

Michigan Space Grant Consortium  
University of Michigan  
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## PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Michigan Space Grant Consortium is a Designated Program Consortium funded at a level of \$575,000 for fiscal year 2012.

## PROGRAM GOALS

**Outcome 1:** *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals. (Employ and Educate)* Higher Education: MSGC Fellowship, Internship, and Seed Grant Programs.

### **The MSGC Fellowship Program**

**Goal:** Increase the number of proposals that the MSGC Fellowship Program receives.

**Goal:** Improve the longitudinal tracking of the MSGC Fellowship award recipients.

**Goal:** Competitively award graduate and undergraduate fellowships with demographics as specified by NASA of 20.3% underrepresented minority (Department of Education). U.S. citizenship required.

### **The MSGC Research Seed Grant Program**

**Goal:** Improve participation in the MSGC Research Seed Grant Program across the Consortium.

**Goal:** Increase the diversity (underrepresented minorities and women) in the MSGC Research Seed Grant Program.

**Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty. (Educate and Engage)* Elementary/Secondary Education: MSGC Higher Education, K-12 Educator Incentive, Pre-College, and Augmentation Programs.

### **The MSGC Precollege Education, Higher Education, K-12 Educator Incentive and Augmentation Programs**

**Goal:** Increase the number of applications coming from outside of the Consortium for the MSGC Precollege Education and K-12 Educator Incentive Programs with augmentation funds available to programs that target underrepresented minorities and women.

**Goal:** Award quality programs that target underrepresented minorities and women.

**Outcome 3:** *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission. (Engage and Inspire)* Informal Education: MSGC Informal Education and Augmentation Programs.

### **The MSGC Informal Education Program**

**Goal:** Increase the number of applications coming from outside of the Consortium for the MSGC Public Outreach Program with augmentation funds available to programs that target underrepresented minorities, women, and persons with disabilities.

**Goal:** Award quality programs that target underrepresented minorities and women.

**Goal:** Award quality programs that encourage Science, Technology, Engineering, and Mathematics education in informal settings; e.g., museums science centers, boy and girl scouts, etc.

### **PROGRAM/PROJECT BENEFIT TO OUTCOME (1, 2, & 3)**

**Outcome 1:** *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals. (Employ and Educate)* Higher Education: MSGC Fellowship, Internship, and Seed Grant Programs. Highlights are provided below:

“The support of the Michigan Space Grant Consortium has had a tremendous impact on my life,” says Space Grant Summer UM Intern, Richard Carrillo. “As a direct result of my research internship, I plan to pursue a Ph.D. and work as a research scientist following the completion of my education. Networking with my advisor at Michigan helped me to secure a research position at the University of Central Florida, working with Dr. Tuhin Das on the applications of the autogyro theory. An autogyro is a type of rotocraft which uses an unpowered rotor in autorotation to develop lift and an engine-powered propeller, similar to that of a fixed-wing aircraft, to provide thrust. The underlying goal for the project is to be able to make use of the autogyro theory for airborne wind energy extraction and determine whether this application

would be successful in increasing the battery life of an unmanned aerial vehicle. Richard is in his junior year at the University of Central Florida.

“My fellowship funding made it possible for me to conduct educational research as well as scientific research in a Native American Indian Reservation in order to increase student interest in geoscience careers,” says Emily Gochis, a graduate student at Michigan Tech University.

“My experience as an SROP<sup>1</sup> intern has inspired me to become a plasma physicist,” says Zachary Carter. “I already had an interest in plasma physics before the internship, but after my time in the Plasma Science and Technology Laboratory at the University of Michigan, I discovered my true passion for the field. Professor John Foster was the best mentor I could have possibly asked for and his lab gave me the experience I needed to devote my life to plasma physics and clean energy research.” Zach recently received a Fulbright Fellowship to study plasma physics in the United Kingdom under the M.Sc. in Fusion Energy Program at the University of York. Once the one-year fellowship has ended, he plans on entering the Ph.D. program at the University of Wisconsin.

“My internship at Marshall Space Flight Center gave me a great experience in individual research,” says Rebecca Kiekhäfer, a graduate from Western Michigan University. “I had a great mentor and the experience gave me the confidence to go on to graduate school.” Rebecca is currently a Graduate Teaching Assistant at Clemson University.

Dr. Loredana Valenzano, an assistant professor in the Department of Chemistry at Michigan Technological University, is a computational chemist who applies quantum chemistry to address the physico-chemical properties of solid materials. She was awarded an MSGC Research Seed Grant for her proposal, *Revealing the Performance Barrier: First Principles Prediction of the Physical-Chemical Properties of New Co-Crystals for Rocket Propulsion*. The capability of accurately describing the properties of novel stable energetic materials plays a crucial role in regard to NASA’s Strategic Goal 5.4: implementation of launch capabilities for existing and future science and space exploration missions. Where do the mechanical stability and yet the requested explosive power of a new synthesized energetic co-crystal originate from? Quantum chemistry can answer this question by providing explanations and, therefore, guidance in the engineering and improvement of materials that may eventually be used as solid rocket propellants. “The project allowed describing, for the first time, the intimate differences in structure and property between the CL20:HMX co-crystal and its pure basic components. Investigations of this sort represent a new fascinating and intriguing opportunity in the engineering of materials such as explosives and solid propellants,” says Dr. Valenzano, “not to mention the possibility of engaging undergraduate students in a novel, interdisciplinary, and challenging project, sitting at the boundary between chemistry, physics, materials science, and engineering.”

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<sup>1</sup> *Summer Research Opportunity Program* – A summer research internship program at the University of Michigan for underrepresented minority engineering undergraduates.

**Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty. (Educate and Engage)*

Elementary/Secondary Education: MSGC Higher Education, K-12 Educator Incentive, Pre-College, and Augmentation Programs. Highlights are provided below:

The 2013 Saginaw Valley State University (SVSU) Summer Mathematics Opportunities was a four-week day camp that targeted approximately 30 seventh and eighth graders at Ruben Daniels Middle School, a Title I school where students are at-risk, underrepresented minority students. The camp, modeled after the successful Wayne State University Math Corp Program, is designed to increase awareness and interest in STEM fields. The proposal for the camp was awarded a Pre-College Education award from the MSGC. Participants were exposed to both basic mathematics and higher-level concepts through interactive lectures by SVSU faculty, high school, and college student mentors, and also a series of enrichment activities and games. The mathematics content was primarily delivered through Basic Math lectures, Discovery Math lectures, Enrichment activities, and practice Michigan Education Assessment Program (MEAP) materials developed specifically for the camp. The Basic Math lectures focused on seventh and eighth grade material. The Discovery Math lectures include topics such as mathematical explorations with the GeoGebra software, graphing using Cartesian coordinates, interest rates, sequences and series, functions, and explorations with prime numbers. The Enrichment activities involved games that reinforced the concepts of mathematics, an online computer program that was based on the MEAP curricula, an engineering activity (crash helmets for melons), and meetings with SVSU faculty and staff. The strong interactions between the high school teacher assistants and the middle school students were set up to provide positive reinforcement in basic mathematical skills and higher mathematical abstractions and concepts so that students' future learning opportunities associated with mathematics will be enhanced. "Students were given a pre- and a post-test based on Wayne State Basic Math material," says Dr. Amy Hlavacek, assistant professor of mathematics and director of SVSU's Math Resource Center. Eighty-nine percent of students who took both the pre-test and the post-test improved their scores. Based on Saginaw Public Schools data, 4.8% of seventh graders and 9.6% of eighth graders were proficient on the 2013 mathematics portion of the MEAP, whereas 22.5% of camp participants earned a "proficient" rating. We plan on expanding the program to include ninth graders and students from all of Saginaw County for 2014."

**Outcome 3:** *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission. (Engage and Inspire)* Informal Education: MSGC Informal Education and Augmentation Programs. Highlights are provided below:

First-year college students are getting and sharing an insider perspective on science through their participation in the First-Year Research in Earth Sciences (FYRES) project at Calvin College. The FYRES course introduces students to Lake Michigan coastal dunes, field research methods, and scientific best practices before setting teams of students to investigate interesting research questions and was funded for her Informal Education Program proposal from the MSGC. The students are guided through their research experiences by Calvin geography professor, Dr. Deanna van Dijk, and upper-level student research mentors. In the fall of 2013, team research projects investigated how storms affect dunes, how a rare dune plant is influenced by its

environment, whether there is a relationship between blowouts and where people walk, and what impacts deer have on dune trails. At the end of the semester, the students presented their research results to dune managers and the community in oral and scientific poster presentations. FYRES participation includes as many “non-science” students (such as business, English, and education majors) as students who are considering science as a possible career. “All of the students leave the course with a better understanding of the work of scientists, including the challenges of designing and carrying out a research project and the joys of discovering new knowledge and sharing it with others,” says Dr. Van Dijk. For more information about the student participants and their research results at [www.calvin.edu/go/fyres/](http://www.calvin.edu/go/fyres/).

## PROGRAM ACCOMPLISHMENTS

**Outcome 1:** *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals. (Employ and Educate).* Higher Education: MSGC Fellowship, Internship, and Seed Grant Programs.

### **The MSGC Fellowship Program**

**Goal:** Increase the number of proposals that the MSGC Fellowship Program receives.

**Metrics:** Compare the number of proposals received from year-to-year.

**Approach:** Provide brochures to all MSGC campus representatives to supplement the other ways (newsletter, website, postings, and e-mails) in which we announce the MSGC Fellowship and Internship opportunities.

**Accomplishment:** The MSGC flagship Fellowship Program received 57 proposals in 2013 as compared to 60 in 2012. We received 30 proposals to the MSGC Undergraduate Fellowship Program and 27 proposals to the MSGC Graduate Fellowship Program.

**Goal:** Improve the longitudinal tracking of the MSGC Fellowship and Internship award recipients.

**Metrics:** Track the next steps that students take after they are awarded fellowship funding from the MSGC.

**Approach:** Mark Fischer, Executive Director of the National Space Grant Foundation, provides us with results from the surveys that he routinely sends to our Fellowship and Internship award recipients with the contact information provided by Bonnie Bryant, MSGC Program Coordinator. Bonnie also contacts the mentors of Fellowship and Internship award recipients for input.

**Accomplishment:** The number of students that received funding from the 2013 MSGC Fellowship Program was 39 and from the MSGC Internship Program was 19 as compared to 40 Fellowships and 22 Internships in 2012. During funding interval 2013 – 2014, 19 students were pursuing advanced degrees in STEM disciplines, 6 accepted STEM positions at NASA

contractors, 12 accepted STEM positions in industry, 2 accepted positions at NASA, 9 accepted STEM positions in academia, and 1 went on to a position in a non-STEM discipline. The remaining students have not yet received the degree that they were pursuing when they received their award from the Michigan Space Grant Consortium.

**Goal:** Competitively award graduate and undergraduate fellowships and internships with demographics as specified by NASA of 20.3% underrepresented minority (National Center of Education Statistics Digest). U. S. citizenship required.

**Metrics:** Compare the number of proposals received each year by gender and ethnicity.

**Approach:** The Summer Research Opportunity Program (SROP), a long-standing minority student recruitment program for graduate school, focuses on exposing rising sophomores, juniors, and seniors to on-campus research activities. The Council of Graduate Schools, a *Big Ten Plus* consortium of graduate schools that routinely brings dozens of high-achieving underrepresented minority undergraduates to its campuses each summer supports the SROP Program. SROP runs through the graduate school at UM and at MSU. In 2013, MSGC dedicated funds to 10 SROP students in order for them to participate in internships at the University of Michigan. The MSGC also offers a fellowship program targeted to undergraduate, underrepresented minority students. In this program, strong mentorship is required. Mentors qualify for \$1,000 per student. A mentor may have up to two underrepresented minority students on his/her team. A \$500 incentive is offered to mentors of underrepresented students not eligible for this program, for example, underrepresented graduate students.

**Accomplishment:** Our goal is to award a minimum of 20.3% underrepresented minority students in our fellowship program. The goal is derived from the underrepresented minority student enrollment percentage for the state of Michigan as per the National Center of Education Statistics Digest. Our commensurate minimum for women is 40%. During funding interval 2013, 24% of the fellowship and internship award recipients were underrepresented minority students; the amount of underrepresented minority students that we awarded in 2012 was 34%. During funding interval 2013, 36% of the fellowship and internship award recipients were women. The amount of women awarded in 2012 was 46%. While we continued to see a dip in the number of eligible women, we persisted in finding new ways to recruit. A preliminary review shows that the number of awards that will go to women will reach or exceed our goal of 40% in 2014 and the number of underrepresented minority students will be closer to the number of participants we had in 2012.

### **The MSGC Research Seed Grant Program**

**Goal:** Improve participation in the Research Seed Grant Program across the MSGC.

**Metrics:** Compare the distribution of awards across the institutions within the MSGC.

**Approach:** Keep a record of the proposals we received overall as well as the distribution across the Consortium.

**Accomplishment:** During funding interval 2013 – 2014, we received proposals to the MSGC Research Seed Grant Program from 6 out of 11 affiliate universities as compared to 8 out of 12 affiliate universities in 2012. We funded proposals from all 6 of these universities as compared to 8 universities in 2012. We suspect the decrease in the number of participating institutions was due to transitions in MSGC campus leadership described on pages 10 and 11.

**Goal:** Increase the diversity (underrepresented minorities and women) in the MSGC Research Seed Grant Program.

**Metrics:** Record the number of applicants each year by gender, ethnicity, and persons with disabilities.

**Approach:** Target announcements to college and university groups using e-mail, group meetings, and invitations from the director and campus representatives.

**Accomplishment:** During the 2013 funding interval, we were pleased to receive 7 proposals from women, over the record-breaking amount of 6 proposals that we received in 2012. Four proposals from women were funded. Underrepresented award recipients included Dr. Vicki-Lynn Holmes from Hope College and Dr. Pablo Llerandi-Roman from Grand Valley State University.

**Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty. (Educate and Engage)*  
Elementary/Secondary Education: MSGC Higher Education, K-12 Educator Incentive, Pre-College, and Augmentation Programs.

### **The MSGC Precollege Education, Higher Education, and K-12 Educator Incentive Programs**

**Goal:** Increase the number of applications coming from outside of the Consortium for the Precollege Education, K-12 Educator Incentive, and Augmentation Programs (all K-12 Educator Incentive Program proposals come from outside of the MSGC).

**Metrics:** Record the number of applications that the MSGC receives from outside of the Consortium.

**Approach:** Some 8,000 brochures are sent to public and intermediate school districts, including high, middle, elementary, charter along with the Boy and Girls Scouts, museums and after-school clubs.

**Accomplishment:** During the 2013 funding interval, we received 19 proposals from outside of the MSGC as compared to the 17 proposals we received during the 2012 funding interval. Nine of these proposals were from the MSGC K-12 Educator Incentive Program.

**Goal:** Encourage quality programs that target underrepresented minorities and women.

**Metrics:** Record the number of programs targeted to underrepresented minorities and women.

**Approach:** Announce that augmented support will be available (via the Augmentation Program) to those programs that target underrepresented minorities and women. Within the announcement add that to be considered for augmented support, an additional page describing in detail why added funds are necessary to assure the success of program targeting underrepresented minorities and/or women.

**Accomplishment:** During the 2013 funding interval, we received 25 proposals that directly targeted underrepresented minorities and/or women. During the 2012 funding interval, we received 20 proposals that directly targeted underrepresented minorities.

**Outcome 3:** *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission. (Engage and Inspire)* Informal Education: MSGC Informal Education and Augmentation Programs.

### **The MSGC Informal Education Program**

**Goal:** Increase the number of applications coming from outside of the Consortium.

**Metrics:** Record the number of applications that the MSGC receives from outside of the Consortium.

**Approach:** Some 8,000 brochures are sent to public and intermediate school districts, including high, middle, elementary, charter along with the Boy and Girls Scouts, museums and after-school clubs.

**Accomplishment:** During the 2013 funding interval, we received 7 proposals from outside of the MSGC, the same number of proposals that we received during the 2012 funding interval.

**Goal:** Encourage programs that target underrepresented minorities and women.

**Metrics:** Record the number of programs targeted to underrepresented minorities and women.

**Approach:** Announce that augmented support will be available to those programs that target underrepresented minorities and women. Within the announcement we added that to be considered for augmented support, an additional page describing in detail why additional funds are necessary to assure the success of program targeting underrepresented minorities and/or women.

**Accomplishments:** During the 2013 funding interval we received 10 proposals that directly targeted underrepresented minorities and/or women compared to the 12 proposals that we received for the 2012 funding interval.

**Goal:** Encourage programs that include Science, Technology, Engineering, and Mathematics in informal settings (e.g., museums, science centers, boys and girl club, etc.).

**Metrics:** Record the number of applications that come from libraries, museums, planetariums, and others that offer STEM education in informal settings.

**Approach:** Some 8,000 brochures are sent to public and intermediate school districts, including high, middle, elementary, charter along with the Boy and Girls Scouts, museums and after-school clubs. We also encourage MSGC campus representatives to reach out to these establishments in their communities.

**Accomplishment:** During the 2013 funding interval, all of the programs awarded offered STEM education in informal settings with highly trained staff that provided supplemental materials; the same was true of the 2012 funding interval. Informal settings included libraries, symposiums, and planetariums, for example, The Detroit Area Pre-College Engineering Program, The Detroit Zoo, The Cranbrook Institute of Science, and the Michigan Science Center.

#### PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Total awards = 58; Fellowship/Scholarship = 39, Higher Education/Research Infrastructure (Internship Program) = 19; 14 of the total awards represent underrepresented minority F/S funding. During the FY13 program year 19 students are pursuing advanced degrees in STEM disciplines, 6 accepted STEM positions at NASA contractors, 12 accepted STEM positions in industry, 2 accepted positions at NASA, 9 accepted STEM positions in academia, and 1 went on to a position in a non-STEM discipline. The remaining students have not yet received the degree that they were pursuing while they received their Space Grant award.
- **Diversity:** Benchmarks for diversity within the MSGC Fellowship and Internship Programs have consistently been met as reported within this and past ADP's. Over half of the Program proposals are targeted to underrepresented minorities or to women. This year, an unprecedented amount of women proposed to the MSGC Research Seed Grant Program.
- **Minority-Serving Institutions:** The underrepresented minority enrollment for students attending Wayne State University and Eastern Michigan University is 36% and 20%, respectively, as compared to 4% - 13% at other MSGC-affiliated universities and colleges. The only historically black college that we have in the state of Michigan is Lewis College, a non-accredited business college in Detroit. Bay Mills Community College and Keweenaw Bay Ojibwa Community College, and Saginaw Chippewa Tribal College are the three tribal colleges located in Michigan but at this time, no engineering programs are offered on these campuses. Our focus remains to recruit minority students and junior faculty members from MSGC institutions and through the SROP Program.
- **NASA Education Priorities** are noted throughout this progress report: **Carrillo** – page 2; **Gochis** – page 3; **Carter** – page 3; **Kiekhaefer** – page 3; **Valenzano** – page 3; **Hlavacek** – page 4; and **van Dijk** – page 4.

## IMPROVEMENTS AND CHANGES MADE IN THE PAST YEAR

MSGC Director, Dr. Alec Gallimore, was named Associate Dean for Academic Affairs (ADAA) for the University of Michigan's College of Engineering (COE), effective January 1, 2014. In addition to managing faculty recruitment and promotion, the ADAA also manages all space in the College of Engineering and interfaces with the department chairs and Campus administration on a host of tactical and strategic matters. Dr. Gallimore most recently served two and a half years as Associate Dean for Research and Graduate Education for COE and, prior to his term at COE, served six years as Associate Dean in the Horace H. Rackham School of Graduate Studies at Michigan.

During the summer and fall, we streamlined the MSGC proposal and review system. The system was moved back to the University of Michigan where we worked with designers within the Michigan Creative department. The MSGC Executive Board was very pleased with the results and they, along with proposers, found the system easy to navigate.

University of Michigan Professor of Electrical Engineering and Space Science, Dr. Brian Gilchrist, was the keynote speaker at the annual MSGC Fall Conference on Saturday, November 2, 2013. Dr. Gilchrist specializes in plasma electrodynamics, principally for in-space applications with a focus on electric propulsion and plasma sensors. He has been a faculty advisor for Michigan's student Solar Car Race Team and the Student Space System Fabrication Laboratory (S3FL) and has advised numerous other hands-on teams over the years. Dr. Gilchrist founded and is co-director of the College of Engineering's Multidisciplinary Design (MD) Program. The MD Program is dedicated to implementing project-based, real-world, multidisciplinary design experiences for the undergraduate and master's curriculum as part of a 21<sup>st</sup> Century vision for engineering education. Dr. Gilchrist's presentation concerned the challenges of preparing future generations of professionals to be capable and adaptable working in a world of sophisticated technologies and complex needs. "Here, technologies for the very small and the very large converge to create a new space capability and are used to highlight some of the efforts at the University of Michigan," said Dr. Gilchrist. "Specifically, we bring together the continuing miniaturization and enhanced capabilities of electronics enabling ever smaller spacecraft, often called picosats, femtosats, or chipsats, and the novel miniaturization of space electrodynamic tethers, typically thought of as reaching up to many kilometers in length, to enable propellantless propulsion within just a few meters of length." He went on to say, "Currently, the work of Ph.D.-level research, along with a team of students from freshman year to students with a master's degree from several different engineering fields, are highlighted while they converge on a student design of Cubesat space mission called MiTEE (Miniature Tether Electrodynamic Experience).

Two long-time members of the MSGC Executive Board, Ms. Chris Anderson from Michigan Technological (MTU) University and Dr. Bhushan Bhatt from Oakland University (OU), have retired. Both Ms. Anderson and Dr. Bhatt had been with the Board from the beginning and their contributions were many. Ms. Anderson nominated Dr. Robert Warrington as the new representative from MTU. Dr. Warrington is currently the director of the Institute for Leadership and Innovation at MTU. Prior to his current position, he was the dean of MTU's College of Engineering from 1996 to 2007 and was the founder and director of the Institute for Micromanufacturing at Louisiana Technological University from 1991 to 1996. Dr. Bhatt

nominated Dr. Laila Guessous as the new representative from OU. Dr. Guessous is an assistant professor and is a University of Michigan-educated mechanical engineer. Her research is in Computational fluid dynamics and computational heat transfer and simulation and modeling of pulsating flows with emphasis also on heat transfer. Dr. Guessous is an award recipient of the MSGC Research Seed Grant Program.

Dr. Deborah Haarsma is now President of The BioLogos Foundation. The BioLogos Foundation invites the church and the world to see the harmony between science and biblical faith. Dr. Haarsma nominated Dr. Larry Molnar, from the Department of Physics, to represent Calvin College. Dr. Molnar is a Harvard-educated astrophysicist who has recently moved into the field of solar system studies.

With the departure of Dr. Kristina Lemmer from Central Michigan University (to join the engineering faculty at Western Michigan University), CMU decided to withdraw from the MSGC. Once Dr. Lemmer left CMU, we received no proposals to MSGC funding opportunities.

Regional conferences are now held biennially. Our last meeting was held on October 11 and 12, 2012 in Milwaukee, Wisconsin. During our last discussion with The Great Midwestern Space Grant regional group, it was decided that the next conference will occur on September 19 and 20, 2014 in Des Moines, Iowa.

#### PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The MSGC Executive Board consists of the following members:

##### Calvin College

Private four-year liberal arts college

Larry Molnar is a Professor of Physics and Astronomy with research in the field of solar system studies.

##### Ann Arbor Public Schools

Ann Arbor Public School System

Mr. Michael Madison is an elementary school principal. Mr. Madison was recently elected President of the Ann Arbor Administrators' Association for a two-year term. He is also Executive Board member of the Ann Arbor Hands-On Museum, and Vice-President of the Pioneer High School Boosters.

##### Eastern Michigan University

Public Ph.D.-granting university

James Sheerin is a Professor of Physics and Astronomy and is very active in space physics research and in developing science courses for non-majors and pre-service teachers.

##### Grand Valley State University

Public Master's-granting university

Bopi Biddanda is an Aquatic Microbial Ecologist interested in the Carbon Biogeochemistry of natural waters. In his research, he addresses questions of carbon flow driven by microorganisms in nature.

#### Hope College

Private four-year liberal arts college

Peter Gonthier is an astronomer and Professor of Physics. Professor Gonthier recently won an NSF grant for his proposal, *Radio, X-Ray, and Gamma-Ray Emission from Neutron Stars*.

#### Michigan State University

Public Ph.D. granting university

Michael Velbel is Professor of Geological Sciences where he investigates the geological, mineralogical, geochemical, and geomorphic factors that control mineral alterations at the Earth's surface and the migration of chemical elements through the landscape, emphasizing small-watershed geochemistry.

#### Michigan Technological University

Public Ph.D. granting university

Robert Warrington is the director for MTU's Institute for Leadership and Innovation.

#### Oakland University

Public Ph.D. granting university

Laila Guessous is an Associate Professor of Mechanical Engineering with research in the field of computational fluid dynamics and computational heat transfer and simulation and modeling of pulsating flows with emphasis also on heat transfer.

#### Saginaw Valley State University

Public Master's-granting University

Garry Johns is Professor of Mathematics and also consults with high school mathematics teachers in the Buena Vista School District regarding best teaching practices and curriculum alignment. Buena Vista has a large African-American population.

#### University of Michigan (lead institution)

Public Ph.D. granting university

Alec Gallimore is the MSGC director, Arthur F. Thurnau Professor of Aerospace Engineering and was recently named Associate Dean for Academic Affairs (ADAA) for the University of Michigan's College of Engineering.

#### University of Michigan (lead institution)

Public Ph.D. granting university

Dr. Cinda Davis is the director of the Women in Science and Engineering Program.

#### Wayne State University

Public Ph.D. granting university

R. Darin Ellis is the Associate Dean of Academic and Student Affairs Wayne State University. He is currently on the faculty of the Industrial Engineering Department where he holds the rank of Associate Professor and teaches courses including statistics, human factors in product development, work design, and ergonomics.

#### Western Michigan University

Public Ph.D. granting university

Massood Atashbar is Professor of Electrical and Computer Engineering and the director of Advanced Smart Sensors and Structures and the Sensor Technology Laboratory.

Respectfully submitted on April 4, 2014.

Alec D. Gallimore, Director  
Michigan Space Grant Consortium

**The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.**