

field notes

The Polar Field Services Newsletter



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Climate warming is a particularly concerning prospect for indigenous peoples living in the circum-arctic regions. Already, the sea ice, which the Inuit have used for hunting and travel for thousands of years, is noticeably thinning and receding. Shari Gearheard, a research scientist at the University of Colorado at Boulder's National Snow and Ice Data Center (NSDIC), is combining the rich ecological knowledge of the Inuit with scientific investigations to better understand just how the sea ice in three arctic communities is changing. Her unique [research project](#), called the "Siku-Inuit-Hila Project" ("sea ice-people-weather" in a mix of Inuit dialects), which kicked off last year, links together the knowledge and languages of Inuit in Greenland, Alaska, and Nunavut--and science.

Through extensive interviews with local Elders and hunters, Gearheard's project documents the language of sea ice in the communities of Clyde River (Kangikugaapik), Canada; Barrow, Alaska; and Qaanaaq, Greenland. The project documents Inuit observations of local changes in the sea-ice landscape. Ten Inuit sea-ice experts from the communities have partnered in the project along with

climate, glacier, and ocean scientists to study and assess local climate and sea-ice conditions together. Each community involved in the project chose the local people who would be involved in the project – three people from Qaanaaq, three from Barrow, and four from Clyde River.

Through an exchange program, these individuals have the opportunity to share their community's unique knowledge and responses to changes in the sea-ice environment with other arctic communities.

"They learn that they share a lot in common as people who live in the Arctic," says Gearheard of the people involved in the program. "The people in Barrow, Clyde River, and Qaanaaq face similar challenges and share similar experiences even though they seem so far apart. Geographically, the locations are very different, but they are all marine peoples, all arctic peoples."

Gearheard, whose background is in geography, became enamored with the Arctic as a child. When she began working as a NOAA post-doctoral fellow at Harvard University in 2003, she found herself with the opportunity to move to Nunavut after her husband saw a job opening that suited him perfectly. Harvard was supportive of the relocation and she and husband Jake, and dog, Bruce, moved to Clyde River in 2004. Since then, Gearheard has taken a position at NSIDC, and telecommutes to Boulder from Baffin Island.

Barrow, Alaska, with more than 4000 residents, is the "big city" in the study. Located at Alaska's northernmost point on the shore of the Beaufort Sea, Barrow sits on low, flat tundra. Between November and July, residents look to the drifting ice pack to protect Barrow from the beach

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Finding the words: The language of ice and climate

By Marcy Davis



Good friends and research partners Shari Gearheard and Ilkoo Angutikjuak, an Elder from Clyde River. Photo: Lene Kielsen Holm



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erosion and flooding that can result from large storms. Daily flights from Fairbanks bring tourists and arctic scientists so Barrow stays well-connected and relatively modern. In contrast, Qaanaaq and Clyde River are isolated on rugged, fjorded coastlines with vertical cliffs and tidewater glaciers that carry ice from inland to the sea. Both communities are home to about 800 people, both over 95 percent Inuit, and accessible only by small plane or helicopter. At all three locations, different geography and sea-ice landscape makes for different tools and skill sets when it comes to subsistence hunting, safety, and travel in different sea-ice conditions.

Gearheard's team launched the project in Qaanaaq where they traveled the sea ice and met with local elders and experts. During workshops, they discussed and documented each community's sea-ice terminology, as well as the human uses of sea ice. The terminology, she found, reflected both the geography and the culture of their respective homes. Gearheard explains, [In Qaanaaq] we had several long meetings to develop what will be an encyclopedia of sea-ice terminology from the four languages/cultures represented on our team - Qaanaaq, Clyde, Barrow, and science."

During one-to-two-week-long stays in each community, the team spends time training in research methods and exchanging information on the importance and uses of sea ice in their culture. The team visited Barrow and Qaanaaq in spring 2007, and travels to Clyde River this month. In Qaanaaq, participants met over maps to discuss changes in local sea-ice distribution and to learn about the impacts of changing sea-ice conditions on activities and travel routes. The research team also took day trips to experience local sea-ice activities first hand, learn about the science of sea ice, and train in using both Inuit and scientific tools for observing and assessing the ice.

"The most important part [of the trip] was spending time on the ice together. We traveled by dog team together to Siorapaluk from Qaanaaq and talked about

the sea ice on the way there and back" says Gearheard. "Sea ice is the common denominator. Whether you are Inupiat or a glaciologist, you have knowledge and some perspective on sea ice. We try to spend as much time outside on the sea ice as possible, where everyone is comfortable. These trips make science more useful to community members and in return scientists can better understand Inuit knowledge. Everyone's skills and knowledge are put into context."

The Siku-Inuit-Hila project also trains and employs local people to take scientific measurements during the course of the year. Each community in the project has up to four sea-ice monitoring stations that measure thickness and temperature, snow depth and temperature, and air temperature. The data are simple, but of very high quality and provide great insight into local/regional sea-ice conditions, freeze up and break up, and other processes. The data are analyzed by project glaciologist Andy Mahoney at NSIDC, who works with Gearheard to communicate the results of station observations back to the community. Combined with Inuit knowledge, the data help add to a more complete story of sea ice and sea-ice change in these locations.

Barrow, Clyde River, and Qaanaaq residents agree that arctic weather is always variable, but that what they are seeing now is different. For example, early break up one year is not an issue, but if they see an early break up for seven years in a row, they recognize the pattern as a change. The exchange program allows participants to share strategies for coping with sea-ice change and their adaptations to a changing environment.

"The exchange trips do seem quite momentous, you can just feel it in the room, how special these meetings are. The Inuit from the three countries often tell me how much they enjoy the trips, so I think they feel it too," says Gearheard. "Personally, for me, learning about dog-sledding Greenland-style was a highlight! I have a dog team here in Clyde River and I was soaking up all the tips and techniques that I could!" ●



Top: Mamarut Kristiansen, one of the project partners from Qaanaaq, takes a break during the long sled trip. Photo: Shari Gearheard

Center: Saying goodbye to Siorapaluk. The research team leaves the most northerly community in the world by 7 dog teams, making their way back to Qaanaaq.

Bottom: On the trail polar bear pants and seal skin boots are preferred by locals. Photo: Yvon Csonka



Vitaly Lednev & Sergey Loginov's sculpture "Day and Night" took 1st prize for Single Block Abstract, World Ice Art Championships. Photo: Rhonda Konicki

alaska

Fairbanks residents celebrated their frozen habitat last month with their annual [Winter Carnival](#). The festivities showcased the [World Ice Art Championships](#), which began late in February and whose many sculptures were on display in town through March.

Alaska's frozen habitat received attention from University of Alaska Fairbanks (UAF) researcher Kenji Yoshikawa in March as well. Yoshikawa is building a network of observatories near schools in communities around Alaska for students to operate: once trained by the scientists, the school communities can maintain their local experiments, and learn how their permafrost measurements stack against those made at other schools. Ned Rozell, who writes a majority of the widely read [Alaska Science Forum](#) articles (including several on Kenji), traveled with Yoshikawa and colleague Tohru Saito along Alaska's northwestern coast last month, logging some 800 miles in a bit over two weeks via snowmachine for the university's [permafrost health outreach program](#).

What was Ned Rozell doing on Yoshikawa's wild ride? "Kenji asked me, and my boss also wanted me to go to work a bit on weather stations we'd installed as part of the [Arctic Climate Modeling Project](#)," Rozell explained via email. This latter UAF program is an NSF-funded effort to teach children in

the Bering Strait School District physical science concepts by drawing them into activities involving the ways in which climate impacts their environments—and lives.

As for the trip with Yoshikawa, "I knew the route would be windy and cold, and it was," Rozell wrote.

"I was surprised at how a snowmachine can overcome almost any weather condition," he continued. "From Shaktoolik to Koyuk, it was blowing so hard over the sea ice that travel by foot would have been impossible (you would have been flash-frozen), and if you had a dog team you probably would have waited for the wind to die down a bit."

We asked how the seemingly tireless Yoshikawa manages his various projects—is there a superhero suit under that parka? Rozell offered, "Kenji is hard-driving and rugged. Works until he gets the job done, often on little food or water. On this trip, for example, he would snowmachine 100 miles over trailless tundra, get to a village, meet the science teacher, drill his permafrost hole, and then repair equipment and get ready for the next day. Sometimes he would hit more than one village per day. One day, we woke in Elim, where he spoke to students, rode to Golovin, where he spoke to students and drilled two holes, and rode on to White Mountain, where he drilled two more holes.

"Another feature that sets Kenji apart



Keji Yoshikawa (L) and Tohru Saito arrive at Kotzebue. Photo: Ned Rozell

is his confidence," Rozell continued. "He blazed trails for several hundred miles of our 800-mile trip. Looking at our GPS tracks at the end of the day, it was striking how straight our lines were. He said he navigated mostly by the sun, using GPS as a backup. His indecision lasted seconds at difficult points, then he was off again, always in the right direction. Maybe his confidence comes from the many miles he has covered in his lifetime." In two weeks, Yoshikawa and team installed some 15 permafrost observatories along the Bering Sea coast. Not bad. The university's Web site has now posted a video and other material (including blogs by Yoshikawa and Rozell) [here](#). Meanwhile, as you ride along on the March trip via the blog, Kenji has already logged more miles on visits to other communities for more permafrost outreach. Enjoy the ride.

In other adventures, UAF's Matt Nolan was in the field late last month for

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Matt Nolan's group will study rivers like the east fork of the Chandalar River, which drains many glaciers on the south side of the Brooks Range. Photo: Matt Nolan

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his [new grant](#). As part of the large IPY effort called [GLACIODYN](#), Nolan will study the mass balance of several glaciers in Alaska's Arctic National Wildlife Refuge near McCall Glacier, itself the focus of intense, ongoing [research](#) by Nolan. He'll also examine how changes in these glaciers impact the rivers and streams they feed.

Nolan and bush pilot Dirk Nickisch flew an aerial reconnaissance around

the McCall, in the Brooks Range. "We didn't have a lot of fuel or time, so we didn't do anything particularly coordinated scientifically, beyond marking out a runway on McCall Glacier with traffic cones and dropping off a load" for the visit later this year, Nolan remarked.

In addition to extensive, on-the-ground efforts to characterize changes in McCall Glacier and other area glaciers, ("Okpilak and Esetuk in particular,

where we have visited several times in the past and will [return] this year," he says), Nolan will shoot aerial photographs to update images taken by photographer Austin Post in the late 1950s. (For an example of how effectively these photos may show changes in the glaciers, see Nolan's Web site, where he has [posted](#) an image of McCall Glacier he shot in 2003 for comparison with Post's 1958 photo). ●

greenland

Kangerlussuaq

The "open" sign is lit in our Kangerlussuaq office now, as PFS staffer Mark Begnaud led a team north last month to ready the operation for early science projects due later this week. The New York Air National Guard's 109th division (ANG) followed with their LC-130 planes on Monday, March 31, and the rest of the week the team worked to open Raven Camp (the ANG's remote training facility in Greenland) and to transport CPS staff to Summit Station to assist the staff there with preseason preparations. Weather over the ice cap foiled scheduled take offs for a few days, but Raven Camp opened on 7 April.

Summit Station

Ken Jessen's winter crew at Summit welcomed an additional three staffers to NSF's research outpost last week, ending what Ken termed "our short but lovely isolation" at the top of Greenland's ice sheet. In preparation for the arrival of the LC-130, the Summiters worked on smoothing the skiway. "Robin [Davies] googled the world's longest runways," Ken reported, "and apparently this is the fifth - missing the first by not a whole lot.

"But it is almost surely the longest skiway in the world. It takes 10 hours to make the first complete pass with the Tucker." The work paid off when the LC-130 glided on skis to Summit's front door on April 9th.

Prior to that, a NASA DC-8 swooped by, dipped its wings at the team, and

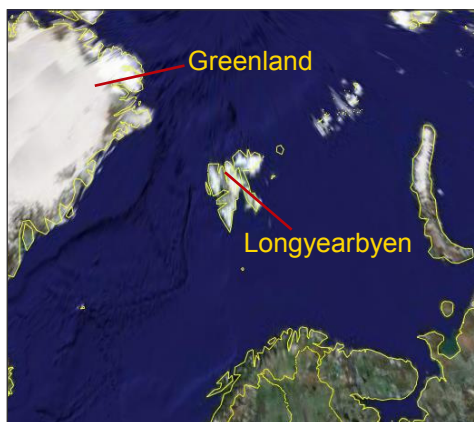
continued its research mission for [ARC-TAS](#), an effort to better understand the effects of pollution (human and natural) on the Arctic atmosphere. ARCTAS researchers are in the midst of a three-week airborne and ground campaign to study "[Arctic Haze](#)." They are taking measurements over Greenland, and also over Alaska, basing activities in the frontier state from Barrow.

The NASA DC-8 flight from Thule Air Base carried atmospheric chemist Jack Dibb (University of New Hampshire), whose "[Halogen Hunters](#)" collaboration is part of ARCTAS, itself part of a larger IPY effort called [POLARCAT](#). The DC-8 flew a spiral over Summit to capture measurements timed to coordinate with activities on the ground.

Summit Station science technician Kat Huybers explains: "We coordinated an ozonesonde balloon launch shortly before the plane arrived, and Jack also wanted to make sure that the MAXDOAS (UCLA) instrument (which measures formaldehyde, nitrogen dioxide, nitrous acid and bromine monoxide in the atmosphere) was functional at the time, which it was. Both instruments are capable of measurements that extend beyond the surface; the balloon obviously measures ozone along its flight path (upwards of 30 km), and the stationary MAX-DOAS instrument is also capable of capturing information several km into the atmosphere. It is my understanding that Jack's flight wanted to compare the numbers that their instruments were collecting for this air mass with those measured by the instruments found on station." ●



Ice crystals refract light as the Summit crew readies the station for summer. Photo: Robin Davies



norway

Svalbard is the scene of a great deal of activity just now, as most teams working for the NSF-funded [North Pole Environmental Observatory](#) (NPEO) are staging in Longyearbyen, on the Norwegian archipelago, for Arctic Ocean research (they also have been working from Barrow and Prudhoe, in Alaska, for a study of the Beaufort sea). Led by Jamie Morison of the University of Washington, scientists from various disciplines have been studying the Arctic Ocean each spring since 2000 from Borneo, a temporary research station on floating ice.

So far, the season is spinning out as

planned, with weather aiding the efforts to recover/service (and/or install new) instruments for various research projects and to fly radar transects over the ocean. Various groups have deployed buoys and other instruments on or beneath the sea ice. The mooring team flew to Borneo late last week and began the recovery, servicing, and redeployment of a two-mile-long cable secured to the seabed.

This stands in contrast to last year's effort, a spectacular disappointment, foiled by weather and runway issues. Morison and crew had to scrap about half of their planned events in 2007, perhaps most notably the mooring recovering and servicing. This cable carries instruments that collect information on sea ice and meteorological conditions, and on the Arctic Ocean all the way to the floor—critical information as scientists scrutinize these waters for changes perhaps wrought by arctic warming.

Polar Field Services staffer Tom Quinn is with the group in Longyearbyen to assist with any logistics issues that may arise for the team. He flew out to Borneo with the mooring team recently, returning to Longyearbyen with the plane. ●

in the media

Take an armchair trip to Svalbard with this *Chicago Daily Herald* [article](#).

“[W]hen I tried to set up the camera, I realized I was standing in wet mush,” National Geographic photographer Jim Balog tells a reporter of his experience of trying to mount a special camera on a Greenland glacier last summer. Balog is working with Jason Box to capture [time-lapse photos](#) of Greenland glaciers. View project photos on display at the Denver Museum of Nature and Science for the next six months or so. The photographer talks about the work and the exhibit [here](#).

Congratulations to the University of Wisconsin-Madison engineering team, which took top honors in this year's [Clean Snowmobile Challenge](#).

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The NPEO team based from this compound in a valley south of Longyearbyen on Svalbard.
Photo: Tom Quinn

field notes

By Polar Field Services, a member of the CH2M HILL Polar Services team.

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FACES of IPY: The Artist Adventurer

—Marcy Davis

“Expeditionary artist” [Maria Coryell-Martin](#) may be Seattle-based, but she’s most at home in remote wilderness, especially if that wilderness is ice-covered. As a member of the [Polar Artists Group](#) and [The Explorers Club](#), Maria values experiencing out-of-the-way places through art. Since 2007 and through this year, Maria will develop a portfolio of work for her IPY project, *Portraits of Ice, Witnessing Climate Change through Art*. She has worked as an artist-in-residence with Quark Expeditions in Antarctica, and alongside scientists in southeast Alaska, Greenland, and the North Cascade Mountain range in the Pacific Northwest. Maria will share her field sketches and paintings with the public through gallery showings, education programs, and publications. As Maria says in her IPY proposal, she seeks to “raise awareness and appreciation for the role of polar and glaciated regions in the global environment.”

Top: *Kullorsuaq Summer Solstice*, Oil on Canvas, 60” x 20”, Spring 2006

Bottom Left: Maria’s “palette of place.” Yes, it’s an Altoids tin. Photo: Maria Coryell-Martin

Bottom Right: We’re not in Greenland anymore! Photo: Christopher Wrigley

“I like the starkness of the polar regions. I love to sit in one place for a while and watch the light change,” she explains. “It is important and interesting to work in a place that is changing so quickly.”

Maria takes her inspiration from field artists like Thomas Moran, Rockwell Kent, and Edward Wilson who often accompanied early North American explorers. She has painted on every continent. Maria’s philosophy is that her art is a record of one place at one time through her eyes. Notebooks filled with gestural field sketches and watercolors capture time and place. They even catalogue the latitude and longitude of her work using a GPS. She chooses a few select pieces to work up as oil paintings back in her Seattle studio.

En plein air is a French expression meaning “in the open air” and describes the act of painting outdoors – an activity Maria takes to extremes that the mid-nineteenth century Impressionist painters never dreamed of. She sits on a sled in the snow or erects a lightweight, portable easel that packs into a backpack. Strategically placed Velcro tabs allow for tools and brushes to be placed within reach and stabilized from often less than idyllic weather conditions. In an Altoid tin, she packs her “palette of place,” a tiny yet effective Technicolor arsenal in which paint is mixed with salt or alcohol to keep it from freezing.

Maria sees herself as a communications link between science and the public. As one who thought during her school years that she might become a scientist, due to an affinity for biology and genetics, she enjoys learning from those she works with, particularly if they can teach her something about glaciers. Maria imparts her knowledge and her art at educational venues like Seattle’s Pacific Science Center, which hosts an annual Polar Science Weekend to raise awareness on the polar regions and climate change, and the North Cascades Institute.

For Maria’s reflections on her 2006 visit to Kangerlussuaq and Summit Station, Greenland, read the May 1, 2006, [edition of field notes](#).

Keep up with Maria at www.expeditionaryart.com

