

FY 2019 Year 5 Extension Annual Performance Document
Michigan Space Grant Consortium Lead Institution: University of Michigan

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A. 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. Although it is primarily a higher education program, 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 Consortium funded at a level of \$760,000 for fiscal year 2019.

B. PROGRAM GOALS

API ED-15-1: *Provide significant, direct student awards in higher education to (1) students across all institutional categories and levels; 2) racially or ethnically underrepresented students; 3) women; and 4) persons with disabilities at percentages that meet or exceed the national percentages for these populations, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics for a minimum of two of the four categories.*

The MSGC Fellowship and Internship 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 using the National Center for Education Statistics (NCES) Digest as a guide for setting diversity targets. The MSGC target is currently 20.3%. U.S. citizenship is required.

API-15-2: *Engage with at least 80,000 educators in NASA-supported professional development, research, and internships that use NASA-unique STEM content.*

The MSGC Higher Education and K-12 Educator Incentive Programs

- **Goal:** Increase the number of applications coming from outside of the Consortium for the MSGC Higher 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.

The MSGC Research Seed Grant Program

- **Goal:** Award proposals that incorporate collaboration of two or more fields of study.
- **Goal:** Award proposals that clearly align with NASA's Strategic Goals and Objective and Lines of Business

API-ED-4: *Maintain the NASA Museum Alliance and/or other STEM education strategic partnerships in no fewer than 30 states, U.S. Territories and/or the District of Columbia.*

The MSGC Informal Education Program

- **Goal:** Increase the number of applications coming from outside of the Consortium for the MSGC Informal Education 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.

API-ED-5: *Engage with at least 600,000 elementary and secondary students in NASA STEM engagement activities.*

The MSGC Pre-College Education Program

- **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.

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

With our Hands-On NASA-related Experiences for Students groups (HONES) we have groups competing in the NASA SUITS Challenge and NASA Robotic Mining

Competition for 2019. More groups in 2020 are competing in more NASA challenges representing more than one affiliate university.

Over the span of some of our informal education programs, MSGC supports a number of camps for the next generation to get exposure in STEM related activities all over the state of Michigan. STEPS Camp takes place in Grand Valley State University as well as Mathematics and Science Summer Camp, Galaxy Girls is held at the University of Michigan, Earth System Science STEM Camp is held at Oakland University and one of our programs includes day activities for students in the upper peninsula of Michigan.

D. PROGRAM ACCOMPLISHMENTS

a. NASA Internships, Fellowships, and Scholarships (NIFS):

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

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

Approach: Provide marketing materials 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 Fellowship Program received 50 proposals from which the 2019 awardees were chosen. We received 20 proposals to the MSGC Undergraduate Fellowship Program and 30 proposals to the MSGC Graduate Fellowship Program. 62 proposals were received in the previous year, resulting in 54 awards (20 Undergraduate and 34 Graduate). We look forward to working with our new Marketing and Communications Specialist on how best to target more applicants in the coming year.

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 of Education Programs Support Services provides us with results from the surveys that he routinely sends to our Fellowship and Internship award recipients. Mentors of Fellowship and Internship award recipients are also contacted.

Accomplishment: 100% of the students have taken their next step (2019) and have been successfully tracked through their next step vs last year (2018) of SG support. 95% of those student's next step went to STEM disciplines.

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

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

Approach: The MSGC 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: The number of female and underrepresented minority awardee has increased from the previous year with fewer applications received this round from 22 to 26. Of the 50 proposals the MSGC Fellowship Program received this year over half were from female applicants (11 undergraduate and 15 graduate); as well as, 11 awardees from underrepresented minority groups (5 undergraduate and 6 graduate).

Higher Education projects:

Goal: Award proposals that develop new or revised courses, hands-on activities, and other higher education projects.

Metrics: Document details of new or revised courses, hands-on activities, and other higher education projects.

Approach: Require Principal Investigators to provide details on new or revised courses, hands-on activities, and other higher education projects.

Accomplishment: In 2018 MSGC developed a hands-on student group known as HONES. In 2019 we supported 6 HONES student groups from three different affiliated universities.

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 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: For the 2019 funding interval, we received 4 teacher training proposals that directly targeted underrepresented minorities and/or women, which is the same amount that we received during the 2018 funding interval.

Goal: Award proposals that incorporate collaboration of two or more fields of study.

Metrics: Document how PIs incorporate the collaboration of two or more fields of study in their research project.

Approach: Updated MSGC website and requests for proposal instructions with language encouraging collaboration of two or more fields of study; requiring principal investigators provide details on how collaborations took place. The new criteria was also added to the rubric for proposal evaluation.

Accomplishment: MSGC will improve tracking of collaborations.

b. Research Infrastructure projects:

Goal: Award proposals that incorporate collaboration of two or more fields of study.

Metrics: Document how Principal Investigators incorporate the collaboration of two or more fields of study in their research project.

Approach: Updated MSGC website and requests for proposal instructions with language encouraging collaboration of two or more fields of study; requiring principal investigators provide details on how collaborations took place. The new criteria was also added to the rubric for proposal evaluation.

Accomplishment: No significant accomplishment this year. It is an area for improvement.

Goal: Award proposals that clearly align with NASA's Strategic Goals and Objective and Lines of Business

Metrics: Document how awarded research projects aligned to the priorities of NASA and to which of the Strategic Goals and Objectives and Lines of Business.

Accomplishment: MSGC requires that Research Seed Grant proposals explain how they align with NASA strategic interests, as specified in the [NASA Strategic Plan 2014](#). This is one of the major criteria that the proposals are evaluated on.

c. Precollege projects:

Goal: Increase the number of applications coming from outside of the Consortium for the Precollege Education Program.

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

Approach: Hired a Communications and Marketing Specialist with fresh perspective and social media expertise necessary to increase visibility with our target audiences. MSGC is collaborating with Michigan Science Teachers Association, supporting scholarships for approximately 20 teachers to attend the 2019 Annual MSTA Conference.

Accomplishment: During the 2019 funding interval, we received 5 proposals from outside of the MSGC as compared to the 3 proposals we received during the 2018 funding interval. Efforts to build relationships with museums and science centers is underway and is an area we aim to grow as part of the next year.

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 2019 funding interval we received 7 proposals that directly targeted underrepresented minorities and/or women, which is the same amount as the proposals that we received for the 2018 funding interval.

Goal: Encourage teachers to engage in STEM educational enhancement activities

Metrics: Record the type of conferences and workshops that teachers are attending and detail what they are bringing back to the classroom.

Approach: Hired a Communications and Marketing Specialist with fresh perspective and social media expertise necessary to increase visibility with our target audiences.

Accomplishments: MSGC is collaborating with Michigan Science Teachers Association, supporting scholarships for approximately 20 teachers to attend the MSTTA 67th Annual Conference in March 2020. We also received 3 proposals for Teacher Training Awards in 2019.

d. Informal Education projects:

Goal: Encourage the proposal of programs that offer informal education.

Metrics: Record where informal programs are held, e.g., conferences, workshops, non-technical courses, and science fairs.

Approach: Hired a Communications and Marketing Specialist with fresh perspective and social media expertise necessary to increase visibility with our target audiences.

Accomplishment: During the 2019 funding interval, we received 2 proposals from outside of the MSGC, compared to the 3 proposals that we received during the 2018 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 both the 2018 and 2019 funding interval, 2 proposals that directly targeted underrepresented minorities and/or women were received.

E. MILESTONES

Communication with affiliates, participants and partners: MSGC has several email groups dedicated to communicating necessary information. On top of that we have developed social media channels for news, updates, deadlines and progress on recipients.

MSGC Fall Conference: The 2019 conference was held in Ann Arbor at the University of Michigan on October 12th.

All other performance dates, deadlines and application periods were met as described in our 5th year proposal milestone chart.

F. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

Include summary data for the bulleted list below:

- a. **Diversity:** Benchmarks for diversity within the MSGC Fellowship and Internship Programs have consistently been met as reported within this and past ADP's. Approximate 40% of the Program proposals funded in 2019 are targeted to underrepresented minorities or to women. Again, this year, we beat our goal of 40% women and our goal of 21.9% underrepresented minorities in the fellowship and internship programs.
- b. **Minority Serving Institution Collaborations:** The underrepresented minority enrollment for students attending Wayne State University and Eastern Michigan University is 22% and 25%, respectively, as compared to approximately 5 - 10% at other MSGC-affiliated universities and colleges. There are no historically black colleges in the state of Michigan. Bay Mills Community College, Keweenaw Bay Ojibwa Community College, and Saginaw Chippewa Tribal College are the three tribal colleges located in Michigan, but at this time, no STEM majors are offered on these campuses. The tribal colleges in Michigan primarily focus on liberal arts, education, and local economic development. There are no Hispanic-serving universities or colleges in the state of Michigan. Our focus remained to recruit minority students and junior faculty members from MSGC institutions.
- c. **Office of Education Annual Performance Indicators:**
 - i. API 3.3.3: STEM 19-1: 160/19/59/0
 - ii. API 3.3.5: STEM 19-5: 71 (from OEPM FY2019)

G. IMPROVEMENTS MADE IN THE PAST YEAR

MSGC developed a new website and turned focus onto social media channels as a better way of communication. Our website is the main hub of information for past, present and future applicants.

MSGC picked up a new affiliate at Wayne State University to increase applications and is working with Eastern Michigan University to increase gender diversity. We are currently working on expanding our partnerships with industry. Summer 2020 Internships at a local space technology company are currently underway. As are our presence with the Michigan Aerospace Manufacturing Association. MSGC has established and are

continuing to grow our partnerships with non-profit STEM educational groups and organizations.

Our requirements, reporting and other materials have been redefined to create a more efficient process.

H. CURRENT AND PROJECTED CHALLENGES

Towards the end of FY2019 MSGC went through more changes in roles. A Marketing Communications Specialist, Katie Klink was hired at the end of August. The Program Manager, Brenda Vyletel stepped down in November. Katie Klink filled in as Interim Program Manager until Debra Warrick was hired in February 2020. While the MSGC team is redeveloping and refocusing their individual roles as of early 2020 we are preparing to meet all of our goals with the request of a NCE required to fund the most recent round of awardees and other initiatives required to meet all of the aims of our original proposal.

I. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The MSGC Executive Board consists of the campus representatives at the following member institutions; as well as board members representing local K-12 and Teacher Training Programs. Campus representatives have the same general role within MSGC, achieving ultra-high equity among the board members. The campus representatives further MSGC's mission and vision on their campus, helping students and ensuring that administrative procedures are followed during the application process. They evaluate and advise MSGC leadership on policies and procedures. They review individual funding applications; their varied individual expertise provides the ability to evaluate applications across a broad spectrum of subject areas. They also meet in February to arrive at final decisions on awards.

Calvin College • Private four-year liberal arts college: Dr. Jason Smolinski is an Assistant Professor of Physics and Astronomy with research in the field of globular star clusters.

Ann Arbor Public Schools • Tom Pachera is the STEAM Coordinator for Ann Arbor Public Schools, has also joined the MSGC executive board this year as an expert in K-12 education. He has taught Technology Education for 29 years and currently teaches Introduction to Engineering Design, and Engineering Design & Development courses for Skyline High School. Key figure in evaluation of Precollege programs.

Eastern Michigan University • Public Ph.D.-granting university: Dr. Roxanne Katus is a Professor of Mathematics and Statistics.

Eastern Michigan University • Public Ph.D.-granting university: Dr. James Sheerin is a Professor of Physics and Astronomy. Key figure in evaluation of Precollege programs.

Grand Valley State University • Public Master's-granting university: Dr. Bopaiiah Biddanda is an Aquatic Microbial Ecologist interested in the Carbon Biogeochemistry of natural waters.

Hope College • Private four-year liberal arts college: Dr. Peter Gonthier is an astronomer and Professor of Physics.

Michigan State University • Public Ph.D. granting university: Dr. Michael Velbel is a Professor of Geological Sciences where he investigates the geological, mineralogical, geochemical, and geomorphic factors that control mineral alterations at the Earth's surface.

Michigan Technological University • Public Ph.D. granting university: Dr. Lorelle Meadows is the dean for MTU's Pavlis Honors College.

Oakland University • Public Ph.D. granting university: Dr. Laila Guessous is an Associate Professor of Mechanical Engineering with research in the field of computational fluid dynamics and computational heat transfer.

Saginaw Valley State University • Public Master's-granting University: Dr. Khandaker Abir Rahman is the Chair and Associate Professor of Computer Science & Information Systems.

University of Michigan (lead institution) • Public Ph.D. granting university: Dr. Mark Moldwin is the MSGC director, Arthur F. Thurnau Professor of Climate and Space Sciences and Engineering within the University of Michigan's College of Engineering. He is also Faculty Director of UM's M-STEM's M-Engin_program, and President of the American Geophysical Union's (AGU) Education Section.

Wayne State University • Public Ph.D. granting university: Dr. Ed Cackett is a professor of Physics and Astronomy.

Western Michigan University • Public Ph.D. granting university: Dr. 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 March 9, 2020
Dr. Mark Moldwin, MSGC Director