The U.S. Navy’s Arctic Roadmap: Adapting to Climate Change in the High North

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In Case You Have Not Heard …

The bad news is the ice cap is melting and it’s going to be almost impossible to catch seals.

The good news is if we keep moving south, there’s tons of fat animals called “humans” who can’t run very fast.
Climate Change Update

The Ocean is Storing Most of the Heat

Total Earth Heat Content from 1950 (Murphy 2009). Ocean data taken from Domingues et al 2008

Arctic Sea Ice Continues to Melt & Thin

Arctic Warming is 2 x the Rest of the World

Mean surface temperature 2001-2007 relative to baseline period 1951-1980, from: The Copenhagen Diagnosis, 2009
Why the Navy Cares

Near-term
- Increasing Arctic maritime activity
- Partnership opportunities
- Energy security initiatives

Mid-Term
- Sea level rise impact on installations
- Water/resource challenges
- Potential increase in Humanitarian Assistance/Disaster Response

Wild-cards
- Ocean acidification
- Abrupt climate change
- Geoengineering

Challenges and opportunities exist
Task Force Climate Change

Establishment
Chief of Naval Operations
Executive Board on May 15, 2009

Composition
Navy, NOAA, USCG in core group with
Joint, interagency, international support

Charter
Global climate change impacts with near term Arctic focus
Engaged nearly 600 individuals from over 175 organizations
Arctic Considerations

The Arctic is an ocean, a challenge, but NOT a vacuum

Native Perspectives

Gulf Coast, 2005

Unalakleet, 2040

One Scenario

Security Concerns

Transportation Access

Poorly Charted

Limited Infrastructure

Harsh Operating Environment

Native Perspectives

Gulf Coast, 2005

Unalakleet, 2040

The Arctic is an ocean, a challenge, but NOT a vacuum
Commercial activity remains limited through 2030

- Shipping, oil, & gas extraction to grow after 2030
- Tourism & maritime research will increase the most
- Fishing to grow but only gradually

..but after 2050?

Harsh operating environment will remain the greatest limiting factor
Navy Arctic Roadmap

Framework

Execution

Phase 1 (FY10)
- Fleet readiness assessment, external studies, strategic implementation plan
- Advocate for UNCLOS
- Monitor Polar SATCOM Program
- Innovative Readiness Training (IRT)
- Arctic TTX & LOE
- POM-12 investments for air-ocean-ice numerical prediction
- Cooperative Navy-NOAA Bering Strait Hydrographic Survey

Phase 2 (FY11-12)
- POM-11 CBA, NSP, & SPPs address the Arctic
- Arctic SAREX, Arctic Edge, Northern Edge NANO OK
- ICEX-11
- Environmental assessments
- Support National Ocean Policy / Marine Spatial Planning Implementation
- Interagency partnership for air-ocean-ice numerical prediction

Phase 3 (FY13-14)
- Execute POM-14
- Implement expanded / new cooperative partnerships
- ICEX-13
- Arctic UUV operations
- Update roadmap ICW ODR

Navy recognized as a valued joint, interagency, & international partner in the Arctic

*** Indicates recurring action
Recent Arctic Activity

About the Arctic

- Finland Arctic Strategy
- Canada National Arctic Policy
- Russian Arctic Strategy
- Arctic Council Reaffirms UNCLOS
- Arctic Council SAR MOU Draft

Within the Arctic

- Vigilant Eagle 2010
- Multiple NSR transits
- NWP cruise Ship & Oil Tanker groundings
- Russian Oil Tankers Collide

Chinese research cruise
US & Other International Research
Arctic Crossroads 2010
US-CAN ECS survey

Navy is engaging with Arctic & non-Arctic countries
Navy Accomplishments: April 2010 – April 2011

**Education**
- Naval Post Graduate School Arctic Science & Security theses
- Arctic science & security Study topics at US Naval Academy
- Naval War College courses address Arctic Science & Security Topics

**Studies & Assessments**
- Naval Arctic Mission Analysis
- Naval Studies Board study
- Naval Arctic Capability Based Assessment

**Outreach & Engagement**
- NSS Interagency Policy Committee
- State Department Arctic Policy Group
- Conferences, Symposia, Media events
- Leadership visits & staff talks

**Policy, Strategy, & Plans**
- Support Arctic Section in 2010 UCP
- Navy Arctic Strategic Objectives
- USN-USCG Arctic Activity Plan

**Operations & Training**
- Navy-NOAA Bering Strait Survey
- Arctic Care 2010
- Pacer Goose
- ICEX 2011
- USS Taylor Port Visit to Murmansk
- Operation NANOOK/NATSIQ

**Science & Research**
- NRL Kara Sea Research cruise
- Interagency partnership For air-ocean-ice numerical prediction
- Science Ice Exercise Plan

**Improve understanding**
**Ensure readiness (resilience)**
Navy Arctic Strategic Objectives

I. Contribute to safety, stability, & security in the region

II. Safeguard U.S. maritime interests in the region

III. Protect the American people, our critical infrastructure, & key resources

IV. Strengthen existing & foster new cooperative relationships in the region

V. Ensure Navy forces are capable and ready

Towards the desired end state: a safe, stable, and secure Arctic
Navy Activity On and Under the Ice

Technology Demonstrations – ICEX-11

Aerial resupply  SSN 778 surfaced

Ice-mining  VIP visit

Interagency Research Efforts – Operation Ice Bridge 2011

Greenland Ice Sheet
Environment
- Daily fog, air temp 30s-40s ºF
- PPE required but expensive

Engineering
- Water production reduced

Logistics:
- No in-port replenishment north of St. Johns

Training
- Ice module for ship simulator is vital

Communications
- Intermittent
- Data transfer rate significantly reduced

Recommendations
- Include replenishment ships
Change is Gradual

- But preparing for the challenges (hardening vessels, logistics facilities) has long lead time (>10 years)

Arctic economic viability

- Understanding this is essential to identifying regional security implications
- Resource extraction will continue to be the priority
- Destination shipping will predominate over global trade

U.S. Accession to UNCLOS

- National imperative (players were unanimous)
- U.S. risks being marginalized if actions, policies & investments don’t keep pace with economic development in the Arctic
- Alternative opinion: U.S. power provides enough leverage to secure national interests
Improving Understanding

More Interagency Collaboration

Earth System Prediction Capability

Recapitalize aging suite of global atmospheric models

Implement interagency collaboration

Revolutionary advancement National predictive architecture

ONR Initiatives

Seamless Global Prediction

ONR's new effort will focus on building the next-generation integrated global prediction system to support the needs of the US Navy in 2020:

- Fully-integrated ocean-wave-ice-atmosphere model

DRI: Emerging Dynamics of the Marginal Ice Zone

The Arctic is becoming more ice-dynamic, with a larger area of sea ice melting and re-freezing on an annual basis:

- Increased surface exposure in the Chukchi and Beaufort Seas
- More opportunity for waves, swell, and wind-induced mixing
- Feedback from air-sea interactions

Goal: Better understanding of the coupled physical processes operating in the Marginal Ice Zone

Better understanding of the MIZ physics will enable improved ice-dynamic models of the Arctic
**Defense**
- Coordination & support to multiple OSD offices
- USEUCOM / SACEUR Flag-level meetings
- USPACOM Environmental Security Conference
- USNORTHCOM Flag-level Meetings

**National**
- National Ocean Policy Implementation
- National Security Staff’s Arctic Interagency Policy Committee
- US Global Change Research Program

**Congressional**
- US-UK Statement to US CODEL
- House sub-committee testimonies
- Multiple briefings to HAC-D, SAC-D, HASC, and SASC staffs

**International**
- Operation NANOOK/NATSIQ
- USS Taylor Port Visit to Murmansk
- Conferences & symposia
- US – Foreign Navy Staff Talks

**Media**
- Radio interviews
- On-line publications

**ClimateWire**
- The Washington Post
- The New York Times
- Traditional printed outlets

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**Demonstrating leadership**
Some Final Thoughts …

“There’s a lot of water where there used to be ice, and now I’m responsible for it.”

Admiral Thad Allen, USCG (ret)

“We have not got the money, so we have to think.”

Sir Winston Churchill

“If anyone invades Canada from the North, my first job would be to rescue them.”

Admiral McFadden, Canadian Navy
Questions?