Seven Hundred Feet Down, a Thousand Years Back

UNH scientists drill Alaskan ice cores in collaborative NSF project

---

Thursday, August 8, 2013

UNH, DARTMOUTH COLLEGE, UMAINE ICE CORE DRILL SITE ON THE MT. HUNTER PLATEAU IN DENALI NATIONAL PARK, ALASKA. THE DRILL SITE IS IN THE MIDDLE OF THE PHOTOGRAPH, JUST LEFT OF THE SUN-SHADE LINE ON THE SNOW AND A MILE FROM UNH SCIENTIST CAMERON WAKE IN THE FOREGROUND. PEAKS FROM LEFT TO RIGHT ARE MT. FORAKER, MT. HUNTER, AND DENALI. PHOTO BY SETH CAMPBELL-UMAINE.

UNH, Dartmouth College, UMaine ice core drill site on the Mt. Hunter plateau in Denali National Park, Alaska. The drill site is in the middle of the photograph, just left of the sun-shade line on the snow and a mile from UNH scientist Cameron Wake in the foreground. Peaks from left to right are Mt. Foraker, Mt. Hunter, and Denali. Photo by Seth Campbell-UMaine.

In an effort to chronicle 1,000 years of regional climatic history, University of New Hampshire (UNH) scientists Cameron Wake and Elizabeth Burakowski spent late spring 2013 in Alaska's Denali National Park as part of a collaborative UNH, Dartmouth College, and University of Maine ice core drilling project.

"We recovered two 700-foot long ice cores from a glacier at 13,000 feet on Mount Hunter, the third highest peak in the Alaska Range and Denali's closest neighbor," says Wake, a research associate professor at the UNH Institute for the Study of Earth, Oceans, and Space Earth Systems Research Center (ESRC). He adds, "Analysis of these cores will allow us to fill a key gap in our understanding of climate change in central Alaska over the past 1,000 years.

ICE CORE DRILL SITE WITH MT. FORAKER IN THE BACKGROUND. THE ICE CORE DRILL - POWERED BY SOLAR PANELS AND A WIND TURBINE - WAS HOUSED IN THE LARGE DOME TENT. PHOTO BY CAMERON WAKE, UNH-EOS.

An unusual lack of storms allowed the team to complete the ice core drilling and conduct an array of supporting field research quickly and efficiently. Alaska's exceptionally warm summer this year also drew attention to the region's shifting climate picture.

With a $1.1 million grant from the National Science Foundation (NSF), Wake and Burakowski collaborated with Erich Osterberg of Dartmouth and Karl Kreutz and Sean Birkel of the University of Maine (UMaine) on the project. Also participating were the National Park Service, the U.S. Ice Drilling Program Office, and students from Dartmouth and UMaine.

The field season started at the beginning of May with Wake, Kreutz and their crew flying to the glacier via ski plane. The team first climbed 14,000 feet up Denali to acclimatize to the altitude. Osterberg and Burakowski arrived in base camp shortly after the climbers made their descent. Equipment and supplies were then helicoptered from Denali base camp in to the drill site and drilling began. In response to a request from the National Park Service, all of the power for the drilling was supplied by renewable power — in this case, a combination of solar and wind.

"This project is part of a long-term effort to improve our understanding of regional climate change in the North Pacific region," Wake says. To understand how fast the glaciers in the Alaska Range are going to respond in the future to global warming from rising greenhouse gases, scientists need to understand how the glaciers responded to past changes in temperature and snowfall, specifically in central Alaska. "These ice cores will provide our first long-term annual record of snowfall in this region," Wake notes.

VIEW SOUTH OF MT. CROSSON (LEFT) AND KAHILTNA DOME FROM THE 11,000 FOOT CAMP FROM THE WEST BUTTRESS ON DENALI. PHOTO BY CAMERON WAKE, UNH-EOS.

Like tree rings, the cores can provide data from their annual layers. Studies of the ice cores will concentrate on the chemistry of the ice—how much dust is in it, how much sea salt is in it—and determine the relative amounts of chemical elements, including pollutants.

In mid-June, all the ice cores, drilling personnel, and equipment were flown from Mount Hunter via helicopter to base camp and by ski plane to Talkeetna. The cores were then packed in freezer trucks and driven to the National Ice Core Laboratory in Denver, CO where they were placed in frozen storage.

“We will go there in October to cut the cores into slabs that will then be shipped to Dartmouth for sampling, using our ice core melting system,” says Osterberg, an assistant professor at Dartmouth and principle investigator on the project. Samples will be then analyzed at Dartmouth, UNH, and UMaine.

This summer was the culmination of six years of work to find the best location to collect the longest and best-preserved record of climate possible from this area, going from glacier to glacier throughout the park with ice-penetrating radar. The radar data collection was led by UMaine Ph.D. student Seth Campbell in collaboration with Steve Arcone at the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, N.H. The team also had maintained weather stations in the area for the last five years, with the goal of relating the weather in the mountains to the snow chemistry.

The collaborative project has also been marked by student participation from all three institutions.

Notes Burakowski, ”Living at base camp for a month provided an excellent opportunity to measure albedo and collect snow samples for comparison with New Hampshire snowpacks sampled this past winter by UNH master’s student Jackie Amante. We were also able to sample snow albedo alongside the National Park Service while they were installing ablation stakes to measure how fast the Kahiltna glacier is moving. Albedo plays an important role in snowmelt and glacial retreat.”

Postdoc Eric Kelsey, now director of research at the Mount Washington Observatory and a research assistant professor at Plymouth State University, participated in the 2008 field season as a UNH Ph.D. student.

The NSF-funded effort has a long timeline, with at least two years of work ahead doing lab analysis. The team will melt 700 feet of ice core twice, sample it, and then analyze those thousands of samples using mass spectrometers, ion chromatographs and other instruments at UNH, Dartmouth, and UMaine. And that’s just to get the data, which will need to be interpreted using statistical analyses, compared it to other records, incorporated into glacier and climate models, and finally, shared with the broader paleoclimate and scientific community.

GLOBAL REACH

SUBSCRIBE TO THE UNH TODAY NEWSLETTER SUBSCRIBE TO UNH TODAY RSS

University of New Hampshire

UNH Today is produced for the UNH community and for friends of UNH.
The stories are written by the staff of UNH Communications and Public Affairs.
Email us: unhtoday.editor@unh.edu.

MANAGE YOUR SUBSCRIPTION   CONTACT US

Like us on Facebook

Follow us on Twitter

Follow us on YouTube

Follow us on Instagram

Find us on LinkIn

UNH Today RSS feeds