SCIENTIFIC ROUNDTABLE

Quick-look Report

03 October 2023
Tromsø, Norway

As human activity in the Arctic increases, our understanding of the challenges faced in the high latitudes continues to grow and evolve. The maritime Arctic region encompasses territories of the Arctic states and international waters, necessitating collaborative work to identify challenges and solutions.

On 03 October 2023, the U.S. Coast Guard Research & Development Center, in conjunction with U.S. Coast Guard Cutter Healy, hosted an Arctic Scientific Roundtable in Tromsø, Norway. The event brought together operators and researchers from various U.S. and Norwegian institutions (a list of participating agencies is included on page three). The ensuing discussion was centered on bilateral cooperation and collaboration in the areas of vessel safety and navigation, Arctic Search and Rescue (SAR), and Arctic pollution response and environmental protection. Key points from the discussion are highlighted below:

Vessel Safety and Navigation

- **Ice Navigation**: Improved high-latitude connectivity and satellite coverage have increased capabilities for vessels to plan safer and more efficient routes through the Arctic, especially in ice zones. However, more could be done to update onboard practices and to develop and employ automation tools to assist with these processes. *Potential Solutions/Research Areas: Collaborative exploration of best practices for using satellite imagery in ice regions, collaboration on development of automated decision support tools to assist with ice navigation.*
- **Monitoring:** Participants expressed greater need for reliable tracking, especially of dark fleets and targets (e.g., fishing vessels operating without automatic identification system (AIS)). *Potential Solutions/Research Areas: Commercial satellite-based monitoring.*
- **Near-shore and Shallow-water Bathymetry:** There is currently a lack of accurate seafloor mapping in shallow and near-shore areas. This is exacerbated by heavy silting from glaciers that causes frequent changes to the bathymetry. *Potential Solutions/Research Areas: Wave Inversion Technology; Uncrewed Systems (UxS).*

Arctic Search and Rescue (SAR)

- **Large Scale vs. Small Scale Exercises:** Much of the international SAR focus is and has been on preparing large scale responses to vessels with 200+ passengers. While these events would critically test the response system, responses to smaller incidents are statistically more likely and these vessels pose different challenges for responses. *Potential Solutions/Research Areas: Exercises targeting smaller incidents; Risk assessment tools.*
- **Response Options – Survival vs. Rescue:** While the focus of many response exercises and policies is rescue, defined as removing all survivors from the incident and returning them to safety, modern technologies may offer ways to increase survivability and habitability through delivery of equipment, supplies, and personnel while a full-scale rescue is coming together. *Potential Solutions/Research Areas: UxS delivery of survival supplies; Resource location modeling for survival supplies and personnel.*
- **Response Logistics and Command/Control (C2):** To compliment the above topic, international assessments of response and rescue equipment, assets, and teams, including response times to different locations, could assist in maintaining cooperative SAR coverage throughout the Arctic region. Additionally, a question was raised if the

proper cooperative rescue agreements are in place to affect an international rescue effort. *Potential Solutions/Research Areas: Exploration of current international SAR assistance agreements for the Arctic region and identification of any additional desired agreements; Location and response time modeling for international assets and teams.*

- **Distress Alerting:** Recent technological advancements have provided the capability for reliable distress alerting at all latitudes. It is unknown if the public is aware of the available technologies and knows how to make an informed decision about what technologies will work best in their situation. *Potential Solutions/Research Areas: Continued assessments of satellite distress alerting technologies in high-latitudes; Maritime public awareness assessments.*
- **Regulatory Effectiveness for Survival:** The IMO Polar Code specifies that life-saving appliances must provide a habitable environment until the maximum expected time to rescue (METR), and that vessels operating in the Arctic may not use a METR of less than five days but provides no standardized method for operators or regulators to calculate METR. The general group consensus was that five days was rarely sufficient for high-latitude rescues, even in best case scenarios. *Potential Solutions/Research Areas: Examination and proposals of repeatable methods to calculate METR.*

Pollution and Response and Environmental Protection

- **Shoreline Cleanup:** The Arctic environment is extremely vulnerable to pollution, and the shoreline poses unique challenges. A lack of accurate near-shore bathymetry may further hinder response as vessels attempt to stay offshore in safer, deeper, navigable water. *Potential Solutions/Research Areas: Shallow-water bathymetry tools; Shallow-water response assets and tools; Exploration of UxS for pollution response.*
- **Availability of Response Assets:** In remote Arctic regions, availability and response time of clean-up assets are significant concerns. Some work has been done to identify technologies like single-vessel sweep systems that can reduce the number of assets needed. Spills and releases in ice, however, further complicate the situation as ice-capable response assets must be identified and mobilized. *Potential Solutions/Research Areas: Assessment and modeling of response times for clean-up assets, including near-shore and ice capable assets; UxS response assets.*
- **Modeling:** Predictive drift models have not proven particularly accurate in Arctic regions. Models are less accurate in complex coastal environments, such as fjords, making planning and executing a pollution clean-up effort in these areas more difficult. *Potential Solutions/Research Areas: Higher-fidelity drift models, especially pollution drift models, for various arctic regions including near-shore, fjords, and in or near ice.*
- **Response Technologies:** Identification of effective response technologies is hindered by several factors. First, a lack of standard international fuel regulations and formulas makes it difficult for responders to know the specific characteristics of spilled products. Additionally, the difficulty of obtaining research permits to conduct in-situ spill cleanup tests and exercises has curtailed scientific and responder knowledge of the effectiveness of different response approaches. *Potential Solutions/Research Areas: Increased transparency of fuel composition, and transmission of this information to Arctic response agencies to prepare for potential clean ups; Cold-water lab and tank testing of clean up equipment and technologies, like dispersants and bioremediation.*
- **Regulations for Environmental Protection:** Regulations for vessel safety, like a mandatory minimum stand-off distance from calving glaciers, don't exist to protect environmentally sensitive areas. *Potential Solutions/Research Areas: Assessment of environmentally sensitive areas to inform potential public policy proposals.*

Summary and Overarching Takeaways

The group identified three key takeaways that cross each of the discussion topics:

1. Operator involvement in ongoing research and development for products, technology, and tools is essential for adoption and integration.
   a. Operators must trust the products and equipment prior to integrating it.
   b. Operators' needs differ from that of researchers.
   c. Operators generally seek decision support tools, rather than decision making tools. Finding the right balance requires operator input from the outset of the research.
2. Cooperation amongst regulatory agencies is necessary to ensure a safe, navigable Arctic.
3. There is a strong desire, and need, to work collaboratively to develop more advanced tools for the Arctic.

The Roundtable discussion examined both challenges and potential solutions in the Arctic maritime region. The event brought together operators and researchers into a common setting to discuss, face-to-face, all facets of the issues. The format allowed an open dialogue and natural back and forth between operators and researchers to ensure that the research and scientific community could focus efforts on solutions that would be most beneficial. The researchers were also able to discuss topics and projects on which they were currently working and to hear from operators how their ideas could be used in the field. The discussion was an overall success with the hope, if not intent, that at least several collaborative operational research efforts will arise over the next several years, harkening back to this Roundtable.

A more detailed report will be provided in the coming weeks.

Participating Agencies

The Scientific Roundtable was attended by members from the following organizations and institutions:

- Norwegian Coast Guard (Kystvakten)
- Norwegian Coastal Administration (Kystverket)
- Norwegian Polar Institute (Norsk Polarinstitutt)
- The Arctic University of the Norway (UiT)
- Norwegian Defense Research Establishment (FFI)
- Norwegian Research Center (NORCE)
- Kongsberg Satellite Service Tromsø
- Memorial University
- U.S. Embassy, Oslo
- Office of Naval Research (ONR) and ONR-Global
- National Oceanic and Atmospheric Administration (NOAA)
- U.S. Coast Guard