

SATELLITE IMAGERY:

Where science and art connect

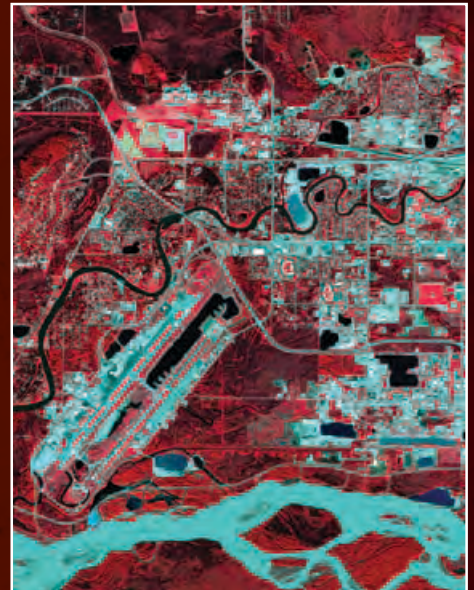
Satellite imagery is a powerful tool for scientists that monitor the dynamic features of Earth's surface. With a vantage point from space, large swaths of landscape can be viewed in a single snapshot. Depending on the sensors used to capture the image, these scientific tools may also serve as beautiful works of art.

From June through September 2010, the Alaska Satellite Facility partnered with the University of Alaska Museum of the North on a special exhibit that contained a mixture of aerial photography and satellite images from the ASF archive. ASF Chief Scientist Don Atwood selected images for the exhibit based on simple, yet elegant criteria.

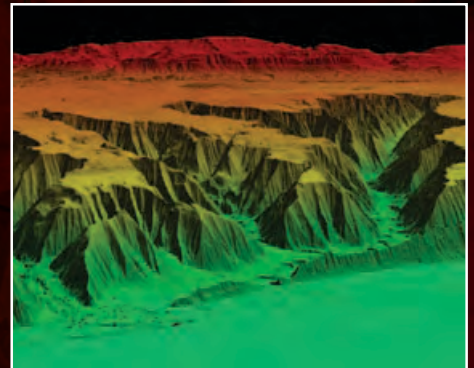
"I tried to choose images for either their scientific importance or just for their physical beauty," he said. "Earth seen from space is gorgeous, so I tried to pick scenes that were visually compelling."

The exhibit's three-month installment helped boost local awareness of the depth and breadth of imagery available in the ASF data archive. The Alaska Satellite Facility was established in 1991 and downlinks, processes, archives and distributes satellite data to scientists across the globe for Earth-science research, field operations and commercial remote-sensing applications beneficial to society.

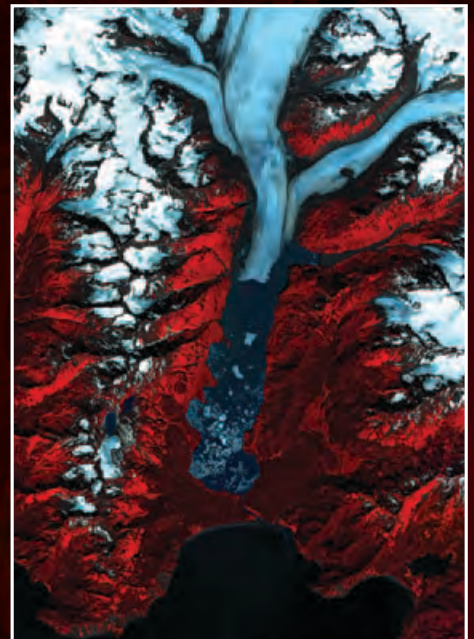
To access ASF datasets online, visit <http://www.asf.alaska.edu>.



courtesy of Don Atwood, ASF



courtesy of Rick Guritz, ASF



courtesy of Don Atwood, ASF

SCIENCE AS ART—At top is an image of the Fairbanks community in 2007. The false-color scene shows vegetation as unnatural red. The middle image is a model of the southern Kenai Peninsula based on LIDAR data. The hills appear twice as tall as in real life, as the vertical topography of the shoreline was doubled to facilitate the study of erosion and coastal flooding. At bottom is a 2007 image of Excelsior Glacier, a tidewater glacier on the Kenai Peninsula. The background image is of Interior Alaska east of Minto. The images, except the middle LIDAR image, were captured with the AVNIR-2 instrument on the Advanced Land Observing Satellite.



INTERNATIONAL POLAR YEAR

Permafrost study results published

Vladimir Romanovsky, a professor with the Snow, Ice and Permafrost Group at the Geophysical Institute, was the lead author of a paper that revealed permafrost warming continues throughout a wide expanse of the Northern Hemisphere. In the report, which was published in the April-June 2010 edition of *Permafrost and Periglacial Processes*, Romanovsky and a team of scientists describe the thermal state of high-latitude permafrost during the International Polar Year, 2007-2009.

“This paper is actually pretty unique,” Romanovsky said, “because it’s the first time such a large geographical area has been involved in one paper.”

During the IPY, Romanovsky and his colleagues launched a field campaign to improve the existing permafrost-monitoring network. The thermal state is monitored with borehole sensors, which gather data from holes drilled deep into the permafrost. The researchers established nearly 300 borehole sites that serve as permafrost observatories across the polar and sub-polar regions in the Northern Hemisphere. Their work more than doubled the size of the previously existing network.

“The heart of monitoring is the measuring of temperatures in boreholes,” Romanovsky said. “For permafrost temperatures, you have to be there. You have to establish boreholes.”

Having data from across the circumpolar north allows scientists to analyze trends affecting permafrost. The article notes that permafrost temperatures have warmed as much as two degrees Celsius from 20 to 30 years ago. They also found that permafrost near zero degrees Celsius warmed more slowly than colder permafrost. According to Romanovsky, this trend is an example of the large-scale analysis possible using data from the expanded network.



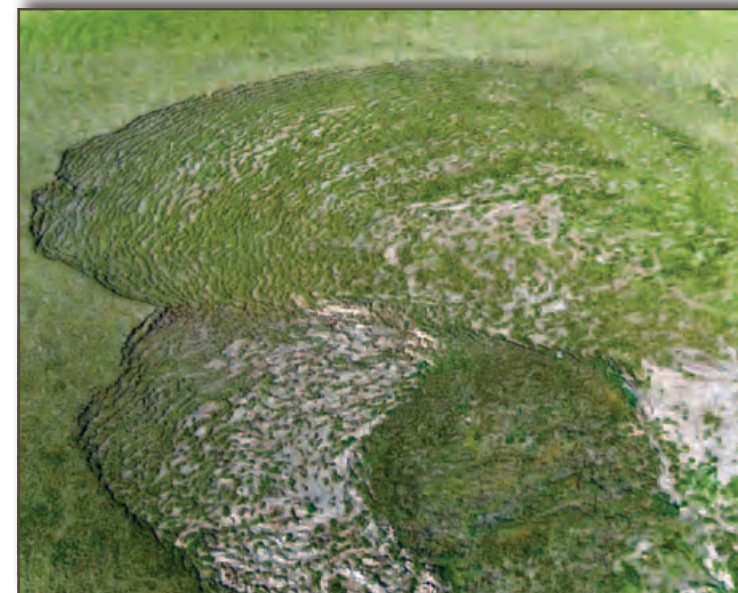
Romanovsky, whose specialty is Russian and North American permafrost conditions, plans to keep building on the legacy of the IPY. With help from a five-year National Science Foundation grant, he continues his collaboration with American and international colleagues, establishing new borehole sites in under-sampled areas and analyzing trends evidenced by the newly available data.

The fourth IPY was a two-year event that began in March of 2007 and focused the attention of the international research community on Earth’s polar regions. GI scientists and students were heavily involved in IPY projects and are still analyzing the resulting data.

PERMAFROST LANDFORMS—At right are aerial views of a thermokarst near Toolik Field Station, 150 miles north of the Arctic Circle. Thawing of ice-rich permafrost resulted in the collapse of the ground surface. The background photo at left is looking across the narrow portion of the thermokarst. As exposed permafrost thaws, more of the intact bank will slump into the depression.

PERMAFROST CORE—At left, Ben Abbott displays an intact core sample of ice-rich permafrost.

All photos by Tamara K. Harms, July 2009.



Permafrost research infused into curriculum for teachers

The Cryospheric Connection to Understanding Climate Change is an online professional development course for secondary teachers that examines how changes in permafrost affect Earth as a whole. The course reveals how teachers can use data from space, suborbital and ground platforms to provide classroom instruction that is reflective of authentic climate science research. NASA funding awarded to Geophysical Institute Outreach Office Director Kathy Berry Bertram made course creation possible. A team of 12 University of Alaska Fairbanks scientists have been involved.

“The program is well designed and is already producing very good results,” said GI Professor Vladimir Romanovsky, who serves on the Cryospheric Connection Advisory Board. “It can be used for K-12 education as it was originally conceived, but also for teaching students at the college level.”

To view the suite of online Cryospheric Connection resources, visit <http://www.CryosphericConnection.org>.

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Pioneering glaciologist leaves legacy of research

Geophysical Institute Professor Emeritus Keith Echelmeyer died at age 56 on Oct. 2, 2010. The glaciologist, pilot, mountaineer and fighter for life passed away with his incomparable wife Susan Campbell by his side. She wrote the following in his obituary:

“During his two decades as a professor of geophysics at the Geophysical Institute at the University of Alaska Fairbanks, Keith mentored many graduate students and felt privileged to work with many talented colleagues on an array of research projects in Alaska, Greenland, Patagonia, and Antarctica. He was a pioneer in airborne laser-altimetry and used his Piper PA-12 aircraft to measure dramatic changes in Alaska glaciers. In July 2002, he co-authored an article in *Science* that highlighted the contribution of Alaska glaciers to sea-level rise and garnered worldwide media attention. Keith also worked on calving and surging glaciers in Alaska, on the world’s fastest flowing glacier in Greenland and conducted extensive research on the shear margins of Antarctic ice streams. He was featured in a Discovery Channel program, ‘Understanding Ice,’ and on the Public Broadcasting Service series, ‘Scientific American Frontiers.’

“In 2003, the international Advisory Committee on Antarctic Names honored his work by renaming an ice stream the Echelmeyer Ice Stream. Keith received the Usibelli Award for Excellence in Research at the University of Alaska Fairbanks in 2003. Receiving these awards was a humbling experience and he always appreciated the support he received from UAF and from his colleagues around the globe. As author and co-author of over 50 scientific papers in peer-reviewed journals, Keith’s work will continue to influence ongoing glacier research worldwide.”

LOSS OF A LEADER—Keith Echelmeyer, seen here paddling on a two-month wilderness trip through the Brooks Range and Alaska’s North Slope, died Oct. 2, 2010. Photo by Chris Larsen.

