

NORTH DAKOTA



SPACE GRANT CONSORTIUM

The Aurora

2013-2014





Notes from the 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 College
Turtle Mountain Community College
United Tribes Technical College
Bismarck State College
Lake Region State College
Dakota College at Bottineau
North Dakota State College of Science
Williston State College
Grand Forks Herald
North Dakota Heritage Center
Gateway to Science Center

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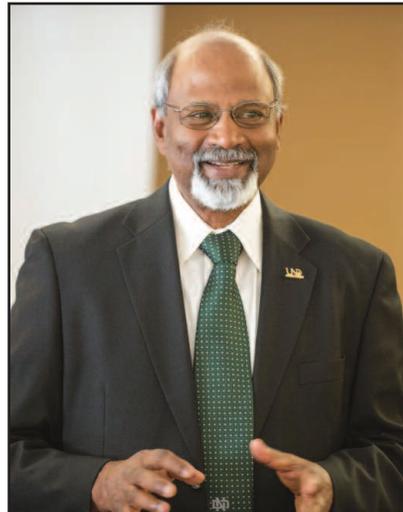


Cover Photo: Students from North Dakota State University prepare their aircraft for the American Institute of Aeronautics and Astronautics Design/Build/Fly competition. From left to right in yellow: Mike Nies, Logan Noess, John Batton. Darker shirts: Ryan Solstad and Greg Matson.

Dear Colleagues,

As one thinks about the Space Grant program, the question that often comes up is, what difference are we making to people?

During one of our launches at the high altitude balloon competition involving middle and high school children, a parent came to me and thanked Space Grant for organizing the competition. As we got talking



further, she said this project is the best thing that has ever happened to her son, an eighth grader. She went on to say that her son is a very shy person, not good with learning from books, and that she was very worried about his academic performance in school. This project she said, has completely changed him and has helped him to discover his skills in "hands on" projects, passion for science, and interest in school overall! By then we had noticed - and so did the judges - that this student was truly exceptional. He was the star of his team that went on to win the competition!

In another instance, during a similar competition, when the launch failed due to a sudden gust of wind (yes, North Dakota is different when it comes to weather, we know), the graduate students who were helping to organize the event recovered the balloon and payloads entangled at the top of a nearby tall tree, and helped re-launch it within an hour! They did all this in below freezing temperatures and with piles of snow on the ground! The graduate students showed great resilience and determination during a difficult and stressful time, and more importantly, were great role models to the school children watching the entire process.

The reason I chose to tell these stories is because, sometimes in our anxiety to achieve loftier goals, we forget the small but important differences projects like these can make in young people's lives. They discover their passion, they develop great leadership skills, and most importantly, they become good citizens. This is what Space Grant is meant to achieve.

This issue of The Aurora once again focuses on many such Space Grant projects and the difference we make to formative, young minds. I dedicate this issue to the many students we serve.

Santhosh Seelan

National Space Grant Meetings



National Space Grant Meeting - Washington, D.C.

The NDSGC attended the 2013 National Council of NASA Space Grant Directors' Annual Spring Meeting in Washington, D.C. February 28 – March 2, 2013. Santhosh Seelan, Suezette Bieri, and new Coordinator Caitlin Nolby attended the meeting and also met with United States Legislators from North Dakota and their aides to share programs and projects funded by Space Grant in the past year. Senator John Hoeven, Senator Heidi Heitkamp, and U.S. Representative Kevin Cramer were all receptive to the Space Grant program, and a special thanks is due to our affiliates as we could not be successful without all of your efforts! The National Space Grant Alliance also helps to advocate for sustained congressional support of the Space Grant Program. This was also Caitlin's first trip to the nation's capital, so Suezette made sure to show her some great landmarks!



Caitlin Nolby at the Washington Monument.

National Space Grant Meeting - Charleston, SC

The fall 2013 Space Grant Meeting was a national level meeting hosted by the South Carolina Space Grant Consortium in Charleston, SC. In addition to Santhosh and Caitlin attending, Becky Mann who manages NDSGC finances, and student presenter Marissa Saad, Space Studies master's student, also attended. This meeting marked the 25th anniversary of the Space Grant program. Although the government shutdown kept NASA Headquarters Space Grant members from attending, there were still excellent presentations made by students and faculty on their funded research projects.

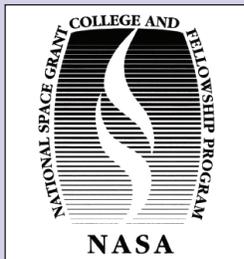


Caitlin, Becky, and Marissa at meeting banquet.



Charleston Harbor kayak tour from Shem Creek.

Background of the National Space Grant College and Fellowship Program



NASA initiated the National Space Grant College and Fellowship Program, also known as Space Grant, in 1989. Space Grant is a national network of colleges and universities. These institutions are working to expand opportunities for Americans to understand and participate in NASA's aeronautics and space projects by supporting and enhancing science and engineering education, research and public outreach efforts. The Space Grant national network includes over 950 affiliates from universities, colleges, industry, museums, science centers and state and local agencies. These affiliates belong to one of 52 consortia in all 50 states, the District of Columbia and the Commonwealth of Puerto Rico.

The 52 consortia fund fellowships and scholarships for students pursuing careers in science, technology, engineering and mathematics, or STEM, as well as curriculum enhancements and faculty development. Member colleges and universities also administer pre-college and public service education projects in their respective states.



National Student Competitions



The Great Moonbuggy Race

The NDSGC sponsored a team of students from North Dakota State University to compete in the NASA Great Moonbuggy Race at the U.S. Space and Rocket Center in Huntsville, Alabama in April of 2013. Organized by Marshall Space Flight Center, this is an international engineering design challenge in which teams construct human-powered vehicles and test them in obstacle course style environments, meant to model Lunar or Martian conditions. The team had a 4th place finish out of 48 university teams! They also received the College Rookie Award for fastest course completion by a new race team.

Left to right: Kory Mensing, James Seidel, Bradley Monahan, William Kuehn, Sara Edinger.

University Student Launch Initiative (USLI)

The University of North Dakota's Frozen Fury Rocketry Team designed and constructed a high-power rocket, named Aurora, which competed in the Student Launch Initiative program in Huntsville, Alabama in April of 2013. The UND rocketry team passed the competitive proposal process, and completed a Preliminary Design Review, Critical Design Review, Flight Readiness Review, and Launch Readiness Review throughout the school year. The team took a tour of the Marshall Space Flight Center's Redstone launch sites, research facilities, and even ate dinner while sitting under a Saturn V rocket in the Davison Center in the U.S. Space and Rocket Center.



Left to Right:
Marissa Saad,
Nicole Fitzgerald,
Brian Badders,
Adam Feigum,
Matt Zimmer,
Andrew Twedten,
Tim Young (advisor).

National Student Competitions



Lunabotics

The University of North Dakota RAPTOR (Robot Automated for the Procurement and Transport of Regolith) team competed in NASA's 4th Annual Lunabotics Mining Competition in 2013 at Kennedy Space Center. The technology concepts developed by the university teams for this competition conceivably could be used to mine resources on the Moon, asteroids, and Mars. The UND team designed and built a skid steer based mobile robot with a unique rotating scoop and drum collection method. Collecting just over 200 kg of regolith during the competition, Team RAPTOR placed second in the mining category at the competition!



Left to Right: Ben Storhaug, Ray Grothman, Karl Williams, Thomas Sitzer, Andrew Goodin, Dan Brown, Shaful Islam, Dustin Rudnik, Susan LaPlante, Theodore Kamen.

High Altitude Student Platform (HASP)

This is the fifth consecutive year the University of North Dakota and the University of North Florida teams have collaboratively flown nano-crystalline sensor arrays onboard the HASP in order to measure the ozone profile in the stratosphere. The UND team consisted of Dr. Ron Fevig, Marissa Saad and Wade J. Snarr. The payload was launched on a zero pressure latex balloon, out of the Columbia Scientific Balloon Facility in Ft. Sumner, New Mexico.

The balloon was launched around 10:00 AM on September 2, 2013 and reached a float altitude of 122,000 feet around 12:00 PM that same day. The balloon impacted the ground around 11:00 PM the following day, September 3, 2013. The UND/UNF payload can be seen in the retrieval image, at a location northwest of Phoenix, Arizona.





NDSGC Scholarships

Every academic year, Space Grant provides each of the affiliate two year, tribal, and four year colleges with a set amount of funding for scholarships. Each college chooses its Space Grant scholarship recipients and the amount of money that each scholarship is worth.

Sitting Bull College

Maurianna Loretto
Elsa Archambault
Amber Gill
Marletta Rotich
Koby Sommer

Lake Region State College

Christian Beck
Miranda Jenson
Lincoln Larson
Robert Longie
Talon Mack
John Nienhuis
Molly Nienhuis
Richard Schill
Preston Stewart
Cliff Van Steenvoort
Kodie Vote
Kelsey Weber
Joseph Burckhard
Austin Nelson

Fort Berthold Community College

Devin Greywater
Bennett Everett Jr.
Connie Green
Demetrius Garrett
Randall Ira Jones
Shelby Lego
Cedar Dancing Bull
Sierra Rain Sun

Dickinson State University

Erin Bertelsen
Lisha Hasskamp
Brandi Mantz
Michelle Decker
Parker Egli
Austin Boepple
Stephen Engebretson
Shane Noonan

Minot State University

Thomas Carraher
Ariane Moore
Melissa Bell
Johannah Miller
Breanne Hatfield

Valley City State University

Bryce Brady
Tyler Bryant
Aaron Burgad
Jenna Coghlan
Amy Doll
Wayne Engelhard
William Greb
Kortney Groettum
Michaela Halvorson
Ben Haugeberg
Garret Hecker
Matthew Kietzman
Melissa Kindelspire
Nicholas Lee
Brittany Lehner
Jessica Puhr
Kinsly Tarmann
Elizabeth Taylor
Steven Wright

Bismarck State University

Kandace Atchison
Lacey Bordeaux
Allison Chalcraft
Stephen Cooper
Jeremy Grossman
Kristen Kramer
Angela Lipp
Steven Schild
Kimberly Schmitz
Drew Spaulding
Tiahna Wagner
Jonathan Widmer
Bo Yesel

Williston State College

Jordan Anderson
Bridger Berrett
Jessie Burwell
Courtney Christianson
Brendan Diaz
Kyle Gerding
Catherine Hahn
Emma Keller
Lauren Nielsen
Daniel Plucknett
Joseph Rice
Katie Sperling
Skyler Sylvester

Dakota College at Bottineau

Lucas Lindholm
Stephanie Liang
Gregory Thompson
Cecile Hoornaert
Erin Lauckner
Susan Indvik
Ashleigh Aufforth

Mayville State University

Andrew Berge
Elizabeth Cakebread
Whitney Leigh Federenko
Riley Francis
Elizabeth Hoglo
Katie Kolness
Paul Koppinger
Ashlee Elizabeth Lotthammer
Hannah Ness
Ryan Ness
Zackery Mathew Slater

United Tribes Technical College

Caresse Davis
Devin Dragswolf
Genevieve Bullhead
Clarence Davis
Connie Begay

Lillian Goettler Scholarship Recipient



Who was Lillian Goettler?

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.

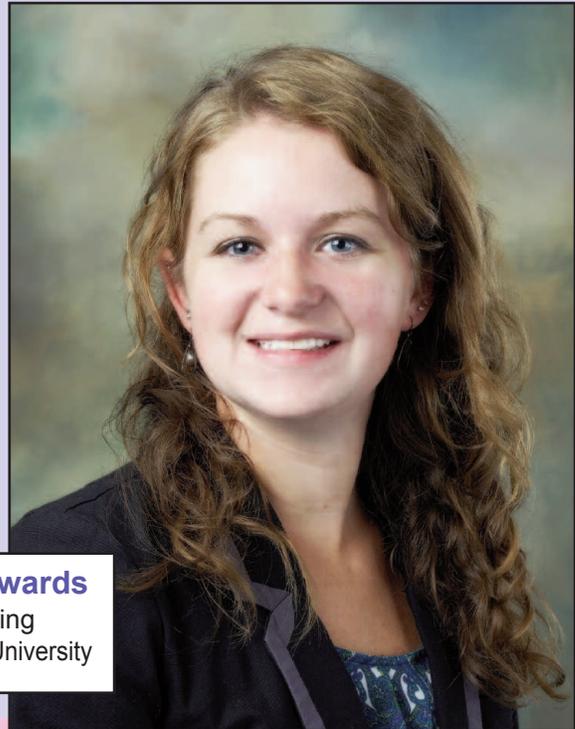
Lillian Goettler became a trailblazer for women in science by being a role model for young women. Her Ph.D. in Mechanical Engineering was unusual for a woman at that time. In addition, she had an intense interest in involving females in science throughout her career. Lillian Goettler died August 14,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

This scholarship is given each year to a female undergraduate student in engineering at NDSU who best exemplifies the academic and leadership qualities of Dr. Goettler and who shows the potential for a promising career in engineering. Recipients must be American citizens and have a minimum of a 3.5 grade point average.

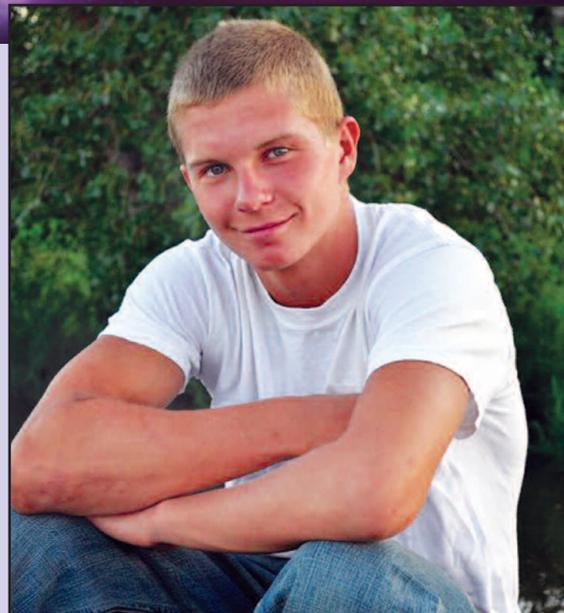
Edwards, from Lake of the Woods, MN, has been an active member in the Society of Women Engineers, E&A Ambassadors, and Civil Engineering Fee Committee. She plans to pursue a master's degree in Civil Engineering with an emphasis in Transportation Engineering to eventually teach engineering courses at a community college level.

Jacqueline Edwards

Civil Engineering
North Dakota State University



NDSGC Scholarships



The NDSGC also gave two scholarships to Lake Region State College students who transferred to the University of North Dakota to continue their education. David Kim (left photo) is double majoring in Commercial Aviation and Unmanned Aircraft Systems and Steven Oliver (right photo) is majoring in Medical Lab Science specializing in Microbiology.



Research Fellowships

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



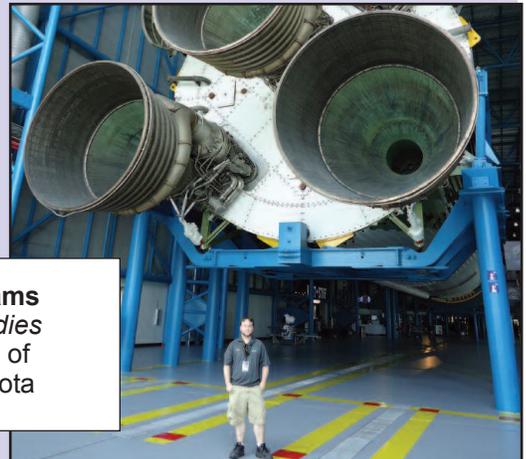
Andrew Taylor
Electrical Engineering
North Dakota
State University



Zachary Hamann
Mechanical Engineering
University of
North Dakota



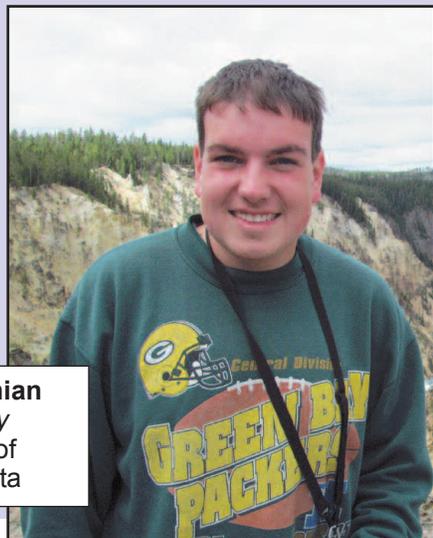
**Ricardo Alfaro
Contreras**
Atmospheric Sciences
University of
North Dakota



Karl Williams
Space Studies
University of
North Dakota



Nick Long
Space Studies
University of
North Dakota

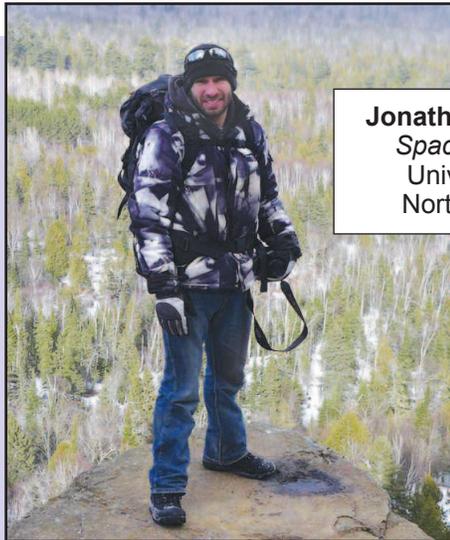


Brett Sergenian
Geography
University of
North Dakota

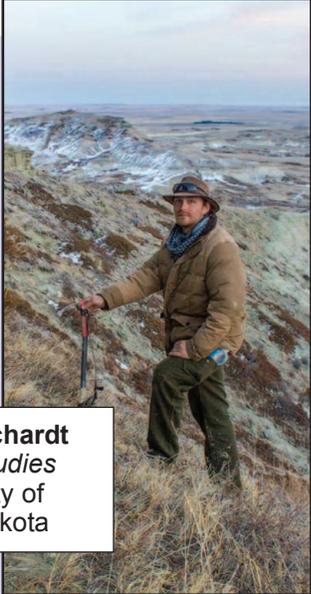
Research Fellowships



Jeremy Holter
Space Studies
 University of North Dakota



Jonathan Schiralli
Space Studies
 University of North Dakota



Josh Borchardt
Space Studies
 University of North Dakota



Matt Zimmer
Space Studies
 University of North Dakota



Brian Badders
Space Studies
 University of North Dakota

Christopher Fixen
Biology
 Lake Region State College



Marissa Saad
Space Studies
 University of North Dakota



Anne Longlet
Space Studies
 University of North Dakota

Star Parties

A partnership between the Space Studies Department at UND, the Northern Skies Astronomical Society, and the NDSGC allowed for the continued success of “star parties” or public telescope viewing of the North Dakota sky. These events are held alternately at the UND Observatory and on UND campus, and attendees not only have the joy of viewing the Moon, constellations, planets, far-off galaxies, and the occasional comet or supernova at these events, but are also welcome to attend a presentation on some aspect of space beforehand. This past season of star parties included UND Space Studies graduate student presenters on their various research projects prior to the viewing of the night sky.



Caitlin explains the different types of space suits designed and constructed by students at UND (led by Dr. Pablo de León) to the AIAA group.

Tours of Space Labs

As the Spacecraft Simulators, Space Suit Labs, Electric Rover, and Inflatable Habitat are all a part of the Human Spaceflight Laboratory at UND and supported in part by the NDSGC, it is important that these research ventures remain visible

to the public. Tours for school children on field trips, summer camps, prospective college students, the general public, and even local legislative staff are regularly scheduled events. This past year included a special trip by the AIAA student chapter from NDSU and the University of Minnesota – Twin Cities in an effort to foster collaboration through new avenues across institutions.

Space Camp at UND and Grafton

In July and August of 2013, day camps with a focus on space and the engineering design process were conducted by the coordinator of the NDSGC, student volunteers, and organized by Laura Munski of the Dakota Science Center in Grand Forks, ND. Two sessions at UND were for students in grades 2-4 and grades 5-8. The camps included tours of the Aerospace facilities, an interactive conversation with Johnson Space Center in Houston, TX on Robotics in Space through NASA’s Digital Learning Network, and a hands-on activity. The younger students worked in teams to build and test robot hands, and the older students worked with “vacuum chambers” to design their own space suits for marshmallow astronauts. A similar camp was conducted in Grafton, ND at the North Valley Career and Technology Center where the students designed their own missions to the Moon and presented these to the other teams. Roughly 60 students were reached through these camps.



Public Outreach



Artwise

The NDSGC participated in the Greater Grand Forks community event for elementary students, Artwise, as the March 2013 theme was focused on space. NASA Solar System Ambassadors, Annie Wargetz and Katrina Jackson, and the NDSGC set up a station where they played a sorting game with students on objects in the Universe, and distributed resources for families on space and STEM-related educational opportunities outside of the classroom. More than 300 individuals visited the booth to learn a thing or two about space!

Super Science Day

Super Science Day is a day full of hands-on science, technology, engineering, and mathematics (STEM) activities for K-8 students and their families. In April of 2013, the NDSGC helped students to build and launch "pencil rockets" and sort the planets into a 3D Venn Diagram according to their physical characteristics. The NDSGC participates each year with a different set of activities for students and their families.



Mars Day at the Library

As a part of a series of Sundays of learning at the Grand Forks Public Library, the November 2013 event was all about Mars. The NDSGC organized multiple stations for students and their parents, which included building their own "Mars Rover Hands," learning about the geological features on Mars as compared to Earth, attempting to land NASA's Curiosity Rover within the landing ellipse on Mars through an Xbox eyetoy, "Pin the Rover on Gale Crater," a Mars Board Game developed by the Lunar and Planetary Institute, and using an iPad application to drive the Curiosity Rover on Mars. The event generated a lot of interest in NDSGC programs, and the kids in attendance really enjoyed being planetary scientists for the day.





K-12 Programs



Cando Team 877: Left to Right: Anna Ramey, Lisa Ramey (coach), Ben Laein, Martin Ramey, Brad Stoll. Not pictured: Austin Howard.

FIRST Robotics Teams

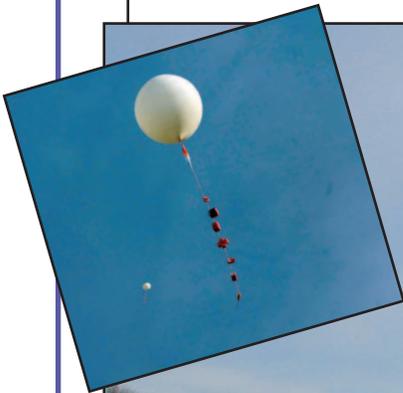
The NDSGC sponsored two *For Inspiration and Recognition of Science and Technology* (FIRST) Robotics Teams this past school year. The North Star Public School in Cando and the Northwood/Hatton High School have participated in this competition for many years, giving these students hands-on experience in the engineering design process.



Northwood Team 876 Thunder Robotics.

Valley Middle School Launch

Marissa Saad conducted her master's thesis research by combining a hands-on STEM engineering project with the simultaneous launch of two high altitude balloons. By implementing a pre- and post-survey, she quantitatively analyzed how effective a HAB mission is in the 8th grade curriculum. The students created a hypothesis, designed, constructed, and flew their own science payloads to an impressive height of 102,000 feet! By becoming real space scientists and engineers, they experienced the scientific method first hand in a real world mission. Saad also received the *NDSGC Award for Outstanding Effort in Promoting STEM Education in North Dakota* for her excellent work with high altitude ballooning at the middle and high school levels. This is given to a student who excels in academics and research, and service to the department.



Near Space Balloon Competition

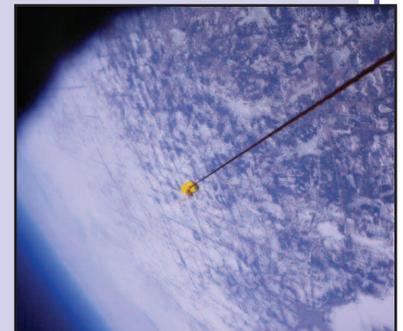


The NDSGC funded the 2nd consecutive Near-Space Balloon Competition (NSBC) in the spring of 2013. NSBC involves the design of scientific payloads by middle school and high school student teams from throughout the state. These students conceptualize scientific experiments, design, and construct their payloads throughout the school year. A team of graduate students from the University of North Dakota help with the launch, chase, and retrieval of the high altitude balloon. After the payload retrieval, the students analyze their data and submit a science report for evaluation. They complete the scientific process just like a real NASA scientist, even experiencing mission failures that need to resort to contingency plans.

The most recent NSBC launch took place from Four Winds Community High School, a secondary school in a Tribal community in Fort Totten, ND. Participating schools included Northwood Public School, Century High School in Bismarck, and Des Lacs Burlington High School. Students remained professional as the first balloon was swept into a patch of trees by an unexpected gust of wind, and were able to ready their payloads for a successful second launch.

Student payloads included cameras, data loggers for temperature, elevation, and humidity, solar radiation detectors, plants, and bacteria. The balloon burst at 87,000 feet and was recovered approximately 50 miles East of the launch site. The first place team for 2013 was Century High School.

The goal of NSBC is to provide K-12 students with opportunities to participate in hands-on activities, inspiring interest in STEM disciplines and careers, as well as encourage the families of the K-12 students to become involved in the process. In an effort to increase participation in NSBC in the future, there will be an educators workshop held at the June 2014 Academic High Altitude Conference at UND.





UND Human Spaceflight Laboratory

Since 2004, dozens of dedicated individuals including students, faculty, and experts, have contributed to incorporating a human spaceflight component to the Space Studies Department at UND. This is one of the few universities in the world to offer human spaceflight training. The Human Spaceflight Laboratory offers hands-on involvement through graduate and undergraduate research positions, NASA projects, and activities related to human spaceflight. This research, led by Dr. Pablo de León, includes space suit prototypes: the North Dakota Experimental-1 (NDX-1) designed for Martian expeditions, the NDX-2 designed for the Lunar surface, and most recently the NDX-2AT used in the Planetary Exploration Initiative tests for extra-vehicular activity. UND is the first university with a NASA-funded laboratory dedicated to designing and constructing space-exploration and planetary surface exploration suits. UND is also the first university with two fully operational spaceflight simulators. These simulators are real-life models of NASA's Apollo command module and SpaceShipOne, both funded by the NDSGC.

In 2009, the laboratory was awarded a large NASA grant for the North Dakota Planetary Exploration Initiative. This initiative was an effort to develop, design, construct, and test an Inflatable Lunar Habitat (ILH) with an attached Pressurized Electric Rover (PER). The ILH consists of a frame surrounded by a "bladder" which protects the habitat from the surrounding atmosphere. The PER was built to have two NDX-2 planetary suits exter-

nally attached that are accessible from inside the rover. The mission of the joined habitat, rover, and planetary suits is to test a conceptual planetary (Moon/Mars) base.

The ILH is a pressurized habitat that can house four people for up to 30 days. There are four bedrooms, a galley, dining area, bathroom with shower and toilet, and a lab area for scientific work. The ILH is attached to the PER via a docking tunnel allowing for pressurized access between them. The PER, equipped with communications antennae and survival supplies, can accommodate two people and is capable of traveling for several hours on a single charge and has a top speed of 25 mph.

The initial testing of the integrated components took place in the fall of 2013, as three UND graduate students lived as the crew members for a ten day mission. These students included Travis Nelson – Commander, Erica Dolinar – Mission Specialist, and Timothy Buli – Science Officer. The focus of the mission was to test out the space suits during EVAs, the PER, the docking tunnel, and the functionality of the ILH, to prepare for future longer duration missions. The crewmembers also recorded their experience over the week and a half as "astronauts" on <http://spacesuitlab.blogspot.com>.

The NDSGC is proud to have been a part of funding this endeavor, which inspires the next generation of scientists, engineers, and explorers, giving them unique, first-hand experience in various aspects of space exploration.



UND Human Spaceflight Laboratory





Annual Affiliates Meeting and Workshops

Annual Space Grant Affiliates Meeting - Bottineau, ND

The 2013 NDSGC Affiliates Meeting was held at Dakota College at Bottineau in Bottineau, ND in May. Presentations included Space Grant funded student research, team projects, faculty research, and STEM education projects from across North Dakota. This was the first time the meeting was held outside of the lead institution in an effort to allow the affiliates to become more involved in Space Grant, as well as show off their campus facilities. This included a tour of the college's greenhouses following the presentations and business meeting. Thank you to affiliates Angie Bartholomay and Larry Brooks for hosting!

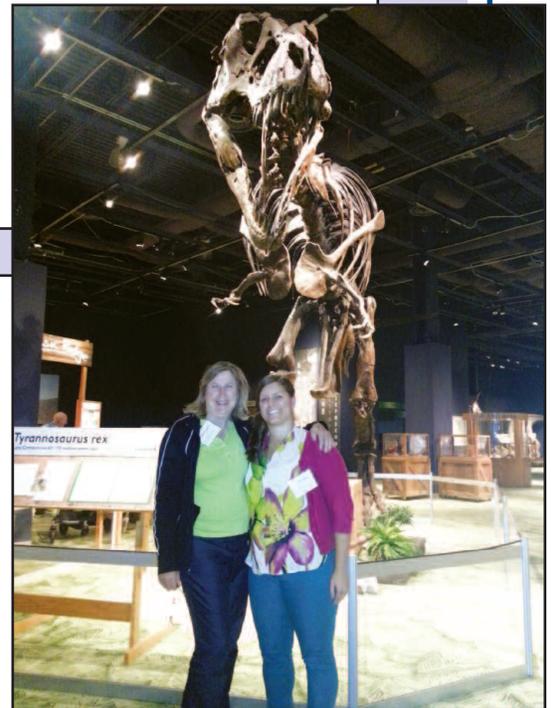


Pre-service Teacher Workshops

The coordinator of NDSGC traveled around the state to conduct various pre-service teacher workshops. These took place at the University of North Dakota, Valley City State University, Dakota College at Bottineau, North Dakota State University, and Turtle Mountain Community College. Education students learned about NASA classroom resources and opportunities for teachers, constructed robot hands, studied space exploration, designed lunar missions, and played board games on space rocks. These workshops allow these future teachers to bring space sciences into the classroom with web resources and hands-on activities.

NASA and Astronomical Society of the Pacific Workshop

Caitlin Nolby was selected to attend the NASA Galileo Educator Network (GEN) Professional Development Institute (PDI) along with affiliate Angie Bartholomay from Dakota College at Bottineau September 28-29, 2013. This workshop was held at the Orlando Science Center in Florida. During the workshop, they participated in hands-on astronomy activities and incorporated the Next Generation Science Standards and the Nature of Science into existing lesson plans. As an outcome of this workshop, materials presented here are being used to implement a similar learning opportunity for teachers, held at the University of North Dakota March 28-29, 2014.



NASA Center Internships



Michael Nies
Langley Research Center
North Dakota State University
Mechanical Engineering



Brian Badders
Ames Research Center
University of North Dakota
Space Studies

Russell Young
Goddard Space
Flight Center
North Dakota
State University
Computer Engineering



Tiffany Swarmer
(pictured with Gene Kranz)
Johnson Space Center
University of North Dakota
Space Studies

These students were funded by the NDSGC to complete internships at a NASA center in the summer of 2013. Some of their research included vibration testing of spacecraft components, the design of missions to the South Pole-Aiken Basin area of the Moon, the investigation of experiment requirements for gravitational loading tests for future spacesuits, and the development of a universal bioreactor platform capable of advanced testing of biological samples on the International Space Station.



Meet an Affiliate

Angie Bartholomay

Dakota College at Bottineau

Angie Bartholomay is a graduate of North Dakota State University – Bottineau Branch with degrees in Forestry / Parks and Recreation. She has a Bachelor of Science in Geology and Environmental Science from Minot State University. She received her Master of Cognate Science from Bemidji State University. Angie taught high school science and coached volleyball, basketball, and track for 32 years before retiring in 2010. She is currently an Associate Professor of Physical Sciences at Dakota College at Bottineau (DCB). While at DCB, she teaches all of the physical science courses and serves as the advisor for the Environmental Technology Program, Pre-Engineering Programs, and the STEM Investigation Team.

She feels very fortunate to receive so many opportunities for herself and her students through the NDSGC. This year she was successful in attaining the NASA Summer of Innovation Grant and the Discovery Dome Loaner Program Grant. This funding was used to support a professional development credit workshop for area K-12 teachers, pre-service training for education majors at DCB and Turtle Mountain Community College, and the DCB STEM Investigation Team Discovery Dome Outreach Project. Angie also received a summer 2013 fellowship to develop an undergraduate research program and received training in Orlando to integrate the common core standards into NASA lessons. One of



her students, Lucas Lindholm was recently accepted to participate in the NASA National Community College Aerospace Scholars Program.

Angie and her husband Scott live in Bottineau. They have two children, Seth and Jessie. Jessie is married to Jared Boehnke and they have a daughter named Bobbi Jo. In Angie's spare time she enjoys quilting, reading, traveling and camping with her family.



Angie and Shelly Hoerer serve as the "Navigation Team" working to prioritize supplies for a mission to the Moon during a workshop funded by the NASA Summer of Innovation Grant. Photo courtesy of the North Central Education Cooperative.

Meet an Affiliate



NASA Discovery Dome

The NASA Discovery Dome Loaner Program is a competitive program open to science museums and planetariums, science centers, Challenger centers, and other community organizations. The dome is an inflatable digital theater which includes a variety of educational presentations on things like stars, planets, dinosaurs, tornadoes, and DNA. As a cooperative effort between Dakota College at Bottineau, the North Central Education Cooperative, Turtle Mountain Community College, and the NDSGC, Angie Bartholomay and her colleagues were able to secure the dome for the fall of 2013. Dr. Patricia H. Reiff, Director of the Rice Space Institute at Rice University in Houston, Texas, traveled to Bottineau, ND to conduct dome training.

As a part of the NASA Summer of Innovation series of workshops, in-service and pre-service teachers were able to learn how to operate the dome and complete lessons with their students at their respective schools. Students at Dakota College at Bottineau also traveled with Angie and her colleagues to bring the dome around the community. Many of the schools are in rural parts of North Dakota, and having this planetarium travel to these small towns over the course of several weeks allowed these students, teachers, and members of the public to be immersed in learning otherwise unavailable to them. Over the course of the dome's travels, over 2,200 individuals in north central North Dakota took part in the program. In surveying those who the dome reached, 94% had never been to a planetarium before, making this a one of a kind experience for them.





Summer Faculty Fellowships

The North Dakota Space Grant Consortium provides summer faculty fellowships so that the teaching of science, technology, engineering and mathematics can be enhanced at North Dakota colleges and universities. New courses can be developed or existing courses can be upgraded to include more space science material. Faculty at all of Space Grant's affiliate institution of higher education are eligible to apply for these fellowships.



Angela Bartholomay
Dakota College
at Bottineau
Courses in
Undergraduate Research



Corinne Brevik
Dickinson State University
*A Constellation of Myth:
A Freshman Experience
Combining Astronomy
and Mythology*
including PHYS 110:
Introductory Astronomy,
PHYS 110L: Introductory
Astronomy Lab, ENGL 232:
Mythology, and ASC 100:
Freshman Seminar

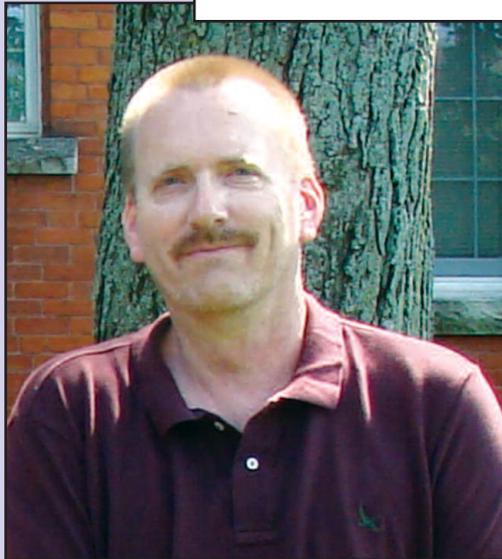
Donald Hoff
Valley City
State University
Geol 100 –
Earth and Space Sciences,
Geol 106 –
Historical Geology,
and Chem 494 and Biol 494 –
Science Teaching Methods



Summer Faculty Fellowships



John Webster
Minot State
University
GEOL 108 – Earth and
Planetary Science



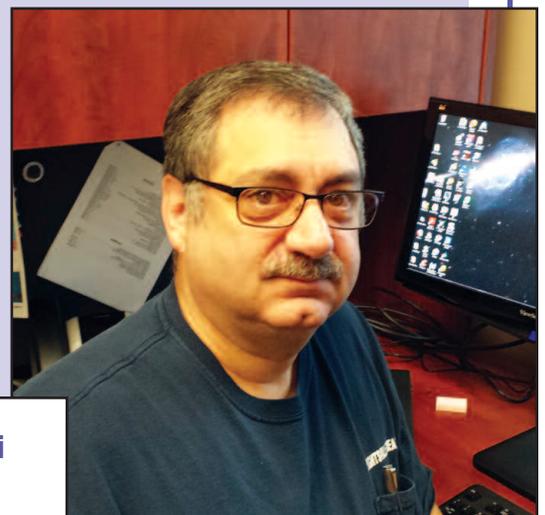
Shannon King
North Dakota State
College of Science
GEOL 108 –
Earth and Planetary Science



Shaun Prince
Lake Region
State College
Precision
Agricultural Program



Students gain hands-on experience in the new precision agriculture program.



Joseph Martinetti
United Tribes
Technical College
Advanced Photogrammetry
and
Remote Sensing with Lab

Travel Grants

The North Dakota Space Grant Consortium provides travel grants to North Dakota college students whose papers or posters have been accepted at regional or national conferences. In most cases their research has been funded by Space Grant and is of interest to NASA. These research projects are part of the plan to develop the nation's science, technology, engineering, and mathematics workforce. The presentations are a means of showing the national academic community the types of research that are occurring in North Dakota.



Marissa Saad
(pictured with Dr. Stephen Ruffin, Director, Georgia Space Grant Consortium)
Space Studies – UND
National Space Grant Meeting
Promoting STEM Education in North Dakota with High Altitude Balloons

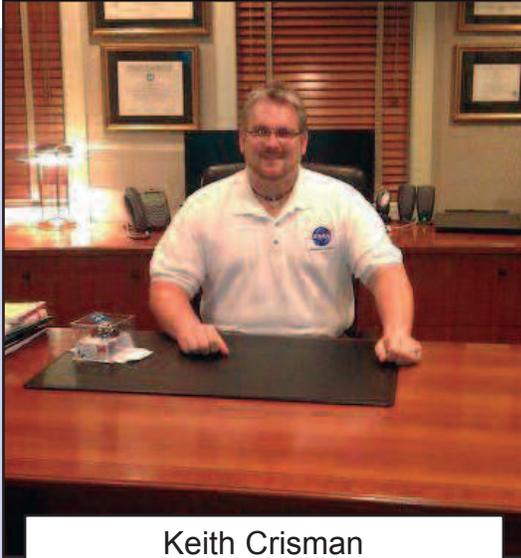


Brian Badders
Space Studies – UND
SpaceVision – Students for the Exploration and Development of Space (SEDS) Conference
Developing Hybrid Near-Space Technologies for Affordable Access to Suborbital Space



Jonathan Schiralli
Space Studies – UND
SpaceVision – Students for the Exploration and Development of Space (SEDS) Conference
A comparison of Solar Prominence data between DOT's H α and SDO's EUV (304A)

Travel Grants



Keith Crisman

Psychology – UND

SpaceVision – Students for the Exploration and Development of Space (SEDS) Conference

Design and Development of a Contained Environment Airlock System and Geologic Sample Return System through Additive Manufacturing



Corey Bergsrud

Electrical Engineering and Psychology – UND

Institute of Electrical and Electronics Engineers Conference

Orbit-to-Ground Wireless Power Transfer Test Mission and Survey of Ground Antenna Systems for Solar Power Satellite Application

Joshua Borchardt

Space Studies – UND

Lunar and Planetary Science Conference

A Comparative Rhizophere and Morphological Study of a Brassica rapa on JSC-1A Lunar Regolith Simulant



Josh Berk

Space Studies - UND

Institute of Electrical and Electronics Engineers Conference and the Lunar and Planetary Science Conference

Open Orbiter: A Platform for Enabling Planetary Science and Space Station 2.0: A Transformational Architecture for Space Development





BISMARCK
STATE COLLEGE

**Bismarck
State College**



**Cankdeska Cikana
Community College**



**Dakota College
at Bottineau**



DICKINSON
STATE UNIVERSITY

**Dickinson
State University**



**Fort Berthold
Community College**



**Gateway to
Science Center**



**Grand Forks
Herald**



**Lake Region
State College**



**Mayville
State University**



**Minot
State University**



**North Dakota State
College of Science**



**North Dakota
State University**



**Sitting Bull
College**



**State Historical Society
of North Dakota**



**Turtle Mountain
Community College**



**United Tribes
Technical College**



**University of
North Dakota**



**Valley City
State University**



**Williston
State College**