



Alaska EPSCoR is a partnership dedicated to growing Alaska's scientific research capacity, funded by the National Science Foundation and the State of Alaska.

Making Connections

The EPSCoR Coordination, Integration and Synthesis Group

Pulling together Alaska EPSCoR's broad research is a daunting task. Fortunately, the Coordination, Integration and Synthesis (CIS) Group lives up to its name: it's where all of EPSCoR's geographic and disciplinary threads are being woven together to create a full portrait of change across Alaska.

"CIS is trying to consciously look at this picture in totality," noted EPSCoR Principal Investigator Anupma Prakash. "That's why it is so central to EPSCoR, because it helps people think bigger, it facilitates interdisciplinarity across geographic regions."



A presentation in Decision Theater North, a new space central to CIS Group visualization efforts at the University of Alaska Fairbanks.

CIS researchers have been coordinating information streams so that data gathered from EPSCoR's Southeast, Southcentral and Northern test cases can be compared with each other. These efforts are bearing fruit in the form of indices, assessments, models and visualizations described in more depth throughout this newsletter.

The products are aimed at a broad and varied audience. Most will form the basis for academic papers, some will be shared with resource managers and community leaders, others are geared to K-12 students, and still others will be made available to the public via various web portals. All are designed to help scientists and communities address biophysical and social changes and better understand the ways we perceive and adapt to them.

"By knowing the past, we also know where the changes are going to be in the future, and so our adaptation strategies are not just reactive," Prakash said. "Those quantitative estimates and information our researchers are producing help us to better prepare for the changing world around us."



From the PI

**Anupma Prakash,
Principal Investigator**

If EPSCoR's research focus is a puzzle, then we've got all of the borders put together, much of the landscape is filled in, and the pile of unsorted pieces grows smaller every day.

A large part of this progress is the work of the Coordination, Integration and Synthesis (CIS) Group, which is a central element of the EPSCoR project. The individual test cases and Education, Outreach and Diversity (EOD) Group are only pieces of the puzzle: a major focus of our research has always been integrating and synthesizing results across the test cases. CIS researchers are making great strides by using test case data to build products that will address broad research questions and be useful to communities.

But findings and papers are just one part of EPSCoR's charge. Our

Models a Key Part of CIS Efforts

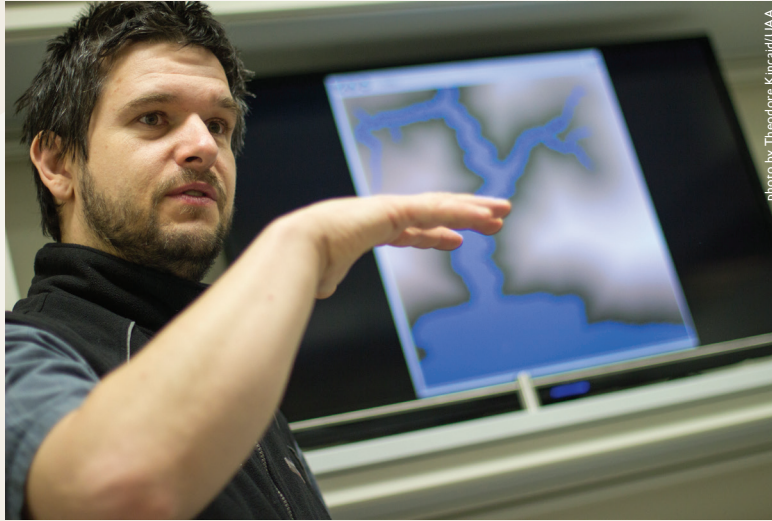
Martin Cenek is a model faculty member. So to speak.

The UAA Assistant Professor of Computer Science and Engineering is at the center of CIS Group work to synthesize EPSCoR results into functional models. He's currently working on three different model efforts, the most ambitious of which mimics the operation of a Kenai River-scale salmon fishery.

"We built this high-fidelity agent-based model that captures stakeholders - five groups of fishermen and two species of salmon - and the dynamics of interaction among them," he explained. "This created a framework that we can ask questions of, and it will give us very informative answers."

The fishery model incorporates a number of data sources from Southeast and Southcentral Alaska, such as delivery harvest data for the Kenai gillnet fleet, fishing tag information, and even the number of portable toilets ordered for Kenai beaches as a proxy for dipnetter numbers. It's spatially-based but not spatially explicit: that is, it uses data from the Kenai but does not recreate its geography, instead using a generic watershed. The model uses proba-

bilistic interactions to capture the feedbacks between various "agents," including salmon and multiple classes of human users, and uses them as the basis for a predictive simulation of the overall system. Cenek said it's worked, as demonstrated by its reproduction of real-world dynamics measured through other means.



CIS researcher Martin Cenek discusses his agent-based fisheries model.

"For example, the dipnetter effort and harvest of the model was 94 percent correlated to the actual measured data for the last 32 years," he said. "So we know that something is working."

Cenek plans to downscale the model for home use, and will produce both a simplified version to teach students about fisheries management, and a more complex one for resource man-

agers in which they can adjust social or environmental factors to test hypotheses. "Since it is predictive it can be used by resource managers to ask questions: What if I enact or implement this policy, how is that going to affect this system of the Kenai?"

Cenek also plans to build an agent-based model of subsistence hunting

patterns incorporating data from the Northern Test Case. Meanwhile, he's building two other models that use EPSCoR data, one of social networks and the other of semantic patterns.

The social network model is based on CIS surveys of Southcentral elected officials, resource managers, and members of non-governmental organizations, in which respondents reported which other individuals

are collaborators. Cenek translated this information into circles and lines that visually represent individuals and their connections. "I'm looking at these names and how they are interconnected, to try to answer the question, how adaptive are these social networks in response to environmental pressure?"

By removing various individuals from the social network model, Cenek said, he can see how networks complement

Coordination, Integration and Synthesis Research Team

Gary Kofinas, UAF Professor of Resource Policy and Management (co-lead)

Sanjay Pyare UAS Associate Professor of GIS and Landscape Ecology (co-lead)

Jamie Trammell, UAA Assistant Professor of Geography and Environmental Studies (co-lead)

Dayne Broderson, Geographic Information Network of Alaska Technical Services Manager

Martin Cenek, UAA Assistant Professor of Computer Science and Engineering

Jess Grunblatt, UAF interdisciplinary Ph.D. student

Meagan Krupa, UAA Research Professional

Jim Powell, UAS Assistant Professor of Public Administration

Paula Williams, UAA Research Professional

Mark Wipfli, UAF Professor of Freshwater Ecology

Frank Witmer, UAA Assistant Professor of Computer Science and Engineering

each other, and where they are susceptible to change. For example, he said, a group of heavily interconnected individuals can easily lose an individual member without a major impact on the network's connectivity, but "if I have these stakeholders connected like raisins on a shoe string, and one of them drops out, all of a sudden I don't have a network, I have two disconnected networks that do not talk to each other."

Cenek said the next step is to ground-truth results through comparison with semi-structured interviews by CIS researchers. He plans to construct a similar network for Southeast Alaska and hopes to also use data about networks in Sweden and Greenland collected by CIS researcher Jim Powell.

Finally, Cenek has been building a semantic analysis tool that sifts through media coverage to spot keywords and map their use. Cenek has been mining KTVA-TV in Anchorage and the

Alaska EPSCoR's current project consists of five components, each of which has been highlighted in a newsletter:

1. Southeast Test Case
2. Southcentral Test Case
3. Northern Test Case
4. EOD Group
5. *CIS Working Group*

Homer Tribune and Peninsula Clarion newspapers for key words about local fisheries, then creating visualizations of word use over time. "We are ren-

dering these 3-dimensional blobs," he said. "That blob is the semantic concept flow through time and how it shrinks and then expands based on the season or policy or a law or environmental change, and how the news media talk about it."

Cenek stressed that the tool offers more than just statistical analysis because it considers the words' context as well; for example a user could compare and contrast appearances of "salmon" with ecological keywords or with economic ones. He said he's creating visualizations both for home use and for the UAA Planetarium and Visualization Theater, and will make the tool available for public use via a web portal.

A New Home for Northern Adaptation Data

If the Arctic had a bulletin board, it might look something like the Arctic Adaptation Exchange Portal.

The portal (arcticadaptationexchange.com) is a home for adaptation information for northern communities, proposed by the international Arctic Council and currently hosted by Alaska EPSCoR and the Geographic Information Network of Alaska (GINA). Originally designed largely to house institutional records, the portal and its associated data catalog and map interface have since been expanded to enable sharing of citizen science and community observations of change.

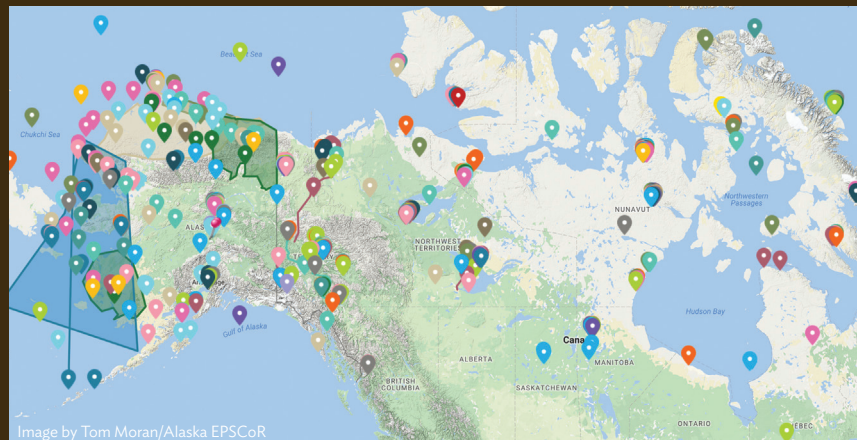


Image by Tom Moran/Alaska EPSCoR
Screenshot of part of the Arctic Adaptation Exchange Portal map interface, showing available data sets across the globe.

"The portal was for gray literature and just general research, so it was a very broad focus," noted Vanessa Raymond of GINA, who manages the project. "The trend of Arctic happenings toward citizen science and user observations have pushed the portal in that direction as well."

The CIS Group was key to the creation of the portal. Project details were largely mapped out at a 2014 meeting of polar researchers

hosted by CIS. Based on that input, the portal was designed and implemented by the Canadian government and GINA. The CIS Group presented on the portal at the 2016 Arctic Science Summit Week in Fairbanks, and feedback from those sessions led to the shift toward citizen science and community input. The portal now enables users to share observations and document problems arising from climate change and to access problem-solving tools.

"I think the part that really makes a broader impact is having that forum where you can post what you have found in your communities, what works in your communities, and what has been challenging to your communities in adapting," noted Alaska EPSCoR Principal Investigator Anupma Prakash.

GINA is slated to continue to maintain the portal during the current U.S. chairmanship of the Arctic Council, which ends in 2017. GINA's role with EPSCoR efforts stretches far beyond the portal: The organization is also implementing the Arctic Water Resource Vulnerability Index website (see page 4), and maintaining and improving Decision Theater North (page 5), including continuing to develop methods for using web-based visualizations in the new venue. GINA is also administering EPSCoR's online test case data portals and is consolidating them into a single portal to simplify future access.

Digging into the Delta

As the saying goes, seeing is believing. But how does what we see compare to what's really there?

The CIS Group is working on a quantitative answer to that question by producing “P-delta-I assessments,” which compare the difference between people’s perceptions of environmental change and change as measured by instruments.

“The hypothesis is that if there’s a big gap between what’s actually happening and what people perceive is happening, that makes them less able to adapt successfully,” said Paula Williams, a UAA research professional putting together the assessments. “It’s a proof-of-concept, because this hasn’t been done before, so right now it’s just looking at ‘Can we compare perception with instrumented data, and how does that work?’”

The assessments are based on EPSCoR surveys of resource managers in Southeast and Southcentral Alaska and a survey she administered to Southcentral fishing guides. Instrumented data includes long-term agency measurements of factors like air and water temperatures, timing of fish runs, and abundance and size of fish. Results take the form of statistical analyses and accompanying graphs and charts. Williams said findings thus far have revealed some interesting discrepancies, such as the fact that resource managers don’t ap-



Paula Williams

pear to discriminate between stream temperature change in glacial and non-glacial streams.

“That’s really important for fish spawning, and it’s kind of striking that they are not articulating that difference,”

Williams noted. “That may not bode well for decisions that they’re making about what resources they’re going to put into which streams.”

CIS researchers are also studying impacts of these findings by examining administrative decisions to see how they correlate to P-delta-I data. “We’re going to compare Board of Fish deci-

sions to recommendations from the Alaska Department of Fish and Game,” said Williams. “We can then look at how these decisions affect fish returns to see whether they’re adaptive or maladaptive.”

The CIS team is also generating a web-interface to the Arctic Water Resource Vulnerability Index (AWRVI): an index published in “Environmental Management” in 2008 by Alessa et al. An AWRVI is designed to provide community members information about their adaptive capacity, particularly as it relates to water resources. A community representative inputs a variety of data points into a web portal, including physical parameters such as precipita-

tion, percent of surface water, and wastewater treatment, and social information such as education and income levels, subsistence use, and transportation to and from the community. The index then generates a series of scores indicating local resilience and vulnerability. “Water is one of the most important resources for humans, we don’t live long without it,” Williams noted. “That was the reasoning for having water as the focus of this adaptive capacity index.”

Williams and CIS Group technicians are working to make AWRVI data inputs web-accessible, and to provide completed versions to the largest communities in the EPSCoR test case areas: Nuiqsut, Cooper Landing, Sterling, Kenai, Soldotna, and Juneau. These will be available online through a dedicated AWRVI website that will also enable individuals to enter community data to create indices of their own.



CIS researcher Jim Powell interviews Aasi Chemnitz Narup, the mayor of Nuuk, Greenland, about P-delta-I and adaptive capacity.

sions to recommendations from the Alaska Department of Fish and Game,” said Williams. “We can then look at how these decisions affect fish returns to see whether they’re adaptive or maladaptive.”

In addition, CIS researcher Jim Powell is gathering P-delta-I information from communities in Sweden and Greenland that will also contribute to

See For Yourself: CIS Visualizations



Frank Witmer

It's not enough for EPSCoR to gather and interpret data; the next step is presenting it to the public. That's where the CIS Group's visualization efforts come in.

"The idea is to really use visualization as a tool to convey science to a broad range of people," said UAA Assistant Professor of Computer Science and Engineering Frank Witmer. "To fellow scientists, to stakeholders in the community, and to students via education and outreach."

Witmer is leading CIS visualization work at UAA, centered on the campus' Planetarium and Visualization Theater (PVT). One major project is a high-resolution 3-D model of the Kenai River watershed, which contains data layers from the 1950s, 1980s and 2013 to illustrate changes over time - from receding glaciers to advancing development. "It's one thing to read an article or even see a movie about these sorts of landscape-scale environmental changes, but to be in the immersive environment of the planetarium really takes it to the next level."

Witmer is also continuing work on SalmonSim, an immersive salmon visualization program developed under an EPSCoR contract in Idaho before recently being transferred to Alaskan researchers. SalmonSim consists of virtual versions of the Russian River and the mouth of the Kenai River stocked with salmon. Through a set of interactive scenes, users can see various parts of the salmon life cycle, change aspects of the environment to see how it affects the fish, and even pilot a salmon upstream to spawn.

Witmer said SalmonSim is currently used mainly for student outreach, and a major goal is to combine the simulation and landscape model into a presentation for school groups. The CIS Group is also working with the Alaska Department of Fish and Game and Kenai watershed organizations to create a version of SalmonSim incorporating the Kenai Peninsula's many overlapping fish regulations and jurisdictions, so they can better understand how these may impact the fishery. "We'd like to be able to create this scene that has real value to managers and users," Witmer said.

EPSCoR's visualization efforts in Fairbanks center on Decision Theater North (DTN), a conference room retrofitted

with seven high-definition monitors and connected directly to UAF computing and storage. The new venue is designed to use visualizations to facilitate group decision-making.

"We can build on the capacity of the university to capture data to create visually stimulating packets of information to help people to understand the world around them," said Alaska EPSCoR Associate Project Director Pips Veazey, who is in charge of DTN. "What we hope Decision Theater North will do in the future is be a gathering space for different kinds of people to come together to talk about complex



photo by Frank Witmer/UAA

An image of a Kenai Peninsula landscape in the UAA Planetarium and Visualization Theater.

problems."

DTN has been open since fall 2015 and has hosted numerous events, including open houses, thesis defenses, and gatherings of officials such as meetings to develop a state entrepreneurship plan. EPSCoR has also championed the DTN through a two-day visualization workshop and grants for researchers to create compelling DTN or PVT content. Future plans include research into how the DTN facilitates team science; a collaboration with a decision theater in Washington D.C.; and community conservation sessions where researchers meet with managers and lawmakers.

"Scientists like to think that they get information out to policymakers but that doesn't magically happen, there needs to be a process for doing that," Veazey said. "Facilities like these can be that midpoint in the bridge between those two groups."

The Arctic, Writ Small

For a week in March, Alaska NSF EPSCoR hosted the future of the Arctic.

EPSCoR was a major sponsor of the Model Arctic Council, which brought 65 college students from around the world to the University of Alaska Fairbanks campus as part of Arctic Science Summit Week. The students spent the week portraying diplomats from arctic states in simulated meetings of the Council, an intergovernmental forum representing eight Arctic nations and six indigenous groups.

“A lot of us were saying we came into this with maybe 10 percent knowledge about the Arctic Council,” noted attendee Rhiannon Klein, a Ph.D. student at the University of Saskatchewan. “And we’ve left really understanding Arctic Council issues, and also just feeling a lot more passionate and engaged with them.”

Students were assigned to represent different countries or indigenous groups, and were assigned positions as either working group members, senior arctic officials or ministers. Working group members were the foot soldiers of the organization, discussing specific problems facing Arctic peoples and hashing out policies to address them.

“Everyone was prepared and there was a lot of critical thinking, critical analysis all the time,” said Eva Wu, an undergraduate at McGill University. “At times it was a little overwhelming, because it was just day in and day out.”

The students split into two working groups, one of which addressed cruise ship tourism and maritime traffic, the

other health and sanitation, and suicide rates in indigenous groups. Their policy recommendations were passed along to students acting as senior arctic officials, who then discussed and modified them

helped to organize the meeting.

Students spoke well of the event in general, noting the high level of preparation of their fellow students, the diversity of perspectives, and the strong



A discussion session during the Model Arctic Council at Arctic Science Summit Week.

before presenting them to the ministers. The final product was a 15-page “Fairbanks Declaration” encapsulating their findings. “It was really interesting because you got to see how the recommendations and the declarations are created and how people are able to work together to have such a widespread consensus,” Wu said.

Participants came from 14 different countries and represented a wide spectrum of academic disciplines, and many were asked to represent a country that was entirely foreign to them. “Some of the students had the greatest experience trying to play a role that wasn’t them at all, that was really a learning experience for them to take on that identity and try to perform it,” noted UAF Professor of Northern Studies Mary Ehrlander, who

voice that indigenous groups have in Arctic Council affairs. “I study indigenous politics and I am indigenous, and that was the best part for me, to be able to have that assertiveness without anyone being able to shut you down right away,” noted Veronica Guido, a student at York University on Toronto.

Unbeknownst to the students, their final “Fairbanks Declaration” had a life beyond their meeting: it was adopted by the actual Council as the starting point for its discussions at Arctic Science Summit Week.

“I think we may see the influence of it on the final declaration at the ministerial meeting next May in Fairbanks,” Ehrlander said. “That’s very unusual, this has never happened before.”

Communicating Change

As Tracie Curry sees it, she's just traded one desert for another.

"I have a love of desert landscapes, definitely," said the Los Angeles native, who is working on visualization efforts with EPSCoR's Northern Test Case. "Something about the Arctic being another kind of a desert – I just kind of wanted to be up there."

That being said, Curry took a circuitous route to the University of Alaska Fairbanks, where she's now a Ph.D. student in Natural Resources and Sustainability (and a fellow in the Resilience and Adaptation Program) focused on using

ways in which communication and collaboration can bolster the ability of communities to adapt to climate change. She's focusing particularly on the coastal North Slope, looking at ways visual elements can improve interactions between researchers, agencies and residents.

"If you live in the Arctic and you're explaining your observations of change, it's difficult for somebody who is not from that area to really understand the magnitude of change, and the effect that it's having on you and your culture," she said. "But I think that there are some ways to do that visually."

Within that broad topic, Curry has been involved in multiple research projects. One is studying the human dimensions and cumulative effects of road development, including examining how communities, agencies, industry and academics interact to impact local adaptation. In another project, she interviewed residents of the North Slope village of Wainwright to record their observations of change, part of an international project researching adaptation in coastal communities. She also undertook an EPSCoR-supported internship with Wainwright through the Resilience and Adaptation Program, where she created a database of existing research information about the village.

The first of these projects gave Curry a chance to flex her visualization skills, because she also worked on an EPSCoR award to translate the research into an interactive narrative, consisting of maps, infographics, animations, photo collage and narration. The idea was to frame the visual elements in an immersive multi-screen environment – in this case, Decision Theater North (see page 5) – to help audiences better grasp concepts like the magnitude and scale of change, to aid in their decision-making, and to expose them to a holistic, social-ecological systems approach to resource management.

All of these projects are helping Curry to develop her thesis, which will focus on both sides of research communications: how community members can better express the complexity of their culture and the impacts of change, and how agencies and researchers can better share technical information with policymakers and citizen groups. "Right now what is mostly delivered are scientific reports to communities which are written for academic audiences, and are not easily digestible for most of the people that live there," she said. "So how can we better communicate research findings?"



Tracie Curry displays one of her visualization projects in Decision Theater North.

visual tools to communicate complex concepts. First came an undergraduate degree in Economics at the University of Pennsylvania Wharton School of Business, then three years in Washington D.C. as a financial analyst for a real estate advisory firm. But it wasn't Curry's element: "I just really hated being inside all the time, and in front of a computer, and in front of spreadsheets."

So she entered a Master's program in landscape architecture at the Harvard University Graduate School of Design, where an instructor's offhand remark about the prospect of an ice-free Arctic sparked an interest in the changing North and its peoples. "I think it's a really interesting place to be involved if you want to have an impact," Curry said. "We have this long view that things will be drastically different in the Arctic in 20, 50 years, and that in my mind is enough time to do something."

Since enrolling at UAF in 2014, Curry has been studying

Three Years of Progress for UAV Program

On a dirt runway 60 miles outside of Fairbanks, Wally Flynn kneels over a dji Phantom drone. He checks its gimbals, notes the condition of the propellers and the camera attachment, listens for alert sounds, and backs away. At each step he recites what he has just done, part of a rigorous preflight procedure.

But it's difficult to understand a word of it, because Flynn is speaking in Yu'pik. A high school senior from the village of Chefnak on the Kuskokwim delta, Flynn has come here to Chena Hot Springs as part of EPSCoR's "Modern Blanket Toss" program, which is bringing cutting-edge unmanned aerial vehicle (UAV) technology to Alaska's rural high schools.

"The purpose of the project is to expose students to science-related activities that broaden their horizons," said John Monahan, who heads the UAF Upward Bound program and is in charge of the project. "It's meant to be something captivating that's fascinating and interesting to them, and gives them a hook on what a possible future career could be."

The Modern Blanket Toss is a three-year project of UAF Upward Bound and EPSCoR to excite students about science and technology careers, funded through a \$750,000 NSF award. Students from five rural high schools have learned about UAV's and Geographic Information Systems (GIS) through afterschool activities, received training in them during a residential summer program at UAF, and have been using the drones to undertake mapping projects to benefit their communities.

At least, that's the theory. Monahan describes a long process of adapting

to the challenges of harsh weather, isolation (three of the five schools are off the road system), and fragile, quickly outdated technology. "We really didn't know that much about UAVs three years ago and part of it was a huge learning curve for us, and documenting everything we have discovered along

shoreline, and Seward high-schoolers made 3D maps of inaccessible mountain valleys to chart their potential to contribute to flooding. "The students seem to plug into community service," Monahan said. "Helping somebody, and having a product they want to show in the end."



Modern Blanket Toss students and staff pilot a UAV above Chena Hot Springs Resort.

the way," he noted. "Some of the best learning was fixing the equipment and mapping the UAVs figuring out what was going wrong."

Even as program emphases and equipment have shifted, students have been able to use the drones for multiple projects. In 2014 they mapped the UAF Frisbee golf course, and in 2015 made similar maps of beaches and recreation areas around Fairbanks. During the school year, students in Nikiski and Chefnak worked to map methane pockets in nearby lakes and rivers, Bethel students looked for rotten ice on the Kuskokwim River, Shishmaref students mapped the erosion eating their

The continued effort to put the drones to good use was what brought Wally Flynn and 15 fellow high-schoolers to Chena Hot Springs this May: the owner has grand plans to expand the property and wanted elevation data, and in exchange he hosted the students. Under wispy cirrus clouds, a group of students, instructors and technicians hiked above the resort, set up a hexacopter in a clearing amid spindly black spruce, ran through the customary checklist, and let fly. Manning the controls was Bethel student Danielle Kashatok, who watched intently as the drone elevated hundreds of feet and entered into a preprogrammed mapping

routine. “I want to be a pilot when I grow up,” Kashatok said. “I feel like a pilot when I’m using the controller.”

Behind Kashatok, student Cyrus Kinegak of Chefnak alternated between studying drone feed on a laptop and scratching Yu’pik words in the dirt. Kinegak said the project fits well with his own goals. “I would like to follow in my brother’s footsteps, he used to be a pilot,” he said. “One of my dreams is to become a pilot, and using UAVs includes a lot of aviation.”

Back down the hill, Flynn and another set of students flew a dji Phantom with the loose idea of making a promotional video. Flynn maneuvered the UAV between tall aspens and followed on foot, while other students pretended to be tourists, walking past a pony corral and staring into a chicken coop. A few minutes later, edging through some trees near the resort entrance, the Phantom clipped a branch and augured 10 feet straight down into a parking lot. Students and instructors picked it up, inspected it, and send it flying again within minutes. “It’s amazing how much these things can survive,” noted Adam Low, a curriculum developer with the project.

Monahan said students have enjoyed the program, evaluators have given it strong marks, and leaders are working on a proposal to expand it. “We’ve had a bunch of roadblocks and hurdles that we have gotten past,” he said. “We learned so much that we are rewriting and enlarging it and talking about taking it nationwide.”

WAISC comes home for 2016

In 2016, the Western Alaska Interdisciplinary Science Conference (WAISC) got back to its roots.

For the third time, the conference took place in the fishing town of Dillingham, home of the University of Alaska Fairbanks Bristol Bay Campus and Associate Professor of Environmental Science Todd Radenbaugh, who founded the event in 2008. The 2016 theme was “Adaptation: Tides of Change.”

“Western Alaska is undergoing rapid change, mostly because of climate change, but also because of cultural influences,” Radenbaugh noted. “So the adaptation and change component is always important in WAISC conferences.”



Todd Radenbaugh leads a WAISC field trip on the tundra near Dillingham.

The annual event rotates among Western Alaska communities, bringing together residents and researchers to discuss local concerns. The 2016 event included panel discussions on the proposed Pebble Mine and on rural education, and a major focus of the event was the impacts of climate change on subsistence activities. Attendees also got a firsthand look at the local environment through a field trip to see local coastal erosion, the town’s new landfill and incinerator, and the nearby village of Aleknagik.

“Instead of talking about global

climate change, which you’d expect at a national conference, here we’re talking about how climate change is affecting local culture and geography,” Radenbaugh said. “The most immediate climate change issue for Western Alaska is subsistence, and changes to subsistence hunting and shoreline erosion.”

Radenbaugh estimated the three-day event drew close to 100 participants, including a number of local residents and even a group of Dillingham high school students. Alaska EPSCoR supports the conference by awarding competitive travel funding, including paying for five University of Alaska students and one staff member to attend in 2016.

Kristin Brown, a Masters student in Fisheries at UAF in Juneau, presented on her studies of the diet composition of sea otters outside of Glacier Bay. “I need to be ready for my thesis defense, but also I really wanted to network with people and hear the other talks,” she said. “I’ve never actually been to a conference like this, and there’s a very diverse array of topics that were presented here that I’ve never really been exposed to.”

Another EPSCoR-funded attendee, UAF Economics Masters student Barbara Johnson, presented on her research into a new affordability indicator for rural water utilities. She appreciated the chance to see a rural water system in person, including an impromptu tour of the local water utility. “The networking was definitely really successful and I was able to talk to people who work in the field, who have worked in it for 20-30 years,” she said.

EPSCoR People

RAP Internships

Alaska EPSCoR supported five graduate students in the UAF Resilience and Adaptation Program to conduct research in summer 2016.

- Biosciences student Casey Brown studied effects of fire on moose harvests near Delta Junction.
- Anthropology student Odin Miller worked with the Midnite Sun Reindeer Ranch and the Nome Eskimo Community to understand how redeveloping reindeer herding around Nome could impact local food systems.
- Anthropology student Emilie Springer conducted writing and outreach projects for her thesis, a nonfiction exploration of the Cordova fishery based on oral histories.
- Natural Resources Management student Stefan Tangen partnered with the village of Shaktoolik's planning committee on a project related to its climate adaptation plan.
- Engineering student Molly Tedesche researched how receding snowfields are impacting caribou in Gates of the Arctic National Park.

Publications

Many EPSCoR researchers have been published in 2016, including several highlighted below.

Northern Test Case (NTC) lead Gary Kofinas contributed to a mammoth interagency report entitled "Subsistence Sharing Networks and Cooperation: Kaktovik, Wainwright, and Venetie, Alaska." NTC researcher Ken Tape was lead author on "Range Expansion of Moose in Arctic Alaska Linked to Warming and Increased Shrub Habitat," published in *PLOS One*, and NTC researcher Anna Liljedahl is lead author on "Pan-Arctic ice-wedge degradation in warming permafrost and its influence on tundra hydrology," which appeared in *Nature Geoscience*. Both of the latter made national news for their findings about Arctic climate change.

Southcentral Test Case (SCTC) and CIS Group researchers published "A science of integration: Frameworks, processes, and products in a place-based, integrative study" in the journal *Sustainability Science*. Also, the SCTC's stakeholder research methodology is summarized in a *Marine Policy* article by researcher Meagan Krupa, entitled "Who's who in the Kenai River Fishery SES: A streamlined method for stakeholder identification and investment analysis."

Timm receives Shoemaker award

Alaska EPSCoR alumna Kristin Timm was awarded the U.S. Geological Survey's Shoemaker Award for External Communications for her poster "From Icefield to Ocean." The poster can be viewed on the Southeast Test Case page of the Alaska EPSCoR website.

EPSCoR Briefs

Veazey co-convening session at AGU Fall Meeting

Alaska NSF EPSCoR Associate project Director Pips Veazey is co-convening a session on "Art and Design of Visualizations in the Geosciences: Inspiration, Interpretation, and Communication" at this year's American Geophysical Union Fall Meeting in San Francisco. The session features collaborations among researchers, artists, and designers to highlight scientific findings and expand efforts to communicate scientific research to diverse populations, inform decision-making, and promote art in the geosciences.

FEW workshop

Alaska EPSCoR provided organization and support for an NSF-funded workshop on "The Food-Water-Energy Nexus in Islanded Communities and High Latitudes," held September 8-9 at UAF. Forty-five invitees attended the two-day workshop, which focused on challenges and solutions in the fields of infrastructure engineering, environmental engineering, and social and economic sciences as they relate to remote food, energy and water needs.

New EPSCoR-related websites

Several EPSCoR-related efforts have recently launched websites to showcase their progress and findings. UAF's new EPSCoR-supported Decision Theater North venue has a site up at www.dtn.alaska.edu, including information on the progress of EPSCoR's Data-to-Decision awards. The Modern Blanket Toss (see page 8) website is located at www.modernblankettoss.org. And the Southcentral Test Case has created an interactive site at southcentral.epscor.alaska.edu/kenai-survey to display the results of their survey of Kenai Peninsula residents.

Augmented-Reality Sandbox videos

The U.S. National Weather Service (NWS) has produced a 3-part series of videos about the Augmented-Reality Sandbox as part of their "Alaska Weather Facts" feature. The videos can be found on EPSCoR's YouTube page at www.youtube.com/alaskaepscor.

EPSCoR Social Media

Have you liked Alaska EPSCoR on Facebook? If not, please visit facebook.com/AKEPSCoR for regular updates on our events and progress. We're also tweeting at twitter.com/AKEPSCOR, posting videos at youtube.com/user/AlaskaEPSCoR, and making these newsletters available at issuu.com/akepscor. And if you're not already on our email listserv and would like to be, please email tmoran3@alaska.edu.

mission is to build research capacity, and I see evidence of that every day. A great deal of our current research and outreach, including much of the effort on our seed grants and Alaska Native engagement grants, is being conducted by junior faculty and students. Recently, two EPSCoR faculty hires, Srijan Aggarwal and Elaine Drew, were co-PI's on a successful NSF workshop on the Food-Energy-Water Nexus in Islanded Communities and High Latitudes, which we at EPSCoR had the privilege of supporting. Seeing EPSCoR students, staff, and faculty learn and prosper is one of the most fulfilling parts of my job.

Even as we celebrate the progress of EPSCoR's present, we stand on the cusp of the program's future. In early August, I led a team of researchers who submitted "Fire and Ice," a pro-

posal to fund the next five years of Alaska NSF EPSCoR. The \$20 million project would employ remote sensing, fieldwork, lab experiments, and modeling to study climate-driven biophysical changes to Alaska's boreal forests and coastal margins. "Fire and Ice" would incorporate research and outreach from throughout the UA system and build off of some of the findings and infrastructure of the current EPSCoR project.

So this newsletter comes as we ponder the transition between the current project, which will end on June 30, and its potential successor. Looking at the results and publications coming from the test cases, and the exciting products being created by the CIS Group, it's clear that Alaska EPSCoR is hitting its stride as it approaches the finish line.

EPSCoR Awards Native Engagement Grants

Alaska EPSCoR is pleased to announce the awarding of seven \$20,000 grants to UA faculty and affiliate teams with proposals to engage Alaska Natives in science, technology, engineering and mathematics (STEM) fields:

- Olivia Lee, UAF Geophysical Institute, for "Engaging communities to share science and traditional knowledge on sea ice change." Lee is working with collaborators in Barrow to produce outreach materials about sea ice change.
- Carie Green, UAF Department of Education, for "Children's environmental identity development in an Alaska Native context." Green is studying how 60 children in Unalakleet make meaning of their natural environment.
- Dan Rinella, UAA Department of Biological Sciences, for "Decision library: Paving the way." Rinella's team is working with the Kenai'tze Tribe to create a library of traditional language, knowledge, and place name maps as well as EPSCoR research.
- Charlene Stern and Jessica Black, UAF College of Rural and Community Development, for "Examining Gwich'in resiliency and theory of change." Stern and Black are conducting interviews and focus groups with Gwich'in leaders to document adaptive capacity and perceptions of change.
- Matthew Sturm, UAF Geophysical Institute, for "Human perceptions and consequences of a changing permafrost landscape near Nuiqsut, Alaska." Sturm and his team are creating a Story Map, photo book and museum exhibit based on observations of local landscape change by Nuiqsut residents.
- Molly Tedesche, UAF College of Engineering and Mines, for "Climate-driven extent changes in perennial snowfields in Gates of the Arctic National Park & Preserve: Utilizing satellite data to investigate impacts on caribou and inform Native Alaskan subsistence users." Tedesche's team is conducting a science camp, public information meeting, and a citizen science workshop in Anaktuvuk Pass.
- Shannon Atkinson, UAF School of Fisheries and Ocean Sciences, for "Project DEM BONES: Promoting higher education through culturally appropriate science interactions." Atkinson's team is continuing and expanding a project that uses the articulation of marine mammal skeletons as a teaching tool for high school students.



UAF Ph.D. student Molly Tedesche and Anaktuvuk Pass high school student Joseph Nukapigak measure dissolved oxygen in Contact Creek during UAF's 2016 Anaktuvuk Pass Summer Science Camp.

Alaska EPSCoR: Experimental Program to Stimulate Competitive Research

University of Alaska Fairbanks
P.O. Box 757010
208 West Ridge Research Building
Fairbanks, Alaska 99775-7010



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EPSCoR Awards Research Seed Grants

The following UA faculty teams have been awarded \$30,000 grants to fund innovative projects with the potential to create new lines of EPSCoR research.

Northern Test Case

- Vladimir Alexeev, UAF International Arctic Research Center, for “Large-scale controls of hydrometeorologic conditions on the North Slope.”
- Nathan Kettle, Alaska Center for Climate Adaptation and Policy, for “Evaluating the North Slope Borough-Shell Baseline Studies Program.”
- Nicole Misarti, UAF Water and Engineering Research Center, for “Investigating the resilience of an important subsistence resource, the Pacific walrus, to changing climates.”

- Santosh Panda, UAF Geophysical Institute, for “Sixty-five years of Colville River dynamics and its impact on present river navigability near Nuiqsut, North Slope of Alaska.”

Southeast Test Case

- Shannon Atkinson, UAF School of Fisheries and Ocean Sciences, for “Changing glacial ice habitats and their impact on

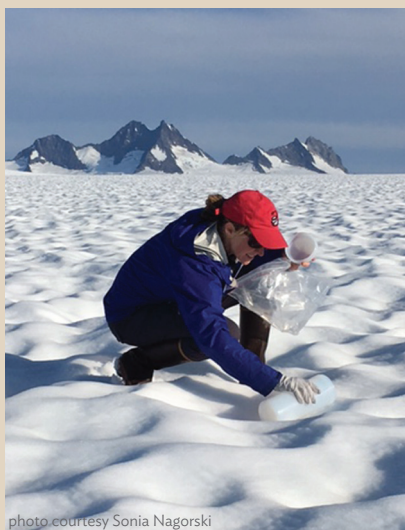


photo courtesy Sonia Nagorski

Sonia Nagorski collects snow samples for black carbon testing on the Juneau icefield.

harbor seals in Southeast Alaska.”

- Sonia Nagorski, UAS Department of Natural Sciences, for “Black carbon deposition onto the Juneau Icefield.”

Southcentral Test Case

- Jennifer Schmidt, UAA Institute of Social and Economic Research, for “Informed decision-making: Effects of management scenarios on sportfishing in the Kenai River.”
- Peter Westley, UAF School of Fisheries and Ocean Sciences, for “Rapid adaptation and the biological invasion of northern pike (*Esox Lucius*) in Southcentral Alaska.”

Coordination, Integration and Synthesis Group

- Peter Webley, UAF Geophysical Institute, for “Building tabletop exercises for airborne hazards: Volcanic eruptions and wildfires.”
- Jordi Cristóbal Rosselló, UAF Geophysical Institute, for “Surface temperature retrieval for the Kenai Peninsula from 1984 to 2011 in support of salmon habitat modeling and integrated SES studies in the ACE test case areas.”