

8TH SYMPOSIUM ON

The Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations

JULY 17–18, 2019, RONALD REAGAN BUILDING AND
INTERNATIONAL TRADE CENTER AMPHITHEATER, WASHINGTON, DC



CO-HOSTS, PARTNERS, AND SPONSORS

This symposium was organized, convened, and co-hosted by the US Arctic Research Commission (USARC), the Wilson Center's Polar Institute, and the US National Ice Center. Program partners include the Arctic Domain Awareness Center, the Center for the Study of Democracy at St. Mary's College of Maryland, and The Patuxent Partnership. Additional sponsorship was provided by the Ronald Reagan Building and World Trade Center, the Marine Mammal Commission, and Akima LLC. See page 8 for more information.

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BEAUFORT SEA (March 18, 2018)

The Seawolf-class fast-attack submarine USS *Connecticut* (SSN 22) surfaces through the ice as it participates in Ice Exercise (ICEX) 2018. ICEX 2018 was a five-week exercise that allowed the Navy to assess its operational readiness in the Arctic, increase experience in the region, advance understanding of the Arctic environment, and continue to develop relationships with other services, allies, and partner organizations. *Photo credit: US Navy photo by Mass Communication Specialist 1st Class Daniel Hinton/Released 180318-N-KC128-506*

Motivation and Background

8th Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations

MOTIVATION

Maritime operations in the Arctic continue to evolve, in part due to the ongoing reduction of sea ice that is attributed to warming (which is two to three times faster in the Arctic than in the rest of the world). This year, above-normal air temperatures in autumn and early winter, warm water in the Bering Sea off western Alaska, and one of the stormiest winters of the past 70 years resulted in near-record low winter maximum sea ice extent across the entire Arctic. The Bering Strait remained virtually ice-free during the 2018–2019 season, a first since 1850. These rapid and extensive changes in the Arctic are redefining ecosystems, landscapes, and communities, as well as economic and geopolitical interests.

This year's symposium program is influenced by a number of recent contributions from the US federal government and international partners.

US FEDERAL GOVERNMENT

To contend with the Arctic's unique nature and challenges, a broad cross section of US federal agencies has produced reports and strategies to guide scientific research efforts.

National Oceanic and Atmospheric Administration

NOAA's 2018 *Arctic Report Card* focused on the current state of different components of the Arctic environmental system relative to historical records. By means of a detailed review of regional sea ice, including its extent, age, and thickness, researchers pointed to a continued warming trend throughout the region in 2018, into early 2019, and beyond. NOAA will also update its *Arctic Action Plan* to be published in the summer or fall of 2019. This plan will provide NOAA scientists, stakeholders, and partners with a roadmap to make shared progress in monitoring, understanding, and protecting this vast, valuable, and vulnerable region. <https://www.arctic.noaa.gov/report-card>

National Science Foundation

NSF is supporting a *Navigating the New Arctic* solicitation that promotes initiatives that empower new research communities, diversify the next generation of Arctic researchers, integrate the co-production of knowledge,

and engage partnerships, particularly among international stakeholders. https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505594

US Arctic Research Commission

USARC released its *2019–2020 Goals Report and Objectives for Arctic Research* highlighting motivations, recommendations and examples for six major research goals. https://www.arctic.gov/reports_goals.html

US Global Change Research Program

The US Global Change Research Program's *4th National Climate Assessment* demonstrates strong evidence for a continuing, rapid, human-caused warming of the global atmosphere and ocean. This report concludes that "it is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century." <https://www.globalchange.gov/nca4>

Department of Defense/ Department of Homeland Security

- DOD's 2019 *Report to Congress Department of Defense Arctic Strategy* updates DOD's strategic objectives for the Arctic region, in light of the agency's renewed assessment of the evolving Arctic security environment. <https://media.defense.gov/2019/jun/06/2002141657/-1/-1/1/2019-dod-arctic-strategy.pdf>
- The updated 2018 *National Defense Strategy* outlines DOD's strategic approach for protecting US national security interests in the Arctic in an era of strategic competition. <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>
- The US Navy's *Strategic Outlook for the Arctic* supersedes the Navy's 2014 update to the *Arctic Roadmap* and continues to assess the area as a "low risk of conflict." The document also highlights partnerships with the US Coast Guard (USCG), including international ones, with specific mention of the US/Canada "unique and enduring defense partnership" vital to both countries' security interests. https://www.navy.mil/strategic/Navy_Strategic_Outlook_Arctic_Jan2019.pdf

- The *USCG Arctic Strategic Outlook* focuses on how the Coast Guard advances national interests through a unique blend of polar operational capability, regulatory authority, and international leadership across the spectrum of maritime governance. https://www.uscg.mil/Portals/0/Images/arctic/Arctic_Strategy_Book_APR_2019.pdf
Of significant interest is the recent award of the Polar Security Cutter contract. <https://content.govdelivery.com/accounts/USDHSCG/bulletins/2406c70>
- The US Air Force (USAF), which has long recognized the Arctic's strategic importance, is responsible for 79% of DOD missions and operations in the Arctic (source: 2016 DOD Report to Congress; <https://dod.defense.gov/Portals/1/Documents/pubs/2016-Arctic-Strategy-UNCLAS-cleared-for-release.pdf>). The USAF is showing increased interest in Arctic infrastructure (location and capacity) in Alaska, Canada, and Greenland. Both enabling and expeditionary infrastructure are a focus.

INTERNATIONAL ENGAGEMENT

As part of the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC; <https://www.mosaic-expedition.org/>), in September 2019 more than 600 scientists from 17 countries will begin a yearlong expedition across the Arctic Ocean aboard the drifting German Research Icebreaker *Polarstern*, frozen into the ice pack. Additional icebreakers and several polar research aircraft will support this ~\$140 M effort to examine the causes and consequences of recent and predicted physical, chemical, and biological changes observed in Arctic sea ice, snow, the overlying atmosphere, and the marine ecosystem. NSF is the primary US sponsor, with additional projects supported by DOE, NASA, and NOAA.

The second Arctic Science Ministerial (<https://www.arcticsscienceministerial.org/en/index.html>), held in Berlin in October 2018, was a successful follow-on to the inaugural event held at the White House in 2016. In 2020, the third ministerial will be held in Japan and co-hosted by Iceland.

CHANGING ICE CONDITIONS

In 2018, Arctic sea ice remained younger, thinner, and covered less area than in the past. When scientists began measuring Arctic ice thickness in 1985, 16% of the ice pack was very old (i.e., multiyear) ice. In 2018, old ice constituted less than 1% of the ice pack, meaning that very old Arctic ice has declined by 95% in the last 33 years.

One of the more remarkable features of Arctic sea ice over the past year was the dearth of ice in the Bering Sea through the 2017–2018 ice growth season. Ice typically begins to form in the Bering Sea around the beginning of October, expands through the winter, and then melts away through the spring. During February, typically the height of the winter season, the Bering Sea actually lost significant ice cover. From 7 February to 23 February 2018, ice extent decreased by ~215,000 km², dropping from ~59% to only ~26% of normal (relative to the 1979–2016 median).

In 2018, 9.89 million km² of ice was lost between the March maximum in sea ice extent and the September minimum. Also, the summer extent was the sixth lowest and the winter extent was the second lowest in the satellite record (1979–2018). The 12 lowest extents in the satellite record have occurred in the last 12 years.

Pan-Arctic observations since the 1970s suggest a long-term decline in landfast sea ice (fastened to the coastline) as well. Landfast ice is an important platform for hunting, traveling, and coastal protection for local communities.

IDA SYMPOSIA HISTORY

The IDA symposium, held biennially since 2007, provides a review of the ongoing and expected impacts on naval and maritime operations due to changes in the Arctic sea ice cover. The series began in April 2001 with a symposium titled, "Naval Operations in an Ice-Free Arctic," sponsored by the Office of Naval Research, the US National Ice Center, the Oceanographer of the Navy, and the US Arctic Research Commission. While that symposium focused on naval operations and national strategic issues, the next symposium, in 2007, expanded the discussion to include impacts on other maritime operations such as commercial transportation, oil and gas exploration and production, fisheries, and oceanographic research. Symposia since then (in 2009, 2011, 2013, 2015, and 2017) have continued to address Arctic sea ice and associated environmental conditions vis-a-vis emerging or expected naval, maritime, and other activities in the region. The year 2019 marks a new era for the Impacts of an Ice-Diminishing Arctic (IDA-8) symposium, with the addition of new partners and sponsors, including the Wilson Center's Polar Institute, the Arctic Domain Awareness Center, The Patuxent Partnership, The Center for the Study of Democracy at St. Mary's College of Maryland, the Ronald Reagan Building and World Trade Center, the Marine Mammal Commission, and Akima LLC.

Agenda (as of July 8, 2019)

The agenda is also online at: <https://www.wilsoncenter.org/event/8th-symposium-the-impacts-ice-diminishing-arctic-naval-and-maritime-operations>

DAY 1, WEDNESDAY, JULY 17

7:00 am **REGISTRATION AND COFFEE/TEA**

8:00 am **WELCOME REMARKS**

Dr. Michael Sfraga, Director, Polar Institute, Wilson Center; Director, Global Risk and Resilience Program, Wilson Center

Andrew Gelfuso, Vice President, World Trade Center, Washington, DC, Ronald Reagan Building and International Trade Center

8:05 am **PACIFIC, ATLANTIC, AND GLOBAL VIEWS OF THE ARCTIC**

Senator Angus King, Maine

Senator Lisa Murkowski, Alaska

In Conversation with Dr. Michael Sfraga, Director, Polar Institute, Wilson Center; Director, Global Risk and Resilience Program, Wilson Center

9:15 am **US COAST GUARD'S ARCTIC PERSPECTIVES**

Admiral Charles W. Ray, Vice Commandant, US Coast Guard

Interviewed by Melody Schreiber, Washington Correspondent, *Arctic Today*

9:45 am **ARCTIC ENVIRONMENT SCENE-SETTER**

Dr. Jackie Richter-Menge, Commissioner, US Arctic Research Commission

Introduced by Fran Ulmer, Chair, US Arctic Research Commission

10:10 am **BREAK**

10:30 am **NOAA'S ARCTIC PORTFOLIO**

Part 1

Rear Admiral Tim Gallaudet, PhD, USN Ret., Assistant Secretary of Commerce for Oceans and Atmosphere; Deputy Administrator, NOAA

Part 2

Craig McLean, Assistant Administrator for Oceanic and Atmospheric Research, NOAA

Rear Admiral Shepard M. Smith, Director, Coast Survey, NOAA

Dr. Louis W. Uccellini, Assistant Administrator for Weather Services, NOAA; Director, National Weather Service

Dr. Stephen Volz, Assistant Administrator for Satellite and Information Services, NOAA

Dr. Cisco Werner, Director of Scientific Programs and Chief Science Advisor, NOAA Fisheries

Moderated by David Kennedy, Senior Advisor for the Arctic Region, NOAA

11:10 am **PERSPECTIVES FROM ARCTIC ALASKA NATIVE REGIONAL CORPORATION CEOs**

Rex A. Rock Sr., President & CEO, Arctic Slope Regional Corporation

Dr. Gail Anagick R. Schubert, President & CEO, Bering Straits Native Corporation

Aaron M. Schutt, President & CEO, Doyon, Limited

Wayne Qaniqsiruaq Westlake, President & CEO, NANA Regional Corporation

Moderated by Greg Razo, Vice President of Government Relations, CIRI

11:50 am **LUNCH**

1:00 pm **THE RUSSIAN MARITIME ARCTIC**

Dr. Lawson Brigham, Global Fellow, Polar Institute, Wilson Center; Researcher, University of Alaska Fairbanks
Dr. Andrei Zagorski, Professor, Moscow State, Institute for International Relations; Head of Department for Disarmament, Arms Control, and Conflict Resolution, Institute of World Economy and World Politics, Russian Academy of Sciences
Dr. Mikhail Grigoriev, Co-owner & Director, GECON, St. Petersburg-Moscow, Russia (invited)

1:40 pm **OPERATIONAL VIEWS ON ARCTIC SHIPPING**

Ann Barker, Arctic Program Leader, Ocean, Coastal, and River Engineering, National Research Council Canada
James Bond, Director, Advisory Services, American Bureau of Shipping
Leslie Canavera, CEO, PolArctic LLC
Tim Keane, Senior Manager, Arctic Operations and Projects, Fednav Limited
Michael Kingston, Managing Director, Michael Kingston Associates; Special Advisor, Protection of the Arctic Marine Environment (PAME) Working Group, Arctic Council
Moderated by Dr. Alyson Azzara, International Trade Specialist, US Maritime Administration, US Department of Transportation

2:20 pm **PREDICTING MARITIME TRAFFIC IN THE US ARCTIC**

Sarah Harrison, Arctic Marine Transportation Specialist, US Committee on the Marine Transportation System
Introduced by Helen Brohl, Executive Director, US Committee on the Marine Transportation System

2:40 pm **BREAK**

3:00 pm **GREAT POWER COMPETITION IN THE ARCTIC**

Andrey Bondarev, Head of Economic Office, Embassy of the Russian Federation to the US
Dr. Heather Exner-Pirot, Research Associate, CIRRICQ
Dr. Robert Huebert, Associate Professor, Department of Political Science, University of Calgary
Moderated by Dr. Rebecca Pincus, Assistant Professor, Strategic and Operational Research Department, Center for Naval Warfare Studies, US Naval Warfare College

3:40 pm **DOE'S ARCTIC PRIORITIES**

Deputy Secretary Dan Brouillette, US Department of Energy
Moderated by Fran Ulmer, Chair, US Arctic Research Commission

4:00 pm **THE STATE OF ARCTIC DIPLOMACY**

Ambassador Kåre R. Aas, Ambassador of Norway to the US
Ambassador Marie-Anne Coninx, EU Ambassador at Large for the Arctic
Deputy Ambassador Kirsten Hillman, Deputy Ambassador of Canada to the US
Ambassador Harri Mäki-Reinikka, Secretary General of Finland's Arctic Advisory Board
Ambassador (Ret.) Ken Yalowitz, Global Fellow, Polar Institute, Wilson Center
Moderated by Raymond Arnaudo, former Director, Office of Oceans and Polar Affairs, US Department of State

4:45 pm **ICELAND'S CHAIRMANSHIP OF THE ARCTIC COUNCIL**

Hreinn Pálsson, Deputy Chief of Mission, Embassy of Iceland to the US

5:00 pm **RECEPTION**

DAY 2, THURSDAY, JULY 18

7:00 am **REGISTRATION AND COFFEE/TEA**

8:00 am **WELCOME REMARKS**

Dr. Michael Sfraga, Director, Polar Institute, Wilson Center; Director, Global Risk and Resilience Program, Wilson Center

8:05 am **ARCTIC SECURITY**

Senator Dan Sullivan, Alaska (invited)

Lieutenant General Thomas A. Bussiere, Commander, Alaskan North American Aerospace Defense Command Region, North American Aerospace Defense Command; Commander, Alaskan Command, US Northern Command; Commander, Eleventh Air Force, Pacific Air Forces, Joint Base Elmendorf-Richardson, Alaska

Introduced by Dr. Michael Sfraga, Director, Polar Institute, Wilson Center; Director, Global Risk and Resilience Program, Wilson Center

9:00 am **HIGH ARCTIC RESEARCH INFRASTRUCTURE**

Dr. Mark D. Ivey, Atmospheric Sciences, Sandia National Laboratories

Dr. Nettie La Belle-Hamer, Director, Alaska Satellite Facility; Deputy Director, Geophysical Institute, University of Alaska Fairbanks

Moderated by Lori Parrott, Manager, Atmospheric Sciences, Sandia National Laboratories

9:30 am **THE ARCTIC IN US NATIONAL IDENTITY**

Zachary D. Hamilla, Executive Director, The Arctic Studio

Moderated by Liz Ruskin, Washington Correspondent, Alaska Public Media

9:50 am **BREAK**

10:10 am **WORLD WILDLIFE FUND'S ARCTIC PROGRAM**

Dr. Peter Winsor, Director, WWF Arctic Program

10:30 am **PERSPECTIVES FROM ARCTIC ALASKA NATIVES**

Mellisa Heflin, Bering Sea, Alaska

Hugh Patkotak Sr., Wainwright, Alaska

Delbert Pungowiyi, Savoonga, Alaska

Moderated by Liz Cravalho, Kotzebue, Alaska

11:00 am **OPERATIONAL ICE CENTERS**

Commander Heather H. Quilenderino, PhD, Commanding Officer, US Naval Ice Center; Director, US National Ice Center

Commander Kristen Serumgard, Commander, International Ice Patrol

Scott Weese, Operations Director, Canadian Ice Service

11:30 am **ARCTIC OCEAN AND THE BLUE ECONOMY**

Alf Håkon Hoel, Professor of Ocean Law and Policy, College of Fisheries Science, University of Tromsø

Ole Rasmus Øvretveit, Director, Arctic Frontiers

Liv Monica Stubholt, Partner, Advokatfirmaet Selmer DA

In conversation with Dr. Michael Sfraga, Director, Polar Institute, Wilson Center; Director, Global Risk and Resilience Program, Wilson Center

11:50 am **LUNCH**

- 12:50 pm **CAN THE UNITED STATES FACILITATE AN INTERNATIONAL ARCTIC SEAWAY?**
Michael Kingston, Managing Director, Michael Kingston Associates; Special Advisor, Protection of the Arctic Marine Environment (PAME) Working Group, Arctic Council
Mead Treadwell, former Lieutenant Governor, State of Alaska; former Chair, US Arctic Research Commission
Tero Vauraste, President, Mariadi Ltd; former Chair, Arctic Economic Council
- 1:30 pm **JAPAN'S ARCTIC INTERESTS**
Rear Admiral Kazumine Akimoto, Senior Research Fellow, Ocean Policy Research Institute, The Sasakawa Peace Foundation
Eiji Sakai, Vice President, Ocean Policy Research Institute, The Sasakawa Peace Foundation
Dr. Atsushi Sunami, President, Ocean Policy Research Institute, The Sasakawa Peace Foundation
- 1:50 pm **CHINA'S ARCTIC INTERESTS**
Dr. Nong Hong, Executive Director, Institute for China America Studies
- 2:10 pm **BREAK**
- 2:30 pm **ARCTIC SCIENCE**
Major General Randy "Church" Kee, USAF Ret.; Executive Director, Arctic Domain Awareness Center
Dr. S. Bradley Moran, Dean, College of Fisheries and Ocean Sciences, University of Alaska Fairbanks
Dr. Frank R. Rack, Arctic Research Support and Logistics Manager, National Science Foundation
Dr. Colleen Strawhacker, Program Director, Arctic Social Sciences, National Science Foundation
Moderated by Dr. John Farrell, Executive Director, US Arctic Research Commission
- 3:30 pm **ARCTIC SECURITY: THE US MILITARY'S PERSPECTIVE**
Vice Admiral Daniel B. Abel, Deputy Commandant for Operations, US Coast Guard
LeeAnn Borman, Senior Executive Service, Deputy Director, Strategy, Concepts, and Assessments, Deputy Chief of Staff for Strategic Plans and Requirements for the US Air Force
Lieutenant General Thomas A. Bussiere, Commander, Alaskan North American Aerospace Defense Command Region, North American Aerospace Defense Command; Commander, Alaskan Command, US Northern Command; Commander, Eleventh Air Force, Pacific Air Forces, Joint Base Elmendorf-Richardson, Alaska
Rear Admiral Thomas Marotta, Reserve Deputy in the Office of the Chief of Naval Operations, Plans and Strategy
Moderated by Major General Randy "Church" Kee, USAF Ret.; Executive Director, Arctic Domain Awareness Center
- 4:10 pm **ALASKA OPERATIONS**
Rear Admiral Matthew T. Bell Jr., Seventeenth District Commander (D17), US Coast Guard
Brigadier General Joseph J. Streff, Assistant Adjutant General, Alaska National Guard
Speaker from US Army Alaska Command to be invited
Moderated by Major General Randy "Church" Kee, USAF Ret.; Executive Director, Arctic Domain Awareness Center
- 4:50 pm **THE GENERATIONAL CONTRACT: EMERGING LEADERS AT THE ARCTIC INSTITUTE**
Alina Bykova, Researcher and Translator, The Arctic Institute
Jack Durkee, Program Assistant, Polar Institute, Wilson Center
Dr. Victoria Herrmann, President and Managing Director, The Arctic Institute
Rebecca Lyng, First Secretary, Greenland Representation in Washington, DC
Val Muzik, Research Associate, The Arctic Institute
Dr. Andreas Raspotnik, Senior Fellow, The Arctic Institute; Senior Researcher, High North Center, Nord University
Moderated by Lillian Hussong, Researcher and Social Media Manager, The Arctic Institute
- 5:30 pm **CLOSING REMARKS**
Dr. Michael Sfraga, Director, Polar Institute, Wilson Center; Director, Global Risk and Resilience Program, Wilson Center

Arctic Photographs

BY MARTIN HARTLEY

Martin Hartley has spent the last 16 years documenting the Arctic Ocean, which is Martin's favorite place, and possibly the most hostile and difficult location on Earth to practice photography. Over the last 16 years, Martin has covered over 2000 miles skiing on separate expeditions, living for 400 days on the skin of the Arctic Ocean, including a mammoth 99-day crossing of The Arctic Ocean from Russia to Canada. On his next expedition, during the late winter and Spring of 2020, Martin will be working closely with the European Space Agency and NOAA to locate and document the last of the oldest remaining sea ice in the Arctic Ocean before it is lost forever to global warming.

US Coast Guard Cutter *Healy* approaches the Russian-flagged tanker *Renda* 97 miles south of Nome, Alaska, January 10, 2012. Photo credit: US Coast Guard Petty Officer 1st Class Sara Francis

Light Sculpture: Ice Mass Balance

BY CY KEENER

Cy Keener is an interdisciplinary artist who uses environmental sensing and kinetic sculpture to record and represent the natural world. He is an Assistant Professor of Sculpture and Emerging Technology at the University of Maryland's Department of Art. His work includes a range of data-based installations to visualize diverse phenomena, including sea ice, wind, rain, and ocean waves. He received a Master of Fine Arts degree from Stanford University, and a Master of Architecture degree from the University of California, Berkeley. Cy has completed commissioned installations at the Scottsdale Museum of Contemporary Art, Stanford University, Suyama Space in Seattle, and the Rubin Center for the Visual Arts at the University of Texas. Over the past year, Cy has presented his work at the International Symposium on Electronic Art in Durban, South Africa, the National Academy of Sciences in Washington DC, and OCAD University in Toronto.



Co-Hosts, Partners, and Sponsors

CO-HOSTS



US Arctic Research Commission (USARC)

<https://www.arctic.gov/>

USARC is an independent federal agency established in 1984 by the Arctic Research and Policy Act (<https://www.arctic.gov/legislation.html>). It is a presidentially appointed advisory body supported by staff in Washington, DC, and in Anchorage, Alaska. In addition to publishing the biennial *Report on the Goals and Objectives for Arctic Research* (https://www.arctic.gov/reports_goals.html), the Commission develops and recommends US Arctic research policy and builds cooperative links in Arctic research within the federal government and with Arctic residents, the State of Alaska, and international partners.



Wilson Center's Polar Institute

<https://www.wilsoncenter.org/program/polar-institute>

The Polar Institute is a US nonpartisan Arctic and Antarctic policy forum that tracks, analyzes, and makes sense of the complex and interconnected dynamics of these regions. The Polar Institute addresses these issues through workshops, public events, policy forums, position papers, and other deliverables—leveraging community, domestic, and international partners to create a platform for in-depth, holistic analysis of the polar regions. The Wilson Center, chartered by Congress in 1968 as the official memorial to President Woodrow Wilson, is the nation's key nonpartisan policy forum for tackling global issues through independent research and open dialogue to inform actionable ideas for the policy community.



US National Ice Center (USNIC)

<https://www.natice.noaa.gov/>

USNIC is a multi-agency center operated by the US Navy, the National Oceanic and Atmospheric Administration (NOAA), and the US Coast Guard. It provides the highest quality, timely, accurate, and relevant ice and snow products and related environmental intelligence services to meet the strategic, operational, and tactical requirements of US interests worldwide.

PARTNERS



Arctic Domain Awareness Center (ADAC)

<http://arcticdomainawarenesscenter.org/>

ADAC is a US Department of Homeland Security Science and Technology University Programs Center of Excellence in Maritime Research. ADAC conducts operator-driven research in order to enhance Arctic domain awareness, response, and resilience. ADAC supports the US Coast Guard and other Arctic maritime operators by providing tools that enable better decision-making such as when deploying a long range autonomous underwater vehicle, tools that permit more accurate sea ice modeling, and oil spill response science and technology that is more Arctic-capable. ADAC also seeks to foster the next generation of scientists and engineers through its educational programs.



Center for the Study of Democracy at St. Mary's College of Maryland

<http://www.smcm.edu/democracy/>

The Center for the Study of Democracy explores contemporary and historical issues associated with the ideas of democracy, liberty, and justice in national and international contexts. The Center facilitates activities that strengthen democracy and the rule of law, enhance security and individual freedoms, invigorate the civil society, encourage free enterprise, and increase economic, environmental, educational, and cultural equity.



The Patuxent Partnership

The Patuxent Partnership

<https://www.paxpartnership.org/>

The Patuxent Partnership is a nonprofit member organization that works with government, industry, and academia to advance education through STEM-based initiatives; to advance technology through speaker programs and networking; to advance science and technology transfer through the exchange of ideas, information, and data related to technologies; and to increase workforce development through an array of initiatives. The Patuxent Partnership connects the dots to foster collaboration among our members in Southern Maryland, and beyond, to promote sustainable economic vitality and enhanced quality of life.

ADDITIONAL SPONSORSHIP



Ronald Reagan Building and World Trade Center

<https://itcdc.com/world-trade-center/>

The World Trade Center Washington, DC, helps clients develop events that connect nations and cultures, foster international dialogue, generate business opportunities, and raise awareness about the economic benefits that can be realized through trade.



Marine Mammal Commission (MMC)

<https://www.mmc.gov/>

The MMC is an independent government agency, charged by Marine Mammal Protection Act, to further the conservation of marine mammals and their environment. The MMC works to ensure that marine mammal populations are restored and maintained as functioning elements of healthy marine ecosystems in the world ocean. They provide science-based oversight of domestic and international policies and actions of federal agencies with mandates to address human impacts on marine mammals and their ecosystems. The MMC is the only US government agency that provides comprehensive oversight of all science, policy, and management actions affecting marine mammals.



Part of the NANA family of companies

Akima LLC

<http://www.akima.com/>

Akima, a subsidiary of NANA Development Corporation, is a federal contractor with over 7,500 employees supporting more than 14,300 Inupiat shareholders in the NANA region of Alaska. Akima and its operating companies support a diverse portfolio of operating companies. Akima provides the infrastructure to support more than 40 socioeconomically disadvantaged small businesses with mature business processes and shared back-office support services.



Speakers



Ambassador Kåre R. Aas

Ambassador Aas was accredited as Norway's Ambassador to the United States on September 17, 2013. Prior to his current position, he served in Oslo as Political Director of the Ministry of Foreign Affairs. Preceding

his assignment as Political Director, Aas served as Norway's Ambassador to the Islamic Republic of Afghanistan from 2008 to 2010. During his tenure in Afghanistan, Norway focused on education, good governance, rural development, and collaboration with civil society. From 2003 to 2008, Aas served as Director General in the Department for Security Policy and the Arctic. In that capacity, he was responsible for Norwegian security policy and Norway's strategic cooperation with European and transatlantic partners. Ambassador Aas was also responsible for Norwegian policy and obligations within the fields of disarmament and nonproliferation, nuclear safety, Norway's Arctic policy, and bilateral relations with the United States, Canada, Russia, Eastern Europe, South Caucasus, and Central Asia.



Vice Admiral Dan B. Abel

Vice Admiral Abel assumed the duties of the Coast Guard Deputy Commandant for Operations in June 2018. He develops operational strategy, policy, guidance, and resources that address national priorities. This oversight of USCG missions, programs, and services includes

intelligence, international affairs, cyber, the maritime transportation system, commercial regulations and inspections, search and rescue, maritime security, law enforcement, defense operations, environmental response, contingency planning, and the operational capabilities of cutter, boat, aviation, shore, and deployable specialized forces. Previously, he served as the Commander of 17th Coast Guard District, headquartered in Juneau, Alaska, where he was responsible for multi-missioned Coast Guard operations in Alaska, the North Pacific Ocean, Arctic Ocean, and Bering Sea. His education includes a Bachelor of Science in Civil Engineering, with high honors, from the USCG Academy in 1983. He also served as valedictorian of the College of William and Mary's Master of Business Administration class of 1994.



Rear Admiral Kazumine Akimoto

As a retired Rear Admiral of the Japan Maritime Self-Defense Force (JMSDF), Mr. Akimoto is now Senior Research Fellow at the Ocean Policy Research Institute of Sasakawa Peace Foundation. Rear Adm. Akimoto's field

of study is maritime security and naval strategy. He has written numerous articles and booklets related to maritime security and naval strategy. Some of his publications are *Sea Power Renaissance*, *Paradigm Shift of the Sea Power*, and *Structural Weakness and Threat in the Sea Lanes*.



Raymond Arnaudo

Mr. Arnaudo is a retired diplomat and former senior scholar at the American Association for the Advancement of Science, with a career of experience in international environmental and science policy affairs at the State

Department. He has a long history of work in the area of US polar policy, including Director of the Office of Oceans and Polar Affairs at the State Department, head of US delegations to Antarctic and Arctic meetings, Chairman of the Arctic Council in 1998–2000, and Science Counselor at US Embassy London. He has also served abroad in Moscow, and, for the last four years of his government career, served on Secretary of State Clinton's Policy Planning Staff. Mr. Arnaudo received his BA from Stanford University and his MA from the John Hopkins School of Advanced International Studies. He's also served in the US military. Mr. Arnaudo is a native San Franciscan and is married to Rose Gottemoeller.



Dr. Alyson Azzara

Dr. Azzara is the Arctic and International Trade Specialist for the US Maritime Administration at the Department of Transportation. Her work focuses on Arctic trade issues, including vessel safety, navigation, infrastructure, and environmental stewardship. Dr. Azzara provides additional policy expertise on Arctic trade issues impacting the US flag fleet, and she serves as a subject matter expert for various Arctic Council and IMO working groups. She holds a PhD in marine biology from Texas A&M University at Galveston with research focused on bioacoustics and the interaction between large vessels and whales in the Gulf of Mexico.



Rear Admiral Matthew T. Bell Jr.

Rear Adm. Bell assumed the duties of Commander, 17th Coast Guard District in May 2018. He is responsible for US Coast Guard operations throughout Alaska, the North Pacific Ocean, Arctic Ocean, and Bering Sea, which includes protecting life and property, enforcing federal laws and treaties, preserving living marine resources, and promoting national security. Rear Adm. Bell is a 1984 graduate from Northern Arizona University. He entered the Coast Guard through the Recruit Training Center in 1985 and received his commission in 1986 upon graduation from Officer Candidate School. Rear Adm. Bell has over 12 years of sea service including three afloat command tours; much of his time at sea was spent patrolling the Pacific and Bering Sea waters. He has also served as the Commander of the Personnel Service Center, Chief of Staff of Pacific Area, and Commodore of Patrol Forces Southwest Asia in Manama, Bahrain.



Anne Barker

Ms. Barker is an engineer within the Ocean, Coastal, and River Engineering portfolio at the National Research Council of Canada (NRC). As leader of the NRC's Arctic Program, Ms. Barker is responsible for the delivery of relevant research outcomes to enable sustainable, low impact resource development of the Arctic while increasing the quality of life of northerners. The program has partners throughout federal, provincial, and territorial government departments, regional corporations, local communities, small and medium enterprises (SMEs), and large multinational corporations. Since joining NRC in 1998, Ms. Barker has participated in and led projects involving numerical simulations, fieldwork, physical modeling, and analytical studies of ice cover behavior and ice structure interaction. Ms. Barker is a member of the Professional Engineers of Ontario and holds bachelor's and master's degrees in civil engineering from Queen's University, Canada.



James Bond

Mr. Bond is Director, Advisory Services, at the American Bureau of Shipping (ABS) in Houston. Mr. Bond focuses on polar shipping and Arctic offshore exploration. He has spent time on ships in ice in the Canadian Beaufort Sea and the Gulf of St. Lawrence. Mr. Bond represented the International Association of Classification Societies (IACS) at the International Maritime Organization negotiations for the Polar Code, is a member of the IACS project team working on updates to the polar ship structures rules, and is Chair of the IACS Expert Group for Polar Code. He oversees and sets priorities for the work at ABS' Harsh Environment Technology Center in partnership with Memorial University of Newfoundland in St. John's. Mr. Bond is a Fellow of SNAME and a registered Professional Engineer in the Province of Ontario.



Andrey Bondarev

Mr. Bondarev, a career diplomat, is Senior Counselor for Economic Affairs at the Russian Embassy in Washington, DC. It is his second appointment to the Economic Office of the Russian Embassy in the US capital. His previous

experience includes working as a consul in the Russian Consulates General in Kharkov (Ukraine) and in Seattle, Washington, and in the North American Department within the Ministry of Foreign Affairs, where he covered bilateral economic issues. Mr. Bondarev is graduate of the economic division of the MGIMO, Russian MFA's alma mater—Moscow State Institute of International Affairs.



Dr. Lawson Brigham

Dr. Brigham is a Global Fellow at the Polar Institute, Woodrow Wilson International Center for Scholars, and a researcher at the International Arctic Research Center, University of Alaska Fairbanks. He is also a Fellow

at the US Coast Guard Academy's Center for Arctic Study and Policy and a member of the National Academies Polar Research Board. As a career Coast Guard officer, Captain Brigham commanded four cutters including the polar icebreaker *Polar Sea* on Arctic and Antarctic expeditions. During 2004–2009, he was chair of the Arctic Council's Arctic Marine Shipping Assessment. He received his PhD from Cambridge University. His research interests have focused on the Russian maritime Arctic, environmental change, polar marine transportation, Arctic security, and polar geopolitics. A central peak in the Gonville and Caius Range, Victoria Land, Antarctica, was named Mount Brigham in January 2008 by the US Board of Geographic Names.



LeeAnn Borman

Ms. Borman (SES), is Deputy Director, Strategy, Concepts, and Assessments, Deputy Chief of Staff for Strategic Plans and Requirements for the US Air Force. She develops and synchronizes Air Force strategy and strategic plan-

ning efforts, and aligns planning products with strategic guidance. She supports the chief of staff of the Air Force with strategy development and assessments. Previously, Ms. Borman served in the Office of the Secretary of Defense as a senior policy advisor in Washington Headquarter Services, and was Director for Operations in the Office of the Assistant Secretary of Defense for Legislative Affairs where she directly supported the Secretary of Defense and managed DOD's legislative program. Ms. Borman worked in the Office of the Under Secretary for Policy for 15 years. From 2007 to 2010 she served as Director for Policy to the Secretary and Under Secretary of the Navy. Ms. Borman began her civil service career as a presidential management intern.



Helen Brohl

Ms. Brohl was appointed as the first Executive Director of the US Committee on the Marine Transportation System (CMTS) in July 2006 by US Department of Transportation Secretary Norman Mineta. Maritime transportation over-

sight and interest within the US federal government is spread throughout many authorities, departments, and budget line items. As a career Senior Executive, Ms. Brohl manages the CMTS partnership, established under a Presidential Directive in 2004 and authorized in 2012, that joins over 25 federal agencies to address US waterways, ports, and intermodal connections. Working with senior political, military, and civilian leaders in the federal government, Ms. Brohl directed the development and Cabinet-level approval of the first-ever *National Strategy for the Marine Transportation System* to improve the MTS for capacity, safety and security, environmental stewardship, resiliency, and financing. Ms. Brohl has degree in coastal geology from Florida Atlantic University and a master of science degree from The Ohio State University in Great Lakes land and water use policy.



Deputy Secretary Dan Brouillette

Mr. Brouillette is Deputy Secretary of the US Department of Energy. He was previously Senior Vice President and the head of public policy for USAA, the leading provider of financial services to the US military community. Before that,

he was a vice president of Ford Motor Company, where he led the automaker's domestic policy teams and served on its North American Operating Committee. Mr. Brouillette held numerous positions in government. He was chief of staff to the US House of Representatives Committee on Energy and Commerce. He also served as Assistant Secretary of Energy for Congressional and Intergovernmental Affairs from 2001 to 2003. In addition, he is a former state energy regulator, having served as a member of the Louisiana State Mineral and Energy Board from 2013 to 2016. Mr. Brouillette and his wife, Adrienne, are both US Army veterans. They hail from San Antonio, Texas, and have nine children.



Alina Bykova

Ms. Bykova is a researcher at The Arctic Institute. She assists the editing team and works on Russian writing and translation. Her research interests include Russian Arctic policy, Russian environmental history, deindustrialization, and Arctic resource extraction. Ms. Bykova completed her master's degree at the Centre for European, Russian, and Eurasian Studies within the University of Toronto. Prior to her experience in academia, she earned a bachelor's degree in journalism from Ryerson University and worked as a breaking news reporter at the Toronto Star, Canada's largest newspaper.



Lt. General Thomas A. Bussiere

Lt. Gen. Bussiere is the Commander, Alaskan North American Aerospace Defense Command Region, North American Aerospace Defense Command; Commander, Alaskan Command, US Northern Command;

Commander, Eleventh Air Force, Pacific Air Forces, Joint Base Elmendorf-Richardson, Alaska. He is the senior military officer in Alaska, responsible for the integration of all military activities in the Alaskan joint operations area, synchronizing the activities of more than 21,000 active-duty and reserve forces from all services. Lt. Gen. Bussiere directs operations to ensure effective surveillance, monitoring, and defense of the region's airspace. He is responsible for the planning and execution of all homeland defense operations within the area of responsibility, including security and civil support actions. The general also commands 11th Air Force, overseeing the training and readiness of five wings and Air Force installations located in Alaska, Hawaii, and Guam. Lt. Gen. Bussiere is a 1985 distinguished graduate of Air Force ROTC from Norwich University.



Leslie Canavera

Ms. Canavera is the CEO of PolArctic LLC, an oceanography and data science company focused on solving business challenges in the Arctic. Ms. Canavera has over 13 years of experience in both the public and private sectors execut-

ing large and complex programs. She is Yup'ik, born and raised in Alaska, and a veteran of the US Air Force where she served as a commissioned officer. From the USAF she transitioned to the National Geospatial-Intelligence Agency (NGA) for five years, conceptualizing and initializing programs with complex geospatial components and analytics. Ms. Canavera left NGA to found the tech start-up PolArctic LLC based on her experience and passion for the Arctic, and to bridge the gap between science and business requirements. She holds a bachelor of science degree from Oregon State University and an MBA from Northcentral University with a focus on International Business. Additionally, she is completing a master of science degree in analytics from American University with studies in artificial intelligence.



Ambassador Marie-Anne Coninx

Ms. Coninx has been Ambassador at Large for the Arctic since September 2017. She previously was European Union Ambassador to Canada (2013–2017) where she extensively visited the Canadian Arctic after serving four years as EU Ambassador to Mexico. Ambassador Coninx also served as the number two at the EU Delegations in New York and Geneva, providing her with extensive experience on multilateral issues. She has been an EU official since 1984. Ambassador Coninx studied law at Gent University (Belgium), did post-graduate studies at Cambridge University (UK) and at European University in Nancy (France). She is Belgian and speaks five languages.



Jack Durkee

Mr. Durkee is the program assistant for the Wilson Center's Polar Institute. His responsibilities include event coordination, financial management, grant management, and administrative issues. Mr. Durkee previously worked with the CEO of the Wilson Center and with the Middle East Program. His research interests include US Arctic policy, Arctic geopolitics, and international relations. He earned his BA in political science (international relations) from UC San Diego.



Elizabeth "Liz" Cravalho

Ms. Cravalho oversees external affairs across NANA. She and her team advance NANA's interests in various areas of policy, including Arctic opportunities, indigenous representation, and initiatives that further NANA's business goals. Ms. Cravalho, a native of Kotzebue, Alaska, has experience advocating for Alaska Native Corporation participation in the Small Business Administration 8(a) Program, working with subsidiary businesses that provide services to federal customers, and supporting responsible resource development. In addition to her time at NANA, Ms. Cravalho serves as the Chair of the Alaska Humanities Forum board, an organization that builds social bridges across Alaska's diverse geography, cultures, and communities through granting, educator, and leadership programs. She served on the Alaska Arctic Policy Commission for two years. Ms. Cravalho holds a BA in history from Colorado College and an MS in organization development from American University.



Dr. Heather Exner-Pirot

Dr. Exner-Pirot is a research associate at the Observatoire de la politique et la sécurité de l'Arctique (OPSA) and the managing editor of the Arctic Yearbook. She has held positions at the University of Saskatchewan, the International Centre for Northern Governance and Development, and the University of the Arctic. Dr. Exner-Pirot is a regular contributor to Radio Canada's Eye on the Arctic website, a Board member for The Arctic Institute (TAI) and Saskatchewan First Nations Economic Development Network, and Chair of the Canadian Northern Studies Trust. She completed her doctoral degree in political science at the University of Calgary in 2011. She has published extensively in Arctic and northern governance, regionalism, human security, and development.



Dr. John Farrell

Dr. Farrell is the executive director of the US Arctic Research Commission, an independent federal agency of Presidential appointees that advises the White House and Congress on Arctic research matters and works

with executive branch agencies to establish and execute a national Arctic research plan. Dr. Farrell previously served as Associate Dean of Research and Administration at the University of Rhode Island's Graduate School of Oceanography. Before that, he was Director of the international Ocean Drilling Program that involved over 20 nations and was dedicated to advancing scientific understanding of the Earth. He earned ScM and PhD degrees in geological sciences from Brown University, and a bachelor's degree in geology from Franklin and Marshall College. He was an NSF-funded postdoctoral fellow at Brown University, an NSERC-funded senior research associate at the University of British Columbia, in Vancouver, Canada, and a science fellow at the US Embassy in Berlin, Germany.



Andrew F. Gelfuso

Mr. Gelfuso is Vice President at Trade Center Management Associates (TCMA), a privately held, wholly owned subsidiary of the Boston-based Drew Company. TCMA serves as the full service property management company

for the Ronald Reagan Building and International Trade Center. This facility is also designated as the official World Trade Center of Washington, DC. Mr. Gelfuso graduated in 1997 from Hobart College in Geneva, New York, with a degree in political science. He earned his MBA with a concentration in international business in 2001 from Johnson and Wales University in Providence, Rhode Island.



Rear Admiral Tim Gallaudet, PhD

Rear Adm. Tim Gallaudet, PhD, USN Ret., Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator. Dr. Gallaudet was previously a rear admiral in the US Navy, where his most recent assignment

was Oceanographer of the Navy and Commander of the Navy Meteorology and Oceanography Command. During his 32 years of military service, Dr. Gallaudet has had experience in weather and ocean forecasting, hydrographic surveying, developing policy and plans to counter illegal, unregulated, and unreported fishing, and assessing the national security impacts of climate change. He has led teams of Navy sailors and civilians performing such diverse functions as overseeing aircraft carrier combat operations, planning and conducting humanitarian assistance and disaster response efforts, assisting Navy SEAL teams during high visibility counter-terrorism operations, and developing the Navy's annual \$52 billion information technology, cyber security and intelligence budget. Dr. Gallaudet holds a bachelor's degree from the US Naval Academy and master's and doctoral degrees from Scripps Institution of Oceanography, all in oceanography.



Dr. Mikhail Grigoriev

Dr. Grigoriev is the co-owner and director of GEOCON, a geological and mineral recovery consulting company with offices in St. Petersburg and Moscow, Russia. From 1997 to 2000 he served as Director of the Institute for Geology

and Development of Fossil Fuels in the Ministry of Fuel and Energy of the Russian Federation. For nearly 20 years, he worked in the Arctic Oil and Gas Division in the All-Russian Research Institute for Geology and Mineral Resources of the Ocean in the Ministry of Natural Resources of the Russian Federation. Dr. Grigoriev has published over 300 papers on oil and gas resources, transportation infrastructure development, and other topics, and has participated in 12 Arctic expeditions. He's a full member of the Russian Academy of Natural Sciences, and a member of the Scientific Council of the Security Council of the Russian Federation, and the European Association of Geoscientists and Engineers.



Zachary D. Hamilla

Mr. Hamilla is Executive Director of the Arctic Studio, a small research organization focused on Arctic politics, economics, and security in Portland, Oregon. Mr. Hamilla is concurrently Adjunct Instructor in Political Science at

Portland State University, where he mostly teaches courses in national security and East Asian politics. He also teaches survey courses in international and comparative politics and United States history at other colleges in Oregon. Mr. Hamilla was previously Principal Analyst for the Arctic at the Office of Naval Intelligence (ONI) from 2009 to 2014. In that position, he conducted original research and authored studies on Arctic security, presenting regularly to senior leadership throughout the US government. He previously served as political-military analyst for Russia and Northern Europe at ONI from 2007 to 2009. Mr. Hamilla received his master's degree in international studies from the Korbel School of International Studies at the University of Denver and his bachelor's degree in history from Vassar College.



Maktuayaq Mellisa Heflin

Ms. Heflin is the executive director of the Bering Sea Elders Group (BSEG). Her passion for protecting, respecting, and maintaining Alaska Native traditional ways of life began while growing up in Nome, Alaska, with her maternal

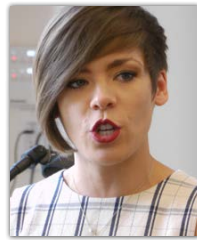
grandparents. Ms. Heflin's upbringing with her grandparents and many other Elders, along with inspiration from her three children, drives her to work to revitalize and promote different cultural aspects of life, from arts and crafts to traditional food preparation and from land and sea preservation to indigenous language revitalization. Ms. Heflin is passionate and motivated to advocate, educate, and share with others the importance of preserving and maintaining Indigenous way of life for the Bering Sea region in the Arctic. She has a strong cultural sense of being Indigenous and carries a deep passion for learning and sharing the Inupiat and Yup'ik cultures.



Sarah Harrison

Ms. Harrison is an Arctic marine transportation specialist with the US Committee on the Marine Transportation System (CMTS), where she is providing support to the CMTS Arctic Marine Transportation Integrated

Action Team and developing a forecast of vessel activity in the US Arctic region from 2020 to 2030. She first joined the CMTS as a Sea Grant Knauss Fellow in 2018 and managed CMTS interagency teams focused on the Arctic and innovative science and technology applications for the marine transportation system. Sarah holds a BS in chemistry from Haverford College and an MS in marine sciences from the University of Georgia, where she studied the fate of oil in the marine environment.



Dr. Victoria Herrmann

Dr. Herrmann is President and Managing Director of The Arctic Institute. Her research and writing focus on climate change, community adaptation, human development, and resource economies. Dr. Herrmann

previously worked as a fellow at the National Academies Polar Research Board and at the Carnegie Endowment for International Peace's Energy and Climate Program. She was awarded a Fulbright Scholarship to Canada to pursue Arctic research in 2013. Dr. Herrmann has published in peer-review journals, including the Polar Law Yearbook, Polar Record, and Polar Geography and has appeared on CNN, BBC, and NPR. She has taught sustainability management at American University and science communication at the University Centre of the Westfjords, Iceland. Dr. Herrmann received her PhD in geography as a Gates Scholar from the Scott Polar Research Institute at Cambridge University in 2018 and holds a master's degree from the Norman Paterson School of International Affairs at Carleton University.



**Deputy Ambassador
Kirsten Hillman**

Ms. Hillman is Canada’s Deputy Ambassador to the United States. Previously, she served as Assistant Deputy Minister of the Trade Agreements and Negotiations Branch at Global Affairs Canada. She also held the position of Associate Assistant Deputy Minister of the Trade Agreements and Negotiations and Canada’s Chief Negotiator for the Trans-Pacific Partnership, and Director General of the Trade Negotiations Bureau. Hillman served as the Senior Legal Adviser at the Permanent Mission of Canada to the World Trade Organization, and Director of the Technical Barriers and Regulations Division. She worked for a number of years in the Legal Branch at Foreign Affairs and International Trade Canada. Prior to becoming a public servant, Ms. Hillman practiced law in Montreal in the area of commercial litigation. She holds a bachelor of arts degree from the University of Manitoba and bachelor of civil law and bachelor of common law degrees from McGill University.



Dr. Nong Hong

Dr. Hong is Executive Director and Senior Fellow of the Institute for China–America Studies. She holds a PhD of interdisciplinary study of international law and international relations from the University of Alberta, Canada, and held a postdoctoral fellowship in the University’s China Institute. She was ITLOS-Nippon Fellow for International Dispute Settlement (2008–2009), and a visiting fellow at the Center of Oceans Law and Policy, University of Virginia (2009) and at the Max Planck Institute for Comparative Public Law and International Law (2007). She is concurrently a research fellow with China Institute, University of Alberta, Canada, and the National Institute for South China Sea Studies, China. Dr. Hong’s research takes an interdisciplinary approach to examining international relations and international law, with focus on international relations and comparative politics in general; ocean governance in East Asia and the Arctic; Law of the Sea; international security, particularly nontraditional security; and international dispute settlement and conflict resolution.



Alf Håkon Hoel

Mr. Hoel is a professor of ocean law and policy at Norway’s Arctic University in Tromsø—the world’s northernmost university—and has an adjunct position at the Institute of Marine Research as well as a Global Fellow at the Wilson Center’s Polar Institute. His research interests center on the ocean and the Arctic in international affairs, on which he has published widely. Mr. Hoel is also an advisor to Norwegian delegations to a number of international processes related to the ocean, ocean science, and fisheries. He served as a Counselor for Fisheries and Oceans within the Royal Norwegian Embassy in Washington, DC, from 2015 to 2018.



Dr. Robert Huebert

Dr. Huebert is an associate professor in the Department of Political Science at the University of Calgary. He also served as the associate director of the Centre for Military and Strategic Studies. He was appointed as a member to the Canadian Polar Commission (now renamed Canada Polar Knowledge) for a term lasting from 2010 to 2015. He is also a research fellow with the Canadian Global Affairs Institute. Dr. Huebert has taught at Memorial University, Dalhousie University, and the University of Manitoba. He publishes on the issue of Canadian Arctic Security, Maritime Security, and Canadian Defence. His work has appeared in *International Journal*, *Canadian Foreign Policy*, *Isuma-Canadian Journal of Policy Research*, and *Canadian Military Journal*. He was co-editor of *Commercial Satellite Imagery and United Nations Peacekeeping and Breaking Ice: Canadian Integrated Ocean Management in the Canadian North*. His most recent book, written with Whitney Lackenbauer and Franklyn Griffiths, is *Canada and the Changing Arctic: Sovereignty, Security, and Stewardship*. He also comments on Canadian security and Arctic issues in both the Canadian and international media.



Lillian Hussong

Ms. Hussong is a PhD candidate at the Rutgers University Division of Global Affairs and a researcher and social media manager for The Arctic Institute. Ms. Hussong is currently writing her dissertation, which focuses on American

strategic planning in the North Atlantic. She has presented her research on American national security in the Arctic at the International Studies Association annual conventions in Baltimore and San Francisco, as well the International Arctic Social Sciences Association's triennial conference in Umeå, Sweden. She has been awarded the Simon Reich Fellowship for Research in Global Governance and the Raphael Lemkin Fellowship at Rutgers. Ms. Hussong also holds a master of arts degree in holocaust and genocide studies with program distinction from Stockton University.



Timothy Keane

Mr. Keane is Senior Manager, Arctic Operations and Projects, and Vice-President, Enfotec Technical Services, a division of Fednav Limited. He began his career at Fednav on the operations side in 1977. Since 1997, Mr. Keane has

been managing the commercial operations of the company's Arctic business line, including to the commercial management of NUNAVIK, UMIAK I, and ARCTIC, the company's icebreaking bulk carriers. In 2010, Mr. Keane assumed responsibility for Enfotec, providing ice navigation support services to the company's vessels and to outside clients. In addition to duties at Fednav, he represents the company's interests on the Coast Guard's Arctic Marine Advisory Board among other industry / government forums.



Dr. Mark D. Ivey

Dr. Ivey is the manager for DOE's North Slope of Alaska Atmospheric Radiation Measurement Facilities. He is a distinguished member of the technical staff at Sandia National Laboratories in Albuquerque, New Mexico, where

he has worked since the early 1980s. Dr. Ivey is a member of the Atmospheric Sciences Department within Sandia's Geoscience Research and Applications group and serves on program management teams developing strategies for Sandia's modeling and measurement capabilities. Before joining Sandia, Dr. Ivey worked for technology companies in New Mexico and California, and he taught as an adjunct in the electrical engineering department at Montana State University in Bozeman. He currently serves on the North Slope Science Initiative's Science and Technology Science Panel and served for six years on the Board of Directors for the Arctic Research Consortium of the United States. Dr. Ivey received his PhD in electrical engineering in 1988 from the University of New Mexico.



Major General Randy "Church" Kee

Major General Kee, United States Air Force (Ret.) is the Executive Director of the Arctic Domain Awareness Center (ADAC) at the University of Alaska, a DHS Center of Excellence. Since January 2016, General Kee leads a

distributed team in a comprehensive effort of Science and Technology, Research and Development. General Kee has commanded at the Squadron, Group and Wing levels. He served as the Vice Commander of the USAF's Global Air Mobility Center. General Kee's staff assignments include US Transportation Command, Headquarters USAF, and the US Joint Staff in both Operations and Strategic Plans and Policy Directorates. He has contributed to US Arctic Strategy, supported domain awareness technology development, and contributed to Defense Support on Arctic planning initiatives. He culminated his military service as the Director of Strategy, Policy, Planning, and Capabilities for US European Command in Stuttgart, Germany.



David Kennedy

Mr. Kennedy is NOAA's Senior Policy Advisor for the Arctic region. He works closely with leadership and the NOAA Arctic Task Force to address policy goals, objectives, and program matters. Kennedy retired from federal service in January 2014, after more than 20 years of service to NOAA and the nation. Prior to retiring, he served as NOAA's Deputy Under Secretary for Operations. As NOAA's chief operating officer, he was responsible for the day-to-day management of NOAA's national and international operations for ocean and atmospheric services, research and coastal and marine stewardship. He was a key advisor to the Under Secretary/NOAA Administrator on program and policy issues. In 2001 and in 2009, Mr. Kennedy was recognized with a prestigious Presidential Rand Award for his leadership and exemplary accomplishments, including the development of NOAA's Office of Response and Restoration that has become the leader in environmental pollution response and assessment.

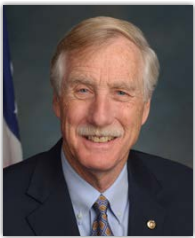
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Michael Kingston

Mr. Kingston, based in London, is an Irish lawyer from Goleen, County Cork in Ireland, and is the 2014–2015 Lloyd's List Global Maritime Lawyer of the Year for his contribution to safety of life at sea, particularly in the polar regions in relation to risk and regulation as the Polar Code was being finalized. Mr. Kingston represented the International Union of Marine Insurance (IUMI) on the IMO's world delegation Correspondence Group in the final stages of the development of the "ice regime" that will guide limitation for operation in ice, following his earlier work on specialist insurers, Lloyd's of London's Arctic Report. He worked with the US Government during their Arctic Council Chairmanship and in July 2015 received the US Coastguard Challenge Coin for his efforts to promote maritime safety by raising awareness about the IMO Polar Code.

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Senator Angus King

In January 2013, Angus King was sworn in as Maine's first Independent United States Senator. A strong believer in the need for greater bipartisan dialogue and relationship building, he is a member of the Armed Services Committee, the Select Committee on Intelligence, the Committee on Energy and Natural Resources, the Committee on the Budget, and the Committee on Rules and Administration. Armed Services Committee Chairman John McCain has called him "one of the most serious and hard-working members." During his Senate tenure, Senator King has worked to strengthen America's national security, conducted critical oversight of the nation's Intelligence Community, supported common-sense budget priorities. He also served as the 72nd Governor of Maine. Senator King attended Dartmouth College and the University of Virginia Law School.

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Dr. Nettie La Belle-Hamer

Dr. La Belle-Hamer is the University of Alaska Fairbank's (UAF's) Geophysical Institute Deputy Director and Director of the Alaska Satellite Facility. A lifelong Alaskan, Dr. La Belle-Hamer received her bachelor's degree in physics from the University of California, Berkeley, in 1985, and both her master's and her PhD in space physics at UAF in 1988 and 1994, respectively. Under her direction since 2002, ASF has grown into a strong program with a bright future in remote-sensing data access that now includes two ground stations, a large NASA data center, and developing CubeSat support. Dr. La Belle-Hamer is leading the UAF collaboration efforts with Sandia National Labs and private industry partners, bringing together many disparate discipline experts at UAF. As UAF's lead in forming the Arctic GeoData Cooperative, she is working to bring together commercial, educational, and governmental partners to produce, enhance, and maintain authoritative, dynamic, geospatial information for the Arctic.

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Rebecca Lynge

Ms. Lynge is civil servant in the Government of Greenland currently working as First Secretary to the Greenland Representation in Washington, DC. She previously worked in the Ministry for Foreign

Affairs and as an intern at the Representation to the EU in Brussels. Ms. Lynge was also Head of Section for Greenland's trade policy and responsible for coordinating Greenland's participation in international program cooperation. In 2016, she was appointed as the Kingdom of Denmark's Head of Delegation to the Arctic Council's Sustainable Development Working Group. While serving in Nuuk, Ms. Lynge advanced indigenous peoples' rights and policy, and worked to achieve the goals of the UN Declaration on the Rights of Indigenous Peoples. She has a bachelor of arts degree in the Spanish language and American studies and a master's degree in international development.



Rear Admiral Thomas Marotta

Rear Adm. Marotta, Reserve Deputy OPNAV N3N5, is a 1985 graduate of the US Naval Academy. Flying the F-14 Tomcat, he was deployed to the Indo-Pacific region and to Operation Desert Shield. Rear Adm. Marotta left

active service in 1995 and affiliated with VF-201 at Naval Air Station Dallas. He took command of Strike Fighter Squadron 201 in March 2002. The squadron was mobilized in support of Operation Iraqi Freedom. Follow-on tours were many, including as Commander, Naval Forces Europe/Commander, US 6th Fleet Maritime Partnership Program Det. and Deputy Commander, Navy Reserve Component Command Southeast. As a flag officer, he has served as Deputy Commander, Navy Recruiting Command and Vice Commander, US Naval Forces Central Command/US 5th Fleet. Rear Adm. Marotta has logged over 3,300 hours and 500 carrier landings in Navy Aircraft and has received many awards. In civilian life, Rear Adm. Marotta is a captain and instructor pilot with FedEx Express.



Ambassador Harri Mäki-Reinikka

Ambassador Mäki-Reinikka is Secretary General of Finland's Arctic Advisory Board, Ambassador on northern policies at the Ministry of Foreign Affairs Arctic Team (since September 1, 2016). He worked as Ambassador of Finland

to six countries—to Lithuania and Belarus from January 2013 through August 2016 and to Syria, Lebanon, Iraq, and Jordan from September 2008 through January 2012. Ambassador Mäki-Reinikka was Deputy to the Minister and Chief of the Secretariat for Nordic Cooperation at the MFA in 2005–2008. He has gained experience on Arctic issues already through his involvement in the Northern Dimension process in 1996–1998.



Craig N. McLean

Mr. McLean is Assistant Administrator for NOAA's Oceanic and Atmospheric Research (OAR) office. He is responsible for directing and implementing NOAA's research enterprise. Among numerous formal international engage-

ments in science and technology, Mr. McLean serves as the US Representative to the Intergovernmental Oceanographic Commission (IOC) and as the co-chair of the US European Union Marine Working Group. Mr. McLean previously served as NOAA's Acting Deputy Assistant Administrator of the National Ocean Service, was founding Director of OAR's Office of Ocean Exploration and Research, and served nearly 25 years in NOAA's Commissioned Corps, making the rank of Captain. Among his achievements and accolades, Mr. McLean led NOAA's planning for the Smithsonian Institution's Sant Ocean Hall and has won the Department of Commerce Silver and Bronze Medals, the NOAA Corps Commendation Medal, and Special Achievement Medal.



Dr. S. Bradley Moran

Dr. Moran is Dean of the University of Alaska Fairbanks College of Fisheries and Ocean Sciences. Prior to his appointment as Dean, Dr. Moran served as Acting Director of the Obama Administration's National Ocean Council, Assistant Director for Ocean Sciences in the White House Office of Science and Technology Policy, and Program Director in the Chemical Oceanography Program at the National Science Foundation. In his previous academic position as Professor of Oceanography at the University of Rhode Island Graduate School of Oceanography, he served as Co-Director of the Rhode Island NSF Experimental Program to Stimulate Competitive Research and as Assistant Vice President for Research. Dr. Moran received a BSc in chemistry from Concordia University, a PhD in oceanography from Dalhousie University, and conducted his postdoctoral research at Woods Hole Oceanographic Institution.



Val Muzik

Ms. Muzik is a research associate and visual manager at The Arctic Institute, where she researches the implications of data-intensive telecommunications technologies on governance in the Arctic. Ms. Muzik is a PhD student in political science at the University of British Columbia in Vancouver, Canada; for her master's in international relations, Ms. Muzik investigated perceptions of climate change and sense of threat to national security in Canada.



Senator Lisa Murkowski

Senator Murkowski is the first Alaska-born Senator and only the sixth United States Senator to serve the state. As the state's senior Senator, she has been a strong advocate for important issues facing the state, including energy, health care, education, military/veterans' affairs, and infrastructure development. She is Chairman of the Senate Energy and Natural Resources Committee and also serves on the Senate Appropriations Committee, where she is Chairman of the Interior and Environment Subcommittee. Senator Murkowski is a member of the Senate Health, Education, Labor, and Pensions Committee and also is a senior member of the Senate Indian Affairs Committee. She earned a BA in economics from Georgetown University in 1980 and a law degree from Willamette University in 1985. Prior to her appointment to the United States Senate, Senator Murkowski practiced law in Anchorage and was elected to three terms in the Alaska State House of Representatives.



Ole Rasmus Øvretveit

Since 2012, Mr. Øvretveit has served as the general manager and now director of Arctic Frontiers, which brings together academia with decision makers from government and business. Before that, he worked as a project manager at Hordaland County and at MultiVit. He has a master's degree in political science and comparative politics from the University of Bergen. "The image that people have of the Arctic is multifaceted... It might be of ice, of remote communities, of ocean, more ice, polar bears, climate change, resources, and more ice, again. Now these are all concepts that exist in the Arctic and they are all important, but they do not constitute the region alone. There are also thriving, modern, technologically advanced, knowledge-based, connected, smart societies in the North."



Hreinn Pálsson

Mr. Pálsson is currently acting as Chargé d'affaires of the Embassy of Iceland. He has worked for the Icelandic Ministry for Foreign Affairs since 2005. Mr. Pálsson was first posted at the Icelandic Embassy in Washington, DC,

followed by a posting to the Department for Administration and Consular Affairs in Reykjavik as deputy head of sections. In 2009 he was in charge of Iceland's participation at World EXPO 2010 in Shanghai and served simultaneously as Iceland's Consul General in the city. In 2011 Mr. Pálsson served as a Director at the Ministry for Foreign Affairs overseeing the translation and implementation of EU aquis into Icelandic law. In 2013 he was posted as Deputy Chief of Mission at the Icelandic Embassy in Moscow, and since 2017 he has served as Deputy Chief of Mission and Defense Attaché at the Icelandic Embassy in Washington, DC. At the Embassy in Washington, Mr. Pálsson is responsible for all matters related to defense, security, politics, and the Arctic.



Hugh Patkotak Sr.

Mr. Patkotak is President and CEO of Olgoonik Corporation, the Alaska Native-owned village corporation of Wainwright, Alaska. An Iñupiaq born and raised in Wainwright, a Chukchi Sea coastal subsistence community,

Mr. Patkotak has served on the Corporation's Board of Directors in various positions for more than a decade. As President and CEO, he oversees the strategic planning and business strategies of Olgoonik's team of international operating companies. He also participates in global forums to maintain Olgoonik's active voice on natural resource development and conservation policy formation. Prior to assuming his current position with Olgoonik, Mr. Patkotak was an accomplished professional pilot for more than three decades. Most recently and for nearly 20 years, he served in the North Slope Borough's Search and Rescue Flight Division where he conducted airborne response in one of the world's most challenging environments. Flying continues to be his enduring hobby and passion.



Lori Parrott

Ms. Parrott leads the Arctic Science and Security initiative at Sandia National Laboratories, integrating investments in Arctic science, energy, and infrastructure, and security across the laboratories. She leads the Atmospheric

Science Department, which manages the North Slope of Alaska sites for the Department of Energy's Atmospheric Radiation Measurement (ARM) program at Oliktok Point, Utqiaqvik, and Atkasuk, Alaska, as well as conducting atmospheric measurement and modeling as a part of DOE's Energy Exascale Earth System Model (E3SM) program. She has led diverse programs at Sandia over her career, including multiscale, multidomain infrastructure consequence modeling and analysis, government liaison, and strategic planning. Her degrees are from Rensselaer Polytechnic Institute and Iowa State University.



Dr. Rebecca Pincus

Dr. Pincus is an assistant professor in the Strategic and Operational Research Department (SORDD) in the Center for Naval Warfare Studies at the US Naval War College (NWC). At NWC, she is an associate of the Russia Maritime

Studies Institute (RMSI) and the Institute for Future Warfare Studies (IFWS). Her current research interests center on security and foreign affairs in the Arctic and North Atlantic. Her work has appeared in *Polar Journal*, *Polar Geography*, *War and Society*, *War on the Rocks*, *The Diplomat*, and more. In 2015, Yale released *Diplomacy on Ice: Energy and the Environment in the Arctic and Antarctica*, co-edited with Dr. Saleem Ali. Dr Pincus previously served as primary investigator at the US Coast Guard's Center for Arctic Study and Policy, and was a Fulbright Fellow in Iceland in 2015.



Delbert Pungowiyi

Mr. Pungowiyi was born on St. Lawrence Island in Savoonga, Alaska, in 1959. He remembers when they used to have nine good months of winter, whereas it is now down to three months. The sea ice is coming in too late and going out

too early. Mr. Pungowiyi has been with the Native Village of Savoonga Tribal Council (a federally recognized tribal government) from 2005 to 2008 and from 2014 to present, the fourth consecutive year as president. He has also served on Savoonga's Corporation-Kukulget, Incorporated from 1994 to 2000. He is currently serving on the Bering Strait Housing Authority Board of Commissioners and the Kawerak Board of Directors. Mr. Pungowiyi is passionate about helping his people and the whole world. His grandfather's message drives him to help his people and the people of the world. Mr. Pungowiyi's grandfather's words are: we need to protect what little ecosystems we have left on our Mother Earth. His grandfather's warning: if we fail to protect what ecosystems we have left, the consequences are worldwide catastrophic, apocalyptic disasters.



Dr. Frank R. Rack

Dr. Rack joined the National Science Foundation (NSF) in 2016 as a Program Manager for Arctic Research Support and Logistics in the Office of Polar Programs. He is responsible for NSF-funded field projects in Alaska and

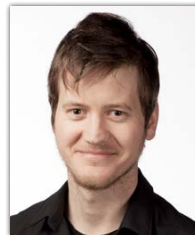
on vessels operating in the Arctic Ocean and surrounding seas. Prior to joining NSF, Dr. Rack was a tenured associate professor at the University of Nebraska-Lincoln, where he served for 10 years as Executive Director of the ANDRILL Science Management Office, focused on scientific (geologic) drilling and clean access (hot water) drilling into ocean and subglacial lake environments in Antarctica. Dr. Rack served as Director of Ocean Drilling Programs at Joint Oceanographic Institutions Inc., from 2003 to 2006, and Assistant Director, Ocean Drilling Programs from 1998 to 2003. Dr. Rack earned his PhD from Texas A&M University in 1992 and served as a research scientist at the University of New Brunswick (Canada) until 1998.



Commander Heather Quilenderino, PhD

CDR Quilenderino, a native of Richmond, Virginia, graduated from the University of South Carolina, earning a Bachelor of Science in Marine Science in 2002. Before transferring to the Naval

Oceanography community, she earned her Surface Warfare Officer designation onboard USS PORT ROYAL (CG 73). CDR Quilenderino served as Staff Oceanographer for Naval Special Warfare Group TEN, and Commander, Carrier Strike Group 10, deploying with the DWIGHT D. EISENHOWER Carrier Strike Group. Prior to command, she served as the Operations Officer for Fleet Weather Center Norfolk. CDR Quilenderino holds a master's degree in oceanographic engineering from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography, and a PhD in meteorology from the Naval Postgraduate School. CDR Quilenderino currently serves as the Commanding Officer of the Naval Ice Center and the Director of the US National Ice Center.



Dr. Andreas Raspotnik

Dr. Raspotnik is a senior fellow and leadership group member at The Arctic Institute. In 2016, he received his jointly-awarded PhD in political science from the University of Cologne and the University of Edinburgh.

His book, *The European Union and the Geopolitics of the Arctic*, was published in 2018. Dr. Raspotnik is a senior researcher at the High North Center, Nord University in Bodø, and a senior research fellow at the Fridtjof Nansen Institute in Oslo. At the High North Center, he is managing the AlaskaNor project (2018–2021) that examines and compares the blue economy potential of Alaska and northern Norway. Dr. Raspotnik holds a Master of Laws in International Law of the Sea from the University of Tromsø and a Master of Arts in Political Science from the University of Vienna. He received a Bachelor of Arts in History from the University of Vienna.



Admiral Charles W. Ray

Admiral Ray became the 31st Vice Commandant of the US Coast Guard in May 2018. As the Vice Service Chief and Chief Operating Officer, he executes the Commandant's Strategic Intent, manages internal

organizational governance and serves as the Component Acquisition Executive. Admiral Ray was selected for Naval Flight Training and earned his wings in 1984. He served at six Coast Guard Air Stations from Alaska to the Caribbean. Admiral Ray was designated as an aeronautical engineer in 1988 and served as an engineering officer. Admiral Ray is the longest serving active duty Coast Guard aviator, which makes him the Coast Guard's 25th Ancient Albatross. A native of Newport, Arkansas, he graduated from Coast Guard Academy in 1981. He earned a master of science degree in industrial administration from Purdue University and a master of science degree in national resource strategy from the Industrial College of the Armed Forces.



Dr. Jackie Richter-Menge

Dr. Richter-Menge began her Arctic research career in 1981, when she joined the US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire. Jackie retired from CRREL

in 2017 but continues to do some work via an affiliation with University Alaska Fairbanks. Dr. Richter-Menge's research activities focus on developing a more comprehensive understanding of the Arctic sea ice cover, providing observations that can be used to advance forecasts in support of near-real time operational needs and future projections associated with global climate variability. In 2016, Dr. Richter-Menge was appointed to the US Arctic Research Commission by President Obama.



Greg Razo

Mr. Razo heads up CIRI's legislative initiatives and engagement with Alaska's congressional delegation and state lawmakers. Mr. Razo is also the corporation's representative with the Alaska Federation of Natives and is active with

many of CIRI's nonprofit affiliates. Mr. Razo is Yup'ik and a CIRI shareholder. He grew up in Anchorage and earned a bachelor's degree in English from Gonzaga University and a Juris Doctorate from Willamette University. Mr. Razo practiced law for 21 years in Kodiak, Alaska, prior to joining CIRI in 2005. He serves as an adjunct professor at Alaska Pacific University where he teaches a class on the Alaska Native Claims Settlement Act for the MBA-level Alaska Native Executive Leadership Program. Mr. Razo is past-chair of the Alaska Criminal Justice Commission, president of the Alaska Legal Services Corporation, and vice chair of the Alaska Native Justice Center.



Rex A. Rock Sr.

Mr. Rock is the president and chief executive officer of Arctic Slope Regional Corporation (ASRC) and oversees all aspects of ASRC's business operations. In this role, he also helps to foster a productive relationship with

the board of directors and the corporation's approximately 13,000 Iñupiat shareholders. A graduate of Tikigaq High School, Mr. Rock went on to attend college at the University of Alaska Fairbanks where he double majored in engineering and linguistics. Mr. Rock has served on the ASRC board of directors since 1993. He was elected to the position of chairman of the board in 2004, following his service as vice-chairman and 1st vice-president. Mr. Rock previously served as president and CEO of Tikigaq Corporation, and was responsible for the overall strategic guidance and vision for the village corporation.



Liz Ruskin

Ms. Ruskin is the Washington correspondent for Alaska Public Media. She covers Alaska’s congressional delegation, federal agency decisions that impact Alaska, money in politics, and elections. Ms. Ruskin was born

and raised in Anchorage. She studied political science at the University of Washington and has an MA in journalism from the University of Missouri. Her first real journalism job was at *Homer News*, before taking a job at the *Anchorage Daily News*. There, for nine years, she covered City Hall, courts, state politics, and Native and rural affairs. In 2001, Ms. Ruskin moved to Washington, DC, to work in McClatchy Newspaper’s DC bureau as a correspondent. After a year off for a journalism fellowship at the University of Colorado Boulder, and freelance print and radio stints for several years in the UK and Japan, she became Alaska Public Radio Network’s one-person Washington bureau in 2013.



Melody Schreiber

Ms. Schreiber is the Washington correspondent for *Arctic Today*. As a freelance journalist, she has reported from nearly every continent (the last holdout: Antarctica) and her articles, essays, and reviews have also been

published by *The Washington Post*, *The Guardian*, *Wired*, *The Atlantic*, *Pacific Standard*, *Outside*, *The New Republic*, NPR, STAT News, and others. She received her bachelor’s degree in English and linguistics from Georgetown University, and her master’s degree in writing from the Johns Hopkins University.



Eiji Sakai

Mr. Sakai is the vice president at the Ocean Policy Research Institute in the Sasakawa Peace Foundation. Since 2000, the Ocean Policy Research Institute, formerly known as the Ocean Policy Research Foundation, has

worked as a think tank that aims for a harmonious relationship between mankind and the oceans through ocean policy research, policy recommendations, and publication of information.



Dr. Gail Anagick R. Schubert

Dr. Schubert is President and CEO, Bering Straits Native Corporation (BSNC), an Alaska Native regional corporation serving seventeen villages in the Bering Strait region. She is Inupiaq and was born and raised in Unalakleet,

Alaska. Dr. Schubert serves on a number of boards, including the ANCSA Regional CEOs Association and the Alaska Federation of Natives. She is also a member of the Arctic Economic Council. Dr. Schubert earned her undergraduate degree from Stanford University, an MBA from Cornell University’s Johnson School of Management, and her law degree from the Cornell Law School. She is an ATHENA society member, YWCA Woman of Achievement awardee, and a 2014 recipient of the Northwest Indian Bar Association’s *Unsung Hero Award*.



Aaron M. Schutt

As president and CEO of Doyon Limited, Mr. Schutt is responsible for working with the Board of Directors to set the overall direction of the Doyon Family of Companies and provide leadership to its senior management team.

Mr. Schutt has worked at Doyon since 2006. Prior to being named President and CEO, Mr. Schutt served as senior vice president and chief operating officer from 2008 to 2011. Mr. Schutt clerked for Alaska Supreme Court Justice Alexander Bryner after graduating from Stanford Law School. He holds a master of science degree in civil engineering from Stanford University, and graduated with honors and as an S. Town Stephenson scholar from Washington State University with a bachelor of science degree in civil engineering. Before joining Doyon in 2006, Mr. Schutt was an attorney at the Anchorage offices of national law firms Sonosky, Chambers, Sachse, Miller & Munson, LLP, and Heller Ehrman, LLP, where he represented tribal and ANCSA corporation clients in transactional and business matters.



Dr. Michael Sfraga

Dr. Sfraga, the director of both the Wilson Center’s Global Risk and Resilience Program and Polar Institute, has spent most of his life living in and exploring Alaska and the Arctic. Trained as a geographer of the polar regions,

Dr. Sfraga is a Fulbright Scholar with a focus on the policy implications of a changing Arctic and Antarctic. Among Dr. Sfraga’s numerous affiliations, he served as Board member and Chairman of the Institute of the North; University of the Arctic’s Head of Delegation to the Arctic Council; Co-Lead Scholar for the inaugural Fulbright Arctic Initiative (2015–2017) and is again serving in this leadership role for the 2017–2019 Fulbright Arctic Initiative 2. Dr. Sfraga continues to work with many national and international organizations such as the Munich Security Conference, UArctic, US Department of State, and maintains an active speaking schedule.



Commander Kristen Serumgard

CDR Serumgard is the 56th Commander of the International Ice Patrol (IIP). Formed by international agreement in the wake of the RMS TITANIC disaster, IIP has successfully protected North Atlantic shipping from iceberg hazards

for over 105 years. A career Cutterman, CDR Serumgard previously served in USCGC FIR (WLB 213), USCGC HOLLYHOCK (WLB 214), USCGC ORCAS (WPB 1327), and USCGC POLAR SEA (WAGB 11). Shore tours include Chief, ATON and Icebreaker Division, Office of Cutter Forces and Chemistry Instructor at the USCG Academy (USCGA). CDR Serumgard has a BS in marine environmental science (USCGA, 2000) and an MS in chemistry (University of North Carolina at Chapel Hill, 2006). She also holds a Master of Unlimited Tonnage upon the Oceans Merchant Mariner license. A Permanent Cutterman, Golden Shellback, Golden Dragon, Shellback, Red Nose, and Great Lakes Sailor, she hails from Great Falls, Virginia and currently lives in Stonington, Connecticut.



Rear Admiral Shepard M. Smith

Rear Adm. Smith became Coast Survey Director on August 26, 2016. He is the 30th leader of the agency since the first superintendent, Ferdinand R. Hassler, was appointed in 1816. As director, Rear Adm. Smith is dedicated

to advancing the Coast Survey initiatives of modernizing digital charting, increasing use of autonomous systems for hydrography, and improving integrated navigation services for seaports. Rear Adm. Smith also serves as the chair of the International Hydrographic Organization’s (IHO) Council that comprises 30 leading IHO member nations and oversees performance management and the business side of the IHO. Rear Adm. Smith holds a bachelor of science degree in mechanical engineering from Cornell University and earned a master of science degree in ocean engineering from the University of New Hampshire. He received a direct commission to the rank of ensign in the NOAA Corps in 1993.



Dr. Colleen Strawhacker

Dr. Strawhacker is the program director for the Arctic System Science and the Arctic Social Sciences Programs in the Office of Polar Programs at the National Science Foundation. She is currently on leave as a research

scientist at the National Snow and Ice Data Center at the University of Colorado Boulder. Dr. Strawhacker earned her PhD in anthropology from Arizona State University in 2013, where she focused on the archaeology of climate-driven risk and vulnerability to food security in the US Southwest and the North Atlantic. Her expertise includes convergent research approaches spanning the natural and social sciences and engineering and developing cyberinfrastructure approaches for the social sciences and Indigenous Knowledge.



Liv Monica Stubholt

Ms. Stubholt is a Norwegian lawyer and former politician for the Norwegian Centre Party. Currently, she is a partner in the law firm Selmer AS and formerly served as Senior Vice President for Strategy and Communication in

Kvaerner ASA in the petroleum industry. Following the 2005 elections, Ms. Stubholt was appointed State Secretary in the Norwegian Ministry of Foreign Affairs. In late 2007 she was appointed State Secretary in the Ministry of Petroleum and Energy. Following her time in politics, Ms. Stubholt has worked as a business lawyer, including as partner in law firm BA-HR. She serves an advisor to a number of international companies investing in Norway. She joined Aker ASA as investment director for Aker Clean Carbon in 2009. Ms. Stubholt was acting CEO in Aker Seafoods in 2010. She graduated with a law degree from the University of Oslo in 1987.



Brigadier General Joseph J. Streff

Brigadier General Streff is the Assistant Adjutant General-Joint Staff, Joint Force Headquarters, Alaska. As Assistant Adjutant General-Joint Staff, he advises the Adjutant General on Air and Army issues and policies relating

to Defense Support to Civil Authorities and security operations. Brigadier General Streff is responsible for establishing and maintaining emergency management capacities throughout Alaska. Brigadier General Streff began his career with the Alaska Army National Guard in 1987, joining as an enlisted air traffic controller in the 207th Infantry Group (Scout). In 1989, he attended the US Army flight school and graduated as a Warrant Officer One UH-60 helicopter pilot. In 1990, he attended Officer Candidate School and was commissioned as a Second Lieutenant. In his 32 years of experience with the organization, he has served in key command and staff positions within Alaska and at the National Guard Bureau. His overseas experience includes deployments to Central America and a combat tour to Iraq.



Senator Dan Sullivan

Senator Sullivan became Alaska's eighth US Senator in January 2015. He serves on four Senate committees vital to Alaska: the Commerce, Science, and Transportation Committee; the Armed Services Committee; the Environment

and Public Works Committee; and the Veterans' Affairs Committee. Earlier, Senator Sullivan served as Alaska's Attorney General where his number one priority was protecting Alaskans, their physical safety, financial well-being, and individual rights. As Commissioner of the Alaska Department of Natural Resources, Senator Sullivan managed one of the largest portfolios of oil, gas, minerals, renewable energy, timber, land, and water in the world. Senator Sullivan has a distinguished record of military and national security service. He is currently an infantry officer and Lieutenant Colonel in the US Marine Corps Reserves. He earned a bachelor's degree in economics from Harvard University in 1987 and a joint law and Master of Science in Foreign Service from Georgetown University in 1993.



Dr. Atsushi Sunami

Dr. Sunami is the president of the Ocean Policy Research Institute of the Sasakawa Peace Foundation (OPRI-SPF) as well as an executive advisor to the president and an adjunct professor of science and technology policy at the

National Graduate Institute for Policy Studies (GRIPS) in Tokyo. He is currently a member of the Advisory Board for the Promotion of Science and Technology Diplomacy in the Ministry of Foreign Affairs, Japan, the Council for Science and Technology in the Ministry of Education, Culture, Sports, Science and Technology, Japan, and the Council for the national ArCS (Arctic Challenge for Sustainability) project. Dr. Sunami was also a special advisor to the Cabinet Office responsible for Science and Technology and Innovation (2015–2018). He holds a BSFS from Georgetown University and an MIA and PhD in political science from Columbia University.



Dr. Louis W. Uccellini

Dr. Uccellini is NOAA's Assistant Administrator for Weather Services, Director of the National Weather Service, and permanent US Representative at the World Meteorological Organization. In this role, he is responsible for the day-

to-day civilian weather operations for the United States, its territories, adjacent waters, and ocean areas. Prior to this position, Dr. Uccellini served as Director of the National Centers for Environmental Prediction (NCEP) for 14 years. He was responsible for directing and planning the science, technology, and operations related to NCEP's nine centers. He led the 13-year effort to plan, develop, and build the new NOAA Center for Weather and Climate Prediction at the University of Maryland M Squared Research Center. Prior to joining the NWS, Dr. Uccellini was the section head for the Mesoscale Analysis and Modeling Section at the Goddard Space Flight Center's Laboratory for Atmospheres from 1978 to 1989. Dr. Uccellini received his PhD, master's, and bachelor of science degrees in meteorology from the University of Wisconsin-Madison.



Mead Treadwell

Former Alaska Lt. Governor Mead Treadwell is co-chair of the Woodrow Wilson Center's Polar Institute Advisory Board and Chair of the Arctic Circle's Mission Council on Shipping and Ports. He is an advisor and participant in

several Arctic Policy and information efforts, including the Arctic Encounter, the UK-based Polar Research and Policy Institute, Arctic Today, the World Economic Forum's Global Agenda Council on the Arctic, and the Hoover Institution's Arctic Security Program. As chair of the US Arctic Research Commission from 2006 to 2010 and a commissioner from 2001 to 2010, he helped fund the eight nation Arctic Council's Arctic Marine Shipping Assessment, which established a blueprint for marine safety in the Arctic. As chair of the Arctic Circle's Mission Council on Shipping and Ports, he led development of pending legislation to create a US Arctic Seaway Development Corporation. Mr. Treadwell is a serial entrepreneur. His current firm, Treadwell Development, advises clients building Arctic Infrastructure projects.



Fran Ulmer

Ms. Ulmer has spent over 45 years in public service. She has chaired the US Arctic Research Commission since being appointed by President Obama in 2011. Ms. Ulmer is a senior fellow of the Arctic Initiative in the

Harvard Kennedy School's Belfer Center. She served as a special advisor to Secretary of State John Kerry on Arctic Science and Policy from 2014 to 2017. In 2010, President Obama appointed her to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. From 2007 to 2011, Ms. Ulmer was the chancellor of the University of Alaska Anchorage. She is a member of the Global Board of the Nature Conservancy and on the Board of the National Parks Conservation Association. Ms. Ulmer, who earned a JD cum laude from the University of Wisconsin Law School, served as an elected official in Alaska for 18 years as the mayor of Juneau, a state representative, and as Lieutenant Governor.



Tero Vauraste

Mr. Vauraste is currently Vice Chair and Past Chair of the Arctic Economic Council, and the owner and CEO of Mariadi Ltd, an Arctic and maritime consultancy agency. He served as President and CEO of Arctia Ltd from

2009 to 2018. Arctia is a Finnish polar maritime services company in icebreaking, research, and oil spill response, operating 11 icebreakers. Mr. Vauraste has broad experience in senior executive positions within transportation and logistics. He holds an MSc in risk, crisis, and disaster management from Leicester University and a Naval Officer's degree from the Finnish Naval Academy, being a Lieutenant-Commander (Ret.). He has served as a vessel master and special unit commander, and as a navigation, SAR, and law enforcement instructor in the Finnish Coast Guard. He chairs the Sub-Committee of Maritime Issues of the Finland China Innovation Committee. Mr. Vauraste is the chairman of the Finnish Arctic Society and a member of the advisory board of the Finnish Lifeboat Institution.



Scott Weese

Mr. Weese joined the Canadian Ice Service (CIS) as a senior ice forecaster in 2012, overseeing a team of operational forecasters and analysts that produced daily ice forecasts and analyses for Canadian waters. Additionally during

this period, he worked as a long range forecaster, providing extended outlooks of sea and lake ice conditions in the Canadian territorial waters. In 2018 as a program manager at CIS, Mr. Weese worked to support transformational initiatives to revitalize our operational work environment and better address our client needs. This past year he has transitioned to his current role as Manager of Analysis and Forecast Operations at the CIS, providing insight and guidance to respond to our evolving stakeholder needs.



Dr. Steve Volz

Dr. Volz brings 30 years of professional experience in aerospace to his role as the leader of NOAA's Satellite and Information Service, where he manages the nation's current and future civilian operational Earth observing

satellites. Dr. Volz is a leader in the international Earth observation community, serving as the NOAA Principal to the Committee on Earth Observation Satellites (CEOS) and US Principal to the Group on Earth Observations. Prior to joining NOAA, Dr. Volz held multiple positions at NASA, including seven years as Associate Director for Flight Programs in the Earth Science Division of NASA's Science Mission Directorate where he guided the development of numerous Earth science satellite missions. Dr. Volz has a doctorate in experimental condensed matter physics from the University of Illinois at Urbana-Champaign (1986), a master's in physics from Illinois (1981), and a bachelor's in physics from the University of Virginia (1980).



Dr. Francisco "Cisco" Werner

Dr. Werner is Director of Scientific Programs and Chief Science Advisor at NOAA's National Marine Fisheries Service. In this capacity, he leads NOAA Fisheries' efforts to provide the science needed to support sustainable fisheries

and ecosystems and to continue the progress in ending overfishing, rebuilding fish populations, saving critical species, and preserving vital habitats. As Director, Dr. Werner oversees NOAA's Fisheries Science Centers, labs, and field stations, and the Office of Science and Technology. Dr. Werner's research has focused on the oceanic environment through numerical models of ocean circulation and marine ecosystems. He has studied the effects of physical forcing on lower trophic levels and the subsequent effect on the structure, function, and abundance of commercially and ecologically important species, and has contributed to the development and implementation of ocean forecasting systems.



Wayne Qaniqsiruaq Westlake

Mr. Westlake serves as NANA's president and chief executive officer. An Iñupiaq from the Native village of Kiana, Mr. Westlake focuses his business experience to deliver on NANA's mission to improve the quality of life

for its more than 14,500 Iñupiat shareholder owners. NANA operates projects throughout the United States and the world. NANA companies serve a wide variety of industries, including federal contracting services, mining, oil and gas, healthcare, and hospitality. NANA has a strong reputation for high-quality service and reliability, securing return business and long-term contracts. With the recent interest in the Arctic, Mr. Westlake works with international, national, state, and local leaders as a valued partner in sharing the future of Alaska's Arctic.



Dr. Peter Winsor

Dr. Winsor is the Director of the World Wildlife Fund's Arctic Program, which has focused on Arctic conservation for almost three decades. Dr. Winsor has worked in the Arctic region for over 20 years as a scientist at the Woods

Hole Oceanographic Institution and as an oceanography professor at the University of Alaska Fairbanks. He has published extensively in leading international journals covering oceanography, climate, and ecosystems of the Arctic and Antarctica. Dr. Winsor has lived in Fairbanks, Alaska, for the last 11 years and has spent significant time in the Arctic and its communities both leading fieldwork and exploring the landscape and mountains. He has participated in a number of large field programs in the Arctic and Antarctica, from crossing the Arctic Ocean on icebreakers to initiating community-based science in Arctic Alaska.



Ambassador (Ret.) Ken Yalowitz

Ambassador Yalowitz directed the Conflict Resolution MA program at Georgetown University for three years until June 30, 2018, and remains an adjunct professor at Georgetown. He is a global fellow at the Woodrow Wilson

Center in Washington, DC, and an adjunct professor of government at the Stanford University in Washington Program. Ambassador Yalowitz served as the Director of the Dickey Center for International Understanding at Dartmouth College from 2003 to 2011 following retirement from the US Department of State after 36 years as a career diplomat and member of the Senior Foreign Service. He served twice as a US ambassador: to the Republic of Belarus from 1994 to 1997, and to Georgia from 1998 to 2001. Ambassador Yalowitz has authored or co-authored op eds and articles in publications such as the *International Herald Tribune*, *Washington Post*, *New York Times*, *Orbis*, *Boston Globe*, *Christian Science Monitor*, *The National Interest*, *Project Syndicate*, *The American Interest*, *The Hill*, *Newsweek*, *CNN Blog*, and *Reuters*. Ambassador Yalowitz completed his undergraduate work at the University of Wisconsin and holds a Russian Institute Certificate, and MA and Master of Philosophy degrees from Columbia University.



Congressman Don Young

Representative Young has served as Alaska's lone Representative to the US House since 1973. He makes his home in Fort Yukon, Alaska, a small village located seven miles above the Arctic Circle. Before beginning

his career in politics, Representative Young made a living as a teacher, gold miner, trapper, and licensed tugboat and barge operator on the Yukon River. He remains the only licensed mariner in Congress. Representative Young is a passionate advocate for Arctic issues and priorities, with a particular focus on resource development, maritime transportation, and international collaboration. He is the co-founder and co-chair of the Congressional Arctic Working Group, a bipartisan group launched in 2014 to help Members of Congress better understand the opportunities and challenges in the Arctic region. Representative Young has served as both the Chairman of the House Natural Resources Committee (1995–2001) and Chairman of the House Transportation and Infrastructure Committee (2001–2007).



Dr. Andrei Zagorski

Dr. Zagorski is Head of Disarmament and Conflict Resolution Studies at the Primakov National Research Institute of World Economy and International Relations (IMEMO) of the Russian Academy of Sciences. He is also Professor of International Relations at the Moscow State Institute of International Relations (MGIMO-University) and a member of the Russian International Affairs Council. Previously, he has served as Vice-Rector of MGIMO, Senior Vice-President of the EastWest Institute, faculty member of the Geneva Center for Security Policy, and Deputy Director of the Institute for Applied International Research, Moscow. He has published intensively on various issues of Russian foreign and security policy, European security, Organization for Security and Cooperation in Europe, conventional and nuclear arms control, and post-Soviet affairs, as well as on governance and security in the Arctic. His most recent publication on Arctic affairs addresses integrated marine management in the *Arctic Russian International Affairs Council Report No. 42* (2018).

Canadian Coast Guard Ship *Louis S. St. Laurent* (left) and U.S. Coast Guard Cutter *Healy* (right) on a joint mission to map the Arctic seafloor. Photo credit: Jessica Robertson, US Geological Survey



Posters

DAILY, AMPHITHEATER FOYER

Learn more about maritime science! Science posters will be on display in the Amphitheater Foyer of the Ronald Reagan Building and International Trade Center Amphitheater throughout the conference. Authors will present their posters during the reception, from 5:00 pm to 7:00 pm on Wednesday, July 17. A preliminary list of posters includes the following.

HIGHLIGHTS OF THE NAVAL WAR COLLEGE'S NEWPORT ARCTIC SCHOLARS INITIATIVE

Walter A. Berbrick (walter.berbrick@usnwc.edu), Gaëlle Rivard Piché, and Michael D. Zimmerman

A PREDICTION PORTAL FOR UNDERSTANDING THE SEA ICE FORECAST

Cecilia Bitz (bitz@uw.edu), Eduardo Blanchard-Wrigglesworth, Nic Wayand, and the SIPN Project Team

SEA-ICE INFORMATION SUPPORT FOR ICEX 2018

Hajo Eicken (heicken@alaska.edu), Andrew Mahoney, Jacqueline Richter-Menge, Brian Brettschneider, John Walsh, Uma Bhatt, Lewis Shapiro, and Heather McFarland

OPPORTUNITY TO PLAN AND DEVELOP A COMPREHENSIVE US HIGH ARCTIC RESEARCH CENTER IN ALASKA

Jasper Hardesty (joharde@sandia.gov), Mark Ivey, Lori Parrott, C.F. Cahill, and Hajo Eicken

HIGHLIGHTS OF THE SANDIA NATIONAL LABS ARCTIC SCIENCE AND SECURITY INITIATIVE

Jasper Hardesty (joharde@sandia.gov), Mark Ivey, Lori Parrott, Holly Dockery, Jonathan Salton, Diana Bull, Kara Peterson, Jennifer Frederick, Darielle Dexheimer, and Erika Roesler

LESS ICE, MORE NEED TO MAP THE COAST: LAUNCHING THE STRATEGY FOR ALASKA

Amy Holman (amy.holman@noaa.gov), Ashley Chappell, Nicole Kinsman, Marta Kumle, Molly McCammon, and Jacqueline Overbeck

DIAGNOSING NEAR-FUTURE CHANGES IN ARCTIC SEA ICE AND OCEAN CONDITIONS

Elizabeth Hunke (eclare@lanl.gov), Cathy Wilson, Gennaro D'Angelo, Julian Dann, Mathew Maltrud, Andrew Roberts, Nathan Urban, Jorge Urrego-Blanco, and Tarun Verma

MEETING THE PRESSING NEED FOR COASTAL MAPPING IN AN ICE-DIMINISHING ARCTIC

Joe Jones (jw.jones@fugro.com) and Rada Khadjinova

ARCTIC RISK FACTORS FOR MARINE OPERATIONS

Brandon Lee (brandonlee@anacostiaconsulting.com)

INTRA-ANNUAL ENSEMBLE PREDICTION OF ARCTIC SEA ICE USING THE REGIONAL ARCTIC SYSTEM MODEL FOR DYNAMICAL DOWNSCALING OF GLOBAL FORECASTS

Wieslaw Maslowski (maslowsk@nps.edu), Younjoo Lee, Jaclyn Clement Kinney, Matthew Watts, Anthony Craig, Mark Seefeldt, John Cassano, Bart Nijssen, Robert Osinski, and Xingren Wu

AN EVOLVING ARCTIC AND NEW CHALLENGES FOR NOAA IN ALASKA

Don Moore (donald.moore@noaa.gov), Robert Foy, Michael Lawson, Mary-Beth Schreck, Carven Scott, and Richard Thoman

STATUS OF THE INTERNATIONAL ARCTIC BUOY PROGRAM

Ignatius Rigor (ignatius@uw.edu), Bryan Brasher, Bailey Miller, John Woods, Annie Shea, Kenneth Arguedas, and Cy Keener

MAPPING RESIDUAL MARINE FUEL USE AND SUBSISTENCE COMMUNITIES IN THE US ARCTIC

David Sorbaro (david.sorbaro.jr.ctr@dot.gov), Alyson Azzara, and Sarah Harrison

SEA ICE PREDICTION NETWORK: A MULTI-DISCIPLINARY APPROACH TO IMPROVE SEA ICE PREDICTIONS

Helen Wiggins (helen@arcus.org) and the Sea Ice Prediction Network Team & Collaborators

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Scientists from the University of New Hampshire's Center for Coastal and Ocean Mapping/Joint Hydrographic Center recently demonstrated the feasibility and efficiency of deploying a small, 12-foot-long autonomous surface vessel (ASV) from the National Oceanographic and Atmospheric Administration (NOAA) hydrographic survey vessel *Fairweather*. The ASV was equipped with a multibeam echosounder for mapping the seafloor adjacent to Alaska's Point Hope. Future use of the ASV, possibly off Utqiagvik, and in close coordination with local authorities, is planned for 2020. *Photo credit: Christina Belton, NOAA Office of Coast Survey*





R/V *Sikuliaq*, owned by the US National Science Foundation, and operated by the College of Fisheries and Ocean Sciences, at the University of Alaska Fairbanks, returns to Seward, Alaska, to pick up a new scientific research team in April 2018. *Photo credit: Sarah Spanos*