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# Ensuring US Maritime Supremacy in the Hidden Ocean

Naval Submarine League Award

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**ABSTRACT:** This article identifies likely stumbling blocks in operationalizing the Navy's Arctic Strategy and suggests ways to overcome them. It draws on official Navy policy papers, CNO statements, historical case studies, and the author's operational experience as a Navy submarine officer who participated in the Navy's biennial ICEX operations.

The biennial ICEX naval exercise “allows the Navy to assess its operational readiness in the Arctic, increase experience in the region, advance understanding of the Arctic environment and continue to develop relationships with the other services, allies and partner organizations.”<sup>2</sup> In February 2014 as an officer serving aboard the Virginia-class fast attack submarine USS New Mexico (SSN-779), I participated in ICEX, surfacing both at a Naval Ice Camp off the Alaskan coast and at the North Pole. When I gingerly stepped onto a wobbly ladder going from the deck onto the Arctic ice and looked out onto an otherworldly landscape of jagged ice floes, I had little appreciation that I was standing on what could be the Navy’s next battlespace.

US Navy focus on the Arctic region has intensified since 2009 when the Navy published its first “Arctic Roadmap.” In a 2014 update of that Roadmap, Chief of Naval Operations (CNO) Admiral Jonathan Greenert—who visited USS New Mexico during ICEX 2014—stated, “The U.S. Navy recognizes the opening of the Arctic Ocean has important national security implications as well as significant impacts on the US Navy’s required future capabilities.”<sup>3</sup> According to the Roadmap, the core US strategic objectives for the Arctic are to:

- Ensure United States Arctic sovereignty and provide homeland defense;
- Provide ready naval forces to respond to crises and contingencies;
- Preserve freedom of the seas; and
- Promote partnerships within the United States Government and with international allies and partners.<sup>4</sup>

The 2014 Roadmap concludes with an implementation plan listing actions, responsible officers, and task completion dates to achieve Arctic supremacy.<sup>5</sup> The plan is generally well-conceived, but historical case studies and the practical experiences of warfighters who have served in Arctic waters point to likely obstacles in the areas of turf, teamwork, preparedness, and vigilance that will need to be addressed to make the Navy’s new Arctic strategy a success. To surmount these obstacles, the Navy could:

- Establish a clear chain of command for the Arctic region;
- Cement Allied commitment to Arctic defense;
- Ensure a joint warfighting Arctic strategy;
- Set and enforce suitable training standards and force readiness levels for Arctic operations; and
- Foster vigilance regarding other great powers’ designs for the Arctic region.

In April 2018, Navy Secretary Richard Spencer and CNO Admiral John Richardson announced that a new Navy Arctic Strategy would be released that summer—except it never happened.<sup>6</sup> The navy.mil website has a “Strategic Documents” section that includes the original US Navy Arctic Roadmap 2014-2030 as well as documents such as the 2018 National Defense Strategy and National Strategy for the Arctic Region (last updated in 2013 during the Obama Administration).<sup>7</sup> However, the hyperlinks are broken for the National Strategy for the Arctic Region, the US Navy Arctic Roadmap, and the US Coast Guard Arctic Strategy. This is indicative of the Navy’s lack of initiative and progress in this vital area of the world that has gone without a strategic update in 5 years.

## Establishing Clear Lanes of Responsibility and Authority

Clarifying and simplifying the command responsibilities for Arctic operations would be the first step. Joint Publication 3-0, Joint Operations, lists unity of command as a critical pre-condition to unity of effort.<sup>8</sup> However, the Arctic is currently the domain of both Northern Command (NORTHCOM) and European Command (EUCOM). These two commands' Areas of Responsibility (AOR) intersect at the North Pole where lines of longitude terminate, with the exception of a small circle from 85 to 90N latitude around the North Pole which belongs to NORTHCOM, as shown in Figure 1.

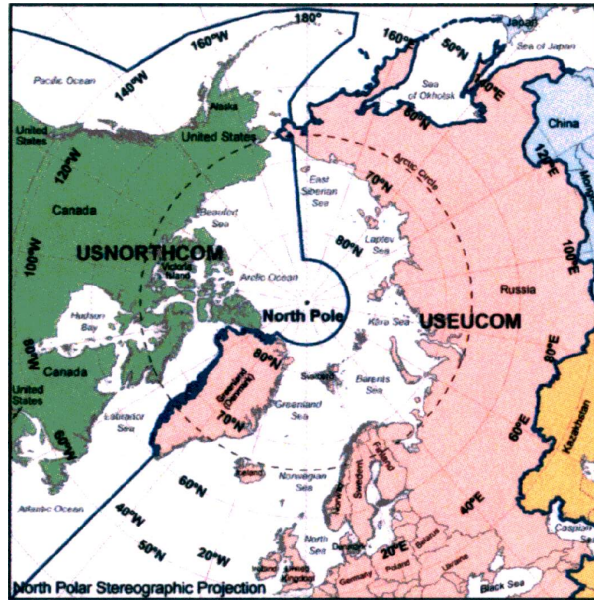


Figure 1: Arctic Ocean Combatant Commands<sup>9</sup>

This division of command is a serious shortcoming because neither command is likely to make the Arctic its top priority. In fact, the Arctic Ocean is rarely shown fully on most standard world maps, including most DoD maps, as demonstrated in Figure 2 taken from the 6<sup>th</sup> Fleet website. As a result, the Arctic is at risk of becoming a forgotten ocean despite the intent of the Arctic road map.

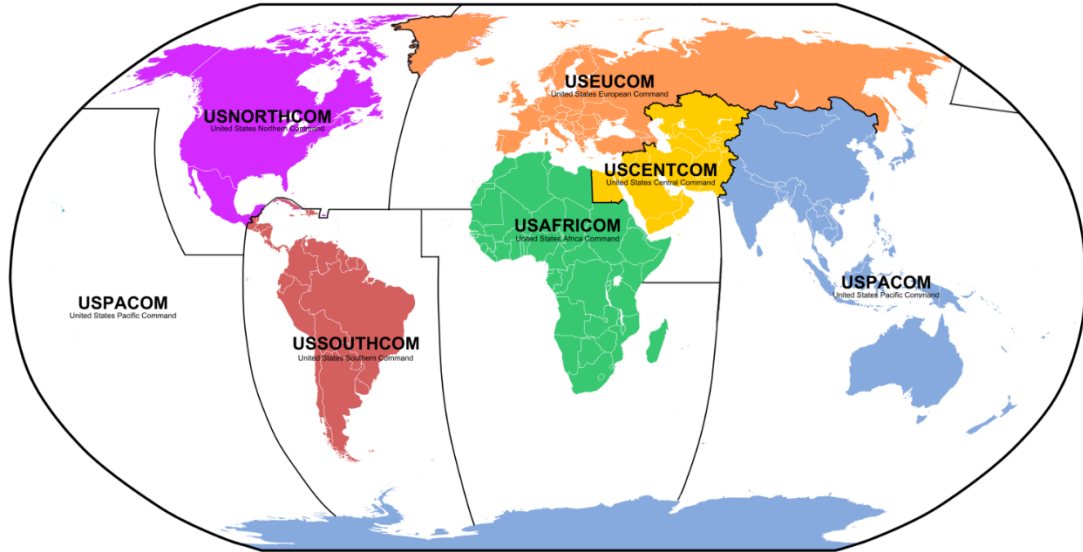


Figure 2: Unified Combatant Command Organization<sup>10</sup>

The numerous DoD and Navy departments, commands, and offices ostensibly involved in executing Arctic strategy further magnify the risks of diffused focus. For example, the 2014 Arctic Roadmap lists as lead offices OPNAV N2/N6, N3/N5, N4, N9, US Fleet Forces Command, the Office of Naval Research, and the Navy Task Force for Climate Change. Supporting offices include at least a dozen components, as well as the US Marine Corps and the US Coast Guard.<sup>11</sup> Moreover, the officer in charge of the process is the Chief of Naval Operations, who already is saddled with innumerable responsibilities associated with running the world's largest Navy.

Hard-earned lessons from the Pacific campaign in World War II provide the strongest cautionary note against opaque lines of responsibility and command. Command of Allied forces in the vast Pacific Ocean was divided between Admiral Chester Nimitz, who directed US forces in the Central Pacific, and General Douglas MacArthur, who commanded the Southwest Pacific theater, in a command arrangement that a leading US military historian has dubbed "a monstrosity."<sup>12</sup> The two commanders vied over scarce shipping, landing craft, troops, and supplies for their respective theaters of operation. The acrimonious dispute over the relative priority of Nimitz's Central Pacific thrust toward Japan and MacArthur's Southwest Pacific campaigns aimed at the liberation of the Philippines consumed the attention of both the US Joint Chiefs and the Allied Combined Chiefs of Staff, and ultimately required the adjudication of an ailing Commander-in-Chief, President Franklin D. Roosevelt, at a conference at Pearl Harbor in July 1944.<sup>13</sup>

To ensure clear lines of authority and unity of effort for the Arctic strategy, NORTHCOM should be assigned responsibility for the entire Arctic region, with naval forces subordinated to the newly resurrected 2<sup>nd</sup> Fleet, specifically tasked with countering a resurgent Russia. In view of increased tensions with Russia in recent years, EUCOM has to prioritize preparedness in case of war for vast land and air operations in Europe as well as naval operations in the Black Sea, Baltic Sea, Mediterranean Sea, and Atlantic Ocean. Responsibility for defense of the Greenland-Iceland-UK (GIUK) Gap up to 70N,

however, should be retained by EUCOM and the 6<sup>th</sup> Fleet, both of which have considerable experience and ongoing relationships with key NATO allies that share a common interest in defending the GIUK Gap.

### **Cementing Allied Commitment to Arctic Defense**

Institutionalizing cooperation with key allies sharing US interests in the Arctic—Canada, Denmark, Iceland, Japan, Norway, and the UK—is a critical component of operationalizing US strategy for the region. This cooperation should include joint staff talks, multinational exercises, and realistic inter-allied training. Joint training and exercises with our Arctic allies have thus far focused mostly on traditional contingencies outside the Arctic AOR. The US and its Arctic allies will need time to develop joint plans, foster interoperability, nurture effective command relationships, and rehearse contingencies for the Arctic region.

The disastrous experience of the American-British-Dutch-Australian Command (ABDACOM) early in the Pacific war provides a stark example of the risks of slipshod inter-allied cooperation and planning. Rushed into existence five weeks after the Japanese attack on Pearl Harbor, ABDACOM was a mere speed bump to Japanese expansion in the southwest Pacific. Awkward command relationships, inexperience, poor communication, and lack of a shared strategy crippled the command from the start of its “short unhappy life,” which lasted barely six weeks in the face of Imperial Japan’s onslaught.<sup>14</sup> Planning and practicing for realistic wartime contingencies with coalition partners in the Arctic region would reduce the perils of ABDACOM-like frictions in the event of a bona fide crisis.

### **Ensuring Joint Commitment to the Arctic Roadmap**

Implementing a truly joint, combined arms approach is another critical step, in view of the Arctic’s harsh environment and its proximity to Russia. The goal should be, in the words of Joint Operations, “the synchronization, coordination, and integration of the activities of governmental and nongovernmental entities to ensure unity of effort. Failure to achieve unity of effort can cost lives...and jeopardize mission accomplishment.”<sup>15</sup>

The 2014 Arctic Roadmap includes a vague requirement to “evaluate requirements for expeditionary units to conduct operations in the Arctic. Environments include on ice, ashore, on permafrost, under ice diving, littoral operations and construction including underwater construction in freezing/subzero conditions.”<sup>16</sup> However, the Roadmap is unclear about who owns these responsibilities, and it does not stress the need for a joint approach.

The costs of service parochialism in such an unforgiving environment can be high. The American victory in the Guadalcanal campaign in World War II, for example, has been heralded as a triumph of American courage, initiative, improvisation, and endurance, and rightly so. But it is easy to overlook what a close call that campaign was. Competing strategic demands, inter-service rivalries, Navy-Marine misunderstandings, and disputes over amphibious tactics, procedures, and priorities hampered the campaign from the start, putting the Marines on Guadalcanal at grave risk for much of the campaign.<sup>17</sup>

Stressing the mutually supporting roles of the services would mitigate the risk of a Guadalcanal-like disconnect during wartime. Arctic contingencies are precisely the type of mission that the combined Navy-Marine Corps amphibious team had mastered by mid-1944 and has traditionally excelled at: expeditionary operations in harsh environments lacking fixed bases or staging areas. In a crisis, the President should have the option to deploy a Marine Expeditionary Unit with an integrated Naval Mobile Construction Battalion to establish a forward operating base in the Arctic area, clear an ice airfield, fly in reinforcements and supplies, and conduct combat or other operations as required. The USMC can expand on the experience it has gained since 2017 from deploying a small contingent of 300 Marines to Norway to train in an Arctic environment, and scale it up to something akin to the Army's 10<sup>th</sup> Mountain Division.<sup>18</sup>

The Coast Guard—which has been involved in every war in the history of the United States—should also be given enhanced authority to prepare, train, and operate in Arctic environments for both combat and non-combat missions. The Coast Guard's multi-mission responsibility and experience in Arctic operations, specifically icebreaking, make it well-suited to support enforcement of US laws and economic interests.

### **Establishing Training Standards, Readiness Levels, and Force Structures for Arctic Operations**

The Arctic may be the most unforgiving operating environment on the planet. Apart from its obvious climatic extremes, the region experiences exaggerated day-night cycles near the solstices, variations in the extent of the polar icecap, and has few clear navigational landmarks. Forces and units unprepared for the Arctic's harshness and unpredictability have paid the price, in material attrition, force effectiveness, and lives.

In 1845, for example, Sir John Franklin, an experienced Royal Navy captain and Arctic explorer, left England with two ships, HMS Erebus and HMS Terror, and 128 men. After being sighted by a whaling ship off the Greenland coast on July 26<sup>th</sup> 1845, Franklin and his crews were never seen again. Franklin's expedition is believed to have become trapped in unexpectedly heavy sea-ice in September 1846 and to have succumbed to cold, hunger, and disease.<sup>19</sup>

More than a century later, seafarers finally conquered the North Pole when the world's first nuclear submarine, USS Nautilus, began an audacious trans-polar voyage under the Arctic ice cap. Had its crew encountered a life-threatening accident, there would have been no rescue mission for no technology existed at the time to even find them, much less rescue them. Like all explorers, they were operating new and untested equipment, such as their Arctic inertial navigation system which they used on August 3<sup>rd</sup> 1958 to assess they had reached latitude: 90N, longitude: indefinite—the North Pole.<sup>20</sup>

The US submarine force has been the only naval component to fully invest in Arctic operations since the Nautilus's historic voyage under the Arctic ice cap 61 years ago. Since then, US submarines have been a consistent presence in the Arctic. The submarine force presents an example of how to conduct Arctic operations at the Type Commander level. It operates an Arctic Submarine Lab, which traces its roots to a 1941 Navy Radio and Sound Lab, before being formally constituted several years later.<sup>21</sup> The submarine force updated its Submarine Arctic Operations Manual very recently, in February 2018.

By contrast, the “U.S. Navy Cold Weather Handbook for Surface Ships” was last updated in 1988.<sup>22</sup> The “Forecaster’s Handbook for the Arctic” was last updated in 1989.<sup>23</sup> These two handbooks were both declared out of date in the Arctic Roadmap. The former was supposed to be updated by OPNAV N9 by the first quarter of the 2015 fiscal year; the latter by US Fleet Forces Command by the first quarter of FY2016. The inability to update two unclassified publications on an appropriate timetable throws into doubt the Navy’s commitment to completing more complex Roadmap tasks, such as to “determine adequacy of Navy supply system to support unit deployments to the Arctic region,” “consider interdependencies between actors and actions in the Arctic and how incentives and decisions are influenced by other actors’ decisions,” or “produce a holistic Arctic environmental sensing plan (ocean, surface, sub-surface and space based) to close validated gaps.”<sup>24</sup>

The surface fleet still appears to be unprepared for Arctic operations. Two winters ago, the newly commissioned littoral combat ship USS Little Rock transited up the St. Lawrence seaway following its December 16<sup>th</sup> commissioning in Buffalo, NY. Colder than forecasted temperatures had created icy conditions in the river that caused some damage to the ship’s external cabling. Little Rock pulled into Montreal for a scheduled port visit and repairs and before the ship was able to leave, the river became unnavigable, causing her to be stuck in Montreal for the winter.<sup>25</sup> In October 2018, the Truman Carrier Strike Group operated north of the Arctic Circle, the first time since the Cold War a US carrier had operated in the region.<sup>26</sup> However, October is a benign month for ice with September typically marking the annual minimum for Arctic ice.<sup>27</sup> Therefore, while a good first step, this operation certainly does not demonstrate a true proficiency in Arctic operations and no ships would have encountered any ice where they were operating at that time of year.

Mastering operations in the Arctic requires disciplined practice with feedback that other Navy communities have not yet undertaken. This is in part because, until recently, the Arctic Ocean was not a viable waterway due to ice. However, NOAA data has shown that in the past decade every year has seen less and less sea ice during the summer and fall. This trend will inevitably continue regardless of mankind’s attempt to slow global warming until the famed “Northwest Passage” becomes a major shipping route between Atlantic and Pacific ports.<sup>28</sup>

The next step in implementing any new Arctic strategy, therefore, is to share know-how in Arctic operations with the Navy’s surface fleet. The submarine force offers the rest of the military a model for creating, archiving, and transmitting institutional knowledge of Arctic operations. Under ice every emergency becomes potentially catastrophic without the ability to emergency blow to the surface or ventilate toxic fumes. Before a deployment with the potential for Arctic operations, US submarines complete a formal certification program which addresses Arctic communications and navigation, under-ice emergencies, vertically surfacing through ice, and operation of ice-keel avoidance sonar.

Technical accommodations for the Arctic are extensive. For example, submarine communications are done via a floating wire antenna dragged under the ice or a separate polar satellite constellation operating in a highly elliptical molniya orbit. Active sonar is used to avoid ice keels protruding down from the ice surface and navigation is done via polar transverse coordinates which are based on an alternate “equator” that instead passes through the North Pole. Each of these preparations has dozens

of details and technical settings that require extensive practice by the ship. Operating in the Arctic requires a level of attention to detail that extends all the way down to knowing where to tape up terry cloth to absorb the moisture the frigid temperatures condense onto the inside of the hull. This may seem like a trivial consideration, but moisture that drips onto electrical equipment can start a fire—among the worst possibilities on any ship.

These are the procedures simply to operate in the Arctic. Warfighting in the Arctic requires an additional level of proficiency. For example, the military is updating the decades-old polar satellite constellation. However even the new Enhanced Polar System only advertises “data rates between 75 bps and 1.28 Mbps” and has a single user spot beam meaning only one ship in the entire Arctic AOR can be conducting active communications at a given time.<sup>29</sup> Before focusing on high-end training, such as under-ice torpedo employment or fixing ship’s position in a GPS denied environment without navigational aids, we must first master the basics.

The final step is to start more complex naval exercises in the region. These exercises would culminate in full-scale events, such as those used to certify Carrier Strike Groups for deployment and would include foreign navy integration, flight operations, and water space management/prevention of mutual interference with submarines. US maritime force structures will also have to change in order to accomplish Arctic missions. Rebuilding our icebreaker fleet is a necessary precursor to any large scale naval operations in the Arctic. The Coast Guard currently operates a single heavy icebreaker, USCGS Polar Star, which is 41 years old and is scheduled to be retired soon. Our most modern icebreaker USCGS Healy, commissioned in 1997, is a medium icebreaker with limited capability for penetrating heavy ice. This current icebreaker fleet is not nearly enough to conduct major civilian or military Arctic operations, but the Navy is attempting to narrow this shortfall by helping to finance the Coast Guard’s new icebreaker class.<sup>30</sup>

### **Anticipating the Adversary’s Next Steps in the Arctic**

In every strategic plan, the enemy gets a vote. The United States is not the only actor focused on the Arctic. As the melting polar icecap makes the region’s resources and transit routes more accessible, Russia is gearing up for competition. Moscow is developing new weapons, novel practices, and asymmetric approaches—including the element of surprise—to offset perceived disadvantages vis-à-vis the United States.

To advance Russia’s return to great-power status, Vladimir Putin has initiated an extensive naval buildup that is projected to continue. This buildup includes an obvious Arctic focus and calls for new nuclear-powered heavy icebreakers to complement Russia’s current fleet of several dozen. Russia is also commissioning a new class of Arctic Patrol Vessels, low-observable hybrid platforms that can function as both a medium icebreaker and as a destroyer armed with cruise missiles and a 76 mm naval gun.<sup>31</sup> Russian submarines have been routinely operating under ice for 50 years. These ships have an obvious purpose, to take control of the Arctic Ocean.

It is imperative for US commanders to be ready for a strategic-level move by Russia in the Arctic. Russia’s swift moves to annex Crimea, launch a proxy war in eastern Ukraine, and intervene militarily in

Syria demonstrate an increasing capacity for sudden military action and acceptance of strategic risk. These developments—in conjunction with the economic sanctions the West has imposed on Russia, the growing awareness of the extensive oil and gas reserves in the Arctic, and the West’s unpreparedness for Arctic contingencies—point to serious risks of strategic surprises in the region. Russia already has a model for seizing control of a water space in what China has done in the South China Sea and even planted a Russian flag on the North Pole seabed as an assertion of sovereignty in 2007.<sup>32</sup>

Similar strategic conditions were present, and even identified with Imperial Japan. One Sunday afternoon, 152 planes launched from aircraft carriers north of Oahu wiped out the United States Pacific Fleet at Pearl Harbor. The date was February 7<sup>th</sup> 1932 and American Rear Admiral Harry Yarnell had launched the aircraft as part of a war game. The attack was a complete success, yet the shortsighted admirals of the day refused to acknowledge the results.<sup>33</sup>

By 1941, it was no secret that the Japanese had conducted a massive fleet expansion, including the construction of six front line aircraft carriers, and were desperate to escape the economic and strategic constraints that US diplomatic pressure and a crippling oil embargo had placed on them. Yet, despite growing awareness that Japan was preparing for some type of strategic escalation and the proven vulnerability of Pearl Harbor, US commanders did not anticipate Japan’s attack on December 7<sup>th</sup>, 1941.

The lesson of Pearl Harbor is the need for vigilance and preparedness in the form of realistic training, large-scale exercises, and updated force structures that anticipate the full range of possible enemy action. For the US, this includes sudden hostile action by Russia to seize a commanding position in the Arctic region.

### **Conclusion: Focus on Arctic Operations as a Key Mission and Core Competency**

The United States military must shift from thinking of Arctic operations as a niche specialty to considering it a core competency. US commanders and strategists should regard the ocean dividing North America and Russia no differently than the North Atlantic, particularly as the polar ice cap melts. To be prepared for a future conflict there, we must create our theater AORs based not on arbitrary lines of longitude eyeballed as a rough dividing line between continents but instead on where the actual conflict is likely to be and which Unified Combatant Command (UCC) is best prepared to wage it. Finally, we must train to the standards necessary for the harshest environment on the planet because in war, as the ancient Greek poet Archilochus said, “we don’t rise to the level of our expectations, we fall to the level of our training.”

<b>Summary of Recommendations</b>		
<b>Action</b>	<b>Responsible Officer</b>	<b>Notes</b>
Update US Navy Arctic Roadmap for 2019	Chief of Naval Operations	Should ideally be based on an updated National Arctic Strategy
Redraw AOR lines such that waging war in the Arctic is the responsibility of a single Unified Combatant Command	Chairman of the Joint Chiefs with Congressional approval	Recommend the Arctic be assigned to NORTHCOM concurrent with their responsibility for defense of North America
Designate a major command within each TYCOM as the subject matter expert (SME) for Arctic operations	Chief of Naval Operations	A squadron for each type of ship, submarine, aircraft, and Marine Expeditionary Unit
Create unit level Arctic training and certification programs	Applicable Arctic SME Squadron/Unit	Will require updated manuals and publications
Create a fleet level training schedule in the Arctic culminating in a Composite Training Unit Exercise (COMPTUEX)	United States Fleet Forces Command	A COMPTUEX is the certification a Carrier Strike Group does for deployment
Rebuild the Coast Guard icebreaker fleet with defensive and some offensive capability	Commandant of the United States Coast Guard	Goal should be a full time presence similar to what the US maintains in other strategic domains

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- <sup>1</sup> Hughes, Michael. "USS New Mexico Surfaced at the North Pole." 28 March 2014.
- <sup>2</sup> Commander Submarine Forces, Public Affairs. "Navy Kicks Off ICEX 2018," 7 March 2018. ([http://www.navy.mil/submit/display.asp?story\\_id=104633](http://www.navy.mil/submit/display.asp?story_id=104633) Accessed 22 April 2019)
- <sup>3</sup> Department of the Navy, "The United States Navy Arctic Roadmap for 2014 to 2030," cover letter by Adm. Jonathan W. Greenert, Chief of Naval Operations. White paper, February 2014. ([http://www.navy.mil/navydata/documents/USN\\_arctic\\_roadmap.pdf](http://www.navy.mil/navydata/documents/USN_arctic_roadmap.pdf))
- <sup>4</sup> Ibid, p. 3
- <sup>5</sup> Ibid, Appendix 3, p. 22-36
- <sup>6</sup> Eckstein, Meghan. "Navy to Release Arctic Strategy This Summer, Will Include Blue Water Arctic Operations," US Naval Institute. 19 April 2018. (<https://news.usni.org/2018/04/19/navy-to-release-arctic-strategy-this-summer-will-include-blue-water-arctic-operations> Accessed 8 May 2019)
- <sup>7</sup> "Strategic Documents," US Navy. (<https://www.navy.mil/StrategicDocs.asp> Accessed 8 May 2019)
- <sup>8</sup> Joint Chiefs of Staff, "Joint Publication 3-0 Joint Operations," 17 January 2017. Appendix A, "Principles of Joint Operations," p. A2-A3.
- <sup>9</sup> National Geospatial Intelligence Agency. "The World With Commanders' Areas of Responsibility Edition 9," 6 April 2011. ([http://archive.defense.gov/news/UCP\\_2011\\_Map4.pdf](http://archive.defense.gov/news/UCP_2011_Map4.pdf) Accessed 22 April 2019)
- <sup>10</sup> US Naval Forces Europe-Africa / US Sixth Fleet. "Areas of Responsibility," (<http://www.c6f.navy.mil/about/area-responsibility> Accessed 22 April 2019)
- <sup>11</sup> Department of the Navy, "The United States Navy Arctic Roadmap for 2014 to 2030," Appendix 3, p. 22-36.
- <sup>12</sup> Spector, Ronald H., *Eagle Against the Sun: The American War with Japan*, (New York, 1985) p. 145.
- <sup>13</sup> Spector, *Eagle Against the Sun*, pp. 144-146, pp. 417-419. See also Murray, Williamson and Millett, Allan R., *A War to Be Won: Fighting the Second World War*; (Cambridge, 2000) p. 197-201, 336-340.
- <sup>14</sup> Spector, *Eagle Against the Sun*, p. 127-134. See also Morison, Samuel Eliot. *The Two-Ocean War*, (New York: 1963) p. 73-83.
- <sup>15</sup> Joint Publication 3-0 "Joint Operations," p. I-8.
- <sup>16</sup> Department of the Navy, "The United States Navy Arctic Roadmap for 2014 to 2030," Appendix 3, p. 33.
- <sup>17</sup> Morison, *Two-Ocean War*, p. 139-159; and Spector, *Eagle Against the Sun*, p. 205-209.
- <sup>18</sup> Woody, Christopher. "US Marines are Stationed in Norway to Help Deter Russia, and Norway May Ask Them to Stay Longer," Business Insider. 16 April 2018. (<http://www.businessinsider.com/us-marines-may-stay-longer-norway-2018-4> Accessed 22 April 2019)
- <sup>19</sup> Watson, Paul. *Ice Ghosts*. p. 43-54 (New York: WW Norton and Company, 2017).

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- <sup>20</sup> Polmar, Norman and Allen, Thomas. *Rickover: Controversy and Genius*. p. 174 (New York: Simon & Schuster, 1984).
- <sup>21</sup> Department of the Navy Arctic Submarine Laboratory. "Timeline," (<http://www.public.navy.mil/subfor/uwdc/asl/Pages/default.aspx> Accessed 22 April 2019)
- <sup>22</sup> Department of the Navy, "U.S. Navy Cold Weather Handbook for Surface Ships," CNO Surface Ship Survivability Office. May 1988. (<http://www.dtic.mil/dtic/tr/fulltext/u2/a247850.pdf> Accessed 27 April 2019)
- <sup>23</sup> Sechrist, Frank; Fett, Robert; Perryman, Dennis. "Forecasters Handbook for the Arctic," Naval Environmental Prediction Research Facility. October 1989. (<http://www.dtic.mil/dtic/tr/fulltext/u2/a238424.pdf> Accessed 27 April 2019)
- <sup>24</sup> Department of the Navy, "The United States Navy Arctic Roadmap for 2014 to 2030," Appendix 3, p. 22-36.
- <sup>25</sup> Werner, Ben. "USS Little Rock Stuck in Montreal, Ship Might Not Leave Until Spring," US Naval Institute. 19 January 2018. (<https://news.usni.org/2018/01/19/uss-little-rock-ice-montreal> Accessed 22 April 2019)
- <sup>26</sup> Eckstein, Meghan. "Truman Carrier Strike Group Operating North of Arctic Circle; First Time for US Navy Since 1991," US Naval Institute. 19 October 2018. (<https://news.usni.org/2018/10/19/truman-carrier-strike-group-operating-north-arctic-circle-first-time-us-navy-since-1991> Accessed 8 May 2019)
- <sup>27</sup> "Quick Facts on Arctic Sea Ice," National Snow & Ice Data Center. (<https://nsidc.org/cryosphere/quickfacts/seaice.html> Accessed 8 May 2019)
- <sup>28</sup> DiLiberto, Tom. "Northwest Passage Clear of Ice Again in 2016," National Oceanographic and Atmospheric Administration. 16 September 2016. (<https://www.climate.gov/news-features/event-tracker/northwest-passage-clear-ice-again-2016> Accessed 25 April 2019)
- <sup>29</sup> "Enhanced Polar System," Northrup Grumman Corporation. (<http://www.northropgrumman.com/Capabilities/EnhancedPolarSystem/Pages/default.aspx> Accessed 22 April 2019)
- <sup>30</sup> Freedberg, Sydney. "New Icebreaker Will Have Space, Power for Weapons: Coast Guard," Breaking Defense. 10 January 2018. (<https://breakingdefense.com/2018/01/new-icebreaker-will-have-space-power-for-weapons-coast-guard/> Accessed 25 April 2019)
- <sup>31</sup> "Ivan Papanin (Project 23550) Class Arctic Patrol Vessels. Naval Technology," (<https://www.naval-technology.com/projects/ivan-papanin-project-23550-class-arctic-patrol-vessels/> Accessed 25 April 2019)
- <sup>32</sup> Parfitt, Tom. "Russia Plants Flag on North Pole Seabed," The Guardian. 2 August 2007. (<https://www.theguardian.com/world/2007/aug/02/russia.arctic> Accessed 25 April 2019)
- <sup>33</sup> Micallef, Joseph. "The First Attack: Pearl Harbor, February 7 1932," Military.com. (<https://www.military.com/navy/pearl-harbor-first-attack.html> Accessed 25 April 2019)