

Prakash is new EPSCoR Head Replaces Myers as Principal Investigator

Change is afoot atop Alaska EPSCoR.

University of Alaska Fairbanks Geophysics Professor Anupma Prakash was selected in December as Alaska EPSCoR's new Principal Investigator. She takes over the job from former UAF Vice-Chancellor of Research Mark Myers, who resigned from the university to take over as Commissioner of the Alaska Department of Natural Resources.

"Alaska is in the midst of witnessing major climate-related changes," Prakash said. "I can't think of anything more exciting and rewarding at this time than leading the EPSCoR effort that addresses these issues and seeks to promote the adaptive capacity of Alaska's communities."



Anupma Prakash, Alaska EPSCoR's new Principal Investigator, works with graduate student Kate Schaefer in a West Ridge Research Building computer lab.

Prakash was selected for the position by consent of University of Alaska leadership, with final approval coming from UA President Pat Gamble. "Anupma Prakash is to assume one of the most important leadership positions within the UA system, and is a perfect fit for assuming that responsibility," said Gamble.

Prakash is Professor of Geophysics in the Department of Geosciences, Associate Dean of UAF's College of Natural Science and Mathematics (CNSM), and Director of CNSM's Division of Research. Her research focuses on the use of remote sensing and Geographic Information Systems (GIS) techniques to map earth surface composition and changes. She received her bachelor's and master's



From the PI

**Anupma Prakash,
Principal Investigator**

Alaska EPSCoR's major research focus is change. It's only appropriate, then, that the program itself is undergoing some changes as well.

The biggest one, of course, is the resignation of Mark Myers, who has left UAF to take over the state Department of Natural Resources. Mark was an excellent steward at UAF and he'll bring the same leadership qualities to his new job. I'm excited about taking over the EPSCoR program in his stead, though I know I will have big shoes to fill.

On the other hand, I'm stepping in at an opportune time. EPSCoR is now halfway through its five-year "Alaska Adapting to Changing Environments" award. We've made great strides already: our sensors, surveys and mapping efforts have already added substan-

North to the Future

Northern Test Case Studies Changes to Arctic Alaska

Thawing permafrost. Changing vegetation and wildlife patterns. Burgeoning oil development. In Alaska's far north, it seems the only constant is change.

This dynamic environment is the focus of Alaska EPSCoR's Northern Test Case, which studies how hydrologic, landscape, and land cover-land use changes are affecting Nuiqsut, a 400-person Iñupiaq village located 18 miles from the Arctic Ocean and surrounded by oil and gas development. The effects of such changes are especially acute in and around Nuiqsut since the community is located off the road system and its residents rely heavily on subsistence foods.

"The Northern Test Case gives us insight into a landscape that has evolved in extreme conditions, and people who live very close to the land and depend highly on resources they're harvesting," said UAF Professor of Resource Policy and Management Gary Kofinas, who heads up the test case.

A central goal of the test case is to understand how these changes affect wildlife, vegetation and other elements of the mixed cash-subsistence village economy, and to assess the local capacity to respond to these changes. Kofinas said the test case will ultimately produce a variety of data, maps and tools, and simulations that will be made available to local and regional organizations, and that will contribute to the overall Alaska EPSCoR project to study the adaptive capacities of northern communities.

To reach these larger goals, the test case encompasses a number of strains of research. "One of the objectives

of the project is to have researchers broaden their focus beyond their home disciplines, to arrive at a greater understanding of the system as a whole," Kofinas said.

tant Professor in charge of the test case's hydrology efforts. "Suddenly you're draining the landscape, and it becomes dry."



Nuiqsut residents above the Colville River.

Hydrology, Fish and Wildlife

Nuiqsut is surrounded by a singular permafrost landscape: A coastal plain consisting of polygonal landforms 10 to 30 meters in diameter, which are slightly indented and often harbor shallow troughs of water. Land development and climate changes have begun to degrade some of these "ice-wedge polygons," enabling water to more easily escape the troughs via channels between the shapes. This change could have major ramifications for vegetation, fish and wildlife that local residents depend on for subsistence.

"If you continue the degradation and you connect all these troughs, then instead of the water ponding in the troughs, now the water can flow if there is a slope to the landscape," explained Anna Liljedahl, a UAF Research Assis-

Liljedahl is studying these hydrologic changes to develop scenarios of how they could continue in the future, and how this would affect habitat. Crucial to her investigation is area LiDAR mapping commissioned by the test case, which has provided sub-meter resolution elevation data to use to map and model landscape dynamics down to the level of individual polygons.

Other Northern Test Case researchers (see story, page 4) are working to understand how changes in the hydrology of the Colville River affect shrubs and in turn herbivores. Another way that the Northern Test Case is linking hydrology and wildlife changes is by contributing to a Terrestrial Ecosystem Model: Made up of 1-kilometer grids across the test case area, the model incorporates data on fire, permafrost,

hydrology, and vegetation, and uses them to project changes in plant communities. Researchers are now retrofitting the model to incorporate other factors like caribou energetics, human infrastructure, and hunter access.

Local Traditional Knowledge

A key element of the test case is acknowledging the expertise of local residents in observing and interpreting changes to the land. “One thing we wanted to do to begin with was to really engage the community in the research,” said test case researcher Todd Brinkman, an Assistant Professor of Wildlife Biology at UAF. “We really wanted to know what the community thought, what their perception of change was.”

To accomplish this, test case researchers are undertaking “participatory mapping” exercises, in which residents identify areas of observed environmental change on local maps. In addition, the test case undertook a project to supply eight hunters with camera-equipped GPS devices over a six-month period. The hunters took photos of changes they viewed as important, and logged the location and other key information. The result was a

GIS database of pictures documenting river erosion, wildlife locations, landscape changes from oil development, and even cultural events. While analysis

Alaska EPSCoR’s current project consists of five components, each of which will be highlighted in a newsletter:

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

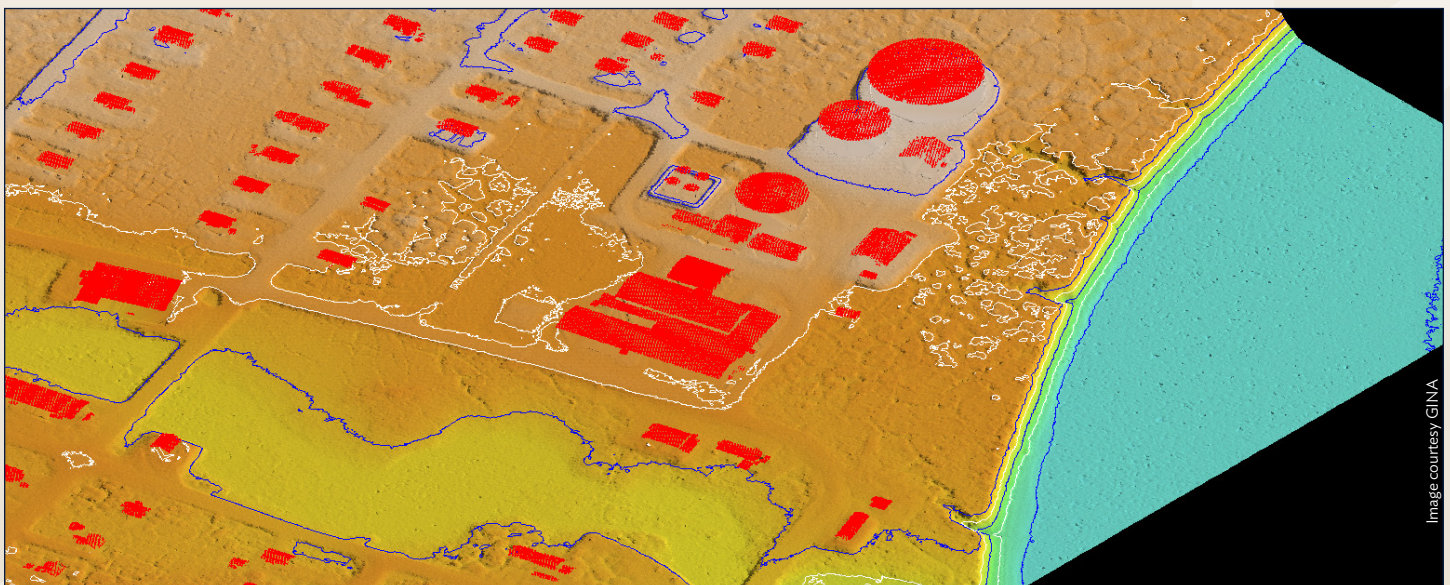
of the photos is ongoing, Brinkman – who is in charge of the project – pointed to some trends. “It looks like they’re paying close attention to changes in hydrology, changes in the river channel, erosion, new plant species, changes in surface water,” he said.

Brinkman said these reports constituted Phase I of the project. In Phase II, he hopes to recruit locals to keep an eye out for more specific changes. “We’ll try to reach an agreement where they’ll probably concentrate their efforts on particular changes that we can link to some of the other instrumented and scientific research that’s being conducted around the community.”

Institutions and Adaptive Capacity

UAF Assistant Professor of Political Science Chanda Meek is spearheading another segment of the test case, which is examining the extent to which federal policies in the Nuiqsut area – in particular, in the National Petroleum Reserve-Alaska, located west of the village – reflect and respond to local concerns, with a particular focus on access to subsistence species. “We’re looking at how the regulatory process has seen change on the landscape, versus how communities have experienced and reacted to those changes,” Meek said.

Meek is working with a UAF master’s student to comb through records to examine how the federal Bureau of Land Management evaluates the impact that land use and land cover change has on subsistence. Then they’re comparing that to people’s actual experiences, culled from existing data and from the GPS project. Meek said she expects the results to be useful to land managers as an indicator of how functional their processes and policies are, and will also help local residents by illuminating potential avenues to effect change. ♦



One key accomplishment of the test case has been gathering new LiDAR data, including this image of Nuiqsut.

Research by Raft

The distances, climate and wildlife of Alaska's North Slope make it a rough place to do research. But that didn't deter Jiake Zhou.

Zhou, a biology master's student at the University of Alaska Fairbanks, spent three weeks in summer 2014 rafting the Nigu, Etivluk and Colville Rivers on the North Slope. The purpose of the trip was to study shrubs along the route, which have been expanding northward due to climate change.

"The focus of my thesis is the interactions between shrubs and herbivores," said Zhou. "Because of the shrub expansion, there are changes like creating new habitat for certain species, while we're losing habitat for other species."

During the 380-mile trip, Zhou and his travelling companions stopped nearly 60 times to measure characteristics of alders and willows. They noted the ground composition of sites along the river, then made 50-meter transects

of shore areas, stopping every 10 meters to measure shrub cover and height, along with browsing intensity by moose, snowshoe hare and ptarmigan.

Zhou's goal is to determine how this expansion correlates to increased moose and snowshoe hare distribution along the rivers, and how these changes could affect subsistence hunters. He plans to combine his data with decades of moose surveys to calculate the threshold at which shrub cover can support moose populations. "My question and my research focus on the interactions between shrubs and moose at what level, and at what threshold," Zhou noted.

Zhou said his findings could be the basis for a predictive model of North Slope moose populations in the future, which would be of use to researchers as well as to local residents. "You have moose numbers back in the 1970's, and you have climate and temperature predictions into the future, into at least 50

years from now," Zhou said. "So that's where it becomes more interesting."

Zhou got the idea for the project from Ken Tape, a UAF Assistant Professor who has been studying North Slope shrub expansion and who saw the significance of including mammals in the equation. Tape said Zhou's research has the potential to address numerous questions, including the relation between shrub expansion and moose abundance; the relations between moose, snowshoe hare and ptarmigan browsing; the relative effects of changing winter length and changing habitat on moose; and the ways the shrubs and floodplain changes interact. He noted that Zhou is also conducting extensive interviews with Nuiqsut moose hunters to better understand how climate-induced changes to shrubs and moose are impacting local subsistence.

"With the data he collected, he'll be able to go in one of a few different directions," Tape said. "It's hard to say at this point exactly what the final product is going to look like."

Zhou's work is co-sponsored by the Liz Claiborne and Art Ortenberg Foundation – which selected him as a George Schaller fellow – and by Alaska EPSCoR, which will incorporate Zhou's findings into its Northern Test Case. Tape said he admired Zhou's decision to do the survey by raft, which saved the cost of a helicopter survey and enabled him to gather a larger and more diverse data set. "It's pretty darn unusual for a graduate student to do a transect like this for graduate work," he said. "What I think is so cool about it is, he samples an incredibly large area, and he is out there the entire time thinking and making observations about this environment that he's studying." ♦



UAF graduate student Jiake Zhou measures shrub dimensions during his summer 2014 research trip.

Graduate Student Cohort Takes Shape

Even as Alaska EPSCoR continues to hire key faculty at the University of Alaska (see page 7), the organization is also looking toward the future.

In collaboration with the Interdisciplinary Program of the UAF Graduate School, EPSCoR is supporting an eight-person “peer group” of Ph.D students focused on social-ecological systems. The study of SES - defined as systems with interacting and interdependent biophysical and social components - is a central focus of Alaska EPSCoR, and the idea behind the program is to provide training and education to a cohort of professionals who will be able to take the lead in future Alaskan SES research.

“One of the things that it does is, it takes midcareer professionals in the field and it gives them degrees and leadership training so that they can stay in the state and advance the state,” said UAF Education faculty John Monahan, who is coordinating the program.

Monahan said the peer group is based on a pair of similar programs he had coordinated at the UAF School of Education, and is designed to keep students focused and on track during the graduate program. “When you look at traditional-type programs there’s a high non-completion rate,” he noted. “What we attempted to create was the sense of a community group, so that people assisted one another in completing the program.”

Alaska EPSCoR is not providing tuition for students in the peer group. Rather, EPSCoR is playing a coordinating role, including funding an annual face-to-face meeting for all the students. In addition, in fall 2013 EPSCoR offered a two-week workshop to help guide interested students in putting together their graduate school applications.

The creation of the peer group spurred the graduate school to create the specific courses needed for the degree, including two credits of research methodology and one credit of seminar each semester. “The classes wouldn’t exist with-

out this group enrolling in it,” Monahan explained. “It’s one of these fields that creates its own rain.”

Monahan said the peer group support is being offered for a total of three and a half years, through the close of the current EPSCoR award in mid-2017. He said the program is also serving as a model of sorts for similar endeavors in



Members of the Alaska EPSCoR graduate student peer group meet in July 2014 on the UAF campus.

other fields.

“A model’s being designed that you could take and apply to a wide variety of disciplines,” Monahan explained. “To that extent they took this model and are trying to adapt it and create a cohort in Guam that is a collaborative effort between UAF and the University of Guam.”

Activities of the Alaska EPSCoR peer group are based out of the UAF campus, but members hail from a number of different areas. The eight members are:

- Tania Clucas, Alaska EPSCoR Outreach Director (Fairbanks)
- Elizabeth Figus, Ph.D student, UAF (Juneau)
- Jessica Garron, Senior Science Consultant for the Alaska Satellite Facility (Fairbanks)
- Jesse Grunblatt, Programmer for the Geographic Information Network of Alaska (Anchorage)
- Tobi Maracle, Ph.D student, UAF (Fairbanks)
- Tim Petty, Senatorial staff (Washington, DC)
- Jon Skinner, Ph.D student (Anchorage)
- Pips Veazey, Alaska EPSCoR Associate Project Director (Fairbanks)♦

Prakash

Continued from page 1

degrees in Geology from Lucknow University in India, and her Ph.D in Earth Sciences from the University of Roorkee, also in India, after which she worked for six years at the International Institute of Geoinformation Science and Earth Observations (ITC) in the Netherlands. She has been a UAF faculty member since 2002 and a full professor since 2009.

Prakash's Ph.D project entailed GIS-based studies of India's Jharia coalfield, with an emphasis on coalmine fires. After coming to Alaska she focused on remote temperature sensing, but her research has expanded considerably since then. "Remote sensing is the way to study Alaska, because there's no way you can reach these vast and unexplored areas," she said. "I've been focusing a lot on using remote sensing data sets for a variety of applications, not just temperature mapping, looking at all types of land surface, whether it's for minerals, whether it's for ecology, whether it's for habitat."

Prakash steps in at the midpoint of Alaska EPSCoR's five-year "Alaska Adapting to Changing Environments" research program. She was already involved in the project, mainly through helping put together the Southeast Test Case's section of the initial project proposal, and has also been heavily involved in Alaska's NASA EPSCoR program.

Prakash now faces the challenge of leading an interdisciplinary program incorporating physical, biological and social sciences. She said a major goal will be to stress the importance of continuing interdisciplinary research and cooperation across the program.

"It's all about teamwork, that's something that I do want to emphasize," she said. "I am a people person, I like to talk to people, I like to get different perspectives, I like to bring cultural sensitivity to the table. I think you've got to have that, and you've got to have an open mind to go forward with this."

Prakash said she is enthused about her new role, and noted that EPSCoR's research into community adaptive capacity is coming at a crucial time. "We are in the midst of these rapid changes and rapid adaptation will be required," she said. "I think we've got a strong team, we've got disciplinary expertise, we've got expertise in integration, we've got people working together to look at this big picture, so I think we're on the right path." ♦

EPSCoR Briefs

Alaska EPSCoR on KUAC

KUAC-TV in Fairbanks has begun to air short videos about the EPSCoR program as part of its television programming.



The eleven videos profile a number of EPSCoR outreach and research efforts, including projects such as the GINA Augmented-Reality Sandbox, the Southeast Test Case's "Hike With the Scientists" activity, and Jiaké Zhou's shrub research, as detailed on page 4.

The videos are also available for viewing at www.youtube.com/user/AlaskaEPSCoR.

S&T Plan Launched

In July 2014, then-Alaska Lieutenant Governor Mead Treadwell officially launched the Alaska State Science and Technology Plan, which was written by EPSCoR staff under the oversight of the Alaska State Committee on Research, a 17-member panel charged with overseeing state science priorities.



Titled "To Build a Fire," the plan prioritizes Alaskan research in seven areas: Community resilience and sustainability; resource extraction; energy solutions; renewable resources; environmental monitoring and management; human health; and transport, communications and information. The plan can be found online at www.alaska.edu/files/epscor/pdfs/2014-ST-Plan.pdf.

AAAS Travel Awards

Alaska EPSCoR provided travel funding for a number of UA students, faculty and affiliates to attend the 2014 American Association for the Advancement of Science (AAAS) Arctic Science Conference, held in September 2014 at UAF.



Funded individuals included Todd Radenbaugh, Associate Professor of Environmental Science at the UAF Bristol Bay Campus; Claudia Ihl, Associate Professor of Biology at the UAF Northwest Campus; UAF students Charles Jones, Liza Mack, and Ann Riddle-Berntsen; UAA student Ian Schacht; UAA instructor Raphia Maglinao; UAA employee Steve Colt; and UAS postdoctoral researcher Jim Powell.

EPSCoR also supported travel for a group of high school students from the Rural Alaska Honors Institute.

tially to Alaska's bodies of environmental and social data and its wealth of knowledge about social-ecological system (SES) science.

The project is now entering a more experimental stage, where we will work to integrate these data streams into products that are useful to communities as they face the uncertainties of climate and social change. These final products will include maps, scenarios and indices that illustrate and quantify the various factors that constitute a community's capacity to adapt to change. With my experience in remote sensing and GIS techniques, this sort of translation and application of data streams is right up my alley, and I'm looking forward to helping guide our statewide efforts in this area. I'll also be

involved in the process for starting to put together a proposal for a next phase of Alaska EPSCoR, which we expect to involve aspects of remote sensing and coupled human-natural systems.

Another opportunity for change also presented itself in February, in the form of our Midcourse Retreat. This three-day meeting was a chance for leaders in all three test cases and the CIS Group to analyze our progress so far and to discuss the "course corrections" needed to meet our overall research goals. The meeting was my first as PI, and it was a great opportunity for me to get fully up to speed, and to help contribute as leaders pinpointed the adjustments we need to get to where we need to be in 2017. ♦

Trainor, Witmer are Newest EPSCoR Faculty



Sarah Trainor

Alaska EPSCoR has added two more names to its growing list of faculty hires.

In fall 2014, EPSCoR helped to fund the hire of Sarah Trainor as the new assistant professor of social-ecological systems sustainability at the UAF School of Natural Resources and Extension. The organization also supported the hire of Frank Witmer as an assistant professor in UAA's Department of Computer Science and Engineering. Both new associate professors will contribute to EPSCoR research over the next three years, during which time the organization will pay half of their salaries.

Trainor's role will be to teach and research sustainability in linked social and natural systems. "It's about understanding the dynamic interactions between human and natural systems and working to solve complex problems," Trainor said. "I've been interested in this since I was a little kid. I've always seen people and the natural world as integrally connected."

Trainor earned her bachelor's degree in philosophy and environmental studies at Mount Holyoke College, and both a master's in energy and resources and a Ph.D. in energy and resources from the University of California, Berkeley. Her career includes serving as coordinator and director for the Alaska Center for Climate Assessment and Policy and stakeholder liaison for the Scenarios Network for Alaska and Arctic Planning. Trainor will work with Professor Gary Kofinas for EPSCoR's Northern test case, focusing on climate change adaptation and vulnerability, and on communicating science.



Frank Witmer

Witmer received his bachelor's degree from Tufts University and his master's and Ph.D in Geography from the University of Colorado, where for his dissertation he analyzed Landsat imagery from

Bosnia to examine the effects of war on land use and land cover change. Prior to coming to UAA Witmer worked as research associate or assistant on a number of projects at the University of Colorado, many of which involved his chief research interest of human-environment geography. At UAA, Witmer is specializing in computational social science and will assist the efforts of the EPSCoR CIS Group.

Trainor and Witmer are the fourth and fifth faculty hires in Alaska EPSCoR's current research project. They join UAS Assistant Professor of Forest Ecosystem Ecology Brian Buma, UAF Assistant Professor of Civil and Environmental Engineering Srijan Aggarwal, and UAF Assistant Professor of Wildlife Biology Todd Brinkman. The hiring process is underway for a final hire, a computational social scientist within the UAF College of Liberal Arts.

Portions of this article came from a September 12, 2014 UAF SNRE blog post by Nancy Tarnai.

Alaska EPSCoR: Experimental Program to Stimulate Competitive Research

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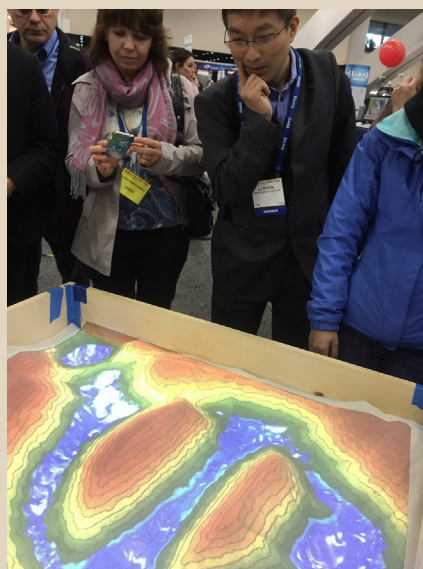
Alaska EPSCoR Well-Represented at AGU Meeting

The Augmented-Reality Sandbox stole the show in San Francisco. The joint Alaska EPSCoR-Geographic Information Network of Alaska (GINA) project, which uses an overhead projector to turn a box of sand into an interactive topographic map, drew a constant crowd throughout the 2014 American Geophysical Union Fall Meeting.

"From the moment we turned the sandbox on we had people lined up asking questions, suggesting new ways to use it as a teaching and outreach tool, and honestly just fascinated," said EPSCoR Outreach Director Tania Clucas, who manned the booth along with GINA technician Greg Wirth.

A number of Alaska EPSCoR researchers attended the meeting, which is the world's largest earth and space science conference. Some highlights of EPSCoR faculty and students at the event:

- Southeast Test Case researcher Jason Amundson discussed a new method of estimating glacial calving for use in glacier-ocean models.
- UAF researcher Andrew Chamberlain, with help from



AGU attendees crowd around the EPSCoR-GINA Augmented-Reality Sandbox.

Northern Test Case scientists, presented research into the hydrologic characteristics of different types of permafrost ice wedge polygon landforms.

- GINA head Tom Heinrichs and other GINA employees presented an overview of the various current and historic mapping efforts being undertaken by the EPSCoR-supported organization, including a new statewide 2.5-meter resolution orthomosaic imagery baselayer and an improved statewide digital elevation model.
- EPSCoR Education Director Elena Sparrow spoke on two subjects: the EPSCoR-supported GLOBE program, which engages K-12 students in climate observations, and an intergenerational

climate-change camp for Alaska Natives.

- EPSCoR student Kristin Timm presented on her master's thesis, which used Juneau tour operators as a case study in effectively communicating climate change information.
- EPSCoR-supported Ph.D student Joanna Young and researcher Anthony Arendt presented on efforts to downscale regional satellite observations of glacier mass to apply to individual glaciers.