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## Nebraska Earth Systems Education Network – Fall 2007

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Master's Online Course to Improve Teachers Science Knowledge  
 by Lindsey Mohlman



The Laboratory Earth series is NASA funded and a key component of the portfolio online courses integrating content and pedagogy, (the science of teaching) underdevelopment by faculty in the College of Agricultural Sciences and Natural Resources and the College of Education and Human Sciences at the University of Nebraska-Lincoln.

These graduate-level courses provide a convenient, teacher-friendly, online professional development opportunity that meets the needs of K-12 educators who wish to improve their ability to teach and understand earth science.

Dr. David Gosselin, UNL School of Natural Resources, has been the primary course developer for “Lab Earth: Earth and its Systems and Lab Earth: Earth’s Natural Resources.” Along with Gosselin, Dr. Ron Bonnstetter from the UNL College of Education and Human Sciences, Dr. Tim Slater from the University of Arizona Department of Astronomy, and Lincoln Southwest high school science teacher Sara Yendra provide critical pedagogical content and facilitation support.

“Lab Earth is an excellent opportunity for teachers to improve their content knowledge in Earth Science in a fun, convenient, hands-on way,” said Yendra. “In addition, many of the activities can be easily modified for use in the classroom providing teachers with new and innovative ways to teach earth science.”

Two quotes from past participants illustrate how lab earth can help change the way people teach science.

“It gave me insight into what science content is expected of elementary teachers and students. It gave me a more cohesive view of the various sciences.”

“The Laboratory Earth class has made me more confident with the course material that I teach my students. I have a better understanding of what is behind each concept. This enables me to better explain any questions that students have.”

For more information, contact Dave Gosselin, [dgosselin2@unl.edu](mailto:dgosselin2@unl.edu), phone (402)472-8919.

## Teacher Spotlight: Susan Frack

by Susan Frack & Lindsey Mohlman

Susan Frack was born and raised in Sidney, Nebraska, where she started her teaching. Frack has been an educator for 30 years and lives in Lincoln. She was named Outstanding Science Teacher by UNL's Chapter of Sigma and has sponsored Science Olympiad and worked with Odyssey of the Mind clubs. Also, she is currently working on her Masters degree.

**Q:** Why did you decide to become a high school science teacher?

**A:** "I always found science exciting and interesting and I wanted to pass that excitement on to students. I also think that science fields are very important and I want students to consider them for career choices."

**Q:** Why are you connected with NESEN?

**A:** "I have been a part of NESEN since its conception! All teachers need a network of other teachers in their field to discuss methods, ideas, and new subject knowledge. NESEN is a way for earth science teachers to do this. It also keeps us in touch with professionals and cutting edge science news/knowledge."

**Q:** What made you interested in science?

**A:** "I have always been interested in science. I always remember watching the space missions on TV as a child and being totally fascinated with them. Astronomy is my favorite topic"

**Q:** What is your favorite teaching technique?

**A:** "I believe that variety keeps the class from getting boring. Students never know what to expect. I use the layered curriculum approach in which some activities are required and others are free choices. Students must do at least one



performance-based activity to get an A."

**Q:** What's your favorite classroom memory?

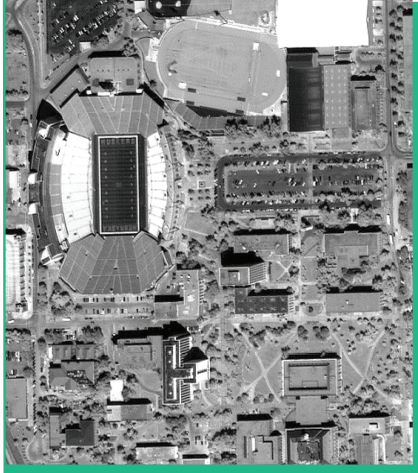
**A:** "My favorite experiences have been using the simplest equipment like balloons, toy cars, and styrafoam meat trays. Students can make the coolest balloon racecars and have so much fun!! They can always think of something new to do. Even the girls get into this activity. They always want to challenge each other to races and make up different stunts do with the cars. Another fun activity is paper airplanes. It's cheap and kids love to make them."

**Q:** Just a side quote.

**A:** "I have been teaching for 30 years and never felt like my job was a "chore". I always want to come to work and hate to be absent!"

## NebraskaView: A Resource for K-16 Educators

by Milda Vaitkus



NebraskaView is part of AmericaView a nationwide U.S. Geological Survey (USGS) program. The program focuses on geospatial data and technologies in support of

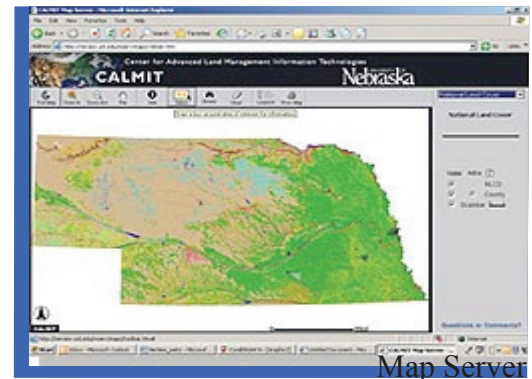
outreach, K-16 education, workforce development, applied research, and technology transfer. In Nebraska, this program is administered by the Center for Advanced Land Management Information Technologies (CALMIT, <http://calmit.unl.edu>) a part of UNL's School of Natural Resources.

NebraskaView's mission is to ensure that Nebraskans (e.g., state and local agencies, K-16 educators) make the greatest use of geospatial data products (such as satellite images, digital aerial photographs, and other geospatial data) and technologies such as geographic information systems (GIS).

Through NebraskaView, CALMIT provides access to geospatial data, conducts training and applied research, offers assistance in applications development, and fosters technology transfer.

Outreach activities have included displays at the Nebraska State Fair and the Nebraska State Office Building. Educational programs, such as short courses and web training, are periodically offered through NebraskaView and can be arranged for groups of six or more. NebraskaView also provide consultation, educational resources and links to free software.

CALMIT has developed a site for archiving and disseminating datasets ([http://calmit.unl.edu/calmit/data\\_maps.php](http://calmit.unl.edu/calmit/data_maps.php)) that provides a central clearinghouse for locating data, a map server for users to make and print maps, and links to additional sources of geospatial data.



For more information contact:  
Milda Vaitkus ([mvaitkus@unl.edu](mailto:mvaitkus@unl.edu)) or  
James Merchant ([jmerchan@unlnotes.unl.edu](mailto:jmerchan@unlnotes.unl.edu))

\*Images courtesy of Milda Vaitkus

## Mueller Planetarium Goes “Fulldome”

by Jack Dunn

Lincoln’s Mueller Planetarium entered a new “Universe” on June 1, 2007, when The Planetarium Theater began presenting shows in the “fulldome” format on a regular basis. Mueller is the first fulldome planetarium in Nebraska. The closest public planetariums utilizing this exciting immersive format are in Denver, Wichita and Chicago.

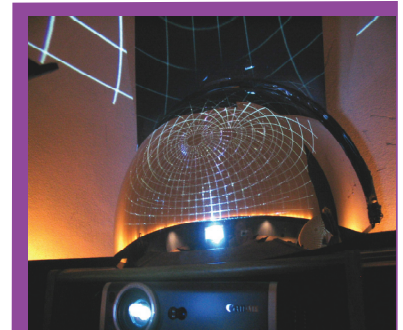
Mueller can still use its star projector to represent the night sky, if that’s what is needed for instruction, but the fulldome digital technology wraps audiences in images that cover the entire 31 ft. diameter dome. It’s now possible to fly through the stars like the Star Ship Enterprise and visit other solar systems and galaxies. Since it is a digital computer graphics system, what you see is limited only by the imagination of those who program it.

Planetarium Coordinator Jack Dunn says “This is the single biggest change and/or advance in the planetarium since it opened 49 years ago. It simply has to be seen for you to comprehend the difference it makes.” Dunn said that the new fulldome shows go far beyond just astronomy in subject matter. He is most proud of the fulldome show “Origins of Life,” produced by Mirage 3D of the Netherlands. “Robin Sip, the show’s producer, spent two years of his life and financed ‘Origins’ on his own because he believed in the project. I think every bit of that shows up on the dome.”

For more information, visit the Planetarium’s website at <http://www.spacelaser.com>. Jack Dunn can be reached at [jdunn1@unl.edu](mailto:jdunn1@unl.edu) or phone (402)472-2641.

“Origins” is the story of the earth’s natural history. It takes you under the sea, back to the big bang, through planet-building, the beginnings of life on earth and out into space. Highlights include a flight through DNA and over Mariner Valley on Mars.

The installation of fulldome at Mueller is made possible because of collaboration between Dunn and Paul Bourke of the University of Western



Australia’s “WASP” project at Perth, Australia. The fulldome format goes back to about 1999, but it was Bourke who developed the type of projection system used at Mueller. This system uses a spherical mirror to achieve fulldome coverage and special software written and designed by Bourke to shape the projected images on the dome. Bourke calls the system “Sphemir.” Mueller is the first permanent planetarium in the U.S. to be using Sphemir on a regular basis. Dunn’s role as collaborator is to spread the information on assembling a Sphemir system to other U.S. planetariums.

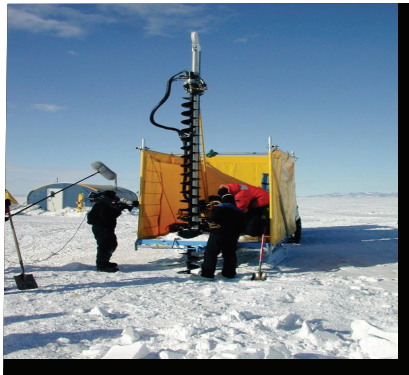
Imagine falling into a black hole, having underwater adventures, or learning about the search for new planets in an environment that surrounds you in three dimensional state-of-the-art graphics. That’s what it’s like to visit Mueller Planetarium.

\*Image: A test grip on the mirror combined with the image of the theater (courtesy Mueller Planetarium)

**ANDRILL**  
**Antarctic Geological Drilling**  
 by Frank Rack

ANDRILL is a multi-national collaboration of scientists, drillers, students, and educators from Germany, Italy, New Zealand, and the United States. There are two current projects, the McMurdo Ice Shelf (MIS) Project, which conducted drilling/coring operations in 2006-2007, and the Southern McMurdo Sound (SMS) Project, which will conduct drilling/coring operations in 2007-2008.

Future drilling projects are in the planning stages, with geophysical and environmental site surveys being conducted or proposed for international review.



Primary accomplishments of the McMurdo Ice Shelf (MIS) Project (October 2006 to January 2007) included the

first deployment and use of an integrated scientific drilling and coring system through an ice shelf (approximately 85 meters of ice) floating 850 meters above the seafloor.

This system recovers nearly 1285 meters of sediment and rock core for use in scientific investigations. The total depth of penetration, below the seafloor at the drill site, was a new record for Antarctica (e.g. the previous record was 999.9 meters below the seafloor in Prydz Bay, in the Indian Ocean sector offshore Antarctica).

The percentage of core recovery relative to the total depth drilled was more than 98 percent. In addition, core quality is excellent. Scientists will be studying these cores for years to tease out the story of Antarctic glacial history and environmental change over the past 10 to 13 million years.

In October 2007, the ANDRILL SMS Project will drill from a sea ice platform to recover sediment and rocks as deep as 1000 meters, having an anticipated age of 17 million years. The SMS Project team will be led by Dr. David Harwood, UNL Department of Geosciences, and Dr. Fabio Florindo, National Geophysical Institute, Rome, Italy.

ANDRILL has established an immersion experience for science educators (ARISE – ANDRILL Research Immersion for Science Educators) to facilitate developing of mechanisms and materials to connect ANDRILL with the public and to contribute to the professional development of the educator participants. The program provides science educators with an inside view of ANDRILL, engages them in authentic Antarctic geosciences research, and utilizes their expertise in education to develop and implement innovative approaches to geoscience education and public outreach. Elements of the ARISE program include both on- and off-ice research experiences.

\*Images courtesy of:  
<http://andrill.org/album/Site/science.html>

During each ANDRILL project a group of educators joins the science team at McMurdo Station in Antarctica. Each educator becomes a member of a science discipline team and is immersed in scientific investigation of the sediment/rock core samples and accepts many of the same responsibilities as the other science team members.

Participating science educators gain valuable insight into the nature of large multidisciplinary international science projects. Educators experience authentic scientific inquiry as the ANDRILL scientific discipline teams generate data from the core, integrate data and work together to develop and debate interpretations, and establish a history of environmental and climatic change in Antarctica. In 2007, five U.S. educators and one each from New Zealand, Italy and Germany will participate in the ARISE program.

Science educators maintain communication and collaboration with their scientific discipline team members and classrooms off the ice, and continue to study data and material collected on the ice after their field experience to develop educational activities and conduct outreach to classrooms and museums.



**The ANDRILL Science Management Office**

The ANDRILL Science Management Office (SMO), located in Bessey Hall at the University of Nebraska-Lincoln, leads the strategic planning effort and provides general management for the ANDRILL Program, as well as working to achieve goals related to research, education, and outreach. Dr. Frank Rack executive director of SMO and Dr. David Harwood is research director.

The ANDRILL staff members (Dr. Richard Levy, Laura Lacy, Charles Augustyn, and Rachel Anderson) are an incredibly talented



group of individuals who work together to achieve outcomes that far exceed the relatively small size of our team. The SMO staff take care of all of the U.S. participants in ANDRILL, facilitate joint planning with international partners, work with Raytheon Polar Services Corporation to coordinate logistics for each project, conduct education and outreach activities - including ARISE and Project Iceberg - that require the development of resources such as posters, banners, brochures, videos, presentations, press releases, web pages, and other materials for professional meetings and public events, and much, much more.

For more information contact:  
 Frank Rack, at [frack2@unl.edu](mailto:frack2@unl.edu) or phone  
 (402)472-4785. Online at <http://andrill.org>



## Toyota USA Foundation Grant to UNL will Promote K-12 Science Education

UNL Office of Communications

The University of Nebraska-Lincoln is the recipient of a grant from the Toyota USA Foundation to help fund development of a collaborative interdisciplinary online master's degree program for K-12 science teachers across the U.S.

Awarded over four years, the \$540,345 grant will help build the online master's program, develop curriculum and courses, recruit and retain teachers to participate and evaluate their progress. Collaborating at UNL are the College of Agricultural Sciences and Natural Resources and College of Education and Human Sciences, and Extended Education and Outreach.

Course tools include textbooks, homework, computer software, examinations, and online discussions with instructors and other teachers, as well as evaluations.

The advantages of the UNL approach is that teachers can participate in the class when and where it is most convenient for them, making a master's degree accessible for teachers in underserved rural areas, and those unable to travel to a college or university location.

"The grant from Toyota USA Foundation will provide an opportunity to create a collaborative interdisciplinary online master's program to more effectively integrate science content and pedagogy into course offerings," said David Gosselin, co-director on the grant. "We have many of the pieces for the professional development program.

We strongly believe that as a teacher's knowledge grows, so does their student's, and that is what it is all about." According to Gosselin, "Elementary teachers are often cited as the most important single influence on the long-term attitudes of their students toward science.

In Nebraska, for example, there are approximately 14,600 elementary teachers who are responsible for the education of 151,400 K-5 students." Yet, these teachers may have had only minimal academic preparation in science. Other teachers to benefit would be pre-service elementary education majors and home-school instructors.

"By making its science education program accessible online, UNL is providing hundreds of teachers across the country a chance to improve their own skills in this important area, and in turn, enhance the teaching they provide for thousands more students," said Patricia Pineda, group vice president, legal, philanthropy and administration at Toyota Motor North America. "We're thrilled to help make this program available through UNL and are certain it will help engage students and pique their interest in science education."

The Toyota USA Foundation is a \$42 million charitable endowment created to support K-12 students and their teachers with an emphasis on mathematics and science. For additional information about the Toyota USA Foundation, visit [www.toyota.com/foundation](http://www.toyota.com/foundation).

For more information contact:  
Mira Sleilati, Toyota Motor America Inc.,  
[msleilati@tma.toyota.com](mailto:msleilati@tma.toyota.com)





## For More Information Future Newsletters

### What is NESEN?

The Nebraska Earth Systems Education Network (NESEN) is a program within the School of Natural Resources (SNR), Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln. NESEN's goal is to improve linkages between K-12 educators and earth science resources.

For more information about NESEN, contact Dave Gosselin, NESEN director, (402-472-8919) [dgosselin2@unl.edu](mailto:dgosselin2@unl.edu); or Lindsey Mohlman, NESEN project assistant, [lmohlma2@bigred.unl.edu](mailto:lmohlma2@bigred.unl.edu).

The NESEN Newsletter is coordinated by Lindsey Mohlman, and edited by Steve Ress, UNL Water Center. Please send your earth science-related news items and announcements for inclusion in our next issue to [lmohlma2@bigred.unl.edu](mailto:lmohlma2@bigred.unl.edu). Deadline for submission of material for the Spring 2008 issue is March 15, 2008. Hard-copy can be mailed or faxed to:

NESEN  
%School of Natural Resources  
Hardin Hall  
3310 Holdrege Streets  
University of Nebraska-Lincoln  
Lincoln, NE 68583-0961  
Phone (402)472-3471  
Fax (402)472-2946