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V-ADAPT

GI technology spurs new business for volcano observation

image by Cyrus Read, courtesy AVO/USGS

Alaska's Augustine Volcano shook, shimmied and swelled for nearly eight months before erupting in January 2006.

The Cook Inlet volcano exploded ash, lava, steam and grit for the next three months.

It was a perfect time for the Volcano Remote Sensing Group, at that time part of the Alaska Volcano Observatory, to test its array of remote sensing systems they long had been working on for just such a moment.

"We got so much data on the events, it was like getting blasted with a fire hose," said Jon Dehn, a research associate professor with the Remote Sensing Research Group in the Geophysical Institute at the University of Alaska Fairbanks.

Seven years later, Dehn, and Peter Webley, an assistant research professor with the remote sensing group, are ready to offer a comprehensive volcanic event detection and preparedness system commercially under the university's first commercial company.

Called V-ADAPT, Inc., which stands for Volcanic Ash Detection, Avoidance and Preparedness for Transportation, the company will offer online services geared toward the airline industry and others who need to detect and track volcanic activity.

"We think we have a well-established customer base with the airline industry," Dehn said. "That way if one airline decides they don't want the service, we still have a diverse group supporting us."

V-ADAPT provides access to data products in near real-time and tools that allow users to be informed about volcanic activity. The tool displays satellite data and offers the online user a layered interface to interpret the data.

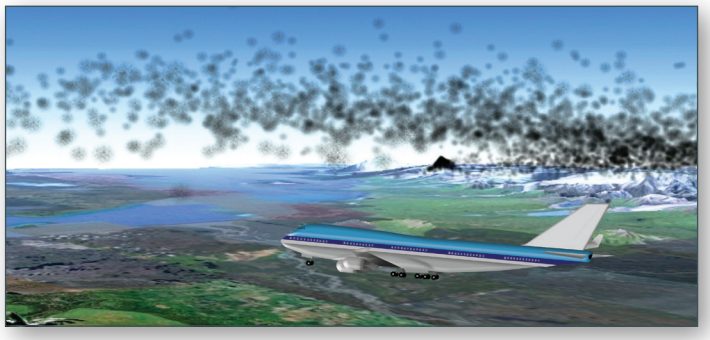
V-ADAPT's service will also provide a volcanic ash cloud-tracking model, which was developed by the Geophysical Institute in the early 1990's. This service gives an online look at where the airborne ash will be and how much fallout can occur from a volcanic eruption. The simulations are seen as an online map with an interactive display, explained Webley, who perfected the conversion of the modeling environment from a reactive to a proactive real-time capability.

"It'll forecast where an ash cloud will go, with simulations made ahead of the eruptive event," Webley said. "That means decisions by the end user can be made quicker and sooner."

UAF's Office of Intellectual Property and Commercialization filed a patent for Dehn's and Webley's new modeling methods. Nanook Tech Ventures, a startup accelerator founded in April 2013, takes equity in start-up companies in exchange for UAF-developed technology and took part in creating V-ADAPT, Inc.

"We're looking forward to the success of this ready-made software in the private sector," said Dan White, associate vice chancellor for research at UAF. "With UAF conducting more than $110 million in research last year, we see a variety of opportunities for new and existing companies based on newly developed technology and software. It is our goal to make sure these new technologies make their way to creating wealth in Alaska companies."

On the web: www.vadapt.net.



Scientists use tracer particles to model volcanic ash cloud movement. The tracer particles appear as puffs on the model above of a KLM airliner encounter with an ash cloud in 1989. Graphic adapted from Peter Webley (2011).

GI's UNMANNED AIRCRAFT VISITS SOUTH AFRICA

The massive South African black eagle decided it had enough of the Aeryon Scout buzzing about a bluff where the predator lived.

The bird, with a wingspan that can go over seven feet wide, swooped down on the silver intruder and took it down.

"Eagle 1. Scout 0," said Greg Walker, of the Alaska Center for Unmanned Aircraft Systems Integration. Walker and a small team from the Geophysical Institute brought the Scout to the Welgevonden Game Reserve in the Limpopo Province of South Africa. The group went to show how unmanned aircraft could support efforts against rhinoceros and elephant poachers, promote tourism and conduct wild game surveys.

AIRCRAFT—In an effort to detect nests of endangered Cape vultures the Aeryon Scout was flown to 2,000 feet altitude before it was attacked by a South African black eagle. Photo by Cathy Cahill.

"We did really well," Walker said. "They were really surprised at how easy it was to fly." The eagle was the only spot of trouble.

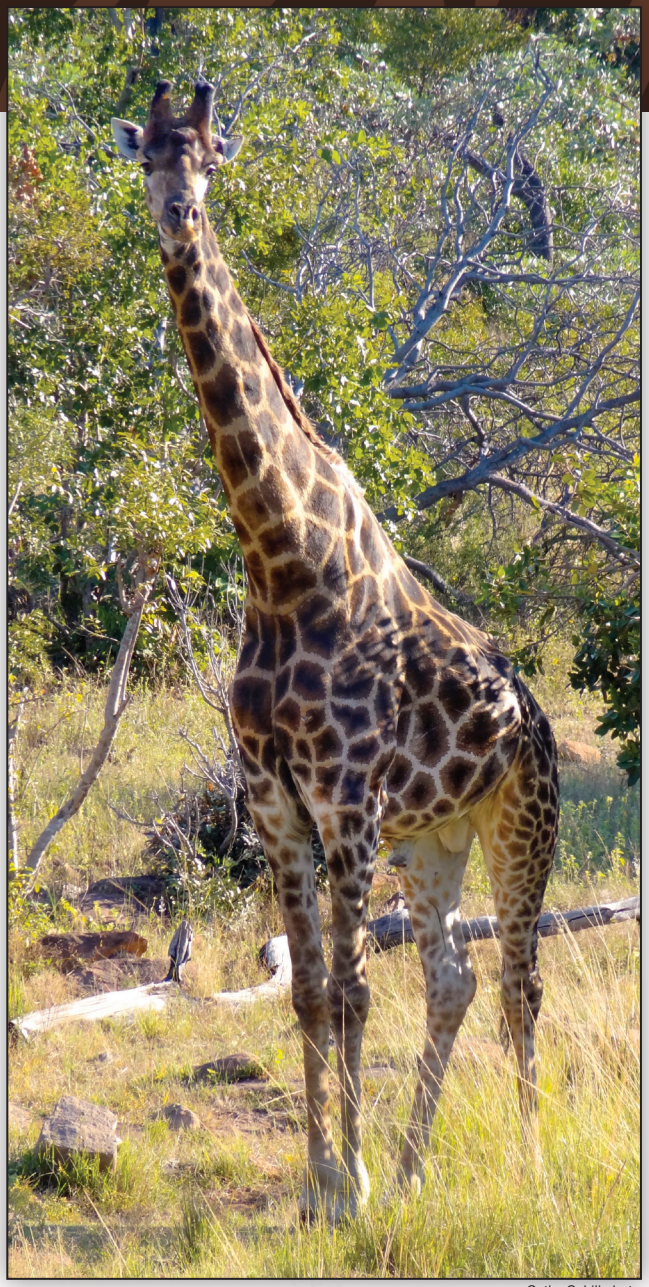
The game reserve, which is under private ownership and is about 93,000 acres, had plenty of wildlife. The group saw zebras, antelopes, elephants, giraffes, rhinos, wildebeests and kudu, a deer-like animal with spiral horns, all while driving to the test launch site, Walker said.

Walker was able to take Scout up to 2,000 feet, the highest it's ever flown. The game reserve biologists wanted them to see if they could find the nests of some endangered Cape vultures that live in a bluff. The eagle put an end to that trip, Walker said.

After the successful demonstration of the usefulness of unmanned aircraft, the game reserve owners now want to use unmanned aircraft for security and game surveys. Walker is working with them on the details of a deal.

Cathy Cahill photo

WILDLIFE—Zebras, giraffes, and kudus were among the wildlife on the Welgevonden Game Reserve.



Cathy Cahill photo

Greg Walker photo

Unmanned smoke detector

In late 2012, the University of Alaska Unmanned Aircraft Program was part of the U.S.'s largest and most complex prescribed wildfire burn research project in over 40 years. More than 3,000 acres of forest and grasslands located on Eglin Air Force Base in Florida were set afire in order to better understand how wildfires behave.

The unmanned aircraft team was part of 90 scientists who made up the Combustion and Atmospheric Dynamics Research Experiment, or Rx-CADRE, led by the U.S. Forest Service.

UAF's aircraft, the Aeryon Scout and ScanEagle, collected information related to smoke transport, air quality, flame dynamics and fire progression using long-wave infrared imagers, visible cameras and an aerosol mass concentration and black carbon sensor.

"In the exercise debrief, UAF's support was assessed as critical to the overall success of this high priority research mission," said Greg Walker, of the UA Unmanned Aircraft Program. "This was the largest and most complex mission related to wildfires carried out in the United States since the 1960s."

A major logistical challenge of the campaign proved successful when up to six airborne platforms were deployed at once, including fixed wing aircraft, unmanned aircraft and a gas-filled aerostat that all operated at various altitudes within the same airspace, he said.

The operations gave the team the chance to substantially advance the use of unmanned aircraft systems in scientific research.

The Rx-CADRE team recorded the fire's behavior, meteorology, smoke particulates and other fire phenomena. All the information was combined into an integrated database that is used worldwide to modify control burns, said Roger Ottmar, who managed the Rx-CADRE team.

Greg Walker photo

GEOPHYSICAL INSTITUTE
University of Alaska Fairbanks
903 Koyukuk Drive
P.O. Box 757320
Fairbanks, AK 99775-7320

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Look for more whale-size dirigibles over Alaska

Roger Smith, former GI director, space physicist and professor emeritus, is working with local engineer John Collette and the GI's machine shop on a cycloidal rotor system that would create a new device for moving and navigating a large helium filled airship. Smith envisions such airships bringing fuel and supplies to offshore oilrigs or Alaska villages.

"It's more like a flying tugboat than a balloon of the standard type," Smith said.

Collette, a local inventor and entrepreneur, came to the GI with the idea of moving an airship with up to six cycloidal rotors, which look like large eggbeaters and provide thrust in directions perpendicular to the rotors. Collette has working on prototypes in his home shop, but needed larger partners to help make his idea into practical reality.

GI illustration/digital composite by Vicki Daniels and Greg Shipman

Possible uses of airships to solve Alaska-type problems include fuel delivery to Alaska communities in ice-bound locations, natural gas delivery from the North Slope to Fairbanks, the servicing of offshore oil rigs in rough seas and the long-distance transport of large, awkward loads.

Smith hopes to partner with other universities and has helped write a proposal to the National Science Foundation that would fund supervisor Greg Shipman and the GI's Machine Shop to build a testable prototype of the cycloidal rotor system.