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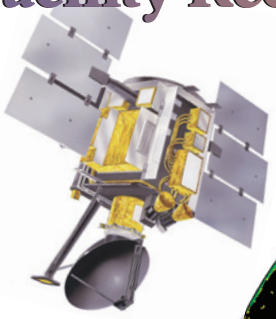
Alaska Satellite Facility Receiving Ocean Wind Data



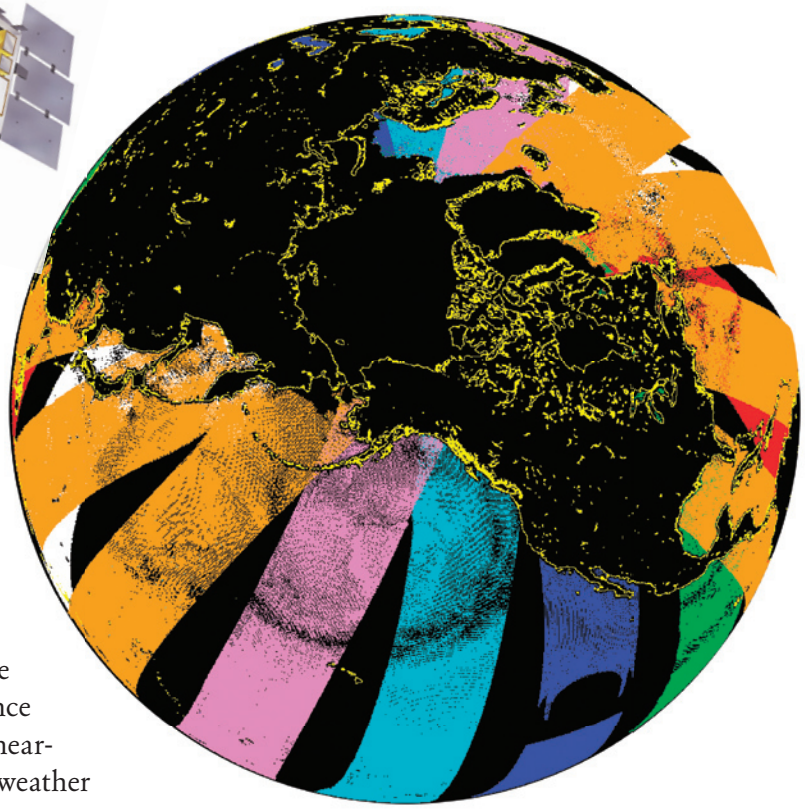
Satellite dishes on UAF's West Ridge and the Geophysical Institute's Elvey Building are receiving detailed information about ocean winds from space.

In January 2004, the Alaska Satellite Facility began receiving information from NASA's Quick Scatterometer satellite, known as QuikSCAT, which researchers use to study winds above the surface of the world's oceans.

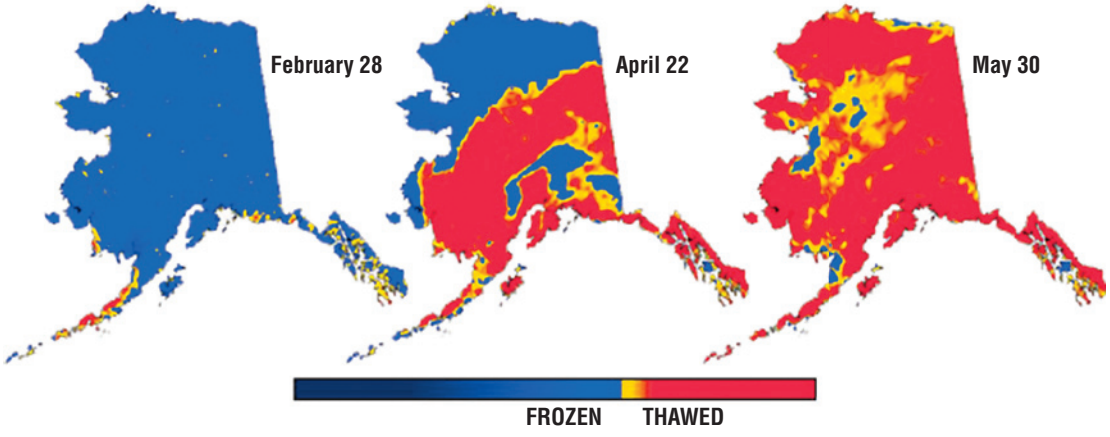
"The observations are used for weather forecasting, studying the movement of oil spills, storm detecting, and more," said Alaska Satellite Facility Director Nettie LaBelle-Hamer.

NASA launched the QuikSCAT satellite in June of 1999. The 2,134-pound satellite orbits Earth at about 500 miles, where an onboard radar scatterometer sends high-frequency microwave pulses to the ocean surface and then measures the pulses that bounce back. The specialized microwave radar can measure near-surface wind speed and direction through any kind of weather above Earth's oceans.

Researchers use QuikSCAT data for many applications. In one NASA-funded research project, called "GhostNet," data are being used in an attempt to help locate lost or abandoned drift nets that threaten fish and marine animals. Data from the SeaWinds scatterometer aboard QuikSCAT also have been used to study climate change in the Arctic.



***SURFACE WINDS**–The globe displays ocean surface winds at a 10-meter height for one day of coverage. Colored bands show orbit tracks; black patterns inside the tracks show actual wind data. Ground Station Engineer Kevin Engle produced the map in the projection from QuikSCAT data.*



***QUIKSCAT**–Data from the SeaWinds scatterometer aboard QuikSCAT were used to create these images, which show the progression of spring thaw in Alaska during 2000. Blue indicates snow and ice; yellow and red portray ice crystals mixed with water and bare ground. Similar measurements taken since 1988 indicate thaw in the Arctic has been advancing by nearly one day each year.*

UAF UNIVERSITY OF ALASKA FAIRBANKS

GI to Provide Solar Shock Arrival Times at Mars

The Geophysical Institute's aurora forecast team will soon expand the operational space weather forecast system it has developed for the Air Force Weather Agency (AFWA) to include information about Mars.

Geophysical Institute Professor Emeritus Charles Deehr, Research Associate Wei Sun, and Research Professor Dirk Lummerzheim are among the scientists who issue aurora forecasts at http://www.gi.alaska.edu/cgi-bin/predict.cgi. For years, the team has had the capability to predict arrival times of solar shock waves anywhere in the solar system.

A new demand for prediction information has arisen with the U.S. government's renewed interest in Mars exploration. Several countries have launched scientific missions to Mars recently, and during a speech in January 2004, President Bush mentioned the possibility of manned missions to Mars.

Solar flares, explosions on the sun, cause shock waves in the solar wind that often lead to great aurora. Unfortunately, these same shock waves also can damage satellites and endanger astronauts in space.

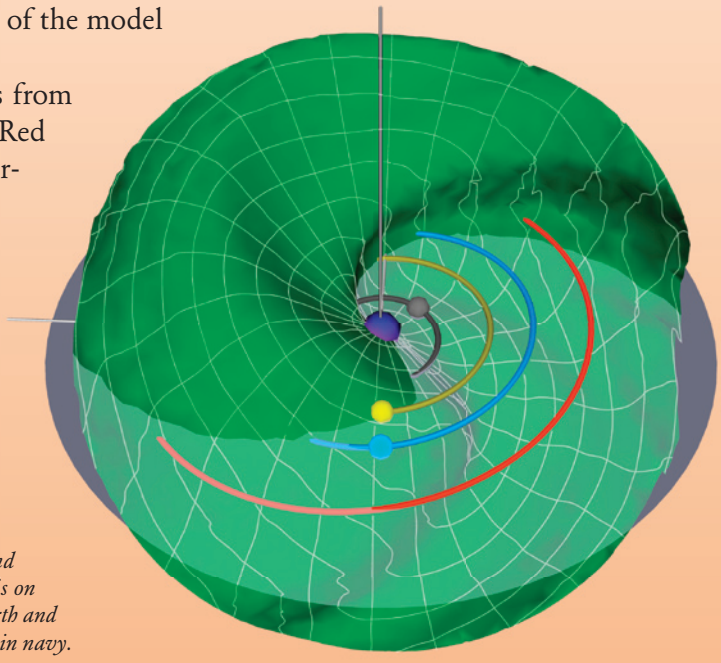
"The AFWA provides space weather information for everyone who puts a satellite up, and, at this point, the vicinity of Earth is the outer limit," Deehr said.

To predict when shock waves and the accompanying particle radiation will arrive at Mars, Deehr and the research team, which also includes experts in Colorado, Alabama, Ireland, Spain and Russia, will upgrade the operational space weather system they provided to the AFWA in 2003. The new system is based on a model developed in part by International Arctic Research Center Director Syun-Ichi Akasofu. A continuously updated graphic output of the model is available at http://gse.gi.alaska.edu/recent.

***CORONAL LOOP**–The Transition Region and Coronal Explorer spacecraft detected the "coronal loop" shown above in a NASA false-color image. Fountains of gas erupting from the surface of the sun can send shock waves throughout the solar system. An illustration of Earth has been included for scale. A Hubble Telescope view of Mars, provided by NASA, looms above.*

In addition to damaging satellites, high radiation levels from solar events would endanger any human that set foot on the Red Planet. Predictions would give space travelers two- to four-days notice of an extreme solar event.

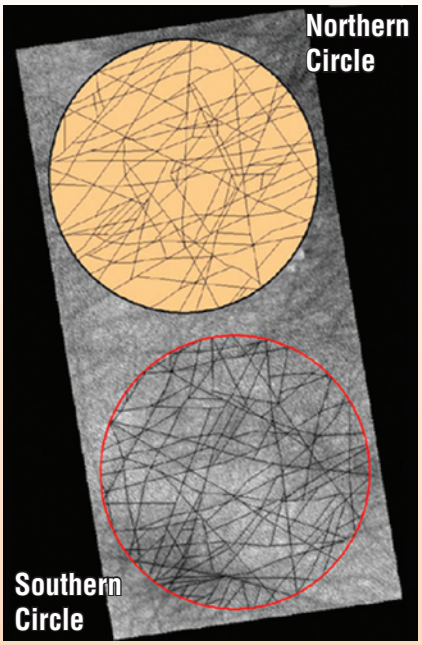
The Geophysical Institute will deliver the Mars space weather forecasts to the AFWA sometime in 2004. The project is part of the University Partnering for Operational Support Program, a Department of Defense initiative that applies basic scientific research to real-life problems.



***HELIOSPHERIC CURRENT SHEET**–The Geophysical Institute's aurora forecast team generates daily three-dimensional displays of the Heliospheric Current Sheet, graphically represented at right. The Heliospheric Current Sheet separates the north and south poles of the solar wind magnetic field and is an indicator of background solar wind, through which solar event shock waves propagate. In this view, Mars is on the other side of the Heliospheric Current Sheet, but its orbit is represented in red; Earth and its orbit are light blue; Venus is yellow; Mercury is gray; and the sun is at the center in navy.*

Planetary Science Program Expanding at GI

Coinciding with a renewed national interest in space exploration beyond Earth's orbit, the Geophysical Institute's planetary science program has expanded with the hire of a new professor. Robert Herrick, formerly of the Lunar and Planetary Institute in Houston, Texas, joined the Geophysical Institute as a research associate professor in July 2004. Herrick plans to use information about Alaska and the Arctic to better understand planets with cold, ice-bearing features, such as Mars.



***LINES ON MARS**–GI researchers believe the unusual linear features on Mars (above) are scour marks left by large dust devils.*

President's Professor of Remote Sensing Buck Sharpton, leader of the Geophysical Institute's planetary science program, said Alaska has temperatures similar to Mars' surface temperatures.

"One of my hopes is that we can convince NASA that Alaska would be an excellent test bed for Mars missions," Sharpton said.

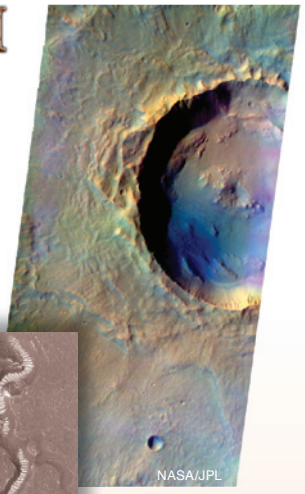
Three GI graduate students–Fred Calef, John Chappelow, and Sharon Pitiss–currently work on Mars projects. Calef studies enigmatic linear features and dark ray craters on Mars, while Chappelow is investigating the surface properties of Mars through the geometry of small impact craters.

Pitiss will soon earn her master's degree for a detailed look at satellite images of the Red Planet. Over several months, she has inventoried more than 16,000 craters on the surface of Mars within the current rover's landing site in a NASA-funded project. Knowing the density of impact craters can help determine the age and processes involved in the formation of planetary surfaces.

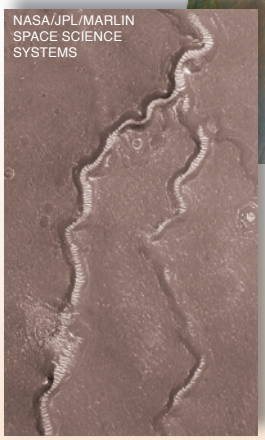
JPL/NASA/CORNELL

***BLUEBERRIES**–NASA's Mars Rover "Opportunity" revealed the tiny spheres spread over the Meridiani Planum crater floor shown above. These spheres, which researchers call "blueberries," have been identified as the mineral hematite, an iron ore.*

Other graduate students in the Geophysical Institute's planetary sciences group include Cindy Peters, who is conducting a remote sensing study of northern Siberia's Elgygytgyn crater, and Roman Krochuk, who studies the ancient Terny crater in the Ukraine.



An unknown fluid formed the light-toned, wind-blown ripples (below) in the region of Mars known as Apsus Vallis.



A thermal emission imaging system on NASA's Mars Odyssey orbiting satellite was used to produce the colorful view of a rampart crater (above).

***GEOLOGIC UNITS**–Through impact crater studies, institute scientists and graduate students determined the geologic units within the hematite region on Mars (below).*

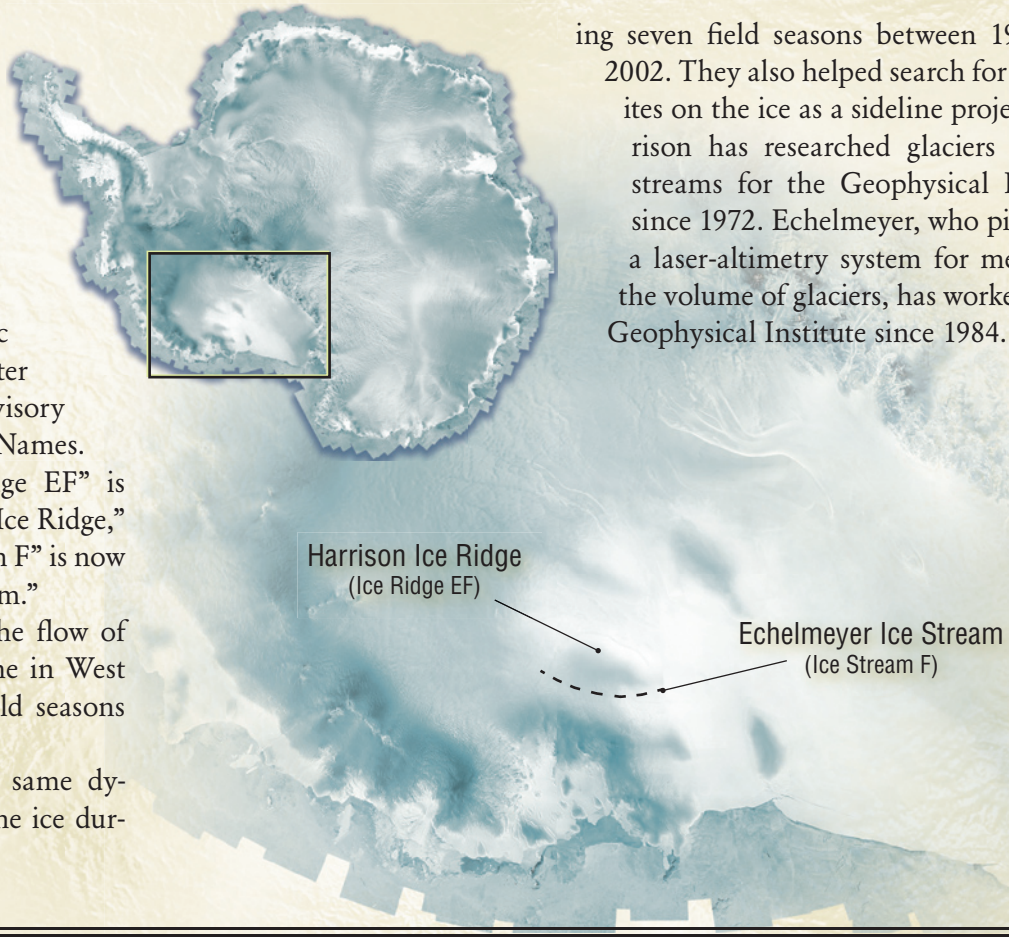
GI Glaciologists on the Map of Antarctica

Geophysical Institute Professor Emeritus Will Harrison and Professor Keith Echelmeyer now can be found on a map of Antarctica. The glaciologists and 11 of their colleagues recently were honored when Antarctic features were named after them by the American Advisory Committee for Antarctic Names.

The former "Ice Ridge EF" is now called the "Harrison Ice Ridge," and the former "Ice Stream F" is now the "Echelmeyer Ice Stream."

Echelmeyer studied the flow of ice streams on Siple Dome in West Antarctica during five field seasons between 1988 and 1995.

Harrison studied the same dynamic characteristics of the ice during seven field seasons between 1988 and 2002. They also helped search for meteorites on the ice as a sideline project. Harrison has researched glaciers and ice streams for the Geophysical Institute since 1972. Echelmeyer, who pioneered a laser-altimetry system for measuring the volume of glaciers, has worked at the Geophysical Institute since 1984.



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