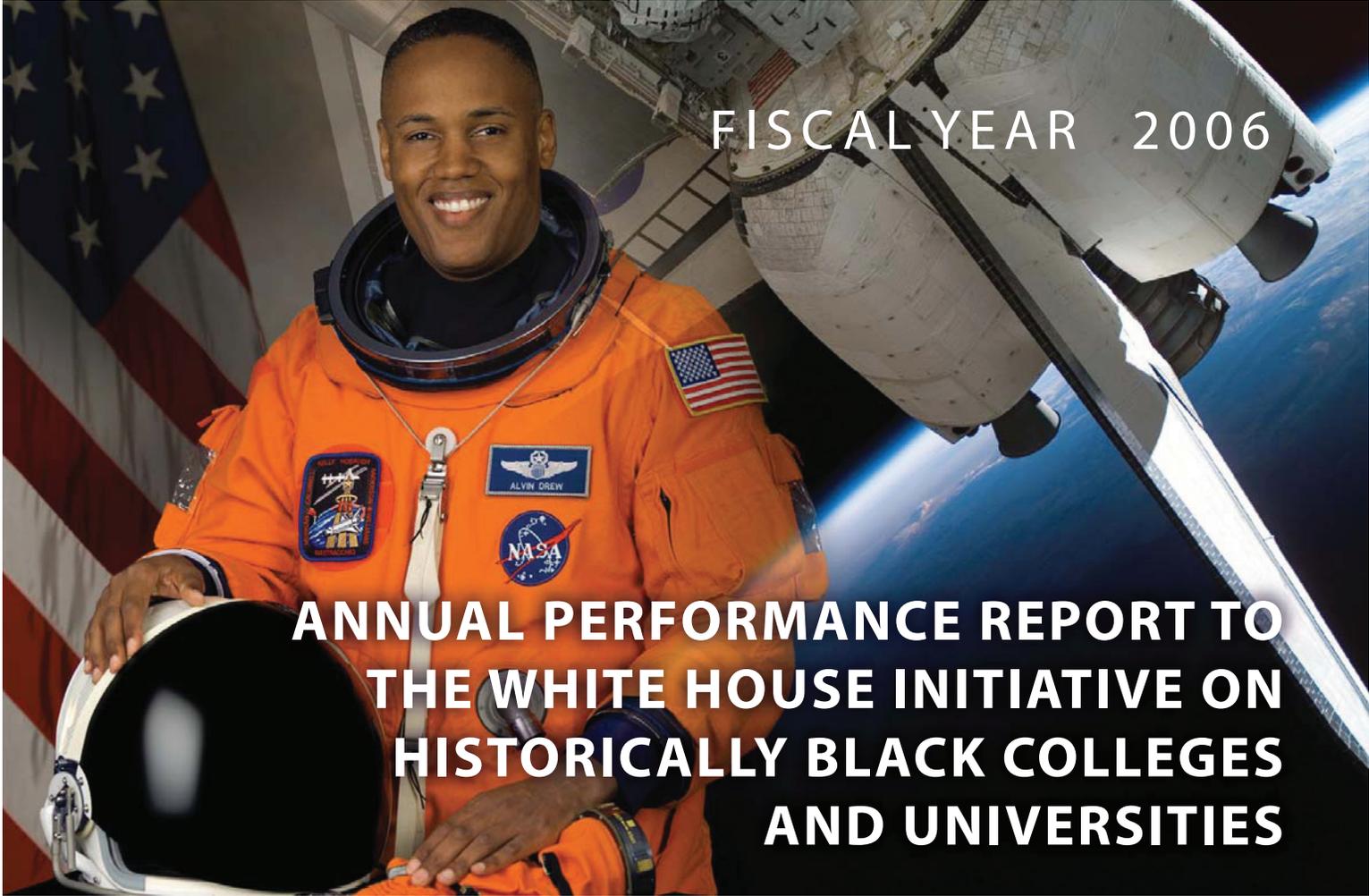


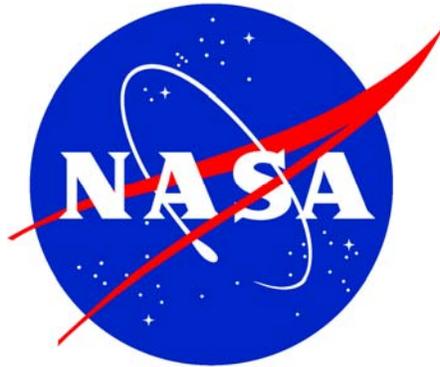
National Aeronautics and Space Administration

A photograph of an astronaut in an orange flight suit, smiling, inside a spacecraft. The astronaut is wearing a NASA patch and a name tag that says "ALVIN CREW". An American flag is visible in the background. The text "FISCAL YEAR 2006" is overlaid on the right side of the image.

FISCAL YEAR 2006

**ANNUAL PERFORMANCE REPORT TO  
THE WHITE HOUSE INITIATIVE ON  
HISTORICALLY BLACK COLLEGES  
AND UNIVERSITIES**

**Office of Education**  
NASA Headquarters  
Washington, DC 20546-0001



**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**FISCAL YEAR 2006 ANNUAL PERFORMANCE REPORT TO THE  
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**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)  
FISCAL YEAR 2006 ANNUAL PERFORMANCE REPORT  
TO THE WHITE HOUSE INITIATIVE OFFICE ON  
HISTORICALLY BLACK COLLEGES AND UNIVERSITIES (HBCU)**

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## EXECUTIVE SUMMARY

The National Aeronautics and Space Administration (NASA) is highly committed to ensuring the broadest participation of Historically Black Colleges and Universities (HBCU) in the Agency's research and education programs and its overall mission. The Agency's goals for HBCUs, as stated in its FY 2006 Annual Plan to Assist HBCUs, is to provide the foundation and guide NASA's planned spending and technical assistance to HBCUs. Executive Order 13256, President's Board of Advisors on HBCUs, requires all Federal agencies to plan and report annually on how they increased the capacity of HBCUs to compete effectively for Federal funding. The NASA programs highlighted in this report are examples of the Agency's strategy for strengthening and expanding research and academic infrastructure development in science, technology, engineering, and mathematics (STEM) at HBCUs.

NASA's commitment is evidenced by the significant progress made toward the Agency's FY 2006 Annual Plan to Assist HBCUs. NASA's planned investment for HBCUs in FY 2006 was \$31.6 million. The actual investment in HBCUs for FY 2006 was \$33.4 million. This represents a 6 percent increase over our projected FY 2006 investment.

In FY 2006, the NASA/Hampton University Aeronomy of Ice in the Mesosphere (AIM) mission is evidence of the Agency's funding commitment to HBCUs. Hampton is the first HBCU selected to lead a NASA space mission. NASA will invest approximately \$140 million in the AIM mission.

AIM is the first mission dedicated to exploration of mysterious ice clouds that dot the edge of space in Earth's polar regions. These clouds have grown brighter and more prevalent in recent years, and some scientists suggest that changes in these clouds may be the result of climate change. AIM will conduct the first detailed probe of this unusual phenomenon, typically observed approximately 50 miles above the Earth's surface in the mesosphere. The mesosphere is the region just above the stratosphere. Researchers know very little about how these polar mesospheric clouds form, why they are being seen at lower latitudes than ever before, or why they have recently grown brighter and more frequent. AIM will provide an understanding of how and why these clouds form, an important contribution toward the NASA goals of understanding the fundamental physical processes of our space environment and how the habitability of planets is affected by the interaction of planetary magnetic fields and atmospheres with solar variability. The AIM mission is scheduled to launch in FY 2007.

Another example of NASA's commitment to HBCUs is the research conducted through the University Research Center (URC) project. As a result of sustained NASA funding in FY 2006, HBCUs reported 190 publications and five patents pending and that five African-Americans received doctoral degrees, 24 African-Americans received master's degrees, and 30 African-Americans received baccalaureate degrees in STEM disciplines.

**SUMMARY OF AGENCY AWARDS TO HBCUs BY CATEGORY: FY 2006**

1. Agency: National Aeronautics and Space Administration

2. Agency Representative: Joyce Winterton \_\_\_\_\_  
 Associate Administrator for Education (Signature/ Date)

3. Total Funds for Institutions of Higher Education (IHE): **\$1,097,318,828**

**DISCRETIONARY AWARDS**

<b>CATEGORY</b>	<b>AWARDS TO IHEs+</b>	<b>AWARDS TO HBCUs*</b>	<b>AWARDS TO HBCUs AS % OF TOTAL AWARDS TO IHEs</b>
1. Research and Development		\$24,264,074	
2. Program Evaluation			
3. Training		\$4,047,232	
4. Facilities and Equipment		\$42,115	
5. Fellowships, Traineeships, Internships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)		\$1,325,388	
6. Student Tuition Assistance, Scholarships, and Other Aid		\$961,975	
7. Direct Institutional Subsidies			
8. Third-Party Awards		\$2,461,897	
9. Private-Sector Involvement		\$248,563	
10. Administrative Infrastructure			
11. Other Activities			
<b>TOTAL</b>	<b>\$1,097,318,828</b>	<b>\$33,351,244</b>	<b>3.04%</b>

Michael D. Griffin \_\_\_\_\_  
 Administrator (Signature/Date)

+ IHE=Institutions of Higher Education  
 \* HBCUs=Historically Black Colleges and Universities

**TOTAL FY 2006 AWARDS TO  
HISTORICALLY BLACK COLLEGES AND UNIVERSITIES**

	<i>Institutions of Higher Education</i>	<i>Historically Black Colleges and Universities</i>
<b>DISCRETIONARY AWARDS:</b>	\$1,097,318,828	\$33,351,244
<b>LEGISLATED AWARDS:</b>	\$0	\$0
<b>TOTAL AWARDS:</b>	\$1,097,318,828	\$33,351,244

**FY 2006 SUMMARY OF AGENCY AWARDS TO HBCUs BY INSTITUTION**

<b>State/Institution</b>	<b>R&amp;D</b>	<b>PE</b>	<b>Training</b>	<b>F&amp;E</b>	<b>Fellows</b>	<b>STA</b>	<b>DIS</b>	<b>TPA</b>	<b>PSI</b>	<b>AI</b>	<b>Other</b>	<b>Grand Total</b>
<b>Alabama</b>												
Alabama A&M University	\$48,760		\$5,000		\$89,000							\$142,760
Lawson State Community College			\$60,000									\$60,000
Oakwood College			\$334,500		\$80,000							\$414,500
Stillman College			\$100,000									\$100,000
Tuskegee University	\$414,901				\$178,758							\$593,659
<b>Florida</b>												
Bethune Cookman College			\$518,000		\$17,500							\$535,500
Florida A&M University	\$300,000											\$300,000
<b>Georgia</b>												
Albany State University			\$250,000		\$248,000							\$498,000
Clark Atlanta University	\$371,250											\$371,250
Morehouse College				\$42,115	\$200,000	\$310,000						\$552,115
Spelman College					\$1,850	\$310,000						\$311,850
<b>Louisiana</b>												
Southern University and A&M College-Baton Rouge	\$1,698,888					\$34,395						\$1,733,283
Xavier University						\$34,395						\$34,395
<b>Maryland</b>												
Bowie State University					\$150,000							\$150,000
Coppin State University	\$185,796		\$191,723									\$377,519
Morgan State University	\$4,003,617		\$93,750									\$4,097,367
University of Maryland Eastern Shore	\$50,000		\$12,500		\$141,000							\$203,500
<b>Mississippi</b>												
Jackson State University			\$54,481			\$34,395						\$88,876



State/Institution	R&D	PE	Training	F&E	Fellows	STA	DIS	TPA	PSI	AI	Other	Grand Total
<b>Virginia</b>												
Hampton University	\$15,301,510		\$570,000									\$15,871,510
Norfolk State University	\$371,250		\$250,000									\$621,250
<b>Washington, DC</b>												
Howard University	\$232,851					\$34,395						\$267,246
University of the District of Columbia			\$340,000									\$340,000
<b>West Virginia</b>												
West Virginia State University	\$50,000				\$61,110							\$111,110
<b>Other HBCU Awards</b>												
Central Intercollegiate Athletic Association (Scholarship Fund)								\$100,000				\$100,000
NASA Space Grant College Fellowship Program								\$511,897				\$511,897

<b>State/Institution</b>	<b>R&amp;D</b>	<b>PE</b>	<b>Training</b>	<b>F&amp;E</b>	<b>Fellows</b>	<b>STA</b>	<b>DIS</b>	<b>TPA</b>	<b>PSI</b>	<b>AI</b>	<b>Other</b>	<b>Grand Total</b>
United Negro College Fund Special Programs, Inc. - Harriett G. Jenkins Predoctoral Fellowship Program								\$750,000				\$750,000
United Negro College Fund Special Programs, Inc. - Curriculum Improvement Partnership Awards (CIPA)								\$300,000				\$300,000
United Negro College Fund Special Programs, Inc. - NASA Administrator's Fellowship Program (NAFP)								\$800,000				\$800,000
NASA Research and Education Support Services (NRESS)									\$248,563			\$248,563
<b>GRAND TOTAL</b>	<b>\$24,264,074</b>		<b>\$4,047,232</b>	<b>\$42,115</b>	<b>\$1,325,388</b>	<b>\$961,975</b>		<b>\$2,461,897</b>	<b>\$248,563</b>			<b>\$33,351,244</b>

<b>ABBREVIATIONS KEY</b>	
R&D	Research and Development
PE	Program Evaluation
TRAINING	Training
F&E	Facilities and Equipment
FELLOWS	Fellowships, Traineeships, Internships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)
STA	Student Tuition Assistance, Scholarships, and Other Aid
DIS	Direct Institutional Subsidies
TPA	Third-Party Awards
PSI	Private-Sector Involvement
AI	Administrative Infrastructure
OTHER	Other Activities

**AWARDS BY OBJECT CATEGORY**

**Research and Development**

<b>STATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
AL	Alabama A&M University	Microresonators used as Optical Strain	\$22,760
AL	Alabama A&M University	Over Expression of a Homologous Trypsin Inhibitor Gene in Transgenic Peanuts	\$26,000
AL	Tuskegee University	Center for Food and Environmental Systems for Human Exploration of Space (CFESH)	\$414,901
DC	Howard University	Howard University West Africa Rainfall Analysis	\$6,851
DC	Howard University	Impact of Soil Moisture Initialization Seasonal Precipitation Forecasts in West Africa	\$24,000
DC	Howard University	Center for the Study of Terrestrial and Extraterrestrial Atmospheres	\$202,000
FL	Florida A&M University	University Research, Engineering, and Technology Institute (URETI)	\$300,000
GA	Clark Atlanta University	High-Performance Polymers and Composites Center	\$371,250
LA	Southern University and A&M College-Baton Rouge	The Center for Coastal Zone Assessment and Remote Sensing	\$1,698,888
MD	Coppin State University	The Middle Passage Project	\$185,796
MD	Morgan State University	Chesapeake Information-Based Aeronautics Consortium	\$3,600,000
MD	Morgan State University	Center for Advanced Microwave Research and Applications	\$403,617
MD	University of Maryland Eastern Shore	Mid-Atlantic Institute for Space and Technology (MIST)	\$50,000
NC	North Carolina A&T State University	North Carolina A&T State University Center for Aerospace Research	\$126,744
NC	North Carolina A&T State University	Meyer Institute for Future Space Transportation	\$50,000
NC	North Carolina A&T State University	Cooperative Agreement with University of Maryland College Park	\$200,000
PA	Lincoln University	Faculty Research Associate	\$15,000

<b>TATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
TN	Fisk University	Center for Photonic Materials and Devices	\$166,000
TN	Fisk University	Development of a Message Passing Interface General Relativistic Particle-in-Cell Code	\$24,733
TX	Prairie View A&M University	Radiation Inter-University Science and Engineering Program	\$37,500
TX	Prairie View A&M University	Model Calculations of Radiation Environment Research Foundation at MARS and Data from Martian Radiation Experiment	\$3,873
TX	Prairie View A&M University	Cooperative Agreement with University of Florida	\$70,000
TX	Texas Southern University	NASA Research Center for Biotechnology and Environmental Health	\$414,901
TX	Texas Southern University	Targeting Specific Bone Cell Signaling Pathways and Immune Suppression in Microgravity	\$89,000
TX	Texas Southern University	Radiation Inter-University Science and Engineering Program	\$37,500
VA	Hampton University	Picasso-CENA International Science Advisory	\$252,030
VA	Hampton University	Improving Arctic Energy	\$54,121
VA	Hampton University	Aeronomy of Ice in the Mesosphere (AIM) Mission	\$14,228,901
VA	Hampton University	Spectral Broudcoud Radiative Forcing Using Combined Measurements	\$108,000
VA	Hampton University	Hampton University Aeropropulsion Center	\$371,250
VA	Hampton University	Multi-Sensor Approach for Estimating Global Aero-Sol Radiative Forcing from Terra and Aqua	\$21,080
VA	Hampton University	Haloe Mission	\$106,128
VA	Hampton University	Inferring Ozone Profiles from SAGE III Limb Scattering Measurements	\$160,000
VA	Norfolk State University	Center for Research and Education in Advanced Materials	\$371,250
WV	West Virginia State University	STEM Pipeline Project	\$50,000
<b>TOTAL</b>			<b>\$24,264,074</b>

## AWARDS BY OBJECT CATEGORY

### **Program Evaluation**

In FY 2006, all grant awards experienced some form of oversight through a combination of NASA technical monitors, data collection on key metrics, site visits, and/or reverse site visits. For institutional research programs, technical review committees comprised of NASA experts in relevant research areas conducted site visits at least annually. These evaluations and assessments are critical tools that provide valuable information to HBCUs that can be utilized to strengthen their research and program outcomes.

### **Performance Outcomes**

To monitor the progress of NASA HBCU programs, all grant recipients were required to submit a Performance Outcomes Report as part of their annual performance report. The Performance Outcomes Report consists of numerical outcomes data and a narrative summary of project accomplishments covering Academic Year 2005-2006 and the summer of 2006. The data were collected electronically via the World Wide Web. This single annual collection of data provides the information necessary for the annual performance goals reports, required White House reports, budget submissions and justifications, responses to Congressional inquiries, and comparative assessments of programs and projects. The numerical data measure program performance against metrics that apply to all NASA education and research programs. These metrics emphasize outcomes over processes. For research projects, including URCs, the metrics track two basic areas--student outcomes (degrees awarded and postdegree plans) and research outcomes (refereed publications, leveraged funding, patents, and commercial products). Vital process information, such as numbers of faculty and students supported and the gross categories in which funds are spent, is also collected. For education projects, the Performance Outcomes Report continues to collect data on numbers and demographics of students supported, but also primarily focuses on measurable improvements in student performance. Both short- and long-term metrics are utilized in the collection of data that pertains to education projects.

In addition to the above, NASA recognizes that it can continue to enhance and improve its evaluation procedures. NASA has taken major steps to improve the evaluation function by:

- (a) incorporating a detailed evaluation plan into its Education Strategy Framework.
- (b) defining an enhanced set of outcome-based performance measures.
- (c) articulating specific roles and responsibilities to ensure accountability
- (d) allocating the resources necessary to support rigorous evaluations and the overall evaluation function.

The most significant improvement NASA is making to its evaluation efforts is to make extensive use of independent, credible evaluators to conduct validation studies. Project-level evaluations will be conducted on three to five major projects each year, with the objective of evaluating each project at least once every five years. In collaboration with the National Science Foundation and the Office of Management and Budget, NASA is working to determine the best ways to apply a Randomized Controlled Trial model of evaluation to demonstrate the impact of its projects.

## **Site Visits**

Onsite reviews of grants were conducted at 15 HBCUs during FY 2006. The purposes of the visits were to ascertain the projects' accomplishments to date, identify any potential barriers to achieving the project's objectives, determine whether collaboration between the institution and NASA is sufficient to achieve maximum benefits for the university and for NASA, and to allow NASA personnel an opportunity to review management of the grant.

## AWARDS BY OBJECT CATEGORY

## Training

ATE	INSTITUTION	DESCRIPTION	AWARD
AL	Alabama A&M University	Michael P. Anderson Summer Outreach	\$5,000
AL	Lawson State Community College	Girls Leading Others by Example	\$60,000
AL	Oakwood College	Enhancing Mathematics and Science Education through Research (EMSER)	\$238,500
AL	Oakwood College	Project Mi Futuro	\$50,000
AL	Oakwood College	Pre-service Teacher Institute	\$46,000
AL	Stillman College	Project Mi Futuro	\$100,000
DC	University of the District of Columbia	Partnership for a Sustainable Space Science Program	\$240,000
DC	University of the District of Columbia	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	\$100,000
FL	Bethune-Cookman College	Education Resource Center	\$410,000
FL	Bethune-Cookman College	Pre-service Teacher Institute	\$40,000
FL	Bethune-Cookman College	The Center for Space Education	\$68,000
GA	Albany State University	Science, Engineering, Mathematics, and Aerospace Academy	\$250,000
MD	Coppin State University	Inspiring the Eagles: Strengthening Coppin State's Capacity in Geography and Geospatial Sciences	\$191,723
MD	Morgan State University	Science, Engineering, Mathematics, and Aerospace Academy	\$93,750
MD	University of Maryland Eastern Shore	Airborne Science Training Initiative (ASTI) Project	\$7,500
MD	University of Maryland Eastern Shore	Small Educational Rocket Initiative (SERI)	\$5,000
MS	Jackson State University	Pre-service Teacher Institute	\$54,481
NC	Fayetteville State University	Pre-service Professional Development Model for Partnership and Change	\$58,130

<b>STATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
NC	Livingstone College	Science, Engineering, Mathematics, and Aerospace Academy	\$93,750
NC	North Carolina A&T State University	Partnership for Research and Education in Space Science	\$249,997
NC	North Carolina A&T State University	Summer Faculty Research Opportunity	\$8,000
OH	Wilberforce University	Science, Engineering, Mathematics, and Aerospace Academy	\$115,420
OK	Coahoma Community College	Mars Public Engagement	\$20,000
OK	Coahoma Community College	Solar System Exploration Forum	\$10,000
SC	South Carolina State University	New Directions in Astronomy and Astrobiology	\$252,000
TN	Fisk University	Fisk Astronomy, Space Science, and Technology (FASST) Program	\$265,000
TN	Tennessee State University	Science, Engineering, Mathematics, and Aerospace Academy	\$125,000
TX	Prairie View A&M University	Pre-service Teacher Institute	\$49,981
TX	Wiley College	Science, Engineering, Mathematics, and Aerospace Academy	\$20,000
VA	Hampton University	Space Science Minor at Hampton University	\$270,000
VA	Hampton University	Continuing Education Aerospace Center	\$300,000
VA	Norfolk State University	Space Science Education and Research at Norfolk State University	\$250,000
<b>TOTAL</b>			<b>\$4,047,232</b>

**AWARDS BY OBJECT CATEGORY****Facilities and Equipment**

There are no competitively awarded grants specifically for facilities and equipment. A small portion of funding is normally permitted under a research or education grant to fund equipment required to support research or education activities. In addition, to the degree that it is available from NASA Centers, HBCUs are able to acquire excess or loaned equipment to support research efforts or scientific teaching.

<b>STATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
GA	Morehouse College	JPL transferred a customized Varian Spectrometer	\$42,115

**AWARDS BY OBJECT CATEGORY****Fellowships, Traineeships, Internships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)**

<b>STATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
AL	Alabama A&M University	Graduate Students Researchers Program (GSRP)	\$48,000
AL	Alabama A&M University	Explorer Systems Summer Research Opportunities	\$36,000
AL	Alabama A&M University	Undergraduate Students Researchers Project	\$5,000
AL	Oakwood College	Minorities in Science and Engineering (MISE)	\$80,000
AL	Tuskegee University	NASA Space Flight and Life Sciences Training Program	\$178,758
FL	Bethune-Cookman College	Explorer Systems Summer Research Opportunities	\$17,500
GA	Albany State University	Project Jumpstart	\$248,000
GA	Morehouse College	Improving Undergraduate Participation in Math, Science, and Technology Research	\$200,000
GA	Spelman College	Internship at Glenn Research Center	\$1,850
MD	Bowie State University	Summer Institute in Engineering and Computer Applications Program (SIECA)	\$150,000
MD	University of Maryland Eastern Shore	NASA University of Maryland Eastern Shore Student Internship Program	\$50,000
MD	University of Maryland Eastern Shore	Airborne Science Training Initiative	\$74,000
MD	University of Maryland Eastern Shore	Summer Faculty Intern	\$17,000
NC	North Carolina A&T State University	NASA Summer Research Opportunity Program	\$13,986

<b>STATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
TN	Fisk University	Explorer Systems Summer Research Opportunities	\$15,500
TN	Tennessee State University	College Bound Program	\$52,120
TN	Tennessee State University	Graduate Students Researchers Program (GSRP)	\$24,000
TN	Tennessee State University	Internship at Glenn Research Center	\$7,350
TN	Tennessee State University	Minority Introduction to Engineering	\$43,000
TX	Texas Southern University	Johnson Space Center Fellowship	\$2,214
WV	West Virginia State University	Upward Bound Program	\$61,110
<b>TOTAL</b>			<b>\$1,325,388</b>

**AWARDS BY OBJECT CATEGORY****Student Tuition Assistance, Scholarships, and Other Aid**

<b>STATE</b>	<b>INSTITUTION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
DC	Howard University	Co-op Education Program	\$34,395
GA	Morehouse College	Strategic Preparedness Advancing Careers in Engineering/Sciences (Project SPACE)	\$310,000
GA	Spelman College	Women in Science and Engineering (WISE) Scholars Program	\$310,000
LA	Southern University and A&M College – Baton Rouge	Co-op Education Program	\$34,395
LA	Xavier University	Co-op Education Program	\$34,395
MS	Jackson State University	Co-op Education Program	\$34,395
TN	Tennessee State University	Undergraduate Scholars Program	\$170,000
TX	Prairie View A&M University	Co-op Education Program	\$34,395
<b>TOTAL</b>			<b>\$961,975</b>

**AWARDS BY OBJECT CATEGORY****Direct Institutional Subsidies**

NASA does not provide direct institutional subsidies.

**AWARDS BY OBJECT CATEGORY****Third-Party Awards**

<b>INSTITUTION / DESCRIPTION</b>	<b>AWARD</b>
Central Intercollegiate Athletic Association (Scholarship Fund)	\$100,000
NASA Space Grant College and Fellowship Program	\$511,897
United Negro College Fund Special Programs, Inc. - Harriett G. Jenkins Pre-doctoral Fellowship Program	\$750,000
United Negro College Fund Special Programs, Inc. - Curriculum Improvement Partnership Awards (CIPA)	\$300,000
United Negro College Fund Special Programs, Inc. - NASA Administrator's Fellowship Program (NAFP)	\$800,000
<b>TOTAL</b>	<b>\$2,461,897</b>

## AWARDS BY OBJECT CATEGORY

### Private Sector Involvement

<b>ORGANIZATION</b>	<b>DESCRIPTION</b>	<b>AWARD</b>
Diversified Global Resources	NASA Research and Education Support Services (NRESS)	\$248,563
<b>TOTAL</b>		<b>\$248,563</b>

NASA's Office of Education programs, including the Minority University Research and Education Program (MUREP), are supported by NASA Research and Education Support Services (NRESS), a consolidated contract of which Diversified Global Resources is the prime contractor. NRESS' functions include the development and enhancement of an Internet-based electronic management system to support solicitation development, peer review and selection, post award evaluation, and grants/cooperative agreements management with HBCUs and Other Minority Universities. Additionally, NRESS provides technical assistance to HBCUs and ensures that they are familiar with and capable of accessing NASA's programs online, via the electronic management system, to receive announcements of opportunity and to submit proposals, evaluations, and post-award management activities.

**Administrative Infrastructure**

There were no awards funded specifically for Administrative Infrastructure at HBCUs during FY 2006.

**AWARDS BY OBJECT CATEGORY****Other Activities**

There were no awards funded specifically for Other Activities at HBCUs during FY 2006.

## AWARDS AND EXEMPLARY PROJECTS

NASA employs a comprehensive and complementary array of strategies to achieve its established goals for HBCUs. These programmatic initiatives are carried out in close collaboration with the Mission Directorates and NASA Centers. The Mission Directorates and Centers support minority university programs through direct funding, use of their facilities, and commitment of their personnel to serve on Technical Review Committees and assist in other facets of program implementation. As a result of the involvement of the Mission Directorates and NASA Centers in the programs of the Office of Education, numerous students and principal investigators from HBCUs are knowledgeable about and make significant contributions to the aeronautics and space community.

Outreach to HBCUs will continue to be made in collaboration with the Mission Directorates and NASA Centers to ensure that HBCUs are knowledgeable about and responsive to the Agency's strategic plan. The Office of Education will continue to set specific program goals that lead to measurable program outcomes that are consistent with the Agency's investment in HBCUs. Sample awards and exemplary projects are outlined below.

### *University Research Centers (URC)*

The URC awards are collaborative projects conducted in cooperation with the Mission Directorates and the NASA Centers. These awards are designed to achieve a broad-based, competitive aerospace research capability among the Nation's HBCUs that will foster new aerospace science and technology concepts, expand the Nation's base for aerospace research and development, develop mechanisms for increased participation by faculty and students in mainstream research, and increase the number of underrepresented and underserved students (who are U.S. citizens) with advanced degrees in NASA-related fields.

The 12 HBCU URCs achieved the following outcomes in FY 2006:

- Three hundred and ninety-one students from underrepresented minority groups participated in URC research: 285 undergraduate students, 62 masters students, and 64 doctoral students.
- Ninety-three faculty members, 64 research associates, 96 graduate assistants, and 13 postdoctoral researchers conducted NASA-related research at URCs.
- Sixty-one degrees in STEM disciplines were awarded to underrepresented and underserved students as follows: 30 bachelors of science degrees, 26 masters of science degrees, and five doctoral degrees.
- Two hundred and five refereed papers and/or book chapters were published or accepted for publication, including 129 with at least one student author.
- One hundred and ninety-eight technical presentations, 166 of which included at least one student presenter.
- Three patents are pending and one patent has been issued.
- Five new courses in STEM were developed.
- Thirty-six research partnerships were developed.

The statistics indicated above were reported by the following HBCU URC institutions: (1) Alabama Agricultural and Mechanical University, (2) Clark Atlanta University, (3) Fisk University, (4) Hampton University, (5) Howard University, (6) Morgan State University, (7) Norfolk State University, (8) North Carolina Agricultural and Technical State University, (9) Prairie View Agricultural & Mechanical University, (10) Southern University and Agricultural and Mechanical College at Baton Rouge, (11) Texas Southern University, and (12) Tuskegee University.

### **An Exemplary URC**

#### **Southern University and Agricultural and Mechanical College at Baton Rouge**

##### **Center for Coastal Zone Assessment and Remote Sensing**

#### **PROGRAM DESCRIPTION**

Southern University's Center for Coastal Zone Assessment and Remote Sensing (CCZARS) focuses on research in Earth Science Applications. CCZARS supports the Earth Science Applications at the Stennis Space Center. The goal of CCZARS is to enhance research and training capabilities in areas that have great potential for impacting the economic development of the State of Louisiana. CCZARS provides among other things:

1. Remote Sensing Applications and Training.
2. Geographical Information Systems(GIS)/Global Positioning System (GPS) data collection and warehousing.
3. Coastal Education Outreach Program.
4. Coastal and Marine Fisheries Resource Evaluation.
5. Undergraduate and Graduate Research Experiences.

The Center focuses on four primary areas including:

1. Fisheries Habitat Assessment - CCZARS conducts studies that assist in the assessment of the wetlands and other environmental habitats of the Gulf of Mexico that are essential to the development and healthy maintenance of its fisheries. This research supports early detection of the decline of habitat conditions prior to their loss to enable better management of the Gulf of Mexico's environmental habitat.
2. Coastal Change-CCZARS studies in this area focus on the complex interactions among climate changes, coastal natural disturbances, and human activities. Research activities in this area include: conducting remote sensing and spatial and temporal studies/assessments that provide information regarding the Gulf of Mexico's coastal zone habitat changes, water quality, vegetation distribution and composition, and wildlife habitat composition. The center also performs studies to determine the Gulf of Mexico's assets at risk and their damage estimation and also monitors the coastal change in the Gulf of Mexico region as it occurs.
3. Land Use/Land Cover Change - This research thrust supports a number of change detection and land-use/land-cover classification in the various regions along the Louisiana Gulf Coast using remote sensing, GIS and GPS technology. Noting that Louisiana's coast currently loses

approximately 23 square miles of coastal marsh per year, this thrust provides data that offer insight to support the restoration of this American asset.

4. Urban Sprawl Affect on Environment - CCZARS conducts analysis of how urban sprawl has impacted local/regional growth and environmental health. The information provided through this analysis gives the Center the opportunity to assist local/regional/national governments in planning efforts to respond to and manage urban sprawl and to assist in the development of more sustainable/habitable urban environments.

The CCZARS' projects provide ongoing, comprehensive studies and partnerships between research institutions, government, and industry to effectively support the Center's goals.

#### **PROGRAM RELEVANCE TO NASA**

NASA is the leading Federal agency charged with generating remote sensing information, which can be used to support local, regional, and global needs, such as Coastal Zone assessment needs. This linkage between NASA and the CCZARS' URC serves NASA by providing studies that local communities and the Nation can use to solve their environmental concerns. Because NASA supports the Earth Sciences as part of its mission, and since the CCZARS' mission falls directly within it, CCZARS helps NASA to fulfill its responsibility to the American people who are affected by coastal erosion, including civilians, private businesses, and other governmental agencies. Without this research linkage, it would be difficult for NASA to disseminate its helping influence at the grassroots level.

#### **PROGRAM BENEFITS TO SOCIETY**

The CCZARS further assists NASA and coastal states as they continue to address the initiatives set forth in the Coastal Wetlands Planning, Protection and Restoration Act [P.L. 101-646 (1990)] and the Coastal Impact Assistance Program, as well as issues addressed in possible future legislative actions. The CCZARS is also assisting NASA and other federal agencies in addressing the initiatives set forth in other legislative mandates such as the Coastal Zone Management Act 1972, the Endangered Species Act, the Federal Sustainable Fisheries Act/Magnuson-Stevens Fisheries Management and Conservation Act (SFA/MS-FCMA), the Coastal Barrier Resources Act (CBRA), the Coastal Barrier Improvement Act of 1990 (CBIA), the Clean Water Act (Sections 319 & 404), the Water Resources and Development Act (WRDA), the Farm Bill, the Conservation and Endangered Species Act, the Federal Noxious Weed Act, the National Environmental Protection Act, and the Marine Mammal Act. The CCZARS engages other state and Federal institutions and programs in its research activities.

With a service institution such as the CCZARS in place, the Gulf of Mexico is aided in its struggle to obtain assistance in the preservation of its coastal wetlands, while maintaining a unique balance with commerce. Through education, training, and outreach, the project also helps to support health, safety, and environmental issues in other coastal areas across the United States.

#### **PROGRAM ACCOMPLISHMENTS**

CCZARS accomplishments include the following:

1. Development of Certified Training Facility for GIS and mapping software training.
2. Development of two Ph.D. courses for the Urban Forestry Ph.D. program.
3. Establishment of campus-wide, state-of-the art CCZARS GIS laboratory.
4. Development of GIS lab for the Urban Forestry Ph.D. program.
5. Provision of GIS services for Southern University.

6. Contribution by participation of collaborating Principal Investigator as the Commissioner and Member of Louisiana Groundwater Commission and Task force.
7. Conducting six GIS training workshops for Louisiana Teachers.
8. Conducting three training workshops for Louisiana school children.
9. Publication and presentation of research papers.
10. Graduating three CCZARS undergraduate scholars.
11. Graduating two CCZARS Masters of Science students.
12. Training 20 students in GIS and research skills.
13. CCZARS scholar winning first place in poster competition at the University of Arizona.

### **Curriculum Improvement Partnership Award (CIPA)**

The CIPA program funds innovative advances in the instructional areas of STEM. Jointly administered by NASA and the United Negro College Fund Special Programs Corporation (UNCFSP), CIPA assists minority colleges and universities in creating STEM programs that elevate institutional prestige and attract and prepare future generations of students for successful careers in the fields of science and technology.

Since its launch in 1999, CIPA has contributed more than ten million dollars to innovative programs at minority institutions. Thirty-seven institutions are now on the CIPA honor roll. They represent a broad range of two- and four-year institutions, serving underrepresented and underserved students engaged in various fields of training and study. Together, these institutions are advancing the educational excellence that will lead to a new era of innovation and discovery.

CIPA's mandate is to increase the quantity and quality of STEM curricula at minority institutions. CIPA also sets ambitious goals to bolster the number of minority students at the pre-collegiate and collegiate levels who study these disciplines and pursue careers in NASA-related fields.

CIPA grantees receive up to \$300,000 over a three-year period. Recipients must demonstrate a significant impact on their institution's long-range development plans, must focus on the creation or improvement of NASA-related disciplines or areas of study, and must generate an increase in the number of NASA-related academic or technical degrees.

The six HBCUs participating in the CIPA program achieved the following outcomes in FY 2005-2006 and the summer of 2006:

- Implemented 25 curriculum-development initiatives and created thirteen new course offerings.
- Registered 685 students who completed one or more of the new course offerings.

### **An Exemplary CIPA**

#### **Denmark Technical College/NASA Robotics Center**

##### **PROGRAM DESCRIPTION**

The Division of Industrial and Related Technology offers associate degrees in Electromechanical Engineering Technology, and Electronics Technology and certificates in Building Construction, Computer Repair and Servicing, Machine Tool, Welding, and Plumbing. CIPA has helped Denmark Technical College to design and implement an educational Robotic Center into its

industrial curriculum. The curriculum focuses on the use of robots in manufacturing processes and provides instruction and hands-on experiences in robotic hand controls, computer controls, and sensor-based controls. The four different modules to train students and individuals from industry include:

1. Robotic Welding – In this module, robots are programmed to select and pick up the materials, position them, and create the weld.
2. Automated Manufacturing – Students design and program robots to perform various tasks including sorting objects by shape and performing various pick and place operations.
3. ROBOLAB – This new hands-on training module uses the LEGO Mindstorm robots and software to facilitate basic programming and control of robots.
4. The Autonomous Robot (ER-1) Lab - This module provides hands-on programming for robots to perform a number of autonomous operations using infra-red sensors and a robotic camera.

As a result of the success of the Robotic Center, the Computer Technology program has implemented robotic programming concepts into its curricula using various computer programming languages.

#### **PROGRAM RELEVANCE TO NASA**

The NASA CIPA project provides hands-on experience on robots and robotic controls, such as programming robotic arms and autonomous vehicles. The acquired experiences give students a better understanding of the challenges of NASA missions. The experiences also strongly impact students' interest in science and math resulting in more graduates opting to pursue higher degrees.

#### **PROGRAM BENEFITS TO SOCIETY**

The Robotics Center enhances the curricular offerings at the college and increases the pool of highly qualified technicians available to the state's manufacturing sectors. The Robotics Center has created new opportunities for the college, the educational community, industry, and the state. Denmark Technical College hosts a high school career day on its campus for about 300-400 high school seniors annually. Robotics awareness program has been added to the career day activities.

#### **PROGRAM GOALS**

The primary goal of the robotics center is to provide support for the experimental and theoretical learning in the design, control, and application of robots. The objective is to prepare students with the skills and competencies to meet the demand of a technologically dynamic, competitive workplace as well as the academic foundation to help them meet college challenges.

#### **PROGRAM ACCOMPLISHMENTS**

- Robotics concept implemented successfully to support curriculum.
- Created interest in other division to revise course syllabi.
- Increased number of graduates.
- Increased number of graduates opting for higher degrees in mathematics and science related fields.

#### **STUDENT ACCOMPLISHMENTS**

Curriculum revision and implementation of robotics have:

- Enhanced critical thinking and problem solving skills.
- Enhanced programming logic and design concepts.
- Improved project collaboration and team work.

### **Minority University and College Education and Research Partnership Initiative (MUCERPI) in Space Science**

MUCERPI represents a critical step by NASA to broaden the participation of underrepresented groups and minority institutions in NASA research programs and missions and to encourage and foster the development of linkages among the NASA Science Mission Directorate, the space science research community, and minority institutions through the establishment of exchange programs and long-term partnerships. MUCERPI awards support programs in one of two broad categories: Academic Program Development or Faculty/Student Professional Enhancement and Development through Partnerships and Exchange Programs. The capabilities developed under this initiative may include research, undergraduate or graduate courses or degree programs, pre-college or public outreach programs, and/or teacher training in space science.

Five HBCUs, first funded in FY 2001 under this initiative, were awarded three-year renewals in FY 2005. These institutions were Alabama A&M University, Hampton University, Norfolk State University, South Carolina State University, and Southern University and A&M College. New FY 2004 HBCU awardees were Fisk University, North Carolina A&T State University, and the University of the District of Columbia.

The most significant MUCERPI outcome for FY 2006 was that the MUCERPI awards resulted in 11 new academic courses relevant to space science.

### **An Exemplary MUCERPI Project**

#### **Hampton University**

#### **A Space Science Curriculum at Hampton University**

##### **PROGRAM DESCRIPTION**

This project has three specific objectives: (1) To implement a sustainable curriculum in space sciences at Hampton University that includes a minor in Space, Earth, and Atmospheric Science. (2) To develop faculty research that supports the space sciences curriculum and provides student research opportunities. (3) To expand the outreach program to K-12 students and teachers, community colleges, and the general public.

##### **PROGRAM RELEVANCE TO NASA**

This program provides training and education that prepares minority students for careers in Space, Earth, and Atmospheric Science with NASA, industry, and education. The program projects NASA achievements and goals to students, teachers, and the public, with particular focus on underserved minority groups. Additionally, the program develops NASA-related research programs, thereby increasing the pool of minority scientists participating in NASA research programs.

## **PROGRAM BENEFITS TO SOCIETY**

By providing training, the program will enhance the development of a pool of trained, underrepresented minorities in geosciences and planetary sciences where minorities are currently underrepresented. As minority participation in the geosciences grows, the scientific community benefits from new and innovative approaches promoted by a greater diversity of participants.

## **PROGRAM GOALS**

- To provide education and training that will prepare minority students for careers and additional studies in space and terrestrial sciences.
- To develop NASA-related research programs and increase participation of underrepresented minority faculty and students in the programs.
- To inspire K-12 minority students, teachers, and the public with information on NASA programs and achievements.

## **PROGRAM ACCOMPLISHMENTS**

A new Department of Atmospheric and Planetary Sciences was approved at Hampton University as a result of the MUCERPI grant that provides support for instruction in astronomy, weather, and climate. Enrollment in these courses has grown from a total of five students in fall 2004, to 136 students in spring 2007. Additionally, a new graduate curriculum leading to an M.S. and Ph.D. was approved in the Department of Atmospheric and Planetary Sciences.

### **An Exemplary Project**

#### **Harriett G. Jenkins Pre-doctoral Fellowship Program (JFPF)**

### **PROGRAM DESCRIPTION**

The JFPF launches the careers of aspiring scientists, mathematicians, and engineers. Since the program's inception in 2000, the JFPF has opened new worlds of opportunity to tomorrow's scientific pioneers. The JFPF is jointly administered by NASA and the UNCFSP through a NASA Cooperative Agreement and was developed with a mission to increase the number of underrepresented persons with masters and doctoral degrees in STEM disciplines in the NASA pipeline, and ultimately, in our Nation's STEM workforce.

### **PROGRAM RELEVANCE TO NASA**

With NASA and other Federal agencies continuing to be concerned by a rapidly aging workforce, the JFPF addresses NASA's priorities and needs by producing vital resources in the form of human capital. As the JFPF continues, nearly 150 underrepresented STEM graduates will access the NASA-related workforce pipeline.

### **PROGRAM BENEFITS TO SOCIETY**

Recent studies by the National Center for Education Statistics show that master's degrees awarded to African-American (5.37 percent), Hispanic (3.29 percent), and Native American (0.39 percent) students and the number of doctoral degrees awarded to African-American (2.36 percent), Hispanic (2.14 percent), and Native American (.23 percent) students continue to be alarmingly disproportionate in the STEM disciplines (*Digest of Education Statistics 2002, 2003, U.S. Department of Education, National Center for Education Statistics, <http://nces.ed.gov/programs/digest/d03/tables/dt271.asp>, February 17, 2005*). The JFPF successfully addresses the need for supporting, mentoring, coaching, and nurturing students

during their graduate school experience resulting in 34 fellows receiving a masters degree and 11 fellows completing doctoral degrees in STEM disciplines.

### **PROGRAM GOALS**

The program has four main goals:

1. To develop U.S. science, technology, and engineering expertise in ethnic and gender groups that are currently underrepresented in the STEM workforce, including those with disabilities.
2. To offset financial barriers for students underrepresented in STEM fields pursuing a graduate education.
3. To provide hands-on research experiences at NASA Centers.
4. To expose students to the salient aspects of professional and career development.

### **PROGRAM ACCOMPLISHMENTS**

JFPF continues to be successful in meeting or exceeding program goals and achieved the following accomplishments during FY 2006:

1. Sixteen JFPF fellows received a NASA Research Award in 2006.
2. Three JFPF fellows have participated in a NASA internship. Two of these fellows are associated with an HBCU.
  - a. One JFPF fellow completed an internship in the NASA Science and Technology Institute for Minority Institutions Summer Internship Program (NSTI-MI). He completed a B.S. in Mathematics at Alabama State University.
  - b. One JFPF Fellow completed an internship in the NSTI-MI. He completed a B.S. in General Science at Morehouse College.

### **STUDENT ACCOMPLISHMENTS**

As a result of JFPF support, students were able to achieve the following accomplishments during FY 2006:

1. Four of the eleven JFPF fellows who received Ph.D.s are associated with an HBCU.
  - a. One fellow, who received a Ph.D. from North Carolina State University in Computer Science, also received a M.S. in Computer Science from Clark Atlanta University and a B.S. from Spelman College in Mathematics.
  - b. Another fellow, who completed a Ph.D. and a M.S. in Atmospheric Sciences at Howard University, also attended Grambling State University, receiving a B.S. in Physics.
  - c. Another fellow completed a Ph.D. in Atmospheric Sciences at Howard University, a M.A. in Mathematics Education from Xavier University of Louisiana, and a B.S. in Physics from Dillard University.
  - d. Another fellow completed a Ph.D. and a M.S. in Chemistry from North Carolina State University and a B.S. also in Chemistry at Hampton University.

2. Two of the six fellows who received a Master of Science in 2006 have ties to an HBCU.
  - a. One JFPF fellow earned a B.S. from Alabama State University in Mathematics.
  - b. Another JFPF fellow completed his M.S. in Physics at Fisk University.