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PROFILE KATHY LICHT

New kind of 'rock' star Professor traces past to help predict future climate changes

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Kathy **Licht** has a cool job-really cool. While some road warriors hop on a plane to domestic destinations knowing that a nice, warm bed awaits them at the end of the day, not so for **Licht**. Instead, she dons multiple layers of clothing and insulated boots and heads out with her colleagues, pulling a tent and provisions on a sled that will serve as her "home" in the brutal cold of Antarctica. **Licht**, 36, is an associate professor of geology at IUPUI, where she has taught since 2000. She and IUPUI student Kate Kramer just returned from Antarctica, where they joined other researchers in studying ice-flow patterns to learn about potential instabilities in ice-sheet behavior. She has visited the area several times before.

"By reconstructing past ice-flow patterns," **Licht** said, "we can improve our predictions of future behavior of ice sheets."

She is studying the composition of the rocks in glacial materials to determine what geographic area they came from.

"It is sort of like fingerprinting," **Licht** said. "Many of the rocks in northern Indiana are not indigenous to that area. They were carried there from glaciers that originated in Canada." Like a CSI investigator, **Licht** and her colleagues match rock types and the region where they naturally occur to reconstruct past flow paths.

IUPUI graduate student Emerson Palmer accompanied **Licht** on a five-week research trip to Antarctica in 2005 to study glacial sediments from the Byrd Glacier, named for famed U.S. arctic explorer Admiral Richard E. Byrd. He called the experience "incredible."

"Kathy is an excellent teacher and adviser," Palmer said. "She has a lot of enthusiasm for her research, and spending time in Antarctica with her was lots of fun and an incredible learning experience."

Antarctic research tests mettle

A native of Barron, Wisc., **Licht** earned a bachelor's degree in natural science from St. Norbert College in 1992, and her master's and Ph.D. degrees in geological sciences from the University of Colorado. While in graduate school there, **Licht** met John Andrews, a professor and researcher who invited her to work with him on Antarctic research.

"I have always enjoyed traveling and was excited about the opportunity to participate in research cruises in Antarctica," she said. "After one trip, I was hooked."

These were no Carnival cruises, however. Researchers typically work 18-hour days, 7 days a week for up to five weeks.

During the recent field trip, **Licht** and her colleagues camped for approximately three weeks on the polar plateau on the East Antarctica Ice Sheet-about 325 miles from the South Pole.

The team arrived in Christchurch, New Zealand, on Dec. 21, where they and their cargo were weighed before boarding the C-17 plane that flew them to Antarctica. After five hours on the plane, they landed and were quickly seated on "Ivan the Terra Bus," as they dubbed the vehicle that delivered them to McMurdo Station, Antarctica's largest community (about 1,200 people live there in the summer and 200 in the winter). It is built on the bare volcanic rock of Hut Point Peninsula on Ross Island, the farthest point south that is accessible by ship.

Established in 1956, McMurdo has grown from an outpost of a few buildings to more than 100 structures, including a harbor, Williams Field airport-with landing strips on sea ice and shelf ice-and a helicopter pad. There are above-ground water, sewer, telephone, and power lines linking buildings.

These connections made it possible to interview **Licht** via e-mail while she was at McMurdo.

Anyone intending to leave McMurdo Station must participate in "snow school," where they learn basic winter camping skills, along with cold-weather first aid and proper radio use, **Licht** said.

"Camp setup includes building a snow wall, pitching Scott and Mountain tents, and building a quinzhee (an igloo-like shelter)," she said. "We were able to practice theoretical situations, such as what to do in a whiteout and how to quickly set up camp in an emergency."

While she described the weather as "beautiful" when she arrived-highs over 20 degrees, weather can change rapidly. In fact, while she, Kramer and a colleague were practicing crevasse rescues, the weather deteriorated to nearly whiteout conditions within five minutes, she said.

Licht and her crew had planned to leave McMurdo on Jan. 6 for their field camp, but weather delayed their flight for a couple of days. When the weather lifted, they departed, spending 19 days in the field collecting samples. Their first priority upon their return to McMurdo was a hot shower.

"I don't think a hot shower ever felt so good," **Licht** said. "We have a new appreciation for getting liquid water out of the tap rather than having to melt snow to make every drop of water we needed."

The samples that she and Kramer have collected were shipped back to IUPUI, where they will be analyzed in great detail over the next few years, **Licht** said. The research is supported with funding from the National Science Foundation's Office of Polar Programs and organized through the U.S. Antarctic Program.

The support of the National Science Foundation for **Licht's** work is a "testament to her research standing in the U.S.," said Gabriel Filippelli, professor of geology and chairman of the Department of Earth Sciences at IUPUI.

"The field of Antarctic glaciation has been a man's club until relatively recently, likely fueled by the macho aspect of exploration and discovery in a very hostile environment," Filippelli said. "Professor **Licht** has been a very strong and effective voice in the field, and thus is showing upcoming graduate students by example that no scientific field is closed to women."

Studying global warming

Why is **Licht** so passionate about studying this region?

"Antarctica is a key component in the earth's climate system because it impacts global ocean and atmospheric circulation, which can affect the climate in regions far from Antarctica," she said.

The ice sheets are closely tied to sea-level changes, **Licht** said.

The continent is about the size of the United States and Mexico combined and is about 98 percent ice-covered, she said. If all of the ice on Antarctica melted, it would cause a sea-level rise of almost 200 feet.

While it's extremely unlikely that the entire ice mass will melt soon, "even a 1/2-to 1-meter sea-level rise, which is the predicted amount for the next century, will dramatically affect low-lying coastal cities such as New Orleans, Venice and many other areas of the world with large population centers," **Licht** said.

She describes the ice shelves as a "canary in the coal mine"-an indicator of the effects of global warming on Antarctica.

"When they disintegrate, the glaciers that were being held back are no longer dammed up, so they flow faster, calve more icebergs and contribute to more sea-level rise," **Licht** said. "So far, only the Antarctic Peninsula has experienced major warming in Antarctica."

Licht, who is married and has no children, said maintaining balance in her life takes a lot of effort. When she's not traveling for research, she enjoys gardening and traveling for pleasure with her husband.

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