Geophysical Institute QUARTERLY

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Houses Bow to Thawing Permafrost

Homes that sag in the middle and roads marred by bumps and cracks may become more common in Alaska if a recent warming trend continues.

During the past three or four years, scientists have discovered that virtually all of the permafrost south of the Yukon River, from Livengood to the Gulf of Alaska, has warmed significantly.

In some areas, the permafrost is within one degree of thawing; in other areas thawing already has begun.

"We may soon find ourselves in a very precarious position," said Geophysical Institute Professor Tom Osterkamp.

For nearly 25 years, Osterkamp has monitored permafrost, the perennially frozen ground that underlies about 85 percent of Alaska and about one quarter of the world's exposed land area.

With funding from the National Science Foundation, Osterkamp monitors permafrost in Alaska using a series of 60-meter-deep bore holes that run north to south down the middle of the state along the trans-Alaska pipeline.

His recent measurements have caused him to focus his research, and his concern, on Alaska's Interior.

Permafrost studies associated with global climate change research in Alaska usually take place on the North Slope, where permafrost occurs in a continuous block, and vegetation (and population) is sparse.

Osterkamp argues that if temperatures warm, it will take much longer for frozen ground to thaw on the North Slope than south of the Brooks Range where the permafrost is discontinuous or scattered in pockets surrounded by unfrozen ground.

"In areas of discontinuous permafrost in Alaska, thawing is not something we are expecting to happen in 100 years or so; it's happening now," Osterkamp said.

In Alaska, Canada, and Siberia, subarctic land masses already show temperature increases of up to 1°C per decade in the winter. Climate change theorists predict that temperatures in the Arctic could warm by up to 10°C during the next century, which would be enough to rid the earth of all naturally occurring ice.

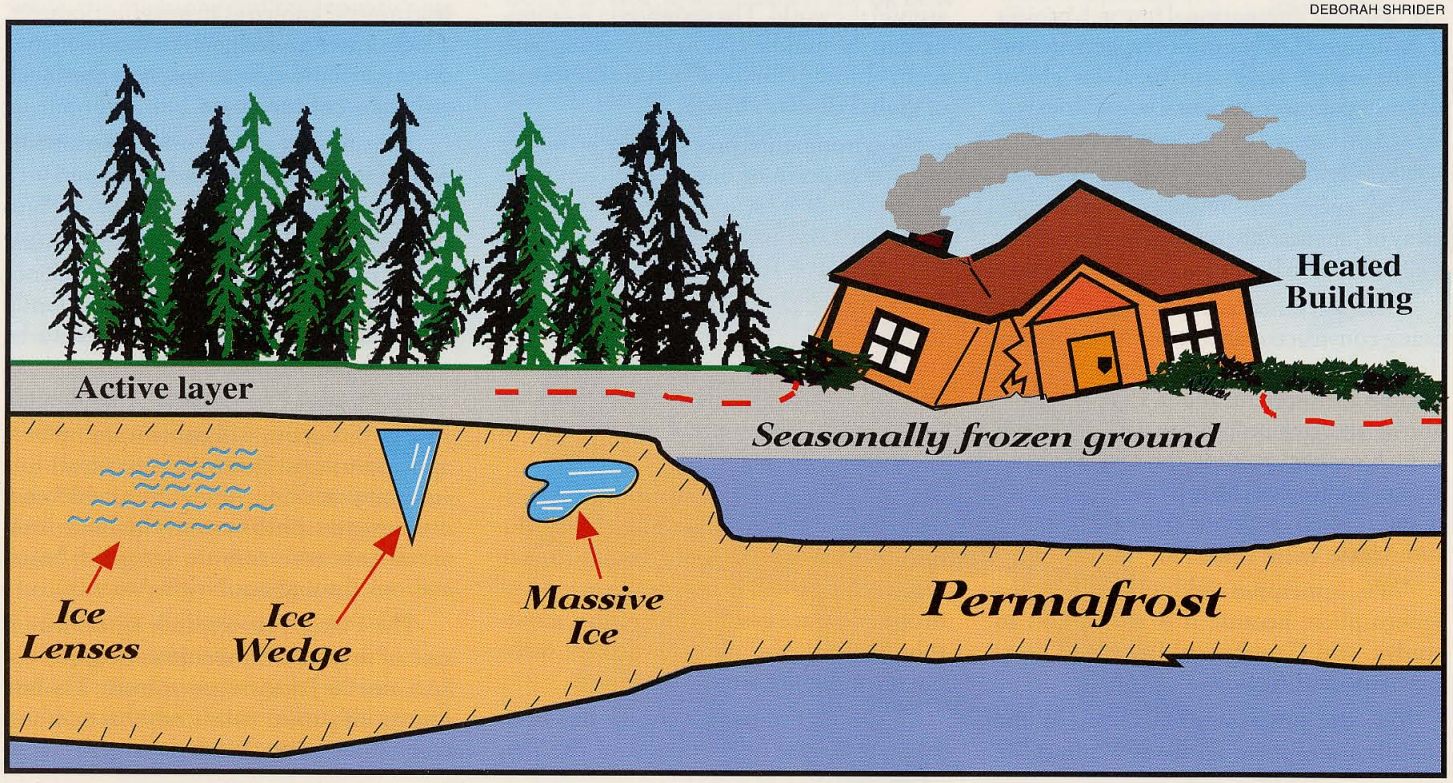
"No ice sounds nice, but the transition period would be chaos," Osterkamp said.

Even a gradual increase in temperature could cause the top 10-15 meters of permafrost in the Arctic to thaw, and, if the warmest predictions come true, the ground could be in various states of thawing for up to a century or more, Osterkamp said.

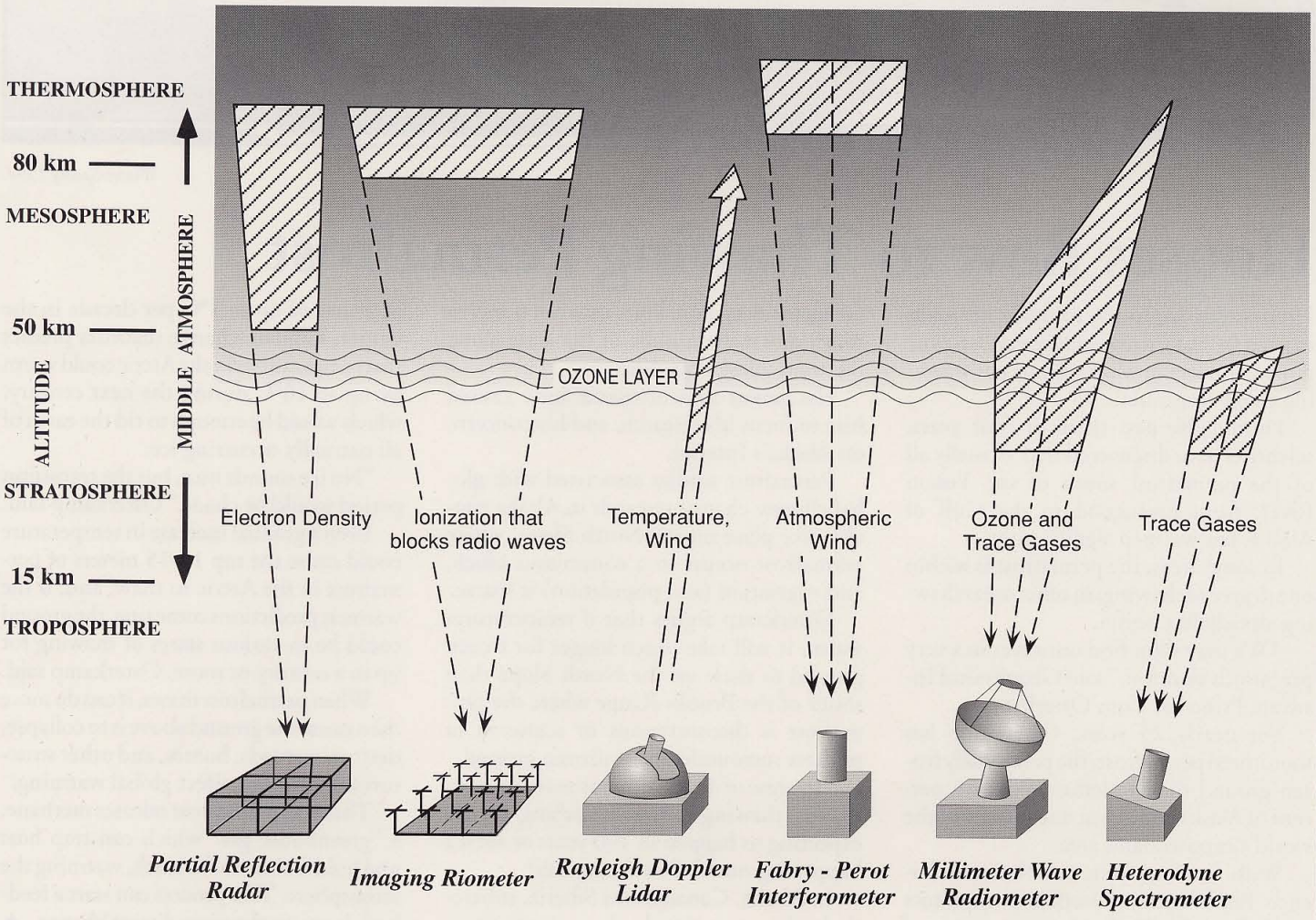
When permafrost thaws, it can do more than cause the ground above it to collapse, destroying roads, homes, and other structures. It also can affect global warming.

Thawing permafrost releases methane, a "greenhouse gas" which can trap heat and hold it close to the earth, warming the atmosphere. This process can start a feedback loop, accelerating climate change. ✦

DEBORAH SHRIDER



Japanese Instruments Destined for Poker Flat



MODIFIED FROM A CRL DIAGRAM BY DEBORAH COCCIA

A 10-year international research project designed to monitor the destruction of the ozone layer and to assess global warming across continental boundaries was signed this spring by Japanese government officials and the Geophysical Institute.

The agreement involves bringing an array of Japanese instruments, worth about $10 million, to Poker Flat Research Range.

The instruments, many of which are being constructed and tested in Japan, are designed to monitor the hard-to-reach middle atmosphere, about 15 to 50 miles above the ground. Scientists generally launch rockets to study the middle atmosphere because satellites fly too high above it and research balloons skim only its bottom layer.

"We sometimes jokingly call it the ignorosphere because it is so difficult to study," said Geophysical Institute Director Syun-Ichi Akasofu.

Yet, the processes that occur in the middle atmosphere are likely to affect life around the world. The ozone layer is prominent in the middle atmosphere, along with night-shining clouds, which are indicators of global climate change.

"Environmental problems are no longer just the concern of one or two countries; they affect all of us," said Director General Kazuyoshi Yoshimura of the Communications Research Laboratory, the branch of the Japanese government overseeing the project.

"That's why international collaboration on research is what we are working toward and what we will see more of in the future," he said.

All of the Japanese instruments destined to operate at Poker Flat during the next decade are designed to be passive receivers; they will make measurements of ozone and trace gases, temperature, atmospheric wind, and electron density without affecting the atmosphere.

A site at the range already has been selected for the construction of the first instrument, known as an imaging riometer, a large antenna designed to monitor conditions in the middle atmosphere that block radio waves from space.

The riometer and the other instruments will be sent to Poker Flat from Japan on a phased-delivery schedule through 1997.

Most of the instruments will be housed under observation domes in the Science Operations Center, which is currently under construction and scheduled to be ready for use by January 1995.

The Science Operations Center, funded by a NASA grant, will contain computers and instruments that will display real-time information about the aurora and other atmospheric phenomena obtained from satellites and remote ground-based stations throughout North America.

The Poker Flat research agreement is one of several collaborations between the U.S. and the Japanese government. The best known is a satellite radar study that monitors tropical rainforest destruction. ✦

Radar May Unearth Buried Treasure

A paved intersection at the University of Alaska Fairbanks could hide a buried treasure, if signals from a ground-penetrating radar device are on target.

After analyzing radar profiles of the area, Geophysical Institute professors Gene Wescott and Koji Kawasaki discovered an anomaly measuring 13 by 17 feet they think may pinpoint the circumference of a pit containing about 30 ancient ivory tusks.

If the tusks are in good condition, they could be worth up to $500,000 in today's retail market. The researchers plan to drill a bore hole into the middle of the area this summer to see if their guess is correct.

Mammoth and mastodon tusks, some weighing up to 200 pounds, were buried in the pit over 60 years ago to preserve them and to prevent them from being stolen.

The tusks and the bones of other animals alive during the Pleistocene Epoch, about 1.8 million to 10,000 years ago, were unearthed in the 1930s by gold-seekers who removed topsoil for placer mining dredges in the Fairbanks district.

Many of the ancient bones and tusks uncovered during the process were collected during the summer and then shipped to museums and universities around the world.

"There were so many tusks that, after a while, the museums said they couldn't use any more," Wescott said.

There were few storage buildings then, so the tusks and bones started piling up around campus.

"People from town started coming out and stealing them to cut up into ivory or to use as yard decorations," Wescott said.

The waste was too much for the late Otto Geist, a self-educated paleontologist and a well-known packrat, whose contributions form the basis for several collections at the University of Alaska Museum.

For safe storage, Geist decided to bury the bones in a pit about eight feet deep. Leo Rhode, a former student who later became a University of Alaska Regent, was hired to dig the pit across from what was then the airplane hanger used by Ben Eielson, one of Alaska's pioneer pilots.

Using an old Model A Ford pickup dubbed the "bone wagon," Rhode and another student drove from pile to pile selecting the most promising and potentially valuable samples for burial. Geist planned to unearth them but the tusks and the location of the pit were forgotten as the years went by.

EVELYN TRABANT

Neil Davis, left, and Koji Kawasaki hunt for ivory.

Wescott decided to search for the tusks after reading about the pit in *The College Hill Chronicles*, a book written by institute Professor Emeritus Neil Davis.

"If it is feasible to unearth them, the sale of those tusks could help the economic difficulties of the university, the Geophysical Institute, and the museum," Wescott said. "Even if it turns out that it is not feasible at this time to retrieve the ivory, it would be wise to know where the cache is if circumstances later permit excavation."

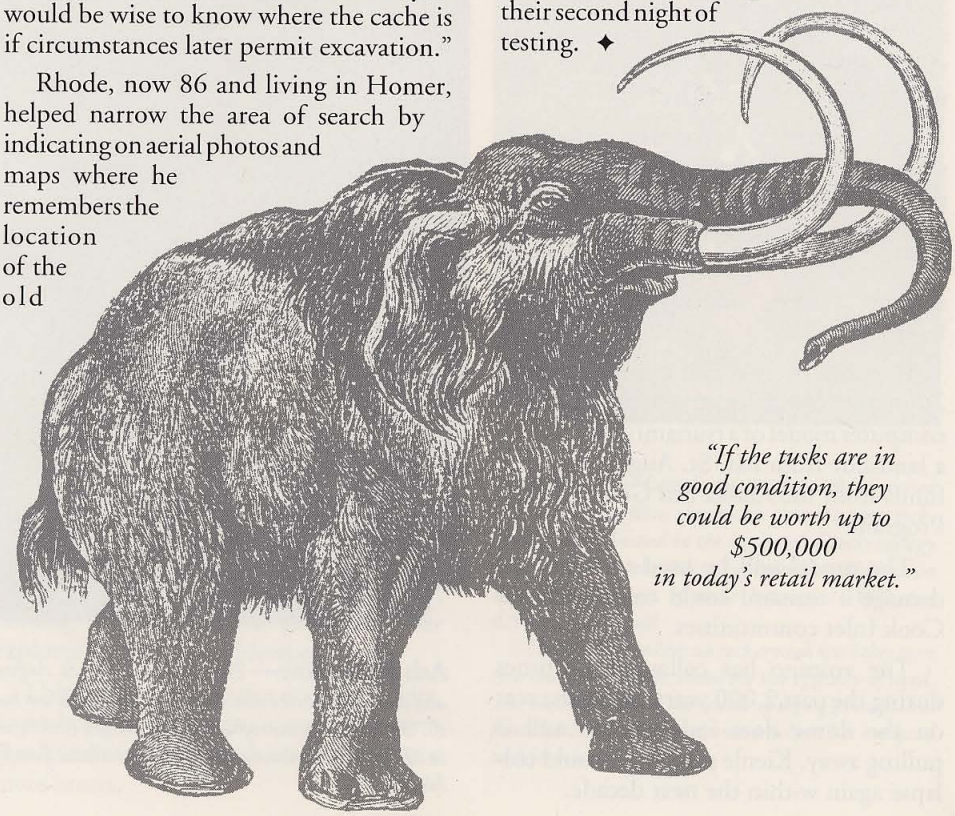
Rhode, now 86 and living in Homer, helped narrow the area of search by indicating on aerial photos and maps where he remembers the location of the old burial site. The researchers estimated that an additional five feet of fill had been dumped over the surface of the pit for construction purposes.

Wescott decided to use ground-penetrating radar to search for the tusks after determining that roads and buildings near the proposed burial site would interfere with tests for specific gravity, magnetic susceptibility, and electric conductivity.

Since there was no ground-penetrating radar device in Alaska, he borrowed one from the U.S. Army Corps of Engineers' Cold Regions Research and Environmental Laboratory in New Hampshire.

The device works by sending pulses of electromagnetic waves into the ground, which are reflected off underlying discontinuities. The reflected waves are received by a antenna, and then recorded for processing and for display on a graphic recorder. The radar waves are attenuated by the earth, causing the pulse to change shape as it propagates.

Wescott, Kawasaki, and Davis searched for the ivory cache late at night to avoid heavy traffic on campus at the busy intersection of Tanana Loop and Taku Drive. The anomaly that may prove to be the circumference of the pit was located in the pouring rain, during their second night of testing. ✦



"If the tusks are in good condition, they could be worth up to $500,000 in today's retail market."

Scar on Summit Could Forecast Tragedy

Across the sparkling water of Cook Inlet, Mt. St. Augustine looks picturesque and relatively harmless. The 4,026-foot volcano is surrounded by a barren island that has been unsuitable for people or development.

Fiery eruptions there during the past few decades have halted air traffic and dusted Cook Inlet residents as far away as Anchorage, but they haven't posed a direct threat to communities on the lower Kenai Peninsula.

That scenario may change if a theory advanced by Professor of Geophysics Juergen Kienle proves true.

Kienle has discovered an unusual crescent-shaped scar on the summit of the volcano that looks as if one of the steep walls under the dome may be pulling away. If that happens, Mt. St. Augustine could collapse and send tons of rock and debris crashing into Cook Inlet.

Scientists believe the impact of the landslide would be great enough to generate a tsunami that would take only about an hour to reach the shores of several nearby fishing communities, including Homer, Seldovia, Anchor Point, and English Bay.

A landslide triggered by the collapse of Mt. St. Augustine in 1883 created a 30-foot tsunami, which crossed the inlet and hit Alexandrovsky, a small fishing village on the tip of the Kenai Peninsula, which later became English Bay.

"Cook Inlet is a contained body of water, like a bathtub; if a big man were to suddenly fall in a tub, all the water would be displaced," Kienle said.

"The same thing could happen if a large amount of debris suddenly fell into Cook Inlet," he said.

Recently, Kienle and marine scientist Zygmunt Kowalik were asked to design a computer model of a tsunami generated by a landslide from Mt. St. Augustine using funds from the Alaska Sea Grant College Program.

The model will be used to assess the damage a tsunami could cause to lower Cook Inlet communities.

The volcano has collapsed 11 times during the past 2,000 years, and if the scar on the dome does indicate the wall is pulling away, Kienle predicts it could collapse again within the next decade.

Each decade or so, enough gas builds up inside Mt. St. Augustine to blow off the summit of the volcano, which Kienle predicts will erupt again before the year 2000.

After the eruption, a carrot-shaped intrusion will rise from the earth's crust, healing the summit and forming a dome. Each intrusion causes the cone to steepen, which increases the potential for landslides.

After a while, the mountain becomes so unstable it collapses; when it collapses, a mass of rock large enough to create a tsunami will be dumped into the ocean.

Kienle, who has studied Mt. St. Augustine for 25 years, plans to inspect the crescent-shaped scar near the summit this summer with Associate Professor of Geophysics Doug Christensen and a team of students from the Geophysical Institute.

Funded by a grant from the National Science Foundation, the team will develop a profile of the inner structure of the volcano using about 170 seismographs and 50 "seismic shots," artificial explosions that send sound waves through the partially molten interior.

Kienle expects this three-dimensional portrait of the inside of Mt. St. Augustine to reveal a set of nested cones formed after numerous past eruptions.

The group also will study micro earthquakes occurring naturally inside the volcano to see if they can locate a slip plane near the scar. The artificial explosions will be strong enough to penetrate different formations inside the volcano, but not great enough to trigger an eruption.

"The force of those mini explosions will have the same impact on the volcano that a mosquito does when it lands on a leaf," Kienle said.

While the crew is surveying, Professor of Volcanology John Eichelberger will monitor the seismic activity of Mt. St. Augustine from within the Geophysical Institute, but no trouble is expected.

"There were several months of high levels of seismic activity preceding all the recent eruptions of Augustine, and there is no evidence of any increase in seismic activity now," said graduate student and crew member Arthur Jolly.

Under Kienle's direction, the students have designed instruments to measure the mass of rock ejected during an eruption. They hope to drop the instruments in the throat of the volcano next summer. ✦

JUERGEN KIENLE

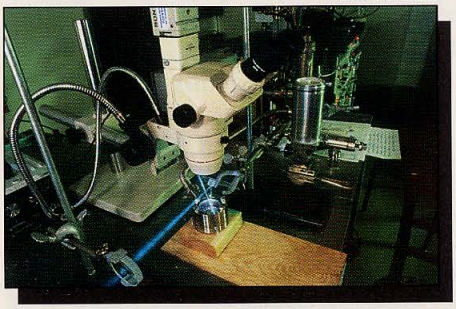
Ash Hurricane—*The eruption of Mt. St. Augustine on March 31, 1986, spewed broken rock, pumice, foam, and dust high into the atmosphere. "It created an ash hurricane of glowing rocks that exploded as they traveled through the air," said Professor of Geophysics Juergen Kienle, who photographed the event from a plane. The cloud to the left in Kienle's photo, above, arose after a pyroclastic flow from the eruption entered the sea on the north side of Augustine Island.*

Laser Rock Dating Can Help Locate Gold and Oil

A rock's age can reveal some of the best kept secrets in Alaska; it can help geologists find veins of gold, locate potential oil reservoirs, and make predictions about when volcanoes might erupt.

Nationally, geologists have dated rocks to analyze craters on the moon and to figure out how dinosaurs became extinct on Earth.

DOUG SIGLER



Determining a rock's age requires expertise and the proper equipment; for years, Alaska has been well stocked with the former, but short of the latter. Assistant Professor Paul Layer changed the equation recently when he secured federal and state funding for the newest and most powerful tool available to geochronologists: a single crystal laser fusion device.

The system is the only one of its kind in Alaska; about a dozen exist elsewhere in the United States. Yet, according to *New Scientist* magazine, virtually every leading geochronology lab around the world has one.

The new rock-dating system, housed in a lab on the third floor of the Geophysical Institute, dates rock samples by heating them with a laser similar to the kind used by doctors for surgery. By analyzing the gases released from the heated sample, the system can determine the ages of even the tiniest rock crystals, rather than using the relatively large chunks required by older furnace-heating rock-dating systems.

The new system's ability to date small crystals permits the analysis of rare rocks and samples from hard-to-reach areas. Using it, scientists can date a few crystals scraped from the delicate rim of a volcano or hauled up from the depths of a mine.

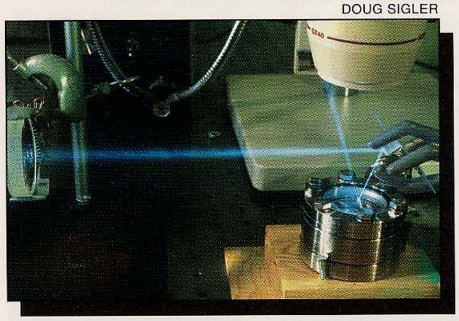
"The system will be able to do more than we imagine," Layer said. "It's full of potential."

Analyzing one crystal as opposed to hundreds from a rock sample also yields dramatically increased precision and reduces problems with contamination, which can cause scientists to inaccurately pronounce artificially old ages for rocks. The laser system double checks by revealing more than a dozen independent dates for a single sample, a benefit that also helps researchers trace the life of a rock.

The past life of a rock is not as sedate as it sounds; it can help scientists piece together the history of an area from well below the ground up. "Each mineral is like a clock that has recorded its own perception of where it has been," Layer said.

Associate Professor of Geology Wes Wallace uses rock dating to help him untangle the geologic history of Alaska's North Slope, and oil companies hope ancient rocks will lead them to untapped reserves.

DOUG SIGLER



"A rock's history is important because, in order to have an economically viable accumulation of oil, a whole series of events need to take place," Wallace said. "By dating rocks, we can figure out the timing of the different events to see if an area has the potential for trapped oil."

Most miners are aware that gold deposits can be associated with rocks of certain ages. Gold in southeast Alaska often is found in igneous rock that formed about 57 million years ago, for example.

"The association of gold with certain ages of rock is so common that rock dating would long have been a routine tool in gold exploration if it wasn't so expensive," said Professor of Geology Rainer Newberry.

The labor-intensive process involved with dating rocks using the old furnace-heating method sometimes took days, making the exercise cost prohibitive for exploration purposes, Newberry said.

Using the laser device to date rocks, Layer hopes to set up an automated system that can date large numbers of samples in mere hours.

"We anticipate the new system will soon be a hot tool for mineral exploration," Newberry said.

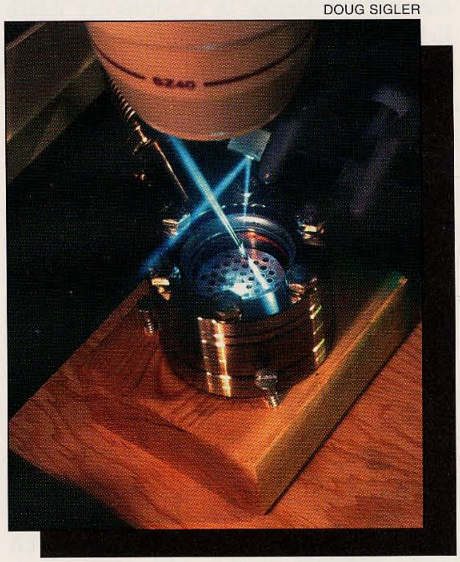
Researchers with the Alaska Volcano Observatory also plan to use the laser rock-dating system to help them predict eruption cycles. Geologist Chris Nye already has asked Layer to determine the age, and the potential eruption cycle of Mount Douglas, located about 350 km southwest of Anchorage.

Although it hasn't had a major eruption in several centuries, Nye considers Mount Douglas a "warm mountain" because it contains a hot, acidic lake and numerous fumaroles above the boiling point at its peak.

"It's a volcano close enough to a populated area to be a problem if it erupts," Nye said.

Before the new system arrived, Layer dated rocks with the furnace-fired mass spectrometer installed in a nearby lab in 1971. That system will continue to be used by graduate students to date older, more common minerals taken from simple geologic settings. ✦

DOUG SIGLER



Meltdown—*Laser beams similar to the kind used by doctors to perform surgery are part of a new rock-dating system housed in the institute's Geochronology Lab. The system, the only one of its kind in Alaska, can determine the ages of rocks between 10,000 and 4.5 billion years old.*

The laser beams heat up rock crystals until they turn into small glass beads, about the size of grains of sand. The meltdown forces the release of argon gas, which is funneled into a mass spectrometer where it is analyzed to determine the rock's age.

GI NOTES

Congratulations:

Visitor Bureau Award

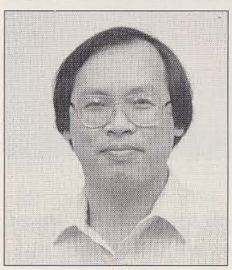
The Second International Conference on Substorms, an international forum for discussions involving the physics of magnetospheric substorms, was hosted by the Geophysical Institute this winter. The conference drew 163 participants, enough to gain recognition from the Fairbanks Convention and Visitors Bureau in the form of their "Meeting of the Month" award.

The bureau estimates that visitors to the conference boosted the local economy by about $125,913. **Syun Akasofu** and **Joe Kan** convened the conference. **John Craven**, **Jeanne Hume**, **Dan Swift**, **Dan Weimer**, and **Kathy Berry** served on the local organizing committee, while **Carol Gering** prepared the abstracts and conference proceedings.

Moore Prize

Associate Professor of Geophysics **Keith Echelmeyer** received the Terris and Katrina Moore prize, an award established by former Geophysical Institute Director Terris Moore to recognize the contributions of deserving researchers in their field of science. Echelmeyer is well known outside the university for his research in glacier flow and mass balance and has contributed extensively within the university to course development and teaching.

Research Award



Lou-Chuang Lee, professor of physics, received the Emil Usibelli Distinguished Research Award, a prestigious award presented to individuals who display extraordinary excellence in teaching, research and public service. Lee's pioneering contributions to the fields of space physics, plasma physics and astrophysics are highly respected nationally and internationally. One of the foremost theoreticians in space physics at the Geophysical Institute, Lee is producing theoretical and simulation studies involving the aurora, solar wind, magnetosphere-ionosphere interaction, solar flares, and sunspot formation.

Video Honored

A dynamic computer-generated video produced jointly by the Arctic Region Supercomputer Center and the Geophysical Institute was chosen from an international field of applicants to become part of a video produced annually by SIGGRAPH, a leading professional organization in the computer graphics industry. The video, which exemplifies state-of-the-art animation techniques, will be sold to researchers around the world.

A segment of the visualization also will be included on an electronic disk produced for instruction in high schools and colleges. The 3-D video animation was produced by Geophysical Institute Senior Systems Analyst **Rick Guritz** and UAF Associate Professor **Mitch Roth**.

DOUG SIGLER

CSC employee Rick Thompson works on the payload.

Landmark Launch

The 250th major sounding rocket was launched from Poker Flat Research Range on Sunday, January 30. The daytime launch attracted a crowd of onlookers who gathered less than a half mile from the range at Chatanika Lodge. The rocket flew 150 miles high carrying instruments to measure chemical reactions in the atmosphere associated with global climate change.

New Jobs

Congratulations to Ph.D. graduates **Yu Lin** and **Lie Zhu.** Yu Lin, a 1993 graduate, has been appointed assistant professor of physics at Auburn University in Alabama. Lie Zhu, a 1990 graduate, has been appointed assistant professor of space physics at Utah State University.

Professor of Physics **Joe Kan** resigned from his position as associate director of the institute this spring so he could concentrate more fully on his newly acquired position as dean of the graduate school. Kan, who joined the institute in 1972, will continue to perform research.

Graduates

Institute graduate students who earned the title of Ph.D. include **Arlene Anderson**, geology; **James F. Conner**, physics; **Dante Espino Garrido**, space physics; **Dominique Gillard**, geophysics; **Yong-Xiang Hu**, atmospheric sciences; **Annette LaBelle-Hamer**, space physics; **David L. LePain**, geology; **Wentong Lu**, atmospheric sciences; **M. Geoff McHarg**, physics; **Qilong Min**, physics; **Mark D. Myers**, geology; **De-Li Shen**, physics; **Jih-Hong Shue**, space physics; **James Robert Slusser**, atmospheric sciences; **Robert Hampton Wade**, geophysics; and **Tingjun Zhang**, geophysics.

Garrido, who is from the Philippines, was the 100th graduate student to defend a thesis at the institute, one of the last steps in the academic journey toward becoming a Ph.D. Garrido's doctoral thesis centered on the properties of the magnetoglow and its uses in the study of the effects of the sun on the earth's environment.

Graduating from the Geophysical Institute with Master of Science degrees are **Terri Bates**, geology; **Carl A. Byers**, applied geoscience; **Wendy Camber**, geology; **Nina Harun**, geology; **North F. Larsen**, atmospheric sciences; **Collette A. Marsh**, physics; **Andrew Nicholas**, space physics; **Alice Veazey**, oceanography; and **Dave Veazey**, chemistry.

PFRR employee **Duane Risse** received a Master of Electrical Engineering degree.

Emeritus Status

During the 72nd UAF commencement this spring, **Daniel Swift**, who plans to retire this summer after working at the institute for 30 years, was named Professor of Physics, Emeritus. The title of Senior Applications Engineer, Emeritus, was conferred upon **John Miller.**

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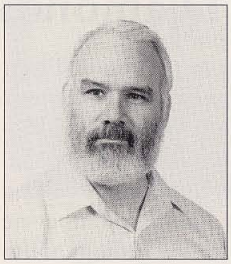
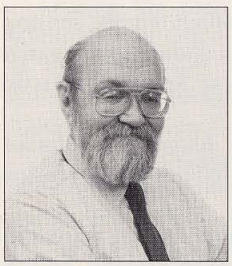
Retirements



James Baldridge retired from the Geophysical Institute in December 1993 after eighteen years of service. He began work at the institute in 1976, beginning with the job of computer programmer and ending as a senior programmer analyst.

Baldridge was a key developer of computerized instrumentation for the upgrade of Poker Flat and of video analysis software for auroral research.

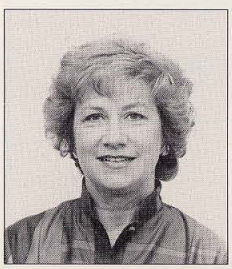


Merritt Helfferich, retired as the institute's associate director in December, but he still works part-time as the director of the Elvey Building Addition Project. Helfferich received a bachelor's degree from UAF in 1966 and has been with the university in a variety of positions since graduating.

He became head of technical services in 1976, the institute's assistant director for administration in 1986, and was promoted to associate director two years later.

After earning his Master of Public Administration degree from Harvard University in 1990, he resumed his well established pattern of community service work by becoming chairman of the Chena Riverfront Commission.

Helfferich was actively involved in the development of Poker Flat Research Range. He also was involved in numerous other activities; he co-founded the Great Tanana Raft Classic in 1976, co-piloted the Farthest North Hot Air Balloon Flight in 1982, and served as boat captain for the trans-Alaska Lithospheric Project in 1987.



Jeanne Hume retired from the Geophysical Institute this winter after years of dedicated service. Hume, who always brought style and compassion to work, started her first job at the Geophysical Institute in 1956. She left and returned several times before the institute finally convinced her to stay in 1976. She worked as an administrative assistant for several of the institute directors, but was well known as the Den Mother for institute graduate students (and as the unofficial social advisor for staff and faculty). Over the years, Jeanne saw more than her share of retirees. Now, it's her turn to say farewell.

Library Lectures

To compliment an already ambitious effort to bring science into the community, the Geophysical Institute presented more than two dozen public lectures at the Noel Wien Library this winter.

The lectures were so well attended the series is scheduled to be an annual event, which may extend into Anchorage libraries next year.

Faculty members who made presentations during this winter's Fairbanks series included **Syun-Ichi Akasofu**, **Richard Benner**, **Carl Benson**, **Sue Ann Bowling**, **Keith Crowder**, **Ken Dean**, **Thomas Hallinan**, **Catherine Hanks**, **Joe Hawkins**, **Merritt Helfferich**, **Steve McNutt**, **Charlotte Rowe**, **David Stone**, and **Willy Weeks**.

In addition, Associate Professor of Geophysics **Doug Christensen** spoke in libraries and schools in Anchorage about the 30th anniversary of the 1964 earthquake. And Research Assistant Professor of Geophysics **Neal Brown** spoke about the Alaska Space Academy, week-long camps which will be held in Fairbanks and Palmer this summer.

Earthquake Preparedness

A weekend Earthquake Preparedness Workshop was held at the institute to help families, schools, and businesses take steps to minimize damage and to ensure personal safety during a major earthquake in the Fairbanks area.

The workshop was organized by Librarian **Judy Triplehorn**, Deputy State Seismologist **Charlotte Rowe**, Adjunct Professor of Seismology **John Lahr** and USGS Geophysicist **Bob Hammond**, from the Geophysical Institute, with volunteers from the Red Cross, the United States Geological Survey, the Alaska Cooperative Extension, and the Fairbanks North Star Borough Office of Risk Management.

Modeling Workshop

The second annual Wadati Climate Modeling Workshop was organized this winter by Geophysical Institute Professor **Gunter Weller** and Wadati Visiting Professor **John Walsh**. The workshop brought together modelers and experimentalists from several different disciplines to address the complex task of modeling all aspects of the environment, including vegetation, permafrost, sea ice, ocean circulation, chemical constituents in the atmosphere, and soil hydrology.

Sculpture Saw

The Fairbanks Ice Festival benefited from sea ice research on the North Slope when Senior Research Consultant **Lew Shapiro** and Machinists **Ned Manning** and **Tim Manning** donated their time and a special saw to Ice Alaska this winter.

DOUG SIGLER

Ned Manning, left, and Lew Shapiro cut ice.

Ice Alaska volunteers, who needed more than 100,000 pounds of ice for sculpture contests, harvested frozen cubes out of a local gravel pit using a motorized, robotic chainsaw designed at the Geophysical Institute. The saw was made to cut through six-foot sea ice off the coast of Barrow, where research on ice mechanics has been funded by the Office of Naval Research.

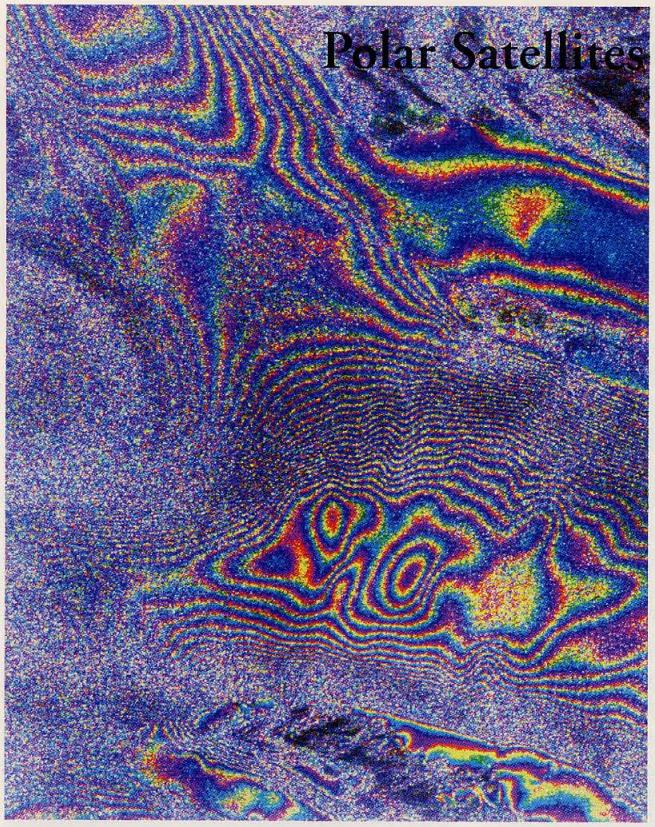
Bronze Award

The ***Geophysical Institute Quarterly*** won the Bronze Award for outstanding work in the 1994 Council for Advancement and Support of Education Circle of Excellence Awards.

In winning the nationwide competition, the *Quarterly* competed against publications from 42 large institutions such as Vassar University, University of Pennsylvania, University of Michigan, University of New York, and Brigham Young University.

The *Quarterly* received the only award in the internal newsletter category. In 1994, it was produced by Science Editor and Writer **Kathy Berry**, Graphic Artist **Deborah Coccia** and Publications Assistant **Jan Dalrymple**.

Polar Satellites Track Fire, Reindeer, and Diamonds



Glacial Movement— *The above interferogram generated by Rob Fatland shows Bagley Icefield, the source area of Bering Glacier, the largest glacier in North America. The image was created by combining two sets of data acquired three days apart from the European Remote Sensing Satellite, which orbits 490 miles above the earth. Scientists can tell how fast ice is traveling in different parts of the Bagley Icefield by examining the bands of color in the image.*

Polar-orbiting satellites have a unique perspective on the Arctic. From hundreds of miles above the earth, they record information about forest fires, volcanic eruptions, schools of fish, sea ice, and even snowfall—information previously hidden from earth-bound scientists.

Scientists who specialize in remote sensing in the Arctic examine satellite images for a variety of reasons. Research Associate Catherine Hanks analyzes information from space to help assess the geology of the Arctic National Wildlife Refuge, for example, while graduate students Rob Fatland and Jamie Roush use data from polar-orbiting satellites to figure out how fast the Bering Glacier moves.

Fatland measures the speed of slow moving portions of the Bering Glacier using "interferograms," created by combining two images received by satellite a few days apart. Complimentary methods to measure velocity in faster moving sections of the glacier are being investigated by Roush.

These Geophysical Institute scientists and other remote sensing experts from around the world shared information about their research at the Third Circumpolar Symposium on Remote Sensing of Arctic Environments in Fairbanks this spring.

The three-day symposium, organized by Assistant Professor Kenneson Dean and Associate Professor Martin Jeffries, was attended by about 100 experts from 12 countries.

At the symposium, scientists learned that remote sensing is used to locate diamond mines in Canada, to herd reindeer in Finland, and to study vegetation in Norway. In the United States, the Coast Guard uses satellite imagery to help ships navigate through ice in the Arctic Ocean and the National Weather Service uses remote sensing to track storms and to alert pilots of other potentially hazardous weather situations.

Plans are being made to hold a fourth international conference for remote sensing experts in Copenhagen, Denmark, in 1996. ✦

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