STEM Science Activation

Presentation to the Committee on the Review of Progress toward Implementing the Decadal Survey Vision and Voyages for Planetary Sciences

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Definitions

**Education.** Comprises those activities designed to enhance learning in science, technology, engineering, and mathematics (STEM) content areas using NASA’s unique capabilities.

**SMD STEM Science Activation:** A state composed of dispositions, practices, and knowledge that enables success in proximal science, technology, engineering, art, and mathematics learning experiences

**Rationale:** Now that SMD has all agreements in place, we are moving from the planning phase to the doing (aka activation) phase of our program.

* Per NPD’s 1380.1 and 1388.1
SMD’s unique contribution to STEM is through our content and experts, but this program does not fund “pipeline” efforts.

Description of Team Members can be viewed at: https://science.nasa.gov/stem-activation-team along with a Map of 2016 Activities: https://science.nasa.gov/learners

Program is also supporting STEM efforts for the 2017 Total Solar Eclipse. See: https://eclipse2017.nasa.gov/

“Macro” Measures of Success by 2020

1. Enable STEM – Active in all 50 states
3. Advance National Educational Goals- e.g. supporting American Innovation and Competitiveness Act (P.L.114-329) goal achievement by 2020
4. Leverage Through Partnerships –10% increase in partnerships from Baseline of 200

To date, program has achieved “reach” beyond expectations…
Key Features of the SMD STEM Science Activation Effort

- The SMD STEM Science Activation emphasizes NASA’s unique assets to meet evidence-based audience needs in an active-learning way (not internally focused to meet NASA needs)

- Awardees cooperate with SMD and each other to promote understanding by major Science discipline in support of SMD’s Science Education objectives/priorities

- Model relies on multiplication effect of partnerships

- Approach responds to technical and social evolution in science education environment

Desired Outcome - To further enable NASA science experts and content into the learning environment more effectively and efficiently with learners of all ages
SMD Science STEM Activation Model

**SMD Assets (Content, SME’s, etc)***

- Heliophysics
- Astrophysics
- Planetary
- Earth
- Cross-divisional

**Science Activation Provider(s)**

Examples:
- Translate Datasets to useful information for users
- Alignment to education Standards and Decadal Questions
- Enable SMEs to share science with target audiences
- Effective Dissemination
- Open/transparent reporting
- Timely evaluation/relevant assessment
- Development of materials, per Needs Assessments

**Outcomes to Meet these SMD Science STEM Objectives**

- Enable STEM Education
- Improve U.S. Science Literacy
- Advance National Education Goals
- Leverage Through Partnerships

**Partnering Opportunities**

* Divisions responsible for science content datasets, Infrastructure/Tools (e.g. Eyes, GSFC Visualizations), SME selection, and enabling flight opportunities
SMD STEM Science Activation Schedule 2017 and Beyond

Major Milestones
- Selections Announced 9/25
- Baseline 11/14-18
- Total Solar Eclipse
- Initiate Targeted Call
- Transition Awardees
- Determination of Options
- Option Period Begins

Events
- Annual Reviews
- Surveys
- External Evaluation

Today

2015
2016
2017
2018
2019
2020
OPTION PERIOD

2015
Selections Announced 9/25

2016
Baseline 11/14-18

2017
Total Solar Eclipse

2018
Initiate Targeted Call

2019
Transition Awardees

2020
Determination of Options

Option Period Begins
2016 “Reach” of Awardees

[Map showing locations of awardees across the United States. Each location is marked with a pin and labeled with different programs and organizations.]

Programs and Organizations:
- NISE Science Museum of Minnesota Network Partners
- Heliophysics Citizen Science
- Citizen Kate
- AREN Project
- Universe of Learning, Space Telescope Science Institute
- Reaching for the Stars NASA Science for Girl Scouts
- Ballooning Eclipse Teams
- International Arctic Research Center (IARC)
- Smoky Mountain STEM
- Planets CAN
- NASA Earth Science Education Collaborative (NESEC)
- Heliophysics Education Consortium
- AAA/SETI
- Night Sky Network
- Astronomical League
In 2020, Description of Success

By 2020: Qualitative listing

• Active learners
• Deliver effective, evidence-based approaches in authentic, data-rich science experiences to meet defined audience needs
• Significant impact on target audiences with increased interest, engagement, achievement in STEM learning and interest in careers
• Reach underserved communities; helping students access resources; understanding support mechanisms and awareness of real-world STEM opportunities
• Help educators understand the value of NASA assets for learning; integrate high-quality NASA or partner-produced science content; and better prepare to support STEM learning goals and standards
• Effective cross-collaboration so that Collective is operating towards the common Desired Outcome
• Better connections between informal and formal education
• Improve science literacy through technology
• Stakeholder engagement- educators Improve citizen understanding and engagement with science and science policy; increased ability to communicate; improved data collection and interpretation skills; students/citizen scientists
Future Opportunities

- Better use of our Data
  - Strategic Approach
  - Technology intersection
    - Mobile platforms
    - Visualizations
  - Citizen Science and Crowdsourcing
  - SME Connections
SMD STEM Science Activation Program - Summary

External Evaluator(s)
Each agreement has an independent external evaluator

Overall effort will have National Academies Board on Science Education

Opportunities
• Enabling of SMD content and experts into additional areas and venues
• Improved coordination across SMD science education
• Reduction in fragmentation and duplication of efforts
• Increased support of targeted audiences based on needs assessments
• Improvement in the understanding of science literacy

Risks/Areas of Concern
• More Dynamic Education environment post ESSA
• Budget uncertainty until restructuring progress is demonstrated
• Identification of milestones to fill gaps in Formal and Underserved areas

Measurable Achievement
• Progress towards CoSTEM goals by 2020
• Statistical Improvement in applicable S&E Indicators by 2020
• Statistical improvement in scientific literacy surveys by 2020
• Budgets reflect progress towards Desired Outcome
• Active in all 50 states
• 10% increase in number of partnerships by 2020
How Are Agreements Evaluated/Managed?

- SMD Divisions have a Lead to coordinate agreements. Dr. Hakeem Oluseyi has been assigned to Planetary and Helio
- Each agreement includes a needs assessment, logic model, baseline of tasks, reporting, internal evaluation, and statement of collaborations
- The entire effort will be evaluated by external independent evaluators and other outside groups (e.g., National Science Academies’ Board on Science Education)
- Monthly telecons and cross-collaboration subteams (aka topical areas of interest) Reporting through the OEd processes
- Annual review by internal and external experts occurs in November of each year to:
  - Assess performance
  - Set priorities for upcoming year
  - Effort that does not meet evaluation criteria will be transitioned out before end of performance period and/or not extended for option period
  - New effort can migrate into agreements on a existing science-discipline, or audience basis
2017 Total Solar Eclipse: By the Numbers (to date!)

- Broke all NASA records! Over 40M views of live broadcast!
- Top websites for the past 30 days per analytics.usa.gov
- 11 Spacecraft observing
- 1 Gulfstream–III aircraft and 2 WB-57 aircraft
- 1 International Space Station
- 50+ High Altitude Balloon Teams at http://eclipse.stream.live
- 240+ Airports in the Path of Totality
- 12 Zoos in the Path of Totality
- 20 National Parks in the Path of Totality
- 6800+ Libraries hosting events, 2M safe solar viewers distributed
- 290 Museums and Science centers receiving toolkits with 240 hosting events
- 234 Solar System Ambassadors supported 453 events pre-eclipse events to date with another 200 planned
- 40 Challenger Centers
- PBS Learning Media resources - over 37K engagements
- 84 GLOBE sites and over 37,000 users registered on the new GLOBE eclipse app
- 68 Citizen CATE sites
- 15 Broadcast locations (web and TV)
- 30K Boy Scout patches distributed
- 3 Girl Scout Camp sites and kits distributed to 90 Councils
- 1 US Coast Guard ship and an eclipse event planned at USS Yorktown

https://eclipse2017.nasa.gov

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