

Alaska's rugged terrain defines new climate divisions

Former Geophysical Institute graduate student Peter Bieniek has identified 13 distinct climate divisions within Alaska, based on cluster analysis he performed using monthly-average temperature data from the 1970s to the present. He has created a new map based on the divisions that will help meteorologists and other researchers better define the climate diversity of Alaska.

Bieniek's new map groups areas that experience similar climate variability. The results surprised him.

"We learned that terrain controls much of this," Bieniek said, pointing to Alaska's Panhandle on a map. "Mountain ranges can be natural barriers."

Bieniek divided Alaska's Panhandle into four separate zones based on precipitation and average monthly temperatures. Some relatively close towns are not in the same climate divisions. For example, Juneau, walled in by mountains and with moderate temperatures, resides in the Central Panhandle. Ketchikan, 297 miles away and isolated from inland areas by the Coast Mountains, is in the South Panhandle because it receives much more precipitation than Juneau or any other zone in state.

Bieniek boosted the number of climate divisions in Alaska from the 10 or 11 traditionally accepted by meteorologists to 13, a number the National Climatic Data Center is in the process of reviewing. The NCDC currently maintains the set of official climate divisions for the continental U.S., in which divisions range from two to 10 per state.

"Our local experts were National Weather Service forecasters from all over Alaska, particularly in the Panhandle," said Uma Bhatt. "[They] helped to refine the divisions."

Bhatt, an associate professor of atmospheric sciences at the Geophysical Institute, oversaw work on the new map as part of Bieniek's doctoral work at the institute. Since this research was published, Bieniek has gone on to accept a postdoctoral researcher position at the International Arctic Research Center where he will continue to examine these divisions and how they can inform other areas of research.





photo by Barbara Trüssel

Girls on the ice of Alaska

This summer, the Girls on Ice program visited an Alaska glacier for the first time. It probably won't be the last, said organizer and Geophysical Institute graduate student Joanna Young.

"We talked about how the girls would be inspired, but we didn't count on how much we would be inspired," said Young, who is working toward a master's degree. In July 2012, she, two other GI graduate students, and a mountaineer led nine teenage girls onto Gulkana Glacier for eight days of science and life on the ice.

The Girls on Ice program, the creation of Alaska glaciologist Erin Pettit, has existed for more than a decade on the glaciers of Washington. Pettit, an assistant professor at the University of Alaska Fairbanks, expanded the program this year to include Alaska, entrusting the details and organization to Young and fellow graduate students Barbara Trüssel and Marijke Habermann. One of their first tasks was to choose an Alaska glacier for the program. They decided on the Alaska Range's Gulkana Glacier.

"It was the perfect spot," Young said. "We all knew the glacier well, it's road accessible, it's got this Indiana Jones bridge and it's safe—there are no huge crevasses."

The trio of instructors, along with Cecelia "CeCe" Mortenson, who was fresh off a guiding trip on Mount McKinley, walked nine girls from Alaska and Washington

over a footbridge, four miles up boulders and into a base camp they set up on rocks next to the glacier. Most of the girls had never worn plastic boots, crampons, or a 50-pound backpack. The 15- to 17-year-olds faced physical and mental challenges they never imagined.

"The moraine's rocky, unstable side was not the best landscape for me to be on," said 18-year-old Heather Gregory of Anchorage of her initiation to the program. "I've never felt so scared to tumble down a hill before! But thankfully the instructors were there to calm me down and guide me through the moraine."

Another participant, 16-year-old Chloe Smith of Palmer, said via email: "The hard part was facing the things that scared me or intimidated me, and the things



photo by Marijke Habermann

GLACIAL TREK—Above, the Girls on Ice Alaska team ascends a steep portion of Gulkana Glacier in the Alaska Range. At right, the team ascends the glacier for a day of exploring features like crevasses, moulins, and supraglacial debris.

that made me uncomfortable. Walking over a rickety suspension bridge. Carefully stepping over crevasse after crevasse as you were engulfed in wind, rain, and fog. Listening to the thunder and distant rock slides from inside our three small tents. I told myself, ‘You can do this. Even if it’s scary, you know you can. Think of how you’ll look back immediately after and say I did that.’”

Smith and her new friends impressed their instructors by their unwavering support of one another and their enduring a few days of rain with nowhere to escape except their tents.

“I was amazed at how nicely they interacted,” said Habermann, who models a Greenland glacier for her graduate work.

“They were so supportive of each other, and really kind to each other,” Young said of the girls. “They were so respectful of us as instructors. It was an opportunity for them to grow a lot and be like adults, and they took it.”

The girls performed science on the glacier, choosing studies on glacier ecology, the effects of rocks and dirt on glacial melt or water discharge from the streams on the glacier. After returning to Fairbanks, the girls gave presentations on what they learned at the university. And they experienced a transformation typical of girls who have attended the intense program on Washington glaciers.

“Before Girls on Ice, mountains were just mountains. Valleys were just valleys. Now when I see them they’re full of questions and stories,” Smith said. “Girls on Ice encouraged a new kind of curiosity in me about things I would have thought boring before. Now I’m considering to pursue geology after high school.”

“I liked the living-on-a-glacier part because being on the head of the glacier made you feel like Queen of the



photo by Marijke Habermann

ICY EXPEDITION—Above, the team has fun using glacier mud for facials. Below, the team descends the Gulkana Glacier through stormy clouds.

Valley,” Gregory said. “We also had makeshift classrooms in the tents, and the learning-then-discussions-after were really fun too.”

One of Smith’s favorite memories of the program is when another girl returned to camp with a tube of greenish glacier mud. That evening, the girls and instructors applied mud facials to one another, laughing and snapping photos.

“We’re out on the glacier, but we’re still girls,” Trüssel said.

The instructors, busy trying to complete their own degrees, found the added stress of conducting a school for girls was one of the most rewarding parts of their graduate school experiences so far.

“I learned about grant writing, organizing a huge expedition, covering all the legal stuff and teaching science to girls who have no background in it,” Young said.

“Marijke and I have fantasized about having something like this in Switzerland when we’re back there,” said Trüssel, who like Habermann is from Switzerland.

Girls on Ice is free for the high-schoolers, which means that its organizers have to raise all the funds to keep the program alive (this year’s sponsors included the Alaska Climate Science Center, the National Science Foundation, UAF’s College of Natural Science and Mathematics, the North Face and private donors).

Even though they have much work ahead in order to graduate, Young, Trüssel and Habermann said they will do what they can to help create a 2013 Alaska version of Girls on Ice.

“It’s just worth it,” Young said.



photo by Joanna Young

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GeoData Center to transform a “buried treasure”

Thousands of photos of North American glaciers sat unused for years in the storage area of the Geophysical Institute’s GeoData Center. Although the content could prove useful to studies of glacial melt and the response of some of the world’s colossal glaciers to global change, the format was passé.

Recently, Matt Nolan, a research associate professor at the University of Alaska Fairbanks’ Institute of Northern Engineering, gained funding to digitize some of the photos. Nolan included in a research proposal the transformation of these images from 35-millimeter film into high-resolution digital files. The conversion of the data will benefit Nolan’s work, but will also push the collection into the 21st century, making it more attractive to today’s scientists and the general public.

“If we excavate and make these treasures available online, people will use them,” said Vicky Wolf, Alaska Satellite Facility User Support supervisor who oversees the center.

Wolf, who recently garnered seed money from the Federation of Earth Science Information Partners to begin digitizing other portions of the photo collection and promote its availability online, sees a market for GeoData that goes beyond academia.

The Glacier – Ice & Climate Project is a collection of approximately 100,000 frames of black and white aerial photography captured between the late 1950s through 2001 by U.S. Geological Survey Scientists Robert Krimmel, Lawrence Mayo and Austin Post. The GeoData Center acquired the photographs in 1996.

Austin Post photo