

TAP STUDENT INTEREST BY TAPPING INTO POLAR SCIENCE

Teachers Experiencing Antarctica and the Arctic

Abstract

One of the most significant changes in science education has been the shift from the strict transmission of content knowledge to the application of knowledge and acquisition of new skills. This “new” education is dramatically enhanced if students understand how and where the knowledge and skills will be used. The experience can be even more powerful if students and teachers have the opportunity interact with scientists at work.

One of the goals of Teachers Experiencing Antarctica and the Arctic (TEA) program sponsored by the National Science Foundation is to provide a window into the life of scientists at work and to give students a chance to interact with scientists in polar regions. Each year, a small group of primary- and secondary-education teachers from around the country is selected to join researchers in polar regions. The teacher becomes a full member of the research team with the additional responsibility of reaching out to—and interacting with—as many

students as possible via online journals, webcast conferences (both archived online), and e-mail before, during, and after his or her time in the field. TEA will have a significant impact on secondary science education in districts around the country because of the classroom transfer and mentoring components required of teachers who participate in the program.

Teachers are involved in research projects in all scientific disciplines. Experiences described here relate one teacher’s involvement in geophysical research conducted at the Matanuska Glacier in Alaska using integrated near-surface seismic & ground-penetrating radar techniques to examine glacier structure and dynamics.



The sun and gravity carve the ice into stunning formations.

About TEA

TEA is sponsored by the National Science Foundation’s Division of Elementary, Secondary and Informal Education and Office of Polar Programs. TEA is facilitated by Rice University, the Cold Regions Research and Engineering Laboratory and the American Museum of Natural History.



Seracs form as a result of the interaction between the ground, ice and sun.

Field Experience

Scott McComb teaches 7th grade science at Franklin Alternative Middle School in Columbus, Ohio. He was one of 16 primary and secondary school teachers from around the country selected by the National Science Foundation to participate in Teachers Experiencing Antarctica and the Arctic program. In July 2001, he traveled to the Matanuska Glacier in Alaska to conduct geophysical research with Dr. Greg Baker, SUNY-Buffalo. They used integrated near-surface seismic & ground-penetrating radar techniques to examine glacier structure and dynamics.

Seismic reflections

To collect seismic data, researchers first laid an array of geophones along a test line. Then, they created seismic waves in the ice with staccato strikes from a sledgehammer. Seismic waves reflected off objects in the near subsurface were recorded on a portable seismograph, data which were later downloaded for more sophisticated analysis.



Researchers negotiated crevasses and ice while traveling to and from the data collection sites



An array of geophones were laid out at the second data collection site, about 2 km up the medial moraine



A sledgehammer was used to create bursts of seismic waves



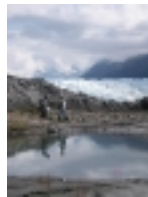
The Matanuska Glacier spills out of the Chugach Mountains.



The Matanuska Glacier lies about 100 miles to the northeast of Anchorage, Alaska



Ground-penetrating radar data was collected at various sites, here about 2 km up the medial moraine.



Ground-penetrating radar data was collected on the terminal moraine

Life in the field

Camp consisted of 3 Quansit huts, researchers’ tents, a fire pit, several outhouses and a tarp-covered frame that passed for a shower. Researchers shared camp and free time with 5 undergraduate students participating in REU and 4 employees of CRREL. The responsibilities for cooking, cleaning and shopping were shared among members of camp. Free time was used to read, play cards, swap stories or play on the ice or nearby mountains.



Life in the field offers many benefits; eating smores is one of them.



Life in the field offers several challenges; showering outside in 50° F is one of them.

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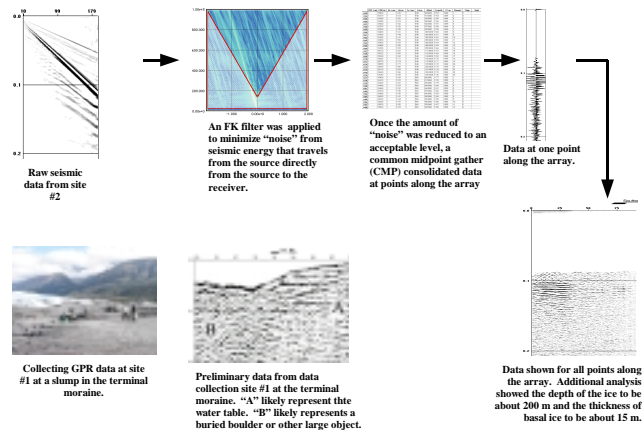
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Preliminary Data

Data were collected from two locations on one of Matanuska’s medial moraines and on two locations on the terminal moraine. Where feasible, both seismic reflection and ground-penetrating radar techniques were used. Some preliminary data are shown below.



Initial analysis of GPR data



Classroom Application

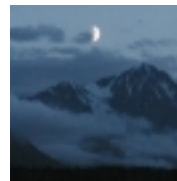
Because few teachers and students have the opportunity to go the Arctic and Antarctica to participate in scientific research, one of the teachers’ greatest responsibilities is to share the experience with others. Teachers in the field are expected to post daily journal entries to the Internet and correspond with students, using various tools to explore the development of the Transantarctic Mountains.

teachers and others via e-mail. Most are also able to organize live Internet-based interactions as well.

You can engage your students in the process of science by following TEA expeditions in your classroom.

- * Follow current expeditions to see the process of science unfold.
- * Follow archived expeditions to match the research being conducted to a specific discipline.
- * Correspond with current and former TEAs.

The TEA website also has lesson plans developed to help teachers K-16 integrate polar science into their classrooms.



1st quarter moon at midnight

2001-02 Field Season

You and your class can partake in the experience of science in the polar regions. Join the expeditions of the teachers who are going into the field this season, or look online for archived expeditions: <http://tea.rice.edu>.



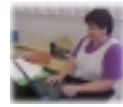
MARIETTA CLECKLY teaches at Uniondale High School (NY) and will join researchers from **Geochemical and Environmental Research Group (Texas A&M) Nov. 11 – Dec. 21, 2001** exploring the scope of human impact on the environment around McMurdo Station.



DENA GERSHON teaches at Lanai Road School (CA) and will join researchers from **Indiana University and Purdue University Feb. 1 – March 30, 2002** analyzing the impact of change on the culture, economy and identity of three Bering Strait Alaskan Inupiat societies.



JASON PETULA teaches at Tunkhannock Area High School (PA) and will join the **AMANDA Project Nov. 25 – Dec. 15, 2001** working at the Antarctic Muon and Neutrino Detector Array.



JAN FRENCH teaches at Cincinnati Country Day (OH) and will join the **International Trans-Antarctic Scientific Expedition Oct. 25 – Dec. 15, 2001** drilling ice cores to examine climate change.



SUSAN COWLES teaches at Linn-Benton Community College (OR) and will join researchers from the **College of William & Mary Jan. 2 – Feb. 6, 2002** engaging in long-term ecological research at Palmer Station.



JENNIFER CURTIS teaches at Shoules Elementary School (MD) and will join researchers from the **University of Alabama Nov. 5 – Dec. 10, 2001** using various tools to explore the development of the Transantarctic Mountains.



TINA KING teaches at West Elementary School (TN) and will join researchers from the **Wadsworth Center Nov. 2 – Dec. 12, 2001** examining seasonal changes in foraminifera communities in three locations in Antarctica.



JUANITA RYAN teaches at Toyon Elementary School (CA) and will travel to Antarctica to hunt for meteorites **Nov. 2001 – Feb. 2002**



TIM VERMATT teaches at Chenango Forks Central School (NY) and will join the **New Mexico Institute of Mining and Technology Nov. 12 – Dec. 22, 2001** monitoring volcanic activity on Mt. Erebus.

EXPLORE MORE: <http://tea.rice.edu>