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THE OPENING OF THE ARCTIC: ESTABLISHING A NEW SECURITY PERIMETER FOR THE UNITED STATES

by

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Biography

Lieutenant Colonel Robert Umstead graduated from the University of Arizona in 1991 with a Bachelor of Science degree in Aerospace Engineering and the School of Advanced Military Studies in 2006 with a Master of Military Art and Science. He earned his navigator wings in 1993 and has over 2,000 flying hours in the T-43, B-52G, B-52H, and F-16D. He has served in three joint billets and is a graduated squadron commander.

Abstract

Over the next twenty years, the impact of climate change will open up the Arctic. The trade routes through the Northwest Passage in North America and the Northern Sea Route near Russia will be viable year around. In addition, the retreat of the ice makes the Arctic a significant new source of energy for the U.S. and the global economy. Given the likely strategic competitions that emerge from this environment, there is a natural strategic position spanning from Darwin northward to Alaska, across the Arctic to Norway, south to the Arabian Gulf, west into the Caribbean, and south to the Strait of Magellan that secures trade routes, protects rich deposits of natural resources, and maintains partnerships and alliances while also balancing the influence of other regional actors.

To take advantage of this strategic position, the Department of Defense must re-tool the global posture of the force to project power quickly and sustain it along a new strategic perimeter. The capabilities needed to prevail in this environment include sea power, long-range aviation, and a network of forward operating locations to support a sustained presence. U.S. sea power is not structured to project a sustained influence throughout the new perimeter, particularly in the Arctic. To fulfill this fundamental requirement, the U.S. will have to rely on long-range aviation. In order to sustain a power projection capability, a series of forward operating locations from the Marshall Islands to the Aleutians, across the North Pole to the Arabian Gulf, to the Caribbean, and south to the Falklands provides the foundation from which to project power. In the next 20 years, the technology is available to independently provide power, fuel, and water to this structure thereby ensuring U.S. ability to project and sustain power across this vast strategic perimeter.

Introduction

As the U.S. Department of Defense begins to look beyond the wars in Iraq and Afghanistan to project its defense requirements in 2032 and beyond, it faces an uncertain future. In the next twenty years the emerging economies of the BRIC countries (Brazil, Russia, India, and China) will overtake the G7 economies of the United States, France, Canada, Italy, United Kingdom, Japan, and Germany in terms of gross domestic product.[1] This shift in economic strength will be accompanied by a shift in the world order from one dominated by the United States to a multipolar one.[2] The rise of BRIC countries are sure to change the global strategic picture, the question is how. The demand on the world's resources by the BRIC and G7 nations will be exacerbated by the demand from the Next Eleven emerging economies.[3]

While the BRIC countries continue to grow and realize their potential, the Arctic icepack will continue to shrink. In September 2012 the extent of the ice reached a record low: 18 percent below the previous record in 2007 and 49 percent below the 1979-2000 average. The last six years have seen the six lowest ice minimums since the satellite era began in 1979.[4] As the ice continues to retreat over the next two decades, the possibility for a major shift in global trade routes increases and additional energy resources become available.

Given this likelihood, one potential outcome is an international landscape where today's emphasis on free trade is overtaken by an environment characterized by intense competition for raw materials such and oil, natural gas, and basic minerals. This paper explores issues surrounding power projection should the current world order devolve into such a multipolar, mercantilist environment. Such an environment would force the United States to rethink its strategic position in terms of resource availability and access to these resources in order to ensure an advantageous position in a less friendly, multipolar world. These interests would define a

new strategic perimeter, which would, in turn, drive the future defense posture and requirements needed to project power quickly and sustain it along the edges of this perimeter.

To describe the posture and requirements for this future, this study first provides a brief description of this Mercantilist alternate future in 2032 and identifies fundamental challenges for the United States given this environment. Based on this analysis, it then outlines a strategy to meet the challenges and discusses global base posture required for the U.S. to prevail. Finally, it makes recommendations as to the military capabilities that are most important to the United States in this future. The study begins by describing a future where today's international system no longer exists, and the world devolves to a structure last seen in the 18th century.

Assumptions: The Mercantilist World of 2032[5]

Understanding how a mercantilist world would affect U.S. defense requirements arises from an understanding of how different this world is. In the mercantilist world of 2032, Nationalism is on the rise in Asia, Europe, and North America as economic disruptions create a serious rift between the world leading economies. As free trade collapses, the competition for natural resources intensifies. This scramble for resources leads to protectionism, increasingly independent action on the part of nations, and larger defense budgets. The effectiveness of international institutions decreases and the conflicts over resources and trade routes have the potential to turn into a major war. For the United States, this international environment leads to a departure from Korea and questions about the nation's capability to support Japan or Taiwan in the face of aggressive territorial claims from China. Given the level of political tension, governments are reluctant to grant the U.S. access to overseas bases. Militarily, China is an equal in the cyber and space domains while both China and Russia have invested heavily in anti-access and area denial technology. Finally, Brazil and India have remained non-aligned but have

leveraged their economic success into seats on the UN Security Council and retain substantial regional influence.

A New Strategic Perimeter

This scenario presents points of continuity and change for U.S. defense planners. In such a shift toward a multi-polar, mercantilist world order, the fundamental challenges for the U.S. remain similar to historical norms: ensure security of the homeland; ensure access to trade routes and freedom of navigation; and ensure access to natural resources.[6] The change, however, is the areas of the world that become more strategically relevant. Accordingly, a regionally based approach of 'hold' or 'pursue' exploits the available resources in North and South America and offers the opportunity to redefine the strategic perimeter of the United States. To establish a common framework, a brief description of the terms 'hold' and 'pursue' is necessary.

'Hold' in the context of this strategy encompasses three concepts: economy of effort, participation with regional partners and allies, and continued trade. Militarily, security cooperation and maintaining access to existing bases and ports are the primary objectives. This may sound like another way of saying, "maintain the status quo." However, in the mercantilist future described above, the status quo has degenerated from the U.S. perspective and 'holding' onto relative stability in territorial disputes, access to facilities, and freedom of navigation over trade routes (both sea and air) will require focused action. But 'holding' will be an economy of effort activity because the U.S. must 'pursue' its interests in other regions.

'Pursue' in the context of this strategy encompasses an expansion of American presence, the development of new operating locations, and participation with regional partners and allies. Freedoms of navigation, protection of resources within U.S. and regional partner economic zones, and diplomatic activity to establish operating locations are the primary objectives. In the

mercantilist future, the competition for raw materials necessitates the patrolling and, if necessary, the protection of resources within the 200 mile economic zone from shore. As such, regional partnerships and participation combined with capabilities unique to the United States will be required to prevail.

Using a 'hold' or 'pursue' approach, it is possible to describe a new strategic perimeter from Darwin northward to Alaska, across the Arctic to Norway, south to the Mediterranean, west into the Caribbean, and south to the Strait of Magellan. Together these five regional approaches: 'hold' in the Pacific, Middle East, and Europe; and 'pursue' in the Western Hemisphere and the Arctic define a new strategic perimeter for the U.S. in a mercantilist world order (see figure 1). Key to the ability to execute this strategy is the Department of Defense's ability to operate from Darwin to Al Udied over the Arctic.

Figure 1. A New Strategic Perimeter[7]

The Pacific

In the Pacific, a 'hold' approach focused on freedom of navigation in the East and South China Seas maintains a military presence in the first island chain established by the Philippines, Taiwan, Japan, and Australia to ensure access to trade routes. This military presence combined with close economic ties with Australia, Japan, and the Philippines serves to balance Chinese influence and assure allies, while supporting the highly integrated global economy of 2032. In concert with persistent diplomacy, these efforts provide a stabilizing effect to territorial disputes and protectionism.

The Middle East and Europe

A similar 'hold' approach in Europe maintains the trans-Atlantic relationship while a military presence in the Middle East ensures the flow of commerce and trade with the Gulf Cooperation Council nations, Turkey, and Egypt. Turkey is historically the bridge between Europe and the Middle East. Turkey's position as a relative equal to Iran in the region, but with influence in the West, places Ankara in a unique position to develop cooperative trade options supportable both in and out of the region. Strengthening security relationships within NATO, between the GCC countries and the United States, and between Egypt, Jordan and the U.S. all serve to blunt protectionism and Iranian regional ambition. Again, Turkey is in a unique position as a NATO member in the Middle East to facilitate.[8]

At the same time, the reliance of the United States on Middle Eastern oil is projected to come to an end by 2032. British Petroleum, in its annual energy outlook, predicts growth in biofuel supplies and unconventional oil and gas will turn North America's energy deficit into a surplus.[9] Further, the Wall Street Journal reported OPEC's own analysis concluded oil

shipments from the Middle East to America "could almost be nonexistent."[10] The International Energy Agency (IEA) predicts American oil imports will drop below 30 percent of demand and the United States will become an exporter of natural gas. While the American energy outlook stands to improve significantly, the IEA predicts the European Union will all grow more reliant on imports of oil and natural gas.[11] Therefore, maintaining the current close relations with Europe, both bilaterally and regionally through NATO and the European Union, solidifies access to markets and secures trade routes across the Atlantic and into the Mediterranean.

The Western Hemisphere

In contrast to the 'hold' approach employed in the Pacific, Europe, and the Middle East, the United States must 'pursue' greater influence in South and Central America bilaterally as well as regionally through organizations such as the Organization of American States. Cooperating with Brazil as a partner politically and economically in the hemisphere provides economic opportunity and access to natural resources while pulling an otherwise non-aligned neighbor closer to the United States and stabilizing the region. Most importantly, the United States must also 'pursue' influence in an area where there has been little need to do so before—the Arctic.

The Arctic: Most Important Strategic Region of 2032?

Over the next twenty years the impact of climate change in the Arctic will open up long-desired trade routes and provide access to significant energy resources. The U.S. must pursue economic and security interests in the Arctic bilaterally with Russia, Canada, Denmark, and Norway as well as regionally through the Arctic Council and NATO. For over 30 years, the Arctic ice has receded approximately 11 percent per decade. Some Arctic models predict the region may be seasonally free of ice between 2030-2040.[12] The trade routes through the

Northwest Passage in North America and the Northern Sea Route near Russia will be viable year around. In addition, combined with new technologies in the oil and gas industry climate change makes the Arctic a significant new source of energy for the U.S. and the global economy.

The tyranny of distance is often referenced with respect to the Pacific, but it applies to the Arctic as well. It is approximately 1690 nautical miles from Nome, Alaska to Alert Airfield on Ellesmere Island at the northern tip of North America. From the Aleutian Islands to the Taiwan is approximately 3200 miles and it is almost 3000 miles from the Aleutians to Svalbard Island north of Norway in the Barents Sea.[13] While the increase in trade due to a lack of sea ice will bring economic benefits, it will also bring environmental concerns, criminal activity, and illegal immigration.[14] The climate, large area, and limited infrastructure all conspire to deny access and make power projection difficult.

The Opening of the Arctic

The scramble for resources in the Arctic has already begun: the U.S. must prepare now to operate in the "High North." In the last three years the number of ships using the Northern Sea Route (figure 2) has increased from four vessels in 2010 to 34 in 2011 to 46 in 2012.[15]

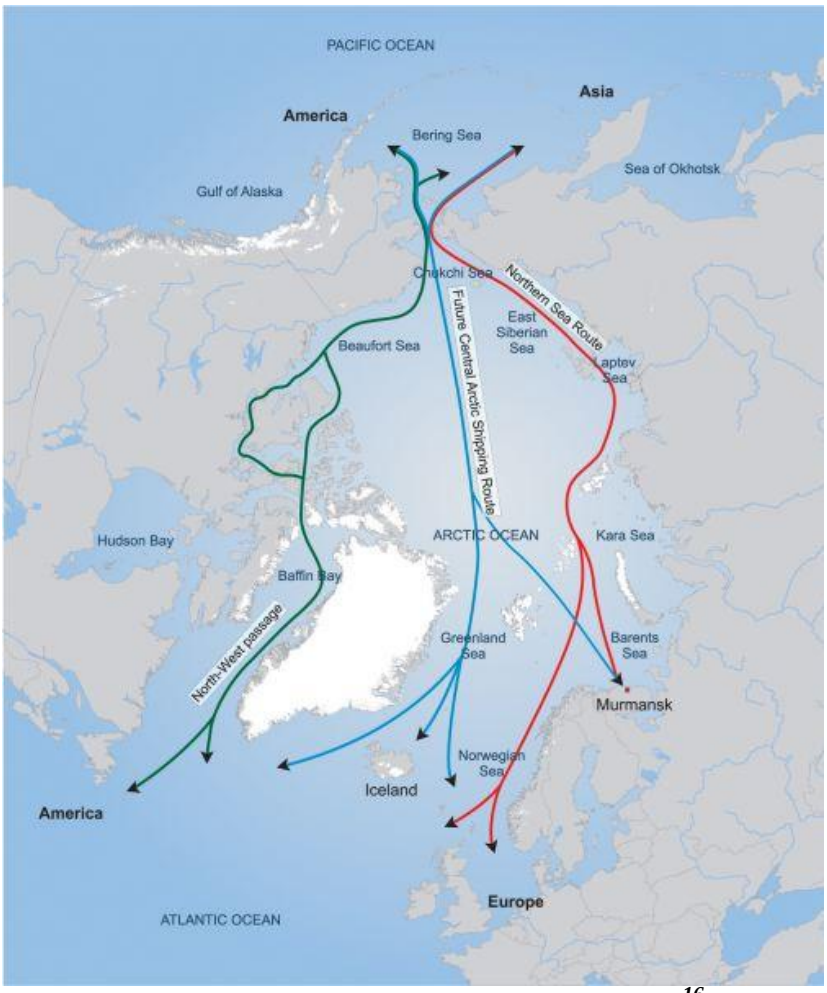

Figure 2. Possible Arctic Shipping Routes[16]

While the volume of ships cannot yet compare to or compete with the Suez Canal (46 vs. 19,000), the reality is the Northern Sea Route saves 40 percent of the fuel and distance over the Suez route, which translates into significant profits for shipping companies.[17] A comparison of the distance between Yokohama, Japan and Rotterdam, Germany is shown in Table 1.[18]

Route	Distance	Time at 20 Knots
North Pole	5618 nm	12 Days
Suez Canal	11209 nm	24 Days
Panama Canal	12250 nm	26 Days
Cape of Good Hope	14735 nm	31 Days

Table 1. Shipping Distances from Yokohama, Japan to Rotterdam, Germany

Notably, if the Northern Sea Route and the Northwest Passage are open year around (and potentially the North Pole route seasonally), the importance of the Straits of Malacca to Pacific Rim trade drops significantly as there is now a second route from major trading centers in Japan and Australia to Europe and the Middle East. This shorter trade route through the Arctic ensures North American access to markets in the Pacific and Europe as well as Pacific and European access to oil and gas from the North America. Shorter sea routes are not the only opportunity provided by the retreating sea ice and, certainly, not the most lucrative.

Oil and Natural Gas

In 2008, the United States Geological Survey (USGS) estimated the total undiscovered oil and natural gas resources in the Arctic at 90 billion barrels of oil, and 1,669 trillion cubic feet of natural gas. The study, known as the Circum-Arctic Resource Appraisal, assessed the potential for recoverable oil and gas reserves north of the Arctic Circle.[19] The USGS assumed current technological capabilities to recover oil and gas along with assumptions that resources would be recoverable in the presence of permanent sea ice and ocean water depth. Further, the study estimated 84 percent of the undiscovered oil and gas resides offshore. An important consideration is where in the Arctic region these natural resources are located. The USGS study

indicates 70 percent of the undiscovered oil occurs in five provinces: Arctic Alaska, Amerasia Basin, East Greenland Rift Basins, East Barents Basins, and West Greenland-East Canada. Of the potential gas resources, 70 percent is estimated to occur in three provinces: West Siberian Basin, East Barents Basins, and Arctic Alaska.[20]

In other words, four of the five provinces estimated to contain 70 percent of the oil and one of the three provinces projected to contain 70 percent of the gas are within the 200-mile economic zone of the United States, Canada, and Greenland (see figure 3). The USGS estimates are based only on conventional reserves. Not included are the oil and gas reserves associated with shale oil and gas, tar sands, heavy oil, tight gas, and coalbed gas, therefore the resource potential is even greater.[21] The combination of resource availability and trade routes helps to explain the increased interest in national boundaries by the Arctic Nations, particularly Russia.

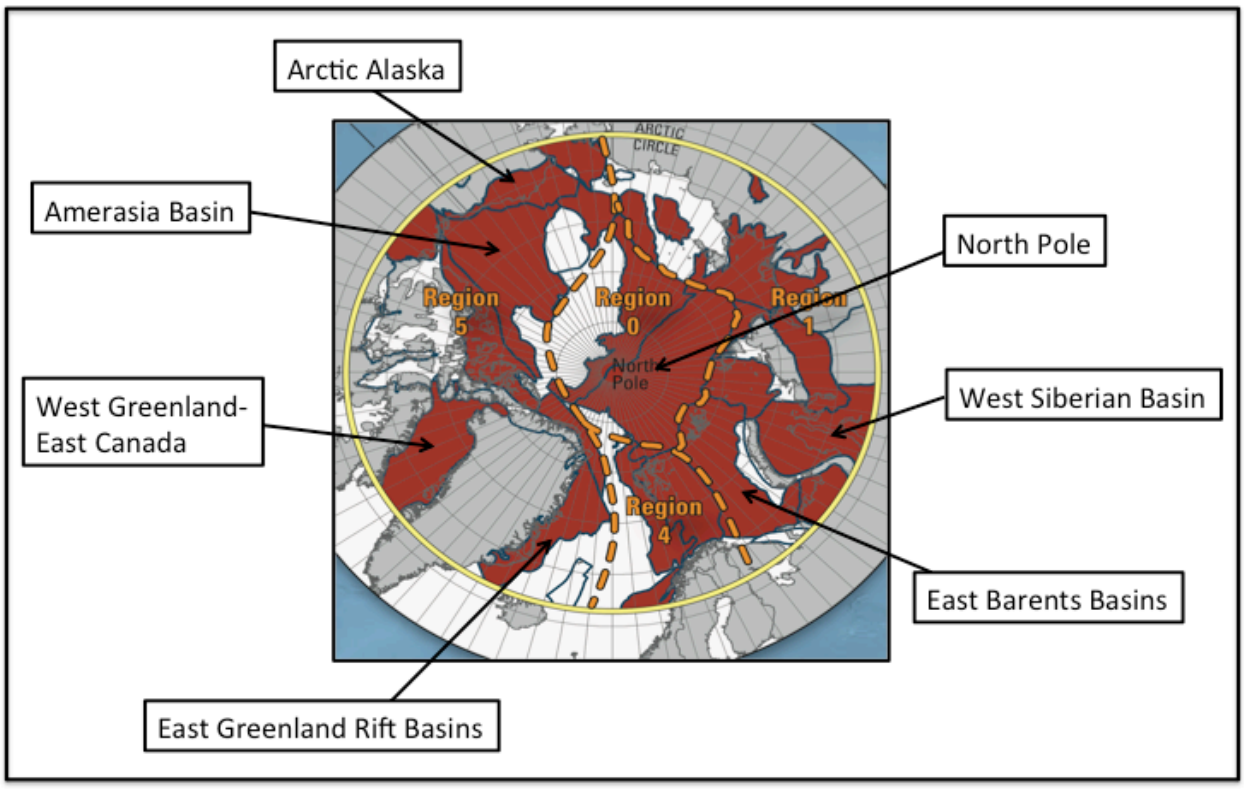

Figure 3. Significant Arctic Oil and Gas Provinces.[22]

Defining Arctic Territory

In 2001, Russia filed a claim under Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS) claiming control of nearly half the Arctic Ocean. However, several nations, including the United States, challenged this claim and the U.N. requested the Russians resubmit the claim.[23] The key to defining national boundaries in the region, based on Article 76 of the UNCLOS, is the location of the continental shelf. Article 76 states: "…The coastal State shall delineate the outer limits of its continental shelf, where that shelf extends beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured…."[24] In addition, Article 76 states the boundaries of the continental shelf shall not exceed 350 nautical miles from which the breadth of the territorial sea is measured.[25] In other words, a nation can claim the 200-mile economic zone and then, provided it can prove the continental shelf extends beyond that, claim up to another 150 nautical miles. After its initial claim was rejected, Russia embarked on a research effort to show the Lomonosov Ridge, an underwater mountain, is an extension of the Russian continental shelf, thus justifying their previous claim (see figure 4).[26] Notably, because the U.S. has not ratified the UNCLOS, the U.S. is strategically behind in the race to define Artic borders and resource access.

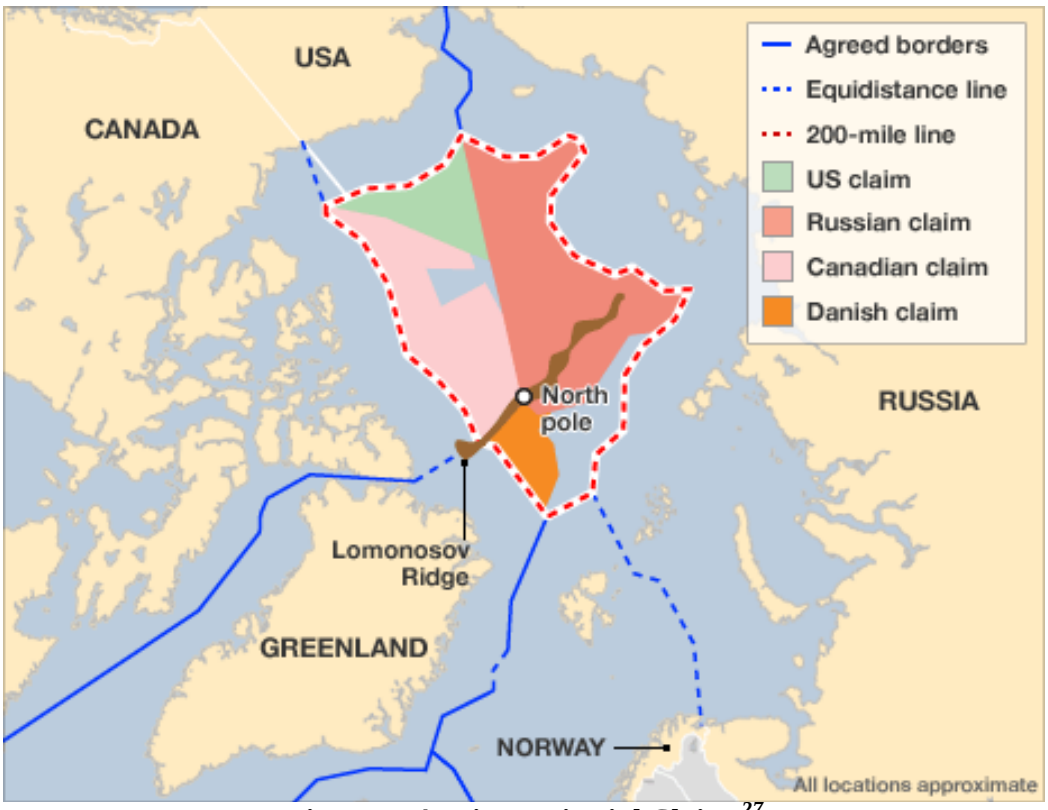

Figure 4. Arctic Territorial Claims[27]

The U.S. government recognized the need for an increased Arctic presence in 2009 with the publication of National Security Presidential Directive-66 and Homeland Security Presidential Directive-25. The confluence of receding sea ice; year-round utilization of the Northwest Passage and Northern Sea Route; and untapped reserves of oil and natural gas sets the stage for greater competition in the Arctic between nations. With respect to human activity in the region NSPD-66 states, "This requires the United States to assert a more active and influential national presence to protect its Arctic interests…"[28] Although the Arctic is predominantly a maritime domain, maintaining presence and influence along the perimeter stretching from the South Pacific to the North Pole to the Mediterranean and encompassing the Western Hemisphere will require a greater degree of speed and flexibility than sea power alone can provide.

Capabilities to Support a New Strategic Perimeter

The capabilities needed to safeguard U.S. interests along this new strategic perimeter include sea power, long-range aviation, and a network of forward operating locations to support a sustained presence. American sea power is not structured to project a sustained influence throughout the new perimeter, particularly in the Arctic. As Reginald Smith outlines in his 2011 *Joint Forces Quarterly* article, ships capable of icebreaking operations are essential to protect sovereignty, conduct search and rescue, and protect resources. None of the three U.S. icebreakers are configured for these operations. In contrast, Canada and Russia both maintain fleets several times the size of the United States. In the current resource constrained environment, catching up will take decades and as much as $20 billion.[29] While the U.S. is capable of sustaining a significant Naval presence in the Pacific, Atlantic, and the Mediterranean as part of the 'hold' approach described earlier, sea power will be significantly limited in the Arctic. More importantly, the Arctic presents unique challenges to operations that must also be addressed.

Navigation Challenges

The combination of weather, drifting ice, heading accuracy, lack of radio-navigation aids, and poorly mapped areas present a navigational challenge that ranges from difficult to dangerous.[30] The Global Navigational Satellite System (GNSS) and nautical charts have significant limitations in the Arctic. Geometry and ionospheric effects reduce GNSS performance while much of the Arctic waters remain uncharted. The waters that have been charted were surveyed, in many cases, with technology dating back to the 1800s.[31]

Inclination angles for GPS and Galileo satellites are 55 and 56 degrees respectively while GLONASS inclination angles are marginally better at 65 degrees. In the Arctic, this means low

elevation angles which leads to errors in vertical position. In addition, horizontal position accuracy is reduced by higher noise levels in the GNSS signal and larger ionospheric effects.[32] Ionospheric models in the GNSS receiver or positioning algorithm normally handle these signal delays. In the Arctic, however, the ionosphere is characterized by large changes in the electron content (the northern lights are an example) and the models used in GNSS systems are not sufficient. The result is significant errors in positioning.[33] This not only affects navigation accuracy, but weapons accuracy as well. The long-term solution is better models of ionospheric effects, but in the near term an executable solution to improve position accuracy is the combination of GNSS and inertial systems.

Surveillance and Communications

In addition to precision navigation, the basic functions of surveillance and communications are often taken for granted, but in the Arctic these functions are also significantly limited. In an effort to increase Canadian capability, Canada has taken significant steps in recent years to improve sea surveillance. In 2007, the Canadians launched Radarsat-2 to facilitate ship tracking and Arctic region surveillance in general. The data from these satellites is provided to NORAD and three more satellites are scheduled for 2014-15.[34] In addition, the Canadians deployed a tethered sonar array off Devon Island in the Barrow Strait to provide persistent surveillance at the eastern entrance to the Northwest Passage.[35]

Even with improved surveillance capabilities, the data must be communicated to be useful. Russia launched an additional meridian telecommunications satellite in November 2012 to improve communications along the Northern Sea Route. The meridian series satellites are dual use for both civilian and military activity.[36] In contrast, dedicated U.S. military communications satellites typically fly in orbits that are below the elevation constraint on most

Arctic terminals and are therefore not usable. In terms of commercially available satellite communications, Iridium is the only service currently available in the Arctic.[37] To leverage combined capabilities in the near term and make efficient use of resources in the long term, close ties with NATO and continued partnership with Canada through the North American Air Defense Command (NORAD) will advance U.S. interests and mitigate limitations in sea power, surveillance, and communications, but to project power in the Arctic the U.S. will need to look to other capabilities.

To project power and ensure access to resources and trade routes in the Arctic, the U.S. must rely on long-range aviation. In the mercantilist world order of 2032, surveillance, airlift, search and rescue, and protection of resources and trade routes are all aviation missions. In an international environment where access to bases is questionable, the DoD must place a premium on range when structuring the fleet of the future. However, there are practical limits to how far these capabilities will be able to range even with an optimized fleet. Therefore, to sustain a power projection capability at the edge of this defense perimeter, a series of forward operating locations will be necessary.

Forward Operating Locations

A third island chain defined by the Marshall Islands at Kwajalein extending north to Wake Island and continuing north to the Aleutian Island locations of Shemya, Adak, and Dutch Harbor provides support to operations throughout the Pacific and into the Arctic. Together these locations sit between the first island chain and the United States and astride the approaches to the Bering Strait and the northern trade routes leading into Arctic.[38]

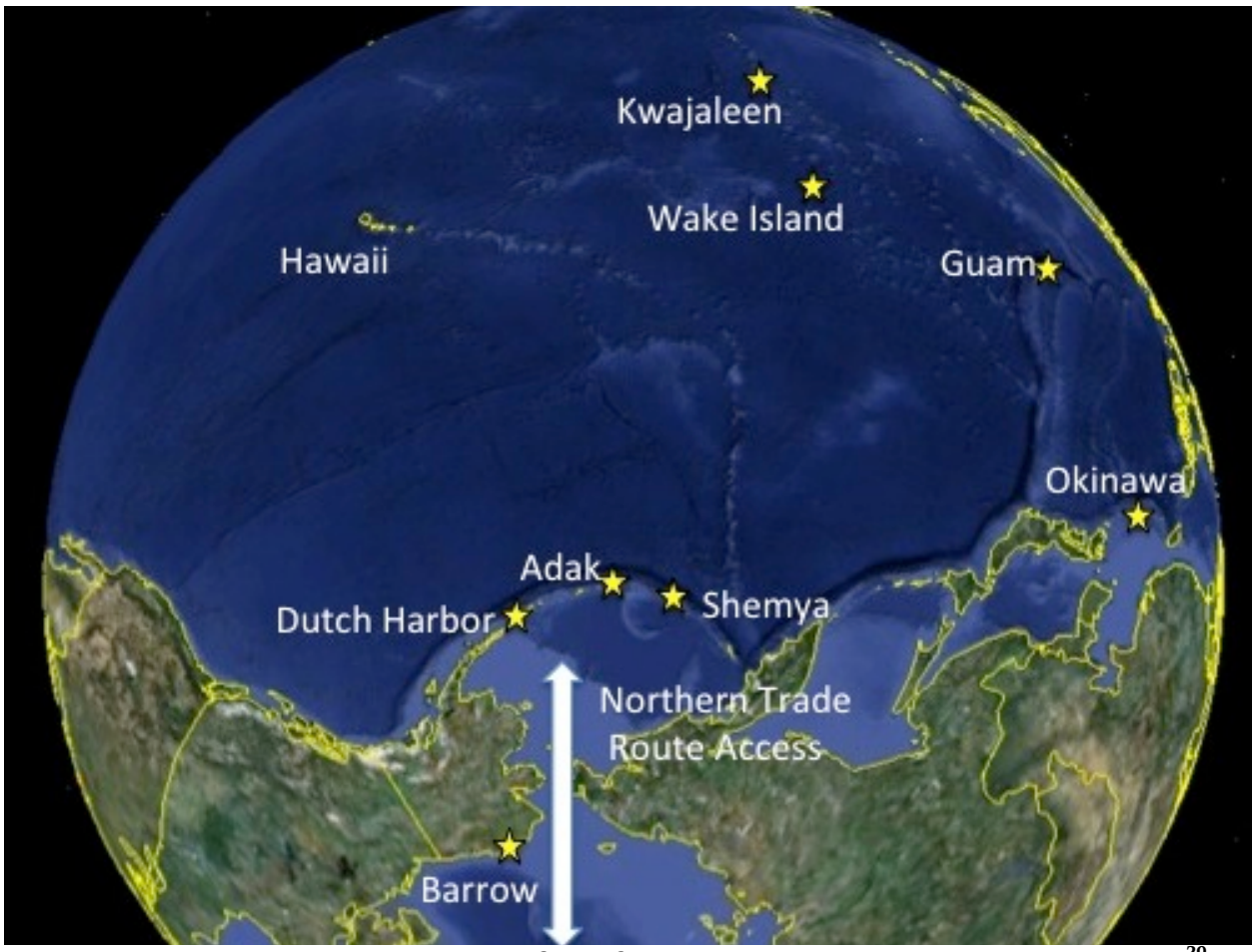

Figure 5: Geographic Relationship of Pacific Operating Locations to the Bering Strait[39]

From the Aleutians, Arctic access can be facilitated with U.S./NORAD locations at Nome and Barrow Alaska and Thule, Greenland. Establishing NORAD or NATO locations on Banks Island, Ellesmere Island, and Svalbard Island (figure 6) extends capability to the north and facilitates access over the North Pole. Existing NATO locations in Iceland and Norway link the Arctic to Europe.

Figure 6: Potential Arctic Forward Operating Locations[40]

Forward operating locations mitigate the distances involved with protecting U.S. interests, establish presence, and enable power projection activities such as surveillance, communications, and search and rescue. However, to be effective these locations must have, as a minimum, power, fuel, and water. Fuel and water currently require significant air or sealift to sustain and power must either be generated with diesel fuel or purchased locally if possible. These

considerations require a modified logistics concept and new technologies to enable power projection.

Forward Operating Location Logistics in 2032

In 2032, the air and sealift resources required to re-supply locations throughout the Pacific and the Arctic will not be available, therefore, the capability to independently provide power, fuel, and water to forward operating locations would significantly reduce the vulnerability of operating locations as well as the logistics tail. The technology is currently available to allow the DoD to do just that in the next 20 years.

Advancements in nuclear reactors have led to a non-light water reactor class of device that can replace a current diesel powered generator or provide the source for a 25 Megawatt nuclear power plant.[41] Generating power is done in a variety of ways including using batteries, diesel generators and plugging into the local power grid if there is one. Obvious disadvantages to the local power grid are the reliance on local willingness to keep power flowing and the increasing vulnerability of SCADA systems to cyber disruption or denial. Similarly, batteries and fuel must be resupplied to keep the generators running. On the other hand, these advanced reactors provide a reliable power source for locations both in the Pacific and the Arctic and would eliminate the need for long supply lines of diesel fuel. This capability is available now from two small companies in the U.S. and the subject of continued research at Los Alamos National Laboratory. Investment in a developmental program to field a 25 Megawatt plant is required to ensure functionality and develop the operating, safety, and consequence management procedures for DoD operation of this type of power plant.[42]

The Naval Research Lab recently published an analysis of the costs involved with converting seawater to jet fuel as a means of eliminating replenishment underway.[43] Resupply

by air is theoretically possible, but given the volume needed and the resulting runway requirements, resupply by ship is the only reasonable choice and in some Arctic cases the only possible method for sustainment. The Navy's research has the potential to reduce the supply lines required to support forward locations while ensuring these locations have an ample supply of jet fuel available. Besides power and fuel, forward locations need a great deal of water. Fortunately, containerized desalination plants are currently available on the commercial market.[44]

Fielding new technologies to provide stand-alone power, fuel, and water to a forward operating location will force a decision to establish logistics capability contracts or organize, train, and equip military personnel to operate these systems. In 2012 the solution to operating a forward base is to cut a logistics capability contract. The advantage is that all base functions are performed without uniformed military presence. The disadvantage is cost. With the exception of desalination, none of today's base support companies have the capacity to build, field, and operate a nuclear power plant or synthetic fuel plant. The DoD may have no choice but to train a cadre of civil engineering personnel to operate and maintain these capabilities. Investment in developmental programs to field any combination of these technologies is required to ensure functionality and to develop the operating, safety, and consequence management procedures for operation of these types of power sources and fuel production facilities.

Summary

Given a mercantilist international environment in 2032, the fundamental challenges for the United States are: ensure security of the homeland; ensure access to trade routes and freedom of navigation; and ensure access to natural resources. Over the next two decades the effects of climate change will open up the Arctic, potentially making the trade routes through the

Northwest Passage and Northern Sea Route viable year around. In addition, the retreat of the ice makes the Arctic a significant new source of energy for the U.S. and the global economy. Considering the likely strategic competitions that emerge from this environment, there is a natural strategic position spanning from Darwin northward to Alaska, across the Arctic to Norway, south to the Arabian Gulf, west into the Caribbean, and south to the Strait of Magellan that secures trade routes, protects rich deposits of natural resources, and maintains partnerships and alliances while also balancing the influence of other regional actors. Strategically, the most important of these regions in 2032 is the Arctic.

Recommendations

The DoD must re-tool the structure of the force to project power quickly and sustain it in the Arctic. The capabilities needed to prevail in this environment include sea power, surveillance, communications, long-range aviation, and a network of forward operating locations to support a sustained presence. In the Arctic environment, U.S. sea power, surveillance, and communications all have limitations that require significant resources and time to overcome. To project power into the Arctic, the U.S. will have to rely on long-range aviation. To support such activity a series of forward operating locations from the Marshall Islands to the Aleutians, across the North Pole to Norway provides the posture from which to project power into the Arctic. To accomplish this, the study provides the following recommendations.

Develop Existing Operating Locations

In order to prepare for increased ship traffic through the Arctic, begin developing existing operating locations in partnership with Canada, Denmark, and Norway. Potential locations may include: Alert Airfield, Sachs Harbor, and Resolute Bay in Canada; Barrow, Adak, Dutch Harbor, Nome and Shemya in the United States; Bodo, and Andoya in Norway; and Thule,

Greenland. Some of these locations are active facilities operated by current NATO allies. Other facilities such as Adak, Alaska were drawn down previously and should be evaluated for renewed access. Finally, test operations such as the C-17 test landing at Alert Airfield in 2010 will be necessary to develop requirements for each location.[45] One way to develop these operating locations and simultaneously build capability is to participate in Arctic exercises such as Norway's Cold Response and search and rescue exercises with Russia, NORAD, and NATO.

Partner with Canada and Norway

Given the resources and time required to field icebreakers, communications systems, and sea surveillance, combining capability with Canada and Norway provides an opportunity to project influence into the Arctic in the near term. The United States contribution to the partnership is long-range aviation. In addition, these partnerships should be leveraged to develop and field systems to provide a common operating picture and execute command and control of forces in the Arctic.

Develop and Field Technologies to Provide Stand-Alone Power and Fuel

In the long term, the United States must develop and field technologies in advanced nuclear reactors and the production of jet fuel from seawater to provide island and coastal locations with stand-alone power and fuel. Power projection along a new strategic perimeter will require locations from which to operate and communicate. Over the next 20 years, the technology is available to independently provide power, fuel, and water to this structure thereby ensuring U.S. ability to meet the fundamental challenges of a mercantilist world order.

Conclusion

Regardless of the character of the future international environment, the United States must turn its attention to the Arctic now. In this time of austerity and re-posturing the force, the

Arctic provides an opportunity to the Air Force. From navigation and communication to surveillance and long-range aviation, the capabilities required in the Arctic are functions of Air Force core missions. Of all the services, only the Air Force is in a position to turn toward the Arctic today.

Notes

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