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UNH crew on expedition in Canadian Arctic

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While the Seacoast basked in this week's summer weather, a University of New Hampshire expedition worked through subfreezing temperatures in the Canadian Arctic to further the school's climate research.

Cameron Wake, professor of Earth sciences at UNH's Institute for the Study of Earth, Oceans, and Space, led a three-week expedition to the Eclipse Icefield in the Yukon's St. Elias mountains, some 10,000 feet above sea level. Wake and his team of five are working to extract two ice cores that give scientists and researchers a glimpse back into time concerning atmospheric impacts.

Graduate student Kaplan Yalcin is part of the expedition, as are two undergraduates from the University of Maine and the University of Ottawa, and Maine professor Karl Kreutz.

"We've seen the whole gamut of weather," said Wake, whose research expeditions include Nepal, China, Pakistan, Greenland and Antarctica. "When we first arrived, we had steady, consistent winds up to 15, 20 miles per hour, which made setting up camp a challenge."

Wake's voice sounded remarkably clear, but broken at times as he communicated via an iridium satellite phone.

The expedition team arrived at the Eclipse Ice Field on May 16 and will remain there until late next week. After the initial high winds, a high-pressure system delivered beautiful days of 25 to 30 degrees, and about 10 degrees at night. At this time of year, daylight lasts 20 to 21 hours.

"The weather conditions were ideal for about a week or so," Wake said on Thursday. "Now we're back into stormy weather, relatively high winds, and right now in the middle of a snow storm. We're safe, comfortable, warm and dry, and we can still drill in this weather."

Ice coring drills and removes long cylinders of ice that present records of the atmosphere preserved in the glaciers. The deeper the ice core, the further the data reaches back in time.

The process has been widely used for about 20 years, but this expedition will document a wider spectrum of pollutants than ever studied from an area of the world from which little data exists.

"We think these areas of the Earth are pristine, that there will always be places we can't affect," Wake said. "However, now we know that remote places like the Arctic are polluted. from atmospheric chemistry studies looking at recent effects."

There are five major external factors that affect the Earth's climate: solar variability, volcanic eruptions, greenhouse gases, changes in Earth's orbit around the sun and impacts from meteorites. But Wake says humans have made that system more complex.

The long-term goal of the ice core community and climate scientists in general is to be able to confidently predict future climate changes. But, Wake admits, "We are a long way from that."

The expedition team will track the impact humans have had during the past century on the remote atmosphere in the Canadian Yukon.

Before drilling, the expedition employed a radio echo sounder to determine the depth of the ice and to pick a drilling area. The selected site had ice down to 1,000 feet.

"The work's gone very well," Wake said. "We're nearing the end of the first hole."

The first ice core will be extracted from a depth of about 750 feet. Scientists will analyze it in laboratories for a wide variety of chemical constituents, including familiar pollutants such as lead, mercury, cadmium and vanadium.

The second, shorter ice core will be drilled to a depth of 300 feet and will be analyzed for persistent organic pollutants.

"The shallow one is looking for PCBs showing up in the Arctic the last 20 to 30 years," Wake said. "We are looking at all major ions, stable isotopes, metals and rare Earth elements for Northwestern North America."

Earth elements offer important clues to indicate where the polluted air came from originally.

Drilling is a slow process and ice cores are reasonably delicate.

"We've spent a lot of time and energy to get them," Wake said. "So we go to great pains to make sure they are safe."

The cores are placed in padded and insulated cardboard boxes and, once removed, are stored in a snow cave. When the last core is removed, the expedition will call in a twin auger plane, with skis instead of wheels, to fly them out.

The cores will be flown to freezer trucks awaiting nearby in the Yukon and will be shipped to Durham, where analysis will begin. The trucks will take four to seven days to reach New Hampshire.

The international project is funded by the National Science Foundation, and involves the Geological Survey of Canada and the National Institute of Polar Research in Tokyo. Both are drilling their own ice cores, which will offer a greater historical record, as well as give sources for comparison.