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AIR UNIVERSITY

ARCTIC ICE MELTING:
NATIONAL SECURITY IMPLICATIONS

by

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A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

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February 2011

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Table of Contents

Disclaimer	ii
Abstract	iv
Preface	v
Section I - Introduction	1
Issue	2
Research Methodology	3
Scientific Facts	4
Section II - Political Analysis	8
Territorial Disputes	9
The United Nations Convention on the Law of the Sea	13
Section III - Economic Analysis	16
Accessible Waterways	17
Emerging Markets	19
Regional Instability - Global Economic Impact	21
Section IV - Military Analysis	24
Safety	24
United States Coast Guard's Role	25
Icebreakers	26
Other Maritime Capabilities	28
Recommendations	32
Conclusion	35
Notes	36
Bibliography	39

Abstract

Arctic ice melting will be the next global cataclysmic change that will have profound impacts on America's national security. The Arctic comprises nearly one-sixth of the world's total land mass and is projected to have an abundance of oil and natural gas reserves. Key maritime channels are now navigable for parts of the year and human activities are increasing due to improved access to the region. Accessible sea passages will have far-reaching impacts to global economies. As global trade routes become viable, oceanic transit shipping times decrease, markets expand, and global competition increases, political and economic friction is likely to increase which could lead to regional or global instability. In essence, the historical trend of Arctic ice melting presents national security challenges to the United States. As a world leader, the United States should not only develop its own geopolitical strategies in response to the inevitable changes in the Arctic region, it should work multilaterally with other nations to develop strategies that address environmental, economic, social, and political consequences to achieve and maintain regional peace and stability. This pragmatic approach will involve international cooperation and strong global relationships to make decisive headway to address this ever-increasing national security threat. This research examines the political, economic, and military national security implications of Arctic ice melting and then provides recommendations on actions the United States should take to minimize undesirable future outcomes.

Preface

The idea for this research topic arose from listening to General Anthony Zinni, USMC (Retired), former Commander, United States Central Command, speak online about climate change and its impact on United States national security. With minimal investigation on the subject matter, I became fascinated with the amount of research that had already been published. When I had to select a research topic to fulfill one of the Air Command and Staff College course requirements, I found quite a few topics that pertained to climate change or global warming. However, I really wanted to focus on a special niche of climate change and national security. I didn't know what that niche was until I realized only two of those topics were specific to the Arctic region. This eureka moment was the genesis of this research paper.

The winter I wrote this paper, our city experienced extremely heavy snowstorms and what the meteorologists described as "Arctic" cold temperatures. Both the snowfall amounts and the temperatures broke all previous records. I found these facts profoundly ironic given my research topic.

On a more personal note, I would like to thank my instructor and my colleagues for their unyielding support in providing feedback and suggestions throughout this arduous task. They provided tremendous help in reviewing my drafts and inspired me week after week when I was left with little inspiration. Finally, I would like to thank my husband. He was kind enough to read my paper and provide inputs whenever I asked for his assistance. I'm not certain I would have finished this paper without his support.

Section I - Introduction

We never have 100 percent certainty. We never have it. If you wait until you have 100 percent certainty, something bad is going to happen on the battlefield. You have to act with intuition sometimes.

- General Gordon R. Sullivan, USA (Retired)¹

Arctic ice melting will be the next global cataclysmic change that will have profound impacts on America's national security. This statement should come as no surprise. In 2006, the Center for Naval Analyses (CNA) military advisory board consisting of 11 retired three- and four-star flag and general officers from the Army, Navy, Air Force, and Marine Corps concluded "climate change can act as a threat multiplier for instability in some of the most volatile regions of the world."² Their analysis, based on scientific data, asserted not only will climate change present the United States with complex national security challenges but that climate change should be defined as a national security threat. Similar to climate change, ice melting in the Arctic region will define its own sets of challenges in terms of national security. Over the past decade, the continuum of Arctic ice melting has significantly increased more so than in any other decade in recorded history. The receding ice pack is exposing the Arctic as a new uncharted frontier. The reality is, this exposure presents long-term and far-reaching national security implications. Territorial disputes, an increase in the number of maritime channels, lack of sufficient ice-breaking technology, and competition for natural resources are only a few of the national and global challenges the United States will face. As a world leader, the United States should not only develop its own geopolitical strategies in response to the inevitable changes in the Arctic region, it should work multilaterally with other nations to develop and address environmental, economic, social, and political consequences to achieve and maintain regional stability and global security.

Issue

The Arctic ice cap is gradually melting. Since 1978, the annual average Arctic sea ice extent has decreased by 2.7 percent per decade, with even larger decreases in the summer ice of 7.4 percent per decade.³ From 2004 to 2008, National Aeronautics and Space Administration (NASA) satellites measured a 42 percent drop in multi-year Arctic sea ice.⁴ As a result, thinner ice is more vulnerable to melting in the summer. This situation has significant implications to the national security interests of the United States as activity in the region increases.

The Arctic has an abundant supply of natural resources such as oil and natural gas that make it an attractive region. Navigable waterways will lead to an ever-increasing need for diplomacy and cooperation amongst states regarding maritime zones, international waters, freedom of navigation, and law of the sea. As human activities in the region increase so too will territorial and maritime disputes. Accessible sea passages will also impact global economies as trade routes become viable, oceanic transit shipping times decrease, markets expand, and global competition increases. The 2010 United States Department of Defense (DOD) Quadrennial Defense Review addressed the DOD's Arctic concerns by stating the DOD will need to adjust its military capabilities and work collaboratively in multilateral forums to manage the effects of Arctic climate change and accessible Arctic waters.⁵ Preparing to meet the challenges of the Arctic's harsh environment and ever-changing geographical region will be a daunting task for the United States military. The military lacks the capabilities that enable it to adequately address safety and security challenges that have long since been a non-priority in this region. In essence, environmental changes in the Arctic and the resulting increase in human activities in the region will impact United States national interests and objectives.

Regional stability is in the best interest of the United States. As a world leader, the United States should utilize its instruments of national power to ensure the safety and security of the United States and its allies. Security implications of a region that comprises one-sixth of the world's land mass should be thoroughly analyzed before the United States political, economic and military strategies can address the challenges and cascading effects imposed by the Arctic region.

Research Methodology

This paper examines political, economic, and military implications to United States national security by using a modified Evaluation methodology. Due to the nature of the subject matter, the methodology has been adjusted to include subjective criteria rather than the standard qualitative criteria. The paper is organized with an introduction to the subject matter, analysis of three national security areas, followed by recommendations for the United States to engage in global cooperative opportunities and strategies to minimize undesirable future outcomes.

The questions addressed by this report are:

1. What conditions, caused by Arctic ice melting, will result in security risks to the United States?
2. What are the political, economic, and military national security consequences of Arctic ice melting?
3. What actions should the United States take to address national security vulnerabilities resulting from Arctic ice melting?

The overall objective of the research is to examine how Arctic ice melting poses national security risks and geopolitical challenges to the United States. The resulting paper will educate a

community of decision makers and national strategists on the impacts Arctic ice melting will have on United States national security interests.

Scientific Facts

The Arctic region is defined as the area north of the Arctic Circle, in other words, the area north of the 66° 33' N latitude line. This region comprises approximately one-sixth of the earth's total land mass and includes a body of water called the Arctic Ocean. The Arctic Ocean is the smallest of the world's five oceans and is unique in that it is iced over most of the year. Sea ice is frozen seawater and is often covered by snow. In the Arctic, the snow's white surface reflects 80 percent of sunlight which keeps the region cool.⁶ However, as more sea ice melts in the summer, dark ocean waters are readily exposed which can absorb up to 90 percent of the sun's energy rays.⁷ As more heat is absorbed, ocean waters become warmer causing more sea ice to melt. This cyclic action has been ongoing for centuries. The terms sea ice and ice will be used interchangeably throughout the paper to refer to Arctic sea ice.

In the past, the amount of winter ice accumulated in the Arctic has been greater than the amount of summer ice that melts. The ice that accumulates each year is known as "multi-year" ice. The majority of Arctic sea ice survives for at least one, if not several years. However, in recent years, the amount of winter ice has not been sufficient to offset the summer ice losses.⁸ As a result, the decrease in multi-year ice exposes thinner sea ice that is more likely to melt in the summer (Figure 1).⁹

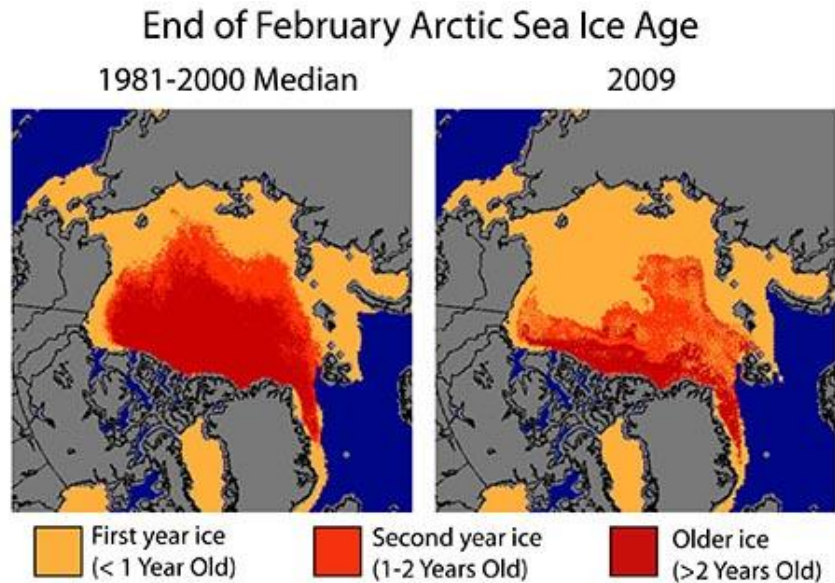


Figure 1. Decrease in multi-year Arctic sea ice cover.

Reprinted from National Snow and Ice Data Center, <http://nsidc.org/arcticseaicenews/2009/040609.html> (accessed 5 February 2011). Courtesy of J. Maslanik and C. Fowler, University of Colorado.

Between the winters of 2004 and 2008, a NASA satellite survey revealed dramatic decreases in multi-year Arctic sea ice. The survey revealed three notable facts. First, "Arctic sea ice thinned dramatically with thin seasonal ice replacing thick older ice as the dominant type for the first time on record."¹⁰ Second, "multi-year ice cover shrank 1.54 million square kilometers (595,000 square miles) - nearly the size of Alaska's land area."¹¹ Third, "the relative contributions of the two ice types to the total volume of the Arctic's ice cover were reversed."¹² In 2003, 62 percent of the Arctic's total ice volume was stored in multi-year ice, with 38 percent stored in first-year seasonal ice.¹³ By 2008, 68 percent of the total ice volume was first-year ice, with 32 percent being multi-year ice.¹⁴ This evidence clearly points to Arctic ice melting as a result of a decrease in multi-year ice. Theories of why Arctic multi-year ice is decreasing fall outside the scope of this report.

In 2010, the trend of decreasing multi-year Arctic ice continued. Arctic sea ice extent for December 2010 was the lowest in history based on satellite records for that month.¹⁵ Sea ice extent is a measurement of the area of ocean where there is at least 15 percent sea ice concentration.¹⁶ Based on recorded satellite observations, the Arctic sea ice extent average in December 2010 was 12 million square kilometers (4.63 million square miles), the lowest December ice extent between 1979 and 2010.¹⁷ Figures 2 and 3 reflect these historical trends.

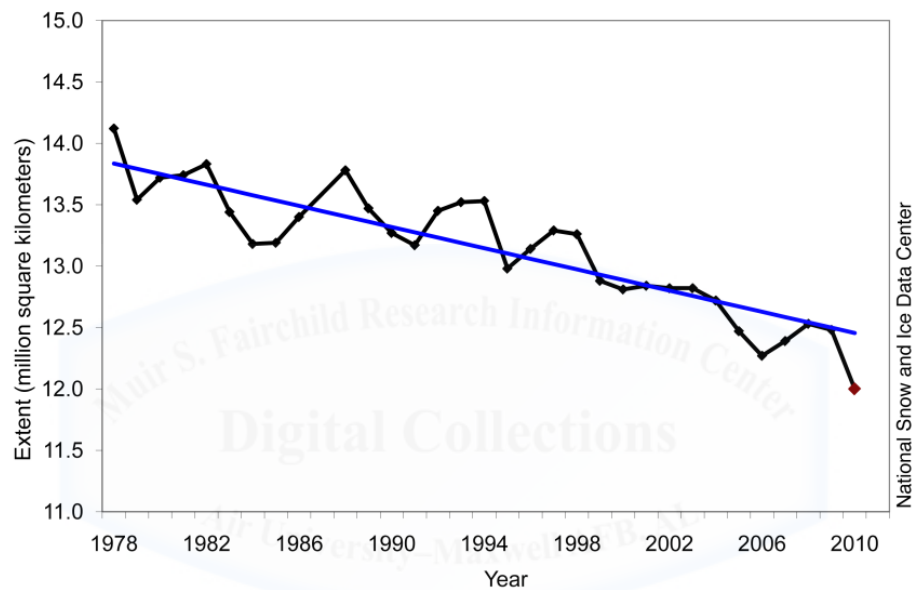


Figure 2. Average Arctic sea ice extent for the month of December. Reprinted from National Snow and Ice Data Center, <http://nsidc.org/arcticseaicenews/2009/040609.html> (accessed 10 February 2011).

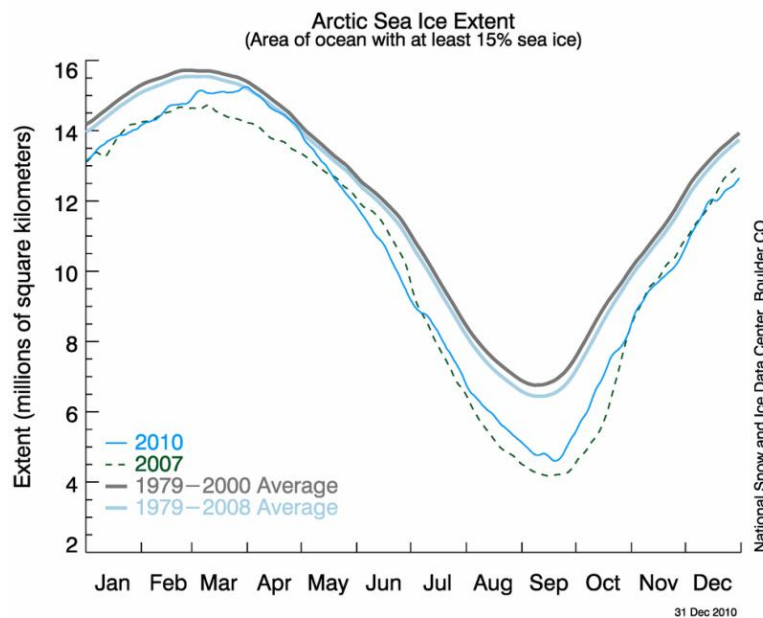


Figure 3. Arctic sea ice extent from 1979 to 2010. Reprinted from National Snow and Ice Data Center, <http://nsidc.org/arcticseaicenews/2009/040609.html> (accessed 10 February 2011).

The trend of less multi-year Arctic ice and thinner summer ice leads to more navigable Arctic waters. In turn, the United States, along with other Arctic nations, will be forced to confront a variety of social and political challenges. Political challenges on the horizon include, but are not limited to, sovereignty issues and interpretation of the United Nations Convention on the Law of the Sea or the Law of the Sea Treaty. While historically there have been a myriad of disputes over sovereign lands in the region, those disputes have largely been left in a state of mere disagreement due to the lack of accessibility to the land and surrounding waters. In the very near future, that won't be possible. As more ships pass through what they perceive as international waters and as more humans have access to shorelines, Arctic nations will be forced to put aside their differences and solidify their political agendas while collaborating on a regional agenda that promotes safety, security, and stability.

Section II - Political Analysis

We [the United States] are the world's leader. We fill a void. There is no one out there that even comes close to filling the leadership role that we have, and some of the moral responsibilities that we have.

- General Anthony Zinni, USMC (Retired)¹⁸

There are eight Arctic nations (Canada, Russia, Norway, Denmark, Iceland, Sweden, Finland, and the United States) that have territorial lands within the Arctic region. The United States became an Arctic nation by virtue of the Alaska Purchase Agreement of 1867 which defined the border between the United States (Alaska) and Canada. These eight nations are also the only member states of the Arctic Council. The Arctic Council is "a high-level intergovernmental forum that provides a means for promoting cooperation, coordination, and interaction among the Arctic states," the Arctic indigenous communities, and other Arctic inhabitants on common Arctic issues.¹⁹

The Arctic is sparsely populated with a number of inhabitants and indigenous groups. The largest indigenous group, the Inuit, occupy lands stretching from Russia, Canada, Greenland, and the United States (Alaska). As the Arctic ice melts and national security challenges arise, the United States will have to partner with other Arctic Council members to foster common objectives that will satisfy national interests. This won't be an easy task, considering national objectives often will interfere with indigenous lands, culture, and population as well as the daily lives of inhabitants. Furthermore, resource exploration and exploitation could disrupt the Arctic's natural environment and ecologies. Thus, the Arctic Council must remain sensitive to the Arctic environment and indigenous population, while maintaining peace in the region and promoting initiatives that address political issues.

Territorial Disputes

Increased navigation within Arctic waters will likely create a causal effect of heightened political tension. Existing territorial disputes could erupt into conflict and new territorial disputes could emerge as the Arctic becomes more accessible.

Currently, the United States and Canada are in disagreement regarding Alaska's northern border. Canada's claim is the border should continue to run along the 141° W longitude line, as indicated by the Alaska Purchase Agreement, even when intersecting the Arctic Ocean.²⁰ The United States contends the line of demarcation should remain at right angles to the coastline, which would "move the maritime border further east," placing potential off-shore oilfields on the United States side of the border.²¹

A previous dispute occurred between Canada and the United States during the 1890s Klondike Gold Rush. The disagreement centered around the words "ten marine leagues" and from what point the leagues should be measured.²² In 1903, the British government settled the disagreement in favor of the United States, establishing their ownership of two major ports, Dyea and Skagway.²³ In doing so, the Americans maintained a significant amount of the gold rush wealth. While the Canadians disagreed wholeheartedly with the British government's decision, for the most part they accepted the agreement. However, one area of the sea lying south of Alaska's Alexander Archipelago and Prince of Wales Island and north of the Canadian Queen Charlotte Islands (known as the Dixon Entrance) still remains in dispute.²⁴ Today, the Dixon Entrance is a prominent fishing ground where both American and Canadian fishing vessels actively operate.

History indicates national sovereignty is often driven by access to natural resources. Not surprisingly, the Arctic's abundance of oil and natural gas resources will likely become the

catalyst of ever-growing tension. On the other hand, there is hope the Arctic, by virtue of increased accessibility, could just as well become the catalyst for cooperation and resolution. States may decide to put aside their differences and resolve disputes in preparation for the inevitable Arctic access. The thirty-five year long dispute over an area in the Barents Sea is a classic model for resolving such differences.

The origins of the Barents Sea dispute began in 1976 following Norway's decision "to establish a 200 nautical mile exclusion zone around its coast."²⁵ Norway claimed their decision was backed by the Svalbard Treaty of 1920. In 1920, the United States, Norway, and other European nations signed The Svalbard Treaty, ratifying the Norwegian claim to sovereignty and formally declaring Svalbard a part of Norway.²⁶ Russia viewed Norway's declared exclusion zone as encroachment on its territories. Using the definition of the "sector" principle, Russia claims its Arctic jurisdiction resides over the area "within a triangle whose three points are the North Pole and the eastern and western limits of the Russia mainland."²⁷ The difference of opinions created a disputed area in the Barents Sea as shown in Figure 4.

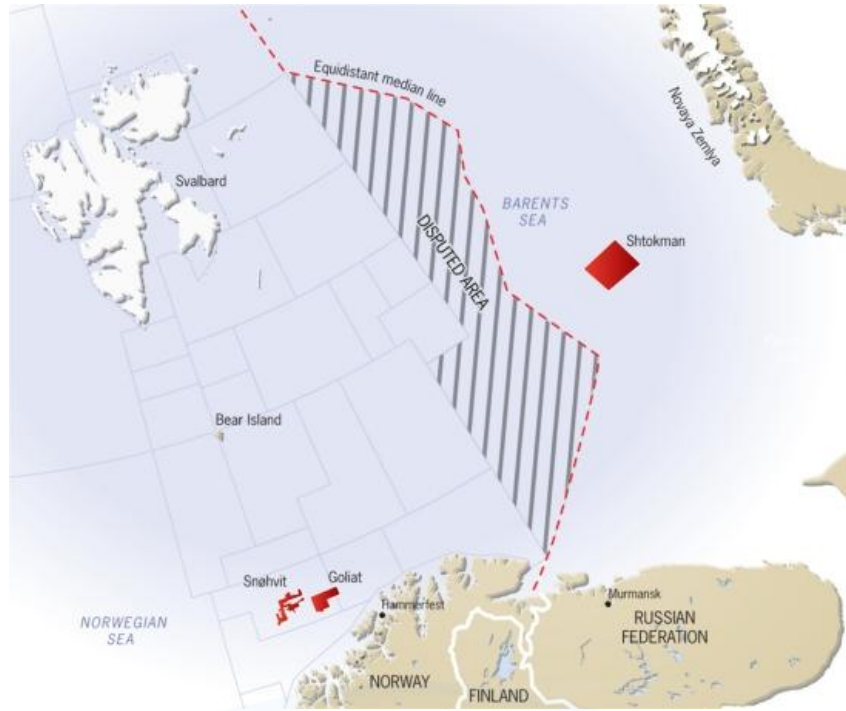


Figure 4. Disputed area in Barents Sea between Norway and Russia.

Reprinted from United Nations Environment Program (UNEP) GRID-Arendal, http://maps.grida.no/go/graphic/extraction_activities_and_disputed_areas_in_the_barents_sea (accessed 25 February 2011). Courtesy of Hugo Ahlenius, UNEP/GRID-Arendal. Sources: ESRI Inc. 1993. *Digital Chart of the World*. Redlands, USA: ESRI. ESRI Inc. 1992. *ArcWorld 1:3M*. Redlands, USA: ESRI. Norwegian Petroleum Directorate. 2006. *od_mainmap* ArcIMS map service. <http://217.68.117.237> (accessed July 20, 2006) Mareano. 2006. *mareano_oljemiljo_2* ArcIMS map service. <http://www.ngu.no> (accessed July 21, 2006) NGA. 2000. *VMAP 0, Version 5*. http://geoengine.nga.mil/geospatial/SW_TOOLS/NIMAMUSE/webinter/rast_roam.html (accessed July 14, 2006) Patterson, T. 2006. *CleanTOPO2*. <http://www.shadedrelief.com/cleantopo2/> (accessed July 20, 2006) Strande, K. 2006. 'Kart for UD'. June 15, 2006, personal email. (June 15 2006)

Peaceful exploitation of the Barents Sea's oil and natural gas reserves relies on the resolution of the international border dispute between Norway and Russia. Fortunately, both countries recognized a resolution could result in a win-win solution. In September 2010, Norway and Russia signed an Arctic border agreement ending their multi-decade dispute over this area.²⁸

As of January 2011, Canada and Denmark are currently in negotiations over the resolution of the Hans Island dispute, and officials from both countries predict an agreement will be signed before 2013.²⁹ Both countries have had "competing claims to the barren piece of rock perched

halfway between Ellesmere Island and Greenland."³⁰ Undoubtedly, the race to secure Arctic lands has accelerated the negotiation process among Arctic nations.

The Arctic's maritime channels, such as the Northwest Passage, are also likely to become areas of heightened friction and national security interest. Though not the first time, the Northwest Passage was briefly navigable during the summer of 2010. The implications of increased access to this waterway should not be ignored. Increased access will require additional security, national or international presence, and surveillance as disrupted access to the channel could have significant negative economic impact on global economies. Largely due to economic opportunities, the Northwest Passage has the greatest probability to spur political tensions between Arctic nations.

The Northwest Passage, also known as the Northwestern Passage, "is a sea route that connects the Atlantic and Pacific Oceans through the Canadian Arctic Archipelago by way of the Bering Strait."³¹ In Figure 5, red lines indicate the Northwest Passage with multiple possible routes through the Canadian Arctic Archipelago.



Figure 5. Various ways to navigate the Northwest Passage. Reprinted from *Geology.com*, <http://geology.com/articles/northwest-passage.shtml> (accessed 10 February 2011). Courtesy of *Geology.com/MapResources*.

The United States and Canada have a long history of disagreement over the jurisdiction of the Northwest Passage. Canada claims the Northwest Passage is Canadian waters which in effect would require consent from other nations to use the waterway. On the other hand, the United States, along with Japan and the European Union, dispute Canada's claim arguing the Northwest Passage is international waters in which freedom of navigation applies. Russia has now entered the debate and is siding with the United States.

The United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea (UNCLOS), which Canada ratified in 2003, affords Canada the opportunity to leverage support from the United Nations for sovereignty over the Northwest Passage. The treaty "codifies widely accepted principles of freedom of navigation" and "establishes rules for use of the world's oceans."³² Its provisions "address national security and economic interests, provide guidelines for commercial activity,

and set standards to protect the marine environment."³³ The treaty also gives coastal countries the right to control access to the belt of shoreline along their coasts. Though there are exceptions, the belt of shoreline is typically 12 nautical miles.³⁴ Under the treaty, a country can expand its territories if they can provide evidence the ridges and rock formations underneath the water are connected to its continental shelf.³⁵ Countries have ten years from when they sign the treaty to submit their scientific data to a United Nations commission to expand their territory.³⁶ Thus, Canada must submit their scientific data by 2013 which is likely to happen since Canada asserts they have the evidence to support their claim. Although UNCLOS has been ratified by 158 countries and the European Union, it does not prevent countries who have signed the treaty from disagreeing with Canada's Northwest Passage sovereign waters claim.

The Northwest Passage dispute and other social and political issues in the Arctic Ocean will give rise to more attention as more maritime vessels seek to utilize Arctic waterways. Rather than resorting to direct conflict, most nations will likely seek political and institutional support to assist them in resolving their issues. As the Arctic is predominantly a maritime domain, UNCLOS is considered by many nations to be the legal framework that will govern most of the Arctic activities. In the event Canada does submit their territorial claim, the United States may find itself at a great disadvantage. As a world leader, the United States' lack of accession to UNCLOS will not only negatively impact their ability to maintain order throughout the Arctic region as the region becomes more accessible, it will also reduce their status as a prominent stakeholder at the negotiating table when fostering solutions to contentious issues. Ratification is a positive step in advancing America's interests abroad. It is also a powerful vehicle by which the United States can send an unequivocal message that America supports multilateral cooperation and international law of the sea.³⁷

The United States is making progress towards UNCLOS ratification. In 2009, former President George W. Bush signed a National Security Presidential Directive on United States Arctic Policy. One of the most notable provisions of the document was a recommendation to the United States Senate to ratify the Law of the Sea Treaty. The United States Arctic Research Commission, a federal agency established in 1984 to develop an integrated national Arctic research policy, continues to urge the United States Senate to accede to the Law of the Sea Treaty. Lastly, the 2010 United States National Security Strategy asserts the United States "will pursue ratification on the United Nations Convention on the Law of the Sea."³⁸

In essence, territorial disputes driven largely by oil and natural gas exploration and national sovereignty are national security implications that will impact the United States and their interests. Increased access to Arctic waterways could easily become an impetus of regional political, social, and economic tension. In reality, the Arctic's political environment will have a causal effect on both regional and global economics which will do nothing more than increase the United States' interests in the Arctic region.

Section III - Economic Analysis

Economic growth may one day turn out to be a curse rather than a good, and under no conditions can it either lead into freedom or constitute a proof for its existence.
- Hannah Arendt³⁹

How will the domestic or foreign economic policies of the United States be affected by Arctic ice melting? Increased access to the Arctic will be the next global economic cataclysm. According to a survey by the United States Geological Survey, the Arctic is expected to have 13 percent of the world's undiscovered oil and 30 percent of its undiscovered natural gas reserves.⁴⁰ Exploration of these natural resources will likely alter the world's gas and oil markets, not just in the near future but for decades to come.

A nation's sustainable economic development relies on access to raw materials and natural resources. Without access, economies will starve and will eventually collapse. According to Anthony Giddens, former Director of the London School of Economics, "the US is already seeing the world as a struggle for energy resources."⁴¹ Since the early 1990s, China has emerged as a powerful global nation not because of its overbearing political or military stance but because of its desire to acquire raw materials to sustain its ever-growing economy. In 2010, China surpassed the United States as the top energy consumer in the world and China's recent agreement with Russia, the world's biggest oil producer, to open an oil pipeline between the two nations is evidence of its drive to secure resources for its exploding economy. Worldwide attention can't help but be drawn to natural resources, their availability, and yet their scarcity. "There is a now 'a qualitative shift in US thinking' prompted 'not by an optimistic faith in America's capacity to dominate the world economy but by a largely pessimistic outlook regarding the future availability of vital resources.'"⁴²

Based on this pessimistic outlook, the Arctic's resources become more attractive. Increased access to the Arctic means increased access to its natural resources. The Arctic is a relatively unexplored region. For some nations, an unchartered frontier coupled with plentiful resources will represent enormous economic growth opportunities. Yet for other nations, exploration of the Arctic's resources will only widen the gap between developed countries and non-developed countries.

Accessible Waterways

Both the Northwest Passage and the Northern Sea Route, along Russia's Siberian coast, were navigable for a few months in the summer of 2010. Accessibility to these Arctic waterways is expected to increase as the Arctic's multi-year ice decreases. Navigation through these maritime channels will have significant global economic impacts since using these waterways will result in a tremendous decrease in sailing distances between major ports.

The Northwest Passage is expected to decrease the sailing distance from Seattle, Washington (United States) to Rotterdam, Netherlands by 2,000 nautical miles as indicated in Figure 6.⁴³ This distance is 25 percent shorter than the current route via the Panama Canal.⁴⁴

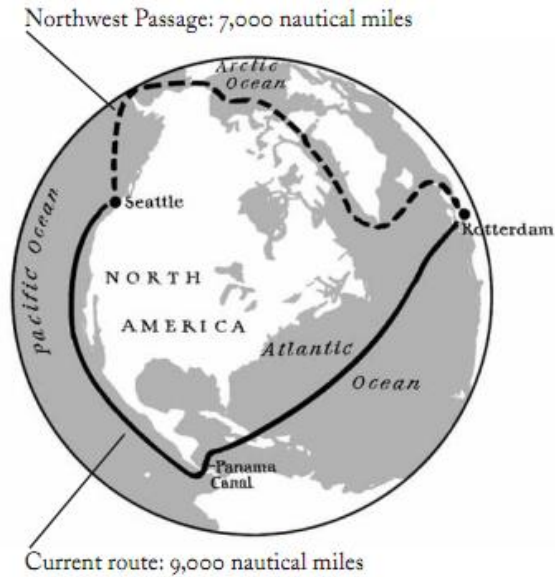


Figure 6. Northwest Passage sailing distance. Reprinted from Scott G. Borgerson, "Arctic Meltdown: The Economic and Security Implications of Global Warming," *Foreign Affairs*, Vol. 87, No. 2 [March/April 2008]: 69.

Navigating through the Northern Sea Route, shown in Figure 7, would result in a 40 percent reduction in the sailing distance between Rotterdam, Netherlands and Yokohama, Japan.⁴⁵ The current route of 11,200 nautical miles, which includes passage via the Suez Canal, would decrease to a total distance of 6,500 nautical miles.⁴⁶



Figure 7. Northern Sea Route sailing distance. Reprinted from Scott G. Borgerson, "Arctic Meltdown: The Economic and Security Implications of Global Warming," *Foreign Affairs*, Vol. 87, No. 2 [March/April 2008]: 69.

Emerging Markets

Decreasing the distances of the oceanic routes between Europe and Asia is likely to expand existing markets throughout the world. Nations that could only export commodities through the Panama Canal or Suez Canal will soon have the option of exporting their commodities through the Arctic's oceanic waterways at lower or comparable costs. In August 2010, a Norwegian, Russian, and Danish partnership enabled a Danish-owned ice-class bulk carrier carrying iron-ore concentrate to transit from Norway to China, passing through Russia's Arctic waters and the Northern Sea Route.⁴⁷ Russian authorities presented the first-ever approval for a foreign vessel to transit from a foreign port to a foreign port through Russian waters.⁴⁸ According to the Russian and Norwegian shipping partners, the Northern Sea Route will be open for transit

voyages for two to four months per year and they expect the number of shipments and transits across the Arctic to increase significantly in the years to come.⁴⁹ In the case of the August 2010 historic transit, the Northern Sea Route shortened the sailing distance to China by approximately one third.⁵⁰ Shipping distances drive costs and shorter shipping distances decrease the time it takes for commodities to become available at the destination. According to a general director of one of the Russian icebreakers, the Northern Sea Route provides a 45 percent time saving compared to the southern route through the Suez Canal.⁵¹ Novatek, Russia's largest independent gas producer, estimates it can save 10 to 15 percent on transportation costs by using the Northern Sea Route.⁵² Word of the time and cost savings figures is spreading quickly. As of September 2010, the Russian nuclear ice breaker fleet Atomflot had received 15 orders for 2011 icebreaker escort operations on the Northern Sea Route, more than they have received in any previous year.⁵³

Global trade thrives on the ability of nations to increase their profit margins and reduce the relative costs of their goods. However, with shorter sailing distances and decreased transportation costs, profits of current suppliers to Asian markets may be negatively impacted if European suppliers can provide goods cheaper and faster. The same could be true for other markets as well.

How will this type of market flow impact American markets and could these activities in fact become detrimental to existing markets in the United States? For example, as the Arctic's maritime channels become more navigable, it is possible to encounter a scenario where some Asian products could be imported and sold cheaper in the United States than their respective American products. Given that scenario, it is also possible to imagine certain sectors of the existing American markets taking a downfall due to the cheaper Asian products that have entered

the market. The market forces may be so significant, the American markets may never recover. This scenario could easily become a reality. In essence, trade frictions between nations are likely to increase as Arctic oceanic shipping lanes become more navigable. These activities will not only impact the United States' world economic policies, they could lead to unwanted political and social tension as well.

Regional Instability - Global Economic Impact

Many global economies rely on trade passing through two major shipping routes, the Panama Canal and the Suez Canal. Understanding the impact these two canals have on global economics and regional stability is relevant to understanding economic national security implications the Arctic region may present in the near future.

Approximately "14,000 vessels carrying 5 percent of the world's ocean cargo" pass through the Panama Canal each year.⁵⁴ Although the canal frequently operates at 90 percent capacity, the Panama Canal Authority, the agency responsible for operating the Panama Canal, has a difficult time keeping up with the flow of vessels.⁵⁵ The Panama Canal has become a bottleneck for shipping vessels passing through the Isthmus of Panama. Often, bidding wars take place to determine which vessel may pass through first. In October 2006, Panama voted to expand the canal which will double the canal's current capacity and allow the canal to accommodate larger container vessels that do not fit through the current locks.⁵⁶ The expansion project is critically important to sustainable economics and global trade as the larger container vessels are expected "to represent 37 percent of the world's container ships" by 2011.⁵⁷

Egypt's Suez Canal can already accommodate the larger container vessels and handles 20 percent more traffic than the Panama Canal.⁵⁸ The Suez Canal also generates more than twice as much revenue as the Panama Canal.⁵⁹

Thus, adding a third major international shipping route, the Arctic Ocean, could have significant economic effects. These effects are not necessarily negative. Increased activity and development in the Arctic could boost the Arctic's local economies and increase the standard of living in the region. Expansion of commercial shipping lanes and competition from the Arctic's navigational routes could decrease overall shipping costs as the Suez Canal and the Panama Canal compete with the new route. To maintain a competitive advantage, canal authorities in Egypt and Panama may reduce canal fees which would likely lead to an increase in global trade.

A majority of Asian and European trade currently flows through the Suez Canal. However, any large scale diversion of oceanic traffic away from the Suez Canal could have global security implications.⁶⁰ The Suez Canal tolls represent Egypt's second largest source of foreign currency earnings.⁶¹ If those tolls are significantly reduced, Egypt could fall victim to increased economic instability which could lead to regional instability for the entire Middle East.⁶²

Regional instability can easily overflow into global instability. In January 2011, politically-driven anti-government protests throughout Egypt erupted into chaos and violence. Though Egypt is not a major oil producer, it controls the Suez Canal through which passes approximately 2.4 million barrels of oil per day, roughly the same as the daily output of Iraq or Brazil.⁶³ Egypt's current internal political instability has caused the Maersk Line, the largest container shipping company in the world, to halt operations in Egypt potentially causing a chain reaction should other companies do the same.⁶⁴

Even more disturbing is the impact the Egyptian anti-government protests had on the global energy market. The price of oil surged to \$101 per barrel on 1 February 2011 as Egyptian protests continued for the seventh straight day.⁶⁵ Economists have indicated oil prices rose because of regional volatility and political uncertainty. Regardless of whether Egypt's protests

remain contained within their borders, the protests have had far-reaching social, political, and economic global effects. Furthermore, the current political instability of Egypt has led to worldwide skepticism of achieving peace in the Middle East. Similarly, it is not difficult to imagine the cascading global economic effects increased activity in the Arctic region could create. The Arctic could easily become the epicenter of global conflict and tension. An alternative to the misapplication of the Arctic region as the epicenter of global conflict and tension is to use it as a global platform from which to address globalization, energy security, and environmental security.

It is in the United States' best interest to remain vigilant of the second and third order effects capable of increasing political, social, and economic tension. As developed countries profit from economic growth opportunities and as non-developed countries become increasingly frustrated with slow progress, the United States must remain a nation of positive global influence in maintaining peace and stability throughout the world.

Section IV - Military Analysis

Often, [America's] desire to help collides with the cold calculus of national interest. Americans are willing to commit their diplomatic, political, and economic resources to help others. We proudly and readily allow our young sons and daughters in uniform to participate in humanitarian enterprises far from home. But when the fighting starts, and American lives are at risk, our people rightly demand to know what vital interest that sacrifice serves.

- General Colin Powell, USA (Retired)⁶⁶

Expanded access to the Arctic will present security challenges for the United States. Social, economic, political, and environmental disagreements with regional and global strategic implications could fuel tensions that could easily turn into conflict. While skilful diplomacy will remain the backbone for the United States to build trust and forge alliances, America's global political role depends, in part, on its strong military capabilities and willingness to use force. As cited in the United States National Defense Strategy, "U.S. interests include protecting the nation and our allies from attack or coercion, promoting international security to reduce conflict and foster economic growth, and securing the global commons and with them access to world markets and resources."⁶⁷ These interests are especially applicable to the Arctic region as human activities increase due to improved access. To that end, the United States must develop and maintain military capabilities to protect its interests, to mitigate conflict, and to promote peace and security in the region.

Safety

Immediate Arctic security challenges revolve around safety. Currently, there are virtually no standards for vessels operating in Arctic waters. Additionally, the 2009 Arctic Marine Shipping Assessment Report, prepared under the direction of the Arctic Council, indicated there are no "uniform, international standards for ice navigators and for Arctic safety

and survival for seafarers in polar conditions."⁶⁸ Arctic maritime channels have only recently been navigable, for short durations of the year, by icebreaking ships. However, as more Arctic sea ice melts, the number of maritime channels and vessel traffic is likely to increase. In October 2010, the director of the National Oceanic and Atmospheric Administration (NOAA), candidly admitted, "charting data in much of the Arctic is woefully out of date or nonexistent."⁶⁹ He also stated, "inadequate charts pose a significant risk for marine safety, potentially leading to loss of life or environmental disaster."⁷⁰ In that same month, the United States collaborated with other Arctic states to develop nautical charts to improve the safety for mariners transiting the Arctic Ocean. Additionally, representatives from Canada, Denmark, Norway, Russia and the United States established a new Arctic Regional Hydrographic Commission whose goal is to promote cooperation by using science and technology to improve safety of life at sea, protect the Arctic ecosystem, and promote social and economic development.⁷¹

In addition to the Arctic Regional Hydrographic Commission, the International Maritime Organization (IMO) may also provide keen insight, direction, and guidelines into Arctic maritime safety. The IMO is a specialized agency of the United Nations whose responsibilities include: (1) develop "measures to improve safety and security of international shipping" and, (2) facilitate international maritime traffic.⁷² From a national security perspective, ensuring safe transportation through and within Arctic waters is important to the United States' security, environment, and economy. Calling on organizations with expertise in these critical matters demonstrates the United States' commitment to the safety and security of international sea.

United States Coast Guard's Role

The United States Coast Guard will have a very important role in protecting America's maritime interests in the Arctic region. In 2003, the Coast Guard became part of the Department

of Homeland Security; however, it can operate under the Department of the Navy in time of war or when directed by the president.⁷³ The Coast Guard is the single United States operator of heavy icebreakers and has fulfilled this role since the Navy transferred its icebreakers to the Coast Guard in 1965.⁷⁴ Since the transfer, the Coast Guard has been responsible for maintaining the nation's military icebreakers, which are capable of operating in both polar regions. The United States Coast Guard's mission includes, but is not limited to: ports, waterways and coastal security; aids to navigation; search and rescue; marine safety; defense readiness; and ice operations.⁷⁵ Protection of coastal shores and ports is a critical aspect of homeland defense and security. Alaska's Arctic coastline is a little over 1,000 miles long, and its low tidal shorelines are just over 2,000 miles long.⁷⁶ Based on the current status of its icebreakers, the Coast Guard cannot adequately protect Alaska's Arctic coastline. They have also stated they do not have adequate resources to respond to major emergencies in the Arctic region.

Icebreakers

Arctic operations require the use of icebreakers. Heavy icebreakers, one of several icebreaker categories, are ships that have the capability to break "6 feet of ice continuously at 3 knots, and can back and ram through at least 20 feet of ice."⁷⁷ The Coast Guard has three polar icebreakers. Although primarily used to break ice, the icebreakers are also used to support scientific research operations and perform other Coast Guard missions.⁷⁸ Both of the Coast Guard's heavy icebreakers, the *Polar Sea* (commissioned in 1977) and the *Polar Star* (commissioned in 1976), are currently inoperable. These icebreakers have exceeded their intended 30-year service life, which makes them difficult to maintain.⁷⁹ The Coast Guard's third icebreaker, *Healy*, was commissioned in 1999 but has less icebreaking capability than the other

two icebreakers. *Healy* is a medium polar icebreaker and is used primarily for supporting scientific research operations in the Arctic.⁸⁰

In fiscal years 2009 and 2010, the United States Congress provided funding to repair *Polar Star* to extend her service for another seven to 10 years.⁸¹ The Coast Guard does not expect the *Polar Star* repairs to be completed until 2013. In an October 2010 interview, the Commandant of the Coast Guard, Admiral Robert J. Papp, Jr., reaffirmed the Coast Guard's icebreakers need to be renovated or replaced in order for the "United States to sustain an active presence and support our sovereignty" in the Arctic region.⁸²

The Coast Guard's request for more icebreakers is not a new agenda. In 1990 the Coast Guard, Department of Transportation, Department of Defense, National Science Foundation, and Office of Management and Budget prepared a report to the President of the United States on polar icebreaker requirements.⁸³ This report reiterated that, "as instruments of national policy and presence, icebreakers are necessary to meet the legitimate needs of national defense and security, to demonstrate the full range of national sovereignty, and to protect economic interests."⁸⁴ The discussion on the lack of United States icebreaking capabilities is best summarized by statements made in a 2008 memorandum sent to the Chairman of the Joint Chiefs of Staff from the Commanders of United States Transportation Command, United States Pacific Command, and United States Northern Command. The memorandum stated, "the nation's icebreaking capability has diminished substantially and is at risk of being unable to support our national interests in the Arctic regions. An example of our reduced icebreaking capability is last season's McMurdo Station resupply mission where USNS GIANELLA spent 50 hours in pack-ice awaiting escort from a leased Swedish icebreaker."⁸⁵

Other Maritime Capabilities

Icebreaking ships will enable the United States to project an active military presence in the region. While icebreakers will play a crucial role in protecting America's national interests, sovereign lands, and citizens, additional maritime security capabilities should be explored. Airborne maritime surveillance operations, similar to the ones conducted in the Strait of Malacca, can assist with mitigating piracy risks and protecting access to shipping lanes. In 2005, Singapore, Malaysia, and Indonesia launched a successful airborne maritime surveillance program known as 'Eyes in the Sky' to protect vessels from piracy attacks.⁸⁶ The results of the multinational maritime patrol program cannot be understated. In the 2005 International Maritime Bureau Annual Report on Piracy Against Ships, the number of piracy attacks dropped "from 38 in 2004 to only 12 attacks in 2005."⁸⁷ Global economies rely on the protection of the shipping lanes as the vessels passing through the strait carry approximately 40 percent of global shipping trade.⁸⁸ Utilizing aircraft such as the C-130 and airborne surveillance capabilities that included the use of inverse synthetic aperture radar, airpower was able to aptly demonstrate its effectiveness in maritime control. Similar types of airpower application may be beneficial in protecting the Arctic's maritime channels.

United States Arctic security and defensive measures may also require the capabilities of the existing North American Aerospace Defense Command (NORAD) early-warning radar sites. NORAD's mission can be best be described as follows:

[NORAD] is a United States and Canada bi-national organization charged with the missions of aerospace warning and aerospace control for North America. Aerospace warning includes the monitoring of man-made objects in space, and the detection, validation, and warning of attack against North America whether by aircraft, missiles, or space vehicles, through mutual support arrangements with other commands. Aerospace control includes ensuring air sovereignty and air defense of the airspace of Canada and the United States.

Through outstanding bi-national cooperation, NORAD has proven itself effective in its roles of watching, warning, and responding. NORAD continues to play an important role in the defense of Canada and the U.S by evolving to meet the changing threat. The events of September 11, 2001 demonstrated NORAD's continued relevance to North American security. Today, NORAD provides civil authorities with a potent military response capability to counter domestic airspace threats should all other methods fail.⁸⁹

In May 2006, the United States and Canada extended the NORAD mission to include maritime warning, which entails a "shared awareness and understanding of the activities conducted in U.S. and Canadian maritime approaches, maritime areas and internal waterways."⁹⁰ Ironically, in 2007, the Pentagon had to close three of its 20 NORAD radar sites in northern Alaska due to soil erosion caused by waves exposed by warmer, ice-free Arctic waters.⁹¹ Fortunately, the loss of these radar sites had no negative impact on NORAD's aerospace defense capabilities because of redundant radar coverage. NORAD's expanded mission and proven capabilities under bi-national initiatives is a model to replicate. It is a model that can readily be applied to the Arctic region. Through multilateral cooperation, nations can minimize fiscal responsibilities while meeting short-term strategic goals. In essence, nations who recognize their lack of Arctic capabilities and shortfalls should work cooperatively with other nations to foster common objectives.

Search and rescue capabilities should be another key area of concern for the United States. Standardized international marine guidelines on mandatory ship construction, design, required equipment, crew training, and ice operations are virtually non-existent. As more ships and humans utilize the Arctic's accessible waters, the number of accidents will likely increase. Search and rescue operations are rarely simple tasks, and the complexity increases significantly when you consider the Arctic's environment stressors. The need to develop and establish standards for some of these foreseeable Arctic operations has not gone unnoticed. According to Canada's CBC News, the Arctic Council is in the process of creating a treaty to clarify how

countries will deploy and coordinate Arctic search and rescue resources and operations. The treaty will "require signatory countries to work together in the event of an oil spill, plane crash, maritime emergency, or other major disaster."⁹² Representatives from the Arctic Council member nations are expected to sign the treaty in May 2011.⁹³

Regional safety and security, and protection of national interests will encompass a wide range of national and multinational initiatives. In 2010, the DOD admitted they lack military capabilities and need to work in concert with the Coast Guard and the Department of Homeland Security on initiatives to "address gaps in Arctic communications, domain awareness, search and rescue, and environmental observation and forecasting capabilities."⁹⁴ In the post 9/11 environment where the types of enemy attacks are less predictable, the maritime security paradigm can no longer be strictly defined for the Arctic or any other region of the world. The types of threats today are different than they were during the Cold War. The recent conflicts in Iraq and Afghanistan had the United States Armed Forces entrenched both in physical conflict as well as political, economic, social, and humanitarian conflicts. The foreseeable conflicts in the Arctic are likely to have a similar mixture.

The United States military faces a conundrum. The military will potentially have the difficult challenge of protecting national interests in an environment in which they lack adequate equipment and capabilities. However, national agendas should evolve to accommodate the nation's men and women in uniform. Strategists should be forthcoming with equipment, resources, and training to address future security and military challenges in the Arctic region. The United States should cooperate with other nations to identify common interests and objectives that may result in partnered solutions to comprehensively address regional and global security challenges. The United States military has already shown signs of its willingness to

embrace a collective approach to address Arctic security challenges. In one of its 2010 national strategic documents, the United States expressed such an interest by identifying a desire to work with Russia on emerging Arctic issues and "the need for effective missile defense architectures designed to protect the [Arctic] region from external threats."⁹⁵ Efforts such as these could bolster international cooperation and strengthen partnerships.



Recommendations

Based on the research findings, the United States will face complex national security challenges as the Arctic ice continues to melt. Increased access to the Arctic region will raise human, social, environmental, political, economic, and homeland security concerns. If not properly addressed, those concerns could easily evolve into a global conflict. Therefore, it is important to have plans, institutions, and frameworks in place to address Arctic issues as they arise. The United States national security agenda should incorporate the following recommendations, which represent a comprehensive, pragmatic approach in addressing national security implications.

First, the United States should promote safety and security in the Arctic region. Immediate concern should be to work with other nations to develop complete and accurate nautical charts and standards for vessels navigating through Arctic waters. Improving safety at sea in one of the harshest environments on earth is of utmost importance. Outdated charts pose significant risks to all seafaring vessels and sailors who seek to navigate the Arctic Ocean. Nautical charts will be critical to all future Arctic operations, to include search and rescue, military, and homeland security missions. International icebreaking vessel standards need to be established. These standards will help to protect human lives and to mitigate environmental disasters as many of the vessels will be carrying oil and other commodities that would be detrimental to the environment in the event of an accident. The United States should also cooperate with the Arctic Council and other organizations such as the IMO, to set standards that will enhance safety and security of international shipping. International compliance monitoring programs should complement safety and security standards to measure and maintain their effectiveness.

Second, the United States should leverage its political power and diplomatic ties to mitigate tension by resolving existing sovereignty issues in the Arctic. Resolution of territorial disputes is strategically important since it could establish the foundation for peace and stability in the region. The United States should focus first on resolving its territorial disputes with Canada, but it should continue to work multilaterally to assist in resolving other Arctic territorial issues. Because of their global influence, Russia and Canada will become key partners for the United States in shaping the region to meet the United States' national objectives. The United States should foster close partnerships with these two respective countries in light of the inevitable geopolitical challenges in the foreseeable future.

Third, the United States Senate should ratify UNCLOS. As the only Arctic nation that has yet to ratify UNCLOS, the United States may lose political leverage when negotiating or discussing issues pertaining to the region. Since the Arctic is primarily a maritime domain, UNCLOS is widely considered, by many nations, as the legal framework which will govern most of the Arctic's activities. Treaty ratification is a sign of America's support for multilateral initiatives and the international law of the sea.

Fourth, a multilateral, cooperative approach is necessary to address and resolve Arctic issues. The Arctic is a harsh, vast environment that requires numerous capabilities and resources to maintain security throughout the region. The Department of Homeland Security and the Department of Defense should review their capabilities, requirements, strategies, and agendas to prepare for Arctic ice operations. In doing so, they should also evaluate the capabilities of other nations. Bilateral initiatives, such as the NORAD mission with Canada, may be a viable solution to enhance the United States' defense, awareness, and monitoring capabilities. This type of cooperation shares operational costs and can assist the United States to become fiscally

responsible in the short-term while it plans and budgets for future acquisitions. Immediate attention should focus on plans to expand icebreaker capabilities. The Coast Guard's icebreaker capabilities are insufficient; funding should be provided to enable the Coast Guard to provide safe, reliable icebreaker capabilities to increase their mission effectiveness.



Conclusion

Like the canary in the coal mine, the climate changes already evident in the Arctic are a call to action.

- Andres Avila

This paper's research findings indicate Arctic ice melting will have national security implications. There should be no skepticism about the geological changes taking place in the Arctic. Scientists have concluded Arctic sea ice is melting at an ever-increasing rate. Increased access and activities in the region will present complex security challenges. Political and economic friction may increase as the region emerges as a strategic crossroads of territorial disputes and oil and natural gas exploration. Despite numerous challenges, the Arctic brings renewed hope to the international community at large. The Arctic's ever-changing environment could easily become the catalyst for multilateral cooperation and resolution. Its abundant natural resources, namely oil and natural gas reserves, may help alleviate global energy security concerns. Increased access to maritime channels and shorter sailing distances will likely reduce global transportation costs. The Northern Sea Route and the Northwest Passage are likely to become viable alternative shipping routes between Europe and Asia. As a result, global trade and emerging markets are likely to increase.

Planning to address these challenges will be a daunting task. Military capabilities are lacking, which severely impacts the ability of the United States to protect its national interests and mitigate conflict in the region. The United States should consider immediate action to address the inevitable security challenges Arctic ice melting will create in the very near future. The United States is not alone in this quest . . .it should leverage the knowledge, capabilities, and resources of other nations to foster common initiatives to meet its national objectives.

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