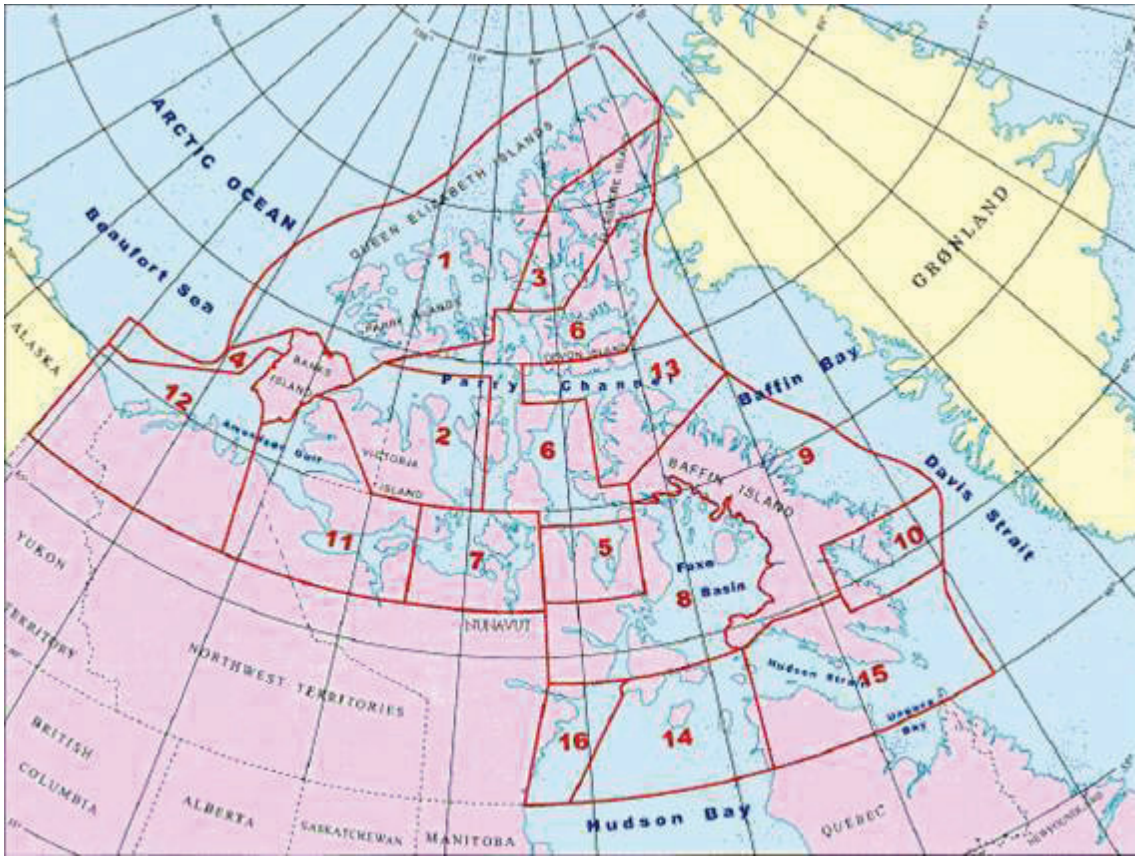

Figure 21 Canadian Shipping Safety Control Zones[270]

The 'Zone/Date System' is based on the premise that nature consistently follows a regular pattern year after year. Therefore, this fixed system does not reflect long-term trends and inter-annual variability of ice conditions. Due to this constraint, Transport Canada introduced the more flexible Arctic Ice Regime Shipping System in 1996. Ships may continue to use the 'Dates of Entry' table provided by the Zone/Date System for estimating when certain ice conditions may occur when planning a basic passage. However, the Arctic Ice Regime Shipping System is currently used when making access decisions outside of the established dates provided by the Shipping Safety Control Zones Order.

Depending on ice strengthening and reinforcement, construction standards, propulsion systems, and other characteristics, ships are permitted to operate in specific zones of the Arctic at different times. The current ice classifications of Canadian naval vessels, for example, would limit operations in the high Arctic and western Arctic (zone 1), much of the Beaufort Sea (zones 1 and 4), and in many of the waterways in the central Canadian Arctic archipelago (zones 2, 3, and 6).[271] In terms of the remaining zones, minimum ice extent usually occurs from early June to mid-

[270] Department of Justice, *Shipping Safety Control Zones Order*.
[271] Environment Canada, "Sea Ice Climatic Atlas – Northern Canadian Waters 1971-2000," *Annual Arctic Ice Atlas* (Ottawa: Canadian Ice Service), http://ice-glaces.ec.gc.ca/App/WsvPageDsp.cfm?ID=11676&LnId=15&Lang=eng (Accessed: February 21, 2005).

September when freeze-up begins.[272] This means that the maximum permissible period that the Canadian Navy would be able to safely enter and operate in the north would be from early June to mid-September.[273]

E.2.7 Vessel Traffic Reporting Arctic Canada Traffic Zone

Canada has also created the Vessel Traffic Reporting Arctic Canada Traffic Zone (NORDREG), which was established by the *Northern Canada Vessel Traffic Services Zone Regulations* under the *Canada Shipping Act, 2001*.[274] The purpose of NORDREG is to strengthen Canadian sovereignty by establishing an interface between the Canadian Coast Guard and maritime transportation operators. It describes to vessel operators the reporting procedures necessary for entering and transiting Canadian Arctic waters. For instance, all accidents and incidents of marine pollution must be immediately reported to NORDREG.[275] NORDREG also aims at preventing the pollution of Arctic waters by establishing a method of screening vessels either entering or in Arctic waters. The NORDREG system monitors and supports vessel traffic north of 60 degrees north latitude. It includes those waters of Ungava Bay, Hudson Bay, and James Bay south of 60 degrees north latitude, and the waters to which the *Arctic Waters Pollution Prevention Act* apply. It does, however, exclude Mackenzie Bay and Kugmallit Bay south of 70 degrees north latitude and east of 139 degrees west longitude.

As of 2010, participation in NORDREG is mandatory. It is the responsibility of the ship owner/master who plans to operate outside the Zone/Date System to submit an 'Ice Regime Routing Message' and wait for NORDREG to acknowledge the routing message. NORDREG checks that the requests are reasonable and if not, it will request additional information or clarification.[276]

E.2.8 Arctic Cooperation Agreement

Following the unapproved transit of the US Coast Guard vessel *Polar Sea* through the Northwest Passage in 1985 (speculated as the US response to the inclusion of the 'Arctic exception' clause in UNCLOS), Canada and the United States began discussions whereby the latter's interest in transiting the Northwest Passage would be made with the consent of the Canadian government. The result was the 1988 "Agreement Between the Government of Canada and the Government of the United States of America on Arctic Cooperation." In this agreement, the United States agreed that any navigation by its icebreakers, within Arctic waters claimed by Canada, would be undertaken with "the consent of the Government of Canada."[277] However, nothing in the

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[272] *Ibid*.
[273] Exercise NARWHAL, for instance, took place from August 12-August 30, at the maximum point of ice melt in the north.
[274] Fisheries and Oceans Canada, NORDREG.
[275] Transport Canada, "NORDREG," *Arctic Shipping – Shipping Operations*, January 19, 2010, http://www.tc.gc.ca/eng/marinesafety/debs-arctic-shipping-operations-nordreg-357.htm (Accessed: January 22, 2010).
[276] Fisheries and Oceans Canada, NORDREG.
[277] Canado-American Treaties, *Agreement Between the Government of Canada and the Government of the United States of America on Arctic Cooperation*, op. cit.

Agreement prejudices either the US position on the Arctic, or Canada's position concerning its sovereignty over the Northwest Passage.

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List of symbols/abbreviations/acronyms/initialisms

ABM	Anti-Ballistic Missile
ADM (S&T)	Assistant Deputy Minister (Science and Technology)
ACIA	Arctic Climate Impact Assessment
AIRSS	Arctic Ice Regime Shipping System
AMAP	Arctic Monitoring and Assessment Programme
AMSR	Advanced Microwave Scanning Radiometer
AMSR-E	Advanced Microwave Scanning Radiometer for EOS
A/OPS	Arctic/Offshore Patrol Ship
ARP	Applied Research Project
ASPPR	Arctic Shipping Pollution Prevention Regulations
ASW	Anti-Submarine Warfare
AWPPA	Arctic Waters Pollution Prevention Act
AWPPR	Arctic Waters Pollution Prevention Regulations
B.C.	British Columbia
CAA	Chinese Arctic and Antarctic Administration
CAGP	Central Asian Gas Pipeline
CARO	Centre d'analyse et de recherche opérationnelle
CAS	Chinese Academy of Sciences
CAST	Chinese Association for Science and Technology
CCG	Canadian Coast Guard
CCP	Chinese Communist Party
CDAI	The Conference of Defence Associations Institute
CDFAI	Canadian Defence & Foreign Affairs Institute

CF	Canadian Forces
CFD	Chief of Force Development
CIWS	Close-In Weapon System
CLCS	Commission on the Limits of the Continental Shelf
CORA	Centre for Operational Research and Analysis
CRS	Congressional Research Service
CS	Continental Shelf
CZ	Contiguous Zone
DCDC	Development Concepts and Doctrine Centre
DCDS	Deputy Chief of the Defence Staff
DMSP	Defense Meteorological Satellite Program
DND	Department of National Defence
DRDC	Defence Research and Development Canada
DRDKIM	Defence Research and Development Knowledge and Information Management
EEZ	Exclusive Economic Zone
ENI	Ente Nazionale Idrocarburi
EOS	Earth Observing System
ESPO	Eastern Siberian-Pacific Ocean
EU	European Union
GDP	Gross Domestic Product
GEBCO	General Bathymetric Chart of the Oceans
GISS	Goddard Institute for Space Studies
GPR	Global Posture Review
GPS	Global Positioning Satellite

GRID	Global Resource Information Database
HSPD	Homeland Security Presidential Directive
IARC	International Arctic Research Center
IASC	International Arctic Science Committee
ICBM	Intercontinental Ballistic Missile
ICC	International Chamber of Commerce
IJIS	IARC-JAXA Information System
IMB	Ice Mass Balance
IMB	International Maritime Bureau
IOCAS	Institute of Oceanology, Chinese Academy of Sciences
IPCC	Intergovernmental Panel on Climate Change
IUU	Illegal, Unreported and Unregulated
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JAXA	Japan Aerospace Exploration Agency
JL-2	Julang-2
JSS	Joint Support Ship
JTFN	Joint Task Force North
KOPRI	Korea Polar Research Institute
LASG	State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics
MCTS	Marine Communications and Traffic Services
MLA	Marine Liability Act
MSCo.	Murmansk Shipping Company
MV	Motor Vessel
NASA	National Aeronautics and Space Administration

NATO	North Atlantic Treaty Organization
NBO	National Bureau of Oceanography
NERSC	Nansen Environmental and Remote Sensing Center
NIPR	National Institute of Polar Research
NOAA	National Oceanic and Atmospheric Administration
NoCGV	Norwegian Coast Guard
NORAD	North American Aerospace Defence Command
NORDREG	Vessel Traffic Reporting Arctic Canada Traffic Zone
NSIDC	National Snow and Ice Data Center
NSPD	National Security Presidential Directive
OGD	Other Government Departments
ONR	Office of Naval Research
PASE	Persistent Arctic Surveillance in Exclusive Economic Zone
PLA	People's Liberation Army
PRC	People's Republic of China
PRIC	Polar Research Institute of China
RADARSAT 2	Radar Satellite 2
RCMP	Royal Canadian Mounted Police
R&D	Research and Development
SIPRI	Stockholm International Peace Research Institute
SLBM	Submarine Launched Ballistic Missiles
SLOC	Sea Line of Communication
SOA	State Oceanic Administration
SS	Steam Ship

SSBN	Nuclear Powered Ballistic Missile Submarine
SSGN	Nuclear Powered Cruise Missile Submarine
SSMI	Special Sensor Microwave Imager
SSN	Nuclear Powered Attack Submarine
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TEU	Twenty-Foot Equivalent Container Units
TM	Technical Memorandum
TR	Technical Report
TS	Territorial Sea
TSB	Territorial Sea Baseline
UAE	United Arab Emirates
UK	United Kingdom
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
US	United States
USA	United States of America
USCG	United States Coast Guard
USD	United States Dollar
WMD	Weapons of Mass Destruction
WTO	World Trade Organization
WWF	World Wildlife Fund
Z/DS	Zone/Date System

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This research paper assesses the People's Republic of China's (PRC's) long-term interests and activities in the Arctic. It is aimed at assessing China's interests in the Arctic, its current activities, and its motivation for allocating increased resources for high Arctic research. This includes a thorough review of Beijing's potential geostrategic interests in the Arctic.

This research paper also supports two Defence Research and Development Canada (DRDC) Applied Research Projects (ARPs). It supports ARP 10aa15, "Arctic Security and Sovereignty Assessment," and ARP 10aa16, "The Rise of China: Strategic Assessment and Implications for Canadian Security."

The research paper assesses China's interests and activities in the Arctic by analyzing existing data, research, and literature on China's preparations for a climate changed and potentially ice-reduced Arctic. Research is based on an analysis of open source literature, electronic sources, published and unpublished reports and papers, and interviews.

The major conclusions to be drawn from this study are that China's activities in the Arctic have not been of the military variety, nor does it appear China will become militarily involved in the Arctic in the near-term. China's involvement in the Arctic is focused on the scientific, environmental, and climatic consequences of melting sea ice, as well as the commercial and economic benefits of melting Arctic sea ice.

This will also be the first time in the contemporary period that a major non-circumpolar power with global interests and aspirations will enter the Arctic region. Over the long term, this has the potential to not only affect the circumpolar balance of power, but also the strategic thinking of all states involved. As such, circumpolar states such as Canada must be prepared to prevent the potential exploitation of the Arctic by non-circumpolar states.

Thus, circumpolar states, including Canada, must think about the Arctic as a strategic region. The Canadian Forces, for its part, should maintain its multi-purpose combat capabilities. A versatile and flexible military that can respond to challenges across a spectrum of non-combat and combat roles, including in the underwater environment, will serve the Canadian government best in addressing the challenges envisaged in the Arctic as non-circumpolar states enter the region.

X

14. KEYWORDS, DESCRIPTORS or IDENTIFIERS (Technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. They should be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location may also be included. If possible keywords should be selected from a published thesaurus, e.g. Thesaurus of Engineering and Scientific Terms (TEST) and that thesaurus identified. If it is not possible to select indexing terms which are Unclassified, the classification of each should be indicated as with the title.)

Arctic Archipelago; Arctic; Arctic Transit Routes; Canadian Arctic; Canadian Navy; China; Circumpolar Security; Climate Change; Maritime Security; Natural Resources; Northern Transit Routes; Oil and Gas; Resources; Transit Routes; UNCLOS

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