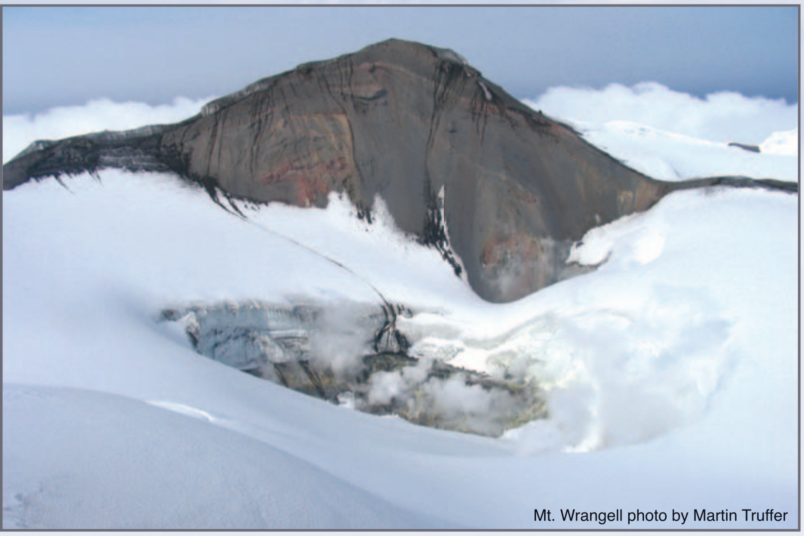
Geophysical Institute Quarterly
Volume 19, No. 2, 2004

photo by Martin Truffer

NOW AND THEN—Tom Hart, Martin Lüthi and Martin Truffer work on Mt. Wrangell in 2004 (above). Hugo Neuburg leads Robert Goodwin, Philip Bettler and Buck Wilson on the mountain in 1953 (right).

photo by Arthur Beiser

Fifty Years of Research on Mt. Wrangell



Mt. Wrangell photo by Martin Truffer

A recent international ice-drilling project capped 50 years of research on Mt. Wrangell by Geophysical Institute and University of Alaska scientists. Ice cores removed from the volcano in the summers of 2003 and 2004 will be compared with those removed from other mountains bordering the Pacific in an effort to help scientists reconstruct the past climates of the Pacific Rim.

Scientists also hope to figure out how much ice exists in Mt. Wrangell's summit caldera. In 2004, seismic techniques were used to determine for the first time that ice depth in the summit caldera is greater than 600 meters.

Assistant Professor Martin Truffer, Post-doctoral Fellow Martin Lüthi, Professor Emeritus Carl Benson, and Assistant Professor of Science Education Daniel Solie teamed up with Takayuki Shiraiwa and Syosaku Kanamori of the Institute of Low Temperature Science in Japan and Yaroslav Muravyev of the Russian Academy of Sciences to form the international group.

Mt. Wrangell rises 4,317 meters (14,163 feet) from the Copper River Valley lowlands. The recent ice cores taken from the volcano (50 meters long in 2003, and 216 meters long in 2004) provide a historic record of snowfall preserved by the minus 20° C (minus 4° F) mean annual temperatures on Mt. Wrangell's summit.

The researchers plan to compare cores from Wrangell to those from Russia's Ushkovsky Volcano on the Kamchatka Peninsula. Ushkovsky is a glacier-capped volcano of about the same height and latitude as Mt. Wrangell.

Benson's recent trip to the summit of Mt. Wrangell marks decades of research involvement there. In May 2004, Benson flew to the summit to bring empty core boxes to the drill site. He first performed research on Mt. Wrangell's summit in 1961.

University research on Mt. Wrangell began in 1953, when University of Alaska President Terris Moore and a New York University physics professor chose the mountain as the location for a high-latitude, high-altitude cosmic ray observatory in Alaska.

A climbing party that included Charles (Buck) Wilson, now a professor emeritus at the Geophysical Institute, flew to 3,000 meters, and then spent three days climbing to the Wrangell summit. There, the team marked an airstrip for Moore, who set a record for the highest ski-plane landing in North America when he arrived safely days later.

In the early 1960s, Alaska bush pilot Jack Wilson made 69 ski-wheel landings to support scientists studying glacier-volcano interactions on Mt. Wrangell.

In 2003-2004, pilot Paul Claus of Ultima Thule Outfitters used a turbo-equipped Single Otter, which can carry at least four times more cargo than any aircraft used in the past. Among that recent cargo was the 216-meter ice core pulled from Mt. Wrangell in 2004. The core was later flown to the Institute of Low Temperature Science in Japan where it awaits an analysis that scientists hope will help them reconstruct past climates of the Pacific Rim.

UAF UNIVERSITY OF ALASKA FAIRBANKS

Alaska's Most Active Fire Season on Record

The summer of 2004 was the most active fire season on record in Alaska. More than 5 million acres went up in flames, an amount greater than the previous year's total for the entire contiguous Lower 48 states. Casualties of Alaska's fire season included a surveillance radar facility and two storage containers at Poker Flat Research Range, located 30 miles north of Fairbanks.

On June 30, 2004, the growing front of the Boundary Fire destroyed the surveillance radar facility, which range workers used to detect small aircraft in the flight zone of research rockets. With help from UAF Facilities Services, range workers cleared trees near buildings and equipment while the UAF Fire Department sprayed retardant on some lower-range buildings.

Several fire crews were based out of Poker Flat, which encompasses 5,132 acres, much of which is covered with boreal forest. Poker Flat staff remained to support firefighters and help protect range structures from damage. They were successful in fighting off three separate waves of fire.

In addition to logistical and housing support, Poker Flat personnel assisted fire officials with state-of-the-art technology. Poker Flat Range Manager Greg Walker suggested that fire officials use Altair, an unmanned aerial vehicle, to assist in mapping the fire. The vehicle flew through areas too smoky for conventional aircraft and identified fire locations and hot spots not visible using other means. Poker Flat, New Mexico State University, and the University of Hawaii are partners in a four-year contract sponsored by the U.S. Air Force to develop and coordinate unmanned aerial vehicle flights within Alaska, Hawaii, and the western U.S. In addition to fire surveillance, the vehicle will fly other scientific and non-military missions.

photo by Jeff Pederson

FIRE DAMAGE—Fire damage sustained by the surveillance radar facility at Poker Flat Research Range is shown above, right. Below, a firefighter examines the area around a Poker Flat telemetry antenna.

photo by Jeff Pederson

CHARRED—The T. Neil Davis Science Operations Center is shown (above) through charred trees at Poker Flat Research Range.

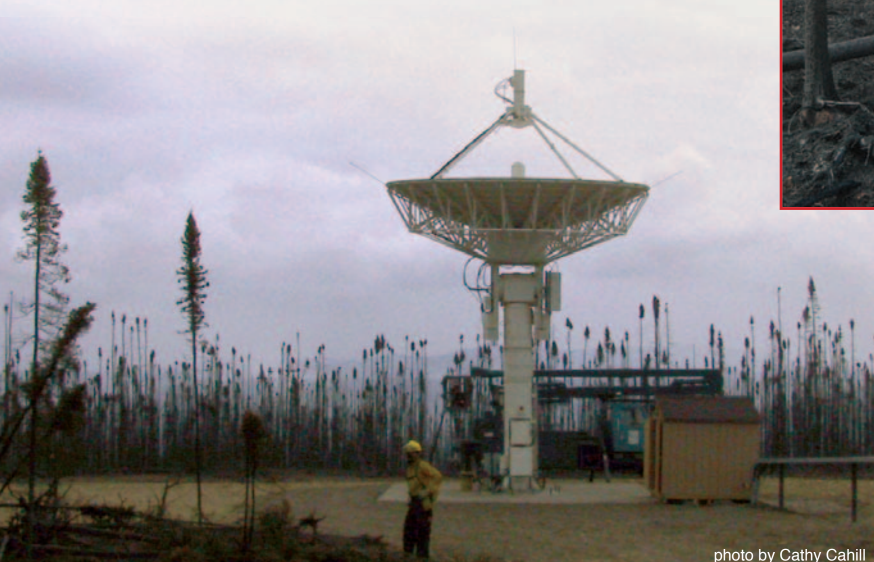


photo by Cathy Cahill

GI Scientists Study Wildfire Smoke Indoors

GI atmospheric scientists didn't need to travel far to study the effects of wildfire smoke on the local environment in the summer of 2004. On June 29, Professor Emeritus Glenn Shaw needed only to stand in the door of the Geophysical Institute to measure the mass distribution of smoke inside and outside the Elvey Building. On that day, when the smoke was visibly thick, Shaw measured 140 micrograms of particulates per cubic meter of air outside the building, compared with a peak reading of about 70 inside the building.

Shaw later performed an informal experiment to determine how many of the smoke particles were getting trapped in his lungs. Using a garbage bag, an air pump, a dryer, a particle-size measuring device and other instruments, Shaw calculated that on a smoky day in mid-August about 10 micrograms per cubic meter of particulates were classified as "fine" in size (about one-half micron in diameter). Shaw calculated that his respiratory system captured only a small fraction of them, and he exhaled the rest.

Associate Professor Cathy Cahill teamed with Bill Reynolds, an indoor air quality consultant, to compare the air quality inside a downtown Fairbanks home with the smoky air outside as measured by a Fairbanks North Star Borough air quality sensor mounted on a building nearby. She and Reynolds discovered that the concentration of smoke particulates in an office portion of the home in which windows and doors were kept shut was one-quarter of the outside particle concentration. During one test of an air filtration system, Reynolds installed an activated charcoal air filter, which reduced the concentration of smoke particles entering a room from 447 micrograms of particulates per cubic meter of air to 8.7 micrograms per cubic meter. The Cold Climate Housing Research Center later funded Cahill and Reynolds to install more of the filters in local homes and to test the effectiveness of the filters on reducing smoke.

photo by Kirill Maurits

photo by Deb Coccia Manning

HEALTH CONCERNS– *Concern about human health increased as smoky conditions continued unabated. Many people, such as Eric Muehling (shown at left), wore masks when walking or exercising outside for extended periods.*

BEFORE

AFTER

MONITORS—Using instrumentation and filters, scientists were able to monitor smoke inside Fairbanks homes this summer. The filter on the left is new. The same filter (on the right) shows considerable smoke residue 15 hours later.

The GI Produces Sensors for Low-Frequency Waves


photo by Dan Osborne

Scientists around the globe use infrasound microphones to detect low-frequency signals of natural phenomena, such as the rumblings of volcanoes, large ocean storms, and even the aurora.

After purchasing the assets of a New Mexico company, the Geophysical Institute has begun producing and selling Chaparral Physics infrasound sensors.

The sensors have the highest sensitivity, lowest noise, and lowest power requirements of any commercially available infrasound sensors.

"The prime purpose of the acquisition was to preserve the specialized microphone technology," said Daniel Osborne, senior research professional at the Geophysical Institute. "One result of this technology is the discovery of a new kind of infrasound wave from the aurora."

Osborne and Research Professional Jay Helmericks, with the GI Electronics Shop, traveled to New Mexico in early 2004 to learn how to assemble the sensors, which are available in different sensitivities and wavelength ranges. Visit http://chaparral.gi.alaska.edu for more information.

The ***Geophysical Institute Quarterly*** is published as a public service by the University of Alaska Fairbanks Geophysical Institute Public Information Office: **Kathryn Bertram**, editor; **Vicki Daniels**, publications specialist/editor; **Deborah Coccia Manning**, designer; **Lynda McGilvary**, publications supervisor; **Ned Rozell**, writer. Free subscriptions are available by e-mail at info@gi.alaska.edu, by phone at (907) 474-7558; by fax at (907) 474-7290, from the address above, or online at http://www.gi.alaska.edu. UAF is an affirmative action/equal opportunity employer and educational institution.

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