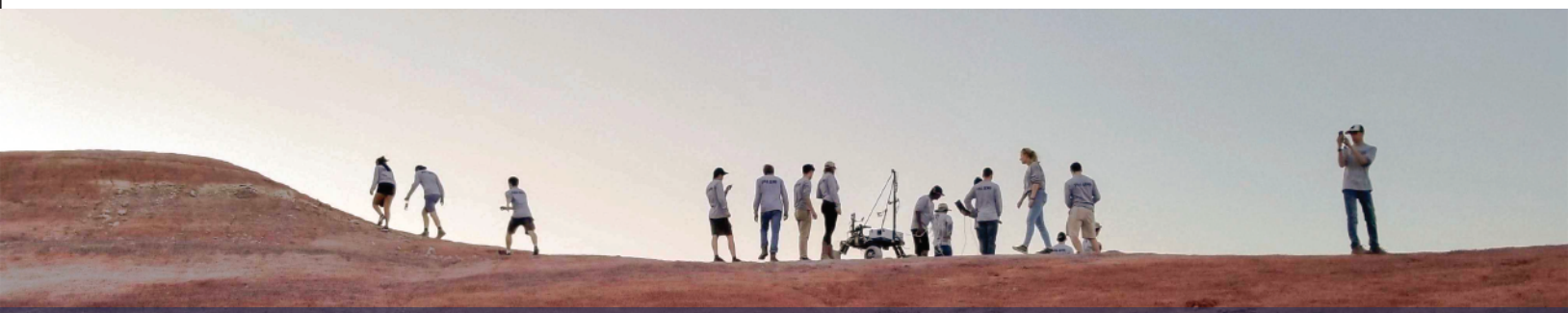
FRONTIERS NEWSLETTER
WINTER 2021

MESSAGE FROM THE DIRECTOR

Despite the COVID-pandemic, NASA MSGC was able to fulfill our mission by funding virtual research experiences for students across our eleven affiliate institutions and NASA Centers and launching a special Virtual Learning Program to support our K12 and non-profit STEM education partners during the Summer of 2020. At our Fall 2020 Virtual Conference, we learned about the success of those efforts from over 65 presenters and over 150 attendees. The talks – including our Keynote from Dr. Andy Klesh from NASA JPL, are available on our new MSGC YouTube channel. On July 30, 2021, we will be celebrating the 50th Anniversary of the "All-Michigan" Crew of Apollo 15th and on October 16, our Fall Conference will be held outside of Ann Arbor for the first time at the Calvin University Conference Center in Grand Rapids. We look forward to expanding our partnerships, collaborations and programming across Michigan in 2021.

Mark Moldwin



MRover

The Michigan Mars Rover Team (MRover) is a student org at the University of Michigan that brings together students from many different disciplines to design and manufacture a Mars rover. The team takes their custom rover to compete in the University Rover Challenge, which tests the rover's abilities while navigating a simulated Martian environment. Unfortunately, due to the Covid-19 pandemic, the competition was canceled, but the team made plans to do some final testing on the rover and use it for their own mock competition once they returned to campus in the fall. With help from MSGC, MRover is able to provide students with the opportunity to learn new technical skills such as using the newest CAD software to design the rover, designing custom circuitry, and writing algorithms to allow for the rover to function autonomously.The Mars Rover Team helps promote space exploration to young scientists and engineers while giving them hands on experience working in the lab.Participating in MRover also allows students to participate in recruiting opportunities which has led to internships and careers in the industry.When surveyed, an overwhelming majority of students who spent over 160 hours working on the rover said that their experience on the team has had a positive impact on their career path.

New Affiliate Campus Representatives

Professor Michael Velbel, longtime Michigan State University MSGC Board Member stepped down in early 2020. While the world was busy changing at a fast pace, Velbel was helping onboard Professor Virginia Ayres in a new and different way during the spring of 2020. Professor Lorelle Meadows, Michigan Technological University MSGC Board Member, has announced her plans to retire and is helping introduce Professor Will Cantrell during the busy application season. We thank Michael and Lorelle for their significant contributions. We wish them the best of luck in their next adventures.

Prof. Virginia Ayres
Michigan State University
ayresv@msu.edu

Professor Virginia Ayres is part of the Electrical and Computer Engineering department at Michigan State University. Her research investigates both inorganic and organic nanostructures.

Prof. Will Cantrell
Michigan Technological University
cantrell@mtu.edu

Professor Will Cantrell is the Associate Provost and Dean of the Graduate School at Michigan Technological Universty, as well as a professor of physics. His research includes atmospheric science, cloud and aerosol physics and chemistry as well as nucleation.

2021 Calendar

MSGC Affiliates

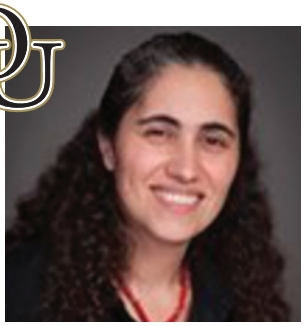
There are 11 affiliated Universities/Colleges around the state of Michigan. The University of Michigan is MSGC's lead institution. If you are interested in learning more about MSGC feel free to reach out to your MSGC Campus Representative at your University/College.

Prof. Jason Smolinski
Calvin University
js85@calvin.edu

Prof. Roxanne Katus
Eastern Michigan University
rkatus@emich.edu

Prof. Bopi Biddanda
Grand Valley State University
biddandb@gvsu.edu

Prof. Peter Gonthier
Hope College
gonthier@hope.edu



Prof. Laila Guessous
Oakland University
guessous@oakland.edu

Prof. Khandakar Abir Rahman
Saginaw Valley State University
krahman@svsu.edu

Prof. Mark Moldwin
University of Michigan
mmoldwin@umich.edu

Prof. Ed Cackett
Wayne State University
ecackett@wayne.edu

Prof. Massood Atashbar
Western Michigan University
massood.atashbar@wmich.edu

2020 Funding

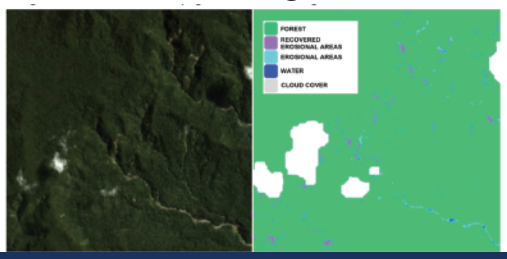
$157,015
for Educational Programs

$20,000
in Research Seed Grants

$313,100
for 79 Fellowhips

Tech in the Forest

Hope College Undergraduate Student, Eric Leu has spent his time developing technology that can automatically detect landslides from large sets of satellite images using machine learning algorithms. By training the classifier with data from landscapes, from before and after landslides Leu and his team were able to bring the model up to 99% accuracy for large scale landslides after validating the classifier with information they took when he and his mentor visited the Monteverde Cloud Forest Reserve (MCFR) of Costa Rica. This type of work is being used to better understand the Earth and how it reacts to the changing climate. He has continued to work on the landslide classifier to allow it to work in a greater number of applications, including drone images for smaller scale landslides. Eric is also contributing to another MSGC funded project that is working to make it easier to map the canopy of the forest. His experience working with MSGC has helped to inspire Eric to pursue Graduate studies working on Artificial Intelligence and Machine Learning.



Roger That!

Faculty at Grand Valley State University (GVSU) have teamed with staff at the Grand Rapids Public Museum (GRPM) to produce the Roger That! symposium for the fourth year in a row. The Roger That! Symposium was created to celebrate the successes of space exploration, and it is named after NASA Astronaut Roger B. Chaffee who was a native of Grand Rapids.

MSGC funding was used to bring speakers who are prominent names in the space exploration field including retired NASA Astronaut Story Musgrave and New Horizon's Mission Operation Manager Alice Bowman. Because the symposium worked closely with GVSU's Making Waves Initiative, Bowman and Musgrave's speeches, as well as many other aspects of the symposium, focused on water in space.

MSGC also helped to fund the K12 outreach activities during the weekend, which include demonstration tables by physics and engineering students from GVSU and presentations from the Design That! entries. The Design That! competition has students propose solutions to real world problems in space science. The entries were all developed by 4th to 6th grade students from the Grand Rapids area. All entries were submitted with documentation, and many of the projects built physical models to represent their designs. It is estimated that 2,460 people attended the outreach activities at GRPM on Saturday with many more people participating in other activities throughout the weekend.

Saving Turtles through Telemetry

Grand Valley State University Graduate Student Carly Brouwers has spent her time studying two types of turtles that are native to the State of Michigan. Through her research, Carly hopes to learn more about the specific habitats these turtles use, so officials can make more informed decisions about land management. Her end goal is to be able to locate areas of high mortality, so as cities continue to expand, efforts can be made to protect the habitats of these threatened turtles. With the help of MSGC, Carly and her team were able to conduct research at three different sites where they were able to find 16 turtles of interest. They were then able to track the movement of these turtles by tagging them with radio transmitters and using telemetry to locate them. Using this technique Carly was able to document 600 turtle locations. She was able to present her findings to other experts in the field at the Michigan Rare Turtle Working Group and the Midwest Fish and Wildlife Conference. While working on this MSGC project, Carly was able to work closely with local wildlife and conservation groups, and this has helped to strengthen her goals of working in the field of conservation. Aside from developing an extensive network of experts in her field of interest, Carly was able to develop valuable skills like experimental design, data collection, and field techniques that she'll be able to use in a career in the field.

Studying Volcanic Activity in Michigan & Ontario

Michigan State undergrad student, Erik Eikey has been doing research on the chemical composition of two places along the Mid-Continental Rift, which is a place that had a large amount of volcanic activity throughout the history of our planet. More specifically, Eikey was able to take chemical samples from two places along the rift, Wetmore Landing, Michigan and Mamainse Point, Ontario. Using the data collected at the two sites, he was able to determine the time period the samples were first created through volcanic activity. He then used that date to determine that there was a strong possibility that Wetmore Landing and its surrounding areas could possess a high concentration of copper, nickel, and platinum ores. Thirteen samples were taken from the two locations for analysis, and unfortunately,they were unable to take more samples due to Covid-19 restriction. Once the restrictions are lifted, Eric says he is excited to be able to attend conferences to talk about his findings. Eikey contributes his choice to continue studying geology to his work on this project. Eikey says he is planning on pursuing a Graduate Degree in the field and is thankful for the opportunity that MSGC to pursue research as an undergrad.

2020-2021 Award Recipients

Undergraduate Fellowships:

Anthony Aragon-Orozco, HC
McKenna Bartley, HC
Lindsey Boltz, HC
Meredith Bomers, HC
Marie Bridges, WMU
Alanah Cardenas-Otoole, UM
Simon Detmer, CU
Cody Donovan, OU
Peter Duimstra, CU
Ethan Gardner, GVSU
Derek Goderis, MSU
Blake Harlow, HC
Safia Hattab, HC
Lauren Henderson, CU
Willem Hoogendam, CU
Patricia Klawitter, MTU
Madison Kortas, MSU
Jackson Krebsbach, HC
Abigail LaDuke, HC
Edward Landon, HC
Corine LeFrenier, HC
Eric Leu, HC
Amanda Liddle, MSU
Carter Mashburn, MTU
Kyle Masiak, OU
Troy Maust, MTU
Ron McGee-Sinclair, WMU
Madisyn Miller, HC
Anna Molloy, HC
Victoria Nizzi, MTU
Grace Ojala, MTU
Erin Ramey, HC
Jose Ignacio Rodriguez-Labra, WMU
Alexis Rogers, OU
John Roselli, UM
Collette Sarver, MTU
Elijah Smith, GVSU
Ian Stone, GVSU
Tyler Strauss, MTU
Shaurya Tiwari, UM
Chase Tuttle, GVSU
Zachery Wylie, HC
Aven Zitzelberger, MSU

Graduate Fellowships:

Shadi Adineh, WMU
Joshua Arnold, GVSU
Alexandria Aspin, OU
Benjamin Bond, OU
Connor Boss, MSU
Jacob Brand, GVSU
Michela Coury, GVSU
Philip Hittepole, WMU
Emily Johnson, WMU
Thomas Kerber, WMU
Baylee Kinkade, EMU
Roman Kulikovskiy, OU
Kelsey LeMay, MTU
Randi Lesagonicz, GVSU
Rachel London, UM
Kaitlin Lowran, OU
Megan Mader, GVSU
Larissa Markwardt, UM
Luis Martinetti, MSU
Brian Mikolajczyk, EMU
David Moutard, WSU
Sophie Mueller, MTU
Emily Neuman, GVSU
Kip Nieman, WSU
Jeremy Rapp, MSU
Nel Rodriguez-Sepulveda, MTU
Elise Rosky, MTU
Alejandro Sanchez, EMU
Kathryn Sheets, GVSU
Sarah Spritzer, UM
Steven Stelly, MTU
Gabriel Stewart, WSU
Regina Szlag, WSU
Christopher Thomas, UM
Mitchel Timm, MTU
Emily Tom, MTU
Hannah Watts, WMU
Isaac Wedig, MTU
Zach Whitacre, WMU
Kevin Whitley, UM

Research Seed

Shadi Alawneh, OU
Seyed Ali, Arefifrar, OU
Jeffrey Christians, HC
Kathryn Docherty, WMU
Elena Giusarma, MTU
Natalia Gonzalez-Pech, HC
Melinda Higley, CU
Yaoxian Huang, WSU
Roxanne Katus, EMU
Kristina Lemmer, WMU
Jianhua Li, HC
Jonathan Maisonneuve, OU
Alireza Mohammadi, UM
Avishek Mukherjee, SVSU
Brooke Odle, HC
Kathryn Perrine, MTU
Michael Philben, HC
Raechel Portelli, MSU
Kristin Renkema, GVSU
Matthew Schrenk, MSU
Darin Stephenson, HC
Zachary Williams, HC
Sean Woznicki, GVSU
Colin Wu, OU

PreCollege Program

Sara Maas, GVSU

Teacher Training

Elena Lioubimtseva, GVSU

Public Outreach

Karen Gipson, GVSU
Carolyn Sparks, CU
Deanna Van Dijk, CU

HONES Groups

CLAWS, UM
HOOP, UM
Mapleseed, UM
Project Space Rocks, GVSU
Sunseeker Solar Car Project, WMU
WALI, WMU

NASA Interns

Liam Alexis, UM/Glenn Research Center
Lauren Bowling, MTU/Langley Research Center
Kindred Griffis, MSU/Ames Research Center
Joseph Pinakidis, MSU/Langley Research Center
Dean Yuan, UM/Langley Research Center

Multiple Programs

Glen Archer, MTU
Susan Brown, HC
Joan Chadde, MTU
Paulette Epstein, Michigan Science Center
Chris Kobus, OU
Harriet Lindsay, EMU
Megan McCullen, WSU
Chelsea Ridge, GVSU
Sue Ruffner, Engineering Society of Detroit
Stephen Scogin, HC
Maria Webb, Detroit Area Pre-College Education Program
Lloyd Wescoat, MTU

Virtual Learning Program

Cassie Byrd, Michigan Science Center
Virginia DeVillers, Plainwell Aviation and STEM Academy
Amy Emmert, Belle Isle Conservancy, Belle Isle Aquarium
Liz Fujita, MTU
Emily Gochis, Copper Coutry ISD
Megan McCullen, Wayne State University Planetarium
Laura Percival, NE MiSTEM Network
Jeffrey Stark, Flint Cultural Center Corportation and Longway Planetarium
Sara Syswerda, Pierce Cedar Creek Institute
Gerald Thompkins, The Engineering Society of Detroit
Lisa Wininger, MiSTEM Network

3D Urban Expansions of Cities across the United States

Research Seed awardee Adam J.Mathews is an Assistant Professor at Western Michigan University, and he has been conducting research on urban expansion in all three dimensions. His research can then be used to understand the environmental effects of urban changes such as changes in atmospheric circulation due to skyscrapers or the urban heat island effect. This research is unique because it includes the effects of vertical expansion which has very rarely been considered. The MSGC grant was able to help fund the salary of a graduate student research assistant who helped Matthews complete the analysis. They were able to complete 3-dimensional analysis of San Antonio, Texas and New Orleans, Louisiana for the years of 2003 –2012. Processing the raw data required a lot of work due to the pure size of the datasets, and then getting the data to properly line up required more work than initially expected. Once the data were successfully analyzed, they were able to represent the vast changes in each city. For example, San Antonio saw large 3-D expansion due to increased population. In the future, Mathews hopes to complete similar analyses of Denver, Detroit, and Oklahoma City, and he hopes to collaborate with other faculty who are focused on urban changes and collaborate with Dr. Son V. Nghiem, who is an expert on spaceborne radar data processing and analysis at the NASA Jet Propulsion Laboratory.

2020 MSGC Virtual Fall Conference

Our annual Fall Conference on October 17th, 2020 definitely looked a bit different this year. We quickly adapted and created an opportunity for presenters to upload a 3-5-minute video presentation of their work and participate in the live Fall Conference Session. The videos were available prior to the Fall Conference and organized by topical session. They are posted on our website and MSGC's new YouTube channel.

Since we couldn't meet in person this year, the MSGC team decided to send all that registered for the 2020 Virtual Fall Conference a MSGC t-shirt that features all of the affiliate universities/colleges. Those shirts all arrived safely before the day of the conference and many of the attendees were seen wearing them.

The day of the conference was split into two different Zoom sessions. The first was a Zoom webinar featuring keynote speaker Dr. Andrew Klesh's talk on "Diving Deep". The second part of the day was a Zoom meeting broken down into 3 organized sessions for over 65 presentations.

During the live sessions each speaker presented a 1-minute-1-slide lightning talk highlighting their work followed by Q&A and open discussion among the presenters and participants moderated by members of the MSGC Board. Full videos of our 2020 conference can also be found on our YouTube channel.

2020 Keynote Speaker Dr. Andrew Klesh

Dr. Andrew Klesh is the project system engineer for the Lunar Trailblazer mission and was the chief engineer of the MarCO interplanetary mission. He also serves as engineering lead of the Buoyant Rover for Under-Ice Exploration and Hadal deep ocean teams, supporting scientists exploring the extreme conditions throughout arctic and ocean environments.

Klesh captivated the screen immediately with his keynote the morning of the conference. His talk consisted of robotic exploration starting in the depths of the oceans and continuing to the ice in the arctic. He went into details about the many different vehicles used in various environments. Attendees had the opportunity to ask many questions.

You can view the full keynote speech on MSGC's new YouTube channel.

Michigan Space Grant Consortium
www.mispacegrant.org

Prof. Mark Moldwin
1418 Climate and Space Research Bldg.
2455 Hayward St.
Ann Arbor, MI 48109-2143
Tel: (734) 647-3370
mmoldwin@umich.edu
mispacegrant@umich.edu

@mispacegrant