Volume 20, No. 3, 2007
Geophysical Institute Quarterly

Unmanned aircraft system arrives at Poker Flat

A forty-pound flying machine with many possible uses in Alaska has a new home at Poker Flat Research Range. The Insitu A-20 unmanned aircraft, marketed by Boeing as the ScanEagle, has a 10-foot wingspan and onboard cameras that provide real-time, high-resolution optical or infrared views of the ground from altitudes up to 16,000 feet.

Poker Flat Research Range Manager Greg Walker said that possible applications for the unmanned aircraft could include wildfire mapping, oil pipeline surveillance, assisting the Coast Guard with ship identification in Prince William Sound, and performing track inspections for the Alaska Railroad. The A-20 is ideal for monitoring wildfires; fire managers at remote command posts could use it to plot the perimeter of a wildfire and observe the fire's behavior to better plan suppression efforts.

University faculty and students also will have opportunities to work with the A-20. A regular competition will be held for undergraduates to propose missions using aircraft flight time.

The unmanned aircraft can fly 20 hours after an operator catapults it from a mobile, trailer-mounted launcher. Operators on the ground can control the aircraft manually or it can be set to automatically track anything that moves, even a moose that walks much slower than the aircraft's 50-mile-per-hour flight speed.

"You control where it's flying on a moving map," Walker said. "With pixel-following software, it'll basically loiter around and follow a target, looping back and forth to keep it on camera."

Controllers on the ground can guide the aircraft to a distance of about 120 miles, but that range can be extended by adding mobile control stations along the flight path. "With ground stations along the way, you could fly it all the way from Valdez to Prudhoe Bay to patrol the entire 800-mile trans-Alaska pipeline," Walker said.

The aircraft doesn't need a landing strip. Instead, it is recovered by hooking its wingtips on a vertical cable suspended from a portable boom, which lowers it to the ground. This mid-air recovery system allows the A-20 to be used in remote areas, or even on a ship at sea. U.S. Marines are using a similar unmanned aircraft system in Iraq.

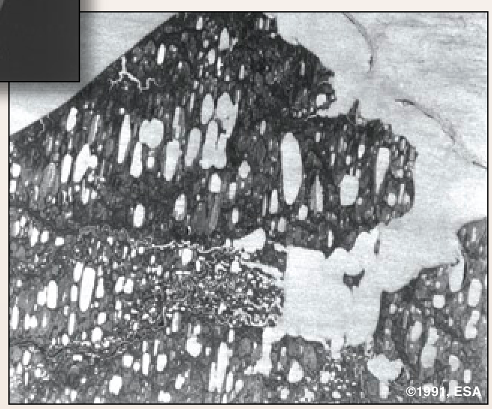
Though brand new to the Poker Flat mission, the unmanned aircraft system will be a major part of range operations during the next few years. "This is a whole new, cutting-edge research area and I'm glad the university is leading the effort," Walker said.

***LAUNCH AND RECOVERY**—At top, the A-20 is catapulted into the sky from a trailer-mounted launcher. As shown at center and at left, in lieu of landing, the aircraft is recovered by hooking its wingtips on a vertical cable suspended from a portable boom, which then lowers the aircraft to the ground. Photos courtesy of The Insitu Group.*

Alaska Satellite Facility celebrates 15 years

On August 7, 1991, a dozen people crowded around a computer in the Geophysical Institute's Elvey Building and saw what they hoped to see–islands and ice rafts north of Hudson Bay, Canada, transmitted to them from a satellite 500 miles overhead. After letting out a collective whoop, they compared the snapshot from above to maps of northern Canada, marveling at the amazing view Alaska's newest scientific tool provided them.

Geophysical Institute photo



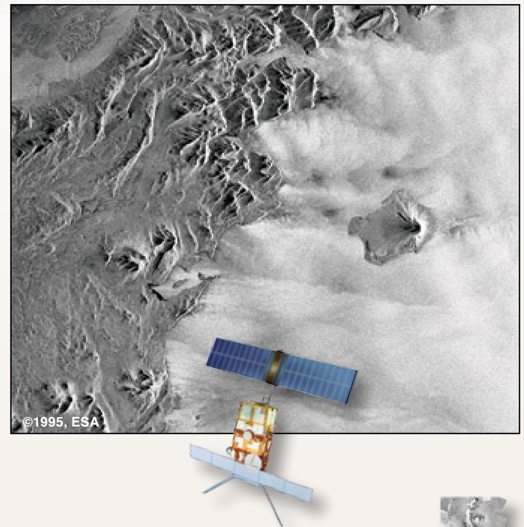
FIRST DATA—Above, personnel await ASF's first data acquisition from the ERS-1 satellite. Shown at right is the first SAR data image of the North Slope near Barrow, Alaska.

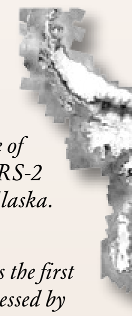
From that beginning 15 years ago, the Alaska Satellite Facility (ASF) at the University of Alaska Fairbanks has received millions of data bits from orbiting satellites. Scientists use the views from space to study things that are hard to view any other way, like ice on the northern oceans.

At the time of ASF's birth, NASA officials were considering sending a new satellite into orbit but decided it was a better use of their money to establish a station that could retrieve data from other countries' Earth-observing satellites. They installed a 10-meter dish atop the highest building on the UAF campus, the eight-story Elvey Building, creating one of the most noticeable features of the Fairbanks landscape. ASF uses this antenna, and a similar antenna located in the woods west of the building, to receive satellite data.

ASF now receives data from two NASA satellites, two satellites owned by Canada, a satellite owned by 13 European countries, and a satellite owned by Japan. Much of the data ASF receives is synthetic aperture radar (SAR) data. SAR technology enables useful data to be received through clouds, fog, darkness, and other conditions that limit systems that rely on conventional observations. SAR capability has enabled researchers to undertake dozens of projects that would otherwise be difficult or impossible, such as mapping Antarctica and other remote regions.

Scientists all around the world use ASF products, often to determine changes in a landscape over time or after a natural disaster. In 2002, Derek Mueller, a post-doctoral fellow based at





VOLCANO MONITORING—By comparing SAR images over time, scientists can detect volcanic surface changes that may hint at eruptions. Above left is an ERS-2 satellite image of Augustine Volcano; above right is an ERS-1/ERS-2 satellite InSAR image of Mt. Peulik Volcano, Alaska.

ANTARCTIC MAP—Shown at right is the first high-resolution mosaic of Antarctica, processed by ASF using RADARSAT-1 satellite data.

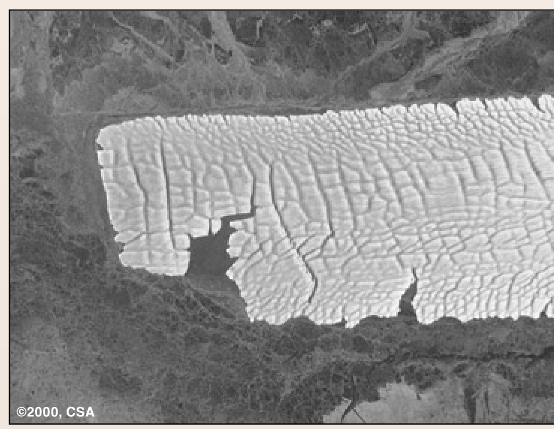
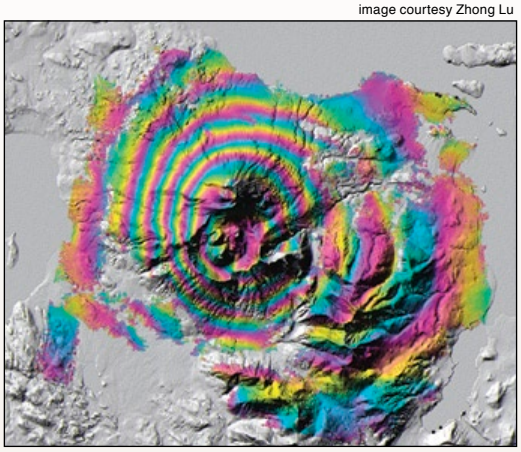


image courtesy Zhong Lu



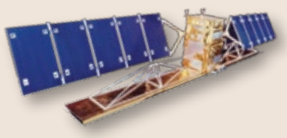
the Geophysical Institute (then a graduate student at Laval University, Quebec) was camped near Ward Hunt Ice Shelf in Canada's Arctic, where he noticed many long fractures in the ice. Intrigued, Geophysical Institute Research Professor Martin Jeffries ordered RADARSAT-1 satellite images of the area from ASF. In less than 24 hours, Jeffries was able to confirm Mueller's observations. The researchers found that one of the cracks ran the width of the ice shelf.

***ICE CRACKS DETECTED**—This SAR image from August 30, 2002, shows visible fractures in the Ward Hunt Ice Shelf.*

Recently, Luke Copland, an assistant professor of geography at the University of Ottawa, Laurie Weir of the Canadian Ice Service, and Mueller used ASF images to confirm the breakup of another ice shelf on the coast of Ellesmere Island in Canada's Arctic called the Ayles Ice Shelf. The ice shelf was the size of Manhattan, about 23 square miles, when it broke off in 2005.

Other highlights of ASF's 15 years include: successfully mapping Antarctica from 1997 satellite data, then again from 2000 data to detect and analyze unprecedented changes; global forest mapping of both rainforests and boreal forests using satellite mosaics; and implementing the ability to observe and analyze Alaska's coastal wind patterns using SAR data.

ASF recently signed an agreement with NOAA to receive, process and distribute remote sensing products from Japan's Advanced Land Observing Satellite. ASF distributes ALOS products to users throughout North and South America.



***BEFORE AND AFTER**—The Drygalski Ice Tongue is shown in the image above, which was acquired and processed by ASF during the Modified Antarctic Mapping Mission in 2000. At left, the Drygalski Ice Tongue is shown colliding with the B-15A iceberg in the Ross Sea, Antarctica, during the spring of 2005. This image is a portion of a larger, RADARSAT-1 satellite ScanSAR Wide-B image.*

***CITY VIEWS**—Images of Delta Junction, Alaska (above), and the Salton Sea area in California (left) were created using data from sensors onboard the ALOS satellite. These images were processed by the Americas ALOS Data Node at ASF.*

GI glaciologists chart surge of McGinnis Glacier

While traveling in the Alaska Range in the spring of 2006, Geophysical Institute Assistant Professor Martin Truffer discovered that a small glacier had a major surge.

Surging glaciers build up snow and ice in their upper portions for years until all the weight flows downhill in dramatic fashion. Surging glaciers aren't necessarily growing glaciers; when a glacier surges, ice mass that was at high elevations moves to lower elevations, making a mess of the glacier in the process.

"There's about a dozen of them in the Alaska Range, but if you think about all the glaciers worldwide, surging glaciers are exceedingly rare," said Truffer, a glaciologist.

Truffer saw the telltale sign that McGinnis Glacier had surged–a severely crevassed surface and a face of ice 300 feet high *(right)*–while on a recent attempt to drive snowmachines into nearby Black Rapids Glacier. After giving up on reaching Black Rapids with his guides Mike Reitz and Dick Flaharty, the group traveled farther north to see the great rockslides that fell from McGinnis Peak during the Denali Fault earthquake of November 2002.

When they approached the lobes of the glacier that wrap around the 11,400-foot peak, Truffer noticed the rough surface of the glacier and wondered what he was seeing.

"When I first saw it, I didn't get it," he said. "I wondered if what I saw was the rockfall, but from far away it looked really rough. When we got closer, I said 'No, this is a glacier surge.' It was totally unexpected, which is what makes it really cool."

photo by Dana Truffer-Moudra

Geophysical Institute Quarterly: Volume 20, No. 3, 2007
The Geophysical Institute Quarterly is published as a public service by the University of Alaska Fairbanks Geophysical Institute Public Information and Education Outreach Office: **Kathryn Bertram**, supervisor; **Vicki Daniels**, editor; **Deborah Coccia Manning**, designer; **Lynda McGilvary**, publications specialist; **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) 474-7125, 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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