

## The ANDRILL ARISE educational outreach program: Educators immersed in science research in Antarctica

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**Summary** This paper is intended to highlight the educational outreach activities of the ANDRILL Research Immersion for Science Educators (ARISE) Program. ARISE is a critical component for dissemination of information on the ANDRILL Program, the scientific process, on-going Antarctic research, geoscience content, and educational materials which help teachers, students, informal education, and the general public focus on the International Polar Year. Six science educators representing the four countries (the United States, New Zealand, Italy, and Germany) participating in the ANDRILL McMurdo Sound Project, were involved in ARISE during the 2006-2007 Antarctic field season. Working alongside scientists in Crary Lab at McMurdo Station, Antarctica, they participated in the research and shared their experiences with a range of audiences across the globe. That sharing is far from over! Each ARISE educator has developed a comprehensive outreach plan to bring curriculum materials, educational presentations/programs, and the International Polar Year to people around the world.

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### Introduction

**ANDRILL** (ANtartic geological DRILLing) is a multinational collaboration involving Germany, Italy, New Zealand, and the United States. Funding support for ANDRILL comes from the U.S. National Science Foundation; New Zealand Foundation of Research, Science, and Technology; Royal Society of New Zealand Marsden Fund; Antarctica New Zealand; the Italian National Program for Research in Antarctica-PRNA; the German Science Foundation; and the Alfred Wegener Institute for Polar and Marine Research Science. The operator for the ANDRILL Program is Antarctica New Zealand. The ANDRILL team arrived in Antarctica in October, 2006 for the McMurdo Ice Shelf Project (MIS). Their goal: to examine sediment cores drilled from the Ross Sea floor and conduct scientific research in a wide variety of science disciplines within geoscience. Approximately sixty scientists came together to look deeper into Antarctica's climate history.

### What's ARISE all about?

Six educators representing the four participating countries joined the ANDRILL MIS scientists. Working alongside scientists in Crary Lab at McMurdo Station, Antarctica, they participated in the research and shared their experiences with a range of audiences across the globe.

Their program is called ARISE—ANDRILL **R**esearch **I**mmersion for **S**cience **E**ducators. Working daily as members of science teams, the ARISE educators were genuinely immersed in current geological research. They worked side-by-side with the scientists, gathering data to share the array of stories the core had to tell. They contributed by performing a variety of scientific analyses including chemical analyses for the porewater geochemistry team, preparing microscope slides for sedimentologists, counting and classifying stones (clasts), or working as core technicians at the ANDRILL drill site laboratory. In addition, ARISE educators helped the curators scan the core and prepare microfossil samples. ARISE educators were able to integrate into two or more different science discipline teams while on the ice, which gave them more opportunities to connect with the process of science and transfer that to classrooms around the world.

In addition to immersion in the science teams, there were on-going opportunities to advance their own content knowledge in many areas of geoscience, as ANDRILL scientists gave daily lectures. The ARISE educators were welcomed into the ANDRILL scientific community as an active part of the project, and this was an excellent learning experience for educators and scientists alike. Immersion enabled educators to connect and share the scientific work being accomplished during the McMurdo Ice Shelf Project and benefited ARISE participants and those around the world who learned about ANDRILL as it took place...being able to ask questions, read daily informational blogs, and see photographs of scientists at work in Antarctica.

From a science and communication outreach perspective, ANDRILL'S ARISE program has been one of the key efforts during IPY to highlight and share the work of scientists in action. This includes professional development of educators and outreach to a broader educational community as a fundamental goal of ANDRILL. Positive outcomes from this integration extend far beyond the field season.

This is evidenced by ARISE participants working on individual educational projects targeted to specific audiences. These projects will become part of ANDRILL's contribution to the educational community. Video journals and instructional multimedia, blogs/journals, websites, presentations, and activities will be available for classroom use and informal learning through the Project Iceberg website <http://www.andrill.org/iceberg>. Since the International Polar Year (IPY) began in March of 2007, ARISE educators have been instrumental in development of educational content available to inform and inspire students of all ages about Antarctica and geologic drilling.

Though the ARISE educators come from a wide range of educational situations, they each have the goal of communicating the excitement and importance of ANDRILL's science to people beyond Antarctica. The challenge for each of the members of the ARISE team was to capture what they could of the research experience and pass it on in ways that will raise awareness of and build value for geoscience research in Antarctica. As part of the ANDRILL ARISE team, this meaningful professional development improved scientific content knowledge, provided participation in the process of science research, and gave participants the tools to carry forth the excitement of science to students and educators around the world.

The collaboration among ARISE educators continues as they work on their individual outreach efforts and work together to develop further projects, materials, and presentation possibilities to highlight ANDRILL and the work of its science discipline teams. On-going cooperation between ANDRILL scientists and ARISE participants is a key component of this outreach program. The team continually seeks to broaden the educational impact of ANDRILL, and will work closely with the new ARISE educators selected to participate in the 2007-2008 Southern McMurdo Sound Project.

### ARISE outreach methods and results

Fourteen video journals produced by Megan Berg while in Antarctica document the drilling process and science discipline teams in action throughout the ANDRILL McMurdo Ice Shelf Project. The video journals were not only shared via the ANDRILL website during the drilling season, but are now available on DVD. Topics covered ranged from drilling operations to individual science discipline teams. A comprehensive booklet of information and suggested classroom activities was written to accompany the ANDRILL video journal DVD. Each video journal provides an important glimpse into the various components that make up the overall ANDRILL scientific project. Feedback from teachers using these multimedia materials in classrooms has been overwhelmingly favorable.

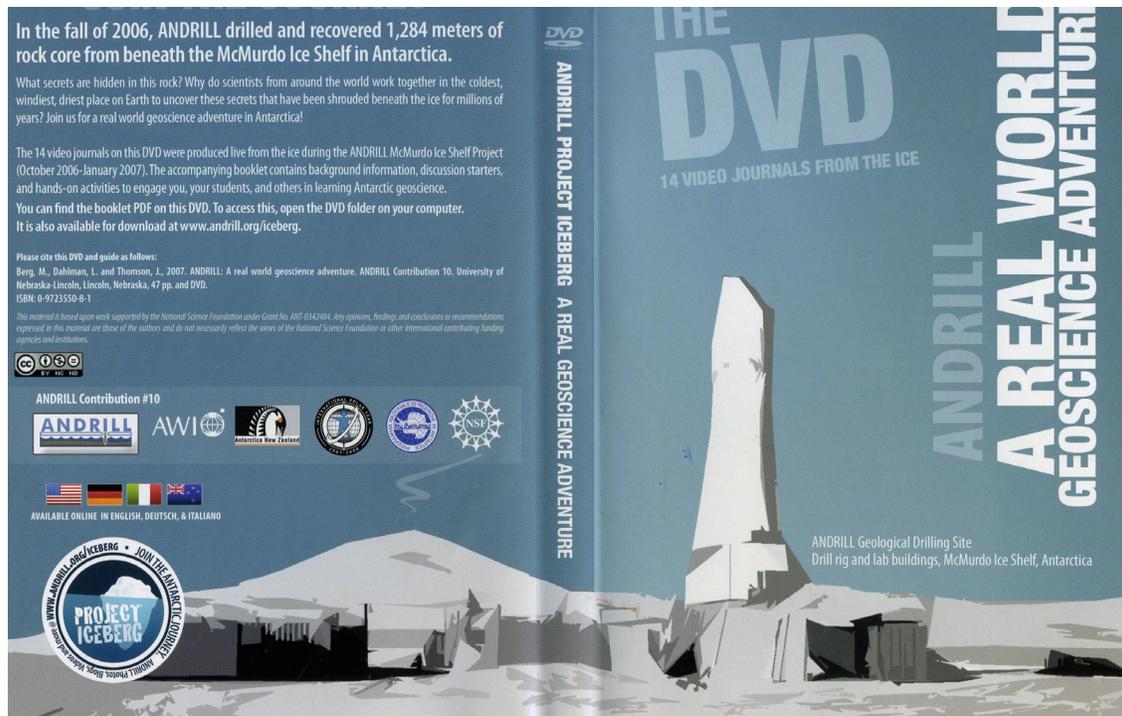


Figure 1. Example of video journal for the ANDRILL project

ARISE participant LuAnn Dahlman is developing computer-based activities for geology students and a book of hands-on learning activities. She is a Co-PI on an IPY project that will produce a NOVA documentary on ANDRILL

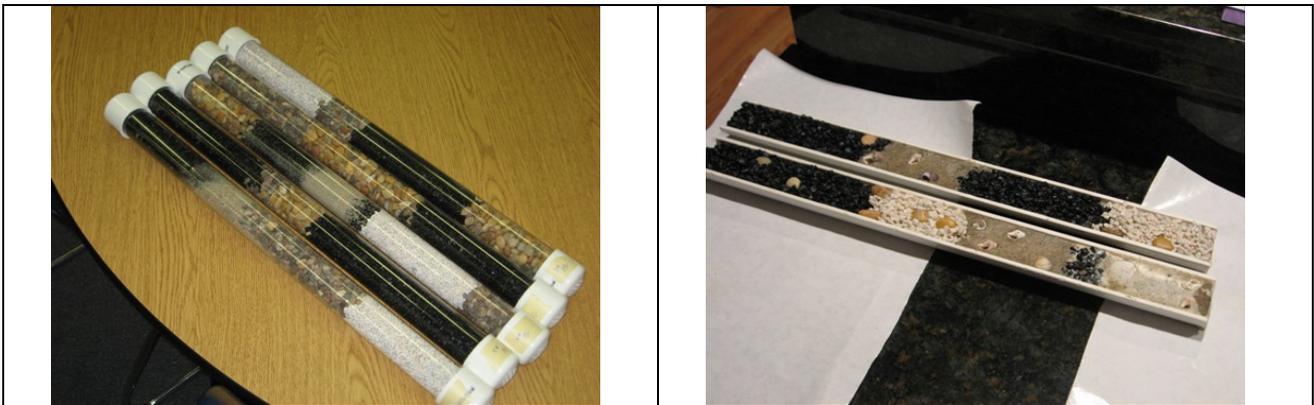
plus an innovative outreach package called the Flexhibit. The web-accessible Flexhibit content and activities will prepare youth groups to host IPY science events in their communities. The Flexhibit is designed to focus on the following topics: “meet Antarctica, ice on land and in the ocean, reading a rock core, clues from fossils, and Earth’s climate controls.” Interviews and audio files were collected throughout the field season. These will be used in podcasts as part of the Flexhibit.



**Figure 2.** Presentations by ARISE members to school children.

ARISE educators, Betty Trummel (US) and Matteo Cattadori (Italy) teamed up with Julian Thomson (NZ) to give presentations around the Christchurch, New Zealand area before heading to the ice as part of ANDRILL. Presentations have helped expand the polar learning network, and sparked interest in following the work of ANDRILL scientists throughout the MIS drilling/field season. The numerous presentations given after the first drilling season continue to promote geoscience and on-going polar research as part of IPY. Thousands of students and teachers have been reached in the four countries participating in the ANDRILL MIS Project. In addition, ARISE teachers have developed polar workshops and seminars to continue professional development for colleagues in their home countries. As ARISE teachers travel around their countries presenting the ANDRILL MIS Project, they transfer their excitement and learning to audiences of all ages.

There is a short course proposal for the National Science Teachers Association annual conference in 2008 to share the ARISE experience with an international audience of teachers. ARISE educators are producing curriculum books and nonfiction children’s books that describe ANDRILL and Antarctica for elementary, middle, and high school students. Matteo is working with Italian educators and high school students to develop projects to share not only the work of



**Figure 3.** Simulated rock cores prepared for teaching children about the ANDRILL program.

ANDRILL scientists and geoscience content, but to highlight what they had learned about living and working in Antarctica. His website provided the content and challenges that students used for their year-end projects. Thousands of educators and students have been reached with this effort.

ARISE educators are working to prepare professional development seminars on polar science and geology. Each ARISE participant is also cultivating opportunities to involve students in authentic science research. By involving local newspapers, television and radio resources, ARISE teachers continue to tell the story of ANDRILL to a broad audience. Photographs and video footage will be used to publicize the importance of scientific research on climate history. Alexander Siegmund's (Germany) media contacts are writing articles and producing documentaries that will be aired nationally on German television and radio.



**Figure 4.** Members of the ARISE team in front: Vanessa Miller (US), Matteo Cattadori (Italy) and in back Julian Thomson (NZ), Betty Trummel (US), Alexander Siegmund (Germany) and LuAnn Dahlman (US)

## Summary

Members of the McMurdo Sound Project ARISE team want to share their work with the scientific community. The multitude of educational outreach projects developed and shared as part of the ANDRILL ARISE program showcase the many exciting ways current scientific research can be highlighted in classrooms and communities during the International Polar Year and beyond.

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