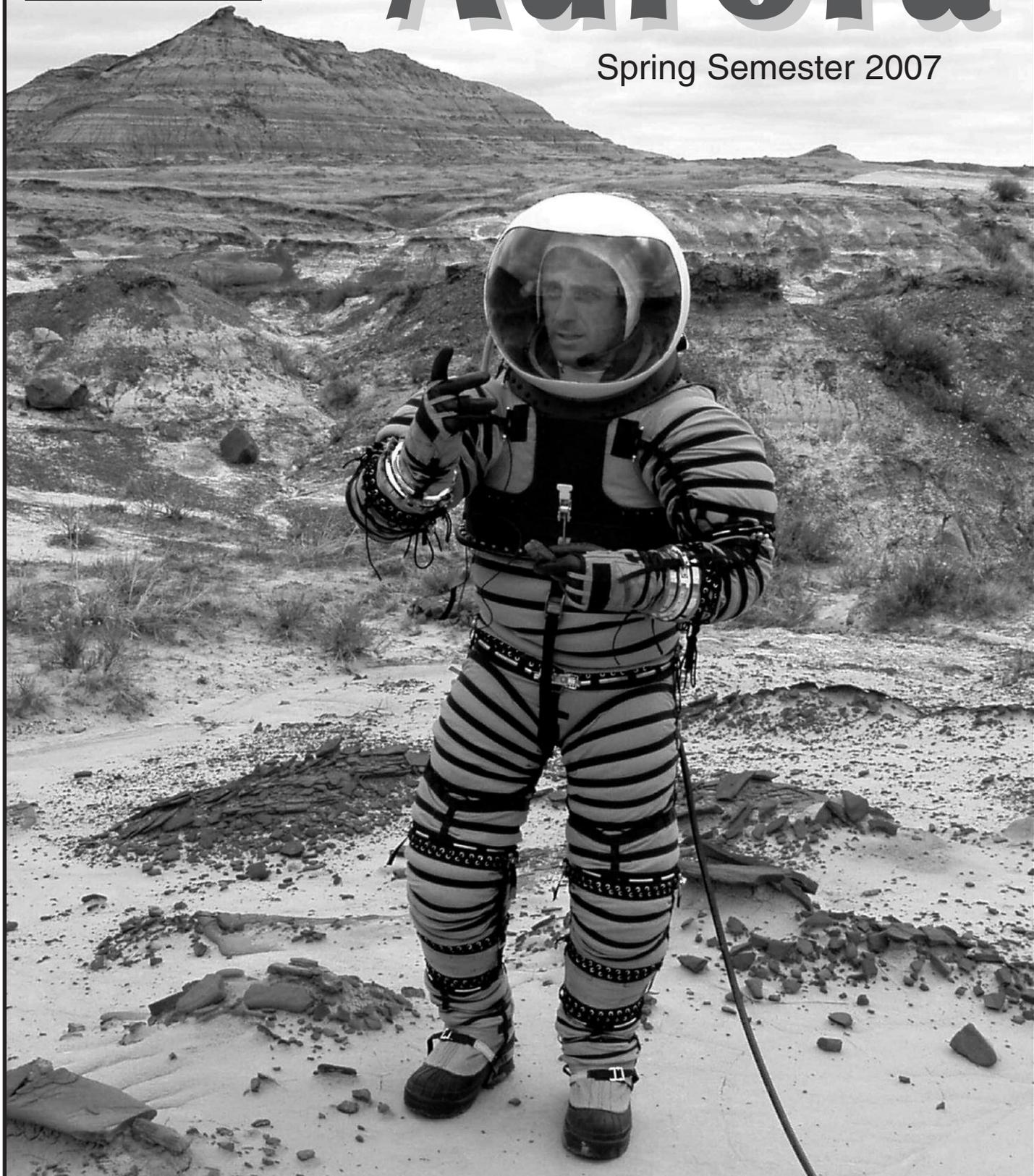




The Aurora

Spring Semester 2007





Letter from the Interim Director

North Dakota Space Grant Consortium

University of North Dakota

North Dakota
State University

Dickinson State University

Mayville State University

Minot State University

Valley City State University

Cankdeska Cikana
Community College

Fort Berthold
Community College

Sitting Bull
Community College

Turtle Mountain
Community College

United Tribes
Technical College

Bismarck State College

Lake Region State College

Minot State University—
Bottineau

North Dakota State
College of Science

Williston State College

Grand Forks Herald

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Cover Photo: The NDX-1 (North Dakota Experimental-1) Planetary Space Suit funded by the North Dakota Space Grant Consortium.

Greetings to all ND Space Grant affiliates, faculty, staff, students, and friends! Today is May Day and I can't help but view our Consortium and its activities in a "Spring-like" fashion. Things are a-changin', life is re-emerging and, much like Spring, your ND Space Grant Consortium is re-emerging with ideas, programs, and vigor that will hopefully benefit North Dakota students and faculty, as well as NASA research and education in this state.

Although I have met some of you, introductions are in order. My name is Paul Hardersen and I am currently the interim director, having replaced Shan de Silva who moved to Oregon last autumn. I have been an assistant professor at UND since Fall 2003, have lived in Grand Forks since 2001, and primarily teach and conduct research in the areas of observational astronomy, planetary science, asteroids, and T Tauri stars. Besides leading ND Space Grant and ND NASA EPSCoR, I also manage and maintain the UND Observatory and am working to build our university's astronomical research capabilities, primarily with the addition of modern, Internet-controllable observatories.

As we all know, North Dakota is not the center of NASA research, so one of our primary goals -- for both Space Grant and EPSCoR -- is to systematically increase the quantity and quality of NASA research in our state. This is a long-term goal, but our strategy is to focus on a few select research areas; areas where an emerging capability is already apparent. The NDX-1 Planetary Space Suit project, led by Pablo de Leon, is a wonderful example of multi-college involvement for faculty and students. We plan to continue and promote efforts such as this. Another focus area is research astronomy.

Another activity, somewhat less formal, is an effort to better publicize NASA, space science and exploration missions, and space career opportunities in North Dakota. This is mostly for college students, but is also relevant to the general public as it is very important to educate and inform people about NASA and its activities.

We hope to begin new research efforts and we would like many of those projects to be collaborative in nature. We want to educate students and their families about the excitement of space exploration and science. We need a strong collective effort to show that space exploration is relevant to the average citizen and that North Dakota has the vision, inspiration, and energy to develop innovative and sustainable NASA-relevant projects that can utilize the capabilities of our citizens.

I look forward to working with all of you in the months and years ahead. Don't hesitate to contact me anytime to discuss the Consortium, our projects, and future direction. A vital, ongoing dialogue should be one of the strengths of our organization.

Ad astra,



Dr. Paul Hardersen

NDSGC Scholarships



NDSGC Scholarships for Fall 2006

NDSGC scholarships are given annually to students at each of the four-year, two-year and tribal colleges in North Dakota. These scholarships are given to those students who have displayed a particular interest or ability in an area of science or mathematics, who have at least a 3.00 grade average and who are American citizens.

Minot State University

Jack Carraher
Paul Dennis
Darron Fry
Maria Olson
Abby Schafer
Rebecca Schommer
Tina Webb

Lake Region State College

Stephanie Leppert
Ronda Pedeliski
Cassandra Axdahl
Melissa Hoffman

Cankdeska Cikana Community College

Heather Joshua
Angela Hook
Robert Thompson, Sr.

Williston State College

Steven Teske
Maria Pillado
Kirsten Haverlock

Valley City State University

Donald Anton
Marcie Bata
Trent Douglas
Andrew Hager

United Tribes Technical College

Alex Azure
Ronald Campbell
Evan Hawk
Keith Hawk
Michaele Lindeman
Richard White

Bismarck State College

Michelle Richard
Stephanie Seeger
Kimberly Zins

Dickinson State University

Nicholas Burgess
Ashley O'Connor
Tracy A. Greff
Samuel Sticka

Mayville State University

Erika Anderson
Charlotte McMullen
Jordan Williams
Jordan Karlstad
Brandon Schafer

North Dakota State College of Science

Levi Moxness
Forrest Sauer
Matthew Vetter

Minot State University—Bottineau

Lukas Wagner
Joanne Vandal
Tyler Berger

Sitting Bull College

Dylan Jones



Andrew Hager (above)
Valley City State University



Trent Douglas (left)
Valley City State University



Donald Anton (above)
Valley City State University

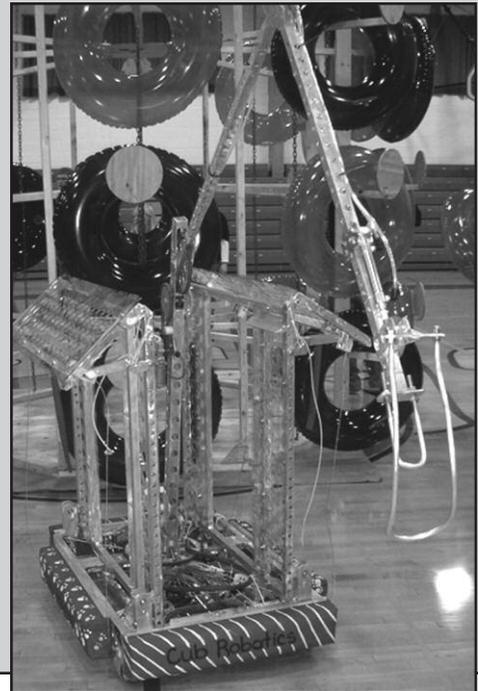


FIRST Robotics

The North Dakota Space Grant Consortium provided partial funding for four FIRST robotics teams in North Dakota in fiscal year 2006. Those teams were from Hatton-Northwood, Rugby, Cando and Surrey High Schools.



Cando Robotics Team



Cando Robotics team members that participated at the FIRST Colorado Regional Robotics Competition at Denver, Colorado were Kyle Murchie, Katie Swenson, Derek Johnson, Bobby Wolsky, Whitney Schaefer, Sarah Pederson, Randy Hunt, Josh Haugen, Nicole Larson, Tanner Aufforth, McKenzie Beck, Dani Miller, Lucas Holien, Adam Jorde, Amy Swenson, Jill Laturnus, Jordan Sifuentes, Doug Lee and three foreign exchange students, Paul Rohrbeck, Soo-Jin Choi and Janine Hartick.

The Team 877 mentors were Dave & Marie Wolsky, Bruce Gibbens, Tom Belzer, Travis & Greg Westlind, Chuck & Faye Dunnigan, and Bruce & Wanda Olsen. A former 2005 Team 877 team-captain, Nathan Gibbens, joined the team at Denver to help advise the students on scouting and driving strategies. Several parents assisted with the design and building of the robot and the field rack and, of course, the fund-raising efforts.

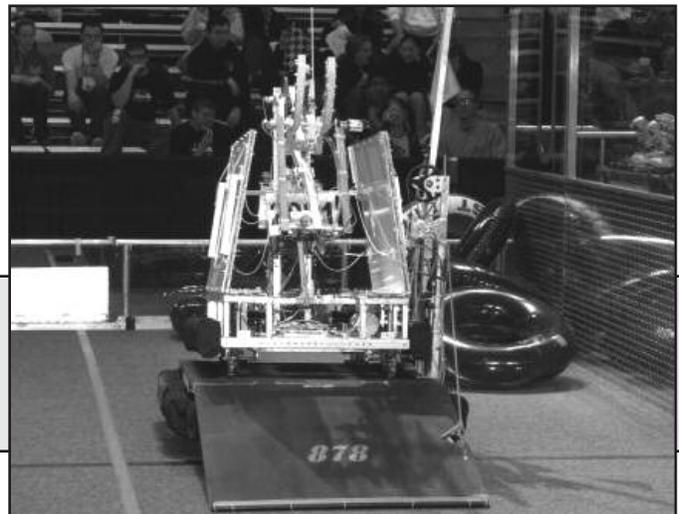
Of the 45 teams that competed in the finals, Cando ranked 18th.

"My experience of building this year's robot was a fun time that I will always remember. This year, I did more building and other hands on stuff than I have in previous years. I think my fellow members also did more and that made it easier for everyone. The experience of working with all the different machinery, tools, trying to figure out how something works, and how to essentially just build a robot that will run and do what we want it to do was a hard task, but I helped get it done and that feels good. My experience in the FIRST Robotics in Cando will help me in my future by challenging me to use my mind to think of what I need to do to overcome a challenge that has been put in front of me."

*Randy Hunt Jr.
Cando High School*

Rugby Robotics

The Rugby Robotics team #878 finished 16th at the Regional competition. Only a controversial ruling prevented them from placing 9th.



FIRST Robotics



Hatton-Northwood Robotics Team

Seniors: Dennis McVeigh; Chelsea Stone; Alyssa Aaland, Alicia Brereton; Chad Severinson and Kamonchanok Anamahaphong. Juniors: Matthew Bahr; Jenna Engen; Jenny Holte; Mark Aamold; Alex Lider; Marin Aamold; William Pankratz; Casey Kemp; Phillip Bumgartner and Adam Swenson. Sophomores: Mike Voeller; Sophie Hoge; Callie Berg; Michael Todd; Dylan Zimprich; David Carpenter; Eva Almonza; Jacob Gunderson; Allison Aaland; Tim Evanstad; Mike Moore; Dani Gorres; Rami Carlson; Kirk Sanders and Erik Lee. Freshmen: Myles Leschied; Chelsea Engler; Kaitlyn Giles; Katelyn Haugen; Jozette Hillebrand and David McVeigh. Adults involved: Dave Hedland; Ray and Laurie Aamold; Ed Wheeler; Mike Voglewede; Tom and Jane Engen; Tim Skjoiten; Robin Holte; Ben Thorsgard; Justin Nygaard; Joan Bahr; Jim Ostlie; Russell Hoge; Rich Altendorf; Scott Ness and Gerry Uglen. The Hatton-Northwood 2007 robotics team was very successful at the Regional competition and was chosen to compete in the World championship competition in Atlanta, Georgia.

Surrey Robotics Team

In 2006 students and mentors at Surrey High School were unable to raise enough money to continue the FIRST Robotics program. However, a former mentor from Surrey working in Loveland, Colorado, was organizing a FIRST team there and asked the Surrey robotics team to mentor it. So for that season, Surrey High School became a part of the Loveland High School team. The students from both schools worked together over the phone, Internet and through video conferencing to plan and build a robot. At the Regional competition the two schools brought the parts of the robot and put it together and then competed as one team. And the joint team was chosen as a seed for the World competitions! The Surrey-Loveland FIRST Robotics teams finished 50th out of 72 teams at the national event. 2007 found the Surrey robotics team with a renewed sense of purpose. The team traveled to Las Vegas, Nevada for the Regional competition where they placed 23rd out of 52 teams.





North Dakota Experimental-1

Prototype Space Suit for Future Astronauts Tested in Badlands

By Juan Miguel Pedraza and David Bullock
Reprinted with permission from University Relations,
University of North Dakota

The first astronaut to land on Mars may wear a special suit designed by University of North Dakota aerospace engineer Pablo de Leon and built in part by students.

A student "astronaut" donned the suit in May and put it through its paces in the Mars-like dusty North Dakota Badlands. Those efforts netted prominent global media coverage of the event and articles in top national science and technology magazines.

The suit's primary test subject (or "model," as he preferred to call himself) was Fabio Sau, an Italian attorney and Space Studies policy student who recently received a master's degree in Space Studies at UND.

Formally the University of North Dakota-National Aeronautics and Space Administration (NASA) Planetary Space Suit Design Team, the group is led by Argentine-born de Leon, who helped to design several experimental space suits. De Leon manages the North Dakota Experimental (NDX-1) Planetary Space Suit Project, which includes students — some of whom have already scored space-related jobs at NASA and in the space industry — and faculty advisors from UND, North Dakota State College of Science, Turtle Mountain Community College, North Dakota State University, and Dickinson State University.

The project is part of a \$100,000 NASA Workforce Development grant awarded to UND and the North Dakota Space Grant Consortium to build a prototype for the next generation of planetary suits that NASA will need to realize its Vision. Several patents have already been applied for.

"College students in North Dakota can do amazing things. This project showcases this local talent with a cutting-edge, high-tech project," said Shan de Silva, former chair of the Department of Space Studies in UND's John D. Odegard School of Aerospace Sciences. A volcanologist who recently accepted

a position elsewhere, de Silva also was director of the NASA North Dakota Space Grant Consortium.

"A lot of people thought we were crazy to undertake this project," said de Silva. "But its success unequivocally testifies to the hard work, perseverance, creativity, and ingenuity of North Dakota's young people."

The UND-led project aimed to economically and quickly produce a suit that could be used in the rough surface terrain on Mars, where gravity is about one-third that of the Earth. The team's effort was widely noted. Four-time Space Shuttle astronaut Thomas Jones, writing in *Popular Mechanics*, pointed out that the UND-led effort resulted in a suit that cost just \$100,000 to build — and it was accomplished in just 14 months by a team of mostly undergraduate students from the five North Dakota colleges and universities.

Building the suit required a lot of new engineering with new materials. But it also demanded a look back at designs, methods, and technologies developed in the slide-rule era of the Mercury, Gemini and Apollo space programs.

"A space suit is essentially a self-contained spacecraft," said de Leon, the author of several Spanish-language texts about aerospace engineer-



UND graduate student Fabio Sau tests the flexibility of the prototype North Dakota Experimental-1 Planetary Space Suit. This Badlands setting near Fryburg, N.D., provided terrain similar to that which might be encountered by explorers on the surface of Mars.

(NDX-1) Planetary Space Suit



The NDX-1 Space Suit was tested for five days in the Mars-like terrain of the North Dakota Badlands. A four-minute videotape of the test can be accessed at www.space.edu/spacegrant/research.html.

ing. "It has to be rugged and able to withstand all kinds of punishment. But it also has to accommodate the kinematics of human movement."

In other words, de Leon explains, an astronaut has to have maximum mobility while wearing this lightly pressurized suit. "Without this specially designed flexibility, the pressure inside the suit would make it so rigid that you couldn't move at all. The

pressurized suit becomes hard as metal."

"But it's not rocket science to build it," said de Leon. "What it takes is a lot of very painstaking work. Really, it's more of an art than engineering."

For example, all of the composite parts, including the molds for components such as the suit's torso, were fabricated by hand by a team of UND students. A protective outer layer was built by a UND Theatre Arts garment expert.

The new space suit, which is actually made up of several layers, is woven from a reinforced, highly tear- and flame-resistant fabric that currently costs about \$70 a yard. This material, manufactured by a U.S. company, also is used in applications such as fire-fighting gear. The suit is outfitted with a light rubberized fabric bladder system coated with latex in a process that was developed at UND by de Leon and his team.

"With this suit, we are opening at UND a new field of research and development. We'll be ready when NASA decides to go back to the Moon, to Mars, or elsewhere," said de Leon.

The prototype NDX-1 Mars space suit was prominently featured in the August issues of *Popular Science* and *Popular Mechanics* magazines, both notable for their coverage of forward-looking science and technology projects.

"This was absolutely tremendous," said de Leon. "This kind of notice tells us that we're onto something big, and the fact is, we're the only university that has actually built one of these Mars prototype suits. The others are still 'virtual' suits."

De Leon sees lots of exciting times ahead for UND space suit researchers and students.

"With this venture, we have clearly established our capabilities, our skills, our expertise. The idea is to establish a center for suit expertise at the University of North Dakota," he said. "I can tell you that since the stories about the space suit hit the Web, we've fielded dozens of calls from the media, space studies professionals, companies wanting to partner with us, and prospective students. Yes, I'd say I'm very excited about the possibilities."

"This was one of the most innovative and creative proposals that we funded under the competition. The basic premise is that the consortium used the technical project of building a prototype Mars space suit to bring students from academic institutions across the consortium together in an interdisciplinary, virtual, distributed project team. A perfect microcosm of how a NASA project team operates. These students are getting a hands-on, real-life experience in systems/integration engineering, project management, and EVA systems (two near-term and one longer-term human capital competency need)."

*Diane DeTroye
Manager of Space Grant, NASA Headquarters
March 29, 2007*



2006 NDSGC Research Fellowship Recipients

North Dakota State University



Matthew Kasper (photo left)
Agr and Biosystems
Engineering/Mechanical
Engineering
Graduate student
"Polymer Selective Piezoelectric
Microcantilever Sensor for
Environmental
and Medical Monitoring"

Jeremy Michael Brown
Computer Science
Graduate student
"Designing an Efficient and Secure Key
Management Scheme for NASA Sensor Webs"

Adam Wohl (photo right)
Chemistry/Biology
Undergraduate student
"Synthesis and Properties of
Dithieno [3,2-b:2'3'-d]
Pyrrole (DTP) Oligomers
as Models of Conjugated
Polymer Systems"



Christopher L. Heth
Chemistry
Graduate student
"Studies of the Electropolymerization of
Aminothiophenes"



Kendall Dennis (photo left)
Mechanical Engineering
Graduate student
"Numeric Modeling of Plasma
Flow Control Applications"

Ben Aakre (photo right)
Mechanical Engineering
Undergraduate student
"Composite Health
Monitoring
w/ RFID Technology"



Todd O. Morken
Geology
Graduate student
"Optical Dating Properties of Thenardite
(Na_2SO_4)—a Potential Sulfur Source
Mineral in Martian Sediments"

Dan Thorstad
Mechanical Engineering
Undergraduate student
"Optical Dating Properties of Gypsum
($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)"

Jaime Lea Jensen
Biochemistry and Microbiology
Undergraduate student
"Enantioselective Radical Reactions Using
Organocatalysts"

The NDSGC research fellowships are given on a competitive basis to undergraduate and graduate students at UND and NDSU who are interested in doing research that is of particular interest to NASA.

University of North Dakota



Virginia Makepeace
Space Studies
Graduate student
"Laboratory Spectral Study of Three-
Phase Pyroxene Mixtures"

Darrell Sydlo
Chemical Engineering
Graduate student
"Accuracy of Current Secondary
Organic Aerosols Experimental Data
and Model Parameters"

John Polansky
Mechanical Engineering/Aerospace
Concentration
Undergraduate Student
"North Dakota Experimental-1
Planetary Space Suit Project"



Brian Berseth
Electrical Engineering/Honors
Undergraduate student
"Design and Demonstration
of a Synthetic Vision Camera
Network for Unmanned
Aerial Vehicles"

Peter Leo Reis
Physics
Graduate student
"Studying Magnetic Organic
Semiconductors using
Dynamical Mean Field Theory"

Travis Wolf
Mathematics and Honors
Undergraduate student
"Weighted Ducci Maps"



Rebecca Obrecht
Atmospheric Sciences
Graduate student
"Studying Aerosol Properties
using DC-8 In Situ Measurements
and NASA Satellite Observation
during the INTEX-B Field
Experiment"

Jordan Grasser
Chemical Engineering
Undergraduate student
"Photo Catalytic Oxidation using
 TiO_2 Nanotubes"

Jody Lindbo
Mechanical Engineering
Undergraduate student
"Measuring Energy Losses in
Fiber Composite Materials"

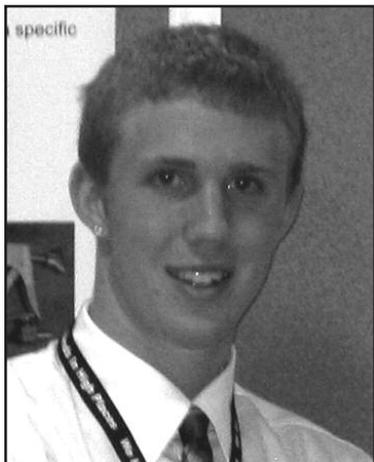


Paul Selid
Chemistry
Undergraduate student
"Development of Target-induced
Fluorescent Nanoparticles for
Determination of Mercury"

Karen Eskelson
Chemical Engineering
Undergraduate student
"Modeling Semivolatile Organics
in Atmospheric Aerosols"

Jessica Wood
Chemistry/Forensic Science
Graduate student
"Novel Synthesis of New
Organopalladium Compounds
on Silica Gel"

2006 Space Grant Summer Internships



Tyler Bohan

Chemical Engineering
Undergraduate student
UND

"I interned at the Materials and Processes Laboratory at the Marshall Space Flight Center in Huntsville, Alabama. I specifically conducted research in a materials diagnostics facility fully loaded with some of the most advanced analysis equipment in the world. Assisting my mentor, I researched and conducted analysis on metal carbides and other materials being considered for use in future space missions. Analysis included

using electron microscopy, optical microscopy, spectroscopy, and x-ray fluorescence to evaluate material performance and to map out failure points of tested carbide samples. Using my background in chemical engineering and some good on-the-job training, I was responsible for locating microscopic failures in the molecular structure of the carbide samples, snapping pictures of the failures at just five micrometers in length, and then assessing what caused the failure in order to recommend possible solutions to the carbide making process."

John Sartori and Kari Ostmo, undergraduate students in Electrical Engineering at UND, each had a summer internship at the Jet Propulsion Laboratory in Pasadena, California. It was the second such internship for both of them.

Chris Sanders, an undergraduate student in Geography at UND, had a summer internship at Wallops Island Research Center in Virginia.

Dereck Stonefish, an undergraduate student in Environmental Science/ Business Administration, had a summer internship at Sitting Bull College in Fort Yates, North Dakota.

Lillian Goettler Space Grant Scholarship 2007

Lillian Goettler Space Grant Scholarship

Lillian L. Goettler was a distinguished NDSU professor. Awarded a doctorate in Mechanical Engineering from the University of Massachusetts-Amherst, she came to NDSU with her husband in 1978.

Lillian Goettler became a trailblazer for women in science by being a role model for girls and young women. Her Ph.D. in Mechanical Engineering was unusual for a woman at that time. In addition, she had an intense interest in involving females in science throughout her career. Lillian Goettler died August 14, 1983.



Annie Vogel-Ciernia

Undergraduate student
Biotechnology and Psychology
NDSU

"My career goal is to further the understanding of the underlying mechanisms of brain function and dysfunction by exploring the human mind from a cross-disciplinary approach. By combining my knowledge of biotechnology with training in psychology, I plan to continue my education to the doctoral level in neurobiology. Examining brain disease will require an extensive knowledge of the biological and chemical functioning of the mind as well as a background in the behavioral sciences."



Science Teaching Enhancement Grants

Each year the North Dakota Space Grant Consortium (NDSGC) offers Science Teaching Enhancement Grants (STEG) of \$250 to encourage North Dakota teachers to: upgrade demonstration or lab equipment; buy science software or books; build telescopes; take students on scientific field trips; or do any special science project that will be exciting for students. The goal of this program is to allow teachers in grades K-12 to try projects that are beyond the scope of current budgets. The STEG can not be used for salaries or administrative costs. The money must be used by teachers for the students in their classrooms. Due to an appropriation from the North Dakota Legislature in 2005, Space Grant was able to increase the STEG to \$500.

2007 STEG Grant Recipients

Randi Bassingthwaite
Richland Elementary School
in Abercrombie

Michelle R. Keller
Bisbee-Egeland School

Marilyn Very
South Central High School
in Bismarck

Patrick Boehmer
Carrington High School

Leslie Wentz
St. Joseph Catholic School
in Devils Lake

Kerri L. Lee
Sullivan Middle School
in Fargo

Katherine DeLaPointe
Longfellow Elementary
School in Fargo

Janice M. Kanwischer
Fessenden-Bowdon School

**Brent Miller and
Jessie Erickson**
Century Elementary School
in Grand Forks

Jim Whalen
Central High School
in Grand Forks

Stacy Marrujo
Towner-Granville-Upham
School District

Roman Fettig
Grenora Public School

Justin Foss
Northwood Public School



Samantha Smith (left) and Meghanne Quam show a clay model of a volcano that has visual "proof" of three eruptions. Both students are third graders at Gussner Elementary School in Jamestown.

Cindy Larcombe
Longfellow Elementary
School in Minot

Steven Fogarty
Jim Hill Middle School
in Minot

Mary Hemphill
Little Flower Elementary
School in Minot

Mary Holand
Park River
Elementary School

Mary Gleason
Dakota Prairie High
School in Petersburg

Rebecca Jungemann
Ray Public School

Mary Hoherz
Stanley High School

Natalie Boe
Washington Elementary
School in Valley City

Julie Hein
Wing Public School

Daren Kurle
Wishek Public School

**Shelly Mann, Sherry Hust,
Mary Ann Kapp,
Connie Kuhn
and Serena Schmidt**
Tappen Public School

Vivian Meiers
Miller Elementary School
in Bismarck

**Carla Kroeber and
Melody Alme**
Roosevelt Elementary
School in Jamestown

Susan Syverson
Lincoln School
in Jamestown

**Lori Hare and
Barbara Williams**
Gussner Elementary
School in Jamestown

**Sally Brovold and
Tammy Strobel**
Kulm Public School

Susan Rankin
Larimore Elementary School

Linda Hovland
Maddock Public School

Roberta Netzloff
McClusky Elementary School

Science Teaching Enhancement Grants



On March 23, 16 juniors and seniors toured various UND departments relating to the field of science, technology and medicine. They had the opportunity to listen to medical students, professors and had hands-on experiences with laboratory research and the human body. The students were amazed at the possible careers in these particular areas.

*Mary Hoherz
Stanley High School*

I would like to thank you for the generous Science Teaching Enhancement Grant I was awarded. I have used the funds from this grant with matching funds from another grant to purchase a computer projection system for my classroom.

With this new technology we have been able to view solar eclipses, images of stars, galaxies, nebulas and have had video conferences with professors from the University of North Dakota. This projector allows us to visit the ends of the universe without leaving our classroom. We see real world events in real time and access sites that breathe life into our curriculum.

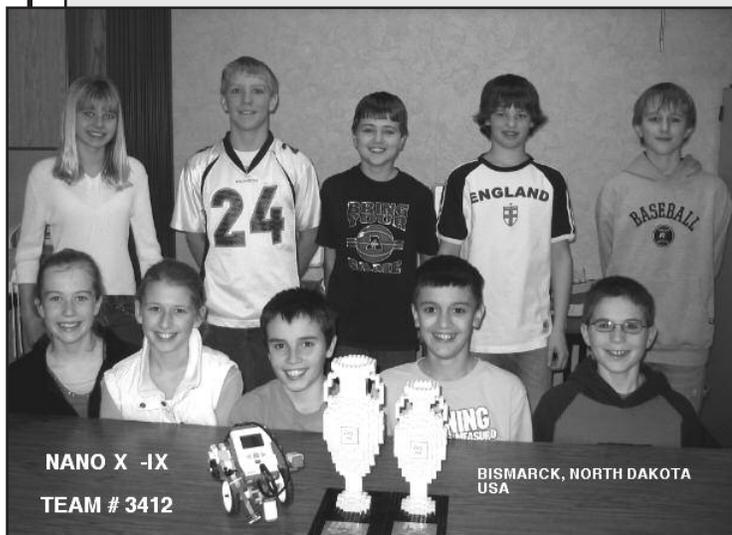
*Jessie K. Erickson
Century Elementary School*



Ashley Risovi, Grade 4, Maddock Public School, has fun dissectioning an owl pellet.

This grant will fulfill a dream I have had, to have an all day hands-on science day for k-6 grades for 75 students. The day will consist of eight different stations with varying experiments/tasks incorporating math, science, English, reading, and listening/following directions skills. The stations: making bread in a bag (which each student will have to measure, follow the directions, bake, and take home a loaf of bread); chemical reactions (alka bombs, etc.); expansion/contraction of molecules using balloons; Bernoulli's principle (apples on a string, blowing fan, etc.); making a clay boat that floats with weight; Ooblick (cornstarch and water); sound experiments (bottle music, tuning fork experiments, etc.); and using microscopes with slides observing various stages of cell division.

*Janice M. Kanwischer
Fessenden-Bowdon School*



NANO X -IX
TEAM # 3412

BISMARCK, NORTH DAKOTA
USA

FIRST Lego League from Miller School, Bismarck. Back row: Abby Ritz; Jacob Sommerfeld; Austin Bergquist; Todd Kessler; Jacob Markel; Front row: Hailey Mills; Abby Larshus; Zachary Schmidt; Brennan Doan; and Michael Kuch. Coaches are Vivian Meiers (teacher of Gifted/Talented) and Terry Kuch (parent). The assistant coach is Dean Ritz (parent).

On behalf of the students and teachers of Gussner Elementary School in Jamestown, I would like to thank you for your gracious gift of \$500.00 for the purchase of an incubator, brooding tub, and miscellaneous supplies. Due to your generosity, the students will be able to learn life science, specifically the growth and life cycle of chickens through hands-on real life experiences. This will be a powerful learning experience for all of our students for many years to come.

*Lori Hare
Gussner Elementary School
Jamestown*

BalloonSat

The BalloonSat launch in the fall of 2005 ended in the loss of the balloon, its GPS tracking equipment and payloads in a place unknown. (See page below from The Aurora, Spring 2006.) The launching and ascent of the balloon were without problems. The chase was exciting as the caravan of cars drove far too fast on gravel county and township roads with antennas stuck out the windows and road maps at the ready.

Chase teams were able to track the balloon during the descent until it was at 50,229 feet in altitude. Then contact was lost with the GPS equipment. Despite hours of searching no further signals were heard from the balloon package. Searches by car and airplane on subsequent days were unsuccessful.

In the spring of 2006, Ryan Felche, who farms near Denhoff, North Dakota, was doing spring's work in his fields when his plow encountered the remains of something unusual.

One of the payloads had recovery information with the name and phone number of Dr. Corinne Krauss of Dickinson State University. Felche called her and arrangements were made for Ryan Kramer of Mandan, one of the Space Grant launchers/trackers to pick up the crumbled and jumbled pieces of the payloads.

In spite of the rough landing, spending the winter outside in the bitter cold, tolerating the spring run-off of the melting snow and the close encounter with the plow, one of the payload cameras actually had useable images taken when the BalloonSat was above the atmosphere at about 98,258 feet. (See images on opposite page.)

The BalloonSat teams were undaunted by the loss and eventual discovery of the mangled remains of what was BalloonSat 2005. Two attempts were made to launch additional balloons in the fall of 2006. Both launches were canceled due to heavy cloud cover. BalloonSat 2006 was



Top and bottom: Shown here are the remains of BalloonSat 2005 after spending months outside in North Dakota's infamous winter and having a close encounter with a plow.



Ryan Felche, a farmer at Denhoff, found the remains of BalloonSat 2005. He said, "...didn't know at first what it was. We are close to a small town. Thought it might be a kite. I later noticed the camera so I took a closer look."

Above is page 11 from The Aurora, Spring 2006

BalloonSat



rescheduled to be launched in the spring of 2007.

Teams from Hatton Middle and High Schools, Northwood Middle and High Schools, Horizon Middle and Century High Schools in Bismarck, Valley City State University and Dickinson State University participated in BalloonSat 2006.

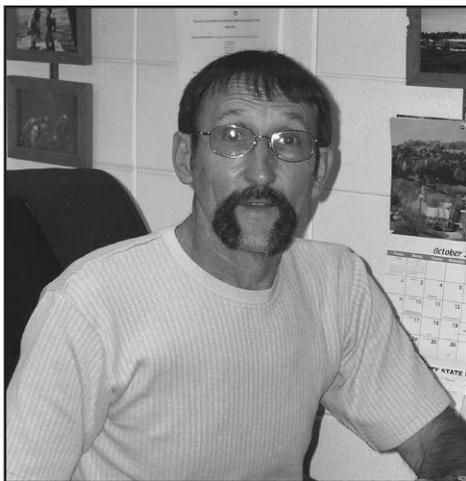
The NDSGC wishes to express a special appreciation to John Nordlie of Grand Forks, Kramer and Mike Gerszewski of Williston for being the backbone and providing the technical expertise of the BalloonSat Project in North Dakota. Those three individuals do all the neces-

sary pre-launch activities (compliance with the FAA regulations, purchase of materials and supplies, construction of the GPS packages, etc.) as well as the actual launch and the chase.

Space Grant paid for Nordlie, Kramer and Gerszewski to develop and present a two day BalloonSat training workshop for educators in school districts in Winnipeg in late autumn 2006. Plans are that the BalloonSat launch in the fall of 2007 will be international in nature with student payloads from both the United States and Canada.



This image was taken above the Earth's atmosphere by a camera on BalloonSat 2005. The camera with its exposed film spent the winter outdoors after the chase team lost contact with the balloon and its payloads.



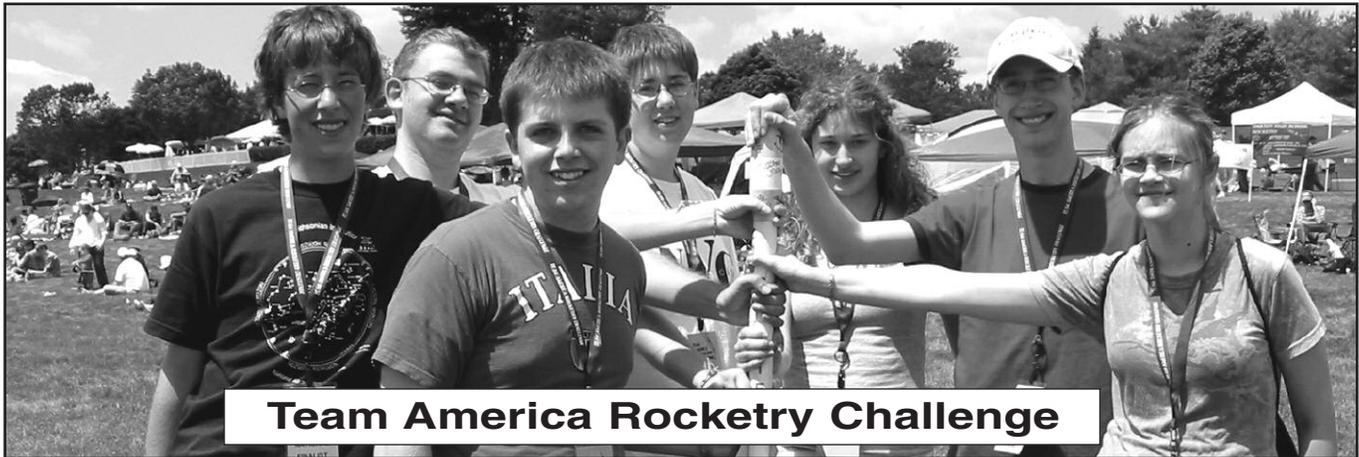
In the summer of 2006, the NDSGC sponsored Juan Gomez of Bismarck State College and Don Hoff of Valley City State University to attend the BalloonSat Workshop in Boulder, Colorado. Shown here is Don Hoff.



This image was taken by one of the BalloonSat 2005 cameras at an altitude of 98,258 feet.



More NDSGC News



Team America Rocketry Challenge

In the month of December (2005) some kids from Century High School in Bismarck meandered into their physics room. Mr. Walz* was standing behind the desk correcting papers. Some old rocket supplies sat on the table waiting to be used for spring 2006. None of us really had any idea what we were getting into. Early morning sessions beginning at 6:45 started occurring in our schedules. Hour after hour was spent working as a team, building about four or five different rocket designs throughout the year. Our later designs looked completely different, really unrecognizable, from our early concepts.

The original goal for our flights was to get a consistent height and time. With only two chances during the initial competition, we had to be ready. The scores were determined by two factors: time and height. Scores were produced by taking the number of feet over or under the required height, 800 feet, and the number of seconds over or under the required time, 45 seconds. Our first qualifying flight gave us a score of 25, the best we ever had.

The second qualifying attempt was launched and the rocket arched high into the sky. It began its descent and the parachute deployed. Team members kept time during the flight. The team looked at the stop watch. It was going to reach close to 45 seconds – our goal. After running a few hundred yards to the rocket's landing site, we all huddled around to listen to the beeps of the altimeter which told us how high the rocket had gone. First it beeped seven times, then nine times, then three times. We all shouted! We flew 793 feet, which accounted for 7 points of our score. The rocket landed at a confirmed time of 44.72 seconds, meaning 0.28 more points were added, giving us a flight score of 7.28! This basically insured us a position in the top 100 to go to Washington D.C. for the national competition. Mr. Walz told us not to tell

anyone about our possible acceptance for the nationals. We waited an agonizing two weeks. Finally, the results were announced! The scores were released! We made it! All teams under a score of about 21 made the top 100.

The cold morning of May 17th rolled around a lot sooner than any of us expected. We were off to Washington D.C., a place most of us had never visited. This trip was certain to be one of those "once in a lifetime opportunities."

Our time to prove ourselves and our rocketry skills had come. The blistering 95 degree day was filled with the launching of rockets by the top 100 teams in the nation! Wow, what a feat, to be a part of such an event. Our launch time finally arrived. We registered our rocket and had it inspected. Approaching our launch space and preparing for launch, we became nervous; but we had never been more of a team. Our rocket was ignited and it launched. Our flight wasn't exactly what we had hoped. We did not do as well as we had expected. We ended up in 45th place with a score of 48. But we walked away happy with ourselves knowing that we had brought pride to our school and state.

Cody Wass, Alan Jacobs, Matt Friesz, Kristen Rosenau, Erik Sjurson, Billy McKenzie, Steph Jensen, Mark Jacobson, Nicole McDonough, and Taylor Mundstock

*Mike Walz, physics teacher at CHS, is advisor to TARC.

NDSGC 2006 Annual Meeting

The 2006 annual meeting of the North Dakota Space Grant Consortium (NDSGC) was held on May 5, 2006 at the Seven Seas Conference Center in Mandan. Those in attendance were: Suezette Rene Bieri (UND); Kristi Black (CCCC); Carol Davis (Spirit Lake Consulting); Shan de Silva (UND); Shannon Dullea (NDSCS); Juan Gomez (BSC); Don Hoff (VCSU); Jean Hushagen (BSC); Shirley LaFromboise (TMCC); Virginia Makepeace (UND); Bob Miess (MaSU); Katie Nettell (LRSC); Donna Seaboy (SBC); John Webster (MiSU); and Melissa White (UTTC).

Agenda items included Space Grant scholarships and fellowships, North Dakota Dark Skies, the North Dakota Experimental-1 Planetary Space Suit project, BalloonSat, summer internships at NASA Space Centers and faculty summer fellowships.

Shan de Silva announced that he would be leaving UND and the NDSGC in mid-August in order to join the faculty at Oregon State University. The affiliate representatives expressed sincere regret at de Silva's resignation. Discussion was held regarding the procedure and election required to fill the position of director of the NDSGC.

cScibot



The NDSGC provided partial funding for the cScibot Lego Robotics Camp in the summer of 2006. Sponsored by the Department of Computer Science at UND, the camp allowed boys and girls ages 10-14 to build computer controlled robots.

North Dakota Student Rocket Initiative Project (STRIPE)



By Dr. Tim Young, UND Department of Physics

The North Dakota Student Rocket Initiative Project (STRIPE) is a two component program that involves college students and faculty from across the state. It is funded by a grant from the North Dakota Space Grant Consortium.

The first component is building a large reusable launch vehicle to send student payloads to high altitudes. The Large Rocket Vehicle is designed, fabricated, and operated by about 30 UND and NDSU students. The rocket is modular to accommodate several launch configurations. There are two fin-cans capable of sending the 18 foot 11.5 inch diameter rocket to an altitude of about 25,000 feet. There are three electronics bays. One controls the deployment of the drogue (small parachute ejected at apogee) and deployment of the main parachute at 1,500 feet, slowing the rocket to a safe descent rate. The second electronics bay controls the air-started four 75mm motors, ensuring the safe ignition of motors at burnout of the main 98mm motor. The third electronics bay is used in the 5-motor configuration to control the student payload/avionics/nose cone section which separates from the fin-can at apogee.

The avionics bay has telemetry and video components. The telemetry is used to give 3-D tracking and digitized visualization of the flight and the video supplements the data with recorded high resolution movies.

Test launches will be conducted in the spring of 2007 and student payload launches will occur in October/November 2007.

The students have also designed and built a mobile launch facility.

The second component is a contest where students compete for a chance to fly their experiment in the Large Rocket Vehicle. Eight teams from North Dakota universities and colleges will compete to become one of three teams that will participate in the full-scale development of their scientific payload. The experimental payloads will be launched by the North Dakota Large Rocket Facility. The three teams will be chosen based on a proof of concept of an experimental



John Nordlie, an original member of the North Dakota Space Grant sponsored High Altitude Balloon Project, works in the STRIPE workshop.

rocket payload. This will be demonstrated by having each team build a high-powered rocket and launch their proposed proof-of-concept scientific payload. The students will fly their respective rockets in September 2007. The chosen teams will then have a chance to fly their full experiments in the Large Rocket Vehicle.

STRIPE will continue every year depending on funding. To help support this project and get your company logo on the rocket and on our website contact Dr. Tim Young at 701-777-4709. More information can be found at <http://www.rocket.und.edu>

Dark Skies

The idea behind North Dakota Dark Skies is very simple; our state has very little light pollution, making it a great place for amateur astronomy. The goal of North Dakota Dark Skies is to make telescopes and astronomy more accessible to everyone by establishing a network of telescopes at affiliate colleges around the state. Space Grant provides funds for the affiliate college to purchase a portable 10" or 12" telescope with accessories. Williston State College and Dickinson State University received Dark Skies grants in 2006.

Susan Zimmerman and Mike Gerszweski have done several astronomy activities in the Williston area, including visits to grade schools and a star party at Lewis and Clark State Park. Zimmerman and Gerszweski are hoping to get the planetarium at the Crosby elementary school up and running. Zimmerman also did a presentation about Lakota medicine wheels and astronomy at the Missouri-Yellowstone Confluence Interpretive Center near Fort Buford.

At Dickinson State University, Corinne Krauss has used the telescope for introductory classes in astronomy and physical science. She has also trained undergraduates to use the telescope and to help with astronomy activities. Krauss has led observing sessions and astronomy discussions for home school students, a Girl Scout summer camp, and the Sister-to-Sister Summit for girls in grades 3-6. A series of workshops for elementary school teachers and the general public is planned for this summer.

ESMD



NASA has been directed by President George W. Bush to embark on a robust space exploration program that will advance the nation's scientific, security and economic interests. This is the fundamental goal of the Vision for Space Exploration and therefore the central objective of the Exploration Systems Mission Directorate (ESMD). ESMD aims to develop a constellation of new capabilities, supporting technologies and foundational research that enables sustained and affordable human and robotic exploration of outer space.

In order to help accomplish these goals, the North Dakota Space Grant Consortium was awarded a \$40,000 grant in autumn of 2006 to provide funding for: summer internships for college students at NASA Space Centers; engineering team projects; and senior design projects. These programs were chosen by the NDSGC to provide a rich portfolio of ESMD higher education opportunities and encourage relevant hands-on training in systems engineering for the college and university students in the state.



NDSGC Briefs



Dr. Corinne Krauss

Meet a NDSGC Affiliate: Corinne Krauss

Corinne Krauss is an assistant professor of physics and astronomy at Dickinson State University where she has been teaching for three years. She received her B.S. in physics from Montana State University in Bozeman and her M.S. and Ph.D. in astrophysics and planetary science from the University of Colorado in Boulder. Her thesis research focused on experimental methods for studying small lightning discharges near the surface of Mars.

Corinne is the advisor for the DSU science club. In the past two years, members of the club have participated in various activities such as the North Dakota Experimental-1 Planetary Space Suit Project, the BalloonSat program, nighttime observing sessions using the NDSGC-sponsored 14" telescope, and numerous community service projects.

Born and raised in the Spokane, Washington area, Corinne enjoys North Dakota's fabulous sunsets and brilliant night skies.

Space Grant National Meeting

The national meeting of Space Grant was held in Washington, D.C. on February 28-March 3, 2007. Attending from North Dakota were Interim Director Paul Hardersen, Space Grant Fellow Virginia Makepeace and two affiliate representatives, Susan Zimmerman and Gary Halvorson.

Zimmerman is an associate professor at Willison State College who teaches biology, microbiology, genetics and astronomy.

Gary Halvorson is an associate professor at Sitting Bull College who teaches agriculture, chemistry, physics, geology and mathematics.



Gary Halvorson



Susan Zimmerman

Regional Educator Resource Center

The NDSGC worked closely this past year with the NASA Regional Educator Resource Center which is located in the Department of Space Studies at UND. Space Grant provided support in terms of logistics and finances. That made it possible for the NDSGC to provide space science materials to teachers around the state. Some of those materials were distributed through in-service workshops while others were provided via the mail.

Pre-Service Workshops

Space Grant worked very hard to develop relationships with the Departments of Education at six of the universities in the state. Preservice workshops were held each semester at the University of North Dakota, North Dakota State University, Mayville State University, Valley City State University, Jamestown College and Dickinson State University.

K-12

Presentations on space science, sponsored by the NDSGC, were made in K-12 classrooms using the faculty and graduate students of the Department of Space Studies at UND.

StarDate™

The North Dakota Space Grant Consortium (NDSGC) is currently underwriting the StarDate programs on the North Dakota Public Radio Network (NDPR) as part of its public outreach goals. StarDate is broadcast each morning, Monday through Friday, shortly after the 7:30am (CT) newscast. That is when the woman with the lovely voice says, "This broadcast is made possible by the North Dakota Space Grant Consortium, a NASA sponsored program whose mission is the enhancement of the NASA related research and education infrastructure in North Dakota. See our web site at www.space.edu/spacegrant"

NDPR has eight full power transmitter stations and eleven translator stations which combine to reach more than 250,000 listeners each week. The underwriting by NDSGC covers the acquisition, production and distribution fees for the StarDate programs to all 20 stations involved.