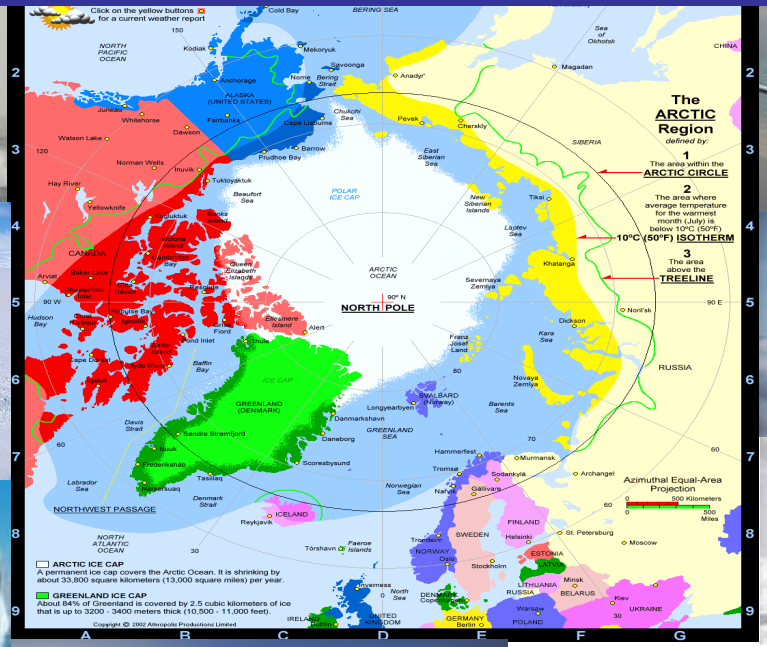
DOD and NORAD USNORTHCOM Arctic Science & Technology Synchronization Workshop 2018



Dr. Hal Moore
Chief Technology Officer
NORAD USNORTHCOM
J8 Science & Technology

Agenda

- Tri-Command Goals
- Arctic Scenarios/Search & Rescue
- ICEX 2016
- Arctic Homeland Defense Concepts
- Arctic Capability Concerns
- Arctic GEOINT
- Over the Horizon Radar
- Denmark Participation
- 2014 Findings

TRI Command Strategic Goals

Commander's Vision and Intent: "NORAD, USNORTHCOM, and CJOC---Strong and reliable partners, working together to protect and defend our nations, peoples, values, and ways of life ---TRI COMMAND STRATEGY

1. Strengthen our **collective ability** to detect, deter, defend against, and defeat threats to our nations

2. Improve **unity of effort** with Commands and with our respective mission partners

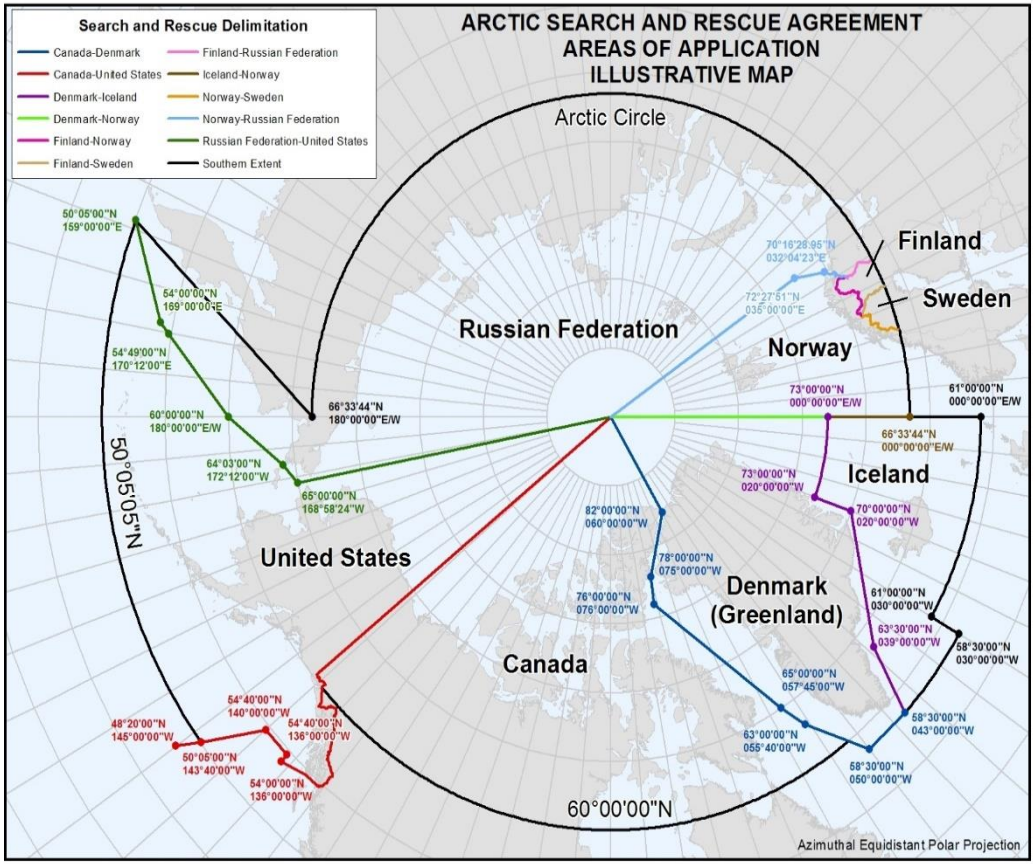
3. Develop a culture of **continuous collaboration** and cooperation in planning, execution, training, information management, and innovation

4. Enhance intelligence and **information sharing and fusion** to support mission accomplishment

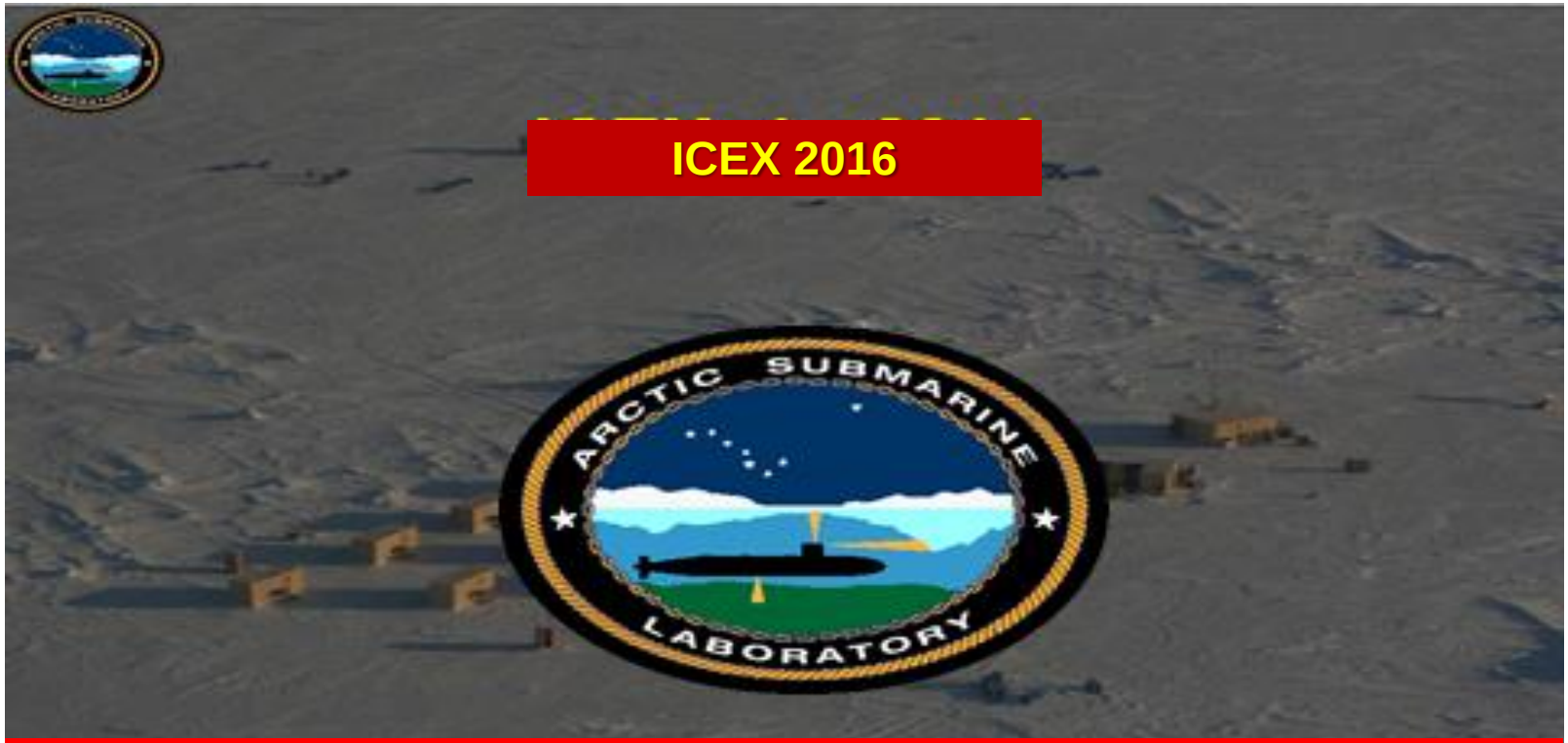
5. Strengthen our collective ability to provide appropriate, timely and effective **support to civil authorities**

Possible Arctic Scenario/Vignettes

- Maneuver expeditiously in Arctic Water and Land
- Conduct a Non-compliant Visit Board Search and Seizure (VBSS) in Arctic Waters
- Detect and Counter a Chemical WMD Threat Transiting the Arctic Pathway
- Deploy ISR capabilities in austere Arctic environment
- Sustain personnel while deployed (power, heat, communications, etc)
- Search And Rescue Operations

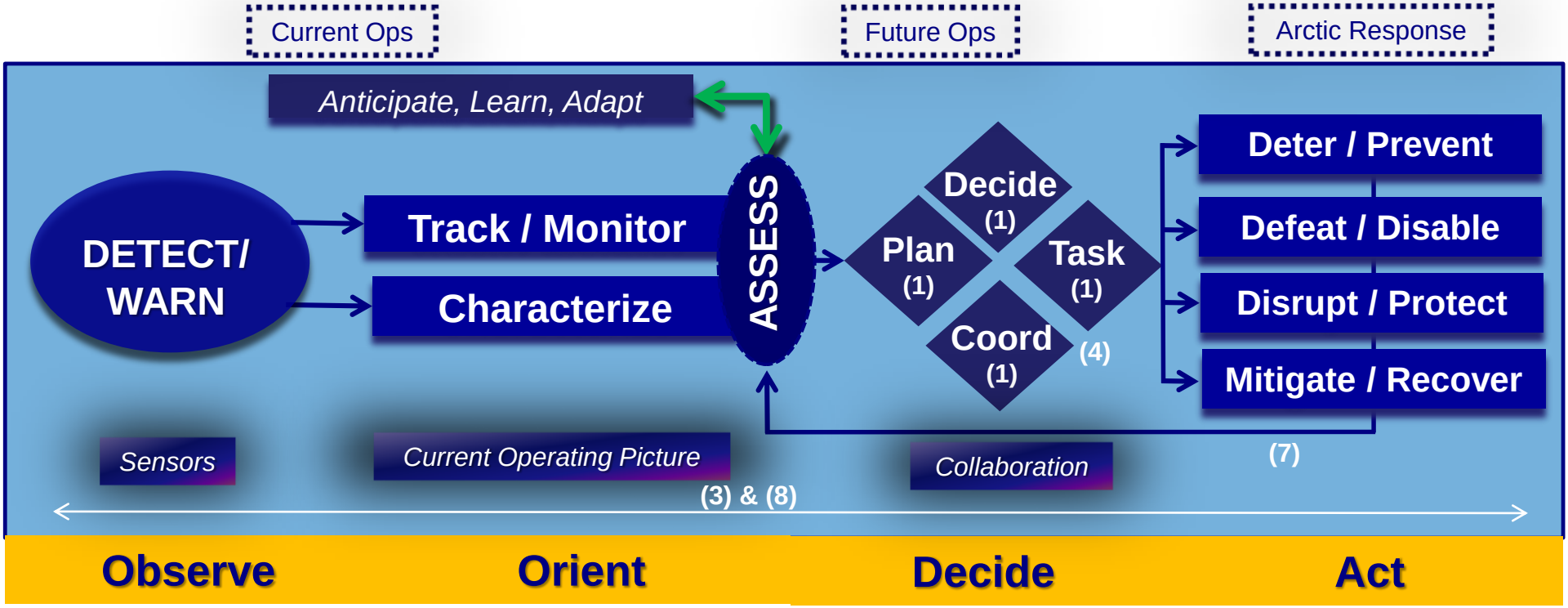


ICEX



- Emergency Evaluation-above normal rapid thawing (March 2016 and March 2014)
- Lack of "Ice Cracking Prediction"; Ice Sea Drift (150+ Miles)
- Recommendations: Move ICEX 2018 earlier in year (Feb); rapid teardown capability (no wooden floors; small, light weight payloads; no heavy lift); Improved Communications with Iridium

Arctic Homeland Defense Concepts



C2 Joint Integrating Concept Critical Capabilities

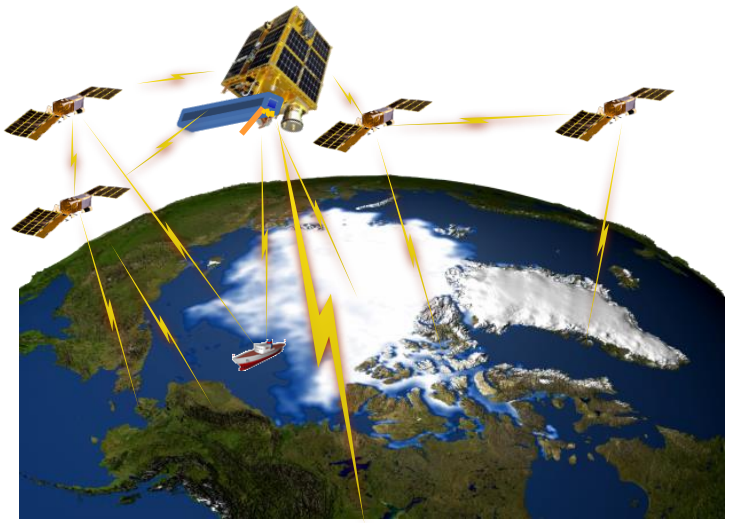
1. Exercise Command Leadership
2. Establish command Structures and Enable Collaboration
3. Develop & Maintain Shared Situational Awareness / Understanding
4. Communicate Commander's Intent and Guidance
5. Plan Collaboratively
6. Synchronize Execution Across All Domains
7. Monitor Execution, Assess Effects and Adapt Operations
8. Leverage Mission Partners

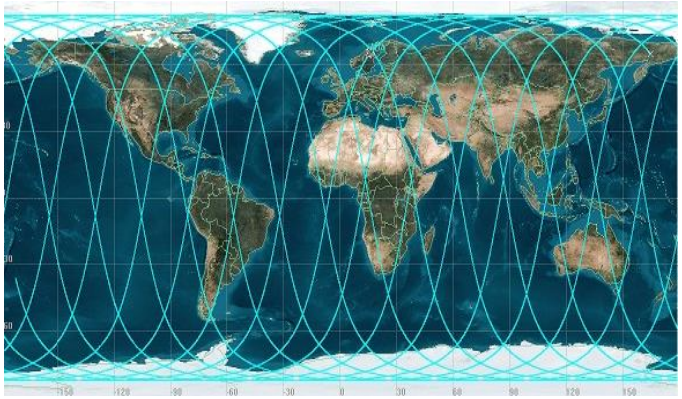
Arctic Capability Concerns

- **Northern Approaches Surveillance**
- **Arctic Communications**
- **Indications & Warning**
- **Maritime Homeland Defense in the Arctic**
- **Air Base Infrastructure**

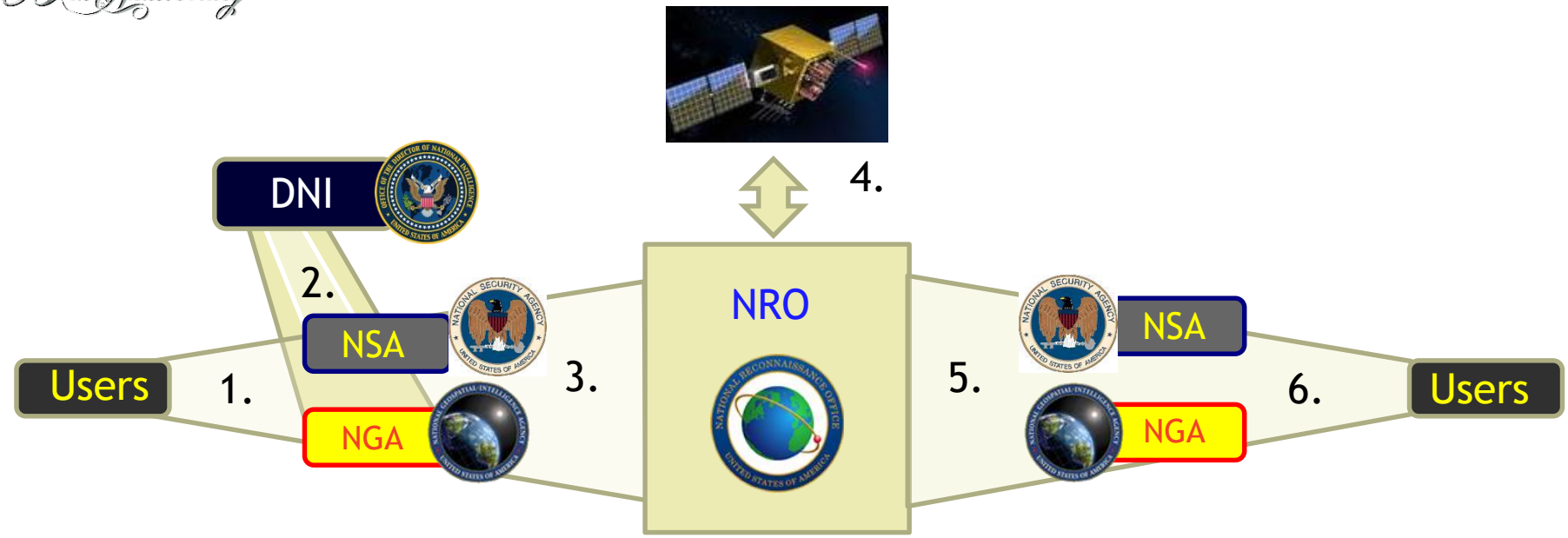
N-NC Operational Arctic GEOINT

- **NORAD Maritime Warning**
- **Ocean Ship Detection**
- **Commercial Hybrid Ship Detection**
- **Image Chips…location, course, speed**
- **Sea-Drift…objects at sea (icebergs, etc)**
- **Ice and Ice prediction**
- **Imagery Operations…Task, Collect, Process, Exploit, and Disseminate**





How COCOMs Receive GEOINT

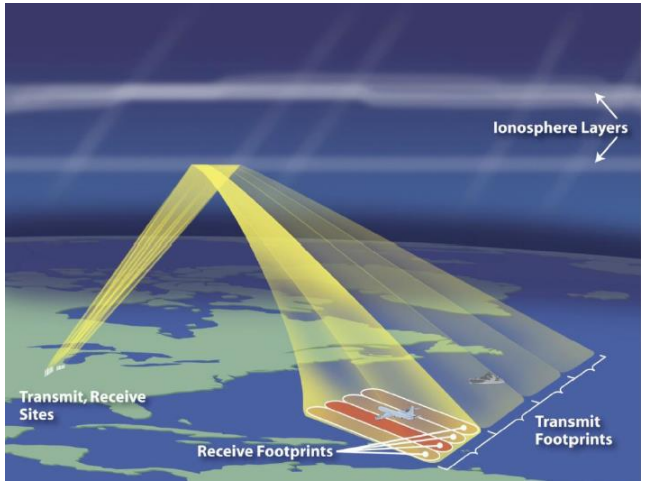


NRO Mission: Develop and operate unique and innovative overhead reconnaissance systems.

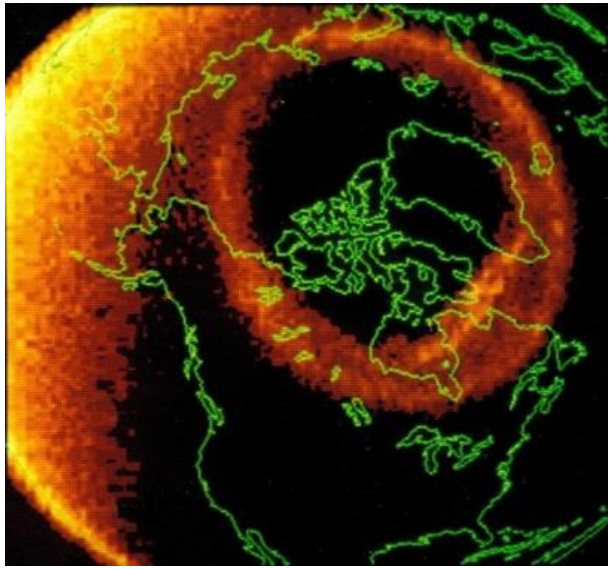
1. *Collection Requirements*
2. **Priority Guidance**
3. **Prioritized collection requirements**
4. *Satellite commands / data return*
5. *Raw Data*
6. *Exploited Intelligence*

Over-the-Horizon Radar (OTHR)

- High-Frequency (HF) Radar (5-30 MHz)
- Refracts HF energy off ionosphere
- ~ 1,000 – 2,500 NM range
- Pros:
  - Long range (decision time)
  - Large coverage area
  - Relatively low cost / surveillance area
  - All altitude detection
  - Proven vs. air, maritime, space targets



(U) OTHR



Denmark Participation

- Prof. Carl Egede Bøggild - Danish Technical University
- Prof. Anders Frederikson Danish/Greenlandic Arctic Technology Centre
- Ms. Maja Kadenic (PhD student) - Aarhus University
- Greenland/Denmark highlight there is a severe shortage of arctic engineering skill set for the arctic nations and nations wishing to operate in this environment …China, Korea, etc

ARCTIC TECHNOLOGY CENTRE

AARHUS UNIVERSITY

2014 Findings

Capability issues:

- **<u>Russia Growth:</u> Office of Naval Intelligence sees growing Russian infrastructure in the arctic region with air bases and sea ports**

- **<u>Arctic Climate Modeling</u>: Program Execution Office Ships is concerned that climate modeling for the Arctic may be conservative, and may need to shorten the horizon from 2025. No model matches actual results.**

- **<u>Climate Change</u> causing the ice to "move" much faster and current is increasing. Sudden wind shifts and more intense wind is another outcome. Airship and UAS operations are negatively impacted. Melting permafrost is negatively impacting infrastructure. Arctic summers have “sea state ” causing greater icing conditions from sea spray and fog.**

2014 Findings (cont)

- **Information Sharing: Arctic Collaboration Environment Joint Capability Technology Demonstration is providing an unexpected "unclassified" COP and collaboration tool for Alaska Command and interagency operations (access by internet)**

- **Unmanned Undersea Vehicle Operations: Canada is making significant progress on UUV operations in the arctic, but still lacks sufficient all domain awareness and communications**

- **US Naval Arctic Surface Operations: NAVNORTH is capable of Arctic air and undersea operations, but challenges are surface presence in the arctic… the fleet needs to take steps to "ice harden" vessels. The question is when?**

- **US Coast Guard S&T demonstrations/test each August for developing capabilities. We need to include them on our roadmaps**

USCG Healy

U of Alaska

2014 Findings (cont)

- **Training/Research: ICEX in March 2014 was shorten due to "cracks" in the ice…early melting…**

- **Sensing (Finland) presented an intriguing topic related to Counter Remote Sensing Techniques. It was sort of "red teaming" how arctic nations are seeking improvements in all domain awareness and defeating new technologies, including hyper-spectral**

- **Infrastructure (Finland) presented details on improving road/highway infrastructure to handle severe swings in climate. This included use of Nano-technology to improve surface materials and quicker concrete hardening in below freezing temperatures**

- **S&T Priorities for the Arctic are All Domain Awareness, Continuous Communications, Mobility, and Improving Endurance, Mass Casualty SAR, Renewable Power in Austere/Autonomous environment**

Questions?

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