

AU/ACSC/2014

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

TAMING THE POLAR BEAR

by

Mikkel N. Behrens, Maj, RDAF

A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

Advisor: Dr. Jeffrey M. Reilly

Maxwell Air Force Base, Alabama

April 2014

Disclaimer

The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the US government or the Department of Defense. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.

TABLE OF CONTENTS

	<i>Page</i>
DISCLAIMER	II
TABLE OF CONTENTS.....	III
ABSTRACT.....	IV
PART 1. INTRODUCTION.	1
PART 2. CONFLICT POTENTIAL IN THE EUROPEAN ARCTIC.....	3
Changing operational environment in the Arctic.....	3
Conflict in the European Arctic: Svalbard Scenario.....	9
PART 3. RUSSIAN A2AD CAPABILITIES AND LIKELY STRATEGY.....	12
Russian A2AD capabilities.	13
Russian A2AD strategy in the European Arctic.	18
PART 4. U.S./NATO RESPONSE TO RUSSIAN A2AD CHALLENGE.....	23
Iceland.....	24
Conventional Deterrence.	26
PART 5. CONCLUSION.....	30
END NOTES	33
BIBLIOGRAPHY	38

ABSTRACT

The Arctic environment is changing, drastically revealing opportunities and vulnerabilities. In this environment, the U.S./NATO could be challenged by a failing and assertive Russia in a potential conflict in the form of a limited conventional war comparable to the Falklands war. Russia's vast arsenal of Anti-Access/Area Denial (A2AD) capabilities in the space-, cyber-, air-, land and maritime domains constitutes a challenge to deny the U.S./NATO access to, or denial in, a conflict scenario in the European Arctic. This paper explores the changing Arctic environment and conflict potential, Russian A2AD capabilities and likely A2AD strategy. This to answer: how should the U.S./NATO respond to the risk of a potential conflict with Russia in the European Arctic and what is Iceland's role in such a response? The U.S. response to A2AD challenges is the Joint Operational Access Concept and Air-Sea-Battle (ASB) concept; however, as conflict should be avoided, these concepts are used to outline credible conventional deterrence to deter Russia. This is essential to support peaceful conflict resolution and enable successful U.S./NATO operations if peaceful cooperation and deterrence fails. The paper finds that U.S./NATO ability and will to execute ASB in the European Arctic is the necessary conventional deterrent to deny a likely Russian A2AD strategy. The cornerstone of this is remilitarization of Iceland, as Iceland is key strategic terrain for projection of power into the European Arctic, therefore key to ASB execution. This through credible forward military presence on Iceland, and through preparation of the European Arctic for successful execution of ASB by prepositioning of supplies and equipment, preparation of facilities and infrastructure to enable rapid force generation.

Part 1. Introduction.

Although the inventions and developments of the military-industrial complex in Russia have waned since the dissolution of the Soviet union, Soviet/Russian military capabilities are proving a major Anti-Access/Area-Denial (A2AD) challenge to U.S. ability to project power on a global scale, both in the hands of present perceived threats of China and Iran – and in the hands of Russia herself. Russian military capabilities in space, cyber, air, land and maritime domains constitutes a challenge to deny the U.S./NATO access to, or denial in, a conflict scenario against a failing and assertive Russia formed by the changing environment in the Arctic. To meet this challenge the U.S./NATO must ensure credible forward military presence in the European Arctic, primarily focused on Iceland; Thereby establishing credible conventional deterrence to deter Russia, support peaceful conflict resolution and enable successful U.S./NATO operations if peaceful cooperation and deterrence fails.

Although protracted counter insurgency wars have been dominant in the first decade of the 21st century, Dr. Colin S. Gray argues that future challenges could include a return to great power rivalry, in addition he lists adverse climate change and resource rivalries and shortages as future challenges among others.¹ Herein, according to Dr. Colin S. Gray, a resurgent Russia could once again play a serious contender in a conflict against the U.S./NATO, if Russia should choose to resolve geostrategic challenges with the resolve and force demonstrated in the 2008 war against Georgia.² The same resolve and cunning has been displayed in Crimea and Ukraine in 2014. In such a future environment of adverse climate change, U.S/NATO could face a resurgent Russia in a conflict over economic, resource and territorial interests, should cooperation, diplomacy and deterrence fail in the European Arctic. This paper examines the challenge through a potential U.S./NATO-Russia armed conflict over the Svalbard archipelago

and adjacent waters after discovery of major oil or gas deposits within the area presently regulated by the 1920 Svalbard Treaty. The key research questions are: how should the U.S./NATO respond to the risk of a potential conflict with Russia in the European Arctic and what is Iceland's role in such a response?

To examine the challenge and answer the research questions the paper is structured as follows: Part one covers thesis, delineation, research questions and the overview. Part two explores the changing arctic environment and conflict potential, herein traits of a potential conflict in the Svalbard scenario. Part three analyzes Russia's capability and likely strategy in the scenario: Russia's A2AD capabilities, and why and how Russia would employ an A2AD strategy in a conflict in the European Arctic, based on definition of anti-access and area denial, and use of Dr. Sam J. Tangredi's 5 fundamental elements of A2AD strategies on the Svalbard conflict scenario. Part four explores the U.S. answer to A2AD challenges and how to address the specific Russian A2AD challenge in a conflict in the European Arctic, the central role of Iceland in such a conflict, conventional deterrence and how the U.S./NATO can establish a credible conventional deterrent based on deterrence by denial of a Russian A2AD strategy as a response to the risk of conflict in the European Arctic. Part five answers the key research questions, summarizes the conclusions of the preceding chapters and gives an outlook on the conclusion.

I cannot forecast to you the action of Russia. It is a riddle wrapped in mystery inside an enigma; but perhaps there is a key. That key is Russian national interest.

Winston Churchill: Radio broadcast 1 October 1939

Part 2. Conflict potential in the European Arctic.

The Arctic possesses a prospect of a combination of the factors of future conflict listed by Dr. Colin S. Gray and has unresolved territorial disputes. The 2008 US Geological Survey (USGS) assessed that the Arctic contains vast undiscovered oil and gas resources.³ In a future of increased competition for scarce resources, the prospects of the Arctic resources could spark competition among the Arctic countries – and possibly conflict, when adverse climate change makes those resources profitable and accessible for extraction. In addition, climate change is expected to reduce the ice cover of the region as a whole, allowing shipping to operate across the Arctic Ocean, initially during ice free summers; reducing transit time for shipping from the US east coast and Europe to the Far East through the North West Passage or North East Passage.⁴ This opening of the Arctic for shipping could create new lucrative sea lines of communication changing the dynamics of the world's shipping industry. Moreover, the Arctic nations of Canada, Denmark, Norway, Russia and the U.S. are challenged by the prospect of extension of Exclusive Economic Zones (EEZ) beyond 200 nm in the Arctic based on the continental shelf; Russia, Norway, Canada and Denmark have already claimed an extension of their EEZ.

Changing operational environment in the Arctic.

The Arctic environment is changing; the last decade has exhibited a number of record lows in summer ice levels, scientist agree that the Arctic sea in the future will have sea ice free summers, some claim this to be within three to four decades, others suggest this state will be reached much earlier. According to National Oceanic and Atmospheric Administration (NOAA)

the year 2012 exhibited a record summer minimum sea ice extent; equal to 49 percent below the 1979–2000 average minimum.⁵ In addition, the period 2007-2012 exhibited the six lowest summer minimums of sea ice extent on record, since satellite observation began in 1979.⁶ The rapid decline in summer sea ice extent has led to the prediction that future summers will be sea ice free in the Arctic, although scientists differ on when such a state of ice free summers will be reached; most agree that it is a question of when, and not if.⁷ Scientist from NOAA and University of Washington estimate “the Arctic will be nearly ice free in three or four decades.”⁸ In the other end of the predictive spectrum is Maslowski from the Naval Postgraduate School, he estimates “that the Arctic could lose its summer ice cover by the end of this decade.”⁹ Nonetheless, Arctic sea ice is receding, and scientists predict that summers can be sea ice free in the future.

Regardless of when the Arctic will be sea ice free in the summer, present summer minimum sea ice extent has enabled the use of two major sea-lines-of-communications (SLOCs): The Northwest passage and the Northern Sea Route, both displaying great economical potential for the shipping industry, will become useable to shipping as Arctic sea ice recedes further. The Northwest Passage is the stretch from the Lancaster Sound to the Bering Strait, a route shorter than the normal commercial route to the Far East through the Panama Canal. In 2013, the receding sea ice enabled the first ever bulk-freighter to transit through the Northwest Passage, saving 1000 nautical miles, demonstrating the economic potential for shipping in use of the Northwest Passage.¹⁰ In addition, receding sea ice has enabled the use of the Northern Sea Route, transiting from Europe, north off the Russian Siberian coast and through the straits of Russian arctic island within the Russian EEZ, to the Bering Strait.¹¹ In 2012 Russian authorities gave permission to 370 ships to use the route, an increase from 4 permits in 2010; this enabled

by the receding sea ice, and the winds from Siberia, blowing sea ice towards the deep sea, making it more passable than the Northwest passage.¹²

In addition to enable shipping, reduced sea ice extent, or even a sea ice free arctic, will enable exploration of the Arctic seabed, and extraction of resource deposits previously inaccessible due to sea ice; most lucrative of which is energy resources. The 2008 USGS estimated the amount of oil and gas north of the Arctic Circle to “90 billion barrels of oil, 1,669 trillion cubic feet of natural gas and 44 billion barrels of natural gas liquids.”¹³ An equivalent of 30% of the world’s undiscovered gas and 13% of the world’s undiscovered oil.¹⁴ However, USGS estimates that 84% of these undiscovered oil and gas deposits in the Arctic are off-shore.¹⁵ Thus, is exploration and extraction of off-shore oil and gas highly dependent on the receding sea ice level; although, exploration and extraction of off-shore oil and gas is an expensive and challenging feat, especially in the Arctic, future resource shortages in combination with receding sea ice levels can make the extraction of off-shore oil and gas in the Arctic profitable.

The receding sea ice and possible ice free summers has sparked the Arctic nations’ interest in exploiting the new prospects of economic gain, be it energy resources, fishing or sea-lines-of-communications. The right to extract resources under United Nations Convention of the Law of the Sea (UNCLOS), both on the seabed and in the sea itself depends on the 200 NM EEZ, and any recognized extensions hereof based on the continental shelf. Presently, the issue of extension of the 200 NM EEZ has not been resolved, and claims have been issued by all the Arctic nations; except the U.S. who, as the only Arctic nation has not ratified UNCLOS, and is therefore unable to make claims in accordance with UNCLOS. Russia made a claim in 2001, based on the continental shelf, mainly the extension of the Lomonosov Ridge from the Siberian

mainland.¹⁶ Norway made their claim in 2006, Denmark and Canada filed their claims in November and December 2013. However, it will take some time for the Committee on the Limits of the Continental Shelf (CLCS) to staff the claims under UNCLOS, and recommend a coordinated delineation of claims in the Arctic beyond the 200 NM EEZ for the Arctic nations to agree on.¹⁷

Nonetheless, many of the unresolved territorial claims are between countries, who are members of the NATO: U.S., Canada, Denmark and Norway and therefore peaceful resolution of the claims in cooperation is likely and conflict potential low. Even one of the ongoing territorial disputes in the Arctic: the delimitation of the Barents Sea was resolved in 2010; in an agreement between Russia and Norway, which settles the boundary, and removes ambiguity from previous treaties, mainly regarding fishery rights, while maintaining cooperation on cross-boundary issues: e.g. cross-boundary gas/oil deposits.¹⁸ Nevertheless, the long contested issue of the status of the Svalbard archipelago and the surrounding waters and seabed remains unsolved; although Svalbard is governed by the 1920 Svalbard Treaty, the ongoing dispute is as old as the treaty itself. Norway and some of the signatories, mainly Russia, have different interpretations of the extent of rights to extract resources and the area in which this right is applicable. The Svalbard Treaty gives Norway sovereignty over the archipelago, however, all signatories are free to hunt and fish and more importantly, engage in “all maritime industrial, mining and commercial operations on a footing of absolute equality.”¹⁹ Interpretation of the extent of this part of the treaty, mainly the right of Norway to regulate such industries, in particular environmental considerations, have collided with Russian coal mining interest in the post-Soviet era; where Russia’s presence on Svalbard has been rapidly declining and Soviet-era coal mines have been closed.²⁰ The treaty is defined as applicable on landmass and “waters” within the area defined by

74°N and 81°N and 10°E and 35°E; however, the ambiguous meaning of “waters” is what separates the parties.²¹ Norway claims the treaty is applicable only to the territorial waters of the islands, whereas Russia and others claim the treaty is applicable to all the waters within the treaty area.²² Until now this different interpretation on the geographical extent of the Svalbard treaty has led to disputes between Norway and Russia especially on fishery as Norway in 1977 established a Fisheries Protection Zone (FPZ) 200 NM around Svalbard. In recent years, this has led to seizure of Russian fishing vessels by the Norwegian Coast Guard within the FPZ, which led to Russian deployment of the destroyer *Severomorsk* in a show of force; this represented the maximum escalation of the dispute so far.²³

In addition to disputes over the right to extract resources and the extent of the area in which this right is applicable, Russia and Norway have disagreed on the treaty’s wording on military on Svalbard; even to the degree of activities on Svalbard being a threat to Russia’s nuclear deterrent. Russia, has objected to any activity, by Norway and U.S./NATO, which could be seen as militarization of Svalbard; this with Russian reference to the treaty’s ambiguous wording on banning the use of Svalbard for warlike purposes.²⁴ Norway has a more liberal interpretation of the treaty as partly demilitarized allowing temporary deployment of soldiers and visits from naval vessels and aircraft; whereas Russia has interpreted the treaty as prescribing demilitarization of Svalbard.²⁵ In short, the Svalbard archipelago and adjacent water is a geographical area disputed by Russia and Norway – the future of this dispute depends greatly on the developments in Russia.

According to Dr. Marcel de Haas, Russia is most likely to be a failing and assertive state in the next decades; in which a resurgent Russia could pursue a limited conventional war.²⁶ Russia is most likely to be failing, due to demographic changes, socio-economic problems, and

an energy dependent economy.²⁷ Russia is most likely to be assertive, as the present Russian leadership is expected to remain in power for years to come, and is likely to use military force to pursue a fast victory abroad, comparable to the war in Georgia in 2008, to gain domestic support in a situation of waning domestic and international power; this with military forces that are only partly modernized due to the Russian economy.²⁸ In this future scenario the Arctic is a likely theatre for such a conflict according to Marcel de Hass as “Russia is already conducting a military build-up in this area, the launching in 2008 of a dedicated [*Russian Federation*] Arctic Strategy, the unsolved territorial disputes with Western Stakeholders...”²⁹ In addition, and most importantly large resources of undiscovered oil and gas “All these aspects could make the Arctic region the primary spot of a future Russian-Western conflict”.³⁰

As argued above, in a future where receding sea ice, enables extraction of vast undiscovered oil and gas resources and lucrative SLOCs in the Arctic, great power rivalry between US/NATO and a assertive Russia over territory and rights to extract resources, could spark into armed conflict over Svalbard. The present unclear and disputed status of the Svalbard archipelago and surrounding waters, especially concerning rights to resource extraction, would be a major issue of controversy in case of major oil and gas discovery within the zone defined by the present Svalbard treaty. In such an event a failing and assertive Russia could choose to seize the Svalbard archipelago militarily, to claim the territory and adjacent waters directly or to improve their position in post-conflict settlement of the status of Svalbard and adjacent waters. Because, the Russian leadership would view the domestic, strategic and economic benefits of seizing Svalbard as outweighing the cost of a conflict in scope similar to the war in Georgia in 2008. In the event of Russian military seizure of Svalbard, Russia would be in direct conflict

with Norway a long term NATO member, whose only chance of return to a pre-conflict status of Svalbard, would be to call upon the help of the U.S./NATO.

Conflict in the European Arctic: Svalbard Scenario.

This U.S./NATO – Russia conflict over Svalbard would in many aspects resemble the British-Argentinian conflict over the Falklands/Isla Malvinas, as the seizure of a remote archipelago would force the one party to project military power over a vast distance to recapture the area. Similarly, both parties would have interest in keeping the conflict limited, as neither the U.S./NATO nor Russia would benefit from the conflict spreading outside the immediate zone of conflict. In keeping the conflict limited both the U.S. and Russia would at the same time avoid escalation to a nuclear conflict. However, such a conflict would still be a direct armed conflict between the U.S./NATO and a capable adversary in a remote and challenging operational environment, where the ability to project power over vast distances, and contend this is the key element of the conflict. The theatre would be the European Arctic, illustrated below.



Map of the European Arctic (Adapted from www.CIA.gov; “Arctic Region”³¹)

The European Arctic extends all the way to the North Pole, key terrain is the Svalbard Archipelago and Iceland, framed by two naval warfare chokepoints the Greenland-Iceland-UK gap (GIUK gap) and the Svalbard-Murmansk gap, and the landmass of Norway and Greenland. Iceland is key terrain for military operations in the European Arctic, due to the geographical location in-between Greenland and the UK, enabling air/sea surveillance and control of the GIUK gap by deployed forces.³² The GIUK gap was a major naval warfare chokepoint during the Cold war, as NATO navy forces and aircraft could block Soviet access to the Atlantic Ocean.³³ The Svalbard-Murmansk gap is the opening in which the Russian Northern Fleet has to pass through for operations in the European Arctic. In addition, it is the only opening to the European Arctic for the Russian Navy in the event of U.S./NATO-Russia conflict, as the Baltic fleet is locked by the Danish Straits and the Black sea fleet is locked by the Turkish Straits.³⁴

No one should have illusions over a possibility of taking military advantage over Russia.

-Vladimir Putin, State of the Nation Speech 12 December 2013

Part 3. Russian A2AD capabilities and likely strategy.

In a Falklands/Isla Malvinas like conflict over Svalbard in the European Arctic, U.S./NATO would face Russia. However, such a conflict would be markedly different, than the European Cold-War challenge to the U.S./NATO. As argued, the ability to project power over vast distances, and contend this is the key element of the conflict. Russian capabilities and likely strategy to contend U.S./NATO power projection is therefore explored in the following.

Russia has an arsenal of anti-access and area denial capabilities and in a conflict in the European Arctic is most likely to employ an anti-access/area-denial strategy. This part will answer the following questions: Which anti-access and area-denial capabilities does Russia possess? Why and how Russia is likely to employ an anti-access and area-denial strategy in the Svalbard scenario for a potential conflict in the European Arctic? These questions are explored through: First, anti-access and area denial is defined. Second, Russian capabilities are analyzed to outline the military capabilities for an anti-access and area denial strategy. Third, anti-access and area-denial strategy is defined. Fourth, a most likely Russian anti-access and area denial strategy in European Arctic is outlined using Dr. Sam J. Tangredi's 5 fundamental elements of anti-access and area denial strategies on the Svalbard conflict scenario.

According to the Joint Operational Access Concept (JOAC), the key U.S. document on the challenge, *anti-access* is: "Those actions and capabilities, usually long-range, designed to prevent an opposing force from entering an operational area."³⁵ *Area-denial* is defined as: "Those actions and capabilities, usually of shorter range, designed not to keep an opposing force out, but to limit its freedom of action within the operational area."³⁶ Although separately defined, the compound term *anti-access/area-denial* (A2AD) will be used throughout this paper, as the

distinction between the two is relative and the same action and capability can be used for both purposes.³⁷ After establishment of this basis of definition of the terminology, Russian A2AD capabilities are analyzed with a focus on outlining the vast array of A2AD capabilities at Russia's disposal.

Russian A2AD capabilities.

Russia, as the direct descendant of the Soviet Union, has inherited an arsenal of A2AD capabilities, export versions of these capabilities have been looked at in the hands of China and Iran; however, in a conflict between Russia and US/NATO in the European Arctic these capabilities, in non-export versions, would come into play in the hands of Russia herself. Russia possesses A2AD capabilities in all warfighting domains; this constitutes a threat to deny the US/NATO access to and denial in a conflict in the European Arctic.

Russia has the capability to operate offensively in the space domain, which could be utilized for A2AD in a conflict. Russia has an active space program, featuring space launch capability and satellite operations, including the indigenous GLONASS system – a global positioning system.³⁸ The Soviet Union had an anti-satellite program, which indicates Russian knowledge and expertise in the field of anti-satellite operations.³⁹ Russia's ability to launch vehicles into space in combination with their experience with satellite operations, and Soviet ASAT experiences could be used to launch vehicles into space and place them in orbit to destroy US satellites. However, as destruction of US satellites in space could have unforeseen consequences, and bear unacceptable risks of escalation, Russia's is therefore more likely to use its knowledge of space operations for disruption and/or denial of US space operations, alternately disruption of the terrestrial element of US space operations. In addition, Russia's indigenous satellites and global positioning system, prevents the US/NATO from simply denying use of

their space assets for communication and positioning in the event of conflict. Nevertheless, Russia possesses the capability to exploit the space domain in support of A2AD by its capability to destroy, disrupt or deny U.S. use of space systems, in addition Russia is not as vulnerable as other nations to a U.S. shut down of commercial satellite based communication and positioning services.

Russia has capability to operate in the cyber domain; the full extent of this capability is unknown. Russia's version of NSA, The Service of Special Communications and Information, has monitoring equipment with all Russian internet service providers, and runs a hacker school in Russia.⁴⁰ In addition, non-governmental hackers and criminals are suspected to operate under the control of, or sanctioned by, the Russian NSA.⁴¹ The combination of Russian governmental and associated groups has been suspected of being employed in two conflicts: Estonia in 2007 and Georgia in 2008. In these two conflicts involving Russia, the attacker demonstrated ability to exploit the cyber domain to the advantage of Russia. For example, in the spring of 2007, following the Estonian relocation of a Soviet soldier statue in Tallinn, viewed by Russia as a provocation, Estonian banks and government agencies came under cyber-attack.⁴² The cyber-attack was in the form of a large scale Distributed Denial of Services (DDOS) attack from "botnets" directed against the telephone, banking and internet infrastructure.⁴³ The cyber-attacks severely affected the Estonian banking and communication system, and brought the largest bank to its knees.⁴⁴ The attacks were traced to originate from Russia, who denied involvement, but at the same time refused to assist Estonia in prosecution of their leads in Russia.⁴⁵ The scale of the cyber-attacks and ambiguity of Russian involvement demonstrates some of the capability and will to use it. This was once again demonstrated in the direct war between Russia and Georgia over South Ossetia in 2008. Here, large scale DDOS attacks by botnets, tracing back to Russia,

were directed against Georgian government, communication and banking sector.⁴⁶ These attacks shut down use of telephone, mobile phone and internet in Georgia; in addition, Georgian banks were effectively shut down by cyber attacks on the banks in Georgia, as well as on their partners abroad.⁴⁷ As in Estonia, Russia denied government involvement; however indications suggest the attacks were orchestrated by Russian intelligence services.⁴⁸

Although struggling with modernization and an aging inventory of vessels, the Russian navy's surface and subsurface vessels and their missile armament, in combination with naval aviation and sea mines, provides Russia with a credible A2AD capability in the maritime domain. The surface component of the Northern Fleet can be deployed to attack US/NATO-forces, bases and SLOCs at range with their anti-ship/surface missiles and anti-ship missiles launched from carrier aviation. The Northern Fleet consist of one KUTZNETZOV-class aircraft carrier (nuclear), one KIROV-class missile cruisers (nuclear), SOVREMENNY- and SLAVA-class missile cruisers, UDALOY-I/II- class destroyers and several smaller vessels.⁴⁹ These surface vessels are armed with a vast array of advanced short-, medium- and long range anti-ship missiles: SS-N-12, SS-N-19, SS-N-22, SS-N-25 and SS-N-26.⁵⁰ Likewise, the subsurface component of the Northern fleet can be employed to attack and interdict US/NATO-forces -bases and -SLOCs with submarine-launched anti-ship/surface- and cruise missiles and torpedoes. For this the Northern Fleet has DELTA-IV-class ballistic missile submarines, AKULA-, SIERRA- and VICTOR-III class attack-submarines (nuclear), OSCAR-II-class cruise-missile attack submarines and KILO-class attack submarines.⁵¹ These are armed with torpedoes, anti-ship/surface-missiles and cruise missiles: SS-N-15, SS-N-16, SS-N-19, SS-N-21 and SS-N-27 (retrofitted to KILO-class).⁵² Naval aviation can be employed for long range surveillance and reconnaissance in support of the surface-/subsurface component and for naval strike with anti-

ship missiles. The Northern Fleets naval aviation component has BACKFIRE naval strike/reconnaissance aircraft, MAY and BEAR-F maritime surveillance/ASW aircraft.⁵³ For area denial and/or coastal defense the Russian navy has a vast arsenal of advanced sea mines, which can be employed from a wide range of air/surface and subsurface platforms.⁵⁴

The Russian Air Force is, as the Navy, struggling with modernization and slow introduction of new weaponry; nevertheless, armed with a full complement of air platforms, air/air- and air-surface-weapons Russia has the capability to exploit the air domain for A2AD. Long range strike and anti-ship capability for anti-access is provided by the strategic and naval strike capability of Russian Air Force long range aviation (BEAR/BLACKJACK/ BACKFIRE bombers) and Russian naval aviation (BACKFIRE). Russia regularly conducts long range patrols with in the Arctic, the North Atlantic and even into the North Sea.⁵⁵ BEAR and BLACKJACK long range bombers can carry AS-15 ('Kent') air launched cruise missiles (conventional and nuclear); furthermore, both can carry AS-16 ('Kickback') anti-surface/anti-ship missiles.⁵⁶ BACKFIRE bombers can carry AS-4 ('Kitchen') and AS-16 anti-surface/anti-ship missiles.⁵⁷ Capability for area-denial of air superiority is provided by the Russian inventory of 4th generation fighters, older interceptors and fighters and their complement of advanced air-air missiles, such as AA-10 ('Alamo'), AA-12 ('Adder') and AA-11 ('Archer').⁵⁸ In addition, capability for area-denial of land and maritime domain is provided by Russian fighters, ground attack aircraft and helicopters in combination with a large inventory of anti-ship- and anti-surface missiles and guided/unguided bombs.⁵⁹ Supplementing these air platforms for A2AD is an array of support aviation in Russian inventory such as AEW (MAINSTAY), AAR (MIDAS), SIGINT, COMINT, reconnaissance, airlift and helicopters, which enables Russia to conduct advanced coordinated air operations.⁶⁰

Ground based air defenses provide additional area-denial capability for Russia to deny an adversary air superiority with advanced SAM systems. This can be achieved by advanced double digit SAM systems such as SA-10 ('Grumble'), SA-11 ('Gadfly'), SA-12 ('Gladiator'/'Giant') and SA-21('Growler'), supplemented by short range, but highly mobile, systems such as SA-15 ('Gauntlet') and SA-22 ('Greyhound').⁶¹ Some of these highly capable missile systems have been adopted for use on Russian naval vessels for air defense, and could be used for area-denial from naval platforms as well. For example, the SA-10 has been adopted for used on KIRAOV- and SLAVA class missile cruiser as the SA-N-6.⁶²

Although still bound by the Intermediate-Range Nuclear Forces (INF) Treaty, Russia has advanced ballistic missiles on both sides of the imposed INF gap. The 1987 INF Treaty bans U.S. and Russian (and other states formerly part of USSR) ground-launched ballistic missiles with ranges between ranges 500-5500km.⁶³ Present Russian inventory of short range ballistic missiles consist of SS-21 ('Scarab') and the more modern SS-25 ('Stone').⁶⁴ These advanced short range ballistic missiles provides Russia with area-denial capability by being able to strike surface targets at range with a range of conventional munitions, in addition to their tactical nuclear capability. In addition, Russia has a large inventory of large caliber Multiple-Rocket-Launchers (MRLs) capable of delivering High-Explosive, thermobaric and conventional sub-munitions.⁶⁵ These MRLs provides further area-denial capability by the immense firepower which can be delivered at range. Russia has a large inventory of silo-based and road-mobile Intercontinental Ballistic Missiles (ICBMs), however, these are solely for delivery of nuclear weapons.⁶⁶

As argued above, Russia has a vast arsenal of capabilities able to exploit all domains for A2AD. This includes capability to operate offensively in the space domain and a proven

capability to operate in the cyber domain. In the maritime domain this capability is based on surface- and subsurface vessels and their missile armament, in combination with naval aviation and advanced sea mines. In the air domain based on different air platforms with advanced air/air- and advanced air-surface-weapons. Moreover, advanced ground based air defense systems, advanced ballistic missiles and large caliber MRLs provide additional capability in the air- and land domain

Russian A2AD strategy in the European Arctic.

After examination of Russian A2AD capabilities, A2AD strategy is defined, in order to examine why and how Russia would adopt such a strategy for conflict in the European Arctic. In his 2013 book *Anti-Access Warfare: Countering A2/AD Strategies* Dr. Sam J. Tangredi outlines 5 fundamental elements of anti-access strategies as defining and determining the adoption of an A2AD-Strategy.⁶⁷ This model will be applied to the Svalbard case to analyze, why (determine) and how (define) Russia would adopt an A2AD-Strategy in a potential conflict in the European Arctic. Herein strategy is defined as “[...] a plan of action designed in order to achieve some end; a purpose together with a system of measures for its accomplishment.”⁶⁸ Tangredi uses this definition to define of A2AD strategy as: “[...] a plan to prevent an opponent from operating military forces near, into, or within a contested region.”⁶⁹ Each element is analyzed separately in the following.

Tangredi’s first element is “the perception of the strategic superiority for the attacking force.”⁷⁰ Although not weak in itself, Russia is in a position of relative weakness, when compared to the combined conventional military of U.S./NATO; thus, would Russia seek an A2AD-strategy in the European Arctic to counter the strategic superiority of U.S./NATO. In Tangredi’s analysis of a fictive U.S./NATO vs. Russia conflict in Central Eurasia, he underlines

that U.S./NATO possesses global power projection capability, whereas Russia presently is confined to projecting power in its near abroad.⁷¹ This also applies to the arctic scenario, as the relationship in global power projection remains unchanged by the shift to the European Arctic. In addition, U.S./NATO's defense expenditures are more than ten times larger than Russia's, indicating a qualitative/technological edge in favor of U.S./NATO. For example, in 2013 the combined military expenditure in U.S./NATO was 1.02 trillion \$, whereas Russia spent 90 billion \$, equaling less than one tenth of U.S./NATO spending.⁷²

The second element is "the primacy of geography as the element that most influences time and facilitate attrition of the enemy."⁷³ In the European arctic, the geography of the area offers large distances to be covered, thus delaying power projection and thereby forces generation; in addition the adverse terrain favors the defense; this supports Russian application of an A2AD strategy. Although major military installations are available in northern Norway, Thule on Greenland and potentially Iceland as a forward base for operations in the Arctic, U.S./NATO forces would still have to be deployed over vast distances to get to these forward locations, thereby influencing the speed of reinforcements and force generation. Furthermore, these forward locations are still far away, the distance from Iceland and Thule to Svalbard is approximately 1000 nm and Bodø, the northernmost major Norwegian air base, is 650 nm from Svalbard; in addition, this area is flanked by Russian military on the Kola Peninsula threatening forces as they deploy. Apart from the vast frigid seas dominating the European Arctic, the terrain is adverse ranging from barren highlands/mountains, inland ice/glaciers to frigid flatlands.⁷⁴ Although, this adverse terrain is challenging for all military operations, it favors the defense, because the defender can establish a defense-in-depth and utilize the adverse terrain in denial of the attackers operations. Thus, does the physical geography of the European arctic favor Russian

application of an A2AD-strategy, as the power projecting party would be vulnerable due to the distances in the European arctic and adverse terrain.

The third element is “the general predominance of the maritime domain as conflict space.”⁷⁵ As stated above, the geography of the European arctic is dominated by the seas, thus underlining the predominance of the maritime domain as conflict space. In this element Tangredi focuses on the sea-denial capability of the defender, denying the attacker sea-control.⁷⁶ Therefore is the Russian tradition and ability for sea-denial key to their adoption of an A2AD strategy. The Soviet navy was designed for A2AD, and during the latter part of the Cold-War aimed at attrition of carrier battle groups and interdicting U.S./NATO SLOCs in the Atlantic, in support of land operations on the European central front.⁷⁷ However, Russia is not likely to duplicate the Cold-War Soviet goal of interdicting forces to Europe beyond the GIUK-gap, because the Russian navy is not near the strength of the Soviet navy and the focus is the European Arctic, not the European continent. Therefore is a likely approach focused at denying U.S./NATO forces sea control of the European arctic north of the GIUK-gap, through employment of the vast array of A2AD capabilities of the Russian armed forces, in order to exploit the maritime domain for sea-denial.

The fourth element is “the criticality of information and intelligence, and -conversely- the decisive effects of operational deception.”⁷⁸ In an area as vast as the European Arctic, accurate location and information on enemy forces is crucial to military operations. In a likely A2AD strategy, Russian capabilities in the cyber- and space domains could therefore be decisive in denying or disrupting U.S./NATO adequate information and intelligence of the battlespace. In addition, Russian capabilities in the air domain and advanced SAM systems could deny U.S./NATO use of airborne ISR platforms, supporting efforts in the space- and cyber domains.

Tangredi emphasizes anti-satellite weapons for denial of information and intelligence.⁷⁹

However, as argued earlier, Russia too is dependent on own satellite infrastructure and is therefore not likely to pursue destruction of enemy satellites, but rather disruption and denial through other means. Russian efforts to conquer territory in the Arctic, here Svalbard, would depend on the element of surprise, in order to prevent U.S./NATO timely reinforcement of threatened areas. Russia has a tradition for large scale military deception to achieve surprise, known as ‘maskirovka’.⁸⁰ A recent example of this is the early 2014 events in Crimea, where Russia utilized a combination of large-scale military exercises near the borders of Ukraine and deployment of unmarked Russian Special Forces to Crimea, to ensure swift de-facto control of Crimea, to the surprise of Ukraine and U.S./NATO.⁸¹ Thus, would Russia in a conflict in the arctic most likely seek to achieve surprise through ‘maskirovka’ and denial of information and intelligence through exploitation of the cyber, space and air domains.

The fifth element “is the determinative impact of extrinsic events (unrelated events in other regions).”⁸² In Tangredi’s Eurasian scenario he suggests that Russia could utilize dependency on Russian natural gas exports to influence European intervention.⁸³ As part of a Russian A2AD strategy in a conflict in the European Arctic this could be a very effective instrument to target the cohesion of the NATO alliance, by economic coercion of natural gas dependent European NATO members. Potentially very effective because, many NATO members in east- and central Europe are dependent on import of Russian natural gas and presently unable to substitute imports from Russia with other sources of energy.⁸⁴ Russia’s will and ability to use gas exports as an effective instrument of power was demonstrated in the winter of 2009, when Russia closed off gas supply to and through Ukraine for 14 days, in order to discredit the Orange

Revolution.⁸⁵ Thus, is Russian use of gas exports as an instrument of power against U.S./NATO alliance cohesion a likely part of an A2AD-strategy in the European Arctic.

As argued above, Russia would likely adopt an A2AD strategy in the European Arctic as they are in a state of relative weakness to U.S./NATO, mainly in ability to project power and defense spending. Moreover, the physical geography favors Russian application of an A2AD strategy as power projecting and force generation could be delayed or prevented, and the terrain favors the defense. Russia's vast arsenal of A2AD capabilities favors an A2AD strategy, herein is the tradition and capability for sea-denial key. Such a Russian A2AD strategy would likely seek to deny U.S./NATO forces sea control of the European Arctic north of the GIUK-gap, through employment of the vast array of A2AD capabilities of the Russian armed forces, in order to exploit the maritime domain for sea-denial. In addition, Russia would likely seek to achieve strategic surprise through 'maskirovka' and exploit the cyber-, space- and air domains for denial of information and intelligence. Moreover, Russia would likely use gas export as an economic instrument of power against U.S./NATO to disrupt alliance cohesion, and prevent intervention at all.

To be prepared for war is one of the most effectual means of preserving peace.

-George Washington: First Annual Address to Congress, 8 January 1790

Part 4. U.S./NATO response to Russian A2AD challenge.

Russian capabilities and A2AD strategy in a potential conflict in the European Arctic is a challenge to U.S./NATO. However, conflict is not inevitable; U.S./NATO efforts must be focused on preventing conflict, while preparing for conflict if deterrence fails. The following explores conventional deterrence based on ASB, herein remilitarization of Iceland, as the U.S./NATO response to deter Russia in the European Arctic. First, Air-Sea-Battle, based on JOAC and the ASB concept is briefly examined to outline the basic U.S. counter-A2AD concepts, central ideas and relevant precepts. Second, Iceland would play an intrinsic role in the U.S./NATO response in the European Arctic. Third, the concept of conventional deterrence is outlined and applied to the deterring Russia in the European Arctic. Final, the implications hereof are outlined in recommendations of how U.S./NATO can ensure credible conventional deterrence.

The A2AD challenge is addressed in two main concepts: The *Joint Operational Access Concept* (JOAC) and the *Air-Sea Battle* (ASB) concept. In supplement, Center for Strategic and Budgetary Assessments (CSBA) has developed *Why Air Sea battle?* detailing the A2AD threat from China and Iran, and addresses these specific challenges in *AirSea Battle: A point of departure concept* and *Outside-In: Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats*.⁸⁶ The JOAC's central idea is the use of *cross-domain synergy*⁸⁷ to overcome A2AD challenges; the central idea is supported by guiding precepts on how to achieve access when opposed; in addition the JOAC establishes basic definitions, terminology and required operational capabilities.⁸⁸ The ASB concept's central idea "is to develop networked,

integrated forces capable of attack-in-depth to disrupt, destroy and defeat adversary forces.”⁸⁹

The central idea is summarized in the acronym NIA/D3: Networked, Integrated, Attack-in-Depth, Disrupt, Destroy, Defeat, and based on cross-domain operations in all domains (air, maritime, land, space and cyber).⁹⁰ At a level deeper than JOAC, the ASB concept aims at development of the joint-force and development of capabilities enabling cross-domain NIA/D3.⁹¹

In short, JOAC and the ASB concept outline the broad-brush response to the A2AD challenge, focusing on general principles, force development and necessary operational capabilities.

Detailed application of this and execution of ASB is available in the CSBA studies on China and Iran, a likewise detailed application to the Russian A2AD challenge in the European Arctic is well beyond the scope of this paper. However, JOAC and ASB ideas and precepts on execution, as well as the development of the joint-force and operational capabilities are equally applicable to the Russian A2AD threat. Thus, is the force and capability development implicit in the following. The focus will therefore be on the two operational access precepts preparing and enabling the execution of ASB in the European Arctic. First, “Prepare the operational area in advance to facilitate access.”⁹² Second, “Consider a variety of basing options.”⁹³ In short, the ability to execute ASB in the Arctic is essential to counter Russian A2AD efforts. Key terrain for the preparation of the operational area is Iceland, which will be explored in the following.

Iceland

Iceland is key strategic terrain for U.S./NATO projection of power into the European Arctic; however, it is presently de-militarized, except for periodic short deployments of NATO fighters for air policing of Iceland's airspace. As argued earlier during the Cold War Iceland was key to preventing Soviet operations into the Atlantic to cut off SLOCs between the U.S. and

NATO Europe. However, now the key issue is ensuring access to the European Arctic, as a likely Russian strategy in conflict will contend this. Iceland is again key terrain because, it is centrally situated in the middle of the southern opening of the European Arctic and within distance of U.S./NATO bases in Europe for augmentation of forces. For example, the distance from Ramstein Air Base to Keflavik Iceland is 1300 nm. Key to power projection, as necessary forces can be permanently deployed or staged for operations into the European Arctic, at distance from Russian military forces in the Kola Peninsula.

Although a NATO member, Iceland does not have any military forces, and as the U.S. withdrew all forces in 2006, Iceland is left with the periodic deployment of NATO fighters for air policing. Nevertheless, the U.S. and Iceland still have a bilateral defense agreement.⁹⁴ During the Cold War the U.S. had forces permanently deployed to Iceland for air/maritime surveillance of Soviet Forces in the European Arctic; for maritime surface and subsurface surveillance this was accomplished through permanent deployment of Maritime Patrol Aircraft and the Sound Surveillance System, a sound detection system on the ocean floor against Soviet submarines transiting through the GIUK gap.⁹⁵ For air surveillance, by establishment of the Icelandic Air Defense System (IADS), with long range air surveillance radars, a control and reporting centre and permanent deployment of fighter-interceptors.⁹⁶ In the 1980's the main U.S. facilities at Keflavik were upgraded with hardened shelters for aircraft, improved C2 and expanded logistic facilities.⁹⁷ Nevertheless, after the Cold War ended the U.S. transferred the ground environment element of the IADS to Iceland and withdrew all U.S. military presence from Iceland in 2006.⁹⁸ Since 2008, NATO has had short periodic deployments of fighters to Iceland, however, not a permanent presence and the only other military activity is 'Northern Viking' a small-scale NATO exercise.⁹⁹ Iceland is therefore de-facto demilitarized. Facing a likely Russian A2AD

strategy, a continued de-facto demilitarized Iceland is untenable, as U.S./NATO operations in, and projection of power into, the European Arctic depends on Iceland as a forward base due to the key geostrategic location, and thereby a central enabler for the ability to execute ASB in the European Arctic.

Conventional Deterrence.

Russian assessment of a credible U.S./NATO ability and will to execute ASB in the European Arctic is necessary as a conventional deterrent against a potentially failing and assertive Russia in order to ensure peaceful resolution of the existing territorial disputes, and avoid armed conflict. U.S./NATO deterrence of Russia in the European arctic requires both nuclear deterrence and conventional deterrence. Deterrence here defined as “the threat of force intended to convince a potential aggressor not to undertake a particular action because the costs will be unacceptable or the probability of success extremely low.”¹⁰⁰ A prerequisite for conventional deterrence of Russia is persistent nuclear deterrence preventing nuclear escalation, through the threat of unacceptable costs to Russia if nuclear weapons were to be used in conflict. Although, nuclear deterrence is effective in deterring nuclear escalation, limited conventional wars between nuclear armed adversaries have been fought. For example, Pakistan and India, both nuclear armed, fought a limited conventional war in the *Kargil Crisis* in 1999.¹⁰¹

Based on a fundament of nuclear deterrence, U.S./NATO therefore has to rely on conventional deterrence to deter Russia from limited conventional war in the European Arctic. Conventional deterrence usually relies on deterrence by denial “the ability to prevent an adversary from achieving its objectives through conflict.”¹⁰² Here deterrence is focused on minimizing the possibility of success for the adversary’s strategy; as Russia is likely to employ an A2AD strategy for conflict in the European Arctic, minimizing the possibility of success for

an A2AD strategy is therefore paramount for successful conventional deterrence. Thus is ASB key to conventional deterrence, as ASB is the response to A2AD challenges. However, this depends on deterrence credibility “the function of an adversary’s assessment of a nation’s military capability and political resolve.”¹⁰³ Thus, are the two key components in conventional deterrence: Russia’s assessment of a credible U.S./NATO military capability to execute ASB and the credibility of U.S./NATO will to act. The implications hereof are outlined in the following recommendations of how U.S./NATO can ensure credible conventional deterrence.

To ensure Russian assessment of credible U.S./NATO will, forward deployment of U.S. forces to Iceland, and European NATO nation independence of Russian energy is recommended. Forward deployment of U.S. forces to Iceland because, this sends a clear message to Russia of U.S. commitment to the European Arctic, as well as to assure NATO countries in the European Arctic of U.S. support in a potential conflict. Independence from Russian energy because, this would hinder Russian use of gas export for coercion of NATO members presently dependent on Russian energy, thereby enabling alliance cohesion in a potential conflict.

U.S./NATO credible military capability to execute ASB is based on the military ability to do so and preparation of the operational area to enable ASB. As the former development is assumed, focus will be on the two identified JOAC operational access precepts preparing and enabling the execution of ASB in the European Arctic.

First, “Prepare the operational area in advance to facilitate access.”¹⁰⁴ According to the JOAC, this includes a wide array of shaping activities, among others: establishment of forward bases, forward deployment of forces, multinational exercises, ISR for improved situational awareness.¹⁰⁵ Forward deployment of U.S. forces to Iceland is crucial, as argued earlier to demonstrate will, but also to prepare and facilitate access to the European Arctic, because of

Iceland's the key geostrategic location. Moreover, Iceland and the U.S. already have a bilateral defense agreement in-place, which previously supported U.S. forces on Iceland. In addition, base facilities are already established at Keflavik, and have logistical facilities and hardened aircraft shelters to protect deployed fighters. Base facilities at Keflavik should be expanded to enable deployment and sustainment of forces in case of conflict.

The U.S. forces on Iceland should consist of long-range maritime patrol aircraft, multirole fighters, and C4ISR units, with necessary force protection and sustainment. Long-range maritime patrol aircraft deployed for improved ISR of the European arctic to increase situational awareness of Russian activities and capabilities. Multirole fighters deployed for long range patrols in the European Arctic to demonstrate U.S./NATO presence, air policing of Iceland, and to provide initial combat power in case of conflict. C4ISR units deployed to control U.S. assets, as well as establishing necessary forward C4ISR infrastructure to enable execution of ASB in case of conflict. Force protection and sustainment to adequately protect and sustain fielded forces. In addition, U.S./NATO should study the feasibility of establishing over-the-horizon radars to extend air and maritime surveillance of the European Arctic; because, these could supplement present long range air surveillance radars, airborne maritime patrol aircraft and space based assets, and provide additional redundancy for ISR in case of conflict. Furthermore, U.S./NATO supplies and equipment should be prepositioned on Iceland to support rapid force generation. U.S./NATO should regularly conduct large scale exercises focused on rapid introduction of forces in the area and projection of power in the Arctic, in order to strengthen military cooperation and ability to execute operations in the European Arctic.

Second, "Consider a variety of basing options."¹⁰⁶ According to the JOAC, the use of forward bases as access infrastructure is critical to mitigate the effect of distance; herein, focus

on mitigating the effect of enemy attacks on forward bases through: hardening, dispersal, use of austere temporary bases and sea basing.¹⁰⁷ In the case of deployment of forces to Iceland, Keflavik's hardened aircraft shelters and facilities should be supplemented to enabled protection of the deployed forces against attack. Although Iceland should be established as the key hub for U.S./NATO operations in the European Arctic, necessary dispersal of forces, through the use of facilities in Norway and Greenland, should be prepared and part of force planning and exercises; which should include prepositioning of supplies and equipment. Moreover, U.S./NATO should study the feasibility of operating forces from austere temporary bases in the European; herein, consider dispersal of necessary supplies and equipment.

In conclusion, Russian assessment of a credible U.S./NATO ability and will to execute ASB in the European Arctic is a necessary conventional deterrent against a potentially failing and assertive Russia, to ensure peaceful resolution of the existing territorial disputes, and avoid armed conflict. Here Iceland is key strategic terrain for projection of power into the European Arctic and presently de-militarized. The credibility of the will to execute ASB should therefore be assured through forward deployment of U.S. forces on Iceland, and European NATO nation's increased independence from Russian energy. The credibility of the military capability to execute ASB should be assured through forward deployment of U.S. long-range maritime patrol aircraft, multirole fighters, and C4ISR units to Iceland. These forces should be deployed to increase ISR, conduct long range fighter patrols and provide initial combat power ensuring access. The military capability should be further assured by prepositioning of supplies and equipment to enable rapid force generation and demonstrated through large scale U.S/NATO exercises. Hardening of facilities and dispersal of forces should be planned and prepared to protect the necessary access infrastructure.

Part 5. Conclusion

The U.S./NATO response to the risk of potential conflict with Russia in the European Arctic should be a strong conventional deterrent based on credible military capability and will to execute ASB against a likely Russian A2AD strategy. The cornerstone of this deterrence effort is remilitarization of Iceland by forward deployment of U.S. forces, as Iceland is a key geostrategic location for projection of power into the European Arctic, therefore key to ASB preparations and execution against a likely Russian A2AD strategy.

The environment in the Arctic is changing; sea ice is receding, and summers will likely be sea ice free in the future. This will enable further commercial use of lucrative SLOCs in the Arctic. Moreover, enable exploration and extraction of resources in the Arctic seabed, including major oil and natural gas deposits. This has sparked the Arctic nations' interest in extension of the 200 NM EEZ. However, the territorial claims have not been settled yet; most claims are between NATO countries therefore with low conflict potential; yet, Russia has issued major claims and has an ongoing dispute over the status of the Svalbard archipelago and adjacent waters. The Svalbard issue could spark into conflict between U.S./NATO and a resurgent and assertive Russia in a limited conventional war; should receding sea ice, enable extraction of vast undiscovered energy resources and use of lucrative SLOCs in the Arctic. The European Arctic would be the theatre for such a scenario involving Svalbard; Russian seizure of a remote archipelago as Svalbard, would force U.S./NATO to project military power over a vast distance

to recapture the area. The ability to project power: assure access, and contend this: deny access, would therefore be the determining elements of such a potential conflict.

This poses a serious challenge to the U.S./NATO as Russia has a vast arsenal of A2AD capabilities for use in all domains, and would be likely to employ an A2AD strategy in such a conflict. Russian A2AD capabilities include capability to operate offensively in the space and cyber domain. In the maritime domain the A2AD capability is based on surface- and subsurface vessels and advanced missiles in combination with naval aviation and advanced sea mines. Advanced air/air- and advanced air-surface-weapons and capable air platforms provides Russia with A2AD capability in the air domain; supplemented by advanced ground based air defense systems. In the land domain A2AD capability is provided by large caliber MRLs and advanced ballistic missiles. Russia is likely to adopt an A2AD strategy in the European Arctic as they are in a state of relative weakness to U.S./NATO. In addition, the physical geography and Russia's tradition for sea-denial and vast arsenal of capabilities favors an A2AD strategy. Russia's A2AD strategy would likely seek to deny U.S./NATO forces sea control north of the GIUK-gap, in order to exploit the maritime domain for sea-denial. In addition, Russia would seek strategic surprise through 'maskirovka' and exploit the cyber-, space- and air domains for denial of information and intelligence. Moreover, Russia would seek to disrupt U.S./NATO alliance cohesion, and prevent intervention, through use of energy exports as an economic instrument of power against NATO member states in Europe.

However, conflict is not inevitable; U.S./NATO efforts must be focused on preventing conflict, while preparing for conflict if deterrence fails. The U.S. answer to A2AD challenges is the JOAC and the ASB concept; these are likewise applicable in a conflict in the European Arctic. Therefore would Russian assessment of a credible U.S./NATO ability and will to execute

ASB in the European Arctic be a necessary conventional deterrent. The cornerstone of this deterrence effort is remilitarization of Iceland, as Iceland is key strategic terrain for projection of power into the European Arctic, therefore key to ASB execution. Deterrence credibility of the will to execute ASB would be provided through forward deployment of U.S. forces on Iceland and European NATO nation's focus on increasing independence from Russian energy.

Deterrence credibility of the military ability to execute ASB should be assured through forward deployment of U.S. long-range maritime patrol aircraft, multirole fighters, and C4ISR units to Iceland in combination with preparation of the European Arctic for successful execution of ASB by prepositioning of supplies and equipment, preparation of facilities and infrastructure, herein hardening and dispersal, to enable rapid force generation and ensure force protection of in-place forces. Lastly the deterrence credibility of the military capability should be demonstrated through large scale U.S./NATO exercises in execution of ASB in the European Arctic.

U.S./NATO commitment to establish the necessary conventional deterrence against Russia, based on remilitarization of Iceland and preparation of the European Arctic for execution of ASB, is essential to ensure continued peaceful development in the European Arctic and prevent conflict. However, as the Arctic environment is already changing, and Russia in early 2014 has demonstrated alarming assertiveness in Ukraine and Crimea, the U.S./NATO should commit to establish conventional deterrence in the European Arctic in the near future, herein remilitarization of Iceland, as part of the total efforts to mitigate Russian renewed assertiveness.

END NOTES

¹ Colin S. Gray “the 21st Century Security Environment and the Future of War. *The US Army War College Quarterly, Parameters*, Vol. XXXVIII (2008). 14-26.

² Ibid.

³ Quoted in, Sven G. Holtsmark and Brooke A.Smith-Windsor, ed. *Security prospects in the High North:geostrategic thaw or freeze?* NDC Forum Paper. Rome: NATO Defence College, 2009. 165.

⁴ Sven G. Holtsmark and Brooke A.Smith-Windsor, ed. *Security prospects in the High North:geostrategic thaw or freeze?* NDC Forum Paper. Rome: NATO Defence College, 2009. 179-184.

⁵ Caitlin Kennedy, “2012 State of the Climate: Arctic Sea Ice” *NOAA Climate.gov*, 30 July 2013, <http://www.climate.gov/news-features/understanding-climate/2012-state-climate-arctic-sea-ice>

⁶ Ibid.

⁷ Sven G. Holtsmark and Brooke A.Smith-Windsor, ed. *Security prospects in the High North:geostrategic thaw or freeze?* NDC Forum Paper. Rome: NATO Defence College, 2009. 180.

⁸ Katherine Leitzell, “When will the Arctic lose its sea ice?” *National Snow & Ice Data Center*, 3 May 2011, <http://nsidc.org/icelights/2011/05/03/when-will-the-arctic-lose-its-sea-ice/>

⁹ Ibid.

¹⁰ Scott Neuman, “Freighter Makes First-Of-Its-Kind Transit Of Northwest Passage,” *NPR.org*, 27 September 2013, <http://www.npr.org/blogs/thetwo-way/2013/09/27/226856198/freighter-makes-first-of-its-kind-transit-of-northwest-passage>

¹¹ Sven G. Holtsmark and Brooke A.Smith-Windsor, ed. *Security prospects in the High North:geostrategic thaw or freeze?* NDC Forum Paper. Rome: NATO Defence College, 2009. 182-184.

¹² Robin McKie, “China's voyage of discovery to cross the less frozen north” *The Observer*, 17 August 2013, <http://www.theguardian.com/world/2013/aug/18/china-northeastern-sea-route-trial-voyage>

¹³ USGS Fact Sheet 2008-3049 “Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle,” *USGS*, <http://pubs.usgs.gov/fs/2008/3049/>

¹⁴ USGS slide presentation “Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle” *USGS*, http://energy.usgs.gov/portals/0/Rooms/arctic/images/CARA_slideshow.swf

¹⁵ USGS Fact Sheet 2008-3049 “Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle,” *USGS*, <http://pubs.usgs.gov/fs/2008/3049/>

¹⁶ International Boundary Research Unit. *Maritime Jurisdiction and Boundaries in the Arctic region*. Durham University, 1 April 2013, <https://www.dur.ac.uk/resources/ibru/resources/Arcticmap.pdf>

¹⁷ Charmaine Noronha, “Canada plans claim that would include North Pole” *Associated Press*, 09 December 2013. <http://bigstory.ap.org/article/canada-plans-claim-would-include-north-pole>

¹⁸ International Boundary Research Unit. “Norway and Russia sign historic maritime boundary agreement,” *Boundary News*, 17 September 2010,

https://www.dur.ac.uk/ibru/news/boundary_news/?itemno=10741&rehref=%2Fibru%2Fnews%2F&resubj=Boundary+news+Headlines

¹⁹ Kristian Aatland and Torbjoern Pedersen, "The Svalbard Archipelago in Russian Security Policy: Overcoming the Legacy of Fear or Reproducing it?" *European Security*, Vol. 17, Issue: 2-3 (2008), 229.

²⁰ Ibid, 237-241.

²¹ Ibid, 229.

²² Ibid, 229.

²³ Ibid, 242-244.

²⁴ Ibid, 232.

²⁵ Ibid, 232-237.

²⁶ Dr. Marcel de Haas. *Russia's Foreign Security Policy in the 21st Century: Putin, Medvedev and beyond*. New York, NY: Routledge, 2010, 163-178.

²⁷ Ibid, 178.

²⁸ Ibid, 178-179.

²⁹ Ibid, 179.

³⁰ Ibid.

³¹ The World Factbook – Arctic Ocean "Arctic Region", Central Intelligence Agency,

https://www.cia.gov/library/publications/the-world-factbook/graphics/ref_maps/physical/pdf/arctic_region.pdf

³² John M. Collins, *Military Geography for the professionals and the public*. National Defense University Press Washington, DC: 1998, 57-58.

³³ Ibid.

³⁴ Dr. Donald Chipman, "Admiral Gorshkov and the Soviet Navy," *Air University Review* July-August 1982, <http://www.airpower.maxwell.af.mil/airchronicles/aureview/1982/jul-aug/chipman.html>

³⁵ *Joint Operational Access Concept (ver. 1.0)*, Joint Chiefs of Staff, Washington, DC: 17 January 2012, 6.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Victor Zaboriskiy, "Policy and strategic considerations of the Russian space program," in *Space Strategy in the 21st Century: Theory and Policy* Ed. Eligar Sadeh Routledge New York, NY: 2013, 238-247.

³⁹ Sam J. Tangredi *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013, 102-104.

⁴⁰ Richard A. Clarke and Rober K. Knake *Cyber War – The next threat to national security and what to do about it* Harper Collins New York, NY: 2010, 63.

⁴¹ Ibid.

⁴² Franklin D. Kramer, Stuart H. Starr, and Larry K. Wentz ed. *Cyberpower and National Security*. Dulles, VA: Potomac Books Inc., 2009, 177-178.

⁴³ Richard A. Clarke and Rober K. Knake *Cyber War – The next threat to national security and what to do about it* Harper Collins New York, NY: 2010, 13-14

⁴⁴ Ibid, 15.

⁴⁵ Ibid, 15-16.

⁴⁶ Ibid, 19.

-
- ⁴⁷ Ibid, 19-20.
- ⁴⁸ Ibid.
- ⁴⁹ Jane's Sentinel Security Assessment - Russia And The CIS, s.v. "Russian Navy" <https://janes-ihs-com.aufric.idm.oclc.org/CustomPages/Janes/DisplayPage.aspx?DocType=Reference&ItemId=++1303058> (Updated 3 February 2014)
- ⁵⁰ John Wood. *Russia, the Asymmetric Threat to the United States: A Potent Mixture of Energy and Missiles*. Santa Barbara, CA: ABC-CLIO, LLC., 2009, 59-63.
- ⁵¹ Ibid, 63-66.
- ⁵² Ibid.
- ⁵³ *Jane's Sentinel Security Assessment - Russia And The CIS*, s.v. "Russian Navy" <https://janes-ihs-com.aufric.idm.oclc.org/CustomPages/Janes/DisplayPage.aspx?DocType=Reference&ItemId=++1303058> (Updated 3 February 2014)
- ⁵⁴ *Military Periscope – Russian Naval Mine Overview* <https://www-militaryperiscope-com.aufric.idm.oclc.org/weapons/minetorp/mines/w0003735.html>
- ⁵⁵ Elena Wilson Rowe ed. *Russia and the North*, University of Ottawa Press, Ottawa: 2009, 21-23.
- ⁵⁶ Duncan Lennox ed. *IHS Jane's Weapons Strategic 2012-2013* IHS Global Limited, Alexandria, VA: 2012, 128-135.
- ⁵⁷ Paul Jackson ed., *Jane's All the World's Aircraft*, Jane's Information Group Inc., Alexandria, VA: 2001. 453-454.
- ⁵⁸ Robert Hewson ed., *Jane's Air-Launched Weapons*, Jane's Information Group Inc., Alexandria, VA: 2011. 32-35, 79-82 and 86-90.
- ⁵⁹ Ibid. 737-740.
- ⁶⁰ *IHS Jane's Sentinel Country risk assessments Russia and the CIS*. IHS Global Limited, Alexandria, VA: 2013, 472-474.
- ⁶¹ Ibid. 459 + 474.
- ⁶² James C O'Halloran ed., *Jane's Land-Based Air Defence 2011-2012*, IHS Global Limited, Surrey, UK: 2011. 216-221.
- ⁶³ Bureau of Arms Control, Verification and Compliance, "Intermediate-Range Nuclear Forces Treaty INF Treaty," *U.S. Department of State*, 08 December 1987, www.state.gov/t/avc/trty/102360.htm
- ⁶⁴ Duncan Lennox ed., *IHS Jane's Weapons Strategic 2012-2013*, IHS Global Limited Alexandria, VA: 2012, 56-60.
- ⁶⁵ Christopher F Foss ed., *Jane's Armour and Artillery 2010-2011*, IHS Global Limited Alexandria, VA: 2011, 1049-1055.
- ⁶⁶ *Jane's Sentinel Security Assessment - Russia And The CIS*, s.v. "Strategic Weapon System" <https://janes-ihs-com.aufric.idm.oclc.org/CustomPages/Janes/DisplayPage.aspx?DocType=Reference&ItemId=++1302957&Pubabbrev=CIS> (Updated 17 March 2014).
- ⁶⁷ Sam J. Tangredi *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013, 13.
- ⁶⁸ Ibid, 75.
- ⁶⁹ Ibid.

-
- ⁷⁰ Ibid, 14.
- ⁷¹ Ibid, 226.
- ⁷² Slobodan Lekic, "Despite cuts, NATO still accounts for most of world's military spending" *Stars and Stripes*, 25 February 2014. <http://www.stripes.com/news/despite-cuts-nato-still-accounts-for-most-of-world-s-military-spending-1.269882>
- ⁷³ Sam J. Tangredi *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013, 16.
- ⁷⁴ John M. Collins, *Military Geography for Professionals and the Public*. Washington, DC : National Defense University Press, 1998. 93-108.
- ⁷⁵ Sam J. Tangredi *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013, 17.
- ⁷⁶ Ibid, 100.
- ⁷⁷ Ibid, 36-38.
- ⁷⁸ Ibid, 13.
- ⁷⁹ Ibid, 101-104.
- ⁸⁰ Gregory K. Butts, *Russian Deception Operations : Another Tool for the Kit Bag, a Monograph* Fort Leavenworth, KS: School of Advanced Military Studies, US Army Command and General Staff College, 1999. 20-25.
- ⁸¹ Johan Norberg , "The Use of Russia's Military in the Crimean Crisis," *Carnegie Endowment for International Peace*, 13 March 2014. <http://carnegieendowment.org/2014/03/13/use-of-russia-s-military-in-crimean-crisis/h3k5>
- ⁸² Sam J. Tangredi *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013, 20.
- ⁸³ Ibid, 227.
- ⁸⁴ Alexander, Ghaleb,. *Natural Gas as an Instrument of Russian State Power*. Letort Papers. Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2011. 14-25
- ⁸⁵ Ibid, 79-80.
- ⁸⁶ Sam J. Tangredi *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013, 56-59.
- ⁸⁷ Definition in *Joint Operational Access Concept (ver. 1.0)*, Joint Chiefs of Staff, Washington, DC: 17 January 2012, 14: "the complementary vice merely additive employment of capabilities in different domains such that each enhances the effectiveness and compensates for the vulnerabilities of the others-to establish superiority in some combination of domains that will provide the freedom of action required by the mission."
- ⁸⁸ *Joint Operational Access Concept (ver. 1.0)*. Washington, DC: Joint Chiefs of Staff, 2012. ii-iii.
- ⁸⁹ *Air-Sea Battle: Service Collaboration to Address Anti-Access & Area Denial Challenges*. Air-Sea Battle Office: 2013, 4.
- ⁹⁰ Ibid, 4-7.
- ⁹¹ Ibid, 7.
- ⁹² *Joint Operational Access Concept (ver. 1.0)*. Washington, DC: Joint Chiefs of Staff, 2012. 18-19.
- ⁹³ Ibid, 19-20.
- ⁹⁴ Einar Benediktsson "At crossroads: Iceland's' defense and Security Relations, 1940-2011," *Strategic Studies Institute*, 18 August 2011,

<http://www.strategicstudiesinstitute.army.mil/index.cfm/articles/Iceland-Defense-and-Security-Relations-1940-2011/2011/8/18>

⁹⁵ Ibid.

⁹⁶ Ibid.

⁹⁷ Ibid.

⁹⁸ Ibid.

⁹⁹ Ibid.

¹⁰⁰ Michael S. Gerson "Conventional Deterrence in the Second Nuclear Age". *The US Army War College Quarterly, Parameters*, Vol. XXXIX (2009). 34.

¹⁰¹ Sumit Ganguly. "Nuclear Stability in South Asia". *International Studies*, Vol. 33, No. 2 (Fall 2008). 54-59.

¹⁰² Michael S. Gerson "Conventional Deterrence in the Second Nuclear Age". *The US Army War College Quarterly, Parameters*, Vol. XXXIX (2009). 37.

¹⁰³ Ibid, 42.

¹⁰⁴ *Joint Operational Access Concept (ver. 1.0)*. Washington, DC: Joint Chiefs of Staff, 2012. 18-19.

¹⁰⁵ Ibid.

¹⁰⁶ Ibid, 19-20.

¹⁰⁷ Ibid.



BIBLIOGRAPHY

- Aatland, Kristian and Pedersen, Torbjoern, "The Svalbard Archipelago in Russian Security Policy: Overcoming the Legacy of Fear or Reproducing it?" *European Security*, Vol. 17, Issue: 2-3 (2008).
- Air–Sea Battle: Service Collaboration to Address Anti-Access & Area Denial Challenges*. Air-Sea Battle Office: 2013.
- Amundsen, Kirsten. *Soviet strategic interest in the North*. New York, NY: St. Martin's Press, Inc., 1990.
- Antrim, Caitlyn L. "The Next Geographical Pivot: The Russian Arctic in the Twenty-first Century." *Naval War College Review*, Vol. 63, No. 3 (Summer 2010).
- Benediktsson, Einar "At crossroads: Iceland's' defense and Security Relations, 1940-2011," *Strategic Studies Institute*, 18 August 2011, <http://www.strategicstudiesinstitute.army.mil/index.cfm/articles/Iceland-Defense-and-Security-Relations-1940-2011/2011/8/18>
- Birkeland, Maj John. O. *The Unsinkable Aircraft Carrier – An American Response to the Chinese Anti-Access/Area Denial (A2/AD) challenge*. Air Command and Staff College, Maxwell Air Force Base, AL: 2013.
- Blank, Dr. Stephen J. ed. *Russia in the Arctic*. Strategic Studies Institute, U.S. Army War College. 2011. www.strategicstudiesinstitute.army.mil/pdffiles/PUB1073.pdf
- Blank, Dr. Stephen J. ed. *Russian Military Politics and Russia's 2010 Defense Doctrine*. Strategic Studies Institute, U.S. Army War College. 2011. <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=1050>
- Blank, Stephen J. and Weitz, Dr. Richard ed. *The Russian Military Today and Tomorrow: Essays in Memory of Mary Fitzgerald*. Strategic Studies Institute, U.S. Army War College. 2010. <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=997>
- Bureau of Arms Control, Verification and Compliance, "Intermediate-Range Nuclear Forces Treaty INF Treaty," *U.S. Department of State*, 08 December 1987, www.state.gov/t/avc/trty/102360.htm
- Butts, Gregory K., *Russian Deception Operations : Another Tool for the Kit Bag, a Monograph* Fort Leavenworth, KS: School of Advanced Military Studies, US Army Command and General Staff College, 1999.
- Clarke, Richard A. and Knake, Rober K. *Cyber War – The next threat to national security and what to do about it* Harper Collins New York, NY: 2010

- Chipman, Dr. Donald, "Admiral Gorshkov and the Soviet Navy," *Air University Review* July-August 1982, <http://www.airpower.maxwell.af.mil/airchronicles/aureview/1982/jul-aug/chipman.html>
- Cohen, Dr. Ariel, Hamilton Col. Robert E. *The Russian Military and the Georgia War: Lessons and Implications*. Strategic Studies Institute, U.S. Army War College. 2011. Available at: <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=1069>
- Collins, John M. *Military Geography for the professionals and the public*. National Defense University Press Washington, DC: 1998
- De Haas, Dr. Marcel. *Russia's Foreign Security Policy in the 21st Century: Putin, Medvedev and beyond*. New York, NY: Routledge, 2010.
- Foss, Christopher F ed., *Jane's Armour and Artillery 2010-2011*, IHS Global Limited Alexandria, VA: 2011
- Ganguly Sumit. "Nuclear Stability in South Asia". *International Studies*, Vol. 33, No. 2 (Fall 2008).
- Gerson, Michael S. "Conventional Deterrence in the Second Nuclear Age". *The US Army War College Quarterly, Parameters*, Vol. XXXIX (2009).
- Ghaleb, Alexander. *Natural Gas as an Instrument of Russian State Power*. Letort Papers. Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2011.
- Giles, Kier. *Military Doctrine of the Russian Federation 2010*. Research Review. Rome: NATO Defence College, 2010.
- Gray, Colin S. "the 21st Century Security Environment and the Future of War. *The US Army War College Quarterly, Parameters*, Vol. XXXVIII (2008).
- Gunzinger, Mark and Dougherty, Chris. *Outside-in: Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats*. Center for Strategic and Budgetary Assessments, 2011.
- Heinl, Robert D. *Dictionary of Military and Naval Quotations*. Annapolis: United States Naval Institute, 1966.
- Hewson, Robert ed., *Jane's Air-Launched Weapons*, Jane's Information Group Inc., Alexandria, VA: 2011
- Holtsmark, Sven G. and Smith-Windsor, Brooke A. ed. *Security prospects in the High North: geostrategic thaw or freeze?* NDC Forum Paper. Rome: NATO Defence College, 2009.

IHS Jane's Sentinel Country risk assessments Russia and the CIS. IHS Global Limited, Alexandria, VA: 2013

International Boundary Research Unit. *Maritime Jurisdiction and Boundaries in the Arctic region*. Durham University, 1 April 2013, <https://www.dur.ac.uk/resources/ibru/resources/Arcticmap.pdf>

International Boundary Research Unit. "Norway and Russia sign historic maritime boundary agreement," *Boundary News*, 17 September 2010, https://www.dur.ac.uk/ibru/news/boundary_news/?itemno=10741&rehref=%2Fibru%2Fnews%2F&resubj=Boundary+news+Headlines

Jackson, Paul ed., *Jane's All the World's Aircraft*, Jane's Information Group Inc., Alexandria, VA: 2001

Jane's Sentinel Security Assessment - Russia And The CIS, s.v. "Russian Navy" <https://janes-ihsc.com.aufric.idm.oclc.org/CustomPages/Janes/DisplayPage.aspx?DocType=Reference&ItemId=+++1303058> (Updated 3 February 2014)

Jane's Sentinel Security Assessment - Russia And The CIS, s.v. "Strategic Weapon System" <https://janes-ihsc.com.aufric.idm.oclc.org/CustomPages/Janes/DisplayPage.aspx?DocType=Reference&ItemId=+++1302957&Pubabbrev=CIS> (Updated 17 March 2014).

Johnson, Lt Col David D. *Arctic Insecurity: Avoiding Conflict*. Air War College, Maxwell Air Force Base, AL: 2010.

Johnston, Peter F. "Arctic Energy Resources: Security and Environmental Implications." *Journal of Strategic Security* Volume 5 Issue 3 (2012).

Joint Operational Access Concept (ver. 1.0), Joint Chiefs of Staff, Washington, DC: 17 January 2012.

Kennedy, Caitlin, "2012 State of the Climate: Arctic Sea Ice" *NOAA Climate.gov*, 30 July 2013, <http://www.climate.gov/news-features/understanding-climate/2012-state-climate-arctic-sea-ice>

Kramer, Franklin D., Starr, Stuart H. and Wentz, Larry K. ed. *Cyberpower and National Security*. Dulles, VA: Potomac Books Inc., 2009

Krepinevich, Andrew F. *Why AirSea Battle?* Center for Strategic and Budgetary Assessments, 2010.

Leitzell, Katherine, "When will the Arctic lose its sea ice?" *National Snow & Ice Data Center*, 3 May 2011, <http://nsidc.org/icelights/2011/05/03/when-will-the-arctic-lose-its-sea-ice/>

Lekic, Slobodan, "Despite cuts, NATO still accounts for most of world's military spending" *Stars and Stripes*, 25 February 2014. <http://www.stripes.com/news/despite-cuts-nato-still-accounts-for-most-of-world-s-military-spending-1.269882>

Lennox, Duncan *IHS Jane's Weapons Strategic 2012-2013* IHS Global Limited, Alexandria, VA: 2012

McKie, Robin, "China's voyage of discovery to cross the less frozen north" *The Observer*, 17 August 2013, <http://www.theguardian.com/world/2013/aug/18/china-northeastern-sea-route-trial-voyage>

Military Periscope – Russian Naval Mine Overview
<https://www.militaryperiscope-com.aufric.idm.oclc.org/weapons/minetorp/mines/w0003735.html>

Neuman, Scott, "Freighter Makes First-Of-Its-Kind Transit Of Northwest Passage," *NPR.org*, 27 September 2013, <http://www.npr.org/blogs/thetwo-way/2013/09/27/226856198/freighter-makes-first-of-its-kind-transit-of-northwest-passage>

Norberg, Johan "The Use of Russia's Military in the Crimean Crisis," *Carnegie Endowment for International Peace*, 13 March 2014. <http://carnegieendowment.org/2014/03/13/use-of-russia-s-military-in-crimean-crisis/h3k5>

Noronha, Charmaine, "Canada plans claim that would include North Pole" *Associated Press*, 09 December 2013. <http://bigstory.ap.org/article/canada-plans-claim-would-include-north-pole>

O'Halloran, James C Ed., *Jane's Land-Based Air Defence 2011-2012*, IHS Global Limited, Surrey, UK: 2011

Osherenko, Gail, and Young, Oran R. *The Age of the Arctic: Hot Conflicts and Cold Realities*. Cambridge: University Press, 1989.

Rowe, Elena Wilson ed. *Russia and the North*, University of Ottawa Press, Ottawa: 2009

Smith, Dr Mark A & Giles, Keir. *Russia and the Arctic: "The Last Dash North"*. Defence Academy of the United Kingdom, 2007.

Tangredi, Sam J. *Anti-Access Warfare: Countering A2/AD Strategies*. Naval Institute Press, Annapolis, MD: 2013.

The World Factbook – Arctic Ocean "Arctic Region", Central Intelligence Agency, https://www.cia.gov/library/publications/the-world-factbook/graphics/ref_maps/physical/pdf/arctic_region.pdf

Trent, Packard C. *An Evaluation of the Arctic—Will it Become an Area of Cooperation or Conflict?* Naval Postgraduate School, Monterey, CA: 2011.

Umstead, Lt Col, Robert K. *The Opening of the Arctic: Establishing a New Security Perimeter for the United States*. Air War College, Maxwell Air Force Base, AL: 2013.

United Press International, “Putin lays down military gauntlet in State of the Nation,” *UPI*, 12 December 2013, http://www.upi.com/Top_News/Special/2013/12/12/Putin-lays-down-military-gauntlet-in-State-of-the-Nation/UPI-90531386863175/

USGS Fact Sheet 2008-3049 “Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle,” *USGS*, <http://pubs.usgs.gov/fs/2008/3049/>

USGS slide presentation “Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle” *USGS*, http://energy.usgs.gov/portals/0/Rooms/arctic/images/CARA_slideshow.swf

Van Tol, Jan, Gunzinger, Mark, Krepinevich, Andrew, and Thomas, Jim. *AirSea Battle: A Point-of-Departure Operational Concept*. Center for Strategic and Budgetary Assessments, 2010.

Wood, John. *Russia, the Asymmetric Threat to the United States: A Potent Mixture of Energy and Missiles*. Santa Barbara, CA: ABC-CLIO, LLC., 2009.

Zaborskiy, Victor. “Policy and strategic considerations of the Russian space program,” in *Space Strategy in the 21st Century: Theory and Policy* Ed. Eligar Sadeh Routledge New York, NY: 2013.