National Aeronautics and
Space Administration

NASA Advisory Council

STEM Engagement Committee

INSPIRE - ENGAGE - EDUCATE - EMPLOY
The Next Generation of Explorers

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.

National STEM Updates

OSTEM Updates

STEM Strategic Outlook

Program Update

State of MUREP

Performance and Evaluation

SMD SciAct National Academy Review

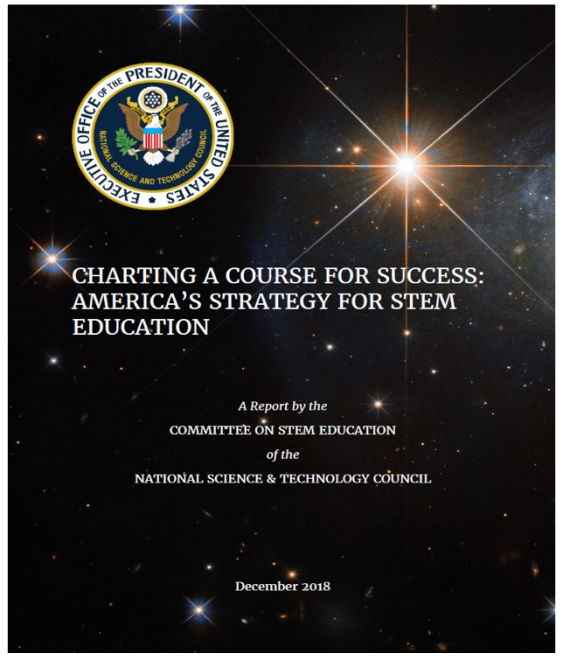
STEM Engagement 5-yr Strategic Plan

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



http://www.whitehouse.gov/wp-content/uploads/2018/12/STEM-Education-Strategic-Plan-2018.pdf

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:

USDA · HHS · DHS · Commerce · Labor · State · Defense · OSTP · Transportation · Education · NASA · EPA · Energy · NSF · Interior · Smithsonian Institution

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.

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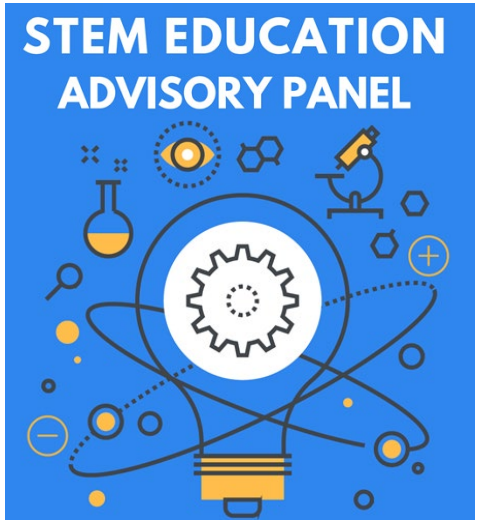
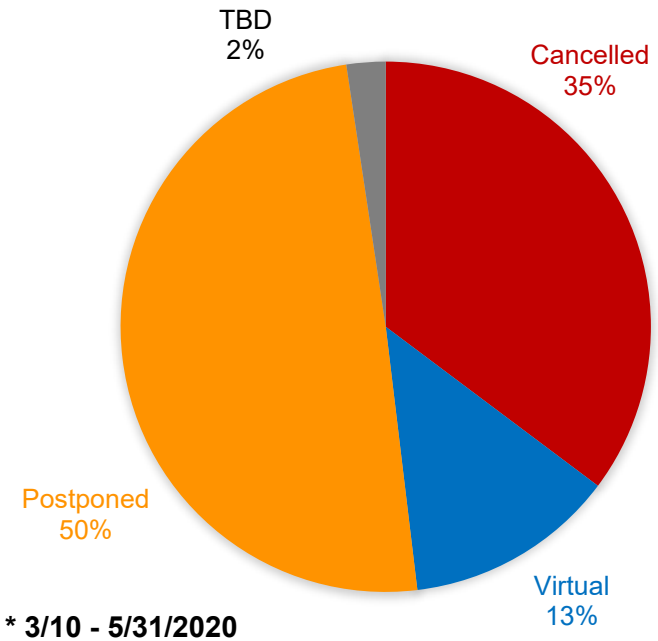
FC-STEM UPDATE

- FC-STEM support during COVID-19 outbreak
  - 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



OSTEM COVID-19 IMPACTS – OVERARCHING

Conducted extensive re-plan of 210 STEM Engagement activities and events between March 10 – May 31



* 3/10 - 5/31/2020

Type	Description	Number
National Project Competitions	Culminating events or activities for OSTEM national level projects such as the Artemis Student Challenges	20
Externally-Sponsored	NASA participation in events and conferences conducted by external sponsors (e.g., FIRST Robotics, USA Science & Engineering Festival, science fairs, etc)	33
NASA Internship Activities	Professional development activities for Spring intern cohort	6
Offsite EPD	Events conducted by contractor and cooperative agreement staff	21
Center Visits	Regional and local events and activities for students and/or educators hosted at Centers	102
Collaborations & Meetings	Strategic and operational events with internal staff, federal colleagues, and external partners	8
Other	Miscellaneous other activities including site visits, road shows, presentations to educator and student groups	20
TOTAL		**210**

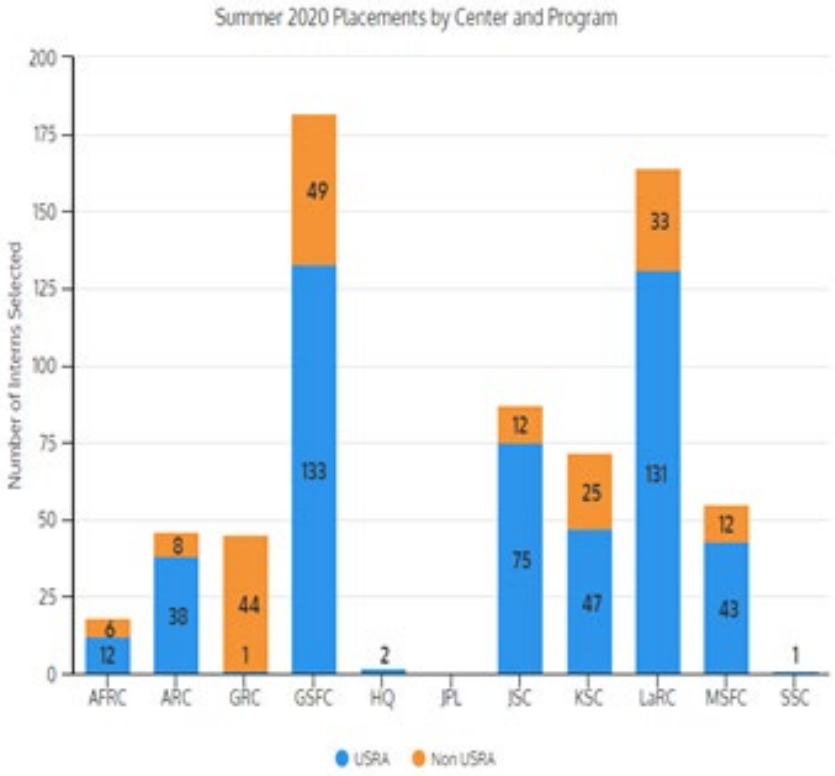
OSTEM COVID-19 Impacts – Internship Program

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.

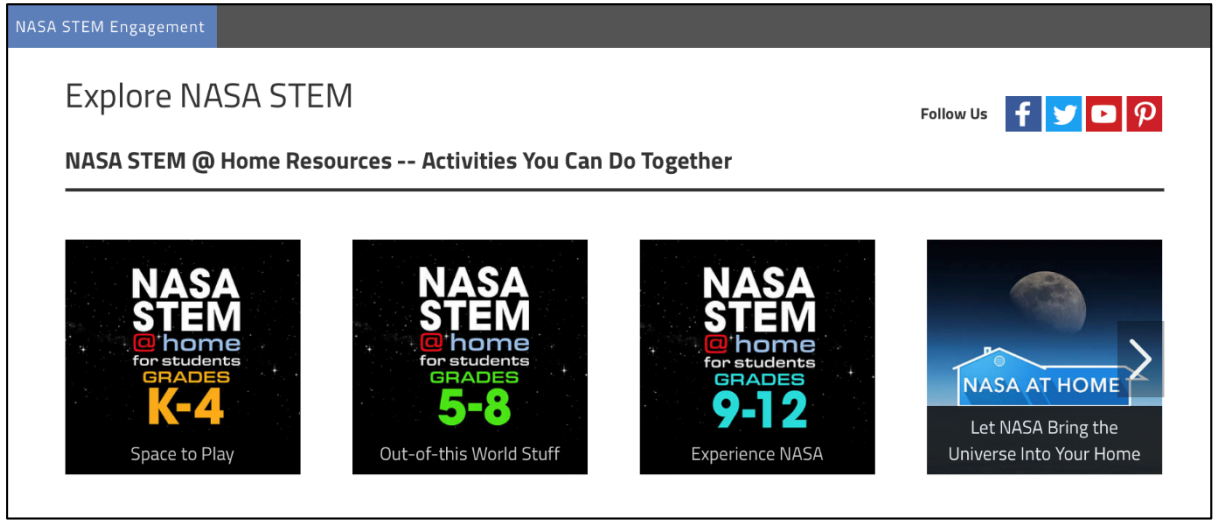
OSTEM International Fellowship Program

- 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.

OSTEM COVID-19 Impacts – Other Program Impacts at a Glance

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 Landing Page
Total Views: 338,060

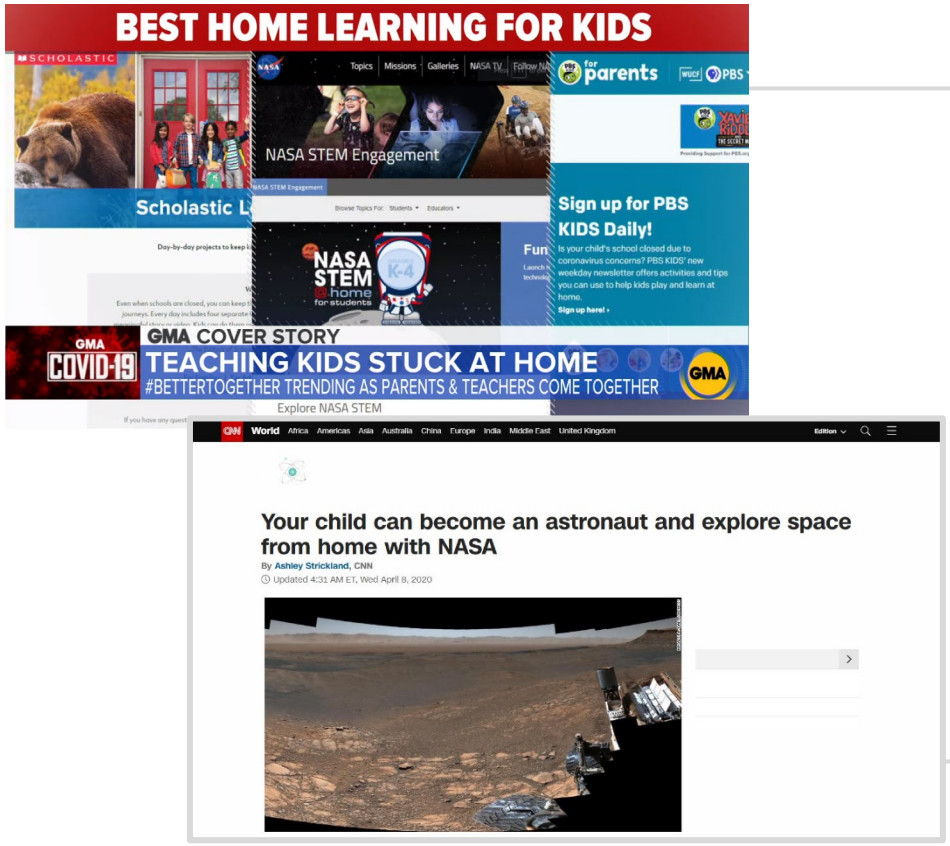
NASA Kids' Club
Total Views: 1,043,499

K-4 (Go Live Date 3/17)
Total Views: 475,098

5-8 (Go Live Date 3/27)
Total Views: 75,157

9-12 (Go Live Date 4/3)
Total Views: 9,083

NASA STEM @ HOME FEATURED



GOOD MORNING AMERICA — **GMA Cover Story – March 18**

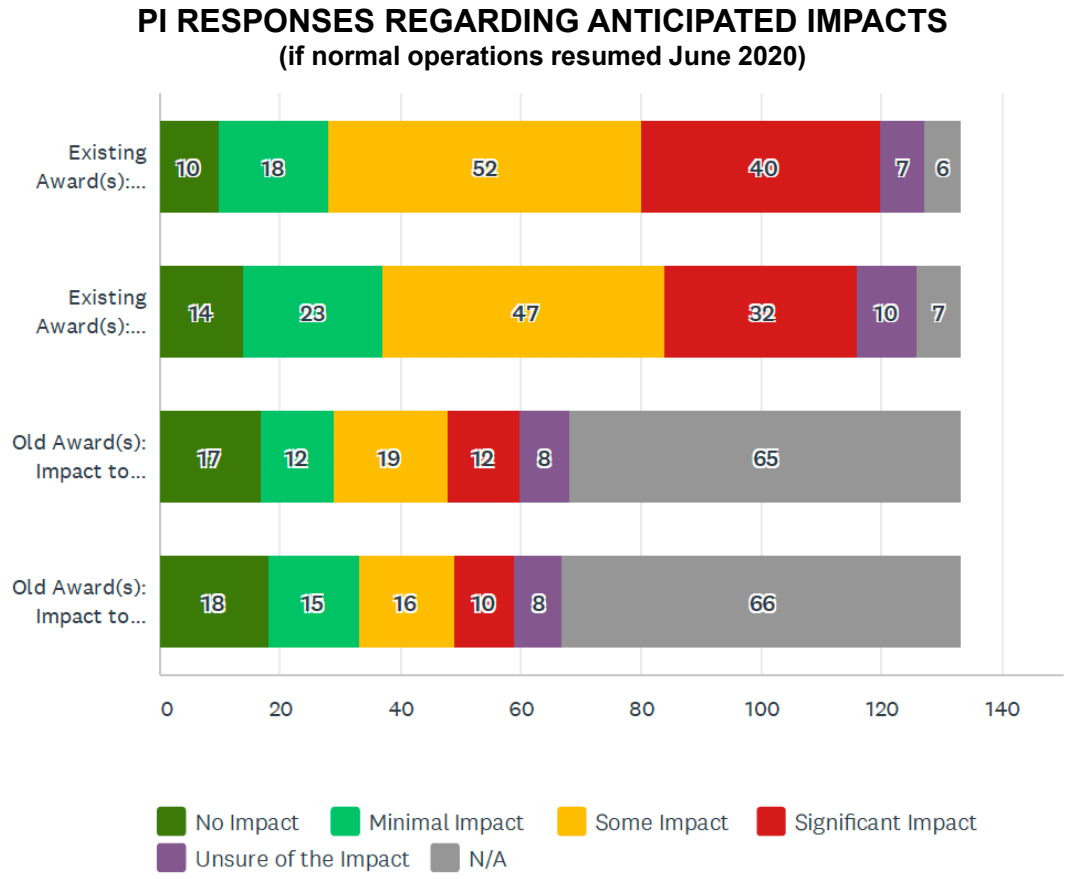
CNN — **Space and Science Feature – April 8**

The New York Times — **Learning: A Special Report – April 23**

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.



Your Input

What else could NASA be doing?

What challenges do you see in the Coronavirus environment?

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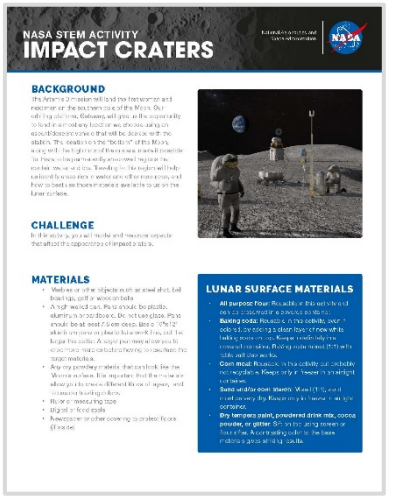
- Mike’s Overview

HUMAN LANDER ANNOUNCEMENT

Hands-on Activity Demonstration



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Teacher Appreciation Week

COMMERCIAL CREW DEMO-2

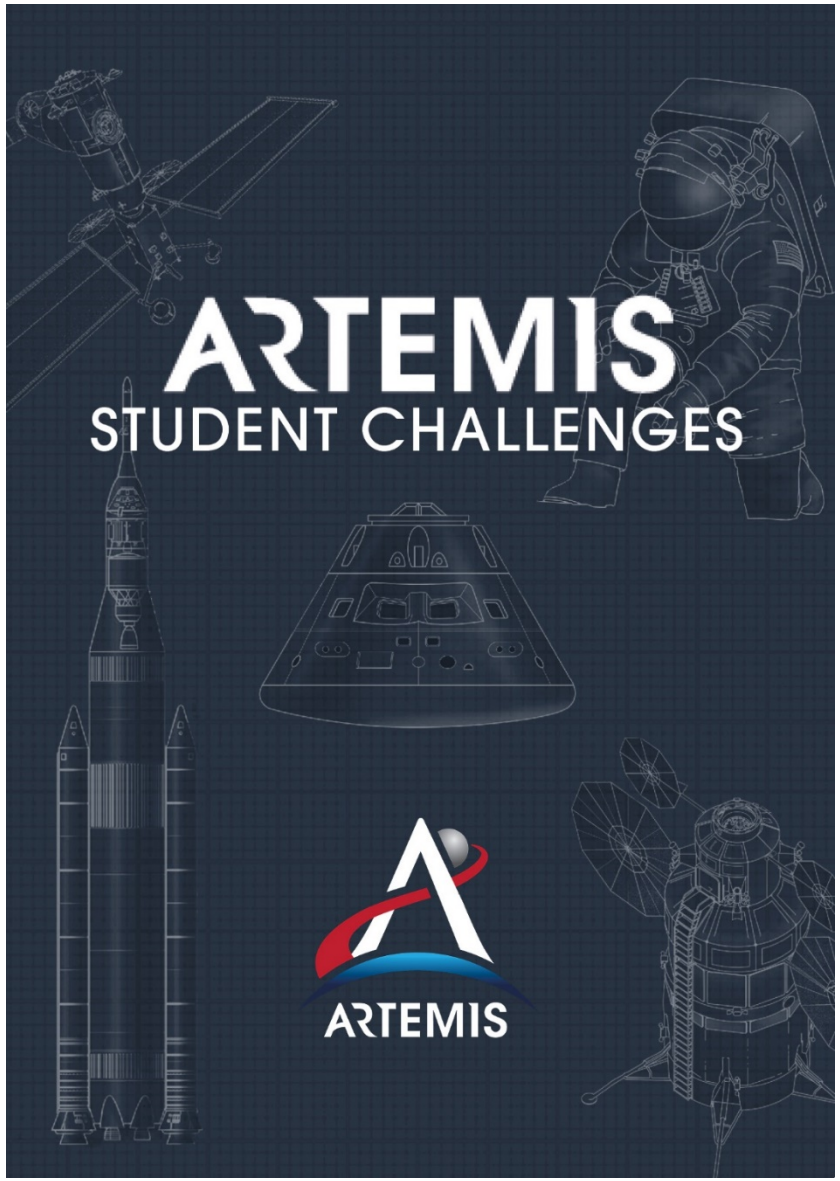
go.nasa.gov/CCPLaunchKit

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**.

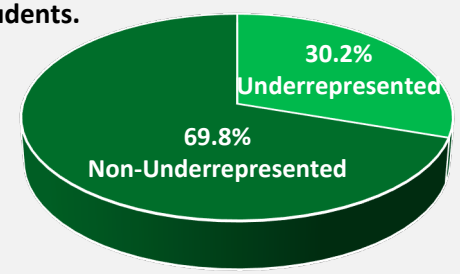


FY18 NASA STEM Engagement Performance Assessment

Internships, Fellowships and Other Higher Education (HE) Awards

8,005

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.

Research and Development

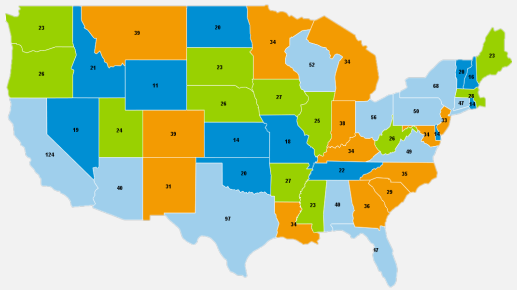
NASA's performance in providing opportunities for learners to contribute to NASA's aeronautics, space, and science missions and work technical paper is assessed across peer-reviewed publications and presentations directly resulting from research funded by NASA STEM Engagement grants and awards to higher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

Collaborators

1,695



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.

Leveraging Partnerships and Network to Broaden the Reach of NASA STEM Engagement Investments

50+ states & territories

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.

Engaging Students in NASA Missions

827,257* Students participated in NASA STEM engagement activities

Training STEM Educators to Engage the Next Generation of STEM Researcher and Explorers

182,601* Educators participated in NASA STEM engagement training activities

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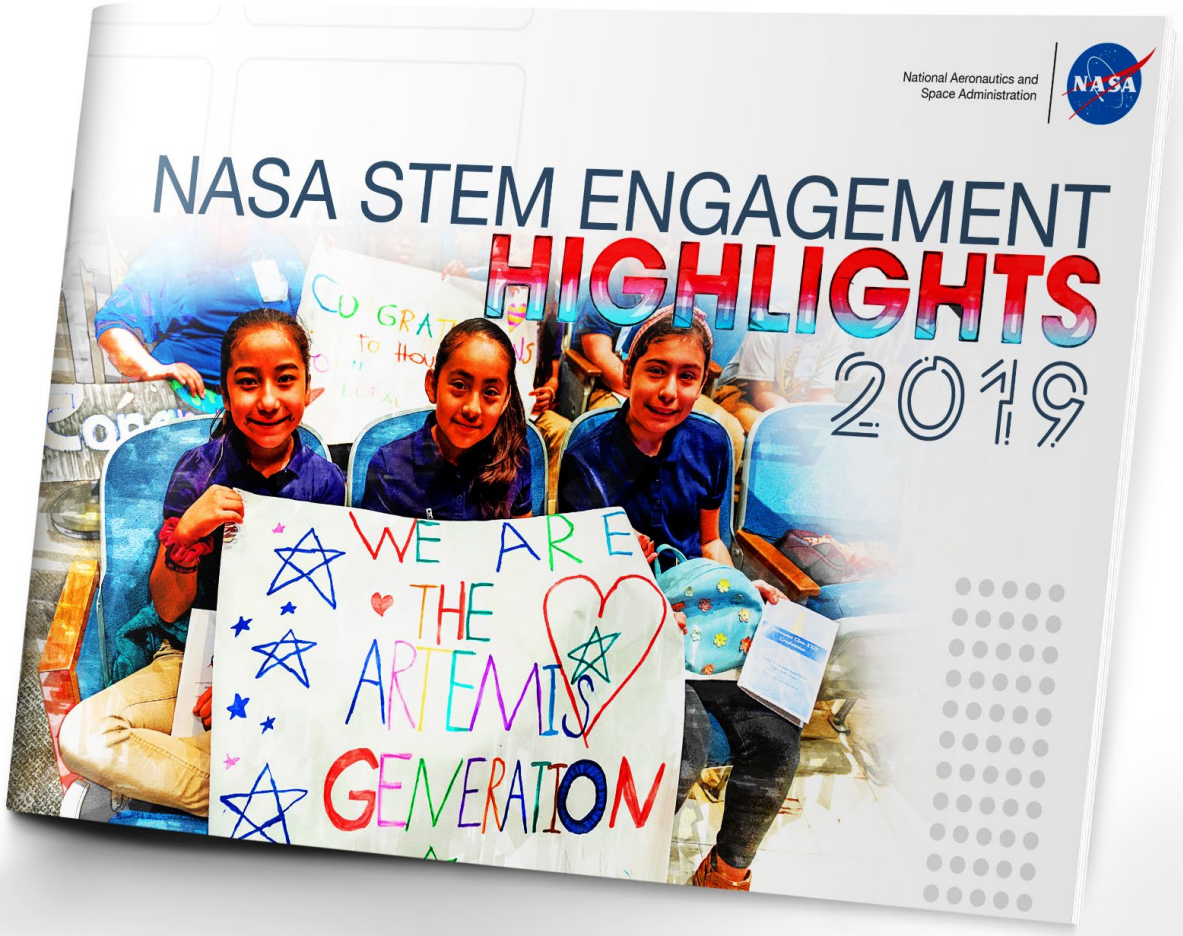
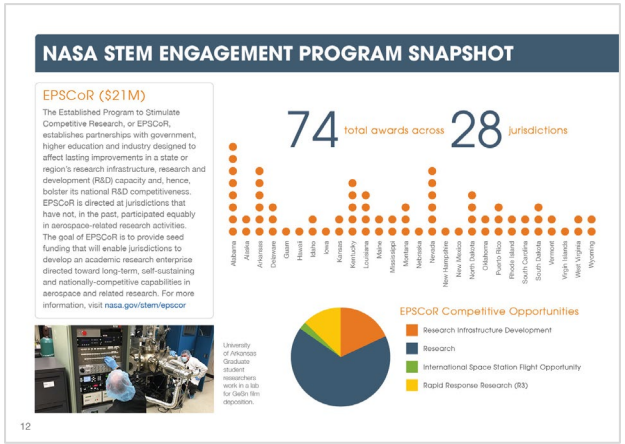
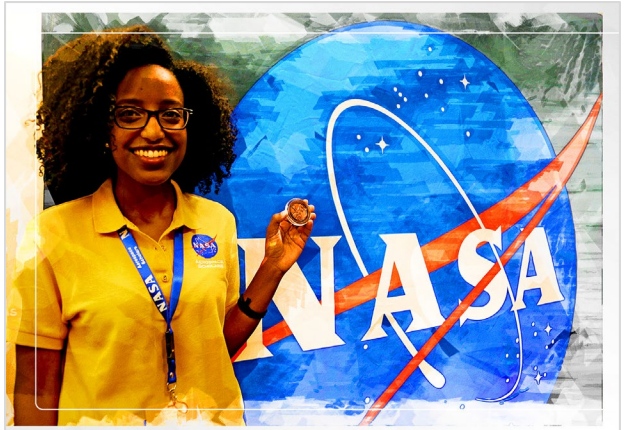
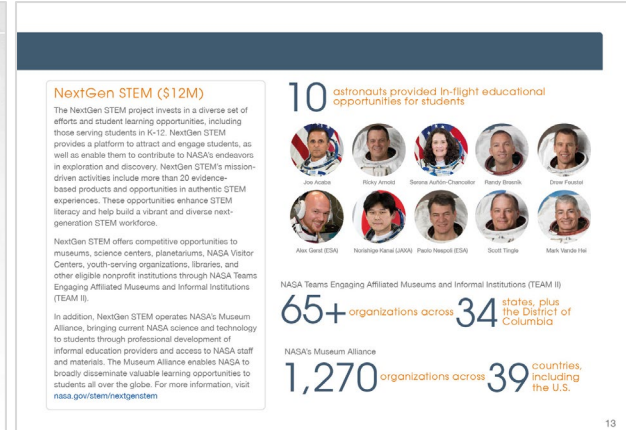
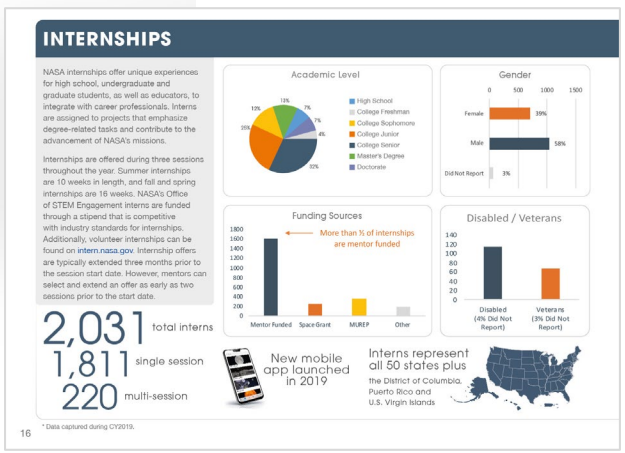


stem.nasa.gov









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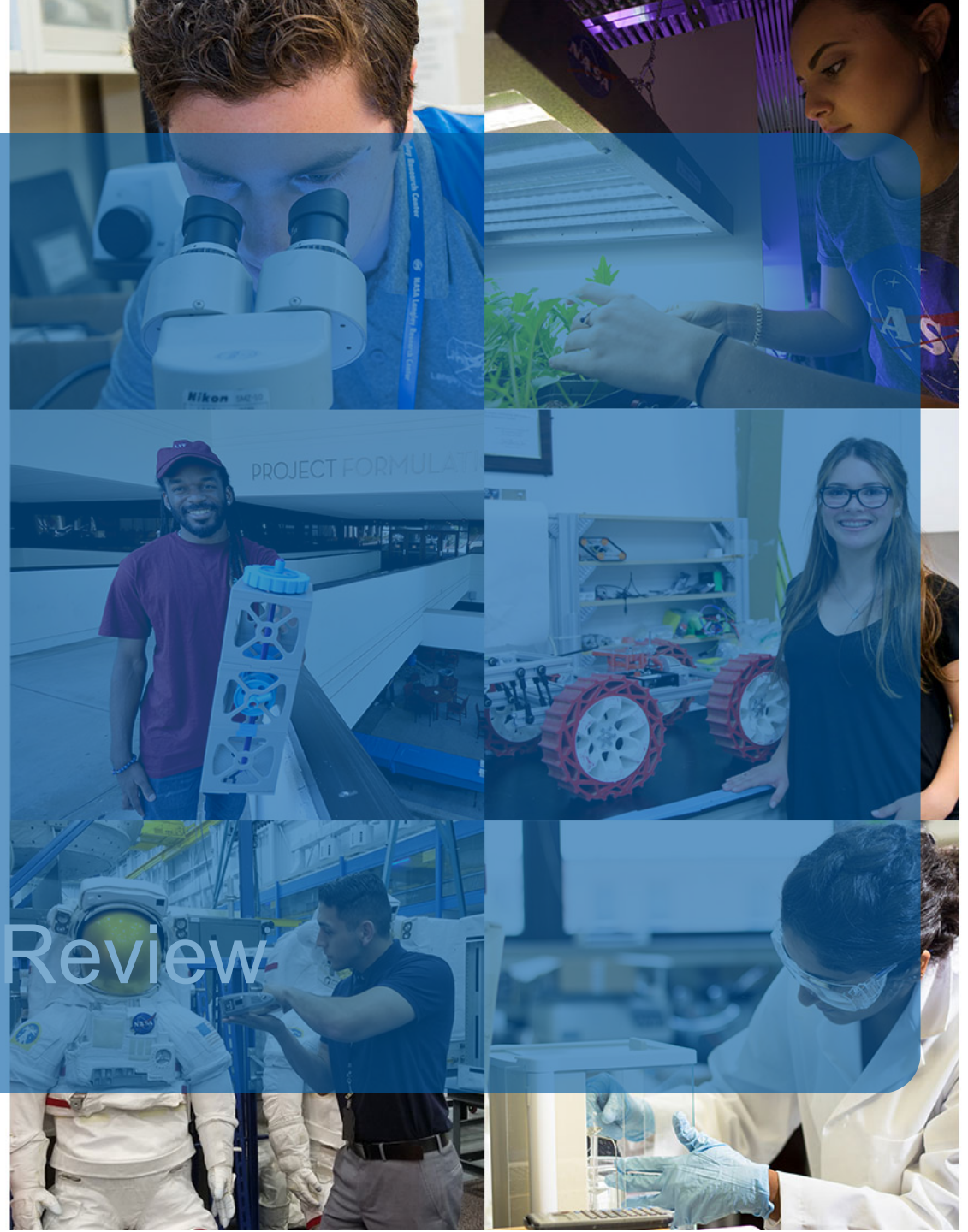


LOOKING AHEAD: STRATEGY FOR STEM ENGAGEMENT 2021-2023

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

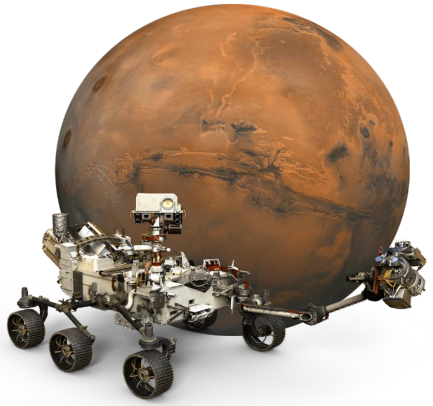
- Kris’ additions to updated strategy slide

FY20 #NASASTEM PRIORITIES

Engage students in challenges and competitions to address mission questions as NASA prepares for the Artemis program

COMMERCIAL CREW 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.



Lessons and activities that use the vantage point of space to **understand and explore our home planet** for the 50th Anniversary of Earth Day.

ARTEMIS

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.

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NASA'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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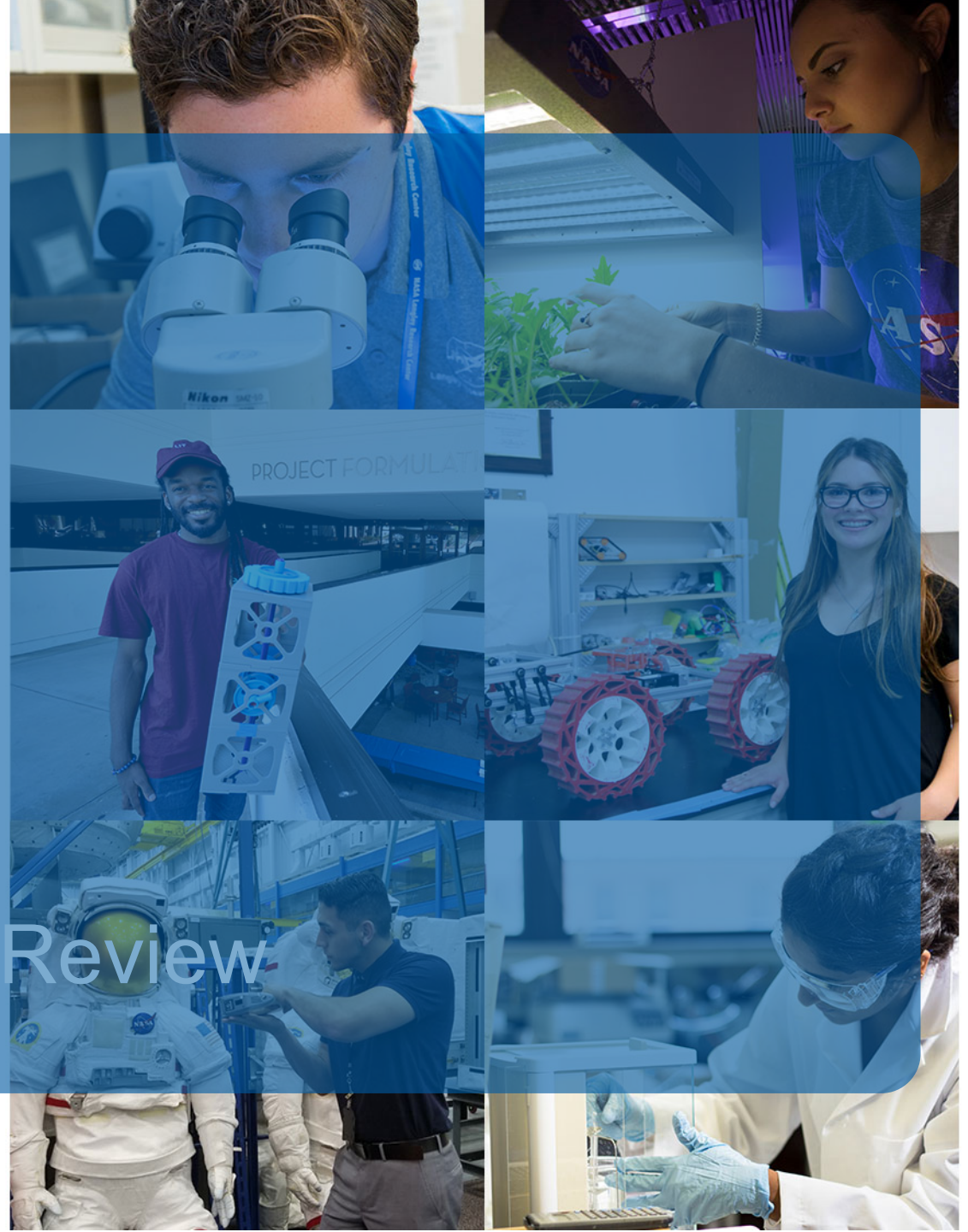

Chad’s charts

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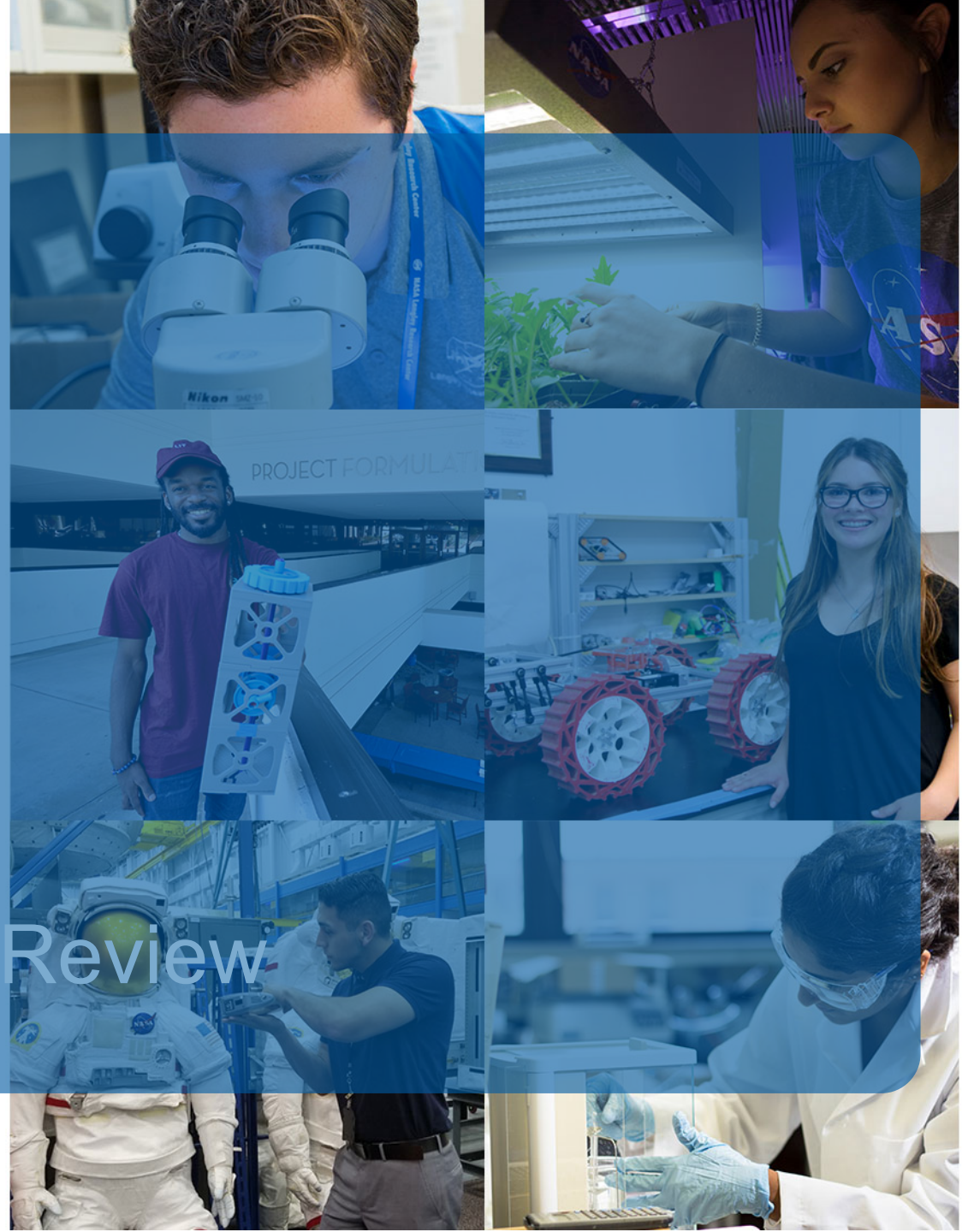


NASA MINORITY UNIVERSITY RESEARCH AND EDUCATION PROJECT (MUREP)

TORRY JOHNSON, MUREP MANAGER
NASA HEADQUARTERS, WASHINGTON DC

MUREP's Purpose

AGENCY RESPONSE TO FEDERAL EXECUTIVE ORDERS FOR MINORITY SERVING INSTITUTIONS (MSIs)

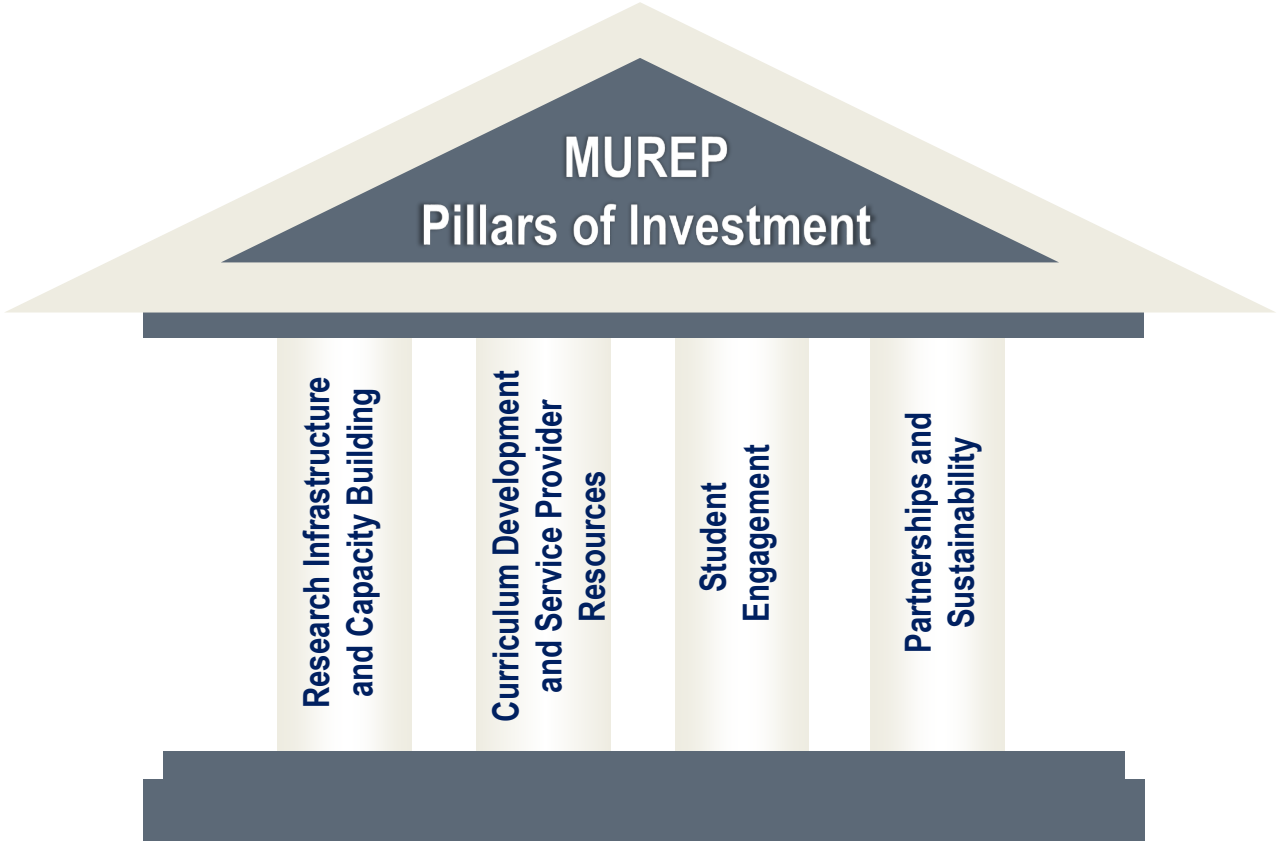
MUREP is established to **increase NASA's responsiveness to federal mandates** related to MSIs and underrepresented and underserved communities, including women, girls, persons with disabilities and veterans.

- **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)

VISION

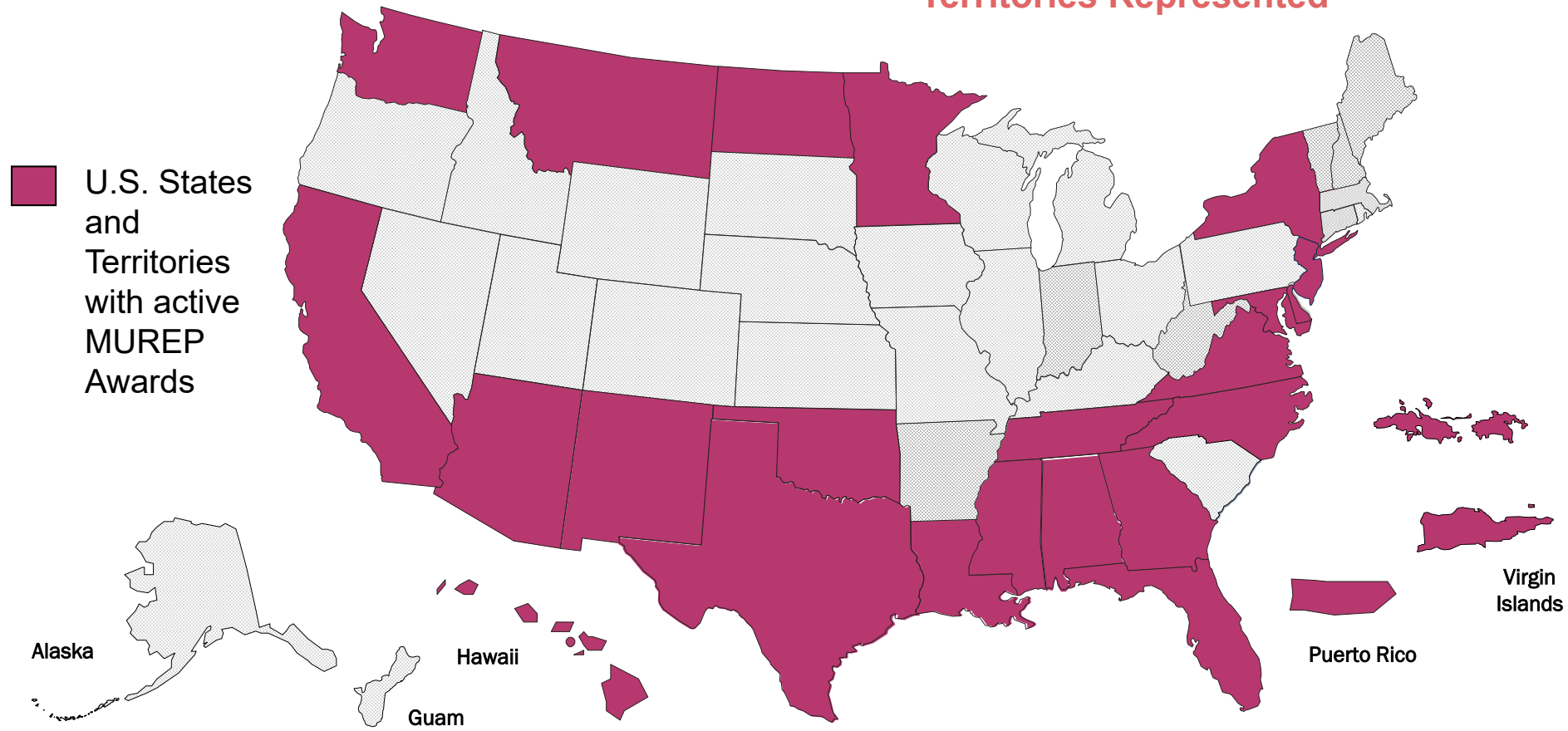
To **enhance** the **research**, **academic** and **technological capabilities** at **MSIs** by providing **authentic student learning** experiences **related to NASA missions** that contribute to a **Diverse Future STEM Workforce**.

FY 2020 - FY2021 SHIFTING PORTFOLIO



FY 2019 - FY2020 Map of Investments

25+ U.S. States and Territories Represented



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2019 AWARDEES 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.

CSUN California State University Northridge

FIU Florida International University

The University of Arizona

UPRRP

University of the District of Columbia

The City College of New York

Navajo Technical University

Sitting Bull College

UTSA The University of Texas at San Antonio™

Prairie View A&M University

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.

THE UNIVERSITY OF TEXAS AT EL PASO

VIRGINIA STATE

TUSKEGEE UNIVERSITY

National Aeronautics and Space Administration

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HBCUs and the MUREP Portfolio

Activity Overview

National Aeronautics and Space Administration

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

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Activity Overview

National Aeronautics and Space Administration

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

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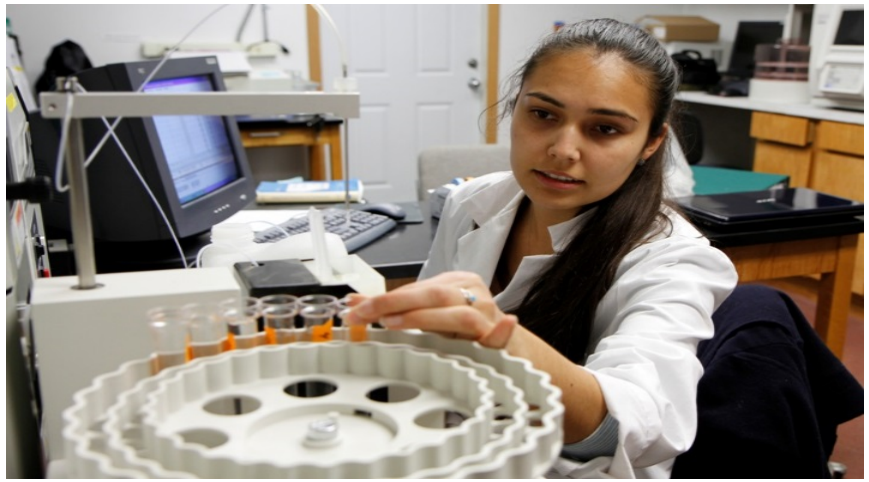
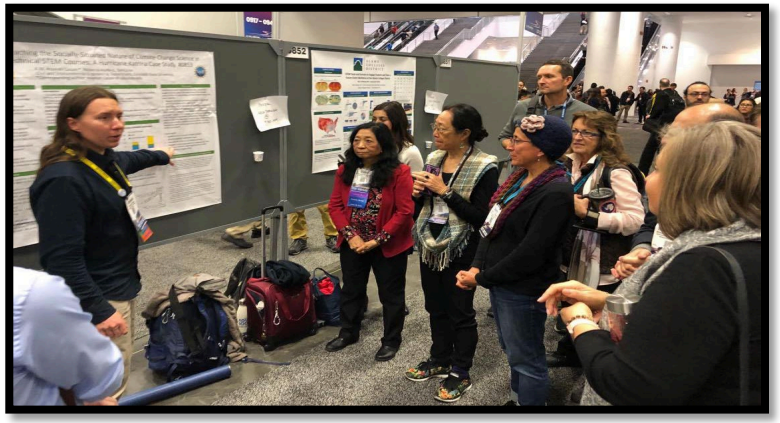
MUREP For American Indian & Alaska Native STEM Engagement (MAIANSE)

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

FY 2019 MUREP Activity Highlights

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

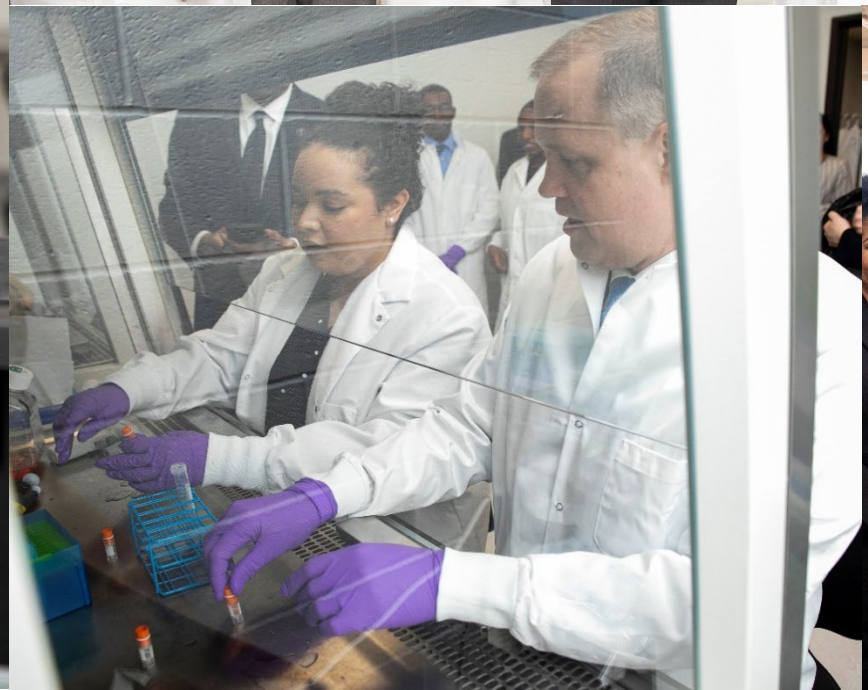
SELECTED INSTITUTIONS:

SITTING BULL COLLEGE

NAVAJO TECHNICAL UNIVERSITY
ESTABLISHED 1979

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).




LANGSTON UNIVERSITY

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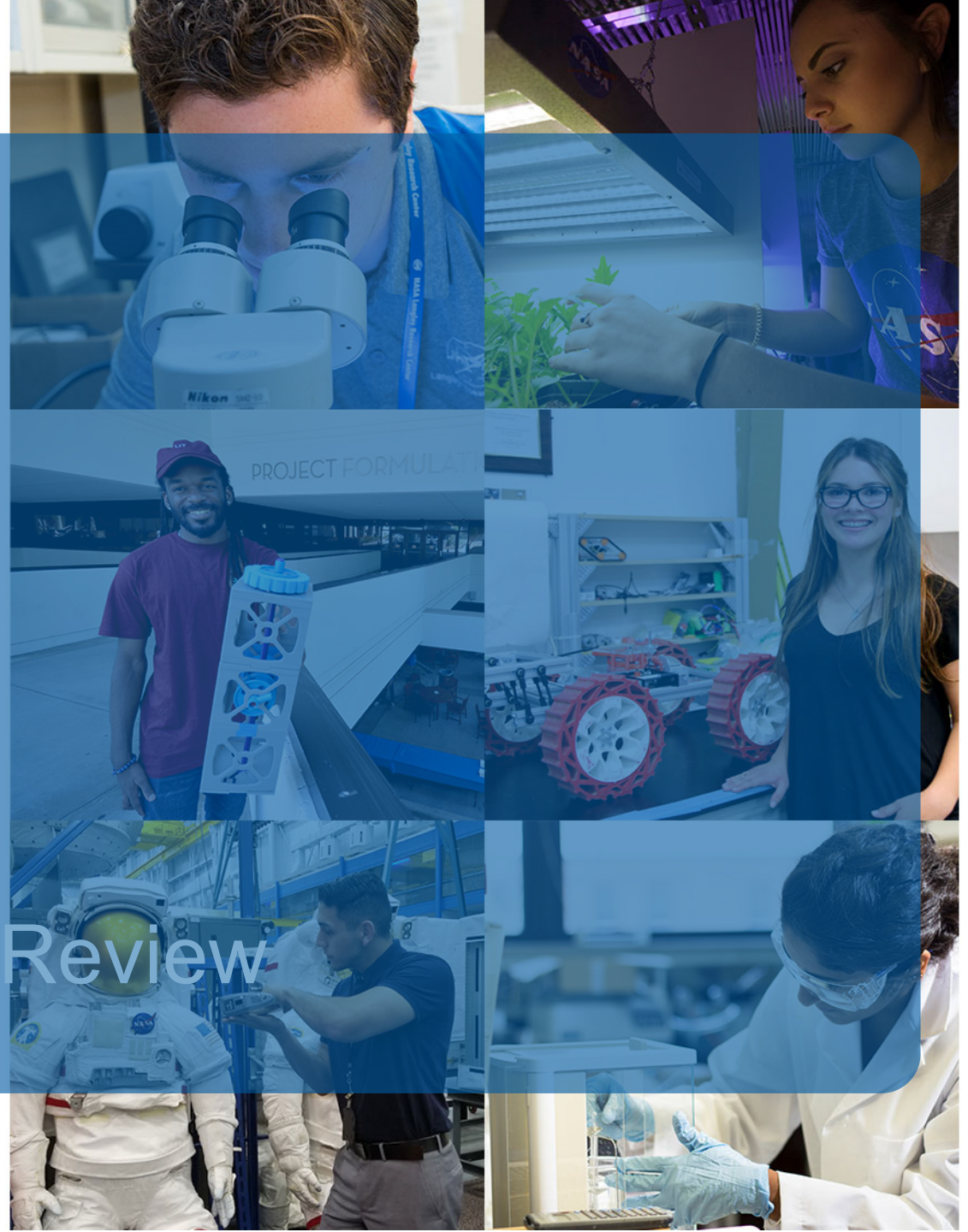

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NASA Advisory Council Mega-Expert Review Panel Feedback

May 12, 2020

Agenda

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

NASA STEM Engagement Evaluation Plans

FY 2020 MUREP Portfolio Evaluation

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

FY 2020 NASA Internships Pilot Longitudinal Study

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

FY 2020 Diversity Deep Dive

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

FY 2020 National Space Grant Program Evaluation Solicitation

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

FY 2020 – FY2021 Next Gen STEM Program Evaluation

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

Dr. Kenneth Alonzo Anderson
Professor & Associate Dean, Howard University

Dr. John Baek
Senior Education Evaluator, National Oceanic and Atmospheric Administration Office of Education

Dr. Sherilynn Black (Virtual participation)
Associate Vice Provost for Faculty Advancement, Duke University

Dr. Heather Boyd
Research Development Program Director, University of Notre Dame

Dr. Angela Calabrese Barton (Virtual participation)
Professor, University of Michigan

Dr. Matthew A. Cannady (Mac)
Research Group Director, UC Berkeley, Lawrence Hall of Science

Dr. Julie Carruthers
Senior Science & Technology Advisor and Acting Director for the Office of Workforce Development for Teachers and Scientists, Department of Energy, Office of Science

Dr. Mica Estrada
Associate Professor, University of California San Francisco

Dr. Sylvia James
EHR Deputy Assistant Director, National Science Foundation

Dr. Carla C. Johnson
Senior Research Fellow and Professor, North Carolina State University

Dr. Natalie King
Assistant Professor, Science Education, Georgia State University

Dr. Michael Lach (Virtual participation)
Assistant Superintendent, Township High School District 113

Dr. Adam Maltese, Ph.D.
Associate Professor of Science Education, Indiana University

Dr. Diann McCants, Ph.D.
Senior Scientist and Analyst, Strategic Analysis, Inc. / Department of Defense Contractor

Dr. Sarah-Kathryn McDonald (Sarah-Kay), Ph.D.
Senior Advisor, Office of the Assistant Director, Directorate for Education and Human Resources, National Science Foundation

Dr. Mwarumba Mwavita, Ph.D.
Associate Professor and Director of Center for Educational Research and Evaluation, Oklahoma State University

Ms. Janet Sellars
Director, Diversity and Data/Analytics Division, Office of Diversity and Equal Opportunity

Dr. Robert H. Tai, Ph.D.
Associate Professor, University of Virginia

Dr. Aaron Thomas, Ph.D.
Associate Professor, University of Montana

Dr. Darryl Williams, Ph.D.
SVP, Science and Education, The Franklin Institute

Dr. Christopher Wright, Ph.D.
Assistant Professor, Drexel University

Dr. Soohyun Yi, Ph.D.
Assistant Professor, Texas Tech University

Dr. Jamaal Young, Ph.D.
Associate Professor, University of Iowa

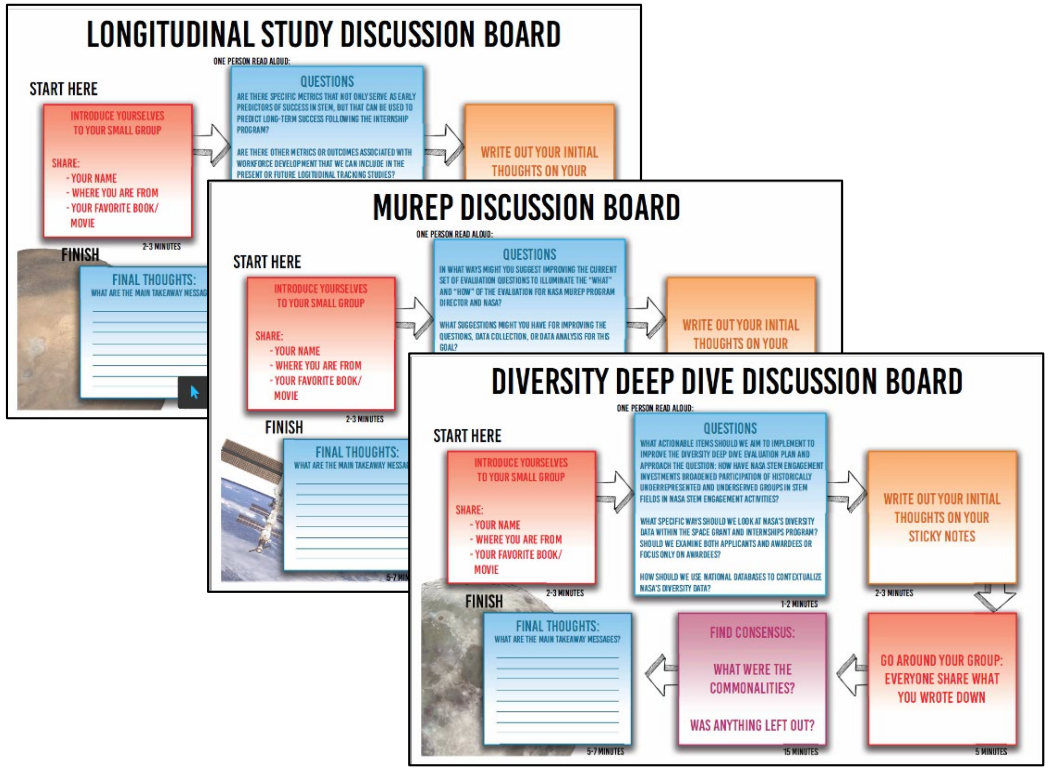
Ms. Erin White
Senior Director, Product Development & Research, STEMconnector

Virtual participation

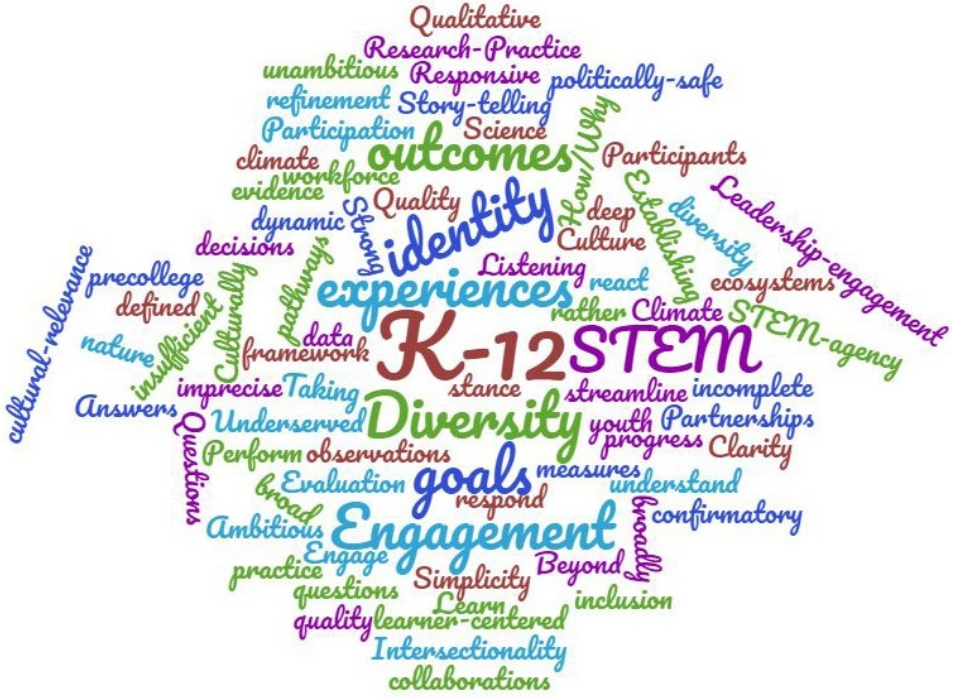
24 Expert Review Panelists

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

STEM INSPIRE - ENGAGE - EDUCATE - EMPLOY
The Next Generation of Explorers

Themes

Maximize Use of Participant Voice

- Include self-report data from participants / institutions
- Qualitative Data
  - Understand why
  - Different perspectives

Examine Full Trajectory

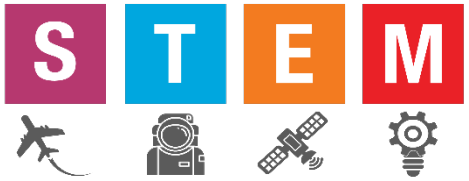
- Examine early-career NASA employees
  - Diversity, Biases, Preparedness
- Transition points along STEM pathways
- NASA's impact long-term: K-12 → Career

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



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The Next Generation of Explorers

Questions?

- SciAct Slides

National Aeronautics and
Space Administration

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The Next Generation of Explorers