Dedicated researchers are known for doing whatever it takes in the field to get the data they need. In this case, dedication meant traveling to Barrow, Alaska, in March 2004 and setting out on snow machines with an Inuit guide who kept watch for polar bears.

Reginald Muskett, a UAF Geophysical Institute (GI) doctoral candidate in geophysics, and ASF Remote Sensing Service Center Manager Don Atwood took Global Positioning System (GPS) measurements of geographical position and elevation on five frozen tundra lakes within 50 miles of Barrow. Their GPS data collection is part of a project investigating the suitability of ICESat laser altimeter data for control of digital elevation models (DEMs) in arctic Alaska. Accurate control is essential for DEMs.

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On-ground differential GPS measurements, such as those made by the researchers, have excellent accuracy. The Barrow GPS measurements taken in March were compared to elevation measurements on the same tundra lakes derived from data acquired in fall 2003 by NASA’s Geoscience Laser Altimeter System (GLAS), which is carried onboard the ICESat satellite.

GLAS instrumentation is a next-generation space lidar that combines a precision surface lidar with a sensitive cloud and aerosol lidar.

ICESat is a NASA Earth Observing System (EOS) satellite mission, launched in January 2003.

The 2003 ICESat/GLAS-derived elevations on the tundra lakes compare closely to the ground differential GPS elevations measured on those same lakes. ICESat altimetry will therefore provide high quality DEM control in this region.

More recent ICESat/GLAS elevations, derived from data acquired during February and March 2004, will also be included in the analysis after these data are processed and made available by the National Snow and Ice Data Center in Boulder, Colorado.

Comparing datasets taken over the flat, relatively uniform terrain of the Alaska North Slope is an important first step in this project. Additional verification will involve comparisons to accurate high-resolution DEMs derived from STAR3i (airborne) interferometric SAR data provided by Intermap Technologies, Inc.

In the next, more challenging phase of the project, comparisons will be...
the duration of Chang's DAR. A corner reflector, when precisely pointed at the satellite in azimuth and elevation, will appear as a very distinct bright object in the resulting imagery.

Using a Geographical Information System (GIS) with cultural, physiographic, and SAR image layers, TAMUK and ASF staff developed an approximate deployment pattern to provide sufficient spatial distribution for coregistering the image data to the GPS points. The final step in site identification was to find cooperative landowners near the proposed GCPs who were willing to host an inverted 8-foot aluminum tripod on their property for a year and a half.

Mark Beaman, a research associate at TAMUK, accomplished this via truck, foot and cell phone. With a laptop computer at his side, Beaman, a Texas native, sat down with farm owners and ranch managers, often at the kitchen table, and gave PowerPoint presentations to introduce the project. More than once, the hosts impressed Beaman with their own GIS familiarity, and shared data and shapes from their precision agriculture GIS applications.

Corner reflector panels were shipped from Alaska to Texas in March 2004. ASF Advanced Product Developer Chris Wyatt and Calibration Technician Charley Slater traveled to Texas in mid-April, where they joined Beaman and the equipment in time to install the reflectors prior to the first Radarsat-1 acquisition on April 20. Slater generated reflector-pointing parameters in the field for each reflector using real-time GPS coordinates and a laptop computer running software developed at ASF. The deployment went smoothly, and then began the waiting as the data was acquired, transmitted and shipped from the Canadian ground station, where it was downlinked, to ASF for processing.

Preliminary analysis of the SAR data collected in April and June indicates that the corner reflector ground control effort will achieve the desired improvement in geolocation accuracy. (Chang's May data was affected by the Radarsat-1 orbit anomaly.)

Five all-vinyl reflectors are visually identifiable in the slant range and ground range image data. The imagery, once calibrated and projected using ASF software, has been observed to deviate by as much as 50 m from the differentially corrected GPS data and other reliable GIS layers.

By carefully adjusting the image data to the known latitude and longitude of the GCPs, the mean planimetric error can be reduced to less than 1 pixel (12.5 m) without significant impact to the absolute radiometry. This will allow the in situ soil moisture measurements to be confidently correlated with the coincident SAR data.

The work by Dr. Chang and his students will attempt to model soil moisture at scales ranging from a few acres at calibration sites to a watershed-wide model spanning nearly 5,000 km².
News Briefs

- ASF Deputy Director Recruitment: The ASF Deputy Director position is currently open until filled; review of applicants began August 31, 2004. For more information, a complete copy of the vacancy announcement and an employment application can be obtained at http://www.gi.alaska.edu/admin/human_resources/.

- Continued ADRO Support: Beginning October 1, 2004, data credits and foreign ground station costs for ADRO projects will no longer be supported through the NASA ADRO program. However, ASF encourages investigators wishing to maintain data continuity for ongoing investigations to obtain continued access and use of SAR data through the ASF data proposal process. The ASF User Services Office staff are available to assist investigators with their pursuit of a new project data account. (Investigators need to secure their own funding for continued foreign ground station data transcription costs, which apply to data downlinked anywhere other than ASF or McMurdo ground stations.) Instructions for writing a short, two-page project proposal can be found on the ASF website at http://www.asf.alaska.edu/5_1_1.html. Contact ASF User Services via email at uso@asf.alaska.edu or by phone at (907) 474-6166.

A list of research funding sources can be accessed online at http://www.asf.alaska.edu/~rgens/rfp_specific.html. ASF welcomes your comments about any additional research opportunities; send inquiries and additions to User Services (uso@asf.alaska.edu).

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