NORTH DAKOTA
SPACE GRANT CONSORTIUM

The Aurora

2015/2016

Notes from the Director

North Dakota Space Grant Consortium

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Mayville State University
Minot State University
Valley City State University
Cankdeska Cikana Community College
Nueva Hidatsa Sahnish 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
North Dakota Heritage Center
Gateway to Science Center

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Check us out on Facebook and Twitter!

Cover Photo: West Fargo FIRST Robotics Team at the World Championship (see page 20 for more info) under the Gateway Arch in St. Louis, MO.

Expanding Our Reach in North Dakota

Dear NDSGC Colleagues,

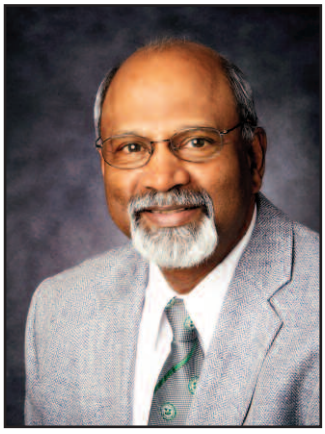
In the last issue of *Aurora,* I wrote about how the space grant program continues to make a difference in the lives of the students we serve, and why we need to reach out to more students. Thanks to your support, and the dedicated work of NDSGC staff, we have expanded our reach considerably during the last year. Before I write more about this, let me introduce to you Ms. Marissa Saad who joined our team last July.


Marissa Saad

Marissa is passionate about STEM education. She is a former UND student completing her MS in Space Studies in 2014, with a thesis titled *"Progressing Science, Technology, Engineering, and Math (STEM) Education in North Dakota through Near-Space Ballooning."* As part of her thesis, Marissa created hands-on exercises involving high altitude ballooning and payload development for middle school children, and integrated her own lessons into the middle school curriculum. Marissa's thesis work involved a strong STEM education component, and as a graduate student she also shouldered the responsibility of being the lead coordinator for NDSGC's Near-Space Balloon Competition involving middle and high school students.

Because of the energy and enthusiasm Caitlin and Marissa bring to our program, we have been able to strengthen and expand our existing activities, particularly the community outreach and K-12 programs, and introduce new activities such as the STEM Ambassador Program. This issue of *Aurora* highlights some of our achievements during the past year. Space Camps and the Bridge Fellowship Program will be introduced next year. We will reach out more to the western part of the state in the coming years.

I would like to take this opportunity to share with you the news that NASA recently released a request for proposals for augmentation funding to which we will be responding soon. With this augmentation funding, and the continuous support from the ND state legislature, the future for the NDSGC's goal of advancing NASA's education priorities of STEM workforce development looks bright.



Thank you all for a great year! I dedicate this issue to the hard work of all our consortium members, and supporters.

Santhosh Seelan

Space Grant Meetings

National Space Grant Meeting - Washington, D.C.

The NDSGC with Senator Hoeven

Dr. Santhosh Seelan, Caitlin Nolby, Dr. Pablo de León, and student Alex Nikle attended the 2015 National Council of NASA Space Grant Directors' Annual Spring Meeting in Washington, D.C. February 25 – 28, 2015. They also met with United States legislators from North Dakota 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. Nikle gave a presentation at the meeting titled, *North Dakota UAS research: Putting the Power of Information Gathering in the Hands of the Farmer*.

The NDSGC with Senator Heitkamp

National Fall Meeting - Tucson, Arizona

The fall 2015 National Space Grant Meeting was hosted by the Arizona Space Grant Consortium from September 29-October 4, 2015. Graduate student in Space Studies at the University of North Dakota, Kam Yee, gave a presentation titled, *STEM Programs Unwrapped*. She presented her thesis work on STEM complementary learning programs with a focus on inclusive teaching strategies for girls of color. The NDSGC also attended a tour of the Kitt Peak National Observatory and the EPSCoR Meeting atop Mt. Hopkins Peak, visiting Whipple Observatory. Thank you to the AZSGC for hosting!

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 enhancement and faculty development. Member colleges and universities also administer pre-college and public service education projects in their states.

National Student Competitions

UND Rocketry team on NASA TV during the competition.

NASA Student Launch

The University of North Dakota's Frozen Fury Rocketry Team designed and constructed a high-power rocket which competed in NASA's Student Launch Competition in April 2015 in Huntsville, AL near NASA's Marshall Space Flight Center. Along with designing and building the rocket and payloads, UND students had to develop a website, reach more than 100 middle school students through outreach, and fund raise. This year the payload was a robotic launch system called MAV or Mars Assent Vehicle. It was sponsored by the Centennial Challenge in which the teams had to retrieve a remote sample by grabbing it, inserting it into the rocket, sealing the rocket payload, raising the rocket to launching position, and inserting the ignition wire into the motor, all robotically with only one initial push of a button. In addition, the robotic process had to be able to halt at any time when signaled by the judges and then resume.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. UND's MAV worked well but did not receive an award. During the raising of the rocket the launch rail stalled and disqualified the team. The rocket reached 3,043 feet and came down with the deployment of the payload in a separate piece. Faculty lead was Dr. Tim Young with student participants: Jacob Teffs, Sofiane Chaieb, Kyle Pletan, Jeff Gendreau, Nathan Carlson, Gregory Foote, Nikolai Verbitsky, Haylee Archer, Rebecca Larson, and Xuchu Xu.

Robotics Mining Competition

The University of North Dakota RAPTOR (Robot Automated for the Procurement and Transport of Regolith) team competed in the 6th Annual Robotic Mining Competition in May 2015 at the Kennedy Space Center. The team took 4th place out of a total of 50 teams from across the country. Team RAPTOR also took 1st place in the outreach component of the competition, which included presentations and hands-on activities with K-12 students. Team members also served as mentors for the local First Lego League Tournament and the NATURE program, which serves students at Tribal schools and colleges in the state. Team members include: Dustin Rudnick, Jacob Berry, Tate Messmer, Nicholas Allen, Austin Cote, Kyle Kunke, Pushkara Jayasekera, Anne Mayer, Alec Redmann, Jordan Senff, and Luke Spray. Advisors for the team are Dr. Jeremiah Neubert and Dr. Naima Kaabouch.

Team RAPTOR at the 2015 competition.

Team members allow students a hands-on experience with robot components.

National Student Competitions

NASA Rover Challenge

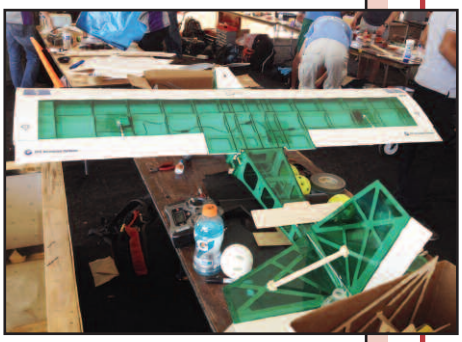
A team of North Dakota State University Mechanical Engineering students competed in NASA's Human Exploration Rover Challenge organized by NASA's Marshall Space Flight Center in Huntsville, Alabama in April 2015. The challenge requires students to race human-powered rovers through a Lunar/Martian-themed obstacle course at the U.S. Space and Rocket Center, with goals of furthering knowledge for future NASA missions. A total of 95 teams competed, from 15 states and 5 other countries. Students participated in the competition as part of their Capstone Senior Design Project Although the NDSU team experienced challenges during the competition, the team came together to successfully cross the finish line. The faculty lead was Dr. Ghodrat Karami with student participants: Kartik Joon, Nabin Karki, Andrew Norris Joe Rogers, and Amanda Sys.

NDSU team members with the vehicle at the 2015 Competition.

NDSU team at the 2015 competition.

AIAA Design Build Fly

The North Dakota State University American Institution of Aeronautics and Astronautics (AIAA) student team competed in the 19th annual Design, Build, Fly Competition in Tucson, AZ in April 2015, earning 56th place. The 2015 challenge included more than 650 students from across the world, participating in a Timed Ferry Flight, a Maximum Load Mission, an Emergency Medical Mission, and a Ground Taxi Mission. The NDSU team successfully completed the first mission, but during the second, the aircraft experienced an irreparable crash landing. The team took this as an opportunity to learn and improve next year's design. The faculty lead was Dr. Bora Suzen with student participants: Ryan Solstad, Jake Williams, Matthew Sharpe, and Eric Cochrane. The NDSGC also funded a trip for the team to travel to Fort Collins, CO in February 2015 to test out an early design of the aircraft.



NDSU team's 2015 aircraft.

HASP

The High Altitude Student Platform (HASP) is a student competition put together by NASA and the Louisiana Space Grant Consortium that allows for 12 student-built instruments to be flown on each mission. The University of North Dakota and the University of North Florida teams have collaboratively flown together since 2008. This year's UND team was led by faculty member Dr. Ron Fevig. The UND/UNF payload consisted of nano-crystalline sensor arrays which measured the ozone profile in the stratosphere. The launch was on 7:47 AM (CST) on September 7, 2015 on a zero pressure balloon, out of the Columbia Scientific Balloon Facility in Ft Sumner, New Mexico with a float time of ~23 hours. You can read more about the UND/UNF payload here: http://goo.gl/RzY2BF.

View from altitude of 2015 HASP launch.

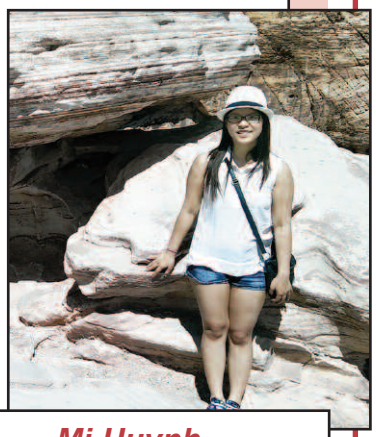
NDSGC Scholarships

Lillian Goettler Scholarship

Michelle is a Junior in Electrical Engineering at NDSU with a Biomedical Focus. During the 2014-2015 academic year, she interned at John Deere Electronic Solutions in Fargo, ND and during the summer of 2015, she interned at Pacific Gas and Electric in San Francisco, CA. At NDSU, her involvement included Student Government, Society of Women Engineers, and TechGYRLS. In her free time, Michelle enjoys reading, traveling, scuba diving and spending time with her family and friends. After earning her master's degree in Business Administration, Michelle hopes to work for Medtronic, a top biomedical company with headquarters in the Twin Cities helping create devices that have the ability to save lives.

Michelle Sauvageau
Electrical Engineering
North Dakota State University

"Ever since I was a child, I have had an interest in mathematics and technology. Although my brother is four years older than me, we have always been close. During the summers of his years in college, he introduced to me what he learned in the field of computer science. I remember being amazed by what a few simple lines of code can do. Furthermore, math is a fundamental tool in computing, so the two fields fit perfectly. After high school, I started taking courses at North Dakota State University as a double major in Computer Science and Mathematics. Beyond the classroom, I am also a member of the Association of Computing Machinery (ACM) and Students & Technology in Academia, Research and Service (STARS). These organizations have given me an exciting, challenging, and enriching experience. They have presented opportunities to me such as networking, competing in computing competitions, and building strong relationships with other students. These experiences are a fundamental component in my journey to become a software engineer. In my spare time, I enjoy reading, hiking, solving puzzles, playing games, and spending time with my family and friends."



Mi Huynh
Computer Science & Mathematics
North Dakota State University

Pearl I. Young Scholarship

"Since stepping on board my first flight at the age of seven, I knew that I wanted to follow my aunt and uncle's footsteps in becoming a pilot. However, I had always been warned to not solely major in Commercial Aviation, due to the various factors that can cause a pilot's medical certificate to be revoked. Math has always been my strongest subject, so I knew that I would double major in Mathematics. I had mainly looked into aviation colleges, but realized that I would not have the opportunity to explore other fields. Once discovering the University of North Dakota, I knew that it was perfect for my path. Furthermore, I tutored math during high school for three years, and I know that I will be able to apply those gained teaching skills when I become a Certified Flight Instructor. Although I foresee a career in aviation, I am open to exploring careers in math. Recently, I was accepted to a math research program at Valparaiso University, where I will be studying Pattern Avoidance in Symmetric Words this summer. I strive to inspire others to find more than one passion, like my aunt and uncle did for me, and I am so thankful for the Pearl I. Young scholarship that will lead me one step closer to my career."

Marika Diepenbroek
Commercial Aviation & Mathematics
University of North Dakota

"I am originally from Ely, MN, and currently a junior in Atmospheric Sciences at UND. I am a member of UND's German Club, Lion's Club, Newman Center activities, UND Weather Update, and my personal favorite, the UND student chapter of the American Meteorological Society (AMS). As a member of the UND AMS outreach committee, I truly love teaching children about weather at local science fairs and other events. I am an avid sports fan (my favorite football team is the Minnesota Vikings), and in my spare time, I enjoy staying active and traveling. My involvement with the German Club allowed me to travel to Europe recently, and I loved learning about other cultures throughout the trip. After graduation, I plan to attend graduate school and then pursue a career in long-range outlooks in the private sector of meteorology, perhaps as a forecaster."

Janelle Hakala
Atmospheric Sciences
University of North Dakota

NDSGC Scholarships

Every academic year, Space Grant provides each of the affiliate two year, four year, and Tribal 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.

Congratulations to this year's scholarship recipients!

Bismarck State College
Carlie Borchers
Sydney Gangle
Levi Kinn
Candi Yates

Cankdeska Cikana Community College
Nashanda Bercier
Danae Black
Mary Cavanaugh
Megan Charboneau
Allura LaRoque
Colten LaRoque
David Mattson
Moriah Thompson

Dakota College at Bottineau
Frank Flight
Mattie Schmitt
Amber Tikasky

Lake Region State College
Sydney Gjermundson
Eric Gullicks
Randall Heck
Jessica Johanson
Ulysses Jones
Clay Montag
Carrie Nienhuis
Alexander Olson
Andrew Rose

Minot State University
Alex Buchholz
Inga Dudley
Ismail Hassan
Rachel Holmes
Miles Knudsvig
Suzannah Miller
Ana Lucia Swor
Dennis Urmacher

North Dakota State College of Science
Joshua Barsness
Trevor Bresin
Matthew Glen
Taylor Heinz
Kayla Karels
Darcy Jilek
Jacob Lagasse
Colin Marum
Matthew Niess
Davis Nyariki
Issac Rutten
Nathan Schmit
Daniel Tuckett Jr.
Ethan Wang
Theresa Zach

Nueta Hidatsa Sahnish College
Eugenia Kirk
Vicki Alberts
Ira Jones
Flo Laducer-Garrett
Sonya Abe

Valley City State University
Alex Askerooth
Michael Block
Benjamin Holen
Tanner Hovland
Jacob Johnson
Richard Langdeaux
Alexis Lennon
Logan Olesen
Clarissa Olson
Jacob Schlecht
Justin Tangen
Katelyn Willer
Hayden Zander

Williston State College
Nicholas Attigah
Kyle Gerding
Grant Haataja
MacKenzie Huygens
Emma Keller
Paul Jacobson II
Don Johnson
Daniel Plucknett

Career Fairs

To increase awareness of Space Grant opportunities, the NDSGC participates in career fairs at affiliate institutions throughout the state. The NDSGC attended college fairs at the University of North Dakota, Williston State College, and the MHA United Nations College Fair (Nueta Hidatsa Sahnish Community College) in 2015. More than 300 students were present at these fairs. The Deputy Director and Coordinator were also given the opportunity to speak to all students in attendance at the MHA Nations College Fair, to inspire them to follow their passion through to completion of not only a high school degree, but also a college degree in a STEM field. As the Tribal community in the New Town area has an unfortunately high dropout rate, there are plans to increase the NDSGC presence here, through more educator workshops, and school visits throughout 2016.

Research Fellowships

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

Haylee Archer

Dwarf Galaxy Alignment

University of North Dakota

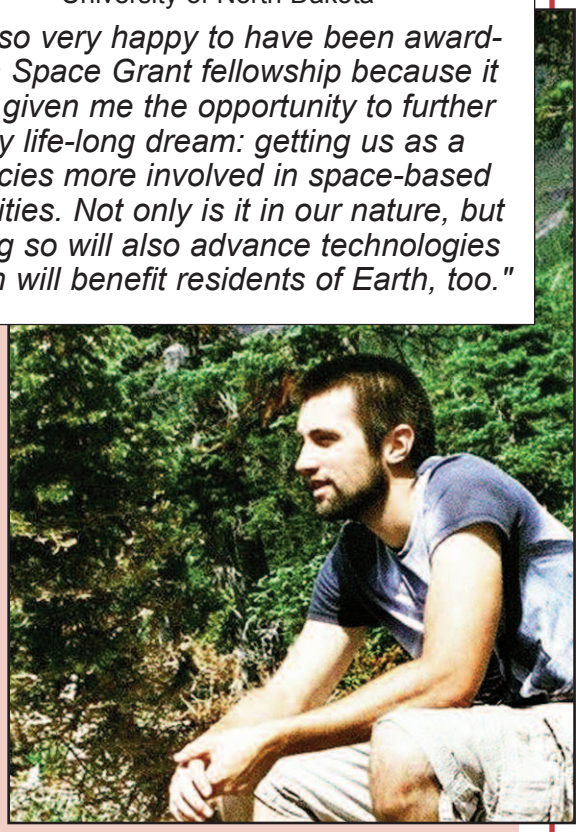
"The opportunity that I have been given by receiving a Summer Research Fellowship has reinforced my love of astronomy and proved to myself that I chose the right career path."

Chris Buelke

A Lunar LOX Production Facility Feasibility Study

University of North Dakota

"I'm so very happy to have been awarded a Space Grant fellowship because it has given me the opportunity to further my life-long dream: getting us as a species more involved in space-based activities. Not only is it in our nature, but doing so will also advance technologies which will benefit residents of Earth, too."

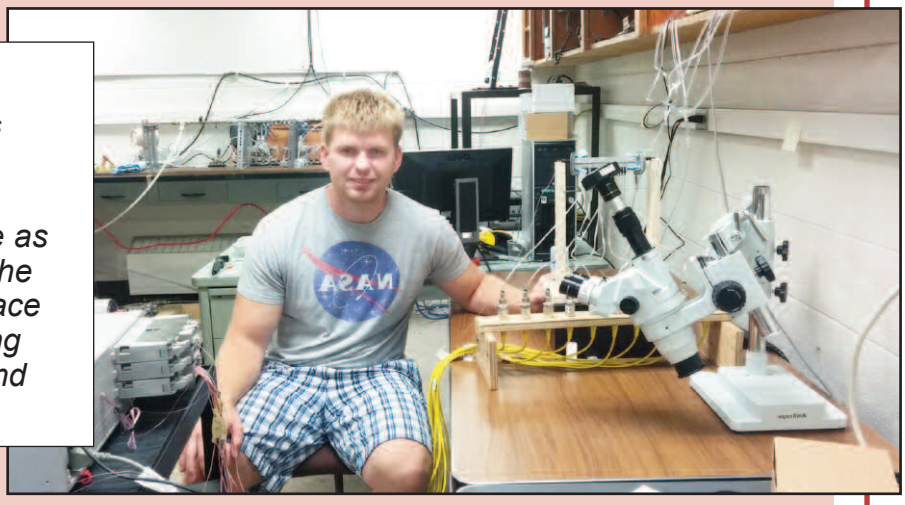


Daniel Berg

Friction Loss for Fluid Flow in Various Miniature Channel Applications

University of North Dakota

"I have been fascinated with space as long I can remember. Thanks to the generous support provided by Space Grant, I was able to fulfil a lifelong dream of contributing to NASA and space research."



Research Fellowships

Lawrence Burkett

A Sustainable Tuvalu

University of North Dakota

"With support from NASA, I was able to study environmental issues in Tuvalu - a remote island nation in the South Pacific made up of several atolls and a heritage that spans several thousand years. Hopefully, my efforts will help Tuvaluans live sustainably ... while helping me earn my doctoral degree."

Maison Davis

STEM Outreach

University of North Dakota

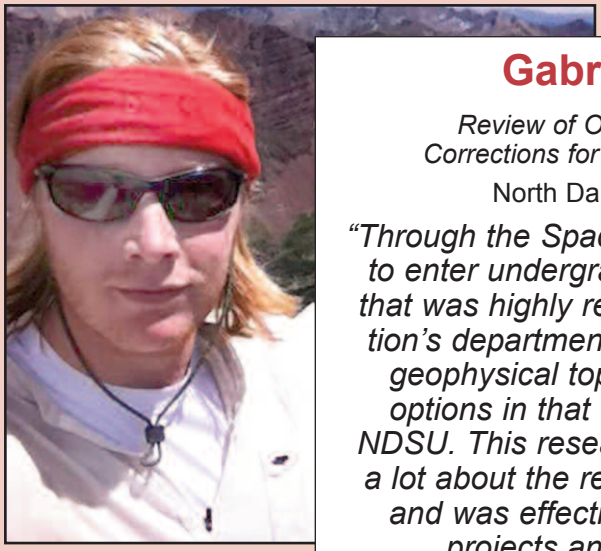
"I would have been unable to lend my time to helping with this important project without the assistance of NASA Space Grant, and the University of North Dakota. The funding provided allowed me to do a small part in sharing my passion for STEM with young members of the community, and hopefully inspire students to pursue their interests in these fields in the future."

Lauren Clarke

Analysis of Simulating Radiation and Chemical In-stability During Atmospheric Re-entry

University of North Dakota

"I am grateful for the experience I received through the ND Space Grant Program in allowing me to take the concepts I've learned in my classes and apply them following my own plan. I am a step ahead in my research skills which will be crucial as I pursue a Master of Science in Chemical Engineering."



Gabriel Ferragut

Review of Optical Dating Literature: Corrections for Phase of Interstitial Water

North Dakota State University

"Through the Space Grant funding I was able to enter undergraduate research in a topic that was highly relevant to my home institution's departmental research and pursue a geophysical topic despite my academic options in that direction being limited at NDSU. This research experience taught me a lot about the real world scientific process and was effective preparation for future projects and further education."

Research Fellowships

Patrick Froehle

Flexible Antennas for Space Monitoring and Communication Systems

University of North Dakota

"This fellowship research enhanced my RF and communication engineering knowledge, and has provided me a jump start into my current career as a systems engineer in the communications department of a leading aerospace company."

Breanne Hatfield

Existence and Uniqueness of Projectile Motion Model

Minot State University

"The research project funded by the NASA Space Grant opened my eyes to mathematical application within the STEM field. I am grateful to say I am one step closer to my career goals and will continue to expand my education outside the classroom."

Amanda Hernandez

Selection and Characterization of the Kepler Spacecraft's Objects of Interest and Exoplanet Candidates

University of North Dakota

"The study of exoplanets is exactly what I hoped to do when deciding to come to the University of North Dakota. I am truly grateful for the opportunities that the North Dakota Space Grant Consortium has given me to pursue my goals and to contribute to the Kepler Project."

Jacob Huesman

Converting 3D Point Cloud Data into 2D Occupancy Grids Suitable for Robot Applications

North Dakota State University

"The North Dakota Space Grant Consortium Research Fellowship was an amazing opportunity to pursue my passion for robotics and space. I learned a ton over this summer and feel better prepared to pursue projects in the field."

Research Fellowships

Miranda Huether

Urban Heat Island Effect in Dickinson, North Dakota

Dickinson State University

"The Space Grant funded my undergraduate research project which allowed me to enhance my skills in designing scientific experiments, analyzing data, and writing research papers. These are important skills that I will use throughout my career."

David Kim

Aerodynamics Research using a Piper PA12 Aircraft

University of North Dakota

"Without Space Grant, I would not have been able to conduct this valuable research and gain knowledge in the field. It was a unique opportunity to build my career as a pilot, and will definitely help me work toward a commercial pilot certificate in the near future."

Dalten Kuhn

Light Pollution in Western North Dakota due to Regional Oil Development

Dickinson State University

"My involvement with the NASA Summer Research Fellowship program has given me a great appreciation for the work it takes to conduct scientific studies. It takes a lot of effort to produce accurate and revealing results which represent the phenomenon being studied, and with this opportunity I was able to better my skills as a scientist."

Research Fellowships

Kaitlynn Meis

Decoding of regulatory logic and network reconstruction of hematopoietic genes

University of North Dakota

"With the support of this program, I was able to obtain research experience in the exact field I would like to pursue, systems biology. I gained knowledge of an important overarching topic in the field of biology, began my computer programming career with exposure to multiple languages, furthered my research experience, gained valuable connections with faculty and students, and improved my problem solving and critical thinking skills, all of which will help me to excel in future academic and research goals."

Sean McCloat

High Altitude Ballooning "Mega Launch" with Schroeder Middle School

University of North Dakota

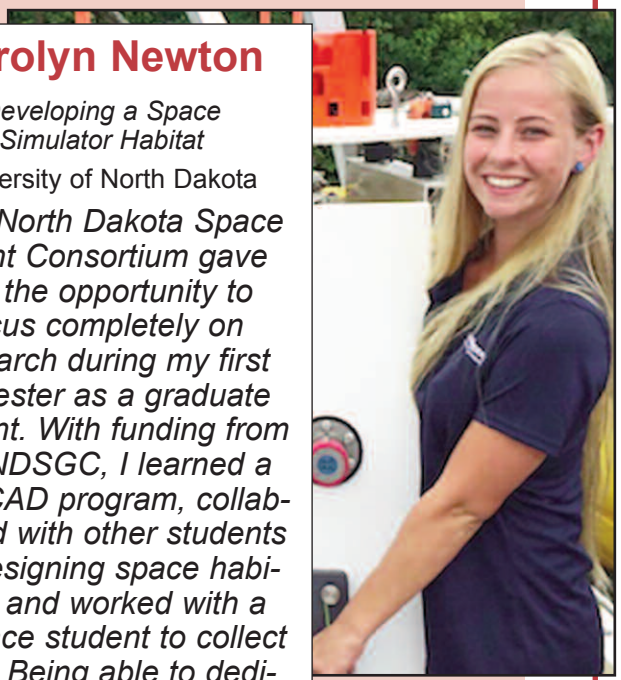
"This project has immensely expanded my STEM education background, which was previously limited to planetarium lecturing. It has encouraged me to consider future STEM E/PO work in my future studies and long term goals."

Suzannah Miller

Mathematical Modeling of Planetary Motion

Minot State University

"The North Dakota Space Grant allowed me to explore my interests in math research while pursuing an undergraduate degree in chemistry. Exploring a topic rich in mathematics and physics helped me broaden my knowledge of the physical sciences while deepening my understanding of calculus-based mathematics."



Carolyn Newton

Developing a Space Simulator Habitat

University of North Dakota

"The North Dakota Space Grant Consortium gave me the opportunity to focus completely on research during my first semester as a graduate student. With funding from the NDSGC, I learned a new CAD program, collaborated with other students on designing space habitats, and worked with a distance student to collect data. Being able to dedicate time to learning new tools and research responsibilities, reinforced my passion for the future of human spaceflight."

Research Fellowships

Luke Novak

Computational Fluid Dynamics Model Improvement Investigation for Turbine Aerodynamics

North Dakota State University

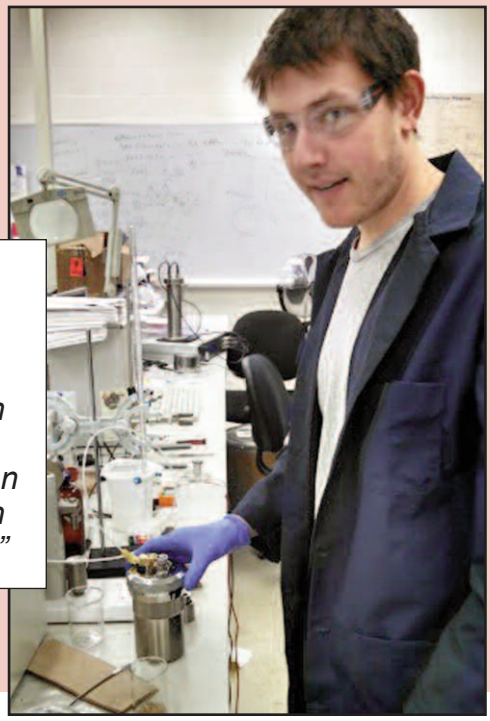
"With the funding provided through this Space Grant Fellowship, I have been able to pursue research that interests me and will allow me to obtain an advanced degree in aerodynamics and computational engineering. The research I have done has been challenging, but rewarding, and I look forward to advancing engineering by the use of computational methods in the future."

Dallas Peterson

Radon Detection

Valley City State University

"The experience provided by the Space Grant is extremely beneficial for my software engineering knowledge. I will rely heavily upon this wonderful experience in my future career as a software engineer."



Tyler Peterson

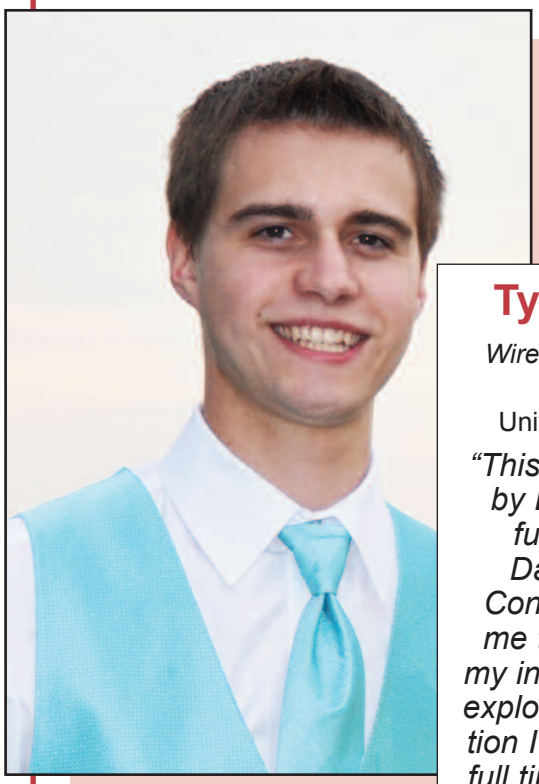
Agricultural Wates as Solid Biofuel

North Dakota State University

"My fellowship from the Space Grant Consortium has allowed me to develop my skills as a researcher. The practices I learned, not to mention my experimental results, will benefit my career in research or design for the long term. Thank you!"

Peterson establishes the energy value of cotton products using bomb calorimetry.

Research Fellowships



Tyler Przybylski

Wireless Body Area Network Hardware Systems

University of North Dakota

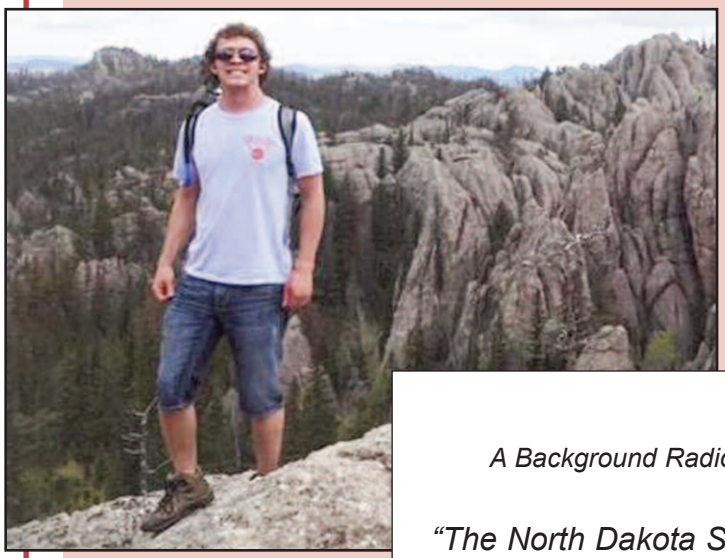
"This opportunity provided by Dr. Fazel-Rezai and funded by the North Dakota Space Grant Consortium has allowed me to continue pursuing my interests in deep space exploration. Since graduation I have started working full time for United Launch Alliance, working on future national security and NASA missions such as Mars Insight."

Justin Tangen

Using Side Scanning Sonar to Map Bottom Substrate Features on North Dakota Rivers

Valley City State Unversity

"I would like to personally thank NASA, North Dakota Space Grant, the University of North Dakota, and Valley City State University for giving me the opportunity to be able to go into the field and learn hands on. It has given me a deeper understanding of the local water systems of the local rivers and how they are able to interact with their environments. This experience has not only taught me valuable lessons but will help benefit my future in the science field."



Dylan Young

A Background Radiogenic Analysis of the Black Hills, South Dakota

University of North Dakota

"The North Dakota Space Grant enabled most of my research to be achievable, due to the scarcity of funding in my field of interest. The funding will allow me to finish my Master's degree. The funding also played a key role in gaining vital data towards future studies in geology and geothermal energy, physics, and for NASA."

STEM Ambassador Program

The North Dakota Space Grant Consortium (NDSGC) is excited to begin a new Science, Technology, Engineering, and Math (STEM) Ambassador program for undergraduate and graduate students. Starting in the fall semester of 2015, STEM Ambassadors have assisted the NDSGC with public outreach events, hands-on projects, and K-12 educational activities.

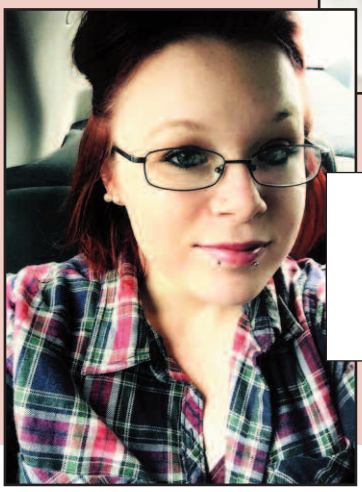
Some of the past events have included the Lunar Night at the East Grand Forks Library, the Near-Space Balloon Competition, and the FIRST Lego League Tournament. They also visited and taught space lessons to K-12 classes in preparation for the Amateur Radio on the International Space Station (ARISS) Contact, taking place in March 2016.

Amy Densborn
University of North Dakota
Graduate Student
Earth System, Science and Policy

Jennifer Grinsteiner
University of North Dakota
Undergraduate Student
Petroleum Engineering

Hope Gutschmidt
Mayville State University
Undergraduate Student
Elementary Education

Janelle Hakala
University of North Dakota
Undergraduate Student
Atmospheric Science



Sheyanne Jerome
Lake Region State College
Undergraduate Student
Precision Agriculture

Community Outreach Events

Library Outreach

The Space Grant team led multiple space-related outreach events at the Grand Forks and East Grand Forks libraries. UND Space Studies graduate students, STEM Ambassadors, and the Space Grant team conducted sessions on the Moon, Mars, and asteroids for the general public. The NDSGC also participated in a special viewing event for the fall 2015 lunar eclipse. Many of these events occurred through partnership with the Dakota Science Center, including summer field trips for elementary students to participate in stomp rocket construction and launches. Roughly 300 members of the general public attended these events throughout the year.

Tours of the UND HSFL

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 special tours for the Board of Directors of the UND Alumni Association, ND Science and Engineering Fair students, Girl Scouts, and NSBC's winning team from MayPort High School. More than 450 students, teachers, and members of the public attended tours of the Human Space Flight Laboratories in 2015.

Westwood Intermediate students are pumped about their space missions!

Classroom Visits

Throughout the school year, the NDSGC team makes visits to classrooms statewide and conducts hands-on activities with students grades K-12. In 2015, this included visits to schools in Grand Forks and Valley City. Through Skype, the Deputy Director and Coordinator were also able to answer Minnesota 4th graders' questions about space, and show students meteorites and space suits, as the students were to tasked with designing crewed planetary missions. Other investigations included parachute building, discovering new planets, and the mathematics of solar energy. Through the new STEM Ambassador program, the NDSGC hopes to expand its reach at the K-12 level in coming years. In 2015, more than 200 students were reached through these efforts.

Elementary students in Valley City test out parachute designs.

St. Catherine students design the next phase of their mission in the "Strange New Planet" activity.

Community Outreach Events

K-12 Space Camp

In July of 2015, the NDSGC participated in UND's Young Scientists and Engineers Academy organized by the Dakota Science Center and the College of Engineering and Mines. Students grades 2-8 attended one of two sessions which included tours of the Aerospace facilities, an interactive conversation with Glenn Research Center on human space exploration through NASA's Digital Learning Network, and a hands-on investigation on neutral buoyancy. Roughly 50 students were reached through these camps.

Community-Organized Events

The NDSGC was invited to participate in many outreach events throughout 2015. In the spring, Space Grant helped 7th graders explore new worlds at Marketplace for Kids in Grafton, ND, built parachutes with elementary students at Super Science Day in Grand Forks, ND, and investigated Jupiter's storms with 5th and 6th grade students at the Water Festival in Bottineau, ND. The NDSGC also supported the ND FIRST LEGO League Championship Tournament with funding for students' kits. Throughout the year, the NDSGC also formed a partnership with North Dakota Vision Services/School for the Blind (NDVS/SB) and worked with groups of students ages 6-13 on lunar phases, solar system distance scales, meteorites, and space suits. Students who participate in these NDVS/SB week-long programs come from around the state and Northern MN. Nearly 800 students participated in these activities.

Students create eddies to understand storms in the atmosphere of Jupiter during a session at the Water Festival.

Students learn about aerodynamics while designing parachutes at Super Science Day.

Trip to the Capital

The NDSGC traveled to Bismarck, ND in April 2015 to share program highlights over the previous biennium with state legislators and capitol visitors. UND student Sean McCloat also attended the event, to showcase his work with K-12 students in high altitude ballooning. The trip was a success, as many student groups and policy makers stopped by the booth to learn about Space Grant opportunities throughout the day.

Pictured from left to right: Senator Ray Holmberg, Space Studies graduate student Sean McCloat, NDSGC Deputy Director Caitlin Nolby, Governor Jack Dalrymple, and NDSGC Director Santhosh Seelan

NSBC 2015

On November 21, 2015, the NDSGC held their fifth annual Near-Space Balloon Competition (NSBC) in Grand Forks, North Dakota. The NSBC is a statewide middle and high school student launch competition, where students gain hands-on experience with the scientific and engineering design process. Students defined a hypothesis, designed, constructed, and launched a payload to near space. After the payload returned back to Earth from the stratosphere, the students analyzed their data and produced a final report. This year's NSBC objective was to design a payload that would fly on a precursor mission to Mars, aligning to NASA's science mission directorate.

On launch day, the UND graduate student team sent a 1500-gram latex balloon filled with helium to an altitude of 103,000 feet above sea level, carrying four student-built payloads. The payload train landed in northeastern Minnesota (47.36573, -96.03775), approximately 90 minutes after lift-off.

There were two high school teams participating in the competition: Kindred High School (from Kindred, ND) and Shiloh Christian School (from Bismarck, ND). The Kindred team studied insulation properties of three different materials, surrounding cress and rye plants. Shiloh Christian School also studied how the change in temperature and pressure affected the insulation properties with hand warmers. Both schools compared their research to the future human exploration missions to Mars, where insulation materials are vital to both humans and machinery.

Two other payloads were designed by Bismarck State College (BSC) students. Apart from the competition, these college students served as mentors to the high school students, displaying two college-level design projects. The two BSC payloads included an ozone, pressure, inside-temperature, and outside-temperature sensor. In addition, the NDSGC launched one of their own GoPro cameras and three graduate student GoPro cameras.

The grand prize winner, Kindred High School, won the opportunity to participate in an NDSGC sponsored STEM-activity (ex. Gateway to Science Center, Fargo Air Museum, etc.) or a trip to the John D. Odegard School of Aerospace Sciences at the University of North Dakota. The trip to UND includes a tour of the Aviation facilities (including a high altitude chamber), Spacesuit Lab, spacecraft simulators, and the UND Observatory.

Additionally, Kindred team members will ask astronauts questions at the NDSGC March 2016 amateur radio contact event, held at UND, after contact is established with the International Space Station.

NDSGC reimburses all payload construction costs, up to $250.00 per team. Teams' travel and lodging is reimbursed, as well. The NSBC comes at no cost to the schools, which incentivizes participation in this engaging inquiry-based learning opportunity. Students and teachers find this design project fun, educational, and exciting; many return year after year. The imagery they bring back marvels everyone – the curvature of the Earth, the darkness of space, and the appearance of the thin blue atmosphere. Students realize that anyone can be a scientist – you don't have to work solely for NASA – but with this experience, you may just end up down that career path one day.

The students' mission objective was to design a payload that would assist future astronauts in their journey to Mars. This balloon-borne precursor mission aligns with NASA's science goals in the long-term Mars Exploration Program. Students realize that anyone can be a scientist – you don't have to work solely for NASA – but with this experience, you may just end up down that career path one day.

Thank you to all UND volunteers, teachers, students, and their communities, and congratulations to all teams involved!

First Place: Kindred High School (team *Cubed to the Fourth*)

2nd Place: Shiloh Christian School (team *$hiloh $hockers*)

NSBC 2015

NORTH DAKOTA SPACE GRANT CONSORTIUM

Check out the NSBC website!

103,000 feet above sea level

Space Studies graduate students fill the balloon.

Kindred NSBC team members work together to finalize their payload.

Image taken by Juan Pedraza

The “forks” of the Grand Forks Rivers

K-12 Programs

FIRST Robotics

In 2015, the NDSGC supported three high school teams to compete in the *For Inspiration and Recognition of Science and Technology* (FIRST) Robotics Competition. Lisa Ramey is the faculty mentor for Northstar Robotics Team 877, Mike Voglewede is the Hatton-Northwood Thunder Robotics Team 876 mentor, and Brad Mackowick is the faculty mentor for West Fargo FIRST Robotics Team 4818, The Herd. This competition gives students hands-on experience in design, construction, and testing of a robot, and involves countless community volunteers as well. All teams also worked on STEM outreach initiatives throughout the school year. Both West Fargo and Northwood teams qualified for the World Championship this year, through exemplary work at Regionals. Thunder Robotics won the sought-after Engineering Inspiration Award at Regionals in Peoria, IL. The West Fargo team even won 1st place in the Regional Championship in Duluth, MN! Congratulations to all teams on an impressive season!

West Fargo Robotics Team


Cando Robotics Team


Thunder Robotics Team

Schroeder Middle School "Mega-Launch"

During the 2015 spring semester, UND Space Studies graduate students from the UND AESIR (Atmospheric and Educational Student-Initiated Research) Ballooning Program worked with 20 teams of 8th graders at Schroeder Middle School in Grand Forks, ND to help students design and build payloads for a grade-wide high altitude balloon launch that took place April 29, 2015. This was the third time the NDSGC supported the participation of an entire 8th grade class in high altitude ballooning. In 2015, the event was also entered into the Global Space Balloon Competition (GSBC) for highest number of payloads flown for a single event. Experiments included studies of plant growth, microbial growth, atmospheric measurements, and the expansion of gasses. More than 150 students were reached through this program.

Graduate students prepare Balloon #1 for launch.


Graduate students explain balloon launch steps to Schroeder Middle School students prior to launch.

Affiliate Involvement

Attendees of 2015 Annual Affiliates Meeting

Annual Affiliates Meeting

The 2015 NDSGC Affiliates Meeting was held at Lake Region State College in Devils Lake, ND in May. Presentations included Space Grant funded student research, team projects, faculty research, and funded STEM education projects from across North Dakota. Attendees also participated in a hands-on competition of designing a safe container for a lightbulb drop, using only Legos. (Thank you to the Colorado Space Grant Consortium for the idea!) The schedule for the meeting along with research presentation downloads can be found here: http://goo.gl/rwF6L0

Lego drop competition in action.

Winning team in Lego Drop Competition.

Educator Professional Development

SEEC 2015

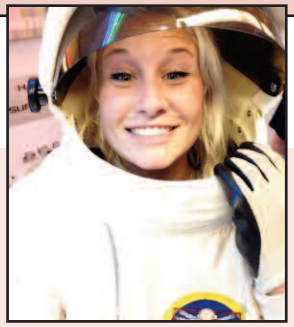
In February 2015, the NDSGC supported educator Tonya Greywind, from West Fargo, ND, to attend the 21st Annual Space Exploration Educators Conference (SEEC) at Space Center Houston to participate in hands-on STEM sessions.

"Not only did this experience provide me with an opportunity to learn about the wonderful things that NASA is doing, but it provided me the sense of belonging to a group of teachers with a greater purpose, essentially to feel as though I am part of something bigger and reinforcing to me that I have not only the power, but the duty to share this with my students." - Tonya Greywind, Science/STEM Teacher, North Dakota Center for Distance Education

Teacher Space Camp

The NDSGC supported three North Dakota teachers to attend Space Academy for Educators at the U.S. Space and Rocket Center in the summer of 2015. As a result of their participation in "space camp," they are now more equipped to include hands-on, NASA relevant, investigations in their classrooms, and encourage their students to pursue careers in STEM fields.

Tonya Greywind
Science/STEM Teacher
North Dakota Center
for Distance Education
"It was definitely one of the best experiences of my life. With my students, I want to use all of the things that I got to try to build some sort of module… Even if it's just a little taste of what NASA has to offer."



Ellen Krueger
Elementary Education Graduate
University of North Dakota
"Overall my experience at Space Camp was incredible, and something that I will remember for the rest of my life. It was a great way to become inspired in the classroom, collaborate with other teachers from all over the world, gain resources, and also have a blast!"

Peter Sykora
Science Instructor
Ellendale School District
"The missions we completed challenged us with various types of problems that required teamwork and critical thinking in order the solve the problems and have a successful mission. I had a great time, and made some incredible friends, including networking and learning from each other. It's a great experience for any teacher."

Valley City State University students work to design a neutrally buoyant object.

Pre-Service Workshops

The NDSGC Deputy Director and Coordinator conducted various pre-service teacher workshops throughout 2015. These took place at the University of North Dakota, Valley City State University, and North Dakota State University. Education students learned about NASA classroom resources and opportunities for them as teachers, constructed a neutrally buoyant tool for an astronaut, studied space exploration, and designed missions to nearby planets. These workshops allow these future teachers to bring space sciences into the classroom with web resources and hands-on activities.

In-Service Teaching

The NDSGC Deputy Director and Coordinator traveled around the state to conduct multiple in-service teacher workshops. These workshops took place at the Dakota College at Bottineau and Mayville State University. Veteran teachers gain additional space education lesson plans for their classrooms, participating in the activities themselves. These teachers learned about NASA classroom resources and were provided with hands-on astronomy and engineering activities. In addition to the lessons, they held and examined real meteorites and fossils.

Teachers use their detective skills to determine the parent body of a glitter-based "meteorite".

Educator Professional Development

NASA in the Classroom Workshop

The North Dakota Space Grant Consortium hosted a three-part educator workshop in October of 2015 for in-service K-12 teachers in the region. Caitlin Nolby (NDSGC Deputy Director) and Marissa Saad (NDSGC Coordinator), with the assistance of Sarah Sletten (Mayville State University faculty), led the workshop - October 8th, 15th, and 22nd - at Mayville State University's campus. The purpose of the workshop was to introduce classroom teachers to new and innovative ways to advance science education. They used various hands-on activities, PBS' *SciGirls*® activities, NASA content, and astronomy teaching reflecting the Next Generation Science Standards (NGSS). Teachers incorporated the "SciGirls Seven" - hands on STEM strategies targeting female participation - into existing lesson plans while investigating the nature of science and science practices. The workshop also included an interactive lesson of how to view the International Space Station (ISS) in real time. The teachers were able to stand outside and view it as it flew by overhead. The NDSGC plans to hold a second iteration of the workshop in 2016 in Dickinson, ND, with improvements made to teaching strategies and new activities included.

Teachers participate in an astronomy activity that teaches the importance of how the evolution of technology affects our science understanding.

"I now feel confident that I can teach Space Science using inquiry in a way students find engaging and relevant. The SciGirls investigations are easy to implement and use materials that are inexpensive and readily available"

- Sarah Breen, 7th and 8th Grade Science
Oak Grove Lutheran School, Fargo, ND

"This is the best professional development class that I have taken! It was engaging, informative, and relevant. I was also able to use the information and adapt it to other areas"

- Laura Breen, 4th Grade Teacher
Holy Spirit School, Fargo, ND

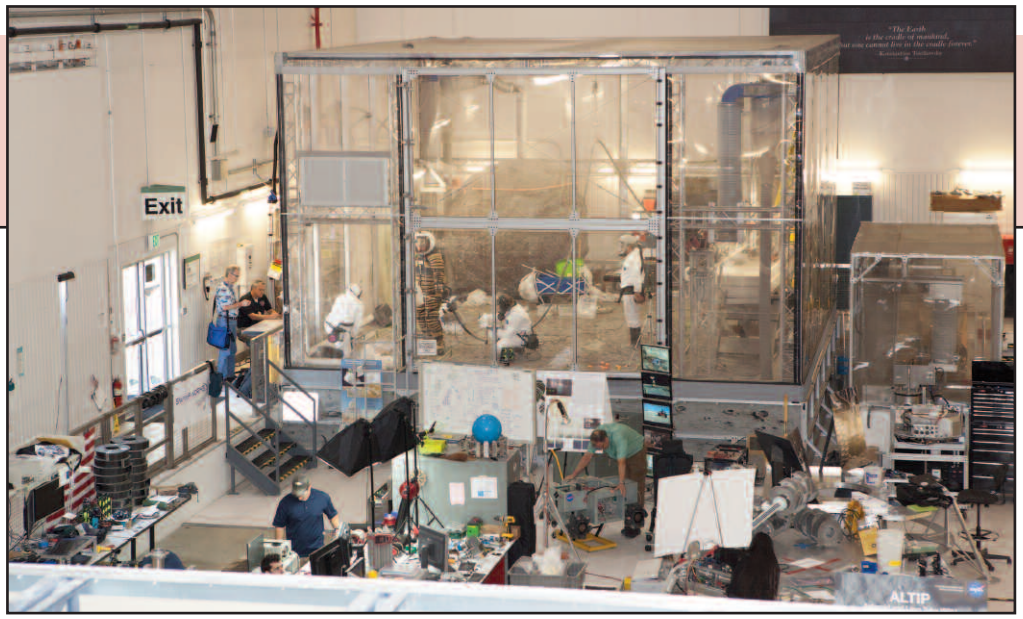
The Mayville "NASA-in-the-Classroom" In-service Educators Workshop.

"Parachute Parade" Hands-on Activity.

"Sucessfully sorted the solar system!"

"Designing habitats for future martian astronauts!"

Human Spaceflight Laboratory Highlights



Granular Mechanics and Regolith Operations Lab at Kennedy Space Center.

In December of 2015, student and faculty researchers from the University of North Dakota's Space Studies Department traveled to NASA's Kennedy Space Center to perform suited testing of revised Apollo lunar geology tools. The test took place in Swamp Works' Lunar Regolith Bin, utilizing its pulverized basalt regolith, and was the facility's first suited test. UND's Human Spaceflight Laboratory provided the suit for test, the North Dakota Experimental-1 (NDX-1) Planetary Suit. The Apollo geology tools utilized in the test are modern facsimiles either provided by the UND team or are on loan from NASA's Johnson Space Center. Tests were performed with the original Apollo tool designs and with modifications to the tools' handles to study the impact of bringing the Apollo era design closer to current NASA standards. Being able to perform the test in the regolith bin permitted a higher fidelity test of the tools due to the similar soil mechanics of the simulant when compared with other possible testing materials.

Work completed as a result of this visit will also further thesis research for UND Space Studies student Lindsay Anderson, with her project titled, *"A Comparative Analysis of the Geology Tools Used During the Apollo Lunar Program and their Suitability for Future Missions to the Moon".*

Travis testing improvements on Apollo geology tools.

"The experience at the regolith lab was a great opportunity to simulate realistic lunar operations in the NDX-1 planetary suit. Very rarely does one get to work in a facility of that caliber and complete meaningful work that will benefit future space exploration."

- Travis Nelson
Space Studies graduate student
University of North Dakota

Travis donning the NDX-1.

Student Travel Grants

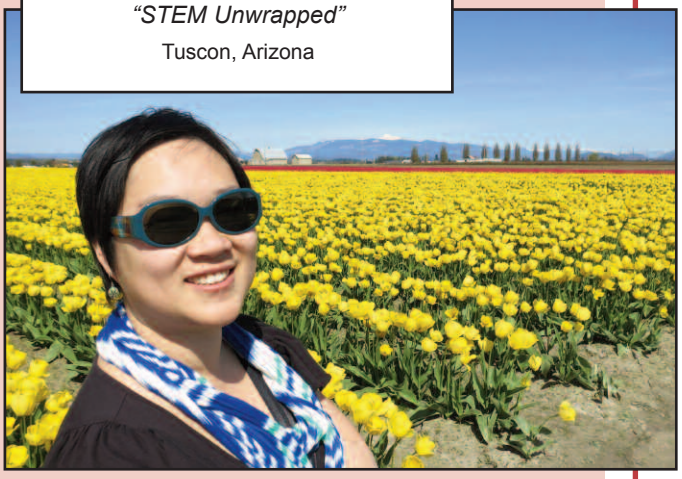
The NDSGC provides travel grants to North Dakota students to present papers or posters at conferences throughout the U.S., as well as conduct research at NASA centers. Many of the research projects presented have been funded by Space Grant. The students have the ability to not only share their research with others in the STEM community but also to network with others in their field. This allows them to eventually become employed in a STEM field as a result of their travel to the conference.

Haylee Archer

Physics and Astrophysics,
University of North Dakota
American Astronomical Society Meeting
"The Alignment of Red-Sequence Dwart Galaxies"
Seattle, Washington

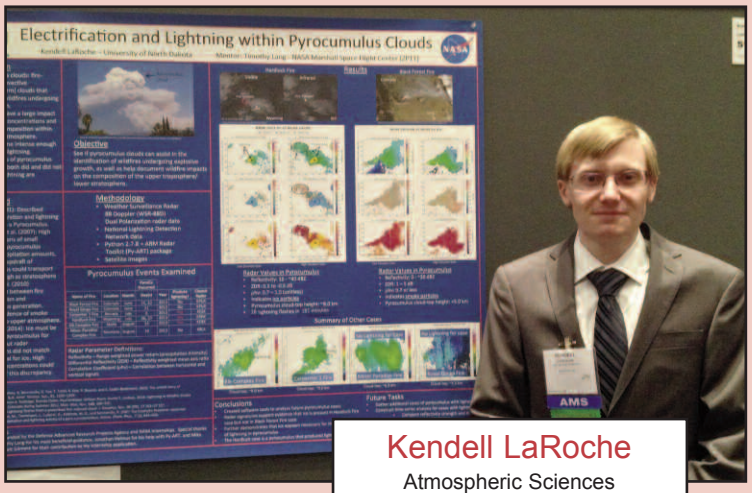
Kam Yee

Space Studies, University of North Dakota
National NASA Space Grant Director's Meeting
"STEM Unwrapped"
Tuscon, Arizona



Alex Nikle

Space Studies
University of North Dakota
National NASA Space Grant Director's Meeting
"North Dakota UAS Research: Putting the Power of Remote Sensing into the Hands of the Farmer"
Washington, D.C.



Kendell LaRoche

Atmospheric Sciences
University of North Dakota
American Meteorological Society Meeting
"Electrification and Lightning with Pyrocumulus Clouds"
Phoenix, AZ

NASA Center Internships

Tyler Lane

University Dynamic Space Research Association (USRA) Intern - Test Systems Group

Johnson Space Center

"This internship experience has given me a new and clear direction of what I want to do for a future career. I want to graduate with my MS degree and go to work for NASA in the wearable robotics lab. Without this internship opportunity I never would have been able to network with many other engineers and scientists in fields I found to be very interesting."

Michael Gerlach

Systems Engineering Intern in Solar Sails

Marshall Space Flight Center

"Working as an intern at NASA's Marshall Space Flight Center has given me the opportunity to learn about the aerospace industry, which I had had no experience in previously. It has also given me the motivation to finish my degree in Mechanical Engineering and pursue a career in the aerospace field."

Chris Buelke

Water Purification Utilizing Holey-Graphene Membranes

Langley Research Center

"Regardless of my future involvement, the opportunity this summer to conduct original research that really mattered and that I felt was important, and to obtain great results after having started a project from scratch at the original NASA research center has really hit home for me. The experience has only made clearer what I want to do in life and has intensified my drive for achieving it: performing research that will really benefit us all."

Samuel Byer

Rocket Propulsion Test Design and Analysis

Stennis Space Center

"NASA's Stennis Space Center has enlightened me to the world of rocketry first hand. Working on the rocket technology that will send humans to Mars was a solidifying and rewarding experience to add to my engineering career path."

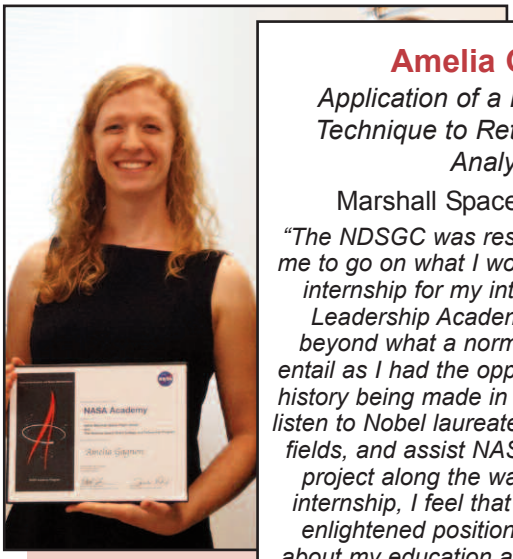
Aaron Scott

Implementing HDF5 and NetCDF4 Capabilities in the MOPITT Subsetter

Langley Research Center

"The internship improved my computer coding skills immensely. It also exposed me to different ideas and knowledge I will always remember going forward."

NASA Center Internships



Amelia Gagnon

Application of a Fast Modulation Technique to Retarding Potential Analyzers

Marshall Space Flight Center

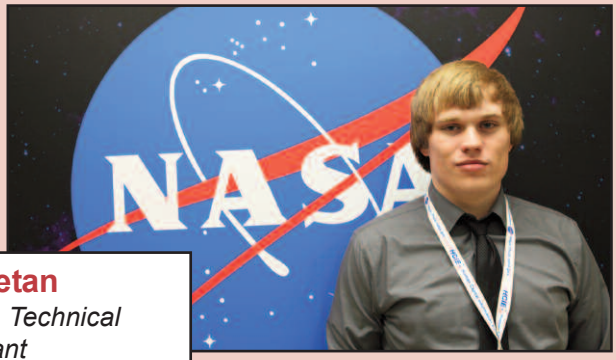
"The NDSGC was responsible for allowing me to go on what I would consider the best internship for my interests. The NASA Leadership Academy was above and beyond what a normal internship would entail as I had the opportunity to see space history being made in more ways than one, listen to Nobel laureates and leaders in their fields, and assist NASA with a meaningful project along the way. Because of this internship, I feel that I am now in a more enlightened position to make decisions about my education and career path, and I am very excited to see what they may hold. Thank you again for funding this unique opportunity."

Sean McCloat

Aurorasaurus

Goddard Space Flight Center

"I learned a solid foundation in space weather and heliophysics, developed my professional network with other interns and scientists, began to dabble in the computer programming language IDL, and have a valuable aurora-hunting tool to bring back to North Dakota with me. For many students passionate about space, an opportunity working at NASA is the dream. This summer, the North Dakota Space Grant Consortium allowed me to turn that dream into a reality."



Kyle Pletan

Innovation Lab Technical Assistant

Goddard Space Flight Center

"The internship experience from NASA which was funded by the North Dakota Space Grant Consortium provided an unparalleled opportunity that showed me what is possible with my education in a STEM field."

Jefferson Brand

Aerospace Structural Health Monitoring Research - AERO Institute

Armstrong Flight Research Center

"My grant allowed me the opportunity to grow and explore new areas like Fiber Optic Sensing System (FOSS) and Fiber Bragg Grading (FBG). It was a great pleasure to work alongside professionals at NASA."

Joseph Roth

Exoplanet Gravitational Microlensing

Goddard Space Flight Center

"Working at NASA gave me the opportunity to work with the the best and brightest of my peers. Participating in high-level research gave me the experience to narrow my career path."

Summer Faculty Fellowships

The NDSGC provides fellowships to faculty at affilate institutions to complete research in a STEM field or to improve or develop courses in STEM to include more NASA-relevant content.

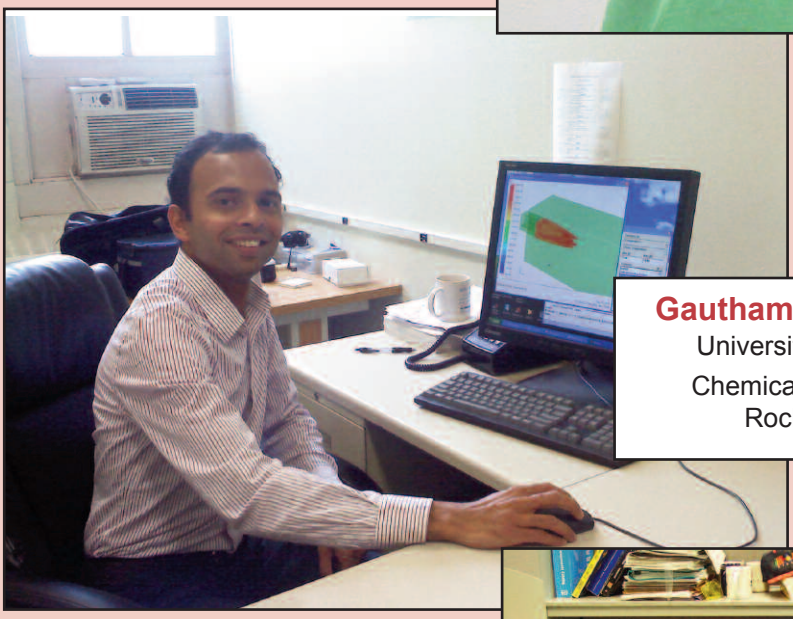
Cindy Burgess
Dickinson State University
Biology 112 - Exploring Human Health in our Environment

Tom Gonnella
Mayville State University
Physics I and II

Aaron Kingsbury
Mayville State University
Science 192 - GIS for Science/Science Education

Summer Faculty Fellowships

Paula Martin
Dickinson State University
Chemistry 450 - Bioinorganic Chemistry



Gautham Krishnamoorthy
University of North Dakota
Chemical Engineering 531- Rocket Propulsion

Vadim Rygalov
University of North Dakota
Space Studies 570 - Psychology of Extreme Environments

Meet an Affiliate

Erik Lee Holland

Erik Holland has been the Curator of Education with the State Historical Society of North Dakota since April 2010. Immediately before his move to Bismarck, Holland was the Site Supervisor at the Missouri-Yellowstone Confluence Interpretive Center and Fort Buford State Historic Site in northwestern North Dakota.

As Curator of Education, he serves as a teacher of record for teacher workshops, develops programs for schools and the public for the North Dakota Heritage Center, and advocates the education voice for its $7 million exhibit expansion of the North Dakota State Museum and the new 8th grade North Dakota Studies curriculum (ndstudies.gov/gr8).

Erik grew up in Grand Forks, North Dakota, where his parents still live. He completed his Bachelor of Arts degree at the University of North Dakota in Anthropology and Archaeology and holds a Master of Arts in History with Certificates in Museum Studies and Public History from the University of Wisconsin—Milwaukee. He is active in several archaeological and museum associations; is a life member of the National Eagle Scout Association; and enjoys the sport of curling. Erik served as the first president of the Museum Education Roundtable to live outside of Washington, D.C., focusing his interest in life-long (or free-choice) learning. He continues to serve as a peer reviewer of articles for the Journal of Museum Education.

In more than forty years educating and interpreting objects and places for the public, he has worked at historic sites and museums in Wisconsin, Virginia, Minnesota, and North Dakota. From 1975-1984, he was Site Supervisor of Fort Clark State Historic Site. He moved to Knife River Indian Villages National Historic Site for six years before pursuing his MA degree. Then, after five years as Interpretive Program Manager at the Jamestown Settlement in Williamsburg, Virginia, he spent twelve years with the Historic Sites Division of the Minnesota Historical Society.

The interplay and tension that is necessary to provide quality interpretive programming dealing with difficult cultural issues interests Erik. He helps audiences appreciate cultural stories from various perspectives, using landscapes, objects, and hands-on opportunities to engage them. His work studies how people understand and use math and science to investigate complex topics and ultimately develop solutions to complicated challenges such as extreme conditions, huge distances, and geologic time.

Following a short stint as Site Supervisor at the Missouri-Yellowstone Confluence Interpretive Center and Fort Buford State Historic Site, Erik accepted the Curator of Education position in Bismarck in April of 2010 and soon after, became an active affiliate of the NDSGC. With the center of the universe nearby, he will continue to provide multiple perspectives as his learning continues.

Holland working with students in Bismarck in 1989.

Student Success Story - Katrina Jackson

Coming out of high school, Katrina Jackson did not have a specific college degree in mind, but she had the crazy idea that she wanted to somehow become both an astronaut and an actor. NASA Space Grant first introduced Katrina to the world of science, when as a sophomore at the University of Arizona, she was awarded a year-long internship with the school's Lunar and Planetary Laboratory studying meteorites.

She stayed with that research group for her remaining three years of undergrad, but realized that while she loved space science, being a researcher wasn't her thing. So she applied to switch to an interdisciplinary studies degree where she could take classes in media arts and theatre arts. Katrina decided that she wanted to one day create and star in science-related entertainment television shows.

A couple years later while working on her Space Studies master's degree at UND, the North Dakota Space Grant stepped in and funded her summer internship with the Office of Communications at NASA's Goddard Space Flight Center. That summer was Katrina's first time conducting an interview, first time organizing a film shoot, and first time telling stories beyond explaining a science result.

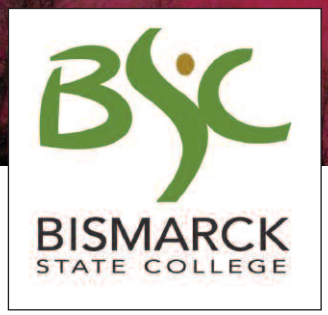
When Katrina returned to school after the summer, she was inspired to try new things like participating in UND's theatre productions and becoming a NASA Solar System Ambassador. She worked on publications for the university's Center for Community Engagement, where she gained more professional experience in communications. Katrina decided to apply for a Fulbright scholarship to study science media production at the Imperial College London, where she could learn all the video production skills needed to create science media.

Katrina interviews the Center Director of NASA's Goddard Space Flight Center.

Katrina encounters a video of herself by the Hubble operations center.

It was a strenuous application process, and ultimately unsuccessful. She applied again the next year, and again was turned down. In the months before graduating from UND, Katrina started her job search. She applied to hundreds of jobs over the course of eight months, and was turned down for each and every one of them. She considered moving out to LA and going the coffee-fetcher route of entering the Hollywood industry, but it just didn't seem like an effective way of doing exactly what she wanted. Luckily, her supervisor from that NASA Goddard internship opened up a temporary production assistant job with their multimedia team.

Two years later, Katrina is still there, and was recently officially promoted to a science video producer. She built up her skillset on the job and now leads multimedia production for the Hubble Space Telescope. She's had the opportunity to interview Mike Massimino, the one person who actually did become an astronaut and an actor (*The Big Bang Theory*). Katrina has been an on-camera host for several videos, and has worked on projects across all four NASA sciences - Earth science, planetary science, heliophysics, and astrophysics. She even directed a full-scale musical production for Goddard's Music and Drama club. Katrina wishes she could go back to her high school self, with uncertain plans and crazy dreams, and tell her the amazing things she's doing now. Check out Katrina's website at http://katrina-jackson.com/



Bismarck
State College

Cankdeska Cikana
Community College

Dakota College
at Bottineau

Dickinson
State University

Gateway to
Science Center

Lake Region
State College

Mayville
State University

Minot
State University

North Dakota State
College of Science

North Dakota
State University

Nueta Hidatsa
Sahnish College

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