2022-2023 Award Recipients

Faculty Led Fellowships for Undergraduate Student Participants:

Alexopoulos, Christopher - Oakland University Balk, Gabriel - Hope College Callebs, Jacob - Wayne State University Callebs, Jacob - Wayne State University Clem, Dylan - Hope College DeWitt, Skylar - Hope College Gagnier, Bridget - Hope College Grimes, Sarah - Hope College Harville, Brendan - Michigan Technological University Jankowski, Lindsay - Hope College Jansen, Ethan - Hope College Kaipainen, Nicholas - Hope College Mangas, Luke - Eastern Michigan University Mangas, Luke - Eastern Michigan University Miller, Grace - Grand Valley State University Okros, Grace - Grand Valley State University Ruiz Fachin, Jhoseph - Grand Valley State University Thomas, Evan - Hope College Vance, William - Hope College Williams, Sierra - Michigan Technological University Zimmer, Gavin - Saginaw Valley State University

Graduate Fellowships:

Graduate Fellowships: About Halloun, Jihan - Wayne State University Barnes, Jackson - Michigan State University Benson, Mikayla - Michigan State University Chanakian, Sevan - Michigan State University Clugston, Jadon - Western Michigan University Essig, Espree - Michigan Technological University Forest, Erika - Grand Valley State University Foster, Emily - Oakland University Hanson, Anthony - Western Michigan University Foster, Emily - Oakland University Hanson, Anthony - Western Michigan University Kaminski, Caleb - Michigan Technological University Kur, Justin - Oakland University Langfield, Katherine - Michigan Technological University LeMahieu, Tyler - Michigan Technological University McClusky, Bridie - Grand Valley State University Nathan, Gabriel - Michigan State University Nieman, Kin - Wayne State University Nieman, Kip - Wayne State University Pease, Allison - Michigan State University Rivera Gonzalezx, Paola - Michigan Technological University

Robinson, David - University of Michigan Santiago, Erican - Michigan Technological University Sargent, Hannah - Western Michigan University Schwiebert, Kyle - Michigan Technological University Sebasco, Nick - Michigan State University Sell, Jakob - Western Michigan University Van Buskirk, Chelsea - Eastern Michigan University

HONES Groups

Lemmer, Kristina - Western Michigan University van Susante, Paul - Michigan Technological University

Research Seed

Bagherzadeh, Mehdei - Oakland University Beetham, Sarah - Oakland University Bolen, Brett - Grand Valley State University Chen, Jun - Oakland University Chen, Jun - Oakland University Christians, Jeffrey - Hope College Gomez, Pablo - Western Michigan University Jaiswal, Surabhi - Eastern Michigan University Jin, Qingxu - Michigan State University Ronald, Kelly - Hope College Ye, Xinyu - Michigan Technological University Yoon, Yongsoon - Oakland University

PreCollege Program

Linday, Harriet - Eastern Michigan University Maas, Sara - Grand Valley State University Narayanan, Krish - Eastern Michigan University Thompkins, Gerald - The Engineering Society of Detroit Tumey, Jannah - Michigan Technological University

Public Outreach

Gipson, Karen - Grand Valley State University Sterner, Anna - Michigan Science Center van Dijk, Deanna - Calvin University

Teacher Training

Lioubimtseva, Elena - Grand Valley State University

Multiple Programs

DeVillers, Virginia - Plainwell Aviation and STEM Academy Gochis, Emily - Copper Country Intermediate School District Ipri Brown, Susan - Hope College Kobus, Chris - Oakland University Pachla, Kris - Grand Valley State University Webb, Maria - Detroit Area Pre-College Engineering Program

NASA Interns

De La Rosa, Diego - University of Michigan Hart, Taylor - Saginaw Valley State University Kasapis, Spyros - University of Michigan Stevens, Adam - Michigan State University

Industry Interns

De Urquidi, Tomas - University of Michigan D'Urso, Eric - University of Michigan Jackowski, Filip - University of Michigan Lawson, Bennett - University of Michigan Rulison, Forest - University of Michigan



Michigan Space Grant Consortium www.mispacegrant.org

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MESSAGE FROM THE DIRECTOR

This will be an exciting year as NASA MSGC's increased funding enables us to expand our impact with new community and industry partners and increased funding to support research experiences for students across our eleven affiliate institutions and NASA Centers.

At our Fall 2022 Conference held at the University of Michigan, we learned about the success of last year's programming from over 100 presenters and attendees. The talks - including our Keynote from NASA's Cindy Hasselbring describing her career path from math teacher in Milan Michigan, to Einstein Fellow, to helping lead NASA's STEM engagement efforts, are available on our MSGC YouTube channel.

Please join us on October 21, 2023 at our Fall Conference at Western Michigan University in Kalamazoo. We look forward to expanding our partnerships, collaborations, and programming across Michigan in 2023.

Marke Moldwin

Mark Moldwin, PhD - Arthur F. Thurnau Professor, Department of Climate & Space Sciences & Engineering, Director of NASA's Michigan Space Grant Consortium.

Fall Conference back in Ann Arbor

MSGC's annual Fall Conference was back in Ann Arbor once again but held in a new location this year. Taking over the atrium and Kahn Auditorium of the BSRB (Biomedical Science Research Building) or affectionately known as the Pringles Building on campus.

Keynote Cindy Hasselbring, K-12 Education Advisor for Next Gen STEM in NASA's Office of STEM Engagement (OSTEM) connected with attendees with the telling of her journey during a Fireside Chat with MSGC Director Mark Moldwin. Her message of having big dreams and tenacity resonated with attendees.

The remainder of the sunny Saturday was split up between two sessions of Poster Presentations lining the atrium and three sessions of Oral Presentations in the auditorium. Giving MSGC awardees from all over the state of Michigan a chance to share their research.



Professor Gonthier Steps Down

Longtime Hope College MSGC Board Member and Campus Representative, Professor Peter Gonthier has stepped down in 2023 in preparation of his retirement. Last year, Professor Gonthier helped onboard a familiar face as he took on Professor Brian Yurk as his Deputy Campus Representative. Brian is now the acting Hope College MSGC Board Member and Campus Representative taking over for Peter after shadowing him for over a year. We thank Peter for his significant contributions and wish him the best of luck in their next adventures.

Observing the Dark Sky in Alpena

The Besser Museum and Planetarium is an educational institution that brings the culture of art, history and science to the northeast Michigan community of Alpena. After receiving a MSGC Virtual Learning Program Award, the Besser Museum was able to purchase a Unistellar eVscope smart telescope along with an iPad to operate it. The goal of their award was to expand their digital presence and interation with local underserved communities and schools.

One way that they did this was by holding several community outreach events. During these events, the telescope is brought to a local Alpena Dark Sky park, Rockport State Recreation Area where community members are able to use the telescope to observe various celestial bodies like comets, nebulae, stars, and galaxies. One such event was a meteor shower watch party where planetarium coordinator, John Winckowski invited locals out to bring their own telescope (and chairs) or take a turn using the smart telescope where he guided them on viewing various objects in the night sky.

Alpena is home to three of Michigan's Dark Sky parks. Rockport State Recreation Area is Michigan's 100th state park nestled along Lake Huron and happens to be a 300-acre abandoned limestone quarry. Thompson Harbor State Park consists of 5,000 acres of sand dunes, upland and marsh. Including 6 miles of rustic trails. Negwegon State Park consists of one of the most beautiful beaches along Lake Huron's coast. Lake Huron does not have a major city on its shoreline enabling wonderful dark skies.

The museum is working with local school districts and Alpena Community College to develop educational materials and events using the telescope. With the goal of setting up their own astronomy research programs using the eVscope and the astronomy database programs. These programs can be streamed online as well as right to their phones using the app.

Located in a community where the poverty rate is high, they are able to bring much-needed scientific outreach and education to many communities.







LiftOff Experience for 7th Grade Science **Teacher Leads to MicroGravity Experiements**

Texas Space Grant Consortium hosts an aerospace workshop every summer called LiftOff, a weeklong professional development training for teachers emphasizing STEM. Teachers are given information through a series of speakers, hands-on activities and field investigations. Last summer MSGC helped send Colleen Cain, a 7th grade science teacher from Larson Middle School in Troy, MI to attend LiftOff. Highlights from her trip included "meeting Apollo 13 astronaut Fred Haise, Clayton Anderson sharing stories about his time on the ISS, meeting and learning from NASA scientists and engineers, getting behind the scenes tours at NASA and meeting incredible teachers from all over the country!" While in Texas, Colleen learned about the Embedded Teacher Program hosted by the Wisconsin Space Grant Consortium. Colleen participated in this program last September with the help of MSGC, and is ging in a microgravity flight with student designed research projects this May. Once she returns home, Colleen uses these experiences to share what she learned not only with her students but with her school and community as well.

Preparing for Potential Emergencies on Other Planets

Kip Nieman is a graduate student at Wayne State University who has been conducting research to determine the best method for manufacturing emergency equipment for human colonies on other planets. If humans establish colonies on planets like Mars, transportation of materials and equipment from the Earth will take months. This takes far too much time if the colony is facing an emergency situation.

One method for emergency equipment production is Powder Bed Fusion (PBF). PBF is a type of "additive manufacturing" that uses a laser to melt thin layers of material in a bed of powder. This has an advantage over other methods because it can produce metal objects. A drawback of the PBF method is the fact that each completed object has internal stresses that weaken the overall structure. These stresses can only be relieved through a process called heat treatment which is demanding in time and energy and can both be limited in an emergency situation on another planet.

FY2022 Funding Addressing NASA Mission Directorates

\$15,000 Aeronautics Mission Directorate



FY2022 MSGC Funding Snapshot

\$171,150 for Educational Programs

\$54,000 in Research Seed Grants

\$247,797 NASA Internships & Fellowships

20 Publications







Nieman's research has been to try to improve the PBF process so that the internal stresses are minimized without having to complete the heat treatment process. Methods to improve the PBF process include optimization and the use of model-based controls. Kip and his team have been focusing on refining a model for the PBF process with the help MSGC funding for several years and most recently had the opportunity to present this work at the MSGC Fall Conference in 2022.



\$194,812 Science Mission Directorate

\$30,000 Space Technology Mission Directorate

Hart flourished at NASA eClips

Taylor Hart is a current undergraduate student at Saginaw Valley State University, and recently had the opportunity to intern at NASA's Langley Research Center where she worked as a science communicator. In this role, Hart, with mentorship from the NASA eClips team, developed interactive multimedia content meant to showcase NASA's educational resources. Developed for K-12 classrooms around the country, they are available through various eClips sites.

Some of Taylor's projects included working with the James Webb Space Telescope Social Director to develop a compilation of art videos for the "Unfold the Universe" competition. As well as working with NPR's "Science Matters" team to publish articles about her experience interning as a science communicator for NASA. Taylor and her partner were also able to greatly boost the eClips social media presence using holidays, anniversaries, and important milestones as ways to connect cultural interests with educational resources.

During the time of her internship, Hart was able to promote educational resources through three in-person events. The first event was a professional development event designed to show educators activities developed by NASA that can be used in the classroom. The second event was created to show families fun activities that they can do at home to learn more about aerospace. The final event was held at a local library and it encouraged families to come and participate in activities that taught about things like the life cycle of a star.

Hart describes that she enjoyed being able to flourish creatively in the development of these projects, and she valued learning how to manage feedback about the projects from different perspectives. This internship has positively changed the way she sees the world of science communication, and she is excited to apply her newly learned design strategies to future projects.





Working Collaboratively for Cleaner Water

Allison Romanski, an undergraduate student at Grand Valley State University (GVSU), was able to work with a team of researchers during the summer of 2021 to repeatedly sample and test the water quality of various locations along the Grand River over a short period of time under different flow conditions.

The team collected over 120 samples during the time in the field, and in collaboration with the Allendale Wastewater Treatment Plant and the GVSU Honors College Lab, the team was able to immediately take the samples to the lab and test for attributes such as nitrate, total phosphate, ammonium, chloride, E. Coli, etc. Romanski and her team were then able to apply a value ranging from 1 to 100 for the quality of the water using the water quality index (WQI) which is determined based on the concentration of the various attributes they tested for.

By the end of the study, some noticeable trends became apparent. First, the WQI of the Grand River remained consistent around 70 during August 2021 which places it under the "Good" label. The next conclusion was that

MSGC Calendar

May 9, 2023: Funding starts for 2023-2024 Awards August 25, 2023: Registration opens for Fall Conference September 1, 2023: Applications open for 2024-2025 Awards

Studying Ice of the Frozen Keweenaw Waterway for Astrobiological Study

Professor Trista Vick-Majors and her team at Michigan Technological University from Houghton, Michigan are attempting to learn about how life might survive in environments outside of our planet. Most of the universe is comprised of frozen, icy environments which makes these environments on Earth the best place to determine how life might survive off planet. This study is working on determining how small microbes interact with their icy environments.

These types of studies are typically conducted in the polar regions using glaciers or sea ice, but this specific study monitored the ice of the frozen Keweenaw Waterway weekly during the winter months. The waterway cuts across the Keweenaw Peninsula, seperating Copper Island from the mainland. Connecting to Lake Superior on its North and South ends.

The team was able to determine that microorganisms trapped in the freshwater ice were at concentrations approximately equal to an equal volume of seawater which shows that freshwater ice traps a significant

many of the nutrients that were tested for were in higher concentrations where the flow rate was highest.

When working with the Allendale Wastewater Township Treatment Plant, Romanski was asked to present her research proposal to the Allendale Township Board. She was asked questions on the purpose of her research and asked to return following the results for another presentation in the following months.

Allison reflected on how engaging her MSGC fellowship has affected her future career path, and she explained that she learned many important values that will allow her to be a successful water scientist. This project has allowed her to learn the value of working in a collaborative scientific environment. It has also taught her the proper method for sampling bodies of water and what attributes can affect the health of a body of water.

October 21, 2023: Fall Conference in Kalamazoo **November 15, 2022:** Applications due for 2024-2025 Awards portion of microbial life. Vick-Majors was also able to determine that these trapped microbes also produce a detectable portion of organic matter that is dissolved in the ice.

Finally, they were able to determine that there are higher concentrations of protein-like dissolved organic matter in the ice compared to the corresponding liquid water samples as well as higher microbial counts in the ice than in the water. All of these results lead to the conclusion that frozen microbes are changing the composition of dissolved organic matter which supports the hypothesis that freshwater systems can serve as appropriate analogs for studies of life in space.

Through the support of a MSGC Research Seed Grant, this project was able to support the research of many students in the Department of Biological Sciences at Michigan Tech including a Ph.D. student, an MS student, and 10 undergraduate students who were involved in the processes of sampling and fieldwork.





GV Moon Miners go from Testing Their Instrument in Houston to Teaching in MI

A team of students known as the Grand Valley Moon Miners, from Grand Valley State University recently Traveled to Johnson Space Center to learn how to design, build, and test instruments that are meant to address challenges that NASA currently faces with their Artemis Program. This was a part of the annual NASA Space Exploration Challenges which are designed to encourage undergraduate students to pursue careers in STEM through outreach events and bands on activities hands-on activities.

GV Moon Miners worked on a project housed in Houston's Neutral Buoyancy Lab that is meant to retrieve samples of the lunar surface using a core bit, a stabilizing jig, and a sample containment mechanism that attaches to a handheld drill. They learned about the importance of understanding the composition of the moon's surface and the difficulties that come with performing scientific experiments on other celestial surfaces.

Once the students left Johnson Space Center, they brought the knowledge they acquired to the 11th and 12th-grade classrooms at Reeths Puffer High School in Muskegon, Michigan. They discussed the difficulties that astronauts face when taking coring samples on the surface of the moon. Afterwards they divided the students into teams and gave them the challenge of building the tallest tower with newspaper and masking tape. Another portion of the team put together a video that was shown during the annual Roger That! Symposium held in Grand Rapids. Roger That! is a conference to educate locals, students and the public on space science and exploration. Lastly, the device was displayed in the Grand Rapids Public Museum to highlight local research.

Industry Intern Builds Toolkits for Satellites

Forest Rulison is a masters student at the University of Michigan studying Aerospace Engineering. He was given the opportunity to work with an Aerospace company, Meta Orbital Effects (MOFX) located in Ann Arbor working at developing software for the Attitude Determina-tion and Control System (ADCS) for several satellites. ADCS is the system that is incharge of recognizing and maintaining a spacecraft's orientation compared to the earth providing stability to the instruments onboard the satellite.

Rulison worked on the "concept of operations" (ConOp) for the ADCS. Forest completed trade studies to determine the suitability for the satellite his team was working on. Building instrumentation from scratch requires a combination of hands-on work and work with computer models which led Forest to develop three tool kits. One to combine data from hands-on work to the model for accuracy. Another tool kit which turns analog data into digital data during the mission. The spacecraft uses that data to then make attitude adjustments. Lastly, a tool kit that characterizes the performance of the new space-craft part in the model. The last tool kit helps scientists and engineers determine the quality of the performance of their new instruments within the model before they build it and put it on the satellite.

MOFX's internship helped Forest apply his knowledge from his coursework while also learning new concepts. He stated that this internship solidified his interest in pursuing a career working with ADCS systems for satellites.



MSGC Affiliates

There are 11 affiliated Universities/Colleges around the state of Michigan. The University of Michigan is MSGC's lead institution. If you are interested in learning more about MSGC feel free to contact your MSGC Campus Representative or visit our web-page www.mispacegrant.org.











