WE ARE THE ARTEMIS GENERATION
NASA’s STEM Engagement Enterprise

Vision
We immerse students in NASA’s work, enhance STEM literacy, and inspire the next generation to explore.

Mission
We engage students in NASA’s mission

Focus Areas

Create unique opportunities for students to contribute to NASA’s work in exploration and discovery.

Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content and facilities.

Attract students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work.
VISION:
- A future where all Americans will have lifelong access to high-quality STEM education.
- The United States will be the global leader in STEM literacy, innovation and employment.

ASPIRATIONAL GOALS:
- Build Strong Foundations for STEM Literacy
- Increase Diversity, Equity, and Inclusion in STEM
- Prepare the STEM Workforce for the Future

### Federal STEM Education 5-Year Strategic Plan

**Committee on STEM Education (CoSTEM)**
- Co-chaired by NASA & NSF
  - Jim Bridenstine & France Cordova
- Coordinates STEM activities and programs
- Monitors overlap in federal STEM programs across agencies
- Develops strategic plan every five years

**Federal Coordination in STEM Education (FC-STEM)**
- Co-chaired by NASA & NSF
  - Mike Kincaid & Karen Marrongelle
- Develops and coordinates five-year plan
- Communicates priorities across agencies
- Develops implementation structure

**FC-STEM Members:**

**STEM Education Advisory Panel:**
Advises and evaluates CoSTEM’s progress in meeting its goals. Established in 2018 by NASA, NSF, NOAA and the Dept. of Education with 18 panel members selected in 2018.
FC-STEM UPDATE

• FC-STEM support during COVID-19 outbreak
  o Ad-hoc COVID-19 internships working group
• STEM Education Advisory Panel meeting on April 15
• 2020 CoSTEM Annual Progress Report planned release in June 2020
Conducted extensive re-plan of 210 STEM Engagement activities and events between March 10 – May 31

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<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Number</th>
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<tbody>
<tr>
<td>National Project Competitions</td>
<td>Culminating events or activities for OSTEM national level projects such as the Artemis Student Challenges</td>
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<tr>
<td>Externally-Sponsored</td>
<td>NASA participation in events and conferences conducted by external sponsors (e.g., FIRST Robotics, USA Science &amp; Engineering Festival, science fairs, etc)</td>
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<td>NASA Internship Activities</td>
<td>Professional development activities for Spring intern cohort</td>
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<td>Offsite EPD</td>
<td>Events conducted by contractor and cooperative agreement staff</td>
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<td>Center Visits</td>
<td>Regional and local events and activities for students and/or educators hosted at Centers</td>
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<tr>
<td>Collaborations &amp; Meetings</td>
<td>Strategic and operational events with internal staff, federal colleagues, and external partners</td>
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<tr>
<td>Other</td>
<td>Miscellaneous other activities including site visits, road shows, presentations to educator and student groups</td>
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<td><strong>TOTAL</strong></td>
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Spring 2020 Internship Program

- Transitioned 347 interns to virtual internships (out of 366).
- Hosting an ISS downlink event exclusively for NASA interns on April 28.
- Concluding spring program on May 8. Students can extend 6-8 weeks.

Summer 2020 Internship Program

- Finalized decision to move to virtual program 4/17.
  - Issued survey to 1500 NASA mentors 3/26 regarding feasibility. Over 600 internship projects transitioned to virtual to date.
- Our team is working extensively on logistics for onboarding/offboarding interns, thanks to excellent coordination with OCHCO, OCIO and OPS.
- Developing implementation plans, with Center STEM Engagement Directors working closely with their leadership on center-unique needs.
- Developing budget/cost impacts associated with onboarding and offboarding.
OSTEM COVID-19 IMPACTS – FELLOWSHIP PROGRAM

OSTEM Fellowship Program
• Delayed schedule for 2020 cohort selection process, with anticipated on-time selection.
• Made decision to NOT hold on-site Center Based Research Experiences (CBREs) in Summer 2020.
  • Queried NASA Technical Advisers and Principal Investigators. 75% of NASA Technical Advisers indicated willingness to accommodate a virtual summer CBRE
• Coordinating virtual onboarding.
• Budget/cost impacts are being developed.

OSTEM International Fellowship Program
• Due to COVID-19 concerns and mandatory shelter-in-place orders, 11 students (10 at ARC & 1 at GSFC) returned home 4-6 weeks early.
• 35 international students selected for NASA projects for Summer 2020 will not be able to participate due to State Department halts on student visas and NASA security concerns regarding foreign nationals for virtual internships.
• Assessing budget impacts due to lack of reimbursable funding provided from international entities.
Created new initiatives and activities to meet student needs and to fill gaps created by cancellation/postponement of planned activities.

- NASA STEM @ Home, created in March, provides students and families hands-on educational activities that can be done with items found around the house.
  - K-4 activities range from a Moon habitat and edible spacecraft, to science-themed puzzles, to rockets
  - Grades 5-8 and 9-12 include more self-directed learning
OSTEM COVID-19 Impacts – OSTEM Program Risk Assessment

• Initiated overall risk analysis and assessment (March 22)
  – Issued survey of all OSTEM Principal Investigators (PIs) to begin identification of potential COVID-19 impacts
  – 133 responses provided early indicators regarding impacts by institutions

• Our project managers continue to work in close coordination with their PIs and institutions.
• Drafting subsequent guidance to PIs (for late April - early May) to identify specific programmatic and budget/cost impacts with longer-term horizon.
What else could NASA be doing?

What challenges do you see in the Coronavirus environment?
National STEM Updates
OSTEM Updates
STEM Strategic Outlook
Program Update
State of MUREP
Performance and Evaluation
SMD SciAct National Academy Review
• Mike’s Overview
TEACHER APPRECIATION WEEK
MISSION DIRECTORATE MATCHING

OSTEM, in a cost-matching partnership with HEOMD, STMD, SMD and NASA’s Chief Economist will award almost $2.4 million to six National Space Grant and Fellowship Program Lead Institutions to advance the reach of current and future Artemis student challenges.

The solicitation was formulated to enable interested undergraduate students, spanning the entire nation to be inspired and prepared to participate in Artemis.

These awards will directly contribute to NASA’s mission, the Office of STEM Engagement’s priorities, and specifically, Artemis.
In Fiscal Year 2018, NASA provided 8,005 internships, fellowships and other higher education (HE) awards to 7,357 higher education students across all institutional categories and levels. These significant awards provided a total of over $32M in direct financial support to higher education students.

30.2% of higher education awards were made to racially or ethnically underrepresented student participants, compared to 24.5% for the national average of STEM degree enrollees.

Additionally, 39.5% of the Agency’s higher education internships and fellowship positions were filled by women.

NASA’s performance in providing opportunities for learners to contribute to NASA’s aeronautics, space, and science missions and work technical paper is assessed across peer-reviewed publications and presentations directly resulting from research funded by NASA STEM Engagement grants and awards to higher education institutions.

1,374 Space Grant, MUREP, and EPScoR grantee and awardee institutions reporting 1,374 peer-reviewed publications and technical papers and presentations in FY 2018.

NASA’s Office of STEM Engagement collaborators are funded and unfunded and located in all 50 states, DC, GU, PR, and VI. Collaborators include: government agencies, industry, formal and informal education institutions including museums, science centers, planetariums, and youth-serving organizations, non-profit, and other education organizations.

Collaborators extend the reach of NASA STEM engagement opportunities by supporting the execution of an opportunity. In FY 2018 OSTEM collaborated with 1,695 institutions and organizations.

Competitive Grants and Cooperative Agreements Awarded to 95 Education Institutions located in all 50 States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

827,257 Students participated in NASA STEM engagement activities

182,601 Educators participated in NASA STEM engagement training activities
LOOKING AHEAD: STRATEGY FOR STEM ENGAGEMENT 2021-2023

Approach:
Convened a small team to examine the strategy and propose necessary modifications/augmentations

Team Representation:
- Lead – STEM Engagement Deputy AA, Strategy and Integration
- 1-2 Mission Directorate Representatives
- 2 STEM Engagement Directors
- Representatives from: Performance Assessment and Evaluation, Tools and Platforms, ODEO, and other SEC representatives

Target Completion Date: March 18, 2020
• Kris’ additions to updated strategy slide
Engage students in challenges and competitions to address mission questions as NASA prepares for the Artemis program.

ISS is in the classroom! Using STEM on Station content, let students engage in ISS research to deliver the excitement of science and technology to students.

Develop a toolkit of resources and content that includes engineering challenges, coding, digital badging, virtual reality and more!

Immersive virtual experiences, lessons and activities in advance of the launch and landing of Mars 2020 rover.

Lessons and activities that use the vantage point of space to understand and explore our home planet for the 50th Anniversary of Earth Day.
Iran’s Space Grant: 30 Years of Impact
February 25 – 28, 2020

Space Grant members and students met with their Congressional delegations to showcase their work and demonstrated cutting edge research being conducted in areas such as Aeronautics, Engineering, Life Sciences, and Satellite Technology to advance NASA’s missions.

**Feb. 25:** Exhibition and Reception held for Members of Congress and Congressional staff in the Rayburn Building Feb. 25 with remarks from Jim Bridenstine

**Feb. 26:** Fireside Chat with OSTEM AA, Mike Kincaid, Administrator Bridenstine and Associate Administrator for STMD Jim Reuter – Q/A on Artemis and agency direction

**Feb. 27 – 28:** Annual National Space Grant Directors’ Meeting for members shared ideas, best practices and program updates.
  - Astronaut Zena Cardman, a North Carolina Space Grant Alumna, spoke with attendees, to share how instrumental Space Grant was in shaping her career path.
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NASA MINORITY UNIVERSITY RESEARCH AND EDUCATION PROJECT (MUREP)

Torry Johnson, MUREP Manager
NASA Headquarters, Washington DC
MUREP is established to increase NASA’s responsiveness to federal mandates related to MSIs and underrepresented and underserved communities, including women, girls, persons with disabilities and veterans.

- **EO 13779**: Historically Black Colleges and Universities (HBCUs)
- **EO 13592**: Tribal Colleges and Universities (TCUs)
- **EO 13555**: Hispanic Serving Institutions (HSIs)
- **EO 13515**: Asian American and Native American Pacific Islander – Serving Institutions (AANAPISIs)
- **EO 13621**: Predominantly Black Institutions (PBIs)
To enhance the research, academic and technological capabilities at MSIs by providing authentic student learning experiences related to NASA missions that contribute to a Diverse Future STEM Workforce.
FY 2020 - FY2021 SHIFTING PORTFOLIO

MUREP Pillars of Investment

- Research Infrastructure and Capacity Building
- Curriculum Development and Service Provider Resources
- Student Engagement
- Partnerships and Sustainability
FY 2019 - FY2020 Map of Investments

25+ U.S. States and Territories Represented

U.S. States and Territories with active MUREP Awards

Alaska
Hawaii
Puerto Rico
Virgin Islands
Guam

34
2019 AWARDREES AT A GLANCE

MUREP INSTITUTIONAL RESEARCH OPPORTUNITY (MIRO)

- Expands Aerospace R&D
- Promotes MSI Research Capacity
- Strengthens Skills in NASA Priority Areas

NASA Partners with Langston University to Study Effects of Microgravity in Space

NASA Administrator helps student conduct an experiment that is studying the effects of microgravity on the immune system. This experiment destined for study aboard the International Space Station will evaluate natural countermeasures to the dysregulated immune system during spaceflight.
2019 Awardees at a Glance

MUREP Aerospace High Volume Manufacturing & Supply Chain Cooperative

- Supports NASA’s Aeronautics Mission Directorate (ARMD) framework needs by introducing new high volume, aerospace manufacturing networks.

- Aligned with NASA and Industry high-volume manufacturing and supply chain ecosystem needs for national competitiveness.

- Advances the development of entrepreneurship and commercialization by guiding students to become leaders and entrepreneurs.
HBCUs and the MUREP Portfolio
Activity Overview

CIAA Conference Support

President/Chancellor Meetings
Middle School Day
High School Day
Career Fair
Exhibit Booth

White House Initiative for HBCUs

Interagency Working Group
Student Engagement
Strategic Planning
Training Workshops/Sessions
Networking

Aeronautics Research Directorate

Two MUREP Awardees – High Volume
Tuskegee/Virginia State
Additional Funding Opportunities
New Lead HBCU – North Carolina A&T
New Embed Connection
Activity Overview

MSI Capability Gateway
- Externally Available
- Database of MSIs
- Listing of Research Capabilities
- Searchable by HBCU

HBCU/MSI Road Tour
- Agency 1% Contracting Goal for MSIs
- Training Workshops
- Networking
- Matchmaking

Minority University Research Opportunity
- Largest MUREP Award
  - $1M Annually
  - Seven HBCUs of 20 Awardees
  - New Solicitation
MUREP FOR AMERICAN INDIAN & ALASKA NATIVE STEM ENGAGEMENT (MAIANSE)

Designed to increase American Indian and Alaska Native engagement in STEM through authentic and unique NASA experiences.

The Earth System Education for Climate Resiliency in the Salish Sea project at Northwestern Indian College incorporates remote sensing and geospatial tools into interdisciplinary programs and course curricula to increase students’ understanding of climate resiliency.

Navajo School Visits KSC | Feb 2020
13 students from various Navajo tribes

A poster session “walk-through” for the indigenous science co-convened at AGU
First Tribal Colleges to receive research awards as a part of MUREP for American Indian and Alaska Native STEM Engagement (MAIANSE) and MUREP Institutional Research Opportunity (MIRO) Pilot • Fall 2019

SELECTED INSTITUTIONS:

Facility for Innovative and Atmospheric Research and Education (FIARE) at Sitting Bull College will advance air quality research, environmental technology and education on the Standing Rock Reservation.

Navajo Technical University proposal for additive manufacturing and materials research and education for NASA application will help NASA’s Marshall Space Flight Center to develop advanced parts for use in the Space Launch System (SLS).
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Order of Events

1. Learning Agenda Progress Update
2. NASA 2020 NASA STEM Engagement Evaluation Plans
3. Overview of Mega-Expert Review Panel (Mega-ERP)
4. Mega-ERP Themes
5. Mega-ERP Panelist Feedback
6. Questions
Learning Agenda Progress Update

• In FY 2018, OSTEM developed a new OSTEM performance assessment and evaluation strategy and the OSTEM FY19-FY20 Learning Agenda

• In FY 2019, OSTEM operationalized the Learning Agenda and executed Year 1 targeted data collection and evaluation studies to create a portfolio of evidence aligned to the Learning Agenda

• In FY 2020, OSTEM is executing Year 2 targeted data collection and evaluation studies to create a portfolio of evidence aligned to the Learning Agenda and develop the next iteration of the OSTEM Learning Agenda
|-----------------------------------|-----------------------------------------------|-----------------------------|-------------------------------------------------------------|--------------------------------------------------|
| Assess how and to what degree MUREP is achieving its goals and objectives.  
- Assess management and operations efficiency and effectiveness  
- Identify challenges and promising practices  
- Assess consistency with STEM Engagement goals and objectives  
- Develop sustainability and partnerships | Pilot methods to assess NASA Intern progression into the STEM workforce, NASA workforce, or STEM-focused post-graduate academic areas:  
- Leverage National Survey of College Graduates (NSCG) data  
- Administer NSCG portion  
- Add question to NSCG  
- Leverage National Directory of New Hires data  
- Investigate NASA Universal Uniform Personal Identification Code (UUPIC)  
- Scrape social media | Evaluate how NASA STEM Engagement investments have broadened participation of underserved and underrepresented groups in STEM fields.  
- Conduct literature review and Benchmark other agencies  
- Convene Expert Review Panel  
- Conduct focus groups  
- Distribute surveys  
- Develop recommendations | Solicit independent program-level impact evaluation of multiple state consortiums in the Space Grant (SG) Program.  
- Assess alignment to NASA's STEM engagement priorities, goals, and federal law  
- Examine program impact and degree SG achieves its intended outputs and outcomes on a national level | Responding to the FY19 Sparking STEM Interest Study recommendations.  
- Assessing the relevance of NGS products and opportunities to the unique needs and contextual factors of various beneficiaries  
- Assessing models of transdisciplinary learning and authenticity  
- Operationalizing NASA’s roll in the broader STEM ecosystem  
- Utilizing a novel, collaborative evaluation approach |
## Mega-ERP Panel Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Title and Affiliation</th>
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<tbody>
<tr>
<td>Dr. Kenneth Alonzo Anderson</td>
<td>Professor &amp; Associate Dean, Howard University</td>
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<tr>
<td>Dr. John Baek</td>
<td>Senior Education Evaluator, National Oceanic and Atmospheric Administration Office of Education</td>
</tr>
<tr>
<td>Dr. Sherilynn Black</td>
<td>Associate Vice Provost for Faculty Advancement, Duke University</td>
</tr>
<tr>
<td>Dr. Heather Boyd</td>
<td>Research Development Program Director, University of Notre Dame</td>
</tr>
<tr>
<td>Dr. Angela Calabrese Barton</td>
<td>Professor, University of Michigan</td>
</tr>
<tr>
<td>Dr. Matthew A. Cannady (Mac)</td>
<td>Research Group Director, UC Berkeley, Lawrence Hall of Science</td>
</tr>
<tr>
<td>Dr. Julie Carruthers</td>
<td>Senior Science &amp; Technology Advisor and Acting Director for the Office of Workforce Development for Teachers and Scientists, Department of Energy, Office of Science</td>
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<tr>
<td>Dr. Mica Estrada</td>
<td>Associate Professor, University of California San Francisco</td>
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<tr>
<td>Dr. Sylvia James</td>
<td>EHR Deputy Assistant Director, National Science Foundation</td>
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<tr>
<td>Dr. Carla C. Johnson</td>
<td>Senior Research Fellow and Professor, North Carolina State University</td>
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<tr>
<td>Dr. Natalie King</td>
<td>Assistant Professor, Science Education, Georgia State University</td>
</tr>
<tr>
<td>Dr. Michael Lach</td>
<td>Assistant Superintendent, Township High School District 113</td>
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<tr>
<td>Dr. Adam Maltese, Ph.D.</td>
<td>Associate Professor of Science Education, Indiana University</td>
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<tr>
<td>Dr. Diann McCants, Ph.D.</td>
<td>Senior Scientist and Analyst, Strategic Analysis, Inc. / Department of Defense Contractor</td>
</tr>
<tr>
<td>Dr. Sarah-Kathryn McDonald (Sarah-Kay), Ph.D.</td>
<td>Senior Advisor, Office of the Assistant Director, Directorate for Education and Resources, National Science Foundation</td>
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<tr>
<td>Dr. Mwarumba Mwavita, Ph.D.</td>
<td>Associate Professor and Director of Center for Educational Research and Evaluation, Oklahoma State University</td>
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<tr>
<td>Ms. Janet Sellers</td>
<td>Director, Diversity and Data/Analytics Division, Office of Diversity and Equal Opportunity</td>
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<td>Dr. Robert H. Tai, Ph.D.</td>
<td>Associate Professor, University of Virginia</td>
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<tr>
<td>Dr. Aaron Thomas, Ph.D.</td>
<td>Associate Professor, University of Montana</td>
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<tr>
<td>Dr. Darryl Williams, Ph.D.</td>
<td>SVP, Science and Education, The Franklin Institute</td>
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<tr>
<td>Dr. Christopher Wright, Ph.D.</td>
<td>Assistant Professor, Drexel University</td>
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<tr>
<td>Dr. Soohyun Yi, Ph.D.</td>
<td>Assistant Professor, Texas Tech University</td>
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<td>Dr. Jamaal Young, Ph.D.</td>
<td>Associate Professor, University of Iowa</td>
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<tr>
<td>Ms. Erin White</td>
<td>Senior Director, Product Development &amp; Research, STEMconnector</td>
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24 Expert Review Panelists

Virtual participation
Mega-ERP Discussion Sessions

NASA STEM Engagement Evaluation Studies

NASA STEM Engagement Learning Agenda Development
Themes

**Short Term**
- Maximize Use of Participant Voice
- Consider Alternative Comparisons

**Long Term**
- Examine Full Trajectory
- Explore Additional Context Questions
Themes

Maximize Use of Participant Voice
- Include self-report data from participants / institutions
- Qualitative Data
  - Understand why
  - Different perspectives

Examine Full Trajectory
- Examine early-career NASA employees
  - Diversity, Biases, Preparedness
- Transition points along STEM pathways
- NASA’s impact long-term: K-12 → Career

Consider Alternative Comparisons
- Participants who decline
- Other agency internship programs
- Additional National data sets

Explore Additional Context Questions
- Use a systems approach
  - Who? Under what circumstances?
  - Other variables related to “success”?
- Analysis of opportunities’ impacts and outcomes
Questions?
• SciAct Slides
INSPIRE - ENGAGE - EDUCATE - EMPLOY

The Next Generation of Explorers