

Maine Space Grant Consortium

2007 – 2009 Evaluation Plan

A. Mission Statement

- Improve our Affiliates research infrastructure in areas of mutual interest to NASA and the state of Maine;
- Encourage more students to consider careers in fields of science, technology, engineering, and mathematics (STEM); and
- Enhance NASA's presence throughout the State of Maine.

B. Goals by National Objectives

Research

Goal: Strengthen the Affiliates' science and engineering research capacity in areas mutually beneficial to Maine and NASA.

Implementation strategies may include:

- Leverage Space Grant funds to encourage, promote and, to the extent possible, to fund support of the development of multi-institutional collaborations around targeted science and engineering areas where collaboration greatly enhances the development of such programs.

Higher Education

Goal: Increase participation of Maine undergraduate and graduate students in science and engineering research conducted by the Affiliates and NASA Field Centers.

Implementation strategies may include:

- Provide support for Maine undergraduate and graduate students to conduct STEM research.
- Support summer undergraduate internships at NASA Field Centers-

Pre-College

Goal: Increase participation of Maine K-12 teachers and high school students in STEM activities

MSGC will place emphasis on supporting and supplementing existing affiliate and state resources and assets as opposed to the creating new programs, services, and activities. A top priority strategy within this goal is to:

- Enhance in-service STEM-focused professional development programs.
- Support summer internships for Maine High School teachers and students with Maine organizations conducting STEM related research and education

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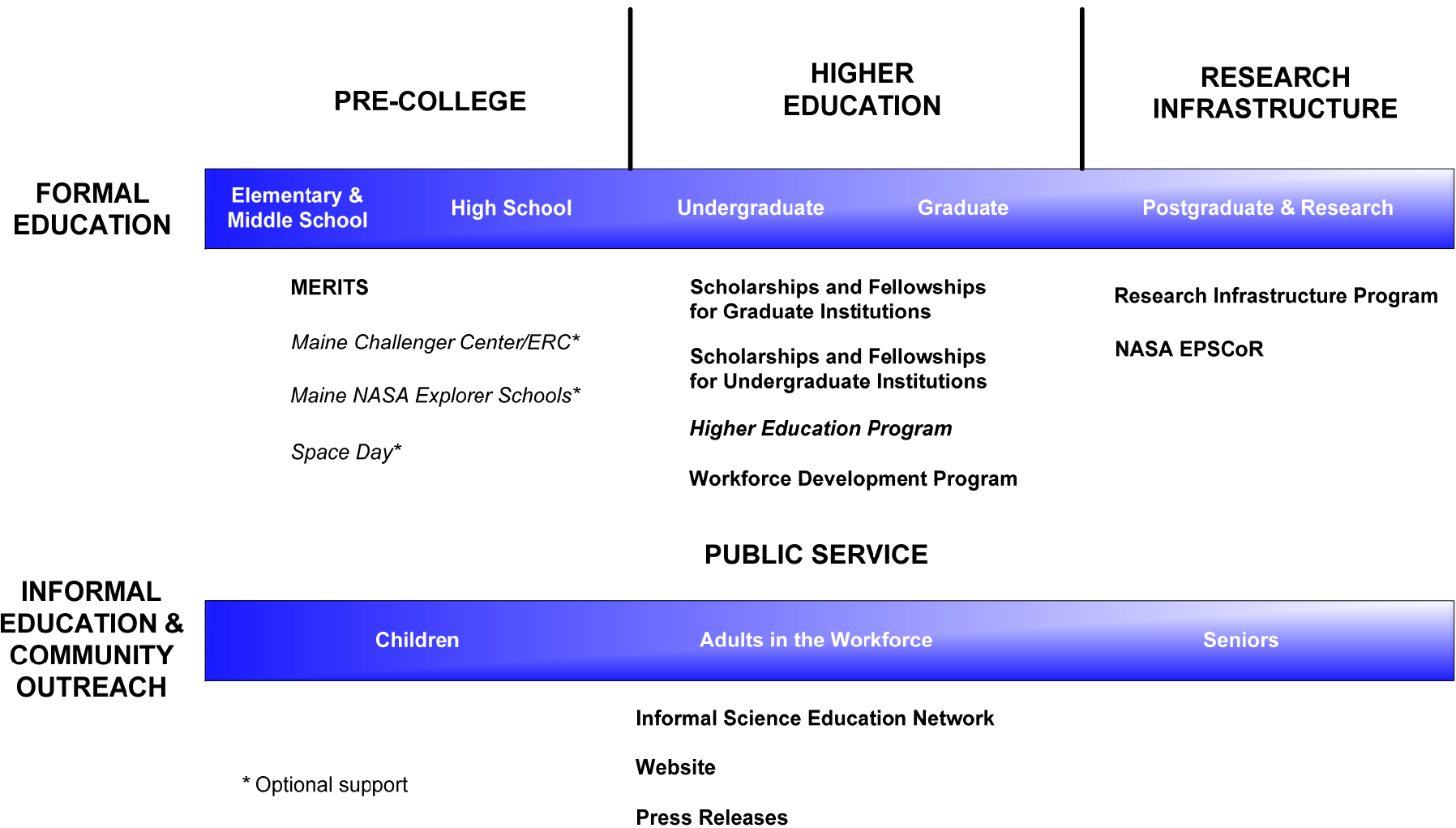
Public Service

Goal: Increase the public's awareness of STEM research, education, and activities that are associated with NASA and the Affiliates.

Implementation strategies may include:

- Develop partnerships to design and implement an informal science education program that provides school-aged children and their families access to Affiliates and NASA-based STEM resources
- Publicize the roles of NASA, MSGC and the Affiliates in supporting Maine students engaged in STEM activities.
- Update and maintain the MSGC Web site to highlight MSGC, the Affiliates and NASA activities in such a way to provide access to additional electronic resources that are truly helpful to the citizens of Maine. The website must communicate the achievements made by Maine students, teachers and researchers supported by MSGC and the Affiliates.
- Develop and implement strategy for regular communication with the State Legislature such as annual legislative breakfasts or mixers - some of which- bring them into contact with students, (including their parents) and researchers who have received support from Space Grant.

C. MSGC STEM Pipeline Impact



* Optional support

D. Indicators of MSGC Contribution to STEM in Maine

According to MSGC's Strategic Plan the mission of MSGC is to "develop and maintain a statewide program that is mutually beneficial to the State and NASA that effectively leverages NASA resources to (1) improve Maine's research infrastructure, (2) encourage more students to consider careers in fields of science, technology, engineering, and mathematics, (STEM), and (3) enhance NASA's presence throughout the State of Maine." In order to review and assess on a regular basis how well MSGC is doing as a whole on micro-indicators that realistically represent the environment in which MSGC operates and the capacity and capabilities of staff to collect data, staff will annually track and review the following indicators that measure the impact of programs and activities on MSGC goals:

- Federally funded R&D performed all Maine institutions
- # publications by faculty and students directly or indirectly attributed to space grant support
- # new sponsored R&D research by faculty directly or indirectly attributed to space grant support
- # graduate students supported by space grant who enter the workforce
- # undergraduate students supported by space grant who continue into graduate school or enter the workforce
- Enrollment of students in new or revised courses resulting from space grant support
- # job placement of space grant supported undergraduate students in NASA jobs
- Ongoing implementation of STEM focused activities by NES teachers and partners
- Continuation of the NES program at Maine schools
- # hands-on experience and education of students in STEM related fields
- # MERITS funded students enrolled in higher education institutions
- # MERITS funded students with declared STEM majors in higher education
- # Maine STEM business and organizations hosting students and teachers
- Informal Science Coalition working group established
- # ISE providers in working group
- # website hits
- # pages downloaded
- # legislators attending breakfast

While it is important for MSGC to know the outcomes and impacts of its specific programs and activities related to this mission, it is also useful, particularly for long-term planning, to review and assess on a regular basis how well the state is doing as a whole on macro-indicators that represent the environment in which MSGC must operate. This will help MSGC target long-term problems needing to be addressed within the state and identify statewide assets to leverage.

- NASA R&D funding received in Maine
- Maine Technology Institute (MTI) awards and funding within aerospace and NASA priority related R&D
- # of proposals submitted for MTI funding by Maine entities and individuals for aerospace and NASA priority related R&D
- Small Business Innovation Research (SBIR) awards and funding for aerospace and NASA priority related R&D
- Employment & wages in aerospace and NASA priority related industries in Maine
- # of undergraduate, graduate, and post-graduate students in aerospace and NASA priority related fields at Maine academic institutions
- # of undergraduate, graduate, and post-graduate degrees conferred in aerospace and NASA priority related fields at Maine academic institutions
- Math and science among K-12 students in Maine

E. Criteria for Program Selection

In order to strengthen the link between programs and activities receiving MSGC support and expected outputs and outcomes, MSGC will utilize criteria to help guide staff and its board in prioritizing and selecting programs and activities. The following is a listing of criteria to be utilized:

Criteria for Research Infrastructure Support:

- Fit with MSGC goals and objectives
- Fit with NASA goals and objectives
- Fit with State science and technology/economic development goals and objectives
- Fit with partnering entity/grantee goals, objectives, strengths
- Potential for partnership/collaboration with industry and fit with Maine's industry strengths/targets
- Technical content
- Potential for partnership/collaboration among research institutions
- Support for students of higher education
- Potential for short & medium term impact/success
- Potential for long-term impact/success
- Potential for and commitment to sustainability
- Funds needed from MSGC/NASA
- Matching Funds Leveraged
- Match Ratio
- Potential to benefit underserved/underrepresented population
- Evaluation methodology and plan

Criteria for Higher Education Support:

- Fit with MSGC goals and objectives
- Fit with NASA goals and objectives
- Fit with State science and technology/economic development goals and objectives
- Fit with partnering entity/grantee goals, objectives, strengths
- Potential for partnership/collaboration with industry and fit with Maine's industry strengths/targets
- Potential for partnership/collaboration among academic and research institutions and fit with Maine's R&D strengths and targets
- Technical content
- Potential for short & medium term impact/success
- Potential for long-term impact/success
- Potential for and commitment to sustainability
- Funds needed from MSGC/NASA
- Matching Funds Leveraged
- Match Ratio
- Potential to benefit underserved/underrepresented population
- Evaluation methodology and plan

Criteria for Pre-College and Public Service Support:

- Fit with MSGC goals and objectives
- Fit with NASA goals and objectives
- Fit with State Learning Results
- Commitment from school district(s) and other partners
- Use of Existing Technology (i.e. Laptop Initiative)
- Potential for short & medium term impact/success
- Potential for long-term impact/success
- Potential for and commitment to sustainability
- Funds needed from MSGC/NASA
- Matching Funds Leveraged
- Match Ratio
- Potential to benefit underserved/underrepresented population

F. Proposed Metrics, Outcomes and Indicators

Research Infrastructure Goal: Strengthen the Affiliates’ science and engineering research capacity in areas mutually beneficial to Maine and NASA.

Program Activity	Proposed Metrics	Outcomes	Indicators
Leverage Space Grant funds to encourage, promote and, to the extent possible, fund the development of research collaborations around targeted science and engineering areas			
Research Infrastructure Program	<ul style="list-style-type: none"> • # of interdisciplinary proposals funded • # undergraduate students directly impacted • # graduate students directly impacted • # Maine/NASA mentor collaborations • Participation of underrepresented minority students is targeted at 4% of total awards and participation of women is targeted at 40% of total awards 	Increased collaborative R&D capacity among Maine research institutions in targeted research areas mutually beneficial to Maine and NASA	<ul style="list-style-type: none"> • \$\$ federally funded R&D performed • # publications • # new sponsored research • # patents • # patent citations
NASA EPSCoR Program	<ul style="list-style-type: none"> • # of interdisciplinary proposals funded • # undergraduate students directly impacted • # graduate students directly impacted • # Maine/NASA mentor collaborations 	Increased collaborative R&D capacity among Maine research institutions in targeted research areas mutually beneficial to Maine and NASA	<ul style="list-style-type: none"> • \$\$ federally funded R&D performed • # publications • # new sponsored research • # patents • # patent citations

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Higher Education Goal: Increase participation of Maine undergraduate and graduate students in science and engineering research and education conducted by the Affiliates and NASA Field Centers.

Program Activity	Proposed Metrics	Outcomes	Indicators
Provide support for Maine undergraduate and graduate students to conduct STEM research			
Scholarship and Fellowship Program for graduate-degree granting Institutions	<ul style="list-style-type: none"> • # funded undergraduate students • # funded graduate students • Participation of underrepresented minority students is targeted at 4% of total awards and participation of women is targeted at 40% of total awards 	<ul style="list-style-type: none"> • Increased participation of Maine undergraduate and graduate students in STEM research and workforce 	<ul style="list-style-type: none"> • # publications • # presentations • # proposals • # graduate students who enter the workforce • # undergraduate students who continue into graduate school and workforce
Scholarship Program for non-graduate degree granting institutions	<ul style="list-style-type: none"> • # student/NASA mentor collaborations • Participation of underrepresented minority students is targeted at 4% of total awards and participation of women is targeted at 40% of total awards 	<ul style="list-style-type: none"> • Increased participation of Maine undergraduate students in STEM research and workforce 	<ul style="list-style-type: none"> • # publications • # presentations • # proposals • # undergraduate students who continue into graduate school and workforce
MSGC Higher Education Program	<ul style="list-style-type: none"> • # interdisciplinary proposals funded • # undergraduate students directly impacted • # graduate student directly impacted • Participation of underrepresented minority students is targeted at 4% of total awards and participation of women is targeted at 40% of total awards • # courses developed or revised 	<ul style="list-style-type: none"> • Increased participation of Maine undergraduate and graduate students in STEM research. 	<ul style="list-style-type: none"> • # publications • # presentations • # proposals • Enrollment of students in new or revised courses
Support summer undergraduate internships at NASA Field Centers			
Maine Aerospace Workforce Development Program	<ul style="list-style-type: none"> • # student research experiences • # student/NASA Collaborations • # Maine high schools receiving undergraduate presentations 	<ul style="list-style-type: none"> • Increased pool of qualified scientists and engineers to fill NASA job opportunities 	# job placement of students in NASA jobs

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Pre-College Goal: Increase participation of Maine K-12 teachers and high school students in STEM activities.

Program Activity	Proposed Metrics	Outcomes	Indicators
Enhance in-service STEM-focused professional development programs			
NASA Explorer Schools	<ul style="list-style-type: none"> • # NES schools supported • # local partners/collaborators assisting with the NES sustainability plan • NES sustainability plan developed and implemented 	<ul style="list-style-type: none"> • Support for Sustainability Plan 	<ul style="list-style-type: none"> • Ongoing implementation of STEM focused programs and activities by teachers and partners • Continuation of the NES program at existing Maine schools
Space Day Maine	<ul style="list-style-type: none"> • # trips supporting STEM professionals participating in Space Day Maine • # mini-grants for teachers to enter the National Space Day Design Challenge 	<ul style="list-style-type: none"> • “Real world” STEM experiences/projects presented to Maine K-12 students and teachers • Increase in the number of Design Challenge projects submitted from Maine students and teachers 	<ul style="list-style-type: none"> • # hands-on experience and education of students in STEM related fields
Support internships for Maine High School teachers and students with Maine businesses			
MERITS	<ul style="list-style-type: none"> • # high school students placed in internships at Maine STEM companies, non-profit research laboratories or academic research projects. • # Maine internship hosts (companies, non-profit, academia) 	<p>Increased interest to enroll in higher education in a STEM related field</p>	<ul style="list-style-type: none"> • # MERITS funded students enrolled in higher education institutions • # MERITS funded students with declared STEM majors in higher education • # Maine STEM-related companies, non-profit research laboratories or academic institutions hosting students and teachers

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Public Service Goal: Increase the public’s awareness of STEM research, education, and activities that are associated with NASA and the Affiliates.

Program Activity	Proposed Metrics	Outcomes	Indicators
Develop partnerships to design and implement an informal science/engineering education program that provide school-aged children and their families’ access to Affiliates and NASA-based STEM resources			
Informal Science Coalition	<ul style="list-style-type: none"> • One ISE working group identified • Operating procedures established • Inventory of Maine ISE providers and activities completed 	<ul style="list-style-type: none"> • Increased participation and collaboration among Maine ISE providers • Increased access to STEM activities in Maine by students and parents 	<ul style="list-style-type: none"> • Working group developed • # providers in working group
Publicize MSGC and the roles of Affiliates in Maine S&T community			
Press Releases	# press releases distributed state-wide	Increased public awareness of achievements made by MSGC-supported students, teachers and researchers	<ul style="list-style-type: none"> • Correspondence to/questions asked of the Consortium from the general public • Increased participation in Consortium activities/program
Website	Increased hits to website by 100%	Increased awareness of MSGC, NASA and STEM related activities in Maine	<ul style="list-style-type: none"> • # website hits • # pages download
Develop and implement strategy for regular communication with the State Legislature			
Legislator Breakfast	<ul style="list-style-type: none"> • # Legislator breakfast events 	Increased awareness of MSGC, NASA and STEM related activities in Maine	<ul style="list-style-type: none"> • # of legislators attending

G. MSGC Data Collection Methods for Outcome Indicators

Indicators	Data Collection Methods
Proposals submitted for research funding, support, and collaborations	Reporting by MSGC and NASA
\$ of R&D performed by Maine researchers and research institutions	Reporting by research institutions and researchers; data from the National Science Foundation: http://www.nsf.gov/sbe/srs/
Federally funded R&D performed	Reporting by research institutions and researchers; data from the National Science Foundation: http://www.nsf.gov/sbe/srs/
Publications, patents, patent citations, new sponsored research by Affiliates	Reporting by research institutions and researchers
State funding for NASA EPSCoR match	Maine Office of Fiscal and Program Review
Maine Technology Institute Awards and \$ provided for activities that are mutually beneficial to Maine and NASA	Obtain data from MTI on awards, \$, and descriptions www.mainetechnology.org
Levels of awards and technical assistance from other state supported programs that are mutually beneficial to Maine and NASA	Interviews and reporting from state support program managers; data from Maine’s Evaluation of Public Investments in R&D
Proposals for scholarships fellowships, and internships to Maine undergraduate and graduate students for STEM related research;	Gathered from MSGC, NASA, and Affiliate reporting
Increased interest in science and engineering related education, research, and occupations among those participating in scholarships and fellowships, and internships	Reporting by participants
Publications, presentations, and proposals resulting from scholarship and fellowship activity	Reporting by participants
Recommendations provided by intern supervisor	Reporting by participant supervisors
Enrollments and degrees awarded in STEM fields of study by Maine academic institutions	Reporting by higher education affiliates; NSF WebCASPAR Database System, http://webcaspar.nsf.gov
Recent S&E graduates in the workforce	National Science Foundation: http://www.nsf.gov/sbe/srs/
# of interns, scholarship and fellowship participants that end up employed in science and engineering related occupations	Reporting by participants
# of Maine minority students participating in STEM activities and science and engineering research	Reporting by participants and affiliates
Increased interest among minority students to pursue education, research, and careers in science and engineering related fields	Reporting by participants
Recent minority S&E graduates in the workforce	To be determined
# of teachers participating in in-service and pre-service STEM related programs	Survey of K-12 science teachers
Increased knowledge and comfort level of teachers to deliver STEM-focused education curriculum and activities	Survey of K-12 science teachers
# of teachers implementing STEM focused programs and activities	Survey of K-12 science teachers

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Indicators	Data Collection Methods
# of students and teachers participating in STEM activities	Reporting by Affiliates, Survey of K-12 science teachers
MEA math and science scores	Maine Department of Education, "Maine Educational Assessment State Results"; http://www.maine.gov/education/mea/reports.htm
#of high school students enrolled in AP science and math courses	The College Board, www.apcentral.collegeboard.com
# of teachers/districts utilizing NASA and NASA related educational programs and resources	Reporting by Affiliates, Survey of K-12 science teachers
# of teachers/districts utilizing Affiliate educational programs and resources	Reporting by Affiliates, Survey of K-12 science teachers
# of Affiliate informal science/engineering education programs	Reporting by Affiliates
# of school-aged children and their families participating in informal STEM activities	Reporting by Affiliates
Level of awareness of NASA and MSGC roles among public	Survey of Public
# of persons participating in NASA and MSGC programs in Maine	Reporting by MSGC and NASA
Level of awareness of achievements made by Maine students, teachers, and researchers supported by MSGC and the Affiliates	Survey of Public
# of persons participating in activities supported by MSGC and Affiliates	Reporting by MSGC and Affiliates
# of visits, length of visits to MSGC Website and pages	Web Site reporting software
Level of awareness of STEM activities among K-12 students and teachers	Survey of K-12 teachers and students
Level of awareness of MSGC, Affiliates, and STEM activities by Legislators	Survey or interviews with Legislators
State funding for STEM related activities related to NASA and MSGC's interests	Maine Office of Fiscal and Program Review
Level of awareness of Affiliates with MSGC	Survey of Affiliates
Level of participation, satisfaction with, and support for MSGC by Affiliates	Survey of Affiliates
Level of faculty and student awareness of the applications of geospatial technology	Survey or focus groups of STEM faculty and students
# of faculty and students participating in activities associated with the applications of geospatial technology	Reporting by Affiliates
# of firms assisted within industry clusters that support NASA's technology transfer objectives	MSGC reporting
Employment in Maine's science and technology-based industry clusters that support NASA's technology transfer objectives	County Business Patterns, U.S. Census Bureau, U.S Department of Commerce, www.census.gov

H. Macro-Indicators of the State of STEM in Maine

Indicator	Relevant MSGC Goals*	Data Source
NASA R&D funding received in Maine	Research	National Science Foundation Survey of Federal Funds for Research and Development: http://www.nsf.gov/sbe/srs/
Maine Technology Institute (MTI) awards and funding for aerospace related R&D	Research	Maine Technology Institute – www.mainetechnology.org
# of proposals submitted for MTI funding by Maine entities and individuals for aerospace related R&D	Research	Maine Technology Institute – www.mainetechnology.org
Small Business Innovation Research (SBIR) awards and funding for aerospace related R&D	Research	U.S. Small Business Administration, www.sba.gov/SBIR
Employment & wages in aerospace related industries in Maine	Public Service - Industry	County Business Patterns, U.S. Census Bureau, U.S Department of Commerce, www.census.gov
# of undergraduate, graduate, and post-graduate students in aerospace related fields at Maine academic institutions	Higher Education	NSF WebCASPAR Database System, http://webcaspar.nsf.gov & Maine Academic Institutions
# of undergraduate, graduate, and post-graduate degrees conferred in aerospace related fields at Maine academic institutions	Higher Education	NSF WebCASPAR Database System, http://webcaspar.nsf.gov
National Assessment of Educational Progress – Math and Science Scores	Pre-College	U.S. Department of Education, National Center for Education Statistics, http://www.nces.ed.gov/nationsreport