

AS CLIMATE SHIFTS, U.S. NAVY FOCUSES ON BOLSTERING ARCTIC OCEAN OPERATIONS



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WASHINGTON, D.C. - *First in a two-part series on how the Navy and its partners are working to improve Arctic operations as the sea ice melts due to warming temperatures.*

The Arctic is the next frontier for U.S. military operations, where the physical environment poses a major threat to achieving strategic dominance, managing assets and ensuring freedom of the seas.

The importance of the Arctic will only increase each year as the decline of the perennial sea ice continues and the ice edge shifts. It is imperative to strengthen the ability to operate there in order to gain a strategic advantage. Effective operations will hinge on reliable environmental intelligence in a region where conditions can be severe.

The U.S. most recently [Updated Its Strategy For The Arctic Region Last October](#) with a new 10-year scope that seeks a peaceful, stable, prosperous and cooperative Arctic at the same time acknowledging strategic competition with Russia and China. Ongoing efforts include investing in technology that detects and tracks potential threats and improves our own capabilities to maneuver in the region. This is not a simple

task due to the dominant role that Russia has in the Arctic, as well as the growing concern for China's desire to be an influential nation there.

ARCTIC ENVIRONMENT PRESENTS CHALLENGES FOR THE NAVY

The Arctic Ocean is in many ways an uncharted domain for conducting military operations. It will be no easy feat to operate effectively because the Arctic is a hostile environment for modern vessels within ice-infested waters.

Currently, the U.S. has a limited icebreaking capability that is completely reliant on the U.S. Coast Guard, with the Coast Guard cutters Healy and Polar Star handling all pathfinding needed to ensure safe transit. This shortfall is driving the production of the next generation of [Polar Security Cutters](#), a joint Navy and Coast Guard program to address the dire necessity for increased icebreaking operations in the near future. The first new Polar Security Cutter is expected to be delivered in 2025.

Along with an updated force, any future naval conflict will require leveraging technological advancements made in the past 80 years since the naval challenges of World War II, when the U.S. was last fully tested as a strategic force implementing older-era warfighting tactics. The Arctic presents conditions and challenges far different from those encountered in earlier eras.

The future of warfighting will demand means beyond globally deployed strike groups and a prominent physical presence. Information warfare will be of greater importance as the challenges facing battlespace awareness, assured command and control and integrated fires are heightened in the austere environment of the Arctic.

Successful intelligence preparation of the operational environment, mastery of the electromagnetic spectrum and solid communications could very well be deciding factors for any

conflicts in the high latitudes. Any future conflict will be settled in large part by how well information, including environmental intelligence, is gained, exploited and disseminated.

Technology that implements artificial intelligence/machine learning (AI/ML) methods could yield a warfighting advantage in predicting the physical battlespace. Current projects are underway across the fleet, many led by Office of Naval Research and Naval Research Laboratory, to address the need for advanced data assimilation to improve high-latitude environmental models for weather and conditions forecasting and predictions.

A variety of environmental data collected through in situ or remote means is necessary for these modeling efforts to be successful. The sea ice edge can vary by hundreds of miles overnight when faced with the dynamic meteorology present in the region.

Many analytical intelligence challenges can be partially to fully automated AI/ML, but even these innovative efforts require substantial data, among other resources, as a driving mechanism. It will be essential to fill the current environmental data gaps in the Arctic if the U.S. is to harness the technical advances made in computing and successfully exploit technologies such as more sophisticated models and innovative AI/ML projects. Some small but highly effective naval commands have started paving a path forward to meet these shortfalls.

HOW THE U.S. NATIONAL ICE CENTER PLAYS A MAJOR ROLE

[The U.S. National Ice Center \(USNIC\)](#) is a tri-agency organization of the Navy, the National Oceanic and Atmospheric Administration (NOAA) and the Coast Guard with a mission to provide global to tactical scale ice and snow information, ice forecasting and related environmental intelligence services

for the U.S. government.

Fewer than 50 uniformed, civilian and contract personnel comprise the USNIC on a daily basis with only a dozen of those individuals creating a variety of routine ice analyses for the Arctic, Antarctic, Great Lakes and other geostrategic locations where ice may form; a daily analysis of U.S. Northern Hemisphere snow and ice information to directly support assets and personnel in the field.

With such a small team, providing environmental intelligence to ensure safety of navigation in treacherous polar waters and economic prosperity within and along high latitude commercial routes and port regions is a vital task. Indeed, providing environmental intelligence in particular about sea ice proliferating in the Arctic Ocean is essential.

Several portions of the Arctic Ocean that have historically been covered with sea ice through at least parts of the winter will become increasingly ice-free in the coming years. This decrease in ice can result in shorter maritime trade routes, or completely new transpolar routes, becoming available, significantly decreasing maritime Arctic transit.

The Arctic is still largely unfamiliar in its delicate environmental complexities. The need for increased and enhanced observations continuously grows as the sea ice left behind year after year becomes more fragile, thin and diminishes in extent, losing an equivalent area the size of South Carolina annually.

Characterizing the ice in the region requires various input sources whether it be satellite-derived data, sensing platforms like high-tech buoys or occasionally deployed personnel feedback while onboard icebreaking operations in the region. The limited in situ observations help increase near-real time environmental knowledge in the Arctic, but at current numbers, they form an incomplete picture and are not

enough for fully forecasting and safely operating within such a complex, harsh domain.

In the next installment, we discuss how USNIC is bolstering sensor and analysis abilities in the Arctic.