3. International Cooperation in Arctic Marine Transportation, Safety and Environmental Protection

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INTRODUCTION

The early 21st century is the dawn of extraordinary changes in the maritime Arctic. The development of Arctic natural resources is linking the region to global markets and increasing the requirements for safe and efficient marine transportation systems. Hydrocarbon developments in coastal Norway and Russia have stimulated increases in Arctic marine traffic, and Russia's Northern Sea Route has witnessed a resurgence of tanker and bulk carrier traffic in summer. Advanced icebreaking ships continue to explore every region of the central Arctic Ocean during summer in support of science and the delimitation process of the outer continental shelf by the Arctic Ocean coastal states. Large cruise ships have ventured into Arctic waters in summer voyages of 'discovery.' Marine access is also changing in unprecedented ways as Arctic sea ice undergoes a profound retreat and transformation in extent, thickness and character influenced by global and regional anthropogenic warming. Longer seasons of Arctic navigation are becoming much more plausible. In summary, rapid economic and environmental changes are transforming the maritime Arctic.

The central challenge for the Arctic states and the global maritime community is how to implement effective protection for the Arctic people and the marine environment and to ensure the safety of shipboard crews during an era of expanding marine use. This new era has evolved rapidly with no international shipping regulations and rules that have binding or mandatory Arctic-specific provisions. The lack of marine infrastructure such as adequate charting, marine observations and emergency response capacity in most Arctic regions (except for areas along the Norwegian coast and northwest Russia) remains a fundamental and serious limitation to significant increases in Arctic marine traffic (AMSA, 2009). Fortunately,

during the past 15 years the Arctic states working through the Arctic Council have focused some of their cooperative efforts and attention on marine safety and environmental protection. Key progress has been made on response concerns, but less progress on protection issues as these must be addressed globally at the International Maritime Organization (IMO). The Arctic states must continue to identify their common interests and develop unified positions at IMO and other international maritime bodies. The real keys for advancing Arctic marine safety and environmental protection will be the engagement of non-Arctic states and the marine industry in the process at IMO (and other international bodies), and the degree to which the Arctic states are proactive in communicating to the global maritime community the critical need to develop effective (and uniform) international rules and regulations for Arctic operations. This chapter explores ongoing initiatives to fill this need and discusses opportunities for the global maritime community to participate in this complex process.

KEY DRIVERS OF ARCTIC MARINE NAVIGATION

The maritime Arctic is being connected to the global economy because of the region's abundant natural wealth. Although Arctic sea ice retreat provides greater marine access and longer seasons of navigation, the main driver of today's Arctic marine traffic is the development of natural resources influenced by global commodity prices and in the long-term, scarcer resources around the globe (AMSA 2009; Brigham, 2011). The Arctic Council's Arctic Marine Shipping Assessment (AMSA) conducted during 2005-2009 used a scenarios creation process to identify the main uncertainties and factors shaping the future of Arctic navigation. The most influential driving forces among some 120 factors were: global oil prices; new Arctic natural resource discoveries; the marine economic implications of seasonal Arctic marine operations; global trade dynamics and world trade patterns; climate change severity; a major Arctic marine disaster; transit fees on Arctic waterways; the safety of other global maritime routes; global (IMO) agreements on Arctic ship construction rules and standards; the legal stability and overall governance of Arctic marine use; and the entry of non-Arctic flag state ships into the maritime Arctic (AMSA, 2009).

Of importance to the AMSA scenarios effort was the identification of

two primary axes of uncertainty used to develop four plausible futures of Arctic marine navigation (to 2020 and 2050). Among the many uncertainties and drivers, degree of plausibility, relevance to Arctic maritime affairs, and being at the right threshold of influence were criteria resulting in the selection of two primary factors: resources and trade, meaning the demand for Arctic natural resources influenced by the uncertainty of global commodities markets and market developments, and governance of Arctic marine activity, meaning the degree of stability of rules and standards for marine use both within the Arctic and internationally (AMSA 2009). Again, climate change and Arctic sea ice retreat are fully considered by the AMSA scenarios as key to improving marine access, and these changes were understood to continue through the century. However, throughout the conduct of AMSA, global economic factors driving Arctic natural resource developments consistently loomed large as the major determinants of future Arctic navigation. A primary example today is the growth in numbers of large tankers and bulk carriers along Russia's Northern Sea Route (Pettersen, 2012; Brigham, 2013). The fact that large oil tankers, chemical bulk carriers and LNG carriers will be sailing sooner in Arctic waters in greater numbers requires complex regulatory measures and much greater cooperation between maritime states and marine industry. Such voyages require that Arctic marine infrastructure improvements be made much earlier than anticipated to keep pace with the rapid increase in use of Arctic coastal waterways and provide adequate systems for safe navigation.

ARCTIC MARINE ACCESSIBILITY

It is critical to note that from the perspectives of marine use, marine safety and environmental protection, the Arctic Ocean remains fully or partially ice-covered for much of the winter, spring and autumn. It is not an ice-free environment to be regulated, but one covered with sea ice may be more mobile. Therefore, ships navigating in Arctic waters will most likely be required to have some level of polar or ice-class capability so that they can safely and efficiently sail for potentially extended seasons of navigation. Global climate models project continued Arctic sea ice reductions with plausible ice-free conditions for a summer time period by mid-century or earlier. Such a period would mark the disappearance of old or multi-year sea ice, leaving the Arctic Ocean covered by seasonal, first year ice which is

more navigable. Recent research has focused on how changes in access can be evaluated by using the global climate model sea ice simulations and a range of polar class ship types (Stephenson, 2013). Higher class ships (Polar Class 3) are able to gain access nearly year-round for much of the Arctic Ocean (Stephenson, 2013). Changing sea ice conditions by mid-century may also allow lower polar class vessels (Polar Class 6) and perhaps even non-ice strengthened ships to cross the Arctic Ocean in September (Smith, 2013). However, none of these results indicates the possibility of regular trade routes, just that certain types of ships may have marine access for selected times of the year given a range of climatic projections. This research does provide important new information about what may be plausible, and technically possible, seasons of Arctic navigation. The types of cargoes and the economics of global shipping along with governance and environmental factors will determine which Arctic routes might become viable (Brigham, 2011; Carmel, 2013).

COOPERATIVE RESEARCH ON ARCTIC MARINE TRANSPORTATION

International cooperation in Arctic marine transportation research is an opportunity for public-private partnerships. Possibilities include a consortia of national maritime bodies/institutes, research universities and marine industry. Experience in this form of public-private cooperative research already exists between several national governments and the ship classification societies. New research ventures should be explored that could include multi-national partners and maritime research institutes and think tanks. Five major themes in need of robust and creative research in Arctic marine transportation include: Arctic marine shipping economics; marine infrastructure (planning, investment and technology); marine safety systems; environmental protection measures, and emergency response strategies.

Future research on Arctic marine shipping economics needs to include more work on quantifying marine access (by Polar Class ships and non-ice strengthened vessels) and determining a range of navigation seasons for commercial ships with or without icebreaker escort. Comprehensive economic studies, specifically cost-benefit-risk analyses, are essential for all potential Arctic routes (for both trans-Arctic and destinational shipping). These studies would need to identify global demands and key

economic needs for use of these potential Arctic routes, and use realistic estimates of the navigation season. Useful to decision-makers will be a comprehensive and comparative analyses of using Arctic marine shipping (Polar Class ships) verses pipelines for the carriage of Arctic oil and gas to world markets. Also, continued research is critical on the socio-economic responses to global climate change (for example, emission controls) and their potential impacts on Arctic natural resource development and Arctic marine operations.

A selection of notable areas of potential cooperative research that would enhance knowledge of Arctic marine safety and environmental protection include:

- An assessment of the trend of increasing ship size (on global and

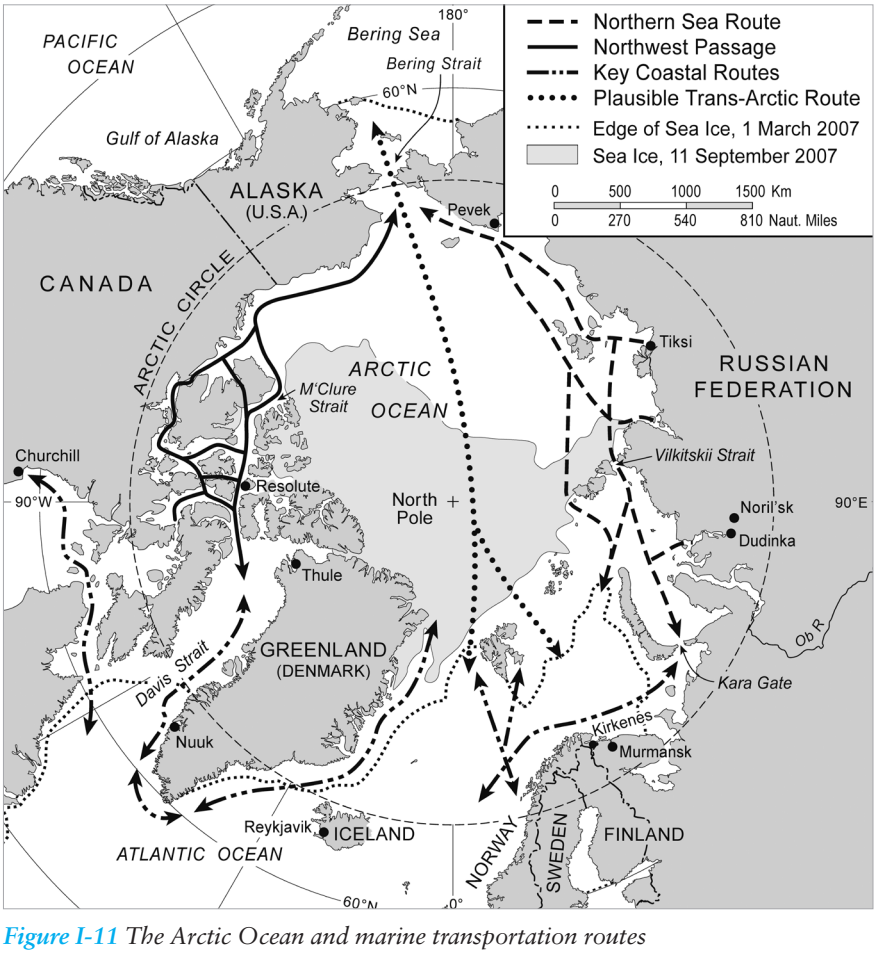

Figure I-11 *The Arctic Ocean and marine transportation routes*

regional trade routes) and the implications for Arctic navigation, including identification of any maximum limitations, technical challenges, and operational constraints for such large ships in potential Arctic trading.

- Risk assessments related to Arctic ship operational challenges, lack of marine infrastructure, and significant ice damages, all of critical importance to the marine insurance industry.
- Studies of the cruise ship industry identifying the constraints, risks and challenges of current practices and future longer seasons of operation in Arctic waters.
- A comparative study of how the Arctic states are addressing liability and compensation, especially for bunker fuel spills and hazardous and noxious substance incidents.
- Conduct of a circumpolar risk analysis to identify the potential locations of emergency response equipment (SAR and environmental response) and marine salvage to respond to Arctic marine incidents.

Considering the ongoing development of a long-term Sustainable Arctic Observing Network (SAON), determining a set of critical parameters to be observed that will be relevant to Arctic marine operations and will enhance Arctic marine safety and environmental protection.

Drawing on IMO's experiences for ship's routing schemes adopted in other regions, examining how Arctic states could address Arctic ship routing in order to protect sensitive areas of the marine environment and meet multiple use challenges such as those between indigenous and commercial users in coastal waters.

There are many other research topics that require attention. But those listed are ripe for international cooperation and perhaps for public-private partnership funding and execution.

THE ARCTIC COUNCIL & ARCTIC STATE COOPERATION

The Arctic Council, an intergovernmental forum, has been the most proactive international body focusing on the challenges of Arctic marine safety and environmental protection. Established by the Ottawa Declaration in 1996, the Council focuses on sustainable development and

environmental protection in the Arctic (Ottawa Declaration, 1996). A key feature of the Council is that six indigenous Arctic peoples' groups (named the Permanent Participants) sit with the eight Arctic state delegations in 'active participation' and 'full consultation' in all Council activities (Ottawa Declaration, 1996). Scientific and policy assessments, and special reports, are developed within six Arctic Council Working Groups: Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment Programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency Prevention, Preparedness and Response (EPPR); Protection of the Arctic Marine Environment (PAME), and the Sustainable Development Working Group (SDWG). Recent work has included cross-cutting projects and activities among the groups. For example, AMAP, CAFF and SDWG have participated with PAME in an Ecosystem Approach expert group, and EPPR has worked closely with PAME on the implementation of key recommendations from the Arctic Marine Shipping Assessment. Engagement and input of ideas and issues from non-Arctic state observers, other Council observers, and outside experts are handled primarily through the working groups which are led by Arctic state delegations (subject matter government experts) with Permanent Participant representation.

The most relevant and visible Arctic Council document on marine safety and environmental protection issues is the Arctic Marine Shipping Assessment conducted by PAME for the Arctic Ministers during 2004-2009. AMSA is an outgrowth of the Council's Arctic Climate Impact Assessment which gained global attention when released in 2004. More than 200 experts, led by Canada, Finland, and the United States, focused the assessment on marine safety and environmental protection issues, consistent with the Council's mandate. Thirteen major workshops were held on key topics such as scenarios, human dimensions, environmental impacts and infrastructure, and fourteen AMSA town-hall meetings were held in Arctic communities to gain insights into the concerns and shared interests of indigenous residents. Ninety-six findings are presented in the Arctic Marine Shipping Assessment 2009 Report (a selected list of key findings is presented in Table I-2).

Table I-2 Select findings of the Arctic Council's Arctic Marine Shipping Assessment (AMSA, 2009)

Arctic Sea Ice	Global climate model simulations indicate a continuing retreat of Arctic sea ice through the 21st century. However, all simulations indicate an Arctic sea ice cover in winter.
Governing Legal Regime	The Law of the Sea, as reflected in the 1982 United Nations Convention on the Law of the Sea (UNCLOS), sets out the legal framework for the regulation of (Arctic) shipping according to maritime zones of jurisdiction.
Key Drivers of Arctic Shipping	Natural resource development and regional trade are the key drivers of increased Arctic marine activity. Global commodities prices for oil, gas, hard minerals, coal, etc. are driving the exploration for Arctic natural wealth.
Destinational Shipping	Most Arctic shipping today is destinational (versus trans-Arctic), moving goods into the Arctic for community resupply or moving natural resources out the Arctic to world markets. Nearly all marine tourist voyages are destinational as well. Regions of high concentration of shipping occur along the coasts of northwest Russia, and in the ice-free waters of offshore Norway, Greenland, Iceland and the Bering Sea.
Impacts of Arctic Shipping on Arctic Communities	Marine shipping is one of many factors affecting Arctic communities, directly and indirectly. The variety of shipping activities and the range of social, cultural and economic conditions in Arctic communities mean that shipping can have many effects, both positive and negative.
Most Significant Environmental Threat	Release of oil in the Arctic marine environment, either through accidental release or illegal discharge, is the most significant threat from shipping activity.
Special Areas	There are certain areas of the Arctic region that are of heightened ecological significance, many of which will be at risk from current and/or increased shipping.
Charting and Marine Observations	Significant portions of the primary Arctic shipping routes do not have adequate hydrographic data, and therefore charts, to support safe navigation. The operational network of meteorological and oceanographic observations in the Arctic, essential for accurate weather and wave forecasting for safe navigation, is extremely sparse.
Marine Infrastructure Deficit	A lack of major ports and other maritime infrastructure, except for those along the Norwegian coast and the coast of northwest Russia, is a significant factor (limitation) in evolving and future Arctic marine operations.
Uncertainties of Arctic Navigation	A large number of uncertainties define the future of Arctic shipping activity including: the legal and governance situation; degree of Arctic state cooperation; climate change variability; radical changes in global trade; insurance industry roles; an Arctic maritime disaster; new resource discoveries; oil prices and other commodity pricing; multiple use conflict (Indigenous and commercial), and future marine technologies.
Central Arctic Ocean	Increased traffic in the central Arctic Ocean is a reality (in summer) – for scientific exploration and tourism.
Ice Navigator Expertise	Safe navigation in ice-covered waters depends much on the experience, knowledge and skill of the ice navigator. Currently, most ice navigator training programs are ad hoc and there are no uniform international training standards.

The entire body of work in AMSA can be viewed in three related ways: as a baseline assessment and snapshot of Arctic marine use early in the 21st century (developed from data collected by the Arctic states on ship/vessel type, marine use, season of operation, and region of operation); as a strategic guide to a host of states, Arctic residents, users, stakeholders and actors involved in current and future marine operations, and as a policy

framework document of the Arctic Council and the Arctic states focused on protecting the Arctic people and the environment. The key aspect of the AMSA 2009 Report is that the seventeen recommendations were negotiated by the Arctic states and consensus reached so that the final report could be approved by the Arctic Ministers at the Arctic Council Ministerial Meeting in Tromsø, Norway in April 2009. The work of AMSA continues to this day as follow-up status reports have been requested by the Arctic Ministers and the Senior Arctic Officials. Two status reports on the implementation of the AMSA 2009 Report recommendations have been issued by the Arctic Council in May 2011 and May 2013. A third status report on implementation is planned for a 2015 release at the next Ministerial Meeting (see Table I-5 under projects for PAME). Thus, AMSA is a 'living' document and a process with a worthy, long-term goal of implementing all seventeen recommendations, each an integral part of a whole policy strategy.

AMSA's seventeen recommendations as approved in 2009, focus on three inter-related themes: (1) Enhancing Arctic Marine Safety, (2) Protecting the Arctic People and the Environment, and (3) Building the Arctic Marine Infrastructure. Table I-3 indicates the specific recommendations and actions required under each of these three broad themes. All of the recommendations require increased international cooperation, among the Arctic states, among the maritime nations at IMO (and other bodies), and in the development of new public-private partnerships. The most significant recommendation in theme 1 is for mandatory IMO standards and requirements for ships operating in Arctic waters, and the augmentation of IMO ship safety and pollution prevention conventions (such as MARPOL) with Arctic-specific requirements. Another recommendation notes the importance of strengthening passenger ship safety in Arctic waters. Theme 2 has a key recommendation for the need to conduct comprehensive surveys of indigenous marine use. These are necessary if integrated, multiple-use management principles or marine spatial planning concepts are to be applied to Arctic areas. There also are calls for identifying areas of heightened ecological and cultural significance and for exploring the need for specially designated Arctic marine areas (such as IMO Special Areas or Particularly Sensitive Sea Areas). The elements of the third theme on marine infrastructure were believed by the AMSA team to be of critical importance. Most of the Arctic marine environment is poorly charted and requires increased hydrographic surveying to support safe Arctic navigation. The

region is in need of many key investments for improved communications, an effective monitoring and tracking system, more observed environmental information (weather, climate, sea ice and more), and environmental response capacity. The infrastructure initiatives are all complex projects and long-term and each will require significant funding.

Table I-3 The Arctic Marine Shipping Assessment recommendations by theme: A framework policy for the Arctic Council (AMSA, 2009)

I. Enhancing Arctic Marine Safety:
A. Linking with International Organizations
B. IMO Measures for Arctic Shipping
C. Uniformity of Arctic Shipping Governance
D. Strengthening Passenger Ship Safety in Arctic Waters
E. Arctic Search and Rescue (SAR) Instrument
II. Protecting Arctic People and the Environment:
A. Survey of Arctic Indigenous Marine Use
B. Engagement with Arctic Communities
C. Areas of Heightened Ecological and Cultural Significance
D. Specially Designated Arctic Marine Areas
E. Protection from Invasive Species
F. Oil Spill Prevention
G. Addressing Impacts on Marine Mammals
H. Reducing Air Emissions
III. Building the Arctic Marine Infrastructure:
A. Addressing the Infrastructure Deficit
B. Arctic Marine Traffic System
C. Circumpolar Environmental Response Capacity
D. Investing in Hydrographic, Meteorological and Oceanographic Data

Although AMSA was focused appropriately on Arctic marine safety and environmental protection, it did provide an overview of some of the issues and challenges of trans-Arctic navigation (AMSA, 2009). The AMSA scenarios creation effort indicated the primary driver of marine traffic would be the Arctic natural resource development. Regional traffic levels would relate to offshore development and shipping of resources out of the Arctic to global markets. The development of potential trans-Arctic routes will depend in part on the continuing presence of sea ice. The seasonality and reliability of Arctic navigation routes will be key factors in trying to integrate Arctic routes into most global marine operations. Any integration efforts involving Arctic ships (Polar Class vessels) will contend with many uncertainties and potentially high operating costs. Although many new icebreaking carriers are designed to operate independently in ice, in some regions, such as along the NSR, escort by icebreaker and

mandatory pilotage will be significant economic issues relevant to the viability of commercial voyages. The prospect of long voyages in ice beyond the summer season (presenting risks for ships and cargo), the lack of marine infrastructure as a safety net, and schedule disruptions will be key factors for the marine insurance industry in establishing Arctic rates. While the conduct of trans-Arctic navigation is technically possible today with advanced icebreakers and Polar Class carriers, the operational, economic, and environmental challenges for routine voyages are not yet fully understood.

Since the release of AMSA, two key recommendations have been acted on by the Arctic states using the Arctic Council process (with Permanent Participant and observer involvement) to negotiate agreements. A treaty on the Arctic search and rescue (SAR), the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, was signed by the Arctic Ministers of the eight Arctic states during the Arctic Council Ministerial meeting in Nuuk, Greenland on 12 May 2011. It is a binding agreement strengthening SAR cooperation and coordination in the Arctic and establishing areas of SAR responsibility for each of the Arctic states.

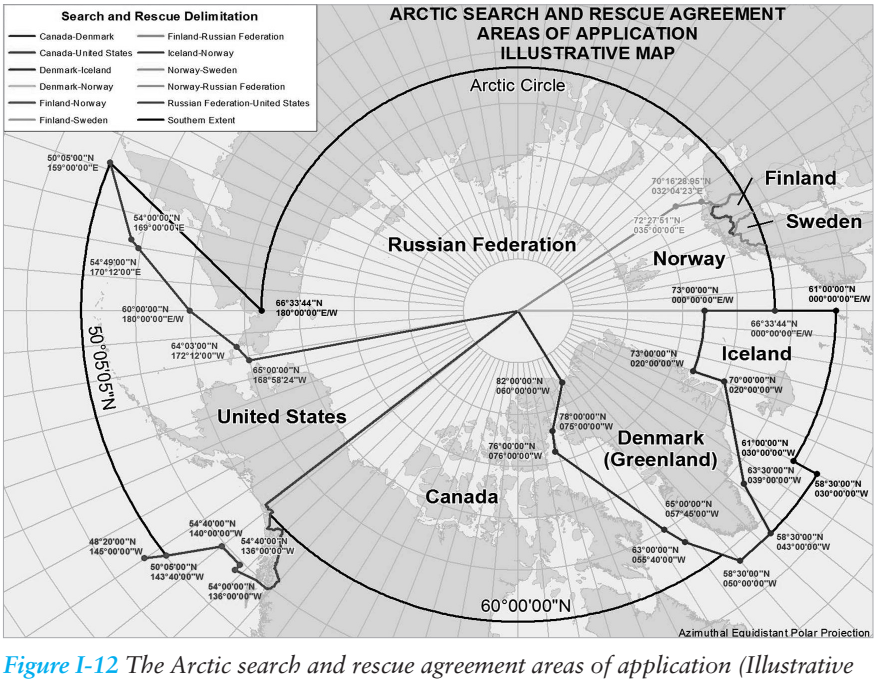

Figure I-12 The Arctic search and rescue agreement areas of application (Illustrative map).

These areas of responsibility (see Figure I-12, SAR Agreement Map), noted in the agreement, do not prejudice any other boundaries between the states or their sovereignty. The agreement also fosters the conduct of joint Arctic SAR exercises and training, lists information on the Arctic states' rescue coordination centers, and addresses the issue of requests to enter the territory of a Party for SAR operations. The Arctic SAR agreement entered into force on 19 January 2013 following ratification by each of the eight (Arctic) signatory states.

A second agreement negotiated under the auspices of the Arctic Council is the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic signed by the Arctic Ministers in Kiruna, Sweden on 15 May 2013. This agreement focuses on Arctic oil spills and addresses a range of practical issues: requirement of a national 24-hour system for response; facilitation of cross-border transfer of resources; notification of the Parties; monitor spills; conduct of exercises and training; joint reviews of responses to Arctic spills, and a set of operational guidelines in an appendix. Both agreements are in their implementation phases and the Arctic Council and maritime community will be able to follow the progress of the Arctic states in developing their cooperation in the practical aspects of Arctic emergency response.

NON-ARCTIC STATE OBSERVERS: ROLES IN THE ARCTIC COUNCIL

Six new, non-Arctic state observers were approved by the Arctic Ministers at the May 2013 Ministerial Meeting in Kiruna, Sweden (Kiruna Declaration, 2013). There are now twelve such observers in the Council: China, France, Germany, India, Italy, Japan, Republic of Korea, the Netherlands, Poland, Singapore, Spain and the United Kingdom. A key challenge for the Arctic states and these observers is how to facilitate non-Arctic state contributions into the work of the Arctic Council. How can experts from the non-Arctic states bring meaningful and useful concepts and information to the Council's working groups? From the symbolic and diplomatic perspectives, these observer states should be present at the Ministerial and Senior Arctic Official Meetings of the Council. While their roles are limited and constrained at these high level meetings, it is important for the Arctic community, and for the observers' diplomats, that

they witness the dialogue and broad range of Arctic issues being addressed by the Council. It is also critical that the observers witness firsthand the role of the Permanent Participants in the Council's deliberations and how indigenous issues are woven into the Council's deliberations. The Senior Arctic Officials have adopted an observer manual to provide guidance to the working groups and other Council bodies on the roles to be played by the observers and meeting logistics (Kiruna Declaration, 2013). The chair of any Arctic Council subsidiary body (working group, task force, etc.) should invite observers to a meeting (no later than 30 days in advance). Of key importance is the procedure that "observers may, at the discretion of the Chair, make statements, present written statements, submit relevant documents and provide views on the issues under discussion" (Arctic Council a, 2013). Thus, the Arctic Council is encouraging the observers to make contributions primarily at the working group/subsidiary body level.

For Arctic marine safety and environmental protection issues, EPPR and PAME are the most appropriate council working groups for engagement by the non-Arctic state observers. Their maritime ministries, coast guards, and response organizations have technical and scientific expertise that can be valuable in the deliberations and review of PAME/EPPR special reports, guidelines and strategies. Table I-4 provides a select list of the broad themes and projects being undertaken by EPPR during 2013-15; notable are efforts focused on Arctic oil spill response, safety systems and radiation response issues. PAME's 2013-15 ongoing select projects are listed in Table

Table I-4 Select 2013-15 projects, activities and lead countries for the Arctic Council's Emergency Prevention, Preparedness and Response (EPPR) working group (Arctic Council b, 2013)

• Arctic Rescue (Best Practices, Emergency Risks Assessment System, Emergency Preparedness Exchange of Information) (Russia)
• Development of Safety Systems in Implementation of Economic and Infrastructure Projects (Russia and Norway)
• Arctic Region Oil Spill Response Resource and Logistics Guide (United States and Canada)
• Arctic Guide for Emergency Prevention Preparedness and Response: Update (United States)
• Radiation Emergency Training and Exercises (United States and Russia)
• Community Radiation Information ~ Public Communications/Information Sharing (United States and Russia)
• Arctic Automated Mutual Assistance Vessel Rescue Network: A AmverNet (United States and Canada)
• Operational Safety and Health of Arctic Oil Spill Response Workers (United States)
• Agreement on Cooperation on Marine Oil Pollution Preparedness and Response Operational Guidelines: Update (All States)

I-5. PAME is focused on continued implementation of AMSA's seventeen recommendations, revising the Council's 2004 *Arctic Marine Strategic Plan*, and forming an experts group to continue work on an ecosystems approach to management of Arctic marine areas. Non-Arctic state observers have a broad selection of themes in which to contribute and to observe Arctic marine policy developments in PAME and the formulation of response strategies in EPPR.

Table I-5 Select 2013-15 Projects and Lead Counties for the Arctic Council's Protection of the Arctic Marine Environment (PAME) Working Group (Arctic Council b, 2013)

• Arctic Marine Shipping Assessment (AMSA) Recommendations ~ Follow-up: Linking with International Organizations; IMO Measures for Arctic Shipping; Heavy Fuel Oil in the Arctic; Passenger Ship Safety in Arctic Waters; Arctic Indigenous Marine Use Surveys; Specially Designated Arctic Marine Areas; Impacts on marine Mammals; Air Emission Reductions; Addressing the Arctic Marine Infrastructure Deficit; Arctic Marine Traffic Systems; Updating the AMSA Arctic Ship Traffic Data; AMSA Implementation Progress Report for 2015 (Previous Reports 2011 and 2013)
• Development of a Sustainable Tourism Initiative (Canada and the United States)
• Health, Safety and Environmental Systems for Arctic Offshore and Gas Operations (United States)
• Arctic Ocean Review Follow-up ~ Matrix of Activities to Address the Recommendations (Canada, Norway and the United States)
• Revision of the Arctic Council Arctic Marine Strategic Plan (AMSP) of 2004 (Canada, Iceland, Norway and the United States)
• Ecosystem Approach to Management (Integrated Assessment, Comparing Cases & Reviewing Existing Methodologies) (Norway, the United States and Canada)
• Framework for an Arctic Marine Protected Areas (MPA) Network ~ Formation of an MPA Expert Group (Norway, the United States and Canada)
• Arctic Biodiversity Assessment (ABA) ~ Follow-up ABA Recommendations Relevant to PAME
• AMSA Recommendation on Areas of Heightened Ecological and Cultural Significance ~ AMSA, AMAP, CAFF and SDWG working group collaboration

INTERNATIONAL MARITIME ORGANIZATIONS: COOPERATION ON ARCTIC ISSUES

All the Arctic states and the non-Arctic state observers to the Arctic Council (20 states) are members of IMO, the International Hydrographic Organization (IHO), the World Meteorological Organization (WMO), and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). This is not surprising, since these states all have a rich maritime heritage and an active involvement in global maritime operations and cooperation. Importantly, each of these international bodies has a

stake in the future of the 'new' maritime Arctic; each has specific initiatives underway where member states can contribute their expertise and voice their concerns, hopefully in more unified approaches.

The IMO is central to any discussion of the Arctic marine safety and environmental protection. The ongoing, complex process to develop a mandatory IMO International Polar Code will establish a unified and enhanced Arctic marine safety and environmental protection regime, providing it is fully adopted and implemented by the Arctic states with the support of the global maritime community. The work on the Polar Code has a lengthy history dating to the early 1990s. An Outside Working Group (IMO language) of technical experts met form 1993-97 (Brigham, 2000). The Polar Code was never intended to duplicate or replace existing IMO standards for safety, pollution prevention and training. Additional measures focused on polar ship construction standards, polar marine safety equipment, and ice navigator standards for training and experience. These elements are included in IMO's voluntary Guidelines for Ships Operating in Polar Waters (IMO, 2009). Recent Polar Code work has focused on defining the risks for various classes of ships operating in ice-covered and ice-free polar waters, identifying marine hazards and then relating to how these hazards can be adequately mitigated to lower (and acceptable) levels. The second challenge has been how to include select environmental protection measures in a Polar Code when they may be more appropriate as Arctic specific annexes to major IMO conventions such as MARPOL. A unified approach by the Arctic states to the evolving, mandatory Polar Code at IMO is required; the non-Arctic state observers to the Arctic Council, all key maritime states, can assist in this process by aligning their Arctic interests and contributing their expertise to shaping a necessary and urgent instrument to protect the Arctic people and the marine environment.

One of the evolving challenges for the Arctic states is to identify areas in the Arctic marine environment where special IMO provisions may be developed and implemented. Table I-6 indicates that there are *no current MARPOL Special Areas designated in the Arctic* requiring strict controls on discharges of oil, noxious liquid substances, sewage, and garbage. IMO has designated many sensitive marine areas in other regions such as the Baltic Sea, Mediterranean Sea, Black Sea, and others; noted in Table I-6 is an Antarctic Area (in the Southern Ocean south of 60 degrees South) that has gained strict controls on oil, noxious liquid substances and garbage. No IMO designation of an Emission Control Area for stricter standards

regarding emissions of air pollutants in the Arctic has been developed and approved. The Arctic Council and its working groups, especially PAME, will be conducting assessments and developing plans for future special area designations which the Arctic state delegations to IMO will propose; non-Arctic state observers to the Council (and other observers) should follow these deliberations and contribute to the dialogue long before they reach the IMO technical committees. One Arctic region that will surely be given future attention is the Bering Strait Region, an international waterway (strait) with sensitive ecological systems and significant human subsistence use.

Table I-6 Summary of IMO MARPOL Special Areas (IMO, 2012)

Annex I	Oil (10):	Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, 'Gulfs' Area, Gulf of Aden, Antarctic Area*, North West European Waters, Oman Area of the Arabian Sea, and Southern South African Waters
Annex II	Noxious Liquid Substances (1):	Antarctic Area*
Annex IV	Sewage (1)	Baltic Sea (1 January 2013 Entry into Force)
Annex V	Garbage (8):	Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, 'Gulfs' Area, North Sea, Antarctic Area*, and the Wider Caribbean Region including the Gulf of Mexico and the Caribbean Sea
Annex VI	Air Pollution (Emission Control Areas) (4):	Baltic Sea (SOx), North Sea (SOx), North American (SOx, NOx and PM), and United States Caribbean Sea (SOx, NOx and PM)

*Antarctic Area: South of Latitude 60 Degrees South

The Arctic states, primarily as outcomes and recommendations from AMSA, will be dealing with a number of additional, key Arctic issues at IMO:

- Restrictions on heavy fuel oil use in the Arctic waters.
- Monitoring and Arctic traffic domain awareness (use of data from IMO mandatory AIS transponders and the application of IMO's requirement for the Long Range Identification and Tracking of Ships).
- Future mandatory ice navigator training and experience ~ mandatory standards (beyond the voluntary guidelines in the 2011 Manila amendments to the International Convention on Training, Certification and Watchkeeping for Seafarers or STCW).
- Passenger ship safety in Arctic waters and enhanced guidelines.
- Identification of Arctic heightened ecological and cultural significance and potential measures for protection.
- Addressing the uniformity of Arctic marine shipping regulatory regimes and potential measures for protection of the central Arctic

Ocean (beyond coastal state jurisdiction).

Each of the above issues has ramifications for the global maritime industry operating in the Arctic. However, none of these issues should come as a surprise; several are focused on making sure there are uniform and non-discriminatory regulations established at IMO for the Arctic. Proactive engagement with the Arctic states on the part of non-Arctic states and the maritime industry will assist in developing mandatory standards that are effective and appropriate for the Arctic shipping risks involved.

The IHO, established in 1921, is a key intergovernmental consultative body that supports safety of navigation and the protection of the marine environment. It coordinates the activities of the national hydrographic offices, sets standards to foster worldwide uniformity in nautical charts, and supports development of new techniques for conducting and exploiting hydrographic surveys. Since its inception, IHO has established fifteen regional hydrographic commissions. The 16th commission, the Arctic Regional Hydrographic Commission (ARHC), was established in October 2010 by the five Arctic Ocean coastal states, Canada, Denmark, Norway, Russia and the United States. Finland and Iceland are now observers to the ARHC. The Arctic Ocean coastal states recognized the need for such a body in an era of increasing Arctic traffic with little availability of reliable navigation and environmental data. The ARHC noted that today, less than 10% of Arctic waters are charted to modern international navigation standards (IHO, 2010). The establishment of ARHC is an important contribution to improving Arctic marine infrastructure, and its commitment to cooperate with the marine transportation community and other intergovernmental bodies bodes well for sharing critical navigation information related to evolving Arctic safety and protection measures. IHO member states can contribute to the work of ARHC and foster cooperation between ARHC and their national hydrographic offices. The IHO, ARHC, and its member states should explore with the global maritime industry the potential for public-private partnerships in surveying and mapping the extensive, uncharted waters of the Arctic.

As a specialized agency of the United Nations, the WMO is a global body focusing on weather, climate and hydrology. WMO has promoted the establishment of worldwide networks for a broad range of meteorological, climatological, hydrological and geophysical observations. WMO fosters the standardization of data and facilitates the global free exchange of

information and observations. Increasingly engaged in climate change issues, WMO is a leading organization for global monitoring, protecting the environment, and developing adequate monitoring/observing systems. WMO, in concert with IMO and IHO, established five new WMO METAREAs (IMO NAVAREAs) covering the Arctic. The new areas became operational in June 2011 with Canada, Norway and Russia taking responsibility for providing services (IMO, 2011). WMO is also linking with the International Ice Charting Working Group (IICWG), a forum of the national ice services, to develop and implement policies and procedures for sea ice mapping, ice forecasts, and ice-edge information (IICWG, 2007).

The development of future Arctic observing systems is another area where the membership of WMO, IMO, IHO and IICWG should seek to develop public-private partnerships and funding mechanisms so that a comprehensive set of observations can support safe Arctic navigation. The involvement of Arctic marine industries in such an initiative - commercial shipping, cruise ship tourism, and offshore development – is essential as they are key providers of regional data as well as significant marine users.

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) is a non-governmental organization and international technical association that fosters the harmonization and development of marine aids to navigation (IALA, 2006). Members include National Authorities responsible for marine aids to navigation, associate members (other service or scientific agencies), and importantly, industrial actors (manufacturers, distributors and technical service providers). IALA has recently developed a Northern (Arctic) Strategy in support of the design and operation of Arctic aids to navigation as well as support infrastructure such as vessel monitoring systems and remote communications. IALA is also addressing the overall information needs for safe Arctic navigation and the technical challenges of virtual aids to navigation. Two strengths of IALA are apparent: it continues to focus on Arctic navigation infrastructure issues and it has members with technical expertise from the marine industry. All maritime states should proactively support the work of IALA as an important contribution to the establishment of safe and efficient Arctic navigation systems for individual ships and vessel traffic. IALA's effort to promote close, international cooperation between national agencies and the maritime industry is a key strategy in using the latest technologies and advancing best practices for newly deployed Arctic navigation networks.

BRIDGING THE NORTH PACIFIC, ARCTIC AND NORTH ATLANTIC: COOPERATIVE OPPORTUNITIES

Two relatively new international coast guard organizations can contribute to a future dialogue on Arctic maritime issues. The North Pacific Coast Guard Forum (NPCGF), established in 2000 at the suggestion of Japan, and the North Atlantic Coast Guard Forum (NACGF), established in 2007, are venues (not bound by treaty, but working via consensus) to facilitate multilateral cooperation on a range of maritime issues. The members of both organizations are listed in Table I-7 Significantly, Canada, Russia and the United States are members of both groups and all eight Arctic states are members of NACGF. The areas of focus for NPCGA and NACGF include: maritime security, illegal migration, illegal drug trafficking, fisheries enforcement, search and rescue, and environmental response. Joint operations have been a key, visible activity and maritime domain awareness an important topic for discussion. All the areas of focus have relevance to Arctic operations and future response strategies to increasing Arctic marine activity.

Table I-7 Member States of the North Pacific Coast Guard Forum (NPCG F) and North Atlantic Coast Guard Forum (NACGF) in 2013

NPCGF (6)	**Canada**, China, Japan, Republic of Korea, **Russia** and **the United States**
NACGF (20)	Belgium, **Canada**, Denmark, Estonia, France, Finland, Germany, Iceland, Ireland, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, **Russia**, Spain, Sweden, United Kingdom and **the United States**.

The advantage of these forums is that they focus on practical and operational aspects of marine safety and security. The meetings bring together technical experts and the heads of the coast guard (or equivalent maritime organizations). Expanding their dialogue and joint exercises to include Arctic operations and transportation issues would be an important and logical extension. Already, during a recent meeting in Iceland, the NACGF dealt with a simulated large cruise ship 'disaster.' Although the forums do not wish to duplicate any ongoing international work by other bodies, Arctic policy issues and operational expertise could be brought together by several initiatives:

- Establishing links with the Arctic Council's EPPR and PAME.
- Planning a meeting among EPPR, NPCGF and NACGF that would

focus on the challenges of Arctic marine safety and environmental response.
- Exploring the broad aspects of Arctic marine domain awareness as one avenue to bridge (across the Arctic) the work of both organizations.
- Participating with other bodies (including EPPR, PAME, IALA, WMO and IHO) and industry in a venue addressing the large Arctic marine infrastructure 'deficit' identified in the Arctic Council's AMSA.

The initiatives of NPCGF and NACGF can be complementary to the Arctic work of other bodies, including the Arctic Council, in addressing key Arctic maritime issues such as marine safety and environmental protection. The two coast guard regional organizations can contribute to bridging the Arctic by addressing the importance of a comprehensive Arctic marine traffic awareness system and enhancing data sharing in near-real time among its member states.

CONCLUSIONS

Arctic marine transportation issues including critical, regional challenges in marine safety and environmental protection require enhanced the levels of global maritime cooperation. Despite the increased cooperation among the Arctic states at the Arctic Council and within international organizations such as IMO and IHO, the Arctic states cannot move these issues along by themselves. A greater understanding of the Arctic issues and proactive cooperation must be developed among the Arctic and non-Arctic states, and a host of stakeholders and actors in the global maritime community. International cooperation can be fostered by the following:

- Increased Arctic state engagement at IMO with maritime states which have active interests in Arctic maritime operations; initial focus should be on gaining support for a uniform and mandatory Polar Code for all ships operating in the Arctic marine environment.
- Involvement of experts from non-Arctic state observers to the Arctic Council in the council's working groups especially within PAME and EPPR. The objectives are to develop unified approaches to Arctic marine environmental protection and foster coordinated strategies for

enhanced emergency preparedness and response.

- Fostering the engagement of non-Arctic states and maritime stakeholders with Arctic indigenous peoples so that the challenges and opportunities of expanded marine use are fully understood by local communities.
- Arctic state actions to develop new partnerships with non-Arctic states within key international organizations such as IHO, WMO and IALA with a focus on closing the Arctic marine infrastructure deficit.
- Closer cooperation between the Coast Guard international forums in the Pacific (North Pacific Coast Guard Forum) and Atlantic (North Atlantic Coast Guard Forum) with regular discussions on Arctic maritime issues with EPPR, PAME and other bodies.
- Development of creative public-private strategies and partnerships focusing on investments in marine infrastructure such as ports, ocean observing systems, communications, aids to navigation, charting, and response capacity.

One of the clear benefits of closer international cooperation on Arctic marine transportation is the fostering of regional stability. Close cooperation between Arctic and non-Arctic states on the practical aspects of Arctic marine safety and environmental protection can set the stage for development of uniform rules and regulations (at IMO) and build lasting relationships with members of the maritime community who will operate in a future Arctic. Addressing together the many environmental security challenges of Arctic navigation can foster an era of unprecedented cooperation among the maritime states, the people who live in the Arctic, and marine industry.

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Comments on Chapter 3: USCG perspective

David A. Vaughn

As so eloquently articulated in Dr. Brigham's paper, the "opening" of the Arctic due to changes in sea ice coverage has broad multinational implications involving:

- Access to a vast array of minerals and other valuable natural resources.
- Potential for shorter trade routes between Europe and Asia.
- Traditional culture and food security for the indigenous Arctic peoples.
- Environmental protection.
- Climate change, including the potential release of methane gas from melting permafrost.
- Multinational sovereignty and boundary claims.
- Law of the sea and freedom of navigation.
- National and homeland security.

Home to vast amounts and varieties of mineral wealth, undiscovered global energy reserves, endangered wildlife, and vulnerable indigenous cultures, the Arctic has witnessed a dramatic increase in maritime activity in the form of resource exploration and extraction, adventure tourism, and commercial vessel traffic. This activity includes accommodating more than one million adventure tourists annually, and cargo trans-shipment increases totaling 100% or more each year (e.g., 46 transits in 2012; 204 transit permits issued by Russia's Northern Sea Route Administration in 2013). There is open water where there used to be ice in the summer and early fall, while relatively undeveloped infrastructure and a developing governance structure provide both challenges and opportunities to engage in a proactive, integrated, coordinated, and sustainable manner to foster the United States' and international initiatives.

STRATEGY/POLICY

The U.S. government has enduring national interests and responsibilities

in the region, including national and homeland security, search and rescue, law enforcement, humanitarian assistance, scientific research, diplomacy, and marine environmental protection. As the Arctic Ocean becomes increasingly navigable, new routes for global maritime trade and increased access for resource exploration are changing the strategic landscape of the region and adding new urgency to efforts to establish a functional Arctic governance structure and infrastructure. The White House approved a *National Strategy for the Arctic Region* in May 2013. The strategy identifies three primary strategic objectives:

(1) Advance United States security interests.
(2) Pursue responsible Arctic region stewardship.
(3) Strengthen international cooperation.

The 2013 strategy builds on the U.S. Arctic policy set forth in the January 2009 National Security Presidential Directive (NSPD) 66/ Homeland Security Presidential Directive (HSPD) 25, "Arctic Region Policy," which acknowledges the effects of climate change and increased human activity and identifies national objectives for the Arctic region.

Importantly, for the U.S. Coast Guard, the U. S. National Strategy and Arctic Region Policy documents direct relevant agencies, including the Department of Homeland Security (DHS), to work with other nations and through the International Maritime Organization (IMO) and Arctic Council to provide for safe and secure maritime transportation in the Arctic region. They also direct the Secretaries of State, Defense, and Homeland Security, in coordination with heads of other relevant executive departments and agencies, to carry out the policy as it relates to national security and Arctic homeland security interests. Executive Order 13547 (Stewardship of the Ocean, Our Coasts, and the Great Lakes) of July 19, 2010 adopts and directs Federal agencies to implement the recommendations of the Interagency Ocean Policy Task Force. These recommendations include, as one priority objective, identifying and implementing actions to address changing conditions in the Arctic through better stewardship, science-based decision-making and ecosystem-based management.

Shortly after the White House issued its *National Strategy for the Arctic Region* and the 2013 ministerial meeting of the Arctic Council, the USCG published the "Coast Guard Arctic Strategy" in late May 2013. This USCG strategy aligns with national policy and provides a theater

strategy for Coast Guard operations in the Arctic region. Although not an implementation plan, it will guide efforts to accomplish national and Coast Guard objectives in the region by leveraging the service's capabilities, authorities, and partnerships.

In 2015, the United States will assume the chair of the Arctic Council after Canada's two-year chairmanship concludes. During the upcoming four-year tenure of the North American chairmanship, the U. S. will continue to work closely with our Canadian partners to ensure consistent themes are brought forward that support the implementation of national and Coast Guard Arctic strategies, including improved Arctic Domain Awareness and sustainable economic development. An area of particular focus will be the development of the Arctic common operational picture (COP) of commercial activity and location of response assets. The COP is vital to successful planning for high-consequence events such as a cruise ship sinking or a large oil spill and will build on work completed by the council over the last two years in the form of the search and rescue and oil spill preparedness and response agreements.

OPERATIONAL ENVIRONMENT

The Arctic contains a wealth of emerging opportunities for energy, shipping, fishing, and adventure tourism. Increased activity in the Arctic necessarily brings additional threats to U.S. interests as well as operational risks inherent to human activity in such a remote and harsh environment. The presence of more open water in the Arctic region does not represent a lower risk environment. Rather, the unpredictable nature of the weather and ice conditions actually creates more hazardous operating conditions for vessel operators and first responders as they try to push further into the region and undertake more-ambitious activities. Weather conditions in the Arctic can be hazardous much of the year, with fog, sub-zero temperatures, and more hurricane-force storms than in the Caribbean. The harsh climate and lack of shore-based infrastructure greatly complicate what would be considered a straightforward response in more traditional Coast Guard operating areas, such as the Gulf of Mexico or Eastern Pacific Ocean.

CURRENT STATUS

The Department of Homeland Security and the U. S. Coast Guard have a broad range of statutory responsibilities to ensure the safety, security, and stewardship of U.S. citizens, assets, resources, and interests in the Arctic maritime domain. With one heavy icebreaker, the USCGC "Polar Star," and one medium, science-focused icebreaker, the USCGC "Healy," the Coast Guard has the capability to operate in the region of ice-covered waters. Seasonal environmental conditions now permit a greater Coast Guard presence during the summer months, and there is the prospect of an extended presence, should the ice continue to recede. While cutters are a vital resource for Arctic operations, they do not cover the full spectrum of potential needs, and the Coast Guard is improving awareness and testing operational capabilities by conducting front-line operations in the region. Our first challenge is to improve our understanding of the Arctic operating environment and its risks, including determining which Coast Guard capabilities and operations will be needed to meet future mission requirements.

For the past several years, Coast Guard District 17 has conducted Arctic Domain Awareness flights along the North Slope and over the Arctic Ocean, assessing aircraft endurance and performance and monitoring maritime activity. Since 2008, the Coast Guard has conducted summer operations in the region, deploying personnel, boats, and aircraft to communities on the Arctic coast such as Barrow, Kotzebue, and Nome. While there, Coast Guard personnel tested cutters, small boats, and aircraft for usability in Arctic conditions. The USCG also worked closely with the Army and Air National Guard and the Public Health Service to provide medical, dental, and veterinary care to isolated outlying communities. In return, the Coast Guard learned about living and operating in this environment from long-time residents.

Operation Arctic Shield 2012 was a three-pronged interagency operation in Alaska's coastal Arctic domain consisting of outreach, operations, and assessment of capabilities. Outreach included delivering safety training and health, dental, and veterinarian services for Arctic indigenous communities. Operations involved the deployment of major cutter forces, air assets, communication equipment, and mission support to conduct the Coast Guard's missions. Additionally, an oil spill contingency exercise in Barrow, Alaska tested Coast Guard and U.S. Navy skimming

equipment launched from a 225-foot Coast Guard buoy tender.

Arctic Shield 2013 will focus more on the Bering Strait region and types of traffic and commercial activities occurring during the summer. It involves employment of the CGC "Polar Star," a National Security Cutter, and a deployed HH-60J helicopter among other assets.

Moreover, the Coast Guard Research and Development Center is planning an Oil in Ice Recovery Technologies Demonstration in the Arctic in September 2013. This demonstration will be accomplished in partnership with the DHS Science and Technology University Center of Excellence Program, NOAA, and BSEE. It will build on previous demonstrations conducted in 2012 in the Arctic and in 2011, 2012, and 2013 in the Great Lakes. During this demonstration, various types of oil spill response equipment will be deployed from the Coast Guard Cutter "Healy," including a small unmanned aircraft, an unmanned underwater vehicle, a remotely operated vehicle, and a brush skimmer. Testing this equipment in Arctic conditions is vital for identifying and developing resources to meet the Coast Guard's growing Arctic mission.

As a military service, the Coast Guard enforces U.S. sovereignty, ensuring freedom of navigation and providing maritime security. Although the risk of an incident in ice-covered U.S. waters is currently low, the nation must plan for ice-capable assets in the future that can effectively carry out year-round search and rescue, environmental response, and other Arctic operations. The Coast Guard is working closely with key federal partners, particularly the National Oceanographic and Atmospheric Administration (NOAA) and the U.S. Navy, to lead and coordinate the interagency effort in the Arctic. The Coast Guard has significant experience and success bridging the traditional divides between military and law enforcement at the federal level, and synchronizing efforts between federal, state, local, tribal, and private-sector stakeholders. Simultaneously, a military service, law enforcement, regulatory agency and an intelligence community member, the Coast Guard is in a unique position to exercise leadership and carry out missions in this emerging maritime frontier.

CHALLENGES

Lack of operational presence undermines national interests. The U.S. government needs a maritime surface and air presence in the Arctic

sufficient to support prevention and response regimes as well as diplomatic objectives. An improved operational presence would enable the nation to respond to vessels in distress, save lives, and protect the environment. It would also ensure enforcement of vessel routing systems, compliance with safety, security, and environmental laws, enforcement of fishery laws, and assertion of sovereignty.

The increase in vessel traffic and other human activities presents challenges for incident prevention and response in the Arctic region. A major accident involving a large cruise ship in the Arctic would pose a significant challenge to responders. If an oil tanker spilled its cargo or an oil well blew out in the Arctic waters, the potential impact on the marine environment would be profound, and removing the oil in icy waters would be a major challenge.

The USCG recognizes the need for further Arctic research. The Coast Guard is addressing this need by working with the Arctic Submarine Laboratory and the Naval Ice Center, and providing support for the establishment of an Arctic Fusion Center, an Arctic Center of Expertise, and other scientific research activities that promote responsible operations in, and use of, the Arctic.

COOPERATIVE OPPORTUNITIES

As suggested in Dr. Brigham's paper, the North Pacific and North Atlantic Coast Guard Forums have served as excellent examples of international cooperation, tackling a number of difficult maritime challenges. Perhaps the addition of an Arctic working group under these forums would be useful. But a clear definition of the role of these forums will be critical to ensure they are not overlapping work done by other organizations.

Comments on Chapter 3: Chinese perspective

Jiayu Bai

INTRODUCTION

The Arctic Ocean is a sea area covered by ice, as characterized by the United Nations Convention on the Law of the Sea (UNCLOS). For a long time, it attracted little attention and was usually ignored. Due to climate change, the Arctic Ocean's ice and snow are melting. The ice extent in April from 1979 to 2013, for example, has declined sharply decade by decade. In the middle of September 2012, the Arctic region recorded the lowest summer sea ice cover on record. The melting of Arctic ice will cause the sea level to rise and other environmental disasters, including losses for people around the world. However, the opening of the Arctic's Northwest Passage (NWP), Northern Sea Route (NSR), and Transpolar Passage to Arctic shipping would shorten the distance of intercontinental sea-lane transportation, which in turn, people would benefit from these new routes.

DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS ON A NATIONAL LEVEL

The Arctic shipping regulatory system encompasses regulations on national, regional and global levels. The Arctic is changing, and the Arctic shipping regulatory system is also experiencing development. Russia and Canada have the most significant jurisdiction over the NSR and NWP, respectively. It is necessary to discuss these states' national regulations for these new Arctic routes.

There are four main regulations and guidelines in Russia for navigation on the NSR. They require guidance by Russian icebreakers with Russian ice pilots on board when foreign vessels navigate through the NSR. Russia's Marine Operations Headquarters collects payments according to the icebreaking services used. Those requirements are sometimes challenged by non-Arctic states considering the interpretation of Article 234 of UNCLOS. The Rules of Navigation on the Water Area of the NSR under the Code of Commercial Navigation of the Russian Federation in 2013 changed the requirement for mandatory icebreaker guidance to one of permission,

which means that fees will be charged only when icebreaker services are provided.

Canada's regulation of the NWP started with its Arctic Waters Pollution Prevention Act of 1970. Two subsequent regulations stipulated pollution prevention measures in detail. The Canada Shipping Act specifies shipping activities and requirements in Canadian waters, including Arctic waters. The 1970 Act specified a 100-mile jurisdiction from straight baselines and zero tolerance for discharges in Arctic waters. Since 1977, Canada has operated a voluntary reporting system requiring cargo and cruise vessels passing through the Canadian archipelago to provide ship reports to the Canadian Coast Guard. The Northern Canada Vessel Traffic Services Zone Regulations in 2010 extended the reporting requirements from 100 to 200 miles and also made them mandatory.

DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS ON A REGIONAL LEVEL

Russian President Mikhail Gorbachev gave a speech in Murmansk in 1987 that called for greater cooperation among Arctic states to turn the Arctic into a "zone of peace." Environmental protection was one of the cooperative issues enunciated in that speech. In 1991, the Declaration on the Protection of the Arctic Environment established the Arctic Environment Protection Strategy on a soft-law basis. This led to the establishment of the Arctic Council in 1996 to address issues of sustainable development and environmental protection in the Arctic. The council is the most influential regional organization involving Arctic states, but it is also a political forum established in a soft-law format. However, the council has played a role in the development of two hard laws: the 2011 Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic and the 2013 Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. These laws aim at strengthening the cooperation and coordination among the Arctic states under the umbrella of the International Convention on Maritime Search and Rescue (SAR) and the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC). The adoption of legally binding instruments under the auspices of the Arctic Council reaffirms the commitments of the Arctic states to their legal obligations under the SAR

and OPRC conventions, but does not change the soft nature of the council.

DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS ON A GLOBAL LEVEL

What developments relating to the regulation of Arctic shipping have occurred at the global level? From a law of the sea perspective, UNCLOS is the ocean constitution. It entered into force in 1994 and has been ratified or acceded to by 165 countries. Russia ratified the convention in 1997 following its main regulations about navigation in the NSR, and Canada ratified the convention in 2003 after its Arctic Waters Pollution Prevention Act and Shipping Act. Article 234 of UNCLOS is the only specific provision applicable to the Arctic in the law of the sea. Arctic coastal states are entitled to stipulate laws and regulations with higher standards than generally accepted international rules, but must meet five requirements: they should be nondiscriminatory laws and regulations; should be about the prevention; reduction and control of marine pollution from vessels; should be within the limits of EEZs only in ice-covered areas; should pay dues regarding to navigation, and should be based on the best available scientific evidence.

The United States and European Union regard the NSR and the NWP as international straits, so the treaty requirements affecting ship operation in the polar region under the IMO should be considered first. These include the International Convention for the Safety of Life at Sea (SOLAS), the International Convention for the Prevention of Pollution from Ships (MARPOL), the International Convention on Standards of Training, and the Certification and Watchkeeping for Seafarers (STCW), which are relevant to navigational safety, environmental security, and crew qualifications. In 2010, the Manila Amendments emphasized the importance of experience for officers navigating or engineering in polar waters. Those treaties apply not only to Arctic highs seas, but also to other shipping in EEZs and high seas. The IMO has made recommendations for ships operating in polar waters in a soft-law format (the Guidelines for ships operating in Arctic ice-covered waters of 2002). Revised guidelines in 2009 apply to both the Arctic and Antarctic waters with high standards for environmental protection. As a soft-law arrangement, the 2009 guidelines are still voluntary.

A mandatory Polar Code is necessary for unified environmental protection standards, manning, and construction technique requirements for vessels. Work on one began in 2010 with intended completion in 2012. However, due to the complex issues it addresses, the code may only be available around 2014. Work on the code addresses ship design, construction and equipment, operational and training concerns, search and rescue, and protection of the marine environment. A range of complex issues are involved in drafting the code. It should reflect the differences between Arctic and Antarctic waters, apply to SOLAS cargo and passenger ships and non-SOLAS ships, effectively protect the marine environment, and control vessel-source pollution in polar waters. Then, the question is whether it is feasible for the Polar Code to include both mandatory and recommendatory requirements, and whether it should be placed under existing IMO instruments or articulated in a separate instrument. A mandatory code placed under existing IMO instruments might be more effective.

COORDINATION OF REGULATIONS AT DIFFERENT LEVELS

How can regulations be coordinated at different levels? First, the Arctic coastal states should regulate under the current UNCLOS framework, meet the requirements of Article 234, and harmonize their regulations with IMO guidelines and a prospective mandatory code. Second, Arctic coastal states should commit to obligations in multilateral treaties and not cause conflict with the treaty laws by unilateral regulation. Third, a mandatory IMO Polar Code should be consistent with the existing international rules applicable to Arctic shipping.

Here is a summary of the development of Arctic shipping regulations. First, coastal states' regulations on Arctic shipping share more similarities than before (i.e., mandatory reporting, no fees for transit only, no mandatory icebreaker requirements, and high marine environmental protection standards). Second, regional regulations initiated by the Arctic Council do not empower the council's legislative function, but reaffirm Arctic states' legal obligations under the original SAR and OPRC frameworks in Arctic waters. Third, it is necessary to adopt a mandatory Polar Code through the adoption of amendments to particular instruments.

Fourth, a comprehensive and fragmented regulatory regime of Arctic shipping will continue.

CHINA'S CONTRIBUTION TO THE DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS

What can China contribute to the development of Arctic shipping regulation? We may also discuss this at the global, regional and national levels. On a global level, China possesses the world's fourth-largest fleet as of 2012 and has been granted IMO A member state status 12 times. China's involvement in the Polar Code and participation in IMO initiatives is of great significance for the stable, sustainable development of world shipping. On a regional level, China was granted observer status by the Arctic Council on May 15, 2013. Although a council observer has no right to vote, it is important to participate in the council because of its influential stature in the field of Arctic environmental protection. On a national level, bilateral arrangements between China and Russia, Canada, and other Arctic states are helpful for prospective destinational bulk cargo and transit container transportation.

In conclusion, Arctic shipping regulation is undergoing rapid development. China will contribute to the sustainable and peaceful use of Arctic shipping routes and to the prosperous development of world shipping.

Comments on Chapter 3: Japanese perspective

Kiyoshi Nakashima

As reported by the world media, on August 11 and 12, 2013, Cosco attempted China's first commercial transit of the Northeast Passage with the full container vessel "Yong Sheng." This event attracted the attention of the world's shipping companies, which anticipate that Arctic routes will be developed to form a new axis of world marine transport.

This commentary focuses on economic and commercial issues that need to be considered to open the Arctic waterways and make it more accessible to the world's shipping industries.

As Professor Brigham pointed out in his paper, there are numerous issues to be solved in the areas of safety and environmental protection. It is a big challenge for the concerned states to harmonize their individual interests and establish new rules for a higher level of Arctic governance. Substantial investments are required to develop marine infrastructure to ensure safe transit, such as additional icebreakers, navigation aids, meteorological observation facilities, SAR facilities, shelters, and so forth. Likewise, large-scale investment for environmental protection is required.

From an economic viewpoint, the major concerns of shipping lines include how much they will need to pay for the services rendered by the owners of those facilities and how much they will need to contribute to environmental protection.

The Arctic routes are now recognized as a shortcut linking Asia with Europe and the east coast of North America. However, such a geographical advantage will not be important unless it is economically justified. The question is whether the shipping industry can benefit from reduced sailing costs and time in the navigation of Arctic routes.

The United Nations Convention on the Law of the Sea (UNCLOS) embraces the principle of equitable and efficient use of the seas and oceans as common resources around the globe. Having been ratified by the Arctic littoral countries except the United States, UNCLOS is currently recognized as the law that governs seaborne traffic in the Arctic Ocean.

To ensure free access of ships at a reasonable cost, the following provisions are included in UNCLOS:

Article 26: Charges which may be levied upon foreign ships

1. *No charge may be levied upon foreign ships by reason only of their passage through the territorial sea.*
2. *Charges may be levied upon a foreign ship passing through the territorial sea as payment only for specific services rendered to the ship. These charges shall be levied without discrimination.*

These provisions prohibit the littoral states from charging a royalty or commission unless it is a reasonable compensation for a specific service. They must also refrain from discriminating against users in levying service charges.

A recent study by the Japan Institute of International Affairs (JIIA) shows that, in the case of the Northern Sea Route (NSR), the following fees are levied by Russian authorities on ships in transit:

- Ice certificate issue fee.
- Ice permission issue fee.
- Icebreaker escort fee, pilotage, etc.

The JIIA estimated the total amount of the above for a bulker navigating from Europe to Asia through the NSR as USD $229,000, while the same ship would pay USD $277,000 for passage through the Suez Canal toll and anti-piracy measures.

Though these services are controlled by Russia's Northern Sea Route Administration (NSRA) and governed by the federal Merchant Shipping Code of the Russian Federation, many observers have noted that there is a vague area in the application of the tariff rates. For example, the official service tariff (http://www.arctic-lio.com/nsr_tariffsystem) announced in June 2011 sets the maximum rate of icebreaker fees for bulk cargo at 707 roubles per ton, amounting to as much as USD $750,000 for a 35,000 det handy max, which is far more than the amount of the Suez Canal toll. Another example reported is that for the crew of a ship who cannot speak Russian, a pilot has to be hired to communicate with the icebreaker. But Russian-flagged ships are exempt from this requirement.

From the facts above, some questions could be raised about whether or not those charges are actually acceptable under the terms of UNCLOS and whether there may be a risk of arbitrary administration by the NSRA in applying those rates in the future.

Analogies to the argument above can be found in the following facts: in

the aviation field, Aeroflot has levied a mandatory trans-Siberian royalty fee on the world's airlines since 1967 (which the EU and Russia have agreed to abolish by the end of 2013). This fee has long been criticized by the aviation industry as conforming to the Convention on International Civil Aviation (Chicago Convention), because it is exorbitant compared with the estimated costs of air traffic control and because it is charged to foreign airlines only.

In July 2012, the Panama Canal Authority (ACP) suddenly announced an increase of the canal toll for many ship types, excluding container ships, of 15% in two consecutive years. In response to strong objections by the shipping industry, the Authority finally delayed raising tolls for three months.

The Suez Canal Authority (SCA) also raised its toll 3% in March 2012, and another 3% in May 2013. The media presumed that the Authority took that action against the background of Egypt's difficult political and economic situation.

In this setting, it is necessary for the world shipping industry to keep a close and persistent watch over the behavior of the littoral countries, including Russia, to monitor compliance with the provisions of UNCLOS and ensure transparency in the service cost breakdown.

Comments on Chapter 3: Korean perspective

Jong Deog Kim

INTRODUCTION

Last May 15, the Arctic Council made a decision regarding the new observer states.[1] As a result, six countries, including Korea, gained observer status on the Arctic Council. The addition of six new observers will strengthen the capability of the council and promote a balanced discussion on various issues. Although they are not Arctic coastal states, Korea, China and Japan – Asian countries in the North Pacific – affect the climate of the Arctic region and are affected by climate change in the Arctic. These countries have trade-based economic systems with the shipping industry as one of their important of economic pillars. They make up a huge energy and resource market, consuming 19% of global oil and trading and 58% of global LNG. They also account for 22% of the global trade in fish. Korea, in particular, obtains 40% of its animal protein from fisheries. For this reason, a stable supply of fish is critical for the national health in Korea.

The three countries own 29% of the global merchant fleet and account for about 60% of international trade in LNG, ashare that might increase when economic development and other regional circumstances are considered. They dominate the global market in shipbuilding with a market share of almost 80%.

In addition, the three countries are major providers as well as consumers in the global logistics market. In the case of container throughput, they account for 40% of the total global market, a figure likely to increase, particularly in the case of China.[2] In a nutshell, the North

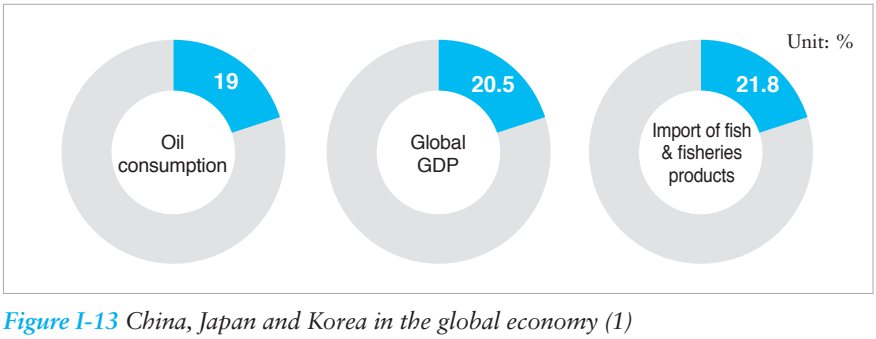

Figure I-13 China, Japan and Korea in the global economy (1)

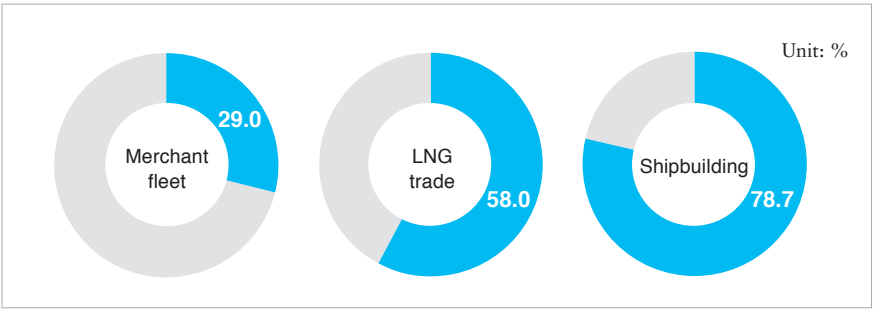

Figure I-14 China, Japan and Korea in the global economy (2)

Pacific Asian region has now become the center of the global shipping industry and holds a substantial position as a resource consumer as well as a provider of ocean development equipment. Moreover, Korea, China and Japan have a high competence in marine R&D relating to shipbuilding and offshore plants, which give them responsibilities, rights and capabilities in various issues in the Arctic.

For these reasons, the three countries are paying close attention to the Arctic from both a short-term and long-term perspective.

INTRODUCTION OF THE REPUBLIC OF KOREA'S NEW ARCTIC POLICY

Since Korea established the Dasan Arctic Research Station in NyAlesund, Svalbard in 2002, it has constantly carried out Arctic research. Its Arctic research activities were expanded with the commissioning of the research icebreaker "Araon" in 2009. Moreover, Korea recently conducted socioeconomic analyses, including throughput predictions for Arctic shipping routes, and announced the Arctic Policy Advancement Direction in 2012. On July 25 2013, the Korean government announced the Comprehensive Arctic Policy Framework Plan ("framework plan"), the basic direction for its systematic Arctic cooperation policies.[3] The framework plan was prepared on a pan-governmental basis with the Ministry of Oceans and Fisheries at the center. Its core principle is to cooperate with the Arctic Council and Arctic states, as well as with global and regional communities. The main objective of the plan is sustainable development of economic opportunities, such as the Northern Sea Route

(NSR), while contributing to the international society through cooperation in climate change response, marine environmental protection and scientific research. According to the time schedule of the plan, a national policy tentatively named the "Arctic Policy Master Plan" is to be prepared by the end of 2013.

Meanwhile, the Korea Maritime Institute (KMI) conducted a survey with 23 domestic experts regarding the expectations of cooperation in the Arctic region last May. The results were 5.5 points (out of a seven-point scale), far higher than last April (4.5). This implies that becoming an Arctic Council observer boosted positive expectations, even though the number of respondents were limited. As for future cooperation areas, the respondents first chose scientific research and analysis, followed by governance cooperation with the Arctic Council, a cooperative response to climate change, logistics cooperation including the NSR, and cooperative protection of the marine environment.

In addition to direct Arctic activities since 2000, Korea has made remarkable achievements in overall economic cooperation through bilateral collaboration with the Arctic states. Korea signed Free Trade Agreements with six of the eight Arctic state members, excluding Canada and Russia, and nine of the 11 observer states.[4]

Moreover, Korea concluded shipping agreements with four of the five Arctic coastal states, excluding Canada, and four observer states out of 11.

Figure I-15 FTAs with Korea

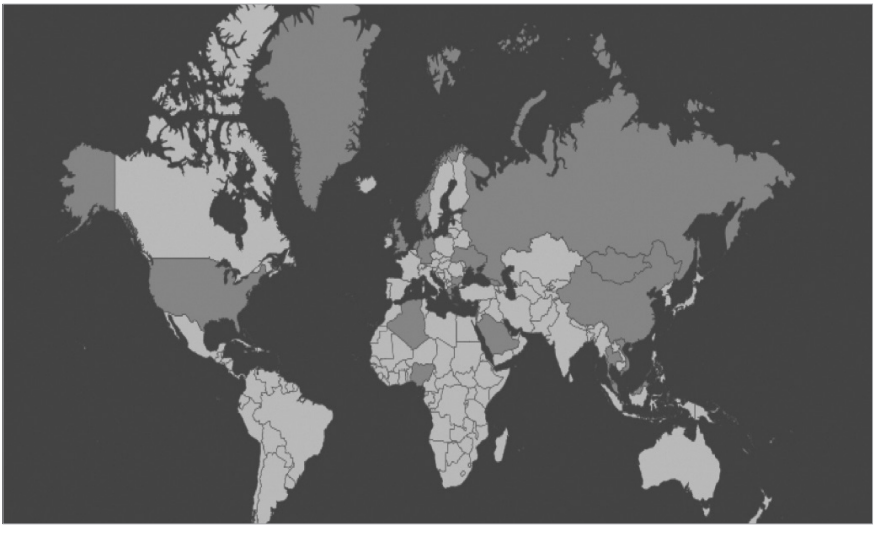

Figure I-16 Shipping agreements with Korea

The Korean government plans to strengthen cooperation with the Arctic Council, particularly with the council's working groups, and actively participate in cooperation with the IMO, other international organizations and NGOs.

In addition, Korea will pursue technology development, seek to reduce the risks of activities in the Arctic Ocean, and pursue bilateral and multilateral cooperation on emergency response. Concerning the long term goals, Korea will expand cooperation and exchanges for mutual development. It plans to work closely together with local communities, including coastal states and indigenous peoples, on economic matters such as use of the NSR, energy, and fisheries resource development.

OPINION ON THE PRESENTATION

Diagnosis and Direction

Professor Brigham noted that "The maritime Arctic is being connected to the global economy due to the region's abundant natural wealth." I agree and I also share his recognition that international society should be prepared for, or respond to, the current situation where international

shipping regulations and rules with binding or mandatory Arctic-specific provisions do not exist. I think his points on cooperative research in Arctic marine transportation have a huge implication for the sustainable and responsible operation of the NSR in the future. Based on the Arctic Marine Shipping Assessment (AMSA) report, he also analyzed the direction for the Arctic Council and Arctic states regarding AMSA's 17 recommendations approved in 2009 and focused on three interrelated themes: enhancing Arctic marine safety, protecting the Arctic people and the environment, and building an Arctic marine infrastructure. I believe this analysis will be helpful in understanding future policies of the Arctic states. Such a diagnosis is expected to be the foundation for establishing policies and cooperative direction with non-coastal states as well as with the Arctic Council members, particularly for shipping activities.

Cooperation in Arctic Shipping

The 2009 AMSA report is one of the most important achievements of the Arctic Council. The report not only evaluates and predicts Arctic shipping, but also identifies many research projects for the use of the NSR. Therefore, understanding the report can bring mutual benefits through cooperation within the region and between regions. I would like to comment in particular on some of the 35 research opportunities presented in the AMSA Report.

First, *facilitating development of the Sustained Arctic Observing Network (SAON)*. The Arctic region, with its huge sea and land areas, limits observation activities, while the harsh natural environment makes constant management difficult. I think this calls for the community-based, or supported, observation system already considered in SAON. A regular monitoring system conducted by local people of the local social and economic phenomena, as well as their observations on natural phenomena can secure useful data. Korea has experience in building an ocean waste monitoring system through cooperation with local island communities and in remote areas as well as utilizing the system for marine environmental management.

Second, *building a database on ship accidents in the Arctic Ocean*. If the ship accident records of each coastal nation are connected to geographic information and causes and background information are provided, then ships can be alerted about navigation risks and their navigation safety can

be enhanced accordingly. Based on reliable information, certain areas can be designated as special risk zones and the risk involved can be lowered.

Third, *a comprehensive economic research, including cost-benefit-risk analyses, for all potential routes of trans-Arctic shipping*. It is important to conduct an economic validity study for major base ports in the North Pacific and North Atlantic, considering various cargoes, ship conditions, and operation timing and conditions. It is also important to identify unrealistic factors and share the results. A comprehensive analysis of the results of the already conducted pilot operations is significant as well. Many research institutes are conducting validity studies based on the preconditions they have set. Organizing a discussion on those studies will generate substantial results.

Cooperation Scope to be Additionally Considered

Navigation in the Arctic Ocean will require the support of icebreakers for a long time. However, only Russia owns commercially operable icebreakers, only some of which are in actual operation. Without the support of icebreakers, navigation risks will increase and crisis response capability will be cut. Therefore, the possible supply of icebreakers as well as fees for their services should be closely calculated and monitored.

How much can the currently available icebreakers satisfy the demand for stable operation of the NSR? According to the route's governing body, the Northern Sea Route Administration, it has granted permission for more than 600 shipping trips through the passage and 71 transit voyages as of the end of 2013, and the figure is expected to rise. Most of the cargoes will be liquid headed towards the Asian nations in the North Pacific. Accordingly, possible problems, such as support by icebreakers and operational conditions should be addressed by a responsive system including companies and governments in states of origin and destination.

In addition, I would like to suggest that the traditional knowledge of local communities, including indigenous peoples, needs to be considered by the shipping sector. The local communities have first-hand, long-term experiences of the climate, natural phenomena, migration of living organisms, and ecosystems. Their knowledge will enhance the safety of the routes and contribute to local communities.

An evaluation of environmental carrying capacities by sub-region is necessary to ensure sustainable development of the region. If the sub-region

is a major base on the route, the carrying capacity of the services involved in development should be analyzed. Regional development should be supplemented with assistance measures.

Moreover, joint research and analyses should be conducted on migratory living organisms (e.g., migratory birds that move between the Asia region and the Arctic coasts) as well as changes in their habitat. Some researchers have pointed out the possibility that birds carry bacterial pathogens. If this happens, ramifications will be huge and affect the livelihood of the indigenous peoples and local ecosystems.

The destinations of ships using the NSR are usually outside the scope of the Arctic Ocean as determined by the SAR agreement in 2011. Therefore, sea areas near the Arctic Ocean need to be considered, and a ship safety management system should be built through information sharing. As Professor Brigham rightly pointed out, a sub-regional SAR cooperative foundation linked with the Arctic Ocean can be built. Such a foundation will be a good way to ensure the safety of rising ship navigation.

CONCLUSION

With the framework plan as the foundation, Korea will consider building a second research icebreaker, enhance its research station and science and technology research, and carry out pilot operations for stable use of the NSR. In addition to these efforts, it will develop various cooperation programs. It will also establish a consultative NSR support body composed of the private, government, industry, and academia sector for sustainable and safe use of the NSR, and review measures to cut costs at ports for NSR users. Moreover, Korea intends to strengthen cooperative networks through information sharing, joint research, seminars, and sea crew training programs with major Arctic coastal states. It plans to expand the participation of technical experts in the development of the IMO Polar Code, gearing its efforts to secure the highest ship safety.

The NPAC is expected to play a role as an important international network under the framework plan. I hope the NPAC will provide a candid, informal and open discussion opportunity for relevant experts, researchers, industry representatives, local residents, and policy makers on various Arctic issues, in particular in the North Pacific region. Moreover, NPAC will aid in the sharing of our ideas and opinions with other forums such as the

Arctic Council. Providing innovative approaches to challenges, including those suggested by the AMSA report, may be another contribution for sustainable development of the Arctic. As for the shipping sector, an in-depth discussion of the magnitude of risks and sustainable measures to avoid or overcome risks is viable through joint research with currently participating experts.

Notes

1. KIRUNA DECLARATION, 15 MAY 2013.
2. KMI report, Sung Woo Lee, 2012.
3. http://www.mof.go.kr/cop/bbs/selectBoardArticle.do
4. http://okfta.kita.net/ftaInfo.do?method=korStatus