MESSAGE FROM THE DIRECTOR

The International Arctic Research Center (IARC) is happy to share our recent research, outreach, and coordination activities. This past year has been extremely busy. The field season is still in full swing and IARC researchers are spread across the Arctic. As I write this, an IARC-led international Arctic Ocean cruise is swapping out instruments and harvesting valuable data to track changes throughout the region.

This type of research relies on international partnerships. It is as much about science diplomacy as it is about understanding major transformations in the Arctic Ocean’s role driving weather and climate in the northern hemisphere. IARC maintains strong collaborative ties with well over a dozen countries. In the Arctic, research collaboration helps us understand some of the most rapid and dramatic changes on our globe, while at the same time developing solutions to respond. IARC researchers work closely with those facing rapid Arctic change. This report provides a few examples.

I am excited to see the Center for Arctic Policy Studies (CAPS—part of the IARC family as of last year) grow into an important resource for policy and decision makers in the State of Alaska and beyond. One of the CAPS goals, as defined by researchers across the university, is to make policy-relevant research and findings more accessible. We welcome Amy Lovecraft to IARC in her role as director of CAPS and look forward to a strengthened collaboration with University of Alaska Fairbanks (UAF) College of Liberal Arts.

In fall 2018, the Science Ministers of 30 nations are assembling for the Second Arctic Science Ministerial. IARC and UAF helped with preparations for this important gathering. The meeting demonstrates both a desire and a need to collaborate internationally on the most pressing Arctic issues. These issues require solid science, new forms of education and outreach, and innovative solutions. IARC researchers and staff will continue to do their part to move the field forward.

Hajo Eicken
IARC Director
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What we do
We are the International Arctic Research Center at the University of Alaska Fairbanks. We foster Arctic research, coordination and communication in an international setting to help the nation and the world understand, prepare for and respond to rapid environmental change in the Arctic and beyond.

Arctic System Services
The Arctic provides important services to society. They include regulating the climate system, providing sea ice as a transportation platform, supplying important cultural resources, supporting food webs, and much more. IARC research follows a framework based on this concept.

By focusing on stakeholder defined research we prioritize efforts that address these services and their benefit or harm to society. We link Arctic system science with local and Indigenous knowledge to advance more meaningful outcomes for stakeholders. To achieve these goals our team of scientists and professional staff excel in modeling and synthesis, data and observations, and producing accessible information products.

The illustration below shows how these pieces fit together and will appear throughout this report. The highlighted components illustrate how each project fits into the broader Arctic system services framework.
From fossil fuels to ocean acidification
As humans burn fossil fuels, carbon dioxide is released into the atmosphere, leading to global temperature rise, extreme weather events and many other issues. But not all emissions end up in the atmosphere. The surface of the ocean absorbs carbon dioxide too. In fact, it absorbs about a third of the emitted carbon dioxide, leading to a decrease in pH.

Marine shells and skeletons
Carbon dioxide absorption also reduces the ocean’s concentration of carbonate ions. These minerals are used by marine organisms like oysters, clams and calcareous plankton to form skeletons and build and maintain their shells.

Cold Alaska waters at risk
Alaska’s waters are particularly vulnerable to ocean acidification because cold water absorbs more carbon dioxide.

Melting glaciers accelerate impacts by adding extra freshwater into the system. This “riverine input” further dilutes the number of carbonate ions available to marine organisms.

Despite vulnerability to acidification, few studies have documented changing ocean conditions in Alaska. Research assistant professor Claudine Hauri is working to fill gaps in our knowledge of the past.

Simulating the past
Hauri is creating a model of the Gulf of Alaska that simulates ocean conditions over the past 35 years (1980–2015). She uses observational data and knowledge of biology, chemistry, physics and riverine input to simulate ocean circulation, biogeochemistry and the functioning of the marine ecosystem.

This simulation helps explain how ocean acidification, carbonate ion loss and climate change have already and will continue to affect the chemical environment of the Gulf of Alaska.

Hauri hopes the model will help identify impacts to marine organisms and ocean food webs. This insight is critical to subsistence communities whose food...
security could be threatened, as well as commercial fisheries and tourism.

**A special kind of model**
The model uses a process called hindcasting. Observational data are entered into a mathematical model. The output is compared to the known result for a particular event.

Hauri makes sure that the output also accurately represents known ocean patterns. For example, there should be high concentrations of iron along the coast and low concentrations offshore. If the model simulates these patterns, Hauri knows it represents the biological world.

“A really special thing about this model is that it simulates riverine input and melting glaciers,” says Hauri. Until now, we were unable to determine if ocean acidification or melting glaciers contributed more to reduction in carbonate ions.

**Are organisms experiencing a new ocean environment?**
Another important question is whether marine organisms today are experiencing ocean conditions never seen in the past. To test this, Hauri’s model simulates ocean variability at several time scales.

Short and long term climate drivers can cause huge variability in ocean conditions. Marine organisms are adapted to these fluctuations. However, when exposed to environments far outside their “natural variability envelope,” organisms may reach a threshold they have difficulty coping with.

Due to ocean acidification and glacial melt, Hauri suspects that marine organisms are now exposed to a natural variability envelope that does not overlap with the conditions experienced in the past.

“Marine biologists often don’t know the full spectrum of variability in the ocean,” says Hauri. This makes it difficult to design experiments to test organisms’ sensitivity to changing environmental conditions.

Hauri is using her model to solve this problem. Looking at the interannual variability of ocean conditions 35 years ago, she can identify the natural variability envelope in the past compared to today.

The magnitude of this shift, along with projected changes in the future, will help marine biologists assess if organisms will adjust quickly enough to keep up with changing oceans.
Reaching northern Alaska through participatory science

One of IARC’s newest and most broadly innovative research projects is taking big steps forward through new tools, connections and collaborations. In doing so, the Alaska Arctic Observatory and Knowledge Hub (AAOKH) is now positioned as one of the most effective and prominent ways to engage the Arctic science community and Alaska’s northern coastal communities.

AAOKH was established in 2015 to provide tools, resources and scientific support for coastal communities to share their Indigenous knowledge and expertise about coastal change. AAOKH focuses on the changing seasonal cycle by supporting community-based observations of sea ice, wildlife and coastal waters. AAOKH data build on previous local sea ice observing efforts at IARC and are archived in an Exchange for Local Observations and Knowledge of the Arctic (ELOKA) database containing over 6,000 local observations.

AAOKH’s “knowledge hub” provides broadly accessible data and technology tools that link relevant remotely-sensed data and information from groups studying subsistence species and ocean conditions, as well as targeted community education and outreach efforts.

New tools for the knowledge hub

Newly appointed AAOKH science co-lead and research assistant professor Donna Hauser notes that recent advancements have kicked the project’s knowledge hub into high gear, strengthening and expanding the network’s connective and communicative abilities. Achievements include a newly released mapping tool which provides a wide array of regional and local observations and data, including sea ice, wildlife dynamics and coastal oceanography.

View the tool at mapventure.org/#/map/aaokh.

An interactive platform

AAOKH’s website (arctic-aok.org) has also seen widespread and content-rich updates, having grown into a

AAOKH’s new mapping tool facilitates the sharing of coastal conditions in combination with observations collected by members of coastal communities.
clearinghouse for project information, participant involvement, and data service. Visitors to the site can find information about becoming collaborating partners in project communities (Kaktovik, Wainwright, Point Lay, Point Hope, Kotzebue, Utqiaġvik, and Wales).

Observers can interact directly with project leaders concerning data and observations on the site. Visitors can also view up-to-date project results and data comparisons for their communities and others, in anticipation and preparation for changing coastal and climatic conditions.

“Well with a large and diverse network of participants, it’s clear that our tools must be highly visual to be consistently useful,” Donna Hauser notes. “So we’ve focused on developing AAOKH’s design and interface elements, prompting strong collaborations with other teams and resources at IARC.” The most recent and extensive of these partnerships, with the Scenarios Network for Alaska + Arctic Planning (SNAP), has been central to Knowledge Hub development, especially including construction and delivery of the new mapping tool, which is part of SNAP’s MapVentures project.

**Community visits matter**

Hauser also places great attention on communicating directly with and visiting constituent communities, in the hopes of building more inclusive and participatory relationships across the project’s network. “Many communities in Alaska want to understand and prepare for drastic changes,” Hauser says, “while also recognizing that much of what they already see and know can help researchers build greater and more complex stores of collaborative understanding.”

**Co-production**

The many moving parts of what Hauser calls the co-production of knowledge and participatory science mean that a day in the life of AAOKH is often highly complex and unpredictable. “There aren’t many roadmaps for large and networked community-based scientific research,” Hauser says, “partly because it’s relatively new as an institutional approach, and because needs and conditions can differ so drastically from one community to the next.”

AAOKH’s clear focus on knowledge sharing and equity make it unique, she observes. “This work is at once more challenging, more rewarding, and more interesting than some of the more traditional research projects I’ve experienced.”
**Salty water lurks in ice**
For generations Utqiaġvik hunters have stored meat in underground ice cellars. The permanently frozen ground acts as natural refrigeration, keeping bowhead whale, caribou and other foods safe year-round. But in many Utqiaġvik cellars, salty, unfrozen water pools even in the dead of winter.

Because of the high salinity, this “brine” won’t freeze. Researchers and oil workers across Russia, Canada and Alaska have unexpectedly found these liquid inclusions while drilling into frozen ground in Arctic coastal regions.

The source of the brine is unknown. “There is some relationship between seawater and permafrost nearby,” says Go Iwahana, research assistant professor and expert in “frozen ground.” Iwahana is part of a team tasked to figure out how these salty solutions form.

**Drilling permafrost to create a 3D model**
To solve the mystery, Iwahana and a team of scientists go underground into an Utqiaġvik ice cave. Used solely for permafrost research, this 30-foot tunnel was cut into ice-rich soil and runs through the middle of an ice wedge. This positioning makes it the perfect model to study the distribution of brine in various ground types.

The first step is to map the three-dimensional distribution of ground ice and brine in the tunnel. To do this, Iwahana’s team drilled over twenty cores into the walls and floor of the tunnel.

Sure enough, they found brine seeping from several boreholes and pooling at both ends of the tunnel. Most commonly the brine came from unfrozen sediment layers within the permafrost. But Iwahana suspects another type of unexpected brine that originates at the boundaries of the big ice wedges.
Where does the brine come from?

Iwahana uses clues of past permafrost and ice wedge development to help account for the brine. Even so, it is challenging to offer a hypothesis that explains the formation of brine originating from unfrozen sediment layers and ice wedges.

Iwahana thinks that the brine found in sediment layers may be a relic of the interglacial period when the Arctic was much warmer. In that era sea level rose and fell. Current Arctic coastal regions were repeatedly covered in a shallow sea that exposed deep permafrost layers.

After transitioning into the current colder period, the sea level dropped. Isolated pockets of saltwater remained. As these pockets dried, salt crystals accumulated into droplets of brine. Droplets trapped in pockets between ice and sediment were preserved.
**Bacteria from the past**

Iwahana collaborates with microbiologist Jody Deming from the University of Washington. Deming is interested in Utqiaġvik’s brine for another reason.

The brine are brimming with bacteria that have been physically isolated from the surface environment since permafrost buried the ancient Arctic seas. “This is a chance to look at microbes that were in an ocean 10,000–30,000 years ago or longer,” Deming says.

Scientists have studied brine-living microorganisms in frozen environments for a long time, particularly in sea ice where bacteria thrive in pockets of brine. But, unlike the brine discovered in deep permafrost, sea ice is a short-lived habitat with the bacteria returning to the ocean after each melt season.

**Thriving in extreme conditions**

Despite cold, salty, and low oxygen conditions that usually limit life, Deming and her team found up to 1000 times more bacteria in the permafrost brine than sea ice brine. Such high densities of bacteria are only found in warm sewage. “So how is it possible that we are seeing all these bacteria in subzero brine?” Deming asks.

She believes that a process called gene exchange that speeds up evolution may play a role. Sequestered in close contact, the bacteria exchange genes in ways that don’t usually happen.

Instead of passing genes from one generation to the next, these bacteria may exchange genes directly with one another, often with the help of a virus. Sometimes a virus brings in a new, advantageous gene and the affected cell becomes more fit to its environment. Over time the brine microbes would have evolved to flourish despite the extreme conditions.

**Modern tools to answer ancient secrets**

Deming’s team is now extracting and sequencing the DNA and RNA from the microorganisms. The results will reveal which bacteria and viruses are present, how closely they are related to organisms found in the modern ocean and its sea ice, and if gene exchange has occurred.

These answers will become increasingly important as more brine emerges due to Arctic warming. The collaboration between Deming and Iwahana may also shed light on what this means for mobilization of the vast amounts of carbon locked up in permafrost.

**This work is funded through the Gordon and Betty Moore foundation.**

Permafrost brine filled with microorganisms found on the tunnel floor (bottom) and in boreholes drilled in the floor and walls (left). Both photos were taken in temperatures well below zero, yet the salty brine remained unfrozen.
IARC’s Rick Lader getting good mileage from new modeling efforts

The frequent and drastic seasonal transitions experienced across Alaska and the Arctic are a familiar part of life for residents and researchers who call these northern regions home. Cycles of change—moving from one set of conditions to another very different one, and then preparing to do it again—characterize Northerners’ personalities, values, and work. Recently minted atmospheric science PhD Rick Lader is no different.

“It’s quite clear even to casual observers that temperatures and precipitation levels are changing here,” Lader notes, “and so we consider it a big need for our research to define with new and better clarity how we should expect these conditions to change in the future.”

High resolution climate data

Lader’s doctoral work focused on establishing much needed gridded climate data, based on temperature and precipitation, at much higher resolution than has previously existed for Alaska. Earlier, data for the region had only represented conditions at a coarse (100-km) scale. For a big state with big variations in topography, questions important to agency and industry decision making — How many days per year will cross a certain temperature threshold? What will be the maximum one-day rainfall in a specific year? — have been extremely difficult to answer.

By examining high-resolution and historical data to forecast large increases in such temperature and precipitation-based features over a 30-year timescale, Lader has been able to better generate needed and relevant data. This information is already being used in other important research projects. This includes forecasts of rain-on-snow events.
(which make travel and transport highly and uniquely dangerous) and growing season length over time (forecasted to increase by one to three months over this century, as a result of a much longer frost-free period).

**Dynamical downscaling to establish greater detail in southeast Alaska**

Lader is now engaged with other collaborators on a new project to establish even greater detail in southeast Alaska. The team will use a process called “dynamical downscaling,” using existing regional simulations to extrapolate other effects of climate processes at a finer scale.

“In the temperate rainforests of Southeast there’s just such a high degree of variation” in topography, Lader says. In order to make any legitimate projections regarding hydrology and precipitation runoff or discharge, “the challenge is to continue to refine our models’ resolution.”

**Products for hydropower and transportation**

These products are highly practical and useful. Projections for total precipitation variability from one year to the next, as well as rain and snowfall extremes within a year, are of tremendous interest to a range of agencies and industry groups. Hydropower projects must identify minimum stream flow rates, and where and when they might vary. And, the Department of Transportation is highly concerned with extreme precipitation event forecasts, including over both single-day and five-day levels, to determine necessary bridge or culvert design and materials.

All of this forecasting process requires a great deal of sophisticated comparison and coordination, says Lader. “This data can be created at any resolution our stakeholders want,” based on the inventory of available measurement stations. These stations belong to a wide network of different state agencies, individuals, and federal groups, Lader explains, and it’s quite useful as a research group to actively operate as a technology and information hub.

“Making data useful and accessible—that’s what I call a big science problem,” Lader says. “Though it’s different than the purely theoretical issues some might consider stereotypical of deep science, much of the real work we do as researchers involves operating and fine-tuning our tools, delivering data in a way that’s clear and actionable, and communicating directly with our stakeholders, early on and often throughout our research process.”

“It’s not that our scientific downscaling approaches are new—this technique has been around for a long time,” Lader says. “But a lot of downscaling products that have existed until now have excluded significant parts of northwest Alaska, and that has a big effect on the model results. What we have now is a new and useful product that didn’t exist before.”

*This 2016 temperature map, generated by Lader and colleagues, shows the number of degrees (°F) above normal Alaska was in this record-breaking year. According to climate projections, this additional warmth is expected to become more common.*
ACCESSIBLE SCIENCE

Communicating science to non-experts
Even important scientific discoveries have little value if not communicated well. Effective science communication increases collaboration, innovation and funding opportunities; helps to captivate the next generation of scientists; encourages informed decision making; and builds a supportive and knowledgeable society.

At IARC we believe that when science is communicated effectively, science flourishes. That’s why making science accessible to diverse audiences is part of our everyday work. Our scientists give talks and write papers, and our communication staff use assorted platforms to create timely, accurate, and understandable information products.

These products meet stakeholder needs and ensure that non-scientists with limited time and understanding of scientific jargon can access our Arctic system research.

Explaining sea ice conditions
As the Arctic changes and extreme events become more common, science communication will play an even larger role.

During winter 2017–2018, the Bering Sea experienced conditions never recorded before. Warm ocean water coupled with strong south winds resulted in ~50,000 square miles less sea ice than the previous record low.

Communities across the Bering Strait were significantly impacted. The result was an outcry for current, accurate scientific information. IARC responded with an outreach document *Bering Strait: An overview of winter 2018 sea ice conditions*.

The four-page document used common language to explain the winter’s events and what we know about changing Bering Sea conditions.
The public is hungry for accessible, science-based information
The product was distributed to communities across the Bering Strait and shared via social media where it was picked up by numerous news and science sites including USA Today, Climate.gov, Scientific American and the Washington Post.

After 543 website hits, 10.5k Facebook and twitter likes, and 5.5k shares, IARC scientists provided numerous interviews, webinars, and presentations. Feedback was clear: the world needs accessible science.
See the document at https://wp.me/p6YI2P-LT.

Science for decision makers
In addition to information products for the general public, IARC supports science communication for decision makers.

“We can perhaps have the most impact by working with decision makers, particularly in governments from village councils to the federal government to the Arctic Council,” says Brendan Kelly, IARC researcher and executive director of the Study of Environmental Arctic Change (SEARCH).

Sharing what we know about the changing Arctic system in an accessible and timely manner isn’t always easy. “Every discipline has its own culture,” says Kelly. “You have to learn that difference for collaboration to be successful.”

For example, scientists typically use inaccessible vocabulary, and science usually progresses slowly. This approach does not always align with the rapid response necessary for decision makers.

That’s why SEARCH is at the interface between science and decision makers. The program promotes understanding of system-wide Arctic change and uses a variety of approaches to connect the best available science to stakeholders.

A key product is the Arctic Answers series. In these policy-relevant briefs Arctic experts answer questions on topics ranging from sea ice to permafrost to mitigation.

Culture shift, Arctic Futures 2050
In 2019, SEARCH is taking it to the next level with Arctic Futures 2050: Science to Inform Decisions. The conference will bring Arctic scientists and Arctic decision makers together to build sustainable relationships. The outcome could be a new culture leading to synthesized science that is usable, accessible and timely.
Learn more at searcharcticscience.org.

Brendan Kelly discusses Arctic change with students and elders in Greenland. Photo credit Marin Lipman.
Meeting needs adds value to research
Prioritizing stakeholder needs ensures that IARC research focuses on the right issues and delivers value to Alaska and the world. This approach shifts the focus from data collection and results to usable information that moves stakeholders forward.

IARC meets stakeholder needs through well designed, cutting edge research that encourages active participation and open communication from user groups.

Safe operations on & under ice
In the constantly changing Arctic Ocean environment, meeting stakeholder needs can take on unique forms. In 2018, UAF researchers were called on to help keep a 50-person floating outpost safe from sea ice hazards. Perched on a drifting ice floe (frozen sea ice) more than a hundred miles north of Prudhoe Bay, Alaska, the outpost supported ICEX, a US Navy submarine exercise for Arctic operations.

A powerful decision-making approach
IARC researcher Brian Brettschneider developed a new forecasting technique that allowed Navy personnel to make decisions based on their own past experiences rather than a range of potentially ambiguous values.

During such exercises, Navy personnel gain strategic under-ice expertise. This year, IARC climate and weather modelers employed their understanding of Arctic environments to reach new frontiers in forecasting weather and sea ice.

Example forecast summary provided to Navy personnel during ICEX 2018.

21 March 2018
No major changes in ice conditions. Forecast for stronger winds Thursday to Saturday with potential for additional crack and lead formation at camp. The analog forecast also shows a close match with conditions during 2014 and 2016 floe break-up.

Beyond the weekend, the forecast is for calmer conditions and no precipitation, boding well for demobilization of camp.

The technique Brettschneider developed—analogue forecasting—looks at the probability that the situation (ice movement,
weather patterns, etc.) will evolve to reflect conditions from a previous year. These “near real-time” to seasonal scale predictions allow the user to draw on knowledge of the issues that developed under a previous season’s environmental conditions to make informed decisions for the future.

“This product really provided a ‘reality check’ for the forecast team when assessing raw numerical output,” says Brettschneider.

Spring 2018 the analog forecasts proved their value when they accurately predicted an early sea ice breakup in the Arctic Ocean. ICEX personnel responded proactively. “The decision to get a jump start on demobilization was based on the weather and ice conditions, of which your analysis weighed heavily,” says Theodore Goda, ICEX program manager.

Coupling research and agencies
IARC research lead Hajo Eicken believes this is just the tip of the iceberg in terms of useful stakeholder tools that can be developed from rigorous scientific research. With an in-depth understanding of user needs, IARC is strategically positioned to help agencies implement cutting edge research.

“ICEX was a great opportunity to collaborate with Department of Defense and allow them to explore new tools and approaches that we develop as part of our Arctic research,” says Eicken. Based on this experience, the IARC team can refine their approach for future collaborations.

Alaska Native community needs
Traditional harvest practices of Alaska Native communities are under threat. Changing climate and rising energy prices are just two factors that impact their self-reliance.

Fostering research capacity in communities to address local needs and resource concerns in the context of these rapid changes is critical.

The IARC-affiliated program, Community Partnerships for Self-Reliance comes alongside communities to meet these needs. “We make information resources at UAF more accessible to rural communities,” says Krista Heeringa, CPS program coordinator.

Heeringa’s role is to facilitate a smooth process for collaborative research. She connects, coordinates, and maintains relationships between communities and scientists. “It’s a privilege to work with tribal, community, and organizational
leaders and scientists that are committed to building understanding of critical challenges facing Alaska communities,” says Heeringa.

**Supporting traditional harvest practices**

In 2016, CPS began a new initiative to foster research that communities felt strengthened their traditional harvest practices. Six tribes and two village organizations participated.

The program model was “listen first,” says Heeringa. This allowed communities the time and space to identify questions that were meaningful to them. From these questions, CPS helped design feasible research projects using the expertise and capacity of collaborating individuals.

**Reviewing the experience**

Participants shared research highlights at the 2018 Community Research Partnership Adaptation Workshop.

Several themes emerged. Community groups expressed the importance of participatory research in demystifying the research process and helping rural residents understand how science can benefit them. Scientists emphasized the value of community priorities becoming research priorities so that data can be applied.

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**Collaborative science in Nulato**

In the remote village of Nulato, residents were concerned about the effects of environmental factors on moose harvest. “We knew that climate change was affecting us,” says Arnold Demoski, Nulato natural resource coordinator.

To investigate these concerns, Nulato Tribal Council partnered with CPS. Biology & Wildlife graduate student Tessa Hasbrouck lead the research. Together they examined leaf drop and water levels affecting access to sloughs in relation to moose harvest success.

“It’s exciting to see all that data and get it out to the tribal council,” says Demoski. The study provides the community with new tools to inform hunting regulation changes.

Aside from the science, both Demoski and Hasbrouck were enriched by the interdisciplinary relationships they built. “If I tried to tackle our research questions without listening to the stories and knowledge of hunters, managers, and professionals ... I would have been operating in the dark,” says Hasbrouck.

Their success story highlights how holistic research can provide value to stakeholders and scientists.
CONSORTIUM

Our scientists work on independent research as well as through larger initiatives. The following are groups and collaborations at IARC that build connections between research and stakeholders within and outside the United States.

**Scenarios Network for Alaska + Arctic Planning**
Helps people plan in a changing climate by exploring possible futures based on the best scientific knowledge and data available. [snap.uaf.edu](http://snap.uaf.edu)

**Alaska Center for Climate Assessment and Policy**
Partners with stakeholders to inform realistic community plans and climate adaptation strategies. [accap.uaf.edu](http://accap.uaf.edu)

**Alaska Climate Adaptation Science Center**
Provides scientific information, tools and techniques that managers can use to anticipate, monitor and adapt to climate change. [casc.alaska.edu](http://casc.alaska.edu)

**Alaska Fire Science Consortium**
Promotes communication and collaboration between fire science research and managers. [frames.gov/partner-sites/afsc](http://frames.gov/partner-sites/afsc)

**Center for Arctic Policy Studies**
Brings together knowledge and expertise of University of Alaska scholars to more readily serve policy makers in the Arctic. [caps.uaf.edu](http://caps.uaf.edu)

**Cooperative Institute for Alaska Research**
Facilitates research, education and outreach in ecosystem function, coastal hazards, climate change and variability. [cifar.uaf.edu](http://cifar.uaf.edu)

**Alaska Arctic Observatory and Knowledge Hub**
Provides northern Alaska coastal communities with the tools, resources, and scientific and administrative support to share their expertise. [arctic-aok.org](http://arctic-aok.org)

**Alaska Global Learning and Observations to Benefit the Environment**
Provides students the opportunity to participate in science. [globe.gov](http://globe.gov)

**Arctic & Earth SIGNS**
Connects youth and adults to climate change learning. [sites.google.com/alaska.edu/arcticandearthsigns](http://sites.google.com/alaska.edu/arcticandearthsigns)

**Community Partnerships for Self-Reliance**
Partners with rural communities as they work toward their vision for self-reliance. [snap.uaf.edu/projects/cps](http://snap.uaf.edu/projects/cps)

**Nansen and Amundsen Basins Observational System**
Studies climatic changes in the eastern Arctic Ocean. [uaf-iarc.org/nabos](http://uaf-iarc.org/nabos)

**Next Generation Ecosystem Experiments**
Seeks to quantify the physical, chemical and biological behavior of terrestrial ecosystems in Alaska. [ngee-arctic.ornl.gov](http://ngee-arctic.ornl.gov)
IARC welcomed new faces
Amber Keith executive assistant
Amy Lovecraft CAPS interim director
Christina Buffington IARC education outreach specialist
Donna Hauser, Go Iwahana, Katie Spellman & Peter Bieniek research assistant professors
Gabe Wolken research associate professor
Heather McFarland communications lead
Kelsey Aho CAPS program coordinator
Megan Hillgartner & Sorina Seeley policy analysts in partnership with NOAA to develop an Arctic STEM education and workforce initiative
Rick Lader & Erin Trochim postdoctoral fellows
Rick Thoman ACCAP climate specialist

CAPS enters a new era
The Center for Arctic Policy Studies is being revitalized within IARC. In this new era, CAPS will work to make the knowledge and expertise of University of Alaska scholars accessible to Arctic decision-makers. The group’s initial project is to work from the Alaska Arctic Policy Commission’s report and implementation plan, along with the subsequent Arctic Policy legislation that was passed to create policy relevant information for a suite of northern concerns.

New & continuing agreements
IARC signed new Memorandum of Understandings (MOU) with Japan’s National Institute of Polar Research and the Chinese Academy of Sciences. IARC also expanded an existing MOU with the Korea Polar Research Institute and will continue an MOU with NOAA Fisheries Alaska.

Noteworthy awards
IARC education outreach director Elena Sparrow won a presidential award for her excellence in mentoring STEM—science, technology, engineering and mathematics.

IARC chief scientist John Walsh won the American Meteorological Society’s Walter Orr Roberts Lecturer in Interdisciplinary Sciences award.