

About the Cover:

Kennedy Space Center (KSC): Against a black moonless sky, Space Shuttle Endeavour lights up the night as it blazes into space after an ontime liftoff at 7:49:47 p.m. EST, Saturday, November 23, 2002. The launch is the 19th for Endeavour, and the 112th flight in the Shuttle program. Mission STS-113 is the 16th assembly flight to the International Space Station, carrying another structure for the Station, the P1 integrated truss. Also onboard are the Expedition 6 crew, who will replace Expedition 5. Endeavour is scheduled to land at KSC after an 11-day journey. (Photo by Scott Andrews)

Photo Inset:

JOHNSON SPACE CENTER, HOUSTON, TEXAS -- (JSC2000-E-21740) Official portrait of astronaut John B. Herrington, mission specialist. Astronaut Herrington is the first Tribally Enrolled Native American astronaut to fly in space and the first Native American to perform a space walk.

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
FISCAL YEAR 2001 ANNUAL PERFORMANCE REPORT
TO THE WHITE HOUSE INITIATIVE OFFICE ON
TRIBAL COLLEGES AND UNIVERSITIES**

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EXECUTIVE SUMMARY

The Fiscal Year (FY) 2001 Performance Report to the White House Initiative Office on Tribal Colleges and Universities (TCU) is the National Aeronautics and Space Administration's (NASA) response to Executive Order 13270, Tribal Colleges and Universities, signed by President George W. Bush on July 3, 2002. It includes fiscal data on all NASA projects that are designed to provide support to Tribal Colleges and to increase educational opportunities for Native American students. NASA's commitment to supporting TCU's dates back to the early 1990's with a summer institute at Diné College. Shortly thereafter, several precollege outreach and undergraduate student support projects were initiated at Northwest Indian College, Turtle Mountain Community College, and D-Q University.

Since the first performance report in 1998 to the White House Initiative Office on TCU's, NASA's TCU initiative has grown from \$2,306,000 to \$4,731,824 in FY 2001.

It is the mission of the NASA Minority University Research and Education Programs (MUREP) to integrate support of TCU's with NASA's Strategic Enterprises. To this end, all of the TCU projects reported herein incorporate NASA's mission themes, make use of NASA-driven technologies, emphasize partnerships with the NASA Centers, and/or support TCU efforts to strengthen and expand their institutions' Mathematics, Science, Engineering, and Technology (MSET) educational opportunities.

In FY 2001, NASA created a new initiative with the American Indian Higher Education Consortium (AIHEC) through a grant entitled, "Building Bridges to Excellence in Mathematics, Science, Engineering and Technology." The purpose of the AIHEC-NASA partnership is to outreach to all 32 TCU's to strengthen NASA-sponsored MSET programs, and to increase opportunities for TCU's to build infrastructure and participate in and benefit from NASA and other Federal agencies' research and education programs.

NASA looks forward to continued collaboration with TCU's and all of its partners to promote educational excellence for Native Americans.

SUMMARY OF AGENCY AWARDS TO TRIBAL COLLEGES AND UNIVERSITIES BY CATEGORY: FY 2001

Agency: National Aeronautics and Space Administration

1. Agency Representative: Adena Williams Loston _____ (Signature)
Associate Administrator
for Education
2. Total Funds for Institutions of Higher Education (IHE): **\$1,118,241,050**
3. Total Funds for Tribal Colleges and Universities: **\$ 4,731,824**

DISCRETIONARY AWARDS

CATEGORY	AWARDS TO IHE's	AWARDS TO TCU's	AWARDS TO TCU's AS % OF TOTAL AWARDS TO IHE's
Research & Development	\$942,505,966	\$569,400	0.06%
Program Evaluation			
Training	\$36,654,017	\$605,381	1.65%
Facilities and Equipment	\$15,149,691		
Fellowships, Internships, Traineeships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)			
Student Tuition Assistance, Scholarships, and Other Aid			
Third-Party Awards		\$2,645,043	
Private-Sector Involvement		\$912,000	
Other	\$123,931,376		
TOTAL	<u>\$1,118,241,050</u>	<u>\$4,731,824</u>	<u>0.42%</u>

Sean O'Keefe
Administrator

(Signature)

**DISCRETIONARY AND LEGISLATED AWARDS TO TRIBAL COLLEGES
AND UNIVERSITIES IN FY 2001**

	<i>Institutions of Higher Education</i>		<i>Tribal Colleges and Universities</i>
DISCRETIONARY AWARDS:	\$1,118,241,050		\$4,731,824
LEGISLATED AWARDS:	\$0		\$0
TOTAL AWARD:	\$1,118,241,050		\$4,731,824

FY 2001 SUMMARY OF NASA AWARDS TO TCU's BY INSTITUTION

STATE	AWARDS TO TRIBAL COLLEGES	R & D	TRAINING	TPA	PSI	TOTAL
Arizona	Dine College	\$218,000	\$136,900	\$4,504		\$359,404
Kansas	Haskell Indian Nations University			\$14,250		\$14,250
Minnesota	Fond du Lac Tribal and Community College			\$2,000		\$2,000
Montana	Salish Kootenai College	\$153,646	\$266,981			\$420,627
Montana	Blackfeet Community College			\$34,776		\$34,776
Nebraska	Little Priest Tribal College			\$750		\$750
Nebraska	Nebraska Indian Community College			\$750		\$750
New Mexico	Southwestern Indian Polytechnic Institute		\$160,000	\$25,000		\$185,000
South Dakota	Oglala Lakota College		\$41,500			\$41,500
Washington	Northwest Indian College	\$97,754		\$15,000		\$112,754
Wisconsin	Lac Courte Oreilles Ojibwa Community College	\$100,000				\$100,000
	Tribal College Total	\$569,400	\$605,381	\$97,030		\$1,271,811
CENTER	AWARDS TO OTHER INSTITUTIONS					
KSC	All Points Logistics, Inc.				\$375,000	\$375,000
GSFC	American Indian Higher Education Consortium			\$1,197,159		\$1,197,159
JSC	College of Santa Fe			\$100,000		\$100,000
GSFC	EduTech Limited				\$217,000	\$217,000
HQ	Global Science and Technology				\$320,000	\$500,000
JSC	Las Cruces Community Unidad Park			\$10,000		\$10,000
HQ	Support for 9 Native American graduates and undergraduates			\$129,000		\$129,000
GRC	National Action Council for Minorities in Engineering			\$34,000		\$34,000
GSFC	National Association for Equal Opportunity in Higher Education			\$365,440		\$365,440
JSC	Ruidoso Center of Eastern New Mexico University			\$25,000		\$25,000
JSC	Sierra Middle School			\$25,000		\$25,000
GSFC	Society for the Advancement of Chicanos and Native Americans in Science and Engineering			\$50,000		\$50,000
GSFC	United Negro College Fund Special Programs Corporation			\$314,334		\$314,334
LaRC	University of Cincinnati			\$120,000		\$120,000
JPL	Wapato Indian Reservation			\$28,080		\$28,080
JPL	World Hope Foundation			\$150,000		\$150,000
	Other Institutions Total			\$2,548,013	\$912,000	\$3,640,013
	GRAND TOTAL	\$569,400	\$605,381	\$2,645,043	\$912,000	\$4,731,824

See Appendix B for Acronyms

FY 2001 SUMMARY OF AGENCY AWARDS TO TCU's BY NASA CENTER AND ENTERPRISE

NASA CENTER	OAT	OE	OES	OHRE	OSF	OSS	GRAND TOTAL
GRC	\$120,000	\$184,000					\$304,000
GSFC		\$2,120,238	\$154,129	\$105,595		\$607,852	\$2,987,814
HQ		\$364,000		\$201,030			\$565,030
JPL						\$178,080	\$178,080
JSC		\$245,360					\$245,360
KSC					\$375,000		\$375,000
SSC		\$76,540					\$76,540
GRAND TOTAL	\$120,000	\$2,990,138	\$154,129	\$306,625	\$375,000	\$778,652	\$4,731,824

See Appendix B for Acronyms

FY 2001 PERFORMANCE

In FY 2001, NASA provided \$4.7 million, the most funding ever awarded in support of TCU's. Included in this amount was \$1.4 million in direct awards to six Tribal Colleges and \$3.3 million in awards to all 32 TCU's through third parties. The direct funding to TCU's was comprised of seven education and training awards to four TCU's and five research and development awards to four TCU's. Through NASA awards, many TCU's developed significant outreach programs for encouraging and assisting Native American students in pursuing education and careers in science, mathematics, engineering, and technology fields.

A major new initiative in FY 2001 reached all 32 TCU's through a Cooperative Agreement between NASA and the American Indian Higher Education Consortium (AIHEC) to enhance NASA-related math and science infrastructure and programs at the TCU's.

For FY 2001, NASA accomplished each of the four goals established in support of TCU's:

GOAL 1: Focus attention on identifying and removing barriers to TCU participation in areas designated by the White House Initiative Office on TCU's (WHITCU) as the top priorities for Federal Agencies' support in the areas of technology, science, and mathematics.

OUTCOME: One of the barriers identified by WHITCU was the digital divide or lack of technology infrastructure at TCU's. To address this barrier, WHITCU established the "Circle of Prosperity, A vision for the Technological Future of Tribal Colleges and American Indians," as a way to develop a plan for TCU's to use information technology. WHITCU invited industry and government partners to work with the TCU's. NASA Ames Research Center technical staff participated in the development of the plan for TCU's to strengthen mathematics, science and technology infrastructure at the Tribal Colleges.

Another barrier NASA identified and eliminated was the requirement that proposals for MUREP solicitations be submitted by tenure-track Principal Investigators. This had the effect of eliminating Tribal Colleges, since most TCU's did not have a tenure track. The result was the first NASA Faculty Award for Research (FAR) grant awarded in FY 2001 to Salish Kootenai College for the project, "Relativistic Dissipative Fluid Theories of Neutron Stars," described further in this report.

GOAL 2: Expand outreach activities to improve the relationships between TCU's and NASA, coupled with systematic modification of existing NASA programs, with particular attention paid to activities designed to increase familiarity of TCU's with NASA.

OUTCOME: This goal has been achieved as the NASA Centers have outreached to Native American communities and Tribal Colleges to expand NASA's knowledge of Native American programs and to bring NASA mathematics, science and technology to Tribal Colleges and Native American students. Programs accomplishing this goal are listed below. Other programs towards this goal are described under "NASA Center Involvement."

NASA Glenn Research Center created a partnership with Leech Lake Tribal College and the University of Cincinnati for a course entitled, "Fundamentals of Remote Sensing" to be taught from the University of Cincinnati via a televideo conferencing facility to the Leech Lake Geographical Information System (GIS) Laboratory in Cass Lake, Minnesota. As part of the collaboration, the Native American Remote Sensing, Inc. and the Water Resources Office at the Leech Lake Reservation will develop a custom GIS

with five applications: increase the wild rice harvest, maple syrup tapping, fish and wildlife management, water resource management, and digitizing maps for reservation boundaries.

The Jet Propulsion Laboratory (JPL), in collaboration with the World Hope Foundation and the Space Science Institute, hosted a "Making Relations Symposium" with Diné and Lakota community leaders. In 10 major Native American community events, JPL-supported programs reached 250 college students, 1,300 K-12 students, 500 teachers and over 1,000 Native American community members. JPL also hosted 3 Native American college students as summer interns.

NASA Ames Research Center hosted three Native American scholars at the 10-week summer experience program for undergraduates, marking the first successful efforts to attract Native American students to Ames through a NASA-sponsored scholarship program. Ames staff participated in the Native American Science Bowl- Far Western Region, planning activities for 50 teams of Native American high school students competing for berths into the National Science Bowl. Ames also hosted a 2-week teacher workshop for twenty-five educators from rural settings who teach students of Native American heritage. This workshop reaches educators who would not typically hear of, compete for, or be selected for other NASA programs. At the conclusion of the workshop, attendees serve as leaders in their educational communities to use NASA's content to enrich their curricula and help bring about systemic improvement in the teaching of mathematics, science, technology and geography.

NASA Headquarters Staff from and the Centers chaired job workshops at the 2001 American Indian Science and Engineering Society National Conference to recruit Native American students for cooperative and internship programs.

In FY 2001, NASA Headquarters staff conducted Technical Assistance Workshops for TCU's to discuss research and educational opportunities and how to write winning proposals. As a result, one attending TCU, Diné College, submitted a proposal and was awarded a grant.

GOAL 3: Work with the Minority University-Space Interdisciplinary Network (MU-SPIN) and other NASA computer and network technology programs to explore avenues for assisting TCU's with their goal of bringing Internet resources to TCU campuses and to train TCU faculty, staff, and students in their usage. NASA TCU programs will explore the possibility of involving TCU's in NASA technology transfer efforts.

OUTCOME: The following shows a successful example of NASA and several entities collaborating to benefit from the NASA Technology Transfer Program. In FY 2001, NASA's American Indian Science and Education Consortium (AISTEC) collaborated with the Johnson Space Center Technology Transfer Office to obtain a license on NASA technology that absorbs and neutralizes small spills of hydrazine. Subsequently, AISTEC learned about the capabilities of Assiniboine and Sioux Tribal Industries on the Fort Peck Reservation that has the capability of fabricating the container for the hydrazine kit.

GOAL 4: Increase the amount of funding in support of TCU's by \$0.2 million per year, so that during the 5-year period from FY 1998 to FY 2003, the amount of funding will increase by \$1 million over the FY 1998 baseline of \$2.3 million.

OUTCOME: The following table shows that overall NASA funding for TCU's has steadily increased far beyond the original plan of a \$0.2 million increase per year. NASA's goal was to increase funding in support of TCU's by \$1 million over 5 years, but actual awards have increased by \$2.4 million in only 3 years.

Awards to TCU's (\$M)	FY 1998 Actual	FY 1999 Planned	FY 1999 Actual	FY 2000 Planned	FY 2000 Actual	FY 2001 Planned	FY 2001 Actual	FY 2002 Planned
Total Awards	\$2.3	2.5	\$2.9	2.7	\$3.4	2.9	\$4.7	\$3.1

Although awards to the Tribal Colleges through AIHEC provide an efficient avenue for reaching all the Tribal Colleges, direct funding to the TCU's continues to be a NASA objective.

AWARDS BY CATEGORY

RESEARCH AND DEVELOPMENT

Research and Development (R&D) includes all direct, indirect, incidental, or related costs resulting from or necessary to R&D performance by private individuals and organizations under grant, contract, or cooperative agreement. Demonstration projects designed to test or prove whether a technology or method is, in fact, workable are considered to be within the scope of R&D if they are designed to produce new information and are accomplished within a given time period.

STATE	INSTITUTION	DESCRIPTION	AWARD
AZ	Diné College	Internet-Based Education and Research with Robotic Telescopes for Native American and Hispanic Students	\$218,000
MT	Salish Kootenai College	Earth System Science Student Research Experiences at Salish Kootenai College	\$105,595
MT	Salish Kootenai College	Relativistic Dissipative Fluid Theories of Neutron Stars	\$48,051
WA	Northwest Indian College	Assessing Agricultural Land Conversion Impacts to Tribal Fisheries Using NASA Satellite Imagery	\$97,754
WI	Lac Courte Oreilles Ojibwa Community College	Renewable Energy and Sustainable Development Institute Project	\$100,000
RESEARCH AND DEVELOPMENT TOTAL			\$569,400

AWARDS BY CATEGORY

TRAINING

Training grants at NASA include those programs that are directed primarily toward the development and maintenance of scientific and technical staffpower.

STATE	INSTITUTION	DESCRIPTION	AWARD
AZ	Diné College	Expanding the Pool of GIS Professionals for the Navajo Nation	\$76,540
AZ	Diné College	Science Enrichment Activities	\$60,360
MT	Salish Kootenai College	NASA Native Earth Systems Science Curriculum Project (NESCP)	\$154,129
MT	Salish Kootenai College	Northern Rocky Mountain Tribal Pathway to Academic Excellence Program	\$100,000
MT	Salish Kootenai College	Astronomy and Astrophysics Course Development at Salish Kootenai College	\$12,852
NM	Southwestern Indian Polytechnic Institute	Stars on Earth, Providing Underrepresented New Mexico High School Students with Research Experience	\$160,000
SD	Oglala Lakota College	NASA/Oglala Lakota College Summer Institute and Research Institute. NASA Honors Supplemental Success	\$41,500
TRAINING TOTAL			\$605,381

AWARDS BY CATEGORY

FELLOWSHIPS, INTERNSHIPS, TRAINEESHIPS, RECRUITMENT, AND ARRANGEMENTS UNDER THE INTERGOVERNMENTAL PERSONNEL ACT (IPA)

DESCRIPTION	AWARD
Graduate Student Researchers Program (GSRP)	\$44,000
FELLOWSHIPS TOTAL	\$44,000

STUDENT TUITION ASSISTANCE, SCHOLARSHIPS, AND OTHER AID

CENTER	INSTITUTION	DESCRIPTION	AWARD
HQ	National Action Council for Minorities in Engineering	NASA USAR Scholarship Program	\$85,000
SCHOLARSHIPS TOTAL			\$85,000

AWARDS BY CATEGORY

THIRD-PARTY AWARDS

Third-Party awards are made to non-Native American-serving colleges, universities, non-profit organizations and companies to use for outreach programs to Native American-serving colleges and universities or to Native American students.

CENTER	INSTITUTION	DESCRIPTION	AWARD
GSFC	American Indian Higher Education Consortium	Building Bridges to Excellence in Mathematics, Science, Engineering, and Technology for NASA Outreach to all the Tribal Colleges	\$1,197,159
HQ	Blackfeet Community College	Space Grant Award	\$34,776
JSC	College of Santa Fe	Mobile Science Project PACE/MSET for the Pueblos in New Mexico	\$100,000
HQ	Diné College	Space Grant Award	\$4,504
HQ	Fond du Lac Community College	Space Grant Award	\$2,000
HQ	Haskell Indian Nations University	Space Grant Award	\$14,250
JSC	Las Cruces Community College	Space Shuttle Rocket in Unidad Park for Native American and Hispanic Students	\$10,000
HQ	Little Priest Tribal College	Space Grant Award	\$750
GRC	National Action Council for Minorities in Engineering	NASA Undergraduate Scholars Awards for Research (USAR) Program – for Native American Students at D-Q University and other non-TCU's.	\$34,000
GSFC	National Association for Equal Opportunity in Higher Education	For the Participation of all TCU's in the NASA Research Park at Ames Research Center	\$365,440
HQ	Nebraska Indian Community College	Space Grant Award	\$750
HQ	Northwest Indian College	Space Grant Award	\$15,000
JSC	Ruidoso Center of Eastern New Mexico University	Summer SMET Camp for Rural Minorities and Girls including students from the Mescalero Apache-Reservation	\$25,000
JSC	Sierra Middle School	Magnet School SciAid Program of Mathematics and Science Serving Native American and Hispanic Students in the Las Cruces, NM School District	\$25,000
GRC	Society for the Advancement of Chicanos and Native Americans in Science and Engineering	NASA K-12 Teacher Workshop for Native American and Hispanic Teachers	\$50,000
JSC	Southwestern Indian Polytechnic Institute (SIPI)	(SIPI) Upward Bound Program	\$25,000
GSFC	United Negro College Fund Special Programs Corporation	Three-Year Effort to Create Innovative Curriculum Improvement Partnership Program for Bay Mills Community College, Keweenaw Bay Ojibwa Community College, Si Tanka College, and Stone Child College	\$314,334
GRC	University of Cincinnati	OhioView Undergraduate Distance Learning Prototype with Leech Lake Tribal College	\$120,000
JPL	Wapato Indian Reservation	JPL Teachers Program at Salish Kootenai	\$28,080
JPL	World Hope Foundation	From the Sun to the Star Nations: Science Programs for Navajo Students	\$150,000
THIRD PARTY AWARDS TOTAL			\$2,516,043

AWARDS BY CATEGORY

PRIVATE-SECTOR INVOLVEMENT

CENTER	INSTITUTION	DESCRIPTION	AWARD
KSC	All Points Logistics, Inc.	Native American owned business providing administrative and clerical support to KSC	\$375,000
GSFC	EduTech Limited	Minority University Program Outreach and Research Support for Tribal Colleges	\$217,000
HQ	Global Science and Technology	NASA Peer Review Services outreach to Minority Universities to Tribal Colleges	\$320,000
PRIVATE-SECTOR INVOLVEMENT TOTAL			\$912,000

AWARDS AND EXEMPLARY PROJECTS

Four different programmatic award categories were established that apply equally to Tribal Colleges and Universities (TCU), Historically Black Colleges and Universities (HBCU) and Hispanic-Serving Institutions (HSI). These programmatic initiatives are carried out in close collaboration with NASA Strategic Enterprises and Centers/JPL with support through direct funding, use of their facilities, and commitment of their personnel to serve on Technical Review Committees (TRC) and assist in other facets of program implementation. As a result of the involvement of the Strategic Enterprises and NASA Centers/JPL in the Minority University Research and Education Programs (MUREP), numerous students, faculty, and Principal Investigators from Minority Institutions (MI) are knowledgeable about and make significant contributions to the Nation's space program.

FACULTY AWARDS FOR RESEARCH

The Faculty Awards for Research (FAR) provide new faculty, and those who have limited NASA experience, the opportunity to integrate the research and education components of their careers with the unique mission requirements of a specific NASA Center/JPL. The FAR program provides merit selection of proposals from outstanding and promising science, engineering, and technology-tenured and tenure-track faculty who are capable of contributing to the Agency's research and education objectives. This award provides faculty members with research support and exposure to the NASA peer review process to enable them to demonstrate creativity, productivity, and future promise in the transition to achieving competitive awards in the Agency's mainstream research processes.

During FY 2002, the FAR program continued funding of one research project at ?

The FAR Awards for TCUs in FY 2002 expanded \$24,000.00. All of these funds were expended in the undergraduate category. The program outcomes were as follows:

- 5 participants, all males
- One non-student investigator serving as a faculty member
- 2 presentations given at peer reviewed national and international conferences of which only one had a student presenter.

A Model FAR Project

Salish Kootenai College

Relativistic Dissipative Fluid Theories of Neutron Stars

Introduction

A physically realistic theory of viscous and thermally conducting relativistic fluids is being applied to neutron stars. The Israel-Stewart fluid theory has many properties required for models of relativistic astrophysical fluid flows: the equilibrium fluid states are stable against perturbations from equilibrium, perturbations propagate causally (with a speed less than light speed), and perturbations obey hyperbolic systems of equations so that a well-posed initial value problem exists. The thermodynamic functions describing the fluid (such as the equation of state and relaxation times) must satisfy a set of constraints for the fluid to be stable, causal, and hyperbolic. The relaxation times ("second-order coefficients") of the Israel-Stewart theory are being calculated for neutron star matter using relativistic kinetic theory. The stability,

causality, and hyperbolicity constraints will be applied to several proposed neutron star equations of state under the conditions of high density found in neutron star interiors. The constrained equations of state will be used to construct neutron star models. The overall expected results of this research include an improved understanding of the nuclear equation of state at high density, tighter theoretical upper limits on neutron star masses, insight on neutron star structure, and substantial research experiences in astrophysics for two Native American students each grant year.

Accomplishments

Salish Kootenai College is continuing to perform the appropriate activities to accomplish the two main objectives of this grant: establishing a theoretical astrophysics research program at Salish Kootenai College, and involving undergraduate Native American students in astrophysical research. For FY2002, the two main accomplishments for the research program are: (1) a new, lower upper bound on the maximum mass of neutron stars was determined using general stability, causality, and hyperbolicity arguments within relativistic kinetic theory; and (2) the effect of three-body repulsive interactions at high density was found to be more important for the high-density nuclear equation of state than previously thought.

Relevance to NASA Strategic Enterprises

A better understanding of the high-density equation of state for compact stars aids in the interpretation of data from several current and future NASA scientific satellites operated by the Office of Space Science. Understanding the physics of neutron stars is a major objective of NASA Office of Space Science Strategic Plan. X-ray emissions from binary systems containing neutron stars are actively studied with NASA space-based telescopes, most notably the Chandra X-ray Observatory. NASA has a future plan to fly LISA, a space based gravitational wave observatory. The NASA Technical Officer for this grant and other collaborators are using Rossi data and the mass limits from the research under this grant to determine the mass, radius, and spin of neutron stars.

Benefits to Society

Support for this research continues to increase the ethnic diversity of space scientists working in the United States by attracting Native Americans to careers in astrophysical research. It is the only tribal college participating in astrophysical research and so is playing a significant role in increasing the levels of access for Native Americans in the field.

Student Achievements

. Four Native American students were recruited and diligently worked as research interns for the second grant year.

MATHEMATICS AND SCIENCE EDUCATION (MSE) AWARDS

MSE awards build upon the institutions' outstanding ability to provide excellence in MSET training while increasing the participation and achievement of socially and economically disadvantaged and/or disabled students in MSET fields at all levels of education. Awards are made in the following three areas: undergraduate and graduate, teacher preparation and enhancement, and precollege activities.

MSE awards contribute to the national education goals by integrating the contents from the NASA mission into the educational outreach projects at MI's. As a result, NASA contributes to the increase in the number and the strengthening of the skills, knowledge, and interest of students and teachers in MSET-based academic programs.

During FY2002, Other MSE Awards expended \$113,531.00 dollars from the Minority gram funds awarded. All of these funds were spent on curriculum development. The program outcomes included:

- no participants
- 9 non-student investigators: 6 were faculty members, and three were research associates/assistants

Each Mathematics, Science, and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP) award recipient receives up to \$200,000 per year for a maximum of 3 years based on performance and availability of funds under the program.

Pre-college Awards offer opportunities for MI's, in collaboration with NASA and local school districts, to provide informal educational opportunities that will enhance the number and percentage of students enrolled in mathematics and science college preparatory courses. As a result of participating in these awards, students will gain awareness of career opportunities in MSET fields and exposure to NASA's mission and scientific and technical personnel role models, and will enter college pursuing NASA-related careers.

The primary purpose of the Pre-college Awards for Excellence (PACE) is to encourage the implementation of innovative projects with collaborative strategies to ultimately increase the pool of talented scientists and researchers in MSET fields. PACE is designed to include any combination of outreach projects such as Saturday Academies, Summer Science Camps, In-School Mathematics and Science Academies, and After-School Enrichment Programs. The program targets hard-to-staff public elementary, middle, and high schools, in which 50 percent or more of the students are disadvantaged and have a large number and/or percentage of uncertified mathematics and science teachers. Salish Kootenai College received continued PACE/MSET funding during FY 2002.

During FY 2002 The PACE Awards spent a total of \$89,450.00 in three of the budget categories, k-8, in-service teachers, and curriculum. K-8 spent the bulk of the funds, 86%, serving a total of 66 students. The program outcomes for 2002 included:

- 66 student participants, 28 males, and 38 females
- 7 non-student investigators who were all faculty members
- 2 presentations
- 10 community oriented partnerships.

A Model PACE/MSET Project

Salish Kootenai College

Northern Rocky Mountain Tribal Pathway to Academic Excellence (NRMT PACE) Program

In partnership with Salish Kootenai College located in Pablo, Montana, and the Nez Perce Tribes Environmental Restoration and Waste Management (ERWM), the NASA Preparation for Academic Excellence Math and Science Camp was hosted at Lewis-Clark State College in Lewiston, Idaho.

Preparation for Academic Excellence is a highly challenging Mathematics and Science Program Camp with the primary goal of preparing students for their first high school algebra course. In addition, the students engaged in daily hands-on science activities and field trips. A total of 74 Native American students were selected to participate based on their academic achievement and interest in both mathematics and science. The total number of students was divided between the two camps. The students in attendance successfully completed the intensive 2-week program.

The goal of Preparation for Academic Excellence is to increase the number of Native American students in mathematics and science high school college preparatory courses by strengthening their mathematics and science skills. Junior high students, currently in regular or honors academic courses, were eligible and the following are the pre- and post-test results and other relevant student data reflecting student program success.

In FY2002, the summer pre-algebra camps were held in Flathead Lake at the Blue Bay Tribal Campground facility for Salish and Kootenai and at Lewiston, Idaho, for Nez Perce. Both camps provided a viable educational experience for grades 7, 8, and 9 that resulted in significant improvements in their understanding of algebra. The demographic information for each camp includes the following:

- a. Flathead Camp – 45 students, 23 females, and 22 males. There were 29 students from the 7th grade and 16 students from the 8th grade. There were 6 different tribal affiliations and 7 school districts represented.
- b. Nez Perce camp – 29 students, 18 females, and 11 males. There were 10 students from the 7th grade, 12 students from the 8th grade and 2 students from the 9th grade. There were 8 different tribal affiliations represented, and 4 school districts.

Salish Kootenai College is pleased with the overall student success of the Summer Preparation for Academic Excellence Program. The following student outcomes for FY2002 are reported:

- a. 100% of the students participating in the two camps showed significant improvement in mathematics and science as measured by pre and post test scores.
- b. 100% of the students completed mathematics and science courses successfully in the year following the camps.
- c. 92 % of the students took and passed Algebra I
- d. 98% of the students participated in cultural presentations and hands-on demonstrations to build self-esteem and ethnic pride.

[The SKC NASA PACE Grant expired March 14, 2003, and the project is presently in a](#)

no-cost extension period which expires on May 14, 2003. The no-cost extension was requested for the following two reasons: 1) lack of NASA PACE Grant opportunities available in the 2002-2003 funding cycle; and 2) the development of an innovative pre algebra curriculum that takes the best of traditional pre algebra instruction and melds it with science modules to be available for wider distribution. To this end, the no-cost extension period is being used to revise this curriculum with more 'as only NASA can' components included.

A Model Undergraduate Mathematics and Science Education Project

TWO MSE PROJECTS:

New Mexico Highlands University - American Indian Science and Technology Education Center(needs expansion)

Salish Kootenai College- NASA Native Earth Systems Science Curriculum Project(NESCP)

PARTNERSHIP AWARDS

Partnership Awards include the Partnership Awards for Innovative and Unique Research and Education Projects (IUREP) and the Partnership Awards for the Integration of Research (PAIR) into MSET Undergraduate Education. These funds were also used to extend the Networks and Research Training Sites (NRTS) awards for 3 additional years. To better measure program outcomes, beginning in FY 2001, the Partnership Awards for IUREP (Research) were offered under the Principal Investigators Award category and the IUREP (Education) under the Mathematics and Science Education Awards category previously described.

The PAIR awards provide opportunities for minority colleges and universities to build upon their NASA-sponsored research across disciplines by creating innovative approaches to interdisciplinary MSET studies.

The Curriculum Improvement Partnership Award Program (CIPA) is a curriculum improvement program for Universities/Minority Institutions . The mission of CIPA is to improve undergraduate mathematics, science, engineering and technology (MSET) curricula. CIPA programs emphasize curricular improvements that directly relate to NASA's mission.

The United Negro College Fund Special Programs (UNCFSP) administers CIPA. Institutions participate in a competitive selection process for a CIPA grant. Institutions selected receive an annual award of up to \$100,000 for a three-year period. A condition of being selected for a CIPA grant is that the institution has received no more than \$100,000 in prior NASA funding. CIPA has three goals:

- Increase the quantity and quality of NASA-related MSET curricula
- Increase the number of minority students at the pre-collegiate and collegiate levels that study MSET curricula
- Increase the number of minority students who choose careers in NASA-related fields

In addition, Partnership Awards have been made in three categories: education, research, and a combination of education and research. This section summarizes the research and education/research Partnership Awards. Research awards are made to cover a wide spectrum of research that is of interest to NASA. Combination awards are made to projects that skillfully combine activities in both the research and education areas.

During FY 2002 the Partnership Award Program expended \$9,305.00 of the allocated Minority Program funds, These monies were expended in one category, undergraduate. He program outcomes included:

- 3 nn-student investigators: one facultymemebr, and 2 research associates/assistants
- 2 presentation given at peer reviewed national and international conferences with each having a student presenter.
- 2 community oriented partnerships developed.

During FY 2002, ?received Partnership Awards.

A Model Research Partnership Project

Recommendation: Dine College Department of Computer Science and Mathematics Dr. Douglas Isley. (pge 291 Vol2)

A Model Education Partnership Project

RECOMMENDATION: DINE COLLEGE - Mathem atics and Science Department Dr. Mark Bauer(VOL2 289)

A Model CIPA Project

Bay Mills Community College

The purpose of the grant is twofold: a) to increase the qualityand quantity of NASA related courses at Bay Mills Community College; and b) to increase the numbers of Native Americans electing to take those courses.. The goals were to make the courses exciting to students, publicize the offerings to the community at large and to K-12 students, and leverage NASA's resources at all times.

The partnerships for the project involved NASA Glenn and NASA Goddard Space Flight Center. In addition, partnerships were formed with universities, projects, satellite information, school districts, and other special initiatives. While two students completed a summer internship at Goddard Space Flight Center, the school began construction on a new science lab to increase offerings to students, demystified science, enable students to live and work with scientists, and started new courses.

Network Resources And Teaining Sites(NRTS)

There were no project in this category at Tribal Colleges and Universities.

NASA ENTERPRISE INVOLVEMENT

AEROSPACE TECHNOLOGY ENTERPRISE

Research and technology play vital roles in ensuring the safety, environmental compatibility, and productivity of the air transportation system and in enhancing the economic health and national security of the Nation. However, numerous factors, including growth in air traffic, increasingly demanding international environmental standards, an aging aircraft fleet, aggressive foreign competition, and launch costs that impede affordable access and utilization of space, represent formidable challenges to the Nation.

The mission of this Enterprise is to pioneer the identification, development, verification, transfer, application, and commercialization of high-payoff aeronautics and space transportation technologies. Through its research and technology accomplishments, it promotes economic growth and national security through a safe, efficient national aviation system and affordable, reliable space transportation.

The Enterprise also has Agency-wide responsibility for technology transfer and commercialization. This function is provided to ensure wide, rapid transfer of NASA-developed technologies to U.S. industry for the social and economic benefit of all U.S. citizens. The Aerospace Technology Enterprise provided funding for a distance-learning project with Leech Lake Tribal College in collaboration with the University of Cincinnati. This distance-learning program is a prototype to provide educational opportunities to remote and underserved communities.

BIOLOGICAL AND PHYSICAL RESEARCH ENTERPRISE

The mission of this Enterprise, formerly the Office of Life and Microgravity Sciences and Applications, is to conduct basic and applied research (including clinical research) to support human exploration of space and to take advantage of the space environment as a laboratory for scientific, technological, and commercial research. The Office oversees the effective use of the International Space Station facilities for scientific, commercial and technology research. The Biological and Physical Research Enterprise did not directly support projects at TCU's but it still plays an important role in TCU's through its collaborations with other NASA Enterprises.

EARTH SCIENCE ENTERPRISE

NASA's Earth Science Enterprise is dedicated to understanding the total Earth system and the effects of natural and human-induced changes on the global environment. The vantage point of space provides information about Earth's land, atmosphere, ice, oceans, and biota that is obtainable in no other way. Programs of the Enterprise study the interactions among these components to advance the new discipline of Earth System Science, with a near-term emphasis on global climate change. These research results contribute to the development of sound environmental policy and economic investment decisions.

NASA's Earth Science Enterprise develops innovative technologies and applications of remote-sensing for solving practical societal problems in food and fiber production, natural hazard mitigation, regional planning, water resources, and national resource management in partnership with other Federal agencies, with industry, and with state and local governments. Earth Science discoveries are shared with the public to enhance science, mathematics, and technology education and increase the scientific and technological literacy of all Americans.

Earth Science combines the excitement of scientific discovery with the reward of practical contribution to the sustainability of planet Earth.

An Exemplary Earth Science Enterprise Project

Salish Kootenai College

NASA Native Earth Systems Science Curriculum Project

Project Overview

The Native Earth Systems Science Curriculum Project (NESCP) seeks to improve the education of Native American K-4 students in Earth systems science. To accomplish this, the project employs two basic strategies. The first is teacher training and curriculum development. The project's main participants are trios consisting of a secondary teacher and an elementary teacher of Native American students, and a Native American elder from each of three Northwestern reservations— the Nez Perce, Colville, and Flathead Reservations. In the training component of the project, participants are trained in the use of constructivist and inquiry-based methodology, educational practices that are deemed appropriate for teaching Native American students. They are further trained in Earth systems science content through on-site visits to NASA Goddard Space Flight Center and use of NASA educational resources.

The second component is based upon curriculum. The curriculum component of the project involves the development of culturally competent K-4 Earth Systems Science lessons by project participants. The lessons also incorporate NASA research and resources. This component melds with the training component as participants, with the aid of workshops and coaching, generate and pilot test 20 K-4 lessons that contain tribally specific content and employ the identified teaching methodologies and content. The result of the project will be a teaching workforce proficient in teaching Earth systems science to Native American students and also proficient in the development of appropriate curricula. In addition, at least 60 of these lessons will be generated and then disseminated nationwide via the Internet.

Project Participants

Project participants include the trios briefly described above as well as Native American elder committees, culture committees, tribal natural resource personnel, and/or Indian Parent Committees from each reservation. These groups of people serve as cultural consultants and educational resource people. In addition, the project provides valuable training and experience for a Native American, preservice teacher who participates in all project activities. Eventually, participants will also include all students impacted by the project as the teachers involved implement the methods and content they have obtained in the project in their classrooms. Specific information about trio participants is outlined below.

Colville Trio

A Colville female, certified as a K-8 teacher, who is currently teaching 6th grade at Paschal Sherman School. The school's student population is 99 percent Colville.

A Colville female, certified as a K-12 teacher, who is currently teaching 9th grade science at Paschal Sherman School. She is also a college instructor and serves as the trio's cultural consultant.

A Caucasian female, certified as a K-8 teacher, who is currently teaching 3rd grade at Paschal Sherman School.

Nez Perce Trio

- A Nez Perce female, certified as a K-8 teacher, who is currently teaching 3rd grade at Lapwai Elementary School. The Lapwai School District's student population is overwhelmingly Nez Perce.
- A Nez Perce female, certified as a K-8 teacher, who is currently teaching middle school at Lapwai Middle School.
- A Nez Perce male, certified as a K-12 teacher, who is currently serving as the Environmental Education Specialist for the Nez Perce tribes. He serves as the trio's cultural consultant.

Flathead Trio

- A Salish/Anishinabe female, certified as a K-8 teacher, who is currently serving as Director of Indian Education in the Ronan School District, as well as adjunct faculty and curriculum specialist for Salish Kootenai College. The Ronan District's student population is 54 percent Native American.
- A Salish Kootenai female, who is currently serving as a director of the Kootenai Housing project. She is the cultural consultant for the Flathead trio.
- A Caucasian female, certified as a 6-12 teacher, who is currently employed as a curriculum specialist and associate faculty at Salish Kootenai College.

Project Achievements

In preparing for trio training, the project staff prepared a handbook for distribution to trio members that covered aspects of the NESCP's goals, methods for research and development of culturally competent curricula, information about constructivist and inquiry-based methods, educational and cultural resources, administrative details of the project, the NASA review and evaluation process, and the lesson plan format. Six workshops with trio members were held in the first 6 months of the project. Early workshops focused on participants understanding the NESCP goals and strategies, training in inquiry-based and constructivist methodology, and training in the development of culturally competent curricula. Based on continual evaluation of the needs of trio members and the progress of the project, later workshops focused on specific aspects of lesson plan development, and included modeling, coaching, and feedback on trio lessons by the project's curriculum specialists. By the end of the reporting period, trios had each generated five lessons and were gaining proficiency in developing appropriate curricula in alignment with project goals. Additionally, an agenda for the summer workshop for trio members at GSFC had been approved.

Partnerships

The trios have each formed informal partnerships with Native American elders, culture committees, and Indian Parent Committees, who provide assistance with the integration of cultural content in curriculum development. Also, the trios have worked extensively with tribal natural resource personnel on each reservation, which provides consultation, data, maps and images relevant to Earth systems science issues on each reservation. Additionally, trios have received assistance and resources from GSFC personnel in the form of satellite images, and educational products. The Flathead trio has also been working with experts at the Earth Observation Satellite (EOS) project at the University of Montana and the Remote-Sensing Project at Salish Kootenai College to obtain and effectively use satellite images of the reservation in addressing Earth science issues relevant to the tribes on their reservation.

OFFICE OF SPACE FLIGHT

The goal of the Office of Space Flight (OSF) Enterprise is to open the space frontier by exploring, using and enabling the development of space. Our programs provide safe, assured transportation to and from space for people and payloads, and develop and operate habitable space facilities in order to enhance scientific knowledge, support technology development, and enable commercial activity. The four major goals of this enterprise are the following:

- Explore the space frontier
- Enable humans to live and work permanently in space
- Enable the commercial development of space
- Share the experience and benefits of discovery

Although OSF did not directly provide funds to TCU's or other Tribal Institutions, they allocated funds through the Kennedy Space Center (KSC) to contract with a Native American-owned business to provide programmatic support to several KSC organizations.

SPACE SCIENCE ENTERPRISE

The Space Science Enterprise seeks to chart the evolution of the universe, from origins to destiny, and understand its galaxies, stars, planetary bodies, and life. The Enterprise asks basic questions that have eternally perplexed human beings such as: How did the universe begin and evolve? How did we get here? Where are we going? Are we alone? The findings from space probes, robotic explorers, observatories, and computer modeling strengthen our quest to answer these extensive questions of our past, as well as those that may shape our future.

In pursuing this mission, the Enterprise develops, uses, and transfers innovative space technologies that provide scientific and other returns to all of NASA's Enterprises, as well as globally competitive economic returns to the Nation. Its knowledge and discoveries are used to enhance science, mathematics, and technology education and the scientific and technological literacy of all Americans.

NASA CENTER INVOLVEMENT

NASA Centers and Enterprises are fully committed to assisting NASA in achieving the goals set by the Agency in support of TCU's. During FY 2001, the NASA Centers continued to implement programs to achieve the goals of strengthening the capability of TCU's to provide quality education, and to conduct first-rate research activities for faculty and students. Moreover, the NASA Centers perceived a need to initiate a more proactive policy in its role as technical monitor, seeking out opportunities to more closely link funded programs to the technical divisions and to broad education and public outreach efforts.

During FY 2001, the NASA Centers implemented numerous projects that helped to strengthen the infrastructure of TCU's. These projects better equipped students and faculty to pursue studies and careers in NASA-related fields. The following summaries are synopses of the accomplishments of the NASA Centers and Enterprises for FY 2001.

AMES RESEARCH CENTER (ARC)

Ames Research Center continued to implement Minority University Research and Education Division (MURED) objectives in FY 2002 in support of Executive Order

13021. The Minority University Research and Education Program (MUREP) at Ames has outlined in their strategic plan an objective to assure that Tribal Colleges and Universities (TCUs) are being targeted. The objective calls for NASA to collaborate with and advocate for TCUs via outreach and personal meetings with potential Principal Investigators with the goal to increase grant funding and to attract greater numbers of students from tribal colleges into NASA-related fields. Site visits to Tribal Colleges and Universities by Ames representatives are part of this objective. MUREP has already begun to reach its objective by establishing rapport with several points of contact at the Institute of American Indian Arts (IAIA) in New Mexico. IAIA is looking to develop a distance- learning project. The benefit of such a project for IAIA is great. It would connect students with educational tools otherwise not available to them.

Funding to TCUs for FY 2002 was \$0.

However, Ames Research Center participated/sponsored additional programs that targeted and included TCUs/Native American students. These activities were:

- The **NASA Scholars Program** for FY 2002 included the participation of one Tribal College/University. Two Native American Students participated in the program.
- The **Summer Robotics Camp** targeted both Native American Students and Hispanic students.
- Native American Community-based Agri-science Research and Development Center at Santa Fe Indian School. This program involves new academic curriculum combining Native American traditional values and technology with NASA's Earth System Science base. Establishes pilot farming sites in selected communities and an experimental greenhouse facility at the high school. (Funding is provided by Marshall Space Flight Center.)
- **Other Work With TCUs /Native Americans (Code S)** ECOSAT branch arranged for a collaborative data acquisition between the Paiute tribe and the state of California for the purpose of environmental monitoring within and surrounding the Paiute lands. This involved the acquisition of remote sensing and resource information needed by the state and the tribe. The ECOSAT Branch transferred 802.11b wireless LAN transmission technology and provided GIS technology to the tribe to be used to connect the three cities on the reservation, and to assess and manage the resources on their lands respectively.
- The **Native American Advisory Committee (NAAC)** at Ames actively participated in reaching out to the Native American Community. The mission of the Native American Advisory Committee is as follows:

The mission of the NAAC is to provide leadership in fulfilling NASA Ames scientific and technical objectives by facilitating the flow of ideas between NASA Ames programs and Native Americans. This will be accomplished by working with the Native Americans at NASA Ames to understand their goals and identify opportunities; facilitating collaborations and partnership between NASA Ames programs and the external Native American Community; identify barriers that may exist and suggest solutions relative to NASA Ames programs.

The group was active in FY 2002 in six different activities ranging from a presentation to approximately 210 students, conference attendance of 5 of the tribal colleges, and participation at three formal NASA presentations.

DRYDEN FLIGHT RESEARCH CENTER (DFRC)

GLENN RESEARCH CENTER (GRC)

GODDARD SPACE FLIGHT CENTER (GSFC)

JET PROPULSION LABORATORY (JPL)

JOHNSON SPACE CENTER (JSC)

KENNEDY SPACE CENTER (KSC)

Dine' College - American Indian Network Information Center (AINIC) served as a member of the NASA SLSTP Academic Partner Alliance (NSAPA) for the SLSTP 2002 summer course. Dine' College served as the Lead Publications Coordinator and Lead of the Publications Team for the third year.

KSC contracted with All Points Logistics, Inc. (\$25,000), an 8(a) Native American and Veteran owned company, to provide 3D graphics and programming support for an Education Technology project. The graphics and programming provided by All Points will be the foundation environment for a CD-ROM based software project providing access to virtual science instruments.

By the end of FY 2002, plans were underway for the **“Linking Education to Employment” Symposium** commemorating the first launch of the First Tribally Enrolled Native American Astronaut John B. Herrington from the Chickasaw Nation and the STS-113 Crew. This NASA wide initiative was implemented in FY 2003, on November 8-11, 2002 at the Peabody Hotel in Orlando, FL.

We continue to target our objectives and goals of identifying TCU's that are able to partner with KSC in implementing center strategic goals and objectives. We will encourage program funding for support of TCU's by identifying talents and skills desired to accomplish programmatic goals.

No awards were made to TCU's in FY 2002.

LANGLEY RESEARCH CENTER (LARC)

Marshall Space Flight Center(MSFC)

In FY02, the Marshall Center collaborated with the Institute of American Indian Arts in Santa Fe, New Mexico, to develop a core curriculum that integrates Native American agricultural practices and cultural values with MSFC's Earth Science resources and technology as a fundamental science component for students. The program implemented a community-based environmental and agricultural educational program that included developing planting sites in three Pueblo communities to teach, test, and revitalize Native American traditional planting, harvesting, and water use practices to be guided by environmental restoration intent and NASA resources and technology. Approximately 200 students and 3 faculty members are involved in the research.

STENNIS SPACE CENTER (SSC)

During FY 2002, there was no direct funding for research and development. However, much effort took place in working with Ilisagvik College in Barrow, Alaska (a Native Alaskan institution) during FY02 to develop a proposal. Preliminary drafts of research efforts were developed, but before the proposal could finally be turned in the principal investigator left the College for a position in one of the continental states. His leaving left a void in the geospatial technology competency needed in the proposed project that the college felt they did not have a replacement for. Efforts will continue into FY03 to reconsider whether the College has found a replacement for this professor such that he/she may be able to carry out a remote sensing research project jointly with SSC.

Additional efforts took place with Dine College to further their research relationship previously established with SSC. A proposal received in FY02 will be funded in FY03 and plans are already underway to have a Dine Staff member come to SSC for the summer. Additional remotely sensed data was collected over the Shiprock, NM area, where Dine is located to support the research project.

While direct funding has not been allocated, SSC has actively supported TCUs in other ways. SSC provided a week of remote sensing and GIS related training experience during FY02 to three students from Haskell Indian Nations University visiting SSC during the summer. They also received specialized training in GPS (global positioning system) for GIS applications. Additional offers of on-campus training were made to other TCUs during FY02, but to date have not yet been acted upon by the universities. SSC will continue efforts to provide such training in FY03.

APPENDIX A

NASA ORGANIZATION

NASA Headquarters in Washington, DC, is the corporate headquarters, responsible for Agency-wide leadership and management, development of program strategies, and interfacing with Congress and the White House. Within NASA Headquarters, five Strategic Enterprises have responsibility for the Enterprise missions:

Office of Space Science—lead responsibility for the Space Science Enterprise.

Office of Earth Science—lead responsibility for the Earth Science Enterprise.

Office of Space Flight—lead responsibility for the Space Flight Enterprise.

Office of Biological and Physical Research—lead responsibility for the Biological and Physical Research Enterprise.

Office of Aerospace Technology—lead responsibility for the Aerospace Technology Enterprise.

Office of Education—lead responsibility for the education programs at NASA.

Funding for TCU's may originate from any of the offices listed above.

NASA CENTERS AND THE JET PROPULSION LABORATORY

The NASA Centers and the Jet Propulsion Laboratory (JPL) are the primary sites from which the Enterprise missions are implemented. Each Center and JPL has Agencywide leadership responsibility for a specific Center of Excellence area (shown in italics) along with other roles and responsibilities for the Strategic Enterprises.

- **Ames Research Center**, Moffett Field, California—*Information Technology, Astrobiology, Aviation Operation Systems.*
- **Dryden Flight Research Center**, Edwards, California—*Atmospheric Flight Operations, Flight Research.*
- **Glenn Research Center** at Lewis Field, Cleveland, Ohio—*Turbomachinery, Aeropropulsion.*
- **Goddard Space Flight Center**, Greenbelt, Maryland—*Scientific Research, Physics and Astronomy, Earth System Science.*
- **Jet Propulsion Laboratory**, Pasadena, California—*Deep Space Systems, Planetary Science and Exploration, Instrument Technology.*
- **Johnson Space Center**, Houston, Texas—*Human Operations in Space, Astro Materials.*
- **Kennedy Space Center**, Kennedy Space Center, Florida—*Launch and Payload Processing Systems.*
- **Langley Research Center**, Hampton, Virginia—*Structures and Materials, Atmospheric Science, Airframe Systems.*
- **Marshall Space Flight Center**, Huntsville, Alabama—*Space Propulsion, Space Transportation Systems, Microgravity Research.*
- **Stennis Space Center**, Stennis Space Center, Mississippi—*Rocket Propulsion Testing, Commercial Remote-Sensing.*

APPENDIX B

Throughout the narratives in this report, awards and projects are identified by the abbreviations given below for both the NASA Headquarters Office from which the funding originated and the Center (or JPL) from which the award was made.

LIST OF ACRONYMS AND ABBREVIATIONS

AIHEC	American Indian Higher Education Consortium
ARC	Ames Research Center
CIPA	Curriculum Improvement Partnership Award
DFRC	Dryden Flight Research Center
EOS	Earth Observation Satellite
ERWM	Environmental Restoration and Waste Management
FAR	Faculty Awards for Research
FELLOWS	Fellowships, Internships, Traineeships, Recruitment, And Arrangements Under The Intergovernmental Personnel Act
FY	Fiscal Year
GIS	Geographic Information System
GLOBE	Global Learning and Observation to Benefit the Environment
GPS	Global Positioning Satellite
GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
GSRP	Graduate Student Researchers Program
HBCU	Historically Black Colleges and Universities
HQ	Headquarters
HSI	Hispanic Serving Institutions
IHE	Institutions of Higher Education
IPA	Intergovernmental Personnel Act
IUREP	Innovative and Unique Research and Education Project
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KSC	Kennedy Space Center
LaRC	Langley Research Center
LARSS	Langley Aerospace Summer Scholars
MASTAP	Math, Science, and Technology Awards for Teacher and Curriculum Enhancement Program
MI	Minority Institution

MSE	Mathematics, Science, and Engineering
MSET	Mathematics, Science, Engineering, and Technology
MSFC	Marshall Space Flight Center
MUREP	Minority University Research and Education Programs
NASA	National Aeronautics and Space Administration
NESCP	Native Earth Systems Science Curriculum Project
NRMT PACE	Northern Rocky Mountain Tribal Pathway to Academic Excellence
NRTS	Network and Research Training Sites
OAT	Office of Aerospace Technology
OBPR	Office of Biological and Physical Research
OE	Office of Education
OES	Office of Earth Science
OHRE	Office of Human Resources and Education
OSF	Office of Space Flight
OSS	Office of Space Science
PACE	Precollege Awards for Excellence
PAIR	Partnership Awards for the Integration of Research
PI	Principal Investigator
PSI	Private-Sector Involvement
R&D	Research and Development
RESDI	Renewable Energy and Sustainable Development Institute
SIPI	Southwestern Indian Polytechnic Institute
SMET	Science, Mathematics, Engineering, and Technology
SSC	Stennis Space Center
STA	Student Tuition Assistance, Scholarships, and Other Aid
TCU	Tribal Colleges and Universities
TPA	Third-Party Awards
TRC	Technical Review Committees
USAR	Undergraduate Student Awards for Research