

## FRIGID 2003 - Abstract

### Field Research Investigating Geophysical Interface Dynamics

Imagine this:

A Native American Community College from the Upper Peninsula, Michigan is working with NASA Rocket Scientists at the North Pole and people worldwide are watching them on the Internet. They're using an old NASA satellite that is uniquely able to point a 16-ft dish antenna at them and give them over 1 Mbps connectivity. Do these people, some who have never seen an elevator, believe they can Reach for the Stars – and get there? What a concept!

Here in action is a pioneering NASA program called, "You Be The Scientist". It's job – to "Inspire the Next Generation of Explorers as only NASA Can". This North Pole Project is the initiative of Bay Mills Community College (BMCC), using grants from the US Government intended to get Native Americans to realize what cutting edge technology is all about and that they too can participate. So, here they are working hand-in-hand with scientists and engineers on a floating Ice station, where they land Russian Jets and Big Bear helicopters. They're using sophisticated scientific instruments, learning to make ground truth measurements about that Ice floe to calibrate and validate satellites. These measurements are pre-requisite to using satellites to map out the entire Arctic Ocean so NASA, the National Science Foundation, NOAA and others can monitor global warming. The fragile sea ice there is the first indicator that the climate is indeed changing and fast enough to notice in a career lifetime. It's everybody's concern, so why would the Native Americans, who's ancestors have always lived in these cold regions, ignore it?

In this project, BMCC is providing the manpower to make detailed ice thickness measurements and related surface properties for this huge ice floe floating around the North Pole. They have convinced NASA and the Cold Regions Research and Engineering Lab (CRREL) to provide the expertise in the form of consultants, who defined in great detail exactly what has to be done in order for the data gathered to be scientifically useful. Radford University in Virginia are providing a scientist and instrumentation equivalent to what CRREL uses in the field when they do this kind of work for NASA and NOAA, and several other universities have been invited in to share in the learning experience.

Two similar ice thickness surveys were done this Spring in the Arctic Ocean. One was off the northern coast of Alaska (71N), and the other at the edge of the perennial ice just North of there (73N). The opportunity to have an additional survey done at ~90N was very attractive to CRREL and thus their support for this tribal school initiative. Dr Jackie Richter-Menge, Head of the Snow and Ice Branch for CRREL noted that the University of Washington, under a grant from National Science Foundation (NSF) is going to be deploying one of the CRREL buoys on this same ice floe in the same time frame. This buoy will continually provide thermal profile temperatures from under the sea ice, through the floe and into the atmosphere. This data is needed in mass balance studies, which monitor the seasonal changes in sea ice thickness year-round. Data from the buoy

will be picked up by a satellite every orbit and sent later in the day to CRREL. It will also serve to locate the Ice Floe for a year

Given that the survey is successful in late April, there is a chance that a NASA scientific aircraft operating in early May in the Arctic Ocean north of Greenland, could be diverted 600 miles to fly over the Pole site. This would be an added blessing of significant scientific value. The survey is done so that it provides "ground truth" for an aircraft carrying a laser altimeter and other instruments similar to those flown on NASA satellites. Knowing the actual snow thicknesses in the surveyed area, the aircraft instruments can be calibrated for the general area. In this way the aircraft can extend the ground truth area over a footprint large enough to calibrate the satellites. Timing is everything in this final phase and weather will play a large roll in whether or not the NASA aircraft is allowed to be diverted for this new information. However, it is a very rare opportunity and the first at the Pole, so it does merit serious consideration.

Nevertheless a new precedent could be set with this tribal college initiative. Inexpensive student labor in exchange for invaluable hands-on career experiences would benefit researchers and students alike. NASA's Minority Education Programs Office hopes that webcasting the work in progress from the North Pole via the Internet will inspire other minority schools to get involved. Senator Debbie Stabenow (D-Michigan) was so pleased with NASA-GSFC support of her WomenQuest 2001 expedition to the North Pole, that she again asked for NASA's Tracking and Data Relay Satellite System (TDRSS) to provide the connectivity, which only 20-year old the F1 satellite can. Goddard Codes 450, 420, and 567 responded on a very short notice and are showing what these engineers can do given a worthy challenge. Main line schools such as Michigan State, Yale, George Mason, Radford, and American International College jumped on the chance to send professors or students along in hopes of getting a jump on enhancing their own field school programs in the foreseeable future. Similarly the University Centre on Svalbard, a Norwegian college specializing in Arctic research is sending a graduate student along as well and will work with the other participating schools to develop a long-term program.

Ultimately the definition of success is that these schools are actually attempting such an incredible feat in the hope of inspiring their students to enter science and engineering careers. If they can add new information to the professional scientific data bases in this effort, then that will be all the more impressive.