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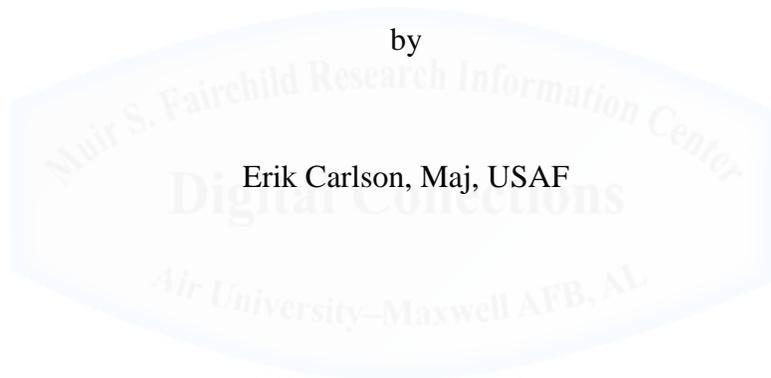
AIR UNIVERSITY

Deterrence Without Escalation:

A Case for the Arctic in 2040

by

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Abstract

Nuclear and conventional deterrence will remain foundational to national security. However, we do not have the capability to preempt or prevent a major regional power from using unrestricted or hybrid warfare methods to increase their influence or prestige without unwanted escalation. Decision makers should be provided an option to deny an adversary's military capabilities to end a crisis while limiting undesired hostilities. Edward Luttwak refers to this as *active deterrence* and it could allow the US military to project power, avoid escalation, and facilitate conflict resolution.

Maritime traffic along the Northern Sea Route is predicted to increase to 10 percent of all container shipping between Asia and Europe by 2050. To ensure freedom of commerce, in a potential Anti-Access/Area Denial (A2/AD) environment, US military power projection methods must include persuasive actions short of major combat operations. This paper will explain how the United States can deny Russian freedom of action through a mutual denial of the battlespace via a High Powered Microwave (HPM) weapon, thus preventing it from achieving its objectives. Military options, such as this, will allow the United States to influence an adversary's decision-making, deter further aggression, minimize the chances of escalation, and achieve US strategic objectives.

1. Introduction

The 1978 Brookings study, *Force Without War*, investigated “the effectiveness of the armed forces as a political instrument.”¹ While the authors concluded that supportive action was more effective than military coercion, they acknowledged that minor actions to modify a behavior “were often associated with positive outcomes.”² Since the end of that study, deterrence proved an effective method of military coercion. With the advanced weapon systems available to the military today, an asymmetric use of force can provide a highly tailored response to foreign aggression. Decision makers should be provided an option to deny an adversary’s military capabilities to end a crisis while limiting undesired hostilities. This combines Edward Luttwak’s *active deterrence*—“preventing a specific opponent from doing something the opponent may wish to do” with knowledge of an adversary’s decision calculus in order to prevent known provocations.³ These options, through in-depth analysis, could allow the US military to project power, avoid escalation, and facilitate conflict resolution.

By the year 2040, nearly 10 percent of all container shipping from Asia to Europe is forecast to transit the Northern Sea Route.⁴ Maritime traffic of the Arctic will increase as the sea ice continues to recede.⁵ To ensure freedom of the seas in a region likely to become an Anti-Access/Area Denial (A2/AD) environment, US military power projections must adapt to maintain uninterrupted access to these shipping lanes without resorting to major combat operations. A Flexible Non-Escalatory Option (FNO) will give the capability to prevent or dissuade aggression of a nuclear-armed regional power.⁶ The United States can deny Russian freedom of action with a High Powered Microwave (HPM) weapon, thus preventing Russia from achieving its objectives.⁷ Military options, such as this, will allow the United States to influence

an adversary's decision making, deter further aggression, minimize the chances of escalation, and achieve US strategic objectives.

The Arctic presents a complex problem for multiple reasons. Not only will it combine the current challenges associated with an A2/AD environment, but it also adds largely inaccessible terrain and dangerous weather conditions, which make traditional power projection methods less effective. Furthermore, the distances in the Arctic are vast. Figures 1 and 2 (below) illustrate the unfamiliar geography and range required for the United States to project power along the Northern Sea Route. If Russia exerts control over the Northern Sea Route and blocks commercial trade, challenging its maritime dominance will prove difficult.

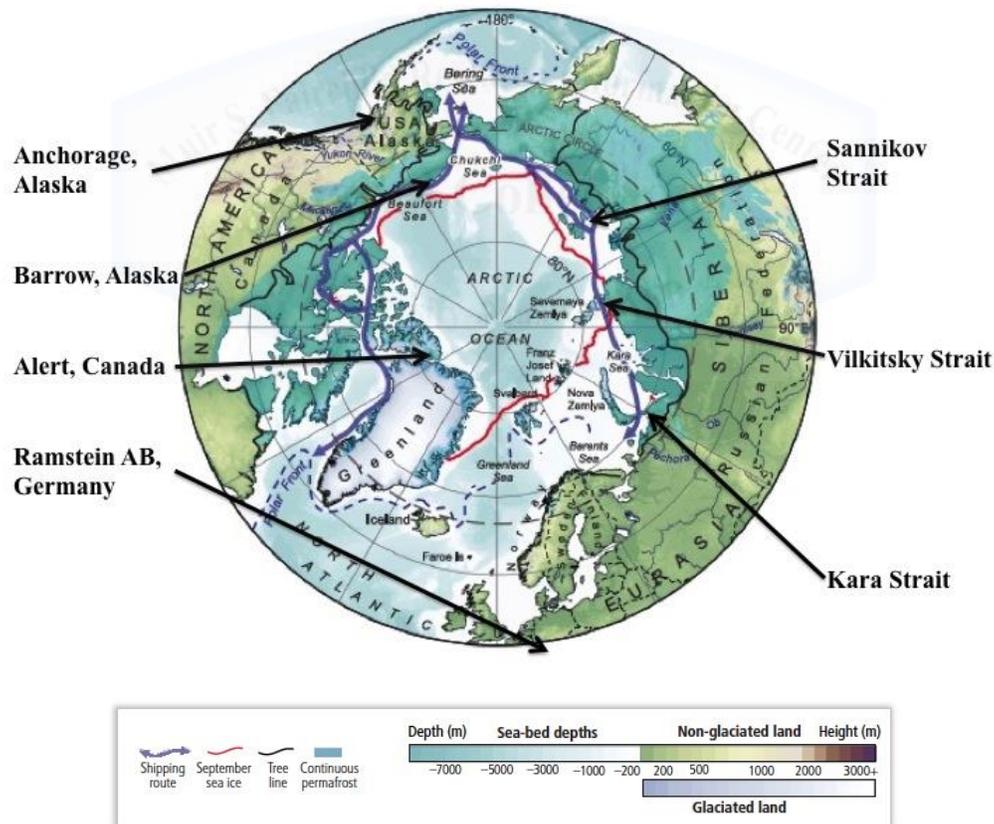


Figure 1 – Arctic Map (Polar Projection) Showing Key Locations (Adapted from J.N. Larsen, et al. Polar Regions. Climate Change 2014. New York, NY: Cambridge University Press, 1567-1612.)⁸

	Anchorage, Alaska		Bering Strait	
	<u>Distance (NM)</u>	<u>Flight Time (Hours)</u>	<u>Distance (NM)</u>	<u>Steam Time (Days)</u>
Sannikov Strait	1,600	5.2	1,100	3.3
Vilkitskiy Strait	2,000	6.5	1,600	4.8
Kara Strait	2,800	9	2,500	7.4

Figure 2 - Approximate Distances, Flight Times, and Steaming Time, Created by the Author⁹

The US Navy is currently the most capable force to maintain a forward presence in the Arctic. Even the most capable US Air Force fighter aircraft, the F-22, would take at least five hours to reach a target on the Northern Sea Route. However, surface ships will have limited access to the Northern Sea Route due to the thick, multi-year sea ice. Furthermore, Russian maritime claims combined with its increased militarization of the Arctic could restrict US naval presence. Submarines have played cat-and-mouse in the Arctic since the Cold War and remain an effective weapon system in this region, but a kinetic attack would certainly escalate a crisis. Similarly, F-22s or B-2s can range the Arctic and project power at those distances in denied environments, but current payloads are limited to a kinetic kill or an ineffective *show of force*. As a likely predictor of things to come, Russia and the United States have increased their *shows of force* through increased long-range bomber patrols over the Arctic; however, there has been no marked change in action by any nation.^{10,11} Inactions have not proven effective at changing the decision calculus of an adversary. While the United States can project hard power in the Arctic, it would be beneficial to give decision-makers an option on a lower rung of the escalation ladder.

To frame the problem, this paper will begin with an outline of the future of the Arctic region and why it will become more important than it is today. Next, we will discuss the most likely source of conflict in the region—the Russian militarization of the Arctic. Necessarily, this will lead to a discussion of how the United States can face such a threat. The concept of Flexible

Non-Escalatory Options will illustrate the possibility of a strategic solution to Russian aggression while minimizing the chance of escalation. Finally, requirements will be specified for a HPM to serve as a FNO in the Arctic.

2. The Arctic in 2040

The Arctic is one of the most inhospitable environments on the planet, but the advantages of this frozen region will begin to materialize as the ice melts and exploration gets easier. Despite the many conflicting interests—natural resources, fisheries, search and rescue responsibilities, environmental protection, and pollution prevention—the Russian militarization of the Arctic will remain the most threatening. Moscow sees the importance of future shipping lanes. Russian leadership seeks more control over the unclaimed Arctic to spark economic development. Experts estimate the Arctic holds 30 percent of the world’s undiscovered natural gas and 13 percent of its undiscovered oil.¹²

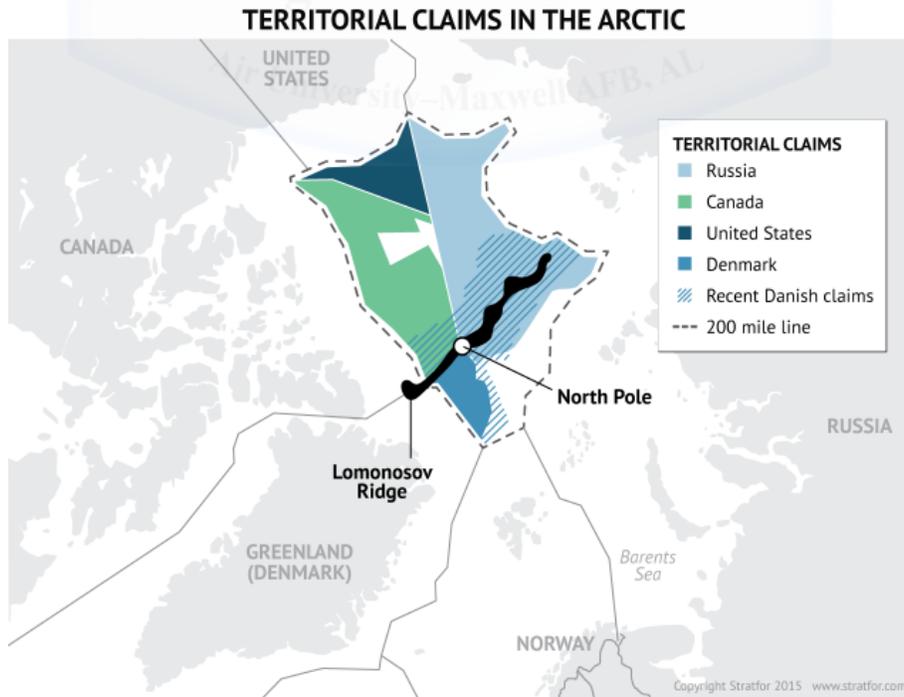


Figure 3 - Competing Territorial Claims in the Arctic
(Reprinted by permission “Russia’s Plans for Arctic Supremacy” *Stratfor*.)

The United Nations Convention on the Law of the Sea (UNCLOS) currently regards the higher latitudes in the Arctic as *high seas*; however, there are competing claims by both Russia and Denmark (see Figure 3 above).¹³ In 1926, Russia exerted a much broader claim, which received validation recently when the Arctic Council allocated Search and Rescue responsibilities to Russia resembling that claim.¹⁴ Adm (Ret) James Stavridis aptly characterizes the Arctic as “a fiefdom of competing claims.”¹⁵ Although Russia’s sovereign claim to the Northern Sea Route has yet to be challenged, it is a contested waterway and will gain in importance as the sea ice recedes.¹⁶

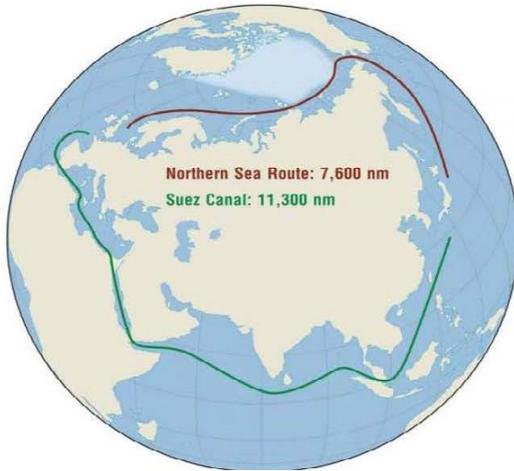


Figure 4 – Arctic Search & Rescue Responsibilities
(Reprinted from Andreas Østhagen, “Coast Guards in the Arctic – Troubles Ahead.” *The Arctic Institute*.)¹⁷

Today, Moscow grants access rights to the Northern Sea Route, but controls it as Russian sovereign waters.¹⁸ As of early 2015, Russia's claim of ownership and control has remained unchallenged. Russia's regional military dominance makes the price to challenge such claims extraordinarily high and the benefit presented by this trade route does not outweigh the costs—yet.

Both the *US National Strategy for the Arctic Region* and the Department of Defense *Arctic Strategy* declare preserving Freedom of the Seas a top priority.^{19,20} The US Navy has followed suit naming Freedom of the Seas a main strategic objective in its 2014 Arctic Roadmap.²¹ To do this, the Navy and the Coast Guard are considering the use of new or existing surface vessels to perform freedom of navigation operations.²² Given our understanding of Russian maritime claims, even if the US Navy could afford to send enough ships to the Northern Sea Route it would be seen as an act of aggression by Russia. Therefore, guaranteeing freedom of the seas without surface vessels would be beneficial.

Both the Northern Sea Route and the Northwest Passage will gain in strategic importance if sea ice extent shrinks as predicted by the Intergovernmental Panel for Climate Change (IPCC) and the US Navy.^{23,24} By the year 2040, the IPCC forecasts that the Russian trade route will be navigable by open water vessels, without an icebreaker escort, around 100 days per year.²⁵ Considering full transits of the Northern Sea Route have been accomplished in 7.5 days and there is little chance of a slowdown due to traffic, this change in the ocean state will certainly cause a corresponding change in the geopolitical environment.²⁶ “Historically, alterations in transport routes have been associated with radical shifts in the balance of economic and political power.”²⁷ With Russia asserting control over a large swath of the Arctic, it will become ever more important for the United States to guarantee freedom of the seas.



Route	Distance	Time (20 Knots)
Northern Sea Route	7,600 nm	16 Days
Suez Canal	11,300 nm	24 Days
Panama Canal	12,300 nm	26 Days
Cape of Good Hope	14,700 nm	31 Days

Figure 5 - Shipping Routes from Yokohama to Rotterdam
(Adapted from *Blue Horizons 2013*, Center for Strategy and Technology, Maxwell Air Force Base, AL: Air University, March 2014).

There are many reasons why polar shipping routes will play an increasing role in global economics. First, these northern routes offer shorter transit distances between Asia and the North Atlantic. For example, it is equidistant for a ship to travel from Hong Kong to Rotterdam via the Suez Canal or the Northern Sea Route.²⁸ For ports farther north, such as a Yokohama, Japan, these polar routes will be far more lucrative (Figure 5, above). Using the IPCC climate model, predictions show that 10 percent of all container trade between Asia and Europe in 2050 will be transported through the Arctic.²⁹ Second, both the Panama and Suez Canals can have significant wait times, while the Arctic has no foreseeable traffic slowdowns. Furthermore, man-made canals limit the size of vessels they can accommodate, but these limits are not applicable to the future polar routes.³⁰ The trend in shipping is to create larger container ships to carry cargo more efficiently, which can quickly become too big for artificial waterways. Finally, current transit routes are frequently interrupted, by piracy, corruption, or political insecurity—such as the ongoing situation in Yemen and past hostilities in Egypt.³¹ These new shipping routes could

prove highly competitive for Asian countries wanting more access to European markets and vice versa.

In the next 25 years, one of the harshest climates on the planet will become increasingly accessible. Current territorial disputes will prove far more important when the sea ice opens the Arctic Ocean to more maritime exploration and shipping, especially considering the build-up of Russian military power in the region.

3. Russian Arctic Posture

Recently, Russia has become far more vocal about its interest in the Arctic for both economic and military reasons.³² This militarization of the Arctic is hardly new for Russia. During the Second World War, the Soviets used the Northern Sea Route to bring Allied supplies into the country from ports on the West Coast of the United States.³³ The military utility of the Arctic only increased in the Cold War when nuclear missile submarines hid under the sea ice. From there it would take a Soviet missile less than 20 minutes to reach Washington DC.³⁴ The Arctic has been a battleground before and if it becomes one again the United States may be ill prepared to respond.

The Russian Northern Fleet, which represents two-thirds of its entire navy, has its headquarters and main bases in the Barents Sea.³⁵ Russian military supremacy of this region extends beyond the maritime domain. They routinely fly MiG-31BM patrols and are modernizing an airstrip on the Arctic archipelago of Novaya Zemlya to accommodate next-generation fighters and advanced air defense systems.³⁶ As Russia outlined in its 2009 Arctic Policy, the defense and protection of its Arctic Zone is vital to the interests of the Federation.³⁷ This can be seen in the announcement by the Russian Defense Minister, Sergei Shoigu, that “14

military airfields on Russia's Arctic seaboard would be operational by the end of the year [2015].³⁸ Figure 6, below, details Russian military build-up in the Arctic.

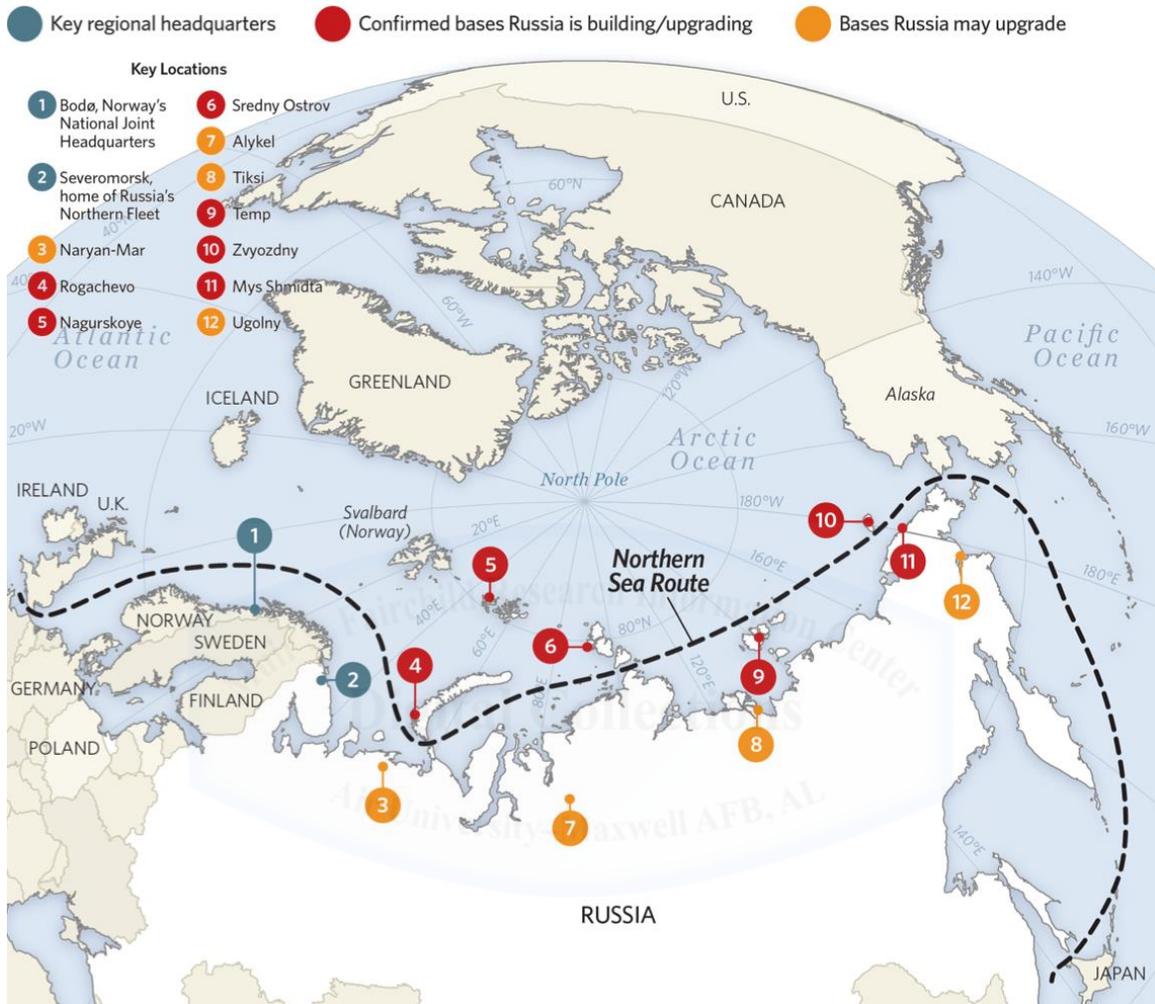


Figure 6 - Russian Arctic Bases
(Reprinted with permission from The Heritage Foundation, “2015 Index of US Military Strength: Assessing America’s Ability to Provide for the Common Defense.” Washington, DC. 2015.)

Without any other bases, these locations provide Russia with a significant ability to control most of the Arctic Ocean and demonstrate a clear A2/AD challenge for the United States.

Red Course of Action

Russia has recently demonstrated effective employment of both unrestricted and hybrid warfare. The former, unrestricted warfare—limited aims, unlimited means—can be seen from

the cyber attack on Estonia, while the latter can be seen in the use of non-uniformed forces in the annexation of Crimea.^{39,40,41,42} BBC News remarked that the Kosmos 2499 satellite, launched in May 2014, shows the ability of Russia to “destroy or disable” orbiting spacecraft.⁴³ Anti-satellite weapons are fundamentally asymmetric and fit squarely within unrestricted warfare tactics. A blockade of the Northern Sea Route to disrupt US, NATO, or Allied trade routes falls in line with this method of warfighting, because there is no longer a distinction between what *is* and what *is not* a battlefield. Furthermore, this would be easy for the Russians to justify because they already claim sovereignty over the entire Northern Sea Route.⁴⁴ If the Russians were to challenge western access of the Northern Sea Route, it would not be without precedent. In the run-up to World War II, the United States placed an economic embargo on Japan in response to territorial aggression in the Pacific. More recently, in response to the crisis in Ukraine, the United States enacted sanctions on shipping along Russia’s northern coast to domestic cargo and energy exports.⁴⁵ It would be unwise to assume Russia would continually allow unimpeded commercial transit of the Northern Sea Route; therefore, the US Air Force must consider possible responses.

Operating Environment

The Northern Sea Route is not new, but it is seldom used, which is why there have been no major jurisdictional challenges to Russia’s claim. As it exists now, “Any foreign vessels seeking access to this area requires Moscow’s consent as well as compliance with cumbersome and expensive regulations, including pilotage and ice-breaking escort.”⁴⁶ Combining this with Article 234 of UNCLOS—which gives coastal states the ability to regulate ice-covered areas within their Exclusive Economic Zone (EEZ)—and the search and rescue responsibilities ascribed by the Arctic Council, one can infer Russian intentions in this region.

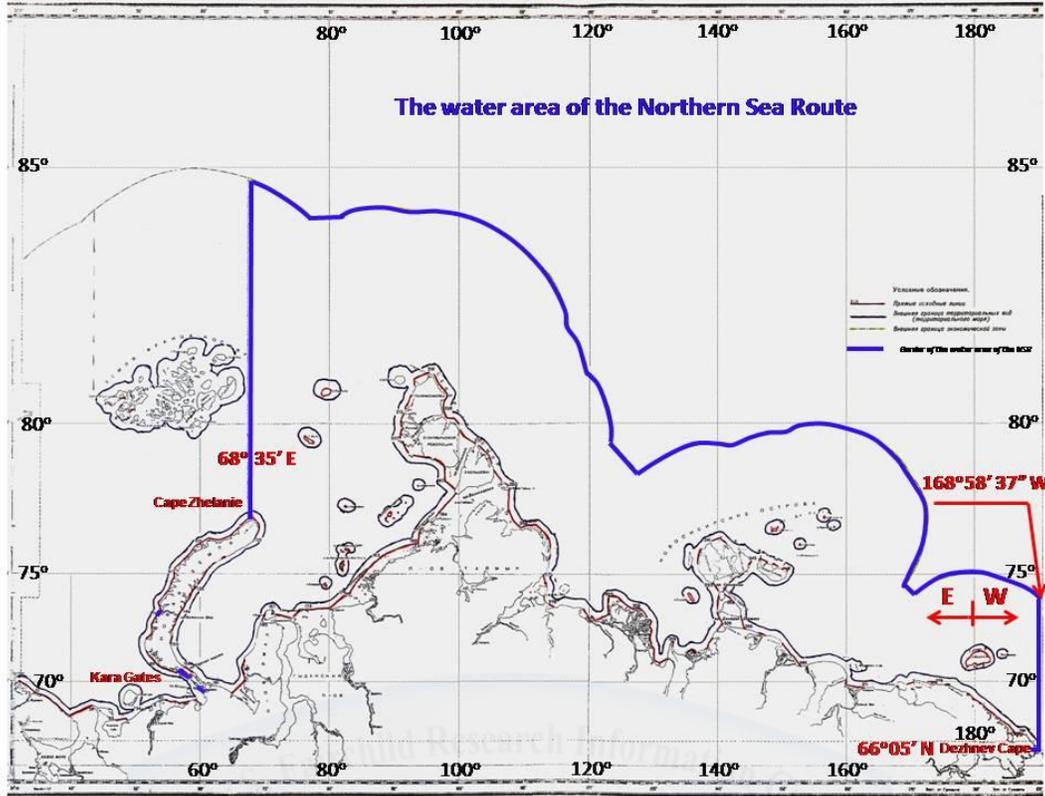


Figure 7 – Russian Definition of the Northern Sea Route
(Reprinted from The Northern Sea Administration, “The Water Area of the Northern Sea Route.”)⁴⁷

Russia views the Northern Sea Route as a national asset, a “unified national transportation link,” and the presence of foreign naval vessels would be perceived as an act of aggression.⁴⁸ In 2012, Dmitry Rogozin, former Russian Ambassador to NATO, “insinuated that NATO warships operating along the ice-free Northern Sea Route would lead to conflict” and Russian Admiral Nikolai Kudinov “opined in 2012 that his country is ‘doomed to geopolitical confrontation with NATO in the Arctic.’”⁴⁹ Based on this stated Russian policy, the US military must develop response options that will not immediately escalate future competition.⁵⁰

4. Current US Military Options in the Arctic

Presently, power projection in this region is limited to airpower and sub-surface warfare. While kinetic solutions are necessary in certain situations, they may prove too escalatory in

others. In the case of a blockade along the Northern Sea Route, damage to or destruction of a Russian warship would likely produce an undesired response from a nuclear-armed adversary. Very few counters to the A2/AD problem would minimize escalation—rather most approaches focus on deterring or defeating an enemy’s ability to control United States’ ability to move within a region. Flexible Non-Escalatory Options provide a method to compel an adversary through denial, degradation, disruption, or other form of coercion to prevent a low-level conflict from turning into major combat operations.

Currently, the Arctic has yet to realize its strategic potential and the US Air Force has little need for airpower projection capabilities beyond what the military already possesses. If the sea ice recedes as predicted, the Northern Sea Route will be navigable for 100 days a year, creating a potential area for economic and political competition. Therefore, the US Air Force needs an ability to project power in the high north, and, ideally, without escalation.

A New Paradigm?

Clausewitz considered it a fallacy to believe there is “some ingenious way to disarm or defeat an enemy without too much bloodshed.”⁵¹ Considering current military technological capabilities could we compel an enemy without a maximum use of force?⁵² It may have been the only form of compellence in Napoleonic military strategy, but the venerated Prussian could never have conceived the current state of military weapon systems. From Sun Tzu to Sir Basil H. Liddell Hart, military theorists have long asserted “the acme of skill” and “the perfection of strategy would be, therefore, to produce a decision without any serious fighting.”^{53,54} The US military has succeeded in deterrence—preventing an action without conflict—in the past. Yet, deterrence did not disarm or defeat the Soviets. Active deterrence, through the use of a Flexible

Non-Escalatory Option, could prove far more effective and coercive in today's geopolitical climate than a strategy of a maximum use of force.

The rationale to pursue escalation control is two-fold. First, the accelerating advancement of technology will allow weapon systems to yield very specific effects. Second, the public has become less acceptant of casualties and this may influence the extent of military operations in the future.

The use of nuclear and precision-guided weapons changed the way wars are fought and how they have been avoided. This same type of revolution of military affairs is occurring today. We have yet to realize the full potential of the cyber and space domains. Cyber warfare allows effects to be meticulously tailored to achieve an objective, while space assets provide capabilities seemingly out of science-fiction movies. The precise future of warfare is yet to be known, but one can safely assume that weapon systems will be able to offer a customizable effect.

The airpower theorist, Colin Gray, believes that “the twenty-first will be another bloody century.”⁵⁵ There are skeptics, such as Steven Pinker from Harvard University, who claim the long-term trend shows that violence of all types has been decreasing and is likely to continue.⁵⁶ However, this “constrained, non-natural peace,” as Nassim Nicholas Taleb—author of *The Black Swan*—argues, reduces low-level volatility, which increases the probability that the next conflict will be catastrophic.⁵⁷ He believes that small wars act as a stabilizing force to reduce the likelihood of major combat operations, because “there is no stability without volatility.”⁵⁸ Christopher Fettweis, of Tulane University, contends “If it is true that 21st century power is exceptionally unlikely to become kinetic, then new ways to envision and measure power are perhaps in order.”⁵⁹ Combining these disparate beliefs, a military must understand and prepare for two possible future scenarios. First, if a conflict between major powers becomes kinetic, it is

likely to escalate quickly with high casualty rates on both sides. Conversely, to be militarily dominant a force must pursue and employ methods of non-escalatory power projection. The application of non-escalatory military power will reduce the overall volatility of the system, help stabilize volatile situations, and allow national leadership to influence and deter nuclear-armed rivals without large-scale conflict.

5. Flexible Non-Escalatory Options (FNOs)

Inherently, all forms of military coercion are difficult. It takes a great understanding of an adversary as well as significant military capabilities to deter. Fortunately, in-depth understanding of advanced weapon systems may present the opportunity to coerce an enemy without serious fighting. This type of power projection can be employed through *Flexible Non-Escalatory Options* (FNOs). These FNOs are similar in nature to Flexible Deterrent Options.⁶⁰

There are obvious advantages to this method of power projection, but it remains challenging. For a FNO to be successful it must have two basic components: coercion and the minimization or prevention of conflict escalation. Coercion will generally be accomplished through active deterrence, but may also include compellence—or *zugzwang*—where an opponent is forced to do something they do not wish to do.^{61,62} A 2002 RAND study noted, “Almost everything true about deterrence applies to compellence as well, though not always in exactly the same way.”⁶³ Therefore, the existing deterrence doctrine and infrastructure can be expanded to include FNOs. For example, the Deterrence Operations Joint Operating Concept and the Strategic Deterrence Assessment Lab at US Strategic Command (STRATCOM) will be integral to analyze competitor decision-making calculus and create each Flexible Non-Escalatory Option.

Non-Escalation

Defining non-escalation is very important to this concept. Regardless of the military action taken against an adversary, there will certainly be a response—most likely asymmetrical.

The goal is to avoid the possibility of conflict escalation to major combat operations. The adversary's response becomes a trade-off. A FNO would provide leadership additional time to de-escalate the crisis and move toward peaceful conflict resolution, but as a consequence those leaders must accept the risk associated with the enemy reaction. Since the enemy decides their own response, no planning can completely prevent escalation; however, it is necessary to eliminate all known provocations.

Considering the advanced strike capabilities of the United States, there are a few methods to pursue non-escalation. First, it is possible to have a strategic or tactical effect on an adversary without that effect immediately recognized as an attack. These types of effects will most likely come from an offensive cyber attack or possibly an anti-satellite weapon. Without recognition of an attack, a response will be extremely unlikely.

If an enemy recognizes an attack, but it lacks clear attribution an escalatory response would be difficult to justify. If neither of these two options is available, a non-lethal attack—or a 'functional kill' such as the one proposed in this paper—could be prosecuted. This would elicit far less of a response than a 'kinetic kill.' Known provocations, such as overt destruction of military assets, are clearly an attack and would likely trigger an escalatory reaction, but a temporary denial, degradation, or disruption of a capability may not.

The use of kinetic force could serve as a final non-escalatory military option in very specific situations. While it is unlikely for a nation with a large military and nuclear weapons to accept an attack on its interests without seeking retribution, a small, weaker state may not retaliate against an overwhelming military force such as the United States or NATO. For example, on two separate occasions Israel attacked nuclear facilities of its neighbors, the Osiraq

reactor in Iraq and the al-Kibar facility in Syria, to prevent them from acquiring nuclear weapons. Both attacks achieved its objective and neither caused significant escalation.⁶⁴

For non-escalatory power projection to work, it must be grounded in well-established theory. Thucydides posed in his “triad of genius” that the primary motives of a belligerent’s behavior are “fear, honor, and interest.”⁶⁵ It must be clear that a FNO should leave the adversary unwilling or unable to take the targeted action and it should not cause that nation to *fear* subsequent actions, have their *honor* tarnished, or feel their *interests* are jeopardized.

Pitfalls

Employing a FNO does not guarantee that an adversary will not counterattack in some form. Therefore, this action must be backed with sufficient force to overpower an adversary should non-escalation fail. FNOs cannot replace a force required to dominate major combat operations. The two must be complimentary. When backed by an overwhelming military force, implementing a FNO shows restraint, signals a desire for escalation control, and adds a deterrent aspect giving the enemy another reason to cease aggression. Additionally, this must not be misused or overused by a dominant power as a form ‘adventurism’ into foreign interventions. Threats become less threatening the more they are used. FNOs too will become less effective the more that they are used and should be employed only when vital national interests are at risk.

Flexible Non-Escalatory Option for the Arctic

Control of the sea will be a central issue for the warming Arctic, specifically freedom of the seas and freedom of navigation in the ice-free waters. Assuming a fleet of ice-hardened warships is not a feasible power projection option, how does the United States challenge Russian sea control along the Northern Sea Route? Robert Rubel of the US Naval War College argues that the ability to defeat an A2/AD environment may not lie in the ability to control the sea—as has been argued by classical naval theorists—but revolves around the ability to deny sea control

to the enemy.⁶⁶ This idea of mutual denial would prove “a less rigorous and presumably less costly requirement.”⁶⁷ According to naval theorist Julian Corbett, the sea is naturally uncommanded.⁶⁸ By extension, the air is inherently uncommanded, too. Only when an air or a naval force exerts control does that domain become controlled. A temporary denial of Russian sea control would create a mutually denied battlespace, in which the Arctic once again becomes uncontrolled and the efforts to restrict the flow of commerce would be prevented. This could prove an effective US response.

6. High-Powered Microwave Weapon

To best understand how to create this FNO, it is best to work the issue backwards. The first requirement is for weapon to effectively disable the Russian naval vessel without significant collateral damage. Next, the weapon must gain access to its target within the A2/AD environment to deliver the necessary effect. Finally, the geography of the Arctic requires such a weapon to have considerable range, which could be integrated into the weapon system or combined with a launch platform. A weapon system that provides all these capabilities will enable this specific FNO to achieve the prescribed strategic objective.

A high probability of a functional kill or disablement is a requirement for this FNO to be successful. High-Powered Microwave (HPM) weapons generate a pulse of energy between 1MHz and 100 GHz to produce an effect similar to that of an electromagnetic pulse (EMP) from a nuclear blast.⁶⁹ Typical shielding used to protect an asset from an EMP generated by a nuclear blast is ineffective against a HPM. In this type of weapon, microwaves disrupt or disable electronic devices common in most modern technology by generating a transient surge of electricity that destroys sensitive electronic components. There are many necessary components for a ship to continue operation in a wartime environment, most of which are suitable targets for

a HPM. Destroying or disabling the controls for navigation, communication, propulsion, or steering of a Russian frigate will deny its ability to engage and could temporarily incapacitate the warship. To get this effect an electric field strength over 20 kilovolts per meter creates ‘probable’ damage to electrical components, but an electric field strength of up to 100 kilovolts per meter can help ensure the maximum effect on the target.⁷⁰

To engage a target, a HPM weapon must be very close to supply sufficient energy on the objective. Laws of physics preclude a HPM weapon from being employed at a distance, because the electric field strength dissipates and the power received at the target becomes less than that required to produce the maximum amount of damage.⁷¹ This requires that the HPM be in close proximity to its target in a highly contested A2/AD environment. To get this access, directed energy weapons could travel at hypersonic speeds, but the beam must propagate through a plasma field—the same plasma field that causes the ‘radio blackout’ of the shuttle during reentry. While there is research in this area, this paper assumes it is physically prohibitive for the near future.⁷² Therefore, the HPM must be on a small, low-observable platform that can access an A2/AD environment by avoiding detection.

Range is a major design factor for any weapon to be employed in the Arctic. Looking back at Figure 1, if employed from Joint Base Elmendorf-Richardson, this weapon would need to travel about 5,000 km to reach the Kara Strait—the most distant chokepoint along the Northern Sea Route. The significant range required for this weapon makes recovery and reuse impractical. However, the Intermediate Nuclear Forces Treaty prohibits ground-launched missiles with this range.⁷³ This HPM weapon must be mounted on a Remotely Piloted Aircraft (RPA) or an air-launched cruise missile. If mounted on an RPA, this gives the weapon system an added level of control, enabling the possibility of re-attacks and, thus, increasing the probability of kill.

To effectively employ a HPM weapon in the Arctic, it must have the range to reach its target, the ability to avoid detection by an advanced integrated aerial defense systems, and get close enough to the target to functionally kill a crucial component of the ship making the vessel incapable of continuing its mission. By the year 2040, these design elements could create a weapon system small enough for it to successfully prosecute this mission.

7. Conclusion

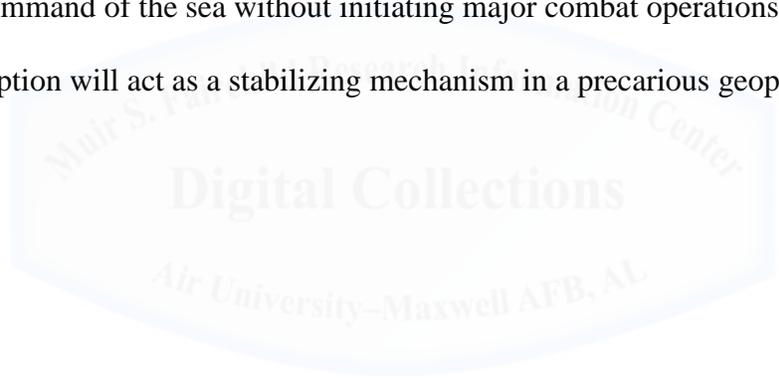
Fielding an effective HPM weapon, which should be possible by 2040, would provide an intermediate option between domination and diplomacy—serving as the “bottom rung of the ladder of force escalation.”⁷⁴ In the case of a Russian naval blockade along an ice-free Northern Sea Route, this HPM weapon, if employed properly in conjunction with the non-military instruments of national power, could provide a positive, non-escalatory solution for the United States. This is precisely the role of the Flexible Non-Escalatory Option.

Colin Gray observed, “Airpower has revolutionized tactics, operations, and strategies but not the nature of strategy, war, or warfare.”⁷⁵ In this paper, I have *not* sought to revolutionize strategy, war, or warfare. The nature of war will persist despite what revolutionary technologies are on the horizon. Rather, this paper seeks new strategies and tactics. With vastly increasing intelligence-gathering capabilities, the United States should be capable of tailoring effects for specific military actions. Using advanced space, cyber, and ISR capabilities in conjunction with geopolitical expertise, by the year 2040 the United States will be able to successfully employ a Flexible Non-Escalatory Option.

Deterrence through denial worked in the Cold War and prevented mutually assured destruction. Today, we see a resurgent Russia using unrestricted and hybrid warfare methods in relatively low-level conflicts to gain regional influence, yet the United States is not adapting to

this new escalation ladder. Nuclear deterrence will continue to protect our country against a first strike, but the military does not have the capability to stop or dissuade a nuclear-armed enemy from using unrestricted warfare methods to increase its relative power in a region.

Assuming the climatological models are correct, by 2040 the Northern Sea Route will dramatically change the global shipping market—directly benefitting Russia. In order to prevent an interruption of global commerce, preserving access to ice-free polar shipping routes will be critical. It would be impractical to field a new naval fleet to secure a shipping lane open less than 30 percent of the year. However, there will still be a need for the United States to project power without ‘command of the sea.’ This paper clearly outlines the utility of a HPM weapon to deny Russia’s command of the sea without initiating major combat operations. This flexible non-escalatory option will act as a stabilizing mechanism in a precarious geopolitical situation.



Appendix 1 - Flexible Non-Escalatory Options*

1. General

FNOs are discrete military actions carefully tailored to influence an adversary's action for a strategic effect and minimize the possibility of conflict escalation. They can be employed to minimize enemy actions as a crisis is unfolding, prevent further aggression during a crisis, or preempt an imminent crisis from occurring. Ultimately, FNOs seek to prevent major combat operations while still achieving strategic objectives. They are physical actions taken by one or more components of the US military as part of a deliberate attempt by national authorities to influence specific behavior of individuals in another nation without engaging in a continuing contest of violence.⁷⁶ **Key Goals of FNOs are:**

- a. Compel an enemy to cease aggression through the denial of its capability.
- b. Deter further aggression.
- c. Compel an enemy toward a political objective through discrete military intervention.
- d. Prevent and/or minimize the chance of escalation to Major Combat Operations
- e. Retain and/or win public approval while making it politically unacceptable for the enemy to retaliate or escalate the conflict.

2. Description of Non-Escalatory Actions

a. The planning engine for FNOs is the deliberate planning process. In the event that SecDef directs execution of a FNO, the supported CCMD, would initiate planning to determine existing options or develop new ones for SecDef and to enable acquisition of authorities and approvals necessary to conduct appropriate military operations to

b. Although the FNO is inherently a military option, it will require the Whole of Government to aid in the planning process.

Military planners will provide the expertise needed to compel the enemy. The intelligence community, specifically the agency or department with the most knowledge on the proposed target, should collaborate to determine the most effective way to

Examples of Flexible Non-escalatory Options

- Offensive Cyber Operations to prevent military command and control
- Offensive Counterspace to prevent the use of adversarial space assets
- High-Powered Microwave weapon used to deny an adversary military capability
- A kinetic strike, depending upon the target, the actor, and the geopolitical situation

* This uses the template from Joint Publication 5-0, Appendix E—Flexible Deterrent Options and Appendix F—Flexible Response Options and much of the verbiage is similar or identical

minimize the chance that a given COA will lead to escalation. This type of interagency planning is the best way to successfully employ a FNO.

3. FNO Characteristics

- a. Developed as directed by the CJCS and maintained by the CCMDs to address the entire range of possible threats.
- b. Provides military options to national leadership.
- c. Preplanned, through the deliberate planning process, or developed real-time, during crisis action planning.
- d. Planning should be based on DOD's capabilities (overt, clandestine, low visibility, and covert).
- e. Will be most effective against large-scale, organized adversary, but could prove effective against a well-organized, disciplined non-state actor.
- f. Focused on enemy critical vulnerabilities.
- g. A combination of direct and indirect action.
- h. Used to influence specific behavior in another nation state without engaging in a continuing contest of violence.
- i. Highly dependent on a holistic understanding of the adversary's decision-making calculus.

4. Flexible Non-escalatory Option Implementation

- a. The President or SecDef directs FNO implementation, and the specific FNO or combination selected will vary with each situation. Their use will be consistent with the US National Security Strategy.
- b. FNOs can be used individually, in packages, sequentially, or concurrently. However, they are most effective when integrated with the diplomatic, informational, military, and economic instruments of national power. It is imperative that extensive, continuous coordination occurs with interagency and multinational partners to maximize the impact and minimize possible escalation.

Endnotes

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https://www.rusi.org/downloads/assets/Defining_Deterrence_-_A_Pre-Conference_Note.pdf (accessed 3 April 2015).

⁴ Det Norske Veritas, *Shipping Across the Arctic Ocean: A Feasible Option in 2030-2050 as a Result of Global Warming*, Research and Innovation, Position Paper 04-2010 (Høvik, Norway: 2010), 14.

⁵ Lawrence C. Smith and Scott R. Stephenson, “New Trans-Arctic Shipping Routes Navigable by Midcentury.” *Proceedings of the National Academy of Sciences of the United States*, 4 March 2013, E1191-EE1192. <http://www.pnas.org/content/110/13/E1191.full.pdf> (accessed 20 March 2013).

⁶ To be more specific, FNOs are discrete military actions carefully tailored to influence an adversary’s action for a strategic effect, which minimizes the possibility of conflict escalation. For further detail on the specifics of FNOs, please refer to Appendix 1.

⁷ While this paper discusses High Powered Microwave Weapons, the focus of this paper is not on the technology, but rather the strategy behind the employment and effectiveness of Flexible Non-Escalatory Options.

⁸ Adapted from J.N. Larsen, O.A. Anisimov, A. Constable, A.B. Hollowed, N. Maynard, P. Prestrud, T.D. Prowse, and J.M.R. Stone. *Polar Regions. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. New York, NY: Cambridge University Press, 1567-1612.
http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap28_FINAL.pdf (accessed 23 Nov 2014): 1572.

⁹ First, this assumes that projecting power from the Atlantic will not be feasible, since the Russian Northern Fleet is based in the Barents Sea. Second, this is based upon great circle routing and actual route of travel may differ. Third, the flight time assumes a F-22 departing from Joint Base Elmendorf-Richardson will require tanker support to fly a sortie of this duration and will fly at 310 knots (no wind). Finally, the Northern Sea Route Information Office references ships travelling at 14 knots along this waterway. This was the speed used to determine time for a ship to steam across the Arctic Ocean.

¹⁰ Sam LaGrone, “WEST: NORAD Head Says Russia Increasing Arctic Long Range Air Patrols,” *US Naval Institute News*, 10 February 2015, <http://news.usni.org/2015/02/10/west-norad-head-says-russia-increasing-arctic-long-range-air-patrols> (accessed 12 February 2015).

¹¹ Joseph Trevithick, “Russia Watched as American Bombers Showed Off Over the Arctic: Polar Grawl is the Latest in a Long Line of Posturing Between Moscow and Washington.” *War Is Boring*. 3 April 2015. <https://medium.com/war-is-boring/russia-watched-as-american-bombers-showed-off-over-the-arctic-8302cebcc8ba> (accessed 3 April 2015).

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- ¹⁵ James Stavridis “Lessons from the White Continent.” *Foreign Policy*, 23 February 2015, <http://foreignpolicy.com/2015/02/23/lessons-from-the-white-continent-arctic-antarctica-nato-russia-north-pole-arctic/> (accessed 2 March 2015).
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- ¹⁹ President of the United States, National Strategy for the Arctic Region, May 2013, http://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf (accessed 8 January 2015). 6
- ²⁰ Department of Defense (DOD) *Arctic Strategy*, Washington, DC: November 2013. 7, 10,
- ²¹ Chief of Naval Operations, *The United States Navy Arctic Roadmap for 2014-2030*, Washington, DC: Task Force Climate Change, February 2014. 32.
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- ²⁴ Chief of Naval Operations, *The United States Navy Arctic Roadmap for 2014-2030*, Washington, DC: Task Force Climate Change, February 2014. 12.
- ²⁵ J.N. Larsen, et al. *Polar Regions. Climate Change* 2014. 1592.
- ²⁶ Margaret Blunden. “Geopolitics and the Northern Sea Route,” 118.
- ²⁷ *Ibid.*, 116.
- ²⁸ Margaret Blunden. “Geopolitics and the Northern Sea Route,” 120.
- ²⁹ Det Norske Veritas, *Shipping Across the Arctic Ocean*, 14.
- ³⁰ Autoridad Del Canal De Panama “Ops Advisory to Shipping No. A-02-2009: Dimensions for Future Lock Chambers and ‘New Panamax’ Vessels.” 19 January 2009. <http://www.pancanal.com/common/maritime/advisories/2009/a-02-2009.pdf> (accessed 21 March 2015). There are also size limitations on the Sannikov and Laptev Straits, but climate forecasts allow for passage north of the New Siberian Islands within the next 25 years, thus eliminating these limits.
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⁵³ Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (New York, NY: Oxford University Press, 1963), 77.

⁵⁴ B.H. Liddell Hart, "Strategy: The Indirect Approach" In *Strategic Studies: A Reader*, edited by Thomas G. Mahnken and Joseph A. Maiolo. 82-85. New York, NY: Routledge, 2008. 82.

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⁵⁹ Christopher J. Fettweis, *Dangerous Times? The International Politics of Great Power Peace*. Washington, DC: Georgetown University Press, 2010. 148.

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⁶⁷ *Ibid.* 32.

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⁷⁶ Barry M. Blechman and Stephen S Kaplan, *Force Without War*, 12.



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