NORTH DAKOTA SPACE GRANT

AFFILIATES MEETING 2026

NORTH DAKOTA

SPACE GRANT CONSORTIUM

April 24, 2026

2026 NDSGC AFFILIATES MEETING AGENDA

8:30 AM - Kickoff

- Breakfast & Welcome
- NDSGC Recap/Aurora

9:00 AM - NDSGC Programs & Opportunities

- Introductions
- 10 Year STEM Ambassador Anniversary Celebration
- Programs & Opportunities Panel
  - STEM Ambassadors
  - Student Research Fellowships
  - Competition Teams

9:45 AM - NASA Internships Video

10:00 AM - Break - Poster Session - A

- Poster session of NASA Internships, Student Fellowships, and other student projects. Students with **odd** numbered posters will be presenting. Abstracts listed at the end of the agenda.

10:30 AM - Strategic Planning Flipped Sessions

- Three 20 minute sessions

11:30 AM - Break - Poster Session - B

- Students with **even** numbered posters will be presenting.

2026 NDSGC AFFILIATES MEETING AGENDA

12:00 PM - Lunch

- *12:15 - Business Meeting - NASA Updates, Sharing Funding information & Opportunities*
- *Paperwork for Reimbursement/Evaluation*

12:45 AM - Senator Hoeven

1:00 PM - Job Service of ND - Resumes

- Breakout session with Job Service (2-30 minute sessions)
- STEM Hands-on activity
- *Session 1 - 1-1:30; Session 2 - 1:35-2:05*

2:05 PM - Break

2:20 PM - Job Service - Interviewing

- *3:00 PM - Interview Role Playing*

3:45 PM - Wrap-up

- Poster Awards
- Scholarship Recognition
- *Paperwork for Reimbursement / Eval*

4:25 PM - Affiliate Meeting Closing

- Load the bus

NDSGC Team

Dr. Caitlin Milera
Director
caitlin.milera@UND.edu

Laurie Salander
Associate Director
laurie.salander@UND.edu

Dr. Dawn Cleveland
Assistant Direcor
dawn.cleveland@UND.edu

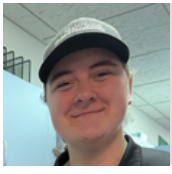
Grecia Flaws
Office Manager
grecia.flaws@UND.edu

STEM Ambassador Attendees

STEM Ambassadorships are open to students who are self-motivated, enjoy interacting with K-12 students, educators, and the general public, and have strong communication skills. Students are paid hourly to conduct STEM and NASA engagement activities (hands-on activities, demonstrations, presentations, and recruitment) throughout the year. Students must be confident in securing their own engagement activities. STEM Ambassadors must visit the UND campus and attend a training session at the start of the fall semester. Here, they will receive instruction on how to conduct numerous STEM lesson plans.

Funding
$18.00/hr, up to 20 hours per pay period
Applications open April 15th - May 15th
Additional information on page XXX

Malissa Reinhardt
University of North Dakota | Physics & Mathematics



Anna Stambaugh
University of North Dakota | Aerospace Engineering

Sarah Frankson
University of North Dakota | Commercial Aviation

Student Fellowship Attendees

The NDSGC Student Fellowship provides funding for North Dakota students to complete research fellowships at both the undergraduate and graduate levels. Research fellowships are available to students completing STEM- or NASA-relevant research under the guidance of a faculty mentor. Students are expected to spend around 15 hours per week on their research projects.

Undergraduate Students
Fall/Spring: $5,500
Summer: $3,100

Graduate Students
Fall/Spring: $6,000
Summer: $3,800

Anton Golovko

University of North Dakota | Biology

Project: Ocular Degradation in Space: Investigating Vision Impairment in Astronauts

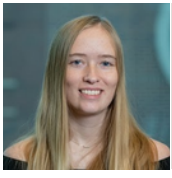
Tanner Veo

Sitting Bull College | Environmental Science & Research

Project: Quantification of Hydrogen Sulfide Emissions from a Concentrated Animal Feeding Operation on the Standing Rock Reservation

Erica Rookey

Sitting Bull College | Environmental Science & Research
Project: Correlating Methane & Benzene Concentrations within the air column in ND utilizing ground measurements versus air column measurement & low earth orbiting satellite imagery



Casia Steinhaus

University of North Dakota | Mathematics & Physics

Project: Modeling of Plasma with GPU-accelerated High-performance Computing

Student Fellowship Attendees

Louis Gaytan

North Dakota State University | Mechanical Engineering

Project: Effects of Gravity on Immiscible Drop Transport in Collapsible Thin-Walled Vessel: An Experimental Study

Malissa Reinhardt

University of North Dakota | Physics & Mathematics

Project: Auroral Temporal Analysis and Kp Index Correlations using UND's NoDDAC Aurora Cameras

Mary Moroney-Fernandez

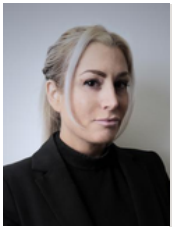
University of North Dakota | Educational Foundations & Research

Project: Growing Scientists: Nature-Based STEM Learning for Children

Cole Gabos

University of North Dakota | Atmospheric Sciences

Project: Operational Application of the Flash Flood 4-Panel Technique to the Desert Southwest



Kim Berthet

University of North Dakota | Aeromicrobiology in Earth System Science & Policy

Project: Advancing Aeromicrobiology: Investigating the Stratospheric Microbiome and Climate Impact Through the Innovation of a STEM-Focused Bioaerosol Sampling Kit

NASA Internship Attendees - Virtual

The NDSGC is committed to support North Dakota students in NASA internships and industry internships. Students who are US citizens and enrolled at NDSGC-affiliated institutions will be able to engage in authentic, hands-on learning experiences that involve real-life problem-solving. Internships are competitively awarded every year, as the NDSGC reviews all applications using a rubric to evaluate student transcripts, resumes, letters of recommendation, and essays. Additional competitiveness and inclusive criteria of NASA internship opportunities are determined by respective NASA centers.

Undergraduate Students
Fall/Spring: $13,120
Summer: $8,200

Graduate Students
Fall/Spring: $15,840
Summer: $9,900

Travel Stipend
up to $2,500 (if required to travel for badging and/or internship)

Terrence Andre San Gabriel
North Dakota State University | Mechanical Engineering

Project: Finite Element Analysis (FEA) Global Parameter Optimization Studies with Machine Learning

NASA Langley Research Center

Emily Mikhail
North Dakota State University | Mechanical Engineering & Physics

Project: Stereo Cameras for Lunar Plume Surface Studies (SCALPSS)

NASA Langley Research Center

Turner Person
North Dakota State University | Mechanical Engineering & Physics

Project: Cryogenics and Fluids - Lunar Applications

NASA Goddard Space Flight Center

Affiliate Mini-Grant Attendees

Affiliate mini-grants are available to NDSGC affiliate representatives who are hosting, or participating in, research or education events related to STEM and/or NASA and students. Affiliate mini-grants may also be applied towards college-level initiatives, such as materials funding for their STEM courses and student research, or travel funding for their college students to participate in field research related to STEM courses. Faculty and students must be directly involved in the programming to be eligible for a mini-grant. Student and/or faculty stipends are unallowable. Funds must be spent within the semester they are awarded.

Educator Funding Up to $2,500

Mark Williamson

University of North Dakota | Research Assistant Professor | Population Health

"I was able to synthesize aspirin from wintergreen plants grown in simulated lunar regolith, showing how space, agriculture, biology, chemistry, and medicine can be combined for a small, innovative project into new frontiers."

Educator Mini-Grant Attendees

Educator Mini-Grants are open to North Dakota Formal and informal educators who are teaching, hosting, or participating in research or education initiatives related to STEM an/or NASA. Educator mini-grants may be applied to STEM-relevant field trips, materials and resources that enhance the STEM classroom, and participation in NASA-relevant or STEM challenges (local/regional/national). These educators teach or work at a North Dakota K-12 school, museum, non-profit, or club.

Educator Funding Up to $2,500

Bethany Higdem

Wahpeton School District | Elementary Instructional Coach

Zoom Into Discovery: Microscopes for Young Scientists

"The impact of this project extends beyond just science instruction; it will create meaningful, lasting experiences that ignite curiosity and build confidence in our 5th-grade learners. These experiences help students see themselves as scientists, increasing engagement in STEM subjects and laying the groundwork for future academic and career pursuits in science-related fields."

Scholarship Attendees

The North Dakota Space Grant Consortium offers several prestigious scholarships for students enrolled in STEM or STEM Education programs at North Dakota colleges and universities.

Lillian Goettler Scholarship $2500
Pearl I. Young Scholarship $2500
Tribal College Scholarship $2500

Undergraduate Scholarships up to $2500
Transfer Scholarship $2500
NVVS/SB Scholarships up to $2500

Hunter Bott
Pre-Engineering

Amanda Kolobakken
Computer Information Systems

Ebony Peltier
Environmental Science & Research

Jetta Tobacco
Engineering & Natural Resources | Pre-Engineering

Matias Tolone
Graduate Assistantship | Space Studies

Helena Mack
Environmental Science & Research

Urseloria Walsey
Engineering & Natural Resources | Pre-Engineering

Michael Medeiros
Environmental Science

Hehaka Sapa Catches
Environmental Science & Research

Joelle Fox
Environmental Science & Research

Dustin Delorme
Engineering & Natural Resources | Pre-Engineering

Laurice Morning Star
Environmental Science

Steven Gillis
Solar Energy

Bob Hughes
Simulation Technology

Affiliate Attendees

Dr. Manohar Sah
United Tribes Technical College
Advanced Mathematics

Dan Kahn
Turtle Mountain College
Cybersecurity

Scott Johnson
Dakota College at Bottineau
Mathematics

Dr. Ram Krishna Hona
United Tribes Technical College
Chemistry

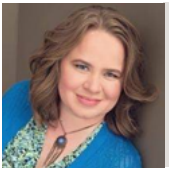
Dr. Katherine McCarville
Minot State University
Geoscience

Mike Holman
Bismarck State College
Electronics & Communications

Dr. Mandy Guinn
United Tribes Technical College
Environmental Science & Research

Dr. Genevieve Kahrilas
Minot State University
Chemistry

Shaun Prince
Lake Region State College
Biology



Shannon King
North Dakota State College of Science
Mathematics & Science

Kerry Hartman
Nueta Hidatsa Sahnish College
Academic Dean & Science Faculty

Dr. Mafany Mongoh
Sitting Bull College
Agriculture & Science

Affiliate Attendees

Angela Bartholomay

Dakota College at Bottineau

Science

Kimberlee Blevins

United Tribes Technical College

STEM Instructor

Dr. Austin Allard

Turtle Mountain College

Engineering

Ishan Shah

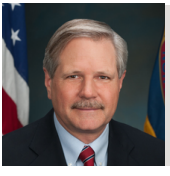
Turtle Mountain College

Cybersecurity

Michelle Graham

Nueta Hidatsa Sahnish College

Director of Financial Aid



Senator John Hoeven

North Dakota

Dr. Wanda Parisien

Turtle Mountain College

President

Adriana Riggs

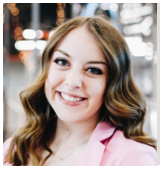
Turtle Mountain College

NYCP Director

Tina Webb

Minot State University

Workforce Development Officer



Hope Burdolski

Gateway to Science

STEM Education Specialist

All students registered for the Affiliates Meeting were given the opportunity to present a poster, whether from a NDSGC funded project or not. Please enjoy this showcase of research.

Poster Abstracts

Poster #1 | Camille Youngbird | United Tribes Technical College

Autonomous Drone Flight on a Calculus-Based Motion Path

Autonomous drones rely on precise flight paths to navigate safely, efficiently, and predictably in controlled airspace. This study applies Calculus to model drone motion within a 400x400x400 ft operational region, translating complex trajectories into equations that describe the position, velocity, and acceleration over time. A circular ascent, spiraling like a corkscrew, illustrates how drones can maintain constant speed while following smooth, controlled paths. Arc length calculations quantify the total distance travelled, helping evaluate energy efficiency along these trajectories. GeoGebra 3D simulations bring the equations to life, allowing visual verification of the flight paths and real-time adjustments to motion. Results show that drones follow smooth, mathematically defined trajectories move predictably, maintain consistent speed, and avoid abrupt changes in acceleration - qualities essential for stability and control. The circular ascent highlights the interplay between forward motion and centripetal acceleration, demonstrating how calculus can guide precise, elegant flight. This study demonstrates that multivariable calculus is not just abstract math - it is a practical tool for designing and optimizing autonomous drone flight paths. By combining analytical modeling with visualization, drones can "fly the math" smoothly, efficiently, and predictably, translating complex equations into real-world motion.

Poster #2 | Kim Berthet | University of North Dakota

AL3X: A High-Altitude Platform for Comparative Analysis of Stratified Atmospheric Microbial Communities Across Earth's Surface Ecosystems

The atmosphere connects every ecosystem on Earth, yet its biological dimension remains largely unexplored. For decades, the stratosphere was considered too extreme to support an active microbiome, leaving a critical gap in our understanding of how microbial life participates in climate-relevant processes above the surface. AL3X (Aeromicrobiology Layered 3D Exploration) was developed to change that perspective a modular, altitude-resolved, 3D-printed sampling platform that generates vertically structured microbial data while enabling scalable, nationwide participation in stratospheric research.

Poster Abstracts

Poster #3 | Malissa Reinhardt | University of North Dakota

A Parameter Study of Transiting Exoplanet Light Curves from Martens Observatory and TESS ExoFOP

This study investigates how transit depth and observing conditions influence the characterization of transiting exoplanets with ground-based observations of the exoplanet WASP-33b. To improve precision within the observational data, differential photometry was applied using dark and bias frame corrections to minimize instrumental and atmospheric effects. The resulting light curve was normalized and analyzed to extract key transit parameters, including transit depth and duration. These results were then compared with archival data from the TESS Exoplanet Follow-up Observing Program (ExoFOP) database. The analysis reveals that variations in transit depth are influenced by observing altitude and atmospheric conditions, which in turn impact estimates of planetary size. Since planetary radius is directly proportional to transit depth, small observational differences can lead to measurable discrepancies in derived exoplanet properties. Higher observing altitudes generally produce deeper and more well-defined transits, improving measurement accuracy. This work highlights the importance of combining ground-based and space-based data to refine exoplanet characterization and demonstrates how observational factors contribute to uncertainties in planetary measurements.

Poster #4 | Laurice Morningstar | Nueta Hidatsa Sahnish College

Analysis of Surface Soil for Radiation and Electrical Conductivity at Oil-Field Sites on the Fort Berthold Reservation

Bakken oil field sites have been heavily hydrofractured since approximately 2008, resulting in over 700 documented spills of oil and wastewater. Although regulations and compliance have improved in recent years, a pan-monitoring effort focused on Mandan, Hidatsa, and Sahnish (MHA) tribal lands has been implemented to assess both short- and long-term environmental impacts. In this preliminary study, 44 oil field sites with previous spill histories, distributed across approximately one-fourth of the Fort Berthold Reservation, were analyzed for soil radiation and electrical conductivity as indicators of contamination. Results indicate that radiation levels were generally low across most sites, with a few locations showing slightly elevated levels. However, several sites exhibited significantly high electrical conductivity, suggesting the presence of salt (brine) contamination. These findings highlight the importance of continued environmental monitoring and provide baseline data to support future research, land management, and remediation efforts on Tribal lands.

Poster Abstracts

Poster #5 | Louis Gaytan | North Dakota State University

Effects of Gravity on Immiscible Drop Transport in Collapsible Thin-Walled Vessel: An Experimental Study

The formation and transport of immiscible liquid drops in large, thin-walled vessels are crucial for cardiovascular flow phenomena, such as thrombus transport and endovascular treatments like portal vein embolization. Physiologically, thin-walled vessels are highly flexible and can buckle or collapse due to imbalances in transmural pressures, such as muscle and hydrostatic pressure changes. Despite extensive research on microfluidic droplet formation, the dynamics of large drops in collapsible vessels under naturally constricted or collapsed conditions remain underexplored. This study experimentally investigates the formation and transport dynamics of immiscible liquid drops in deformable thin-walled tubes. A co-flow liquid-in-liquid injection system generated immiscible silicone oil drops within a continuous phase of glycerin and water mixtures, ensuring neutral buoyancy as drops flowed through distended and constricted tube cross-sections. Additionally, high- and low-density ratios have been examined to compare the gravity effects on the drop transport dynamics. High-speed camera footage captured drop motion, while pressure and flow rates were monitored. Results indicate that drop size, spacing, and the transition from dripping to jetting regimes depend on both the external Capillary number (ratio of viscous force to surface tension) and the internal Weber number (ratio of inertial force to surface tension).

Poster #6 | Hunter Bott | Dakota College at Bottineau

The Impact of High-Frequency Pulse Charging on Lithium-Ion Batteries

Standard Constant Current (CC) charging of lithium-ion batteries leads to capacity degradation due to a nonuniform distribution of lithium ions, causing mechanical structural fatigue and rapid solid electrolyte interphase (SEI) layer growth. High-frequency pulse charging is a promising alternative to combat these problems. Using NMC532/graphite cell lithium-ion batteries to compare standard CC charging vs square pulse wave charging up to 2000 Hz with a 50% duty cycle across 1000 charge-discharge cycles, Operando Raman spectroscopy and scanning electron microscopy (SEM) were used to monitor real-time and post-mortem electrode behavior. The data is able to demonstrate a clear correlation between the charging frequency and the battery's longevity. After 1000 charge cycles, the CC method showed severe signs of degradation, with the state of health (SOH) below 50%. On the contrary, cells charged using the 2000 Hz pulse protocol were able to maintain an 81% SOH, basically doubling the battery's service life. Post-mortem imaging showed that high-frequency pulse charging produced a much thinner and more uniform SEI layer. Additionally, Raman spectroscopy showed that the structural integrity of the NMC cathode was preserved. Even though high-frequency pulse charging causes challenges concerning hardware complexity, increased costs, and electromagnetic interference (EMI), its ability to dramatically extend a battery's life cycle makes it a viable and sustainable option for the next generation of electric vehicles and consumer electronics.

Poster Abstracts

Poster #7 | Eniola Soetan | Dakota College at Bottineau

From Yeast Cells to ACLs: Investigating the Use of Recombinant Type I Collagen in Compensatory Synthetic Ligaments

Collagen is a fibrous structural protein crucial for wound healing, organ protection, fibroblast formation, and blood clotting. Type I collagen, the most abundant in the body, is a key component of tendons and ligaments. Its triple-helical structure, stabilized by glycine, proline, and hydroxyproline in a Gly-Pro-X or Gly-X-Hyp sequence, allows for efficient crosslinking, ensuring strength and integrity. However, genetic disorders such as Type I Osteogenesis Imperfecta (OA1) and Ehlers-Danlos Syndrome Arthrochalasia (EDS ARTH) introduce sequence mutations that disrupt helix formation and crosslinking, weakening collagen integrity. This study investigates the effects of these mutations on the mechanical properties of mock ligament grafts formed from such collagen. It also evaluates compensatory strategies including glutaraldehyde and genipin crosslinking agents, as well as gelatin methacrylate (GelMa) hydrogel versus gelatin scaffolds, to improve tensile strength and elasticity. Collagen will be synthesized using Komagataella pastoris induced with plasmids encoding normal and mutated collagen genes. Synthesized collagen will undergo fibrillation and characterization via Fourier Transform Infrared Spectroscopy (FTIR). The remaining soluble collagen will be molded into mock Anterior Cruciate Ligament (ACL) grafts under two crosslinking agents and scaffolding treatments, followed by mechanical testing of tensile strength and elasticity. This research contributes to bioengineered ligament and tissue graft development, potentially improving structural integrity and mechanical function in individuals with collagen-related genetic disorders, particularly in cases of ligament repair and reconstruction. These findings could also improve ligament reconstruction strategies broadly, even for individuals without genetic disorders, by eliminating the need for autograft harvesting, thereby reducing surgical morbidity and improving patient outcomes.

Poster Abstracts

Poster #8 | Mary Moroney-Fernandez | University of North Dakota

Growing Minds: Integrating STEM Education into Community Garden Programs

This project documents the creation and development of a community garden as a site for place-based STEAM (Science, Technology, Engineering, Arts, and Mathematics) education and original research, made possible through a Mini Grant and Fellowship from the North Dakota Space Grant Consortium. Grounded in the belief that nature is one of the most powerful and accessible classrooms, the initiative aimed to bridge the gap between formal STEAM instruction and the lived, sensory experiences of the natural world. Grant funding supported the purchase of essential tools, materials, and infrastructure, enabling the full establishment of a community garden designed to serve learners of all ages. The space was intentionally developed not only as a site for cultivation, but as a dynamic outdoor classroom where scientific inquiry, creativity, and community engagement could unfold together. Participants engaged in hands-on activities such as planting, observation, measurement, and design, fostering both practical skills and conceptual understanding. In parallel with the garden's development, the fellowship supported original research examining the effectiveness of nature-based STEAM learning. This research explored how garden-centered experiences nurture curiosity, strengthen observational skills, and promote critical thinking and interdisciplinary connections. By integrating the arts alongside traditional STEM disciplines, the project emphasized that creativity and aesthetic awareness are fundamental components of scientific inquiry. Findings suggest that nature-based STEAM activities provide an inclusive and engaging pathway into science learning, particularly for individuals who may feel disconnected from conventional educational environments. Ultimately, the community garden model illustrates how small-scale, grant-funded initiatives can create meaningful, lasting educational spaces that continue to benefit communities well beyond the duration of the award.

Poster #9 | Casia Steinhaus | University of North Dakota

Modeling of Plasma with GPU-accelerated High-performance Computing

On this ongoing project, I aim to improve the accuracy of measurements taken of plasma by Langmuir probes by developing a modeling framework that can describe the kinetic motion of ions and electrons in plasma. I am implementing the Particle-in-Cell Monte Carlo Collision (PIC-MCC) method in my team's in-house developed Comet code. This will allow me to use GPU-accelerated computing to significantly decrease the computational expense of applying this theory.

Poster Abstracts

Poster #10 | Matias Tolone | University of North Dakota

From ISS to Commercial Space Stations: Managing Public-Private Partnerships in the New Space Age

This paper examines the transition from the International Space Station (ISS) to commercial low-Earth orbit (LEO) destinations through public-private partnerships (PPPs). With NASA planning to retire the ISS in the early 2030s, the agency is shifting from direct government operation to purchasing services from privately owned and operated stations. This change raises a central management question: can government and private incentives align to ensure safe, sustainable, and strategically valuable operations? The paper focuses on NASA and U.S. commercial station initiatives projected for 2030–2040, including Axiom Space, Starlab, and Orbital Reef as representative cases. Using qualitative archival paper, the project analyzes NASA directives, oversight reports, feasibility studies, industry filings, and academic literature. The analytical framework combines comparative analysis of ISS and emerging governance models, stakeholder and incentive mapping, and a sustainability assessment across operational, financial, and strategic dimensions. The paper highlights conditions for successful alignment— such as regulatory oversight, contractual mechanisms, and the role of NASA as an anchor customer—while identifying risks including market immaturity, schedule delays, and persistent fiscal dependence on the government. Findings inform whether PPP-managed commercial space stations can achieve a central U.S. objective as the ISS retires: maintaining continuous American human presence in LEO.

Poster #11 | Anson Tippie | University of North Dakota

Characterizing Optical Signatures of Meteors in Geostationary Lightning Mapper Observations

A bolide is a bright fireball or meteor in earth's atmosphere and can be detected by the Geostationary Lightning Mappers (GLM) originally used to detect lightning. We can then use the GLM data to compare events captured by the American Meteor Society (AMS) citizen reporting network and bolide detections as reported by NASA. To date, our current database contains 49 reported events, of which 28 are analyzed and 12 show GLM detection. We have plots and animations for data points from the GLM, typically showing a tail as the bright flash of light streaked across our atmosphere. Select cases will be presented. At higher latitudes, satellite-based GLMs exhibit reduced detection efficiency due to parallax effects and viewing geometry limitations, affecting North Dakota. A comparison of these reporting systems will help create accurate models of entry characteristics for larger, potentially hazardous objects, ultimately contributing to planetary defense through improved tracking and mitigation strategies. Due to reduced GLM detection at high latitudes, we are building a camera network in Grand Forks designed to observe meteors. As well, we are joining the Global Meteor Network filling a critical gap in the Red River Valley in ground observations.

Poster Abstracts

Poster #12 | Adriana Swanberg | University of North Dakota

Stratospheric Telemetry & Atmospheric Research for Venus Exploration & Reconnaissance of Surface Environments

The S.T.A.R.V.E.R.S.E. (Stratospheric Telemetry & Atmospheric Research for Venus Exploration & Reconnaissance of Surface Environments) mission concept, developed through the NASA L'SPACE Mission Concept Academy, investigates the coupled geologic–atmospheric evolution of Venus by constraining surface–atmosphere exchange processes and identifying active geochemical pathways. A stratospheric aerobot operating at altitudes of 50–70 km is proposed to enable sustained in situ and remote sensing measurements within a dynamically relevant regime of the Venusian atmosphere. The payload suite is designed to acquire high-resolution ultraviolet (UV), visible (VIS), and infrared (IR) spectra to retrieve atmospheric composition, including trace constituents (e.g., phosphate-bearing species), while multispectral imaging and thermal remote sensing constrain surface mineralogy, stratigraphy, and thermal structure. Targeted observations of geologically active regions, including Idunn Mons, are incorporated to evaluate volcanic resurfacing, impact cratering, erosion, and depositional processes and their potential coupling to atmospheric variability. Time-resolved measurement strategies are defined to assess temporal correlations between episodic geologic activity and atmospheric chemical evolution. The integration of atmospheric retrievals with geologic mapping products enables first-order assessment of volatile transport, geochemical cycling, and the contribution of volcanism to atmospheric composition. This work establishes a mission-driven framework for quantifying key processes governing Venusian evolution and climate. Modeled surface–atmosphere interactions and instrument-driven observational constraints provide insight into volatile fluxes and atmospheric–surface feedback mechanisms. The proposed architecture and measurement strategy inform future Venus mission design and support the development of improved atmospheric and climate models, with broader implications for comparative planetology and the study of extreme greenhouse environments on terrestrial planets, including Earth.

Poster Abstracts

Poster #13 | Anton Golovko | University of North Dakota

Reducing Sputtering and Secondary Radiation on Spacecraft to Mitigate Emission Exposure

This project investigates how spacecraft materials influence astronaut exposure to secondary radiation and surface degradation through sputtering. When high-energy particles from space radiation interact with spacecraft's structures, they generate secondary X-rays, gamma radiation, and ejected surface atoms, all of which can contribute to crew risk. A key factor in this process is the atomic number (Z) of the shielding material, as higher-Z materials tend to produce more secondary radiation through mechanisms such as Bremsstrahlung radiation. To study this, a low-cost experimental approach was developed to simulate aspects of the space radiation environment. An Americium-241 source was used to emit alpha particles, approximating helium ion interactions relevant to those in space conditions. These particles were directed at an aluminum target to generate secondary emissions, which were measured using a gamma spectrometer. Various materials were then tested to evaluate their ability to attenuate these secondary emissions. Results showed that material composition plays a critical role in radiation behavior. In particular, boron-doped and hydrocarbon-based materials demonstrated reduced secondary radiation compared to higher-Z materials. Boron's large radiation capture cross-section contributed to this effect, highlighting its usefulness as a shielding additive. Additionally, boron as a material offers practical advantages including low atomic number and flame resistance which can be used to reduce reliance on toxic compounds such as PFAS. Overall, this study demonstrates that accessible, low-tech experimental methods can be used to investigate complex radiation interactions, while also identifying promising material strategies to improve astronaut safety during long duration space missions.

Poster Abstracts

Poster #14 | Hannah Murray | Minot State University

Green Silver Nanoparticle Synthesis Using Blue LED and Ambient Light

Silver nanoparticles (AgNPs), which have unique optical, electrical, and antimicrobial properties, have a wide range of applications in a variety of fields including catalysis, sensing, and medicine. Traditional synthesis methods employ harsh chemicals that negatively impact the environment, and dangerous setups that can potentially harm the experimenter; therefore, the study of nanoscience is often out of reach for smaller institutions and classrooms. To address this need, we have developed an alternative, facile synthetic method that uses safe reagents and green energy sources to produce morphologically controlled AgNPs. Using nothing but sugars as reducing and capping agents, solutions are seeded using ultrasonic energy and then "pulled" into non-spherical shapes using nothing but LED and ambient light irradiation. Here we show that royal blue (448 nm) LED radiation can be used to create decahedral AgNPs, and when combined with ambient light exposure, a red-to-blue wavelength-tunable light-scattering AgNP solution is produced. The shape transformation reaction itself is also accompanied by vivid color changes and can be easily tracked using UV-visible spectroscopy. Not only does this novel synthetic method produce AgNPs with uniquely powerful optical qualities, it is also itself a visually stunning and safe way to bring nanoscience into any classroom or university. By strengthening nanoscience education and research at all levels, we hope to broaden access to this rapidly advancing field of study and enable the next generation of students to contribute to the future of nanotechnology.

Poster #15 | Krista Permentier | Minot State University

Green Synthesis of Triangular Silver Nanoparticles using Cyan LED Light

The development of safe, sustainable methods for silver nanoparticle (AgNP) synthesis remains a critical bottleneck in the advancement of nanotechnology. Traditional AgNP syntheses often relies on harsh reducing agents such as sodium borohydride and N,N-dimethylformamide which pose environmental and explosive safety hazards. Shaped AgNP synthesis in particular is often dangerous and difficult, and very few green syntheses exist. These difficulties and dangers also prevent nanoscience from being widely taught or studied in universities and schools lacking specialized setups. To these ends, our method employs a green approach for synthesizing morphologically controlled silver nanoparticles (AgNPs) using nothing but non-toxic plant-based sugars, ultrasonic energy, and light-emitting diode (LED) radiation to "pull" nanoparticles into non-spherical shapes. Here we show that cyan (505 nm) LED radiation can be used to create hexagonal and then triangular AgNPs which are highly stable over time. UV-visible spectroscopy is used to track the shape transformation progress as this cause shifts in the surface plasmon resonance wavelength which corresponds to spectacular color changes in the reaction solution. By emphasizing low-cost materials and minimizing hazardous reagents, this work contributes to the broader goals of green chemistry. Ultimately, this novel and green method produces shape-controlled AgNPs with potential applications in sensors, chemical probes, antimicrobial applications, all while offering an accessible route for bringing nanomaterial science into the classroom.

Poster Abstracts

Poster #16 | Tanner Veo | Sitting Bull College

Quantification of Hydrogen Sulfide Emissions from a Concentrated Animal Feeding Operation on the Standing Rock Reservation

Hydrogen sulfide (H2S) is a hazardous gas produced during the anaerobic decomposition of animal waste. Chronic exposure to H2S has been linked to adverse health effects. In McLaughlin, South Dakota, a concentrated animal feeding operation (CAFO) was established before current environmental regulations and has been grandfathered in as the town developed around the facility. This research project quantified ambient hydrogen sulfide concentrations near the CAFO and evaluate the potential exposure risk to nearby residents. H2S concentrations were measured using an Aeroqual ranger under varying wind, temperature, and humidity conditions to assess dispersion. This study establishes a baseline profile and identifies exposure hotspots. Results will be interpreted in relation to public health using acute exposure guideline levels developed by the U.S. Environmental Protection Agency. This study will provide valuable data for the Standing Rock Reservation and support future environmental monitoring, risk assessment, and policy discussions. The findings will contribute to a better understanding of the impacts of aging agricultural infrastructure on Tribal communities and will guide strategies to reduce harmful exposure.

Poster #17 | Cole Gabos | University of North Dakota

Operational Application of the Flash Flood 4-Panel Technique to the Desert Southwest

Within the U.S over the last 30 years, flash flooding has been the leading cause of weatherrelated fatalities. A new way of issuing flood advisories and impact-based flash flood warnings using a 4-panel technique has recently been developed and applied to County Warning Areas (CWAs) in the Midwest, Northern Great Plains and East Coast, and has gained traction within the operational community. Previous research that applied this technique to CWAs on the East Coast and the Great Lakes region yielded a promising increase in lead time and accuracy for warning operations involving high-severity flash flooding events. This project aims to extend and improve upon this technique for the Flagstaff, Arizona CWA, covering central and northeast Arizona. This location presents a unique operational challenge due to its complex terrain, sparse radar coverage, short-duration/high-intensity FF events during the monsoon season, burn scars, and slot canyons. Using 807 flash flood events from 2021-2025, we have developed severity-based parameter thresholds and evaluated several potential variable combinations via event recategorization. Preliminary results in threshold and event recategorization analysis indicate a promising 4-Panel configuration using 1-hr QPE, GFFG, HP Unit Streamflow, and SAC Unit Streamflow. Reanalysis of events using these thresholds has shown promise in potential lead time associated with warning issuance. Ultimately, the primary goal of this project is to provide forecasters with a consistent framework for issuing flash flood warnings of different severities (e.g. Base, Considerable, and Catastrophic). Future work will focus on validating thresholds against Local Storm Reports and calculating lead-time to assess real-time operational applicability for the Flagstaff CWA.

Poster Abstracts

Poster #18 | Erica Rookey | Sitting Bull College

Mobile Monitoring of Volatile Organic Compounds in the Mandan/Bismarck Area, North Dakota: A Preliminary Study

Mobile air quality monitoring offers a practical approach for capturing fine scale spatial variability in VOCs such as benzene and non-methane hydrocarbons (NMHC). This preliminary study evaluates the feasibility of using a single Aeroqual Series 500 monitor with two sensor heads to collect site-specific data in the Mandan/Bismarck area. The purpose is to determine if portable sensor technology can identify localized air quality risks obscured by regional averages from stationary monitors. The research compares benzene and methane measurements obtained from regulatory air quality monitoring programs with field measurements collected using a portable Aeroqual Series 500 monitor in the Mandan-Bismarck region of North Dakota. The Tracks Logger app recorded GPS coordinates that were integrated into ArcGIS Pro to identify localized VOC hotspots. Data collection is ongoing, and this phase of the research focuses on identifying patterns between portable and fixed-site measurements. Initial observations suggest that portable monitoring may reveal localized variations in VOC concentrations not fully represented by regulatory stations while also demonstrating that this method is feasible for rapid, site-specific assessment. This study demonstrates that mobile VOC monitoring is feasible for rapid, site-specific assessment and provides a foundation for a larger scale study. It also establishes a strong methodological framework for integrated air quality monitoring. This preliminary phase ensures data integrity and procedures necessary for expanded sampling in the North Dakota Bakken region, providing a verified foundation for enhanced environmental risk evaluation.

Poster #19 | Ebony Peltier | United Tribes Technical College

Poster Abstracts

*Student presenters not in attendance, viewing only

Poster #20 | Turner Person | North Dakota State University

Cryogenics and Fluid Internship

During Summer 2025, I interned at NASA Goddard Space Flight Center working on cryogenic thermal systems and lunar materials. My work focused on two primary projects: designing a methane-based cryogenic heat pipe system and characterizing engineered lunar regolith composite (ELC). I developed a Thermal Desktop model of the heat pipe system and optimized graphite and aluminum heat straps to reduce unwanted heat loss and keep temperatures more consistent across the system. In parallel, I designed and built a custom 4-point probe system using dual Keithley sourcemeters controlled through LabVIEW to measure the electrical properties of ELC. The system achieved less than 1% measurement error, and testing showed promising performance for use in lunar thermal and electrical infrastructure. This work supports the development of reliable systems for future Artemis missions. Throughout the internship, I worked closely with two other interns and gained experience stepping into a leadership role while still collaborating effectively as part of a team. This experience improved my ability to communicate technical ideas and take ownership of project direction. The ELC project has also led to two research papers, allowing me to contribute to published work. Outside of project work, I toured several facilities at Goddard, including the largest clean room in the country, and met engineers and researchers who are highly dedicated to their work. This experience reinforced my motivation to pursue a career in aerospace engineering.

Poster #21 | Emily Mikhail | North Dakota State University

SCALPSS (Stereo Cameras for Lunar Plume Surface Studies) Internship

During my internship at NASA Langley Research Center, I was part of the SCALPSS (Stereo Cameras for Lunar Plume Surface Studies) project, which investigates plume-surface interactions during lunar landings. My work focused on both experimental system development and optical diagnostics to support both ground testing and future flight applications. In my first project, I developed preliminary designs for a custom vacuum chamber and pumping system that would simulate lunar plume environments. The main objectives were flexibility for varying experimental configurations, compatibility with lunar regolith simulants, and maximal optical access for imaging. In parallel, I designed and built a lab-scale stereoscopic Particle Image Velocimetry (PIV) system for potential application on future SCALPSS flights. PIV systems traditionally use highpowered, pulsed lasers and high frame rate cameras with small fields of view (FOV). However, due to the constraint of using SCALPSS flight hardware, the team needed to determine if a PIV system was feasible with a continuous-wave laser and low frame rate, large FOV cameras. I implemented laser pulsing, optimized laser and camera parameters, and leveraged forward light scattering intensity and single-frame PIV techniques to obtain useful particle motion data. This prototype can demonstrate the feasibility of additional quantitative imaging techniques on future SCALPSS missions. I also supported SCALPSS ground testing efforts by assisting with checkout procedures, calculations and alignment for diffractive elements, camera calibration, and thermal monitoring of instruments.

Poster Abstracts

*Student presenters not in attendance, viewing only

Poster #22 | Terrence San Gabriel | North Dakota State University

FInite Element Model Parameter Optimization Studies Leveraging Machine Learning

This work evaluates an alternative framework for structural optimization that addresses several practical limitations of traditional gradient-based finite element optimization. In the present use case, MSC NASTRAN offers SOL 200, a built-in design sensitivity and optimization sequence commonly used for structural design studies. While effective for many applications, SOL 200 has important constraints that can limit its usefulness for broader design-space exploration. Because it relies on a gradient-based search strategy, convergence may occur at a local minimum rather than a global optimum, and the resulting search is restricted to the trajectory defined by the initial design seed. This can leave large regions of the design space unexplored. In addition, SOL 200 provides limited flexibility for composite optimization, and its treatment of multi-objective problems is also restrictive. To address these limitations, this study investigates the feasibility of a multi-objective structural optimization framework based on Quasi-Monte Carlo sampling coupled with Bayesian active learning. The proposed approach uses Python to manage sampling, surrogate-model development, and adaptive design-space exploration, while MSC NASTRAN is used to perform the underlying structural analyses. Quasi-Monte Carlo methods provide a more uniform exploration of the design space than conventional random sampling, and Bayesian active learning guides additional evaluations toward regions with high potential value or uncertainty, reducing unnecessary computational cost. This work assesses whether such a framework can provide a more effective and computationally efficient alternative to conventional optimization workflows in high-dimensional aerospace design applications of practical interest.

Poster #23 | Kristian Haugen | University of North Dakota

Design of Small-Scale Rotating Detonation Rocket Engines for Rapid Experimentation

Rotating Detonation Rocket Engines (RDREs) are extremely complex rocket engines utilizing continuous detonation to provide thrust. The complexity of these systems has often proven prohibitive to many research groups in the nation, leaving the majority of studies to be done by high end graduate groups or professional laboratories. With the rapid movement of this technology from the laboratory setting to flight vehicles and field testing, it is evident that a wider understanding of these devices is necessary. To encourage further knowledge and development, more research teams must be capable of completing studies on the topic. Bridging this gap is the primary purpose of the design developed through this project. This design proves that collegiate participation in the research of Rotating Detonation Rocket Engines is a viable possibility for the future of the technology. A 3” Diameter RDRE was developed for the preliminary work of this project. Three pressure ports, and Four Thermocouple ports allow for the acquisition of engine data in future tests. Designed around Low Cost and Ease of Manufacturing, this engine opens the door for many universities to get their hands on advanced propulsion equipment and begin contributing to the ever-growing research field.

NASA

Word Search

DIRECTIONS: Find and circle the vocabulary words in the grid.
Look for them in all directions including backwards and diagonally.

ADMINISTRATION	HOUSTON	RESEARCH
AERONAUTICS	HUBBLE	ROCKET
AGENCY	LAUNCH	SATELLITE
APOLLO	MERCURY	SHUTTLE
ASTRONAUT	MISSION	SKYLAB
CAPE CANAVERAL	MOON LANDING	SPACE
CIVILIAN	NASA	STATION
EARTH SCIENCE	NATIONAL	TELESCOPE
EXPLORATION	ORION	US GOVERNMENT
GEMINI	PROBES	WASHINGTON D.C.

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NORTH DAKOTA SPACE GRANT STEM AMBASSADOR PROGRAM

NORTH DAKOTA SPACE GRANT CONSORTIUM

What is a STEM Ambassador:

North Dakota Space Grant (NDSGC) STEM Ambassadors are responsible for inspiring and engaging students, educators, and the community in the fields of science, technology, engineering, and mathematics. As a representative of theNDSGC, STEM Ambassadors will promote STEM education, outreach activities, and serve as mentors to foster interest and awareness in STEM subjects. This role requires enthusiasm, communication skills, and a passion for helping others discover the possibilities within STEM careers.

Eligibility:

- Open to any major
- Must be a U.S. Citizen
- Must be in good academic standing (2.0 GPA)
- Must be enrolled at an NDSGC Affiliate College or University

Funding:

- $18/hr, up to 20 hours per pay period
- Work remotely or in our office
- Must work a minimum of 10 hours per pay period

Application Deadline
May 15th

NASA Partner

NDSGC website for more info:

NDSGC STEM Ambassador Application Guide:

Notes

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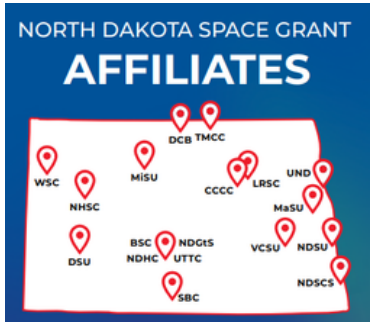

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