Oklahoma Space Grant Consortium
Lead Institution: University of Oklahoma
Director: Dr. Victoria Duca Snowden
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Oklahoma Space Grant Consortium is a Designated Consortium funded at a level of $785,000 for fiscal year 2009.

PROGRAM GOALS

Goals and objectives of the OSGC are divided into 6 categories: Fellowships/Scholarships, Research Infrastructure, Higher Education, Workforce Development, Precollege, General Public/External relations. Goals and objectives for each category are as follows:

Fellowship/Scholarships

OSGC Goal: To use the NASA mission, facilities, human resources, and programs to provide information, experiences, and research opportunities for students at all levels to support the enhancement of knowledge and skills in the areas of science, technology, engineering, and mathematics.

OSGC SMART Objectives to meet Goal:

- Educate students at all levels by encouraging, supporting interdisciplinary, multidisciplinary research experiences, and education programs.
- Provide support to the science and technology workforce pipeline by including greater participation of underrepresented groups in science, mathematics, engineering and technology, in NASA student programs.
- Increase the number of NASA student support opportunities through partnerships and industry collaboration and cooperation
- Increase the number of students hired as full-time employees by NASA.

Research Infrastructure
OSGC Goal: To establish OSGC as a valuable State resource and catalyst for aeronautics and space-related research, education, and state economic and workforce development.

OSGC SMART Objectives to meet Goal:

- Create and foster opportunities for faculty and student research at all OSGC affiliates in areas related to NASA's strategic interests.
- Develop and foster interdisciplinary programs to assure the development and transfer of publications in aeronautics and space-related research and education.
- Leverage Consortium and State strengths to meet academic needs and the agenda for economic development.

Higher Education
OSGC Goal: To support Higher Education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.

OSGC SMART Objectives to meet Goal:

- Use NASA mission-based programs to demonstrate the integrated education applications of science, technology, engineering, and mathematics for use in student learning activities.
- Provide access to and promote utilization of NASA-related materials and information resources.
- Increase the number and diversity of students and faculty from underrepresented and underserved communities in NASA-related STEM fields.

Workforce Development
OSGC Goal: To enhance state economic and workforce development in aeronautics and space, while providing applied learning experiences for students and faculty.

OSGC SMART Objectives to meet Goal:

- Develop linkages between Oklahoma aerospace industry, researchers, and students that foster the creation of market driven technology products.
- Award competitive grants/fellowships to faculty and diverse student populations to facilitate hands-on learning related to state economic and workforce development.
- Provide University Career Services personnel support to increase their knowledge of employment opportunities within aerospace-related industry and at NASA Centers.

Precollege
OSGC Goal: Increase the number of teachers and students, especially those in underserved and underrepresented communities, who are involved in NASA-related education opportunities.

OSGC SMART Objectives to meet Goal:

- Develop opportunities for elementary and secondary education teachers to learn effective use of NASA- content, STEM based, materials and programs in the classrooms.
- Introduce students to Space Exploration to encourage an interest in STEM disciplines.

General Public And External Relations
OSGC Goal: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research and exploration missions.

OSGC SMART Objectives to meet Goal:
- Provide instructional materials and technologies derived from NASA research and scientific activities that meet the needs and requests from within the community.

PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, OR 3)

Meaningful anecdotes related to work completed in 2009 include (Shown relative to outcomes)

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals.

Two OSU Aerospace Design Teams sponsored in part, by the OSGC, took first and second place in the world's largest aerospace design contest. The AIAA/Cessna, Raytheon Design/Build/Fly contest. Over 66 collegiate teams from around the world competed in the contest. 44 Mechanical and Aerospace Engineering students from Oklahoma State University, were involved.

A team consisting of NASA OSGC, University Multispectral Labs, Oklahoma State University, Zivko Aeronautics Inc, Republic Aerospace Inc., and Triton Scientific Inc., were successful in winning a $900,000 contract with the State of Oklahoma EDGE board, to develop a unique center for unmanned aerial vehicle testing, research, and education, in Oklahoma. The participation of the NASA OSGC was instrumental in the development of a new curriculum as well as an airfield for UAS education. The airfield will not only be used for education of students, but to host national UAS events such as contests and fly-ins.

The ASTRO balloonsat program continues to grow. Last year 48 freshmen in aerospace engineering built small balloonsats, and made final presentations of their data. This year, the class has grown to 75 students. For most of them, this is their first exposure to aerospace engineering, and their first exposure to hands-on STEM projects.

2009 was the final year of the joint OSGC-EPSCoR project: "Tissue Equivalent Detectors for Space Crew Dosimetry and Characterization of the Space Radiation Environment" The cooperative effort was a first for OSGC, and was a success. The deliverables for EPSCoR would not have been possible without the efforts of the OSGC.

Southwestern Oklahoma State University was able to place two student interns at Johnson Space Center during Summer 2010. Chris Parton was asked to remain for the fall 2010 semester and will do so.

Sarah Glenn, Oklahoma Space Grant undergraduate research assistant at the Center for Spatial Analysis and recipient of an OSGC workforce development travel award, presented her research on 3D modeling of lightning entitled "Using GIS to investigate relationships between lightning and storm structure" at the American Meteorological Society conference on Interactive Information and Processing Systems for Meteorology, Oceanography and Hydrology. Upon graduation Sarah secured a position with a private meteorological consulting and risk management firm as a forecaster.

Twenty six high school teams from Oklahoma, Texas, and Kansas, built robots and brought them to the First Tech Challenge event to compete. Over 250 students and teachers completed evaluations that were very complimentary with comments such as, "Organized and supportive staff" and "Great Assistance from SWOSU Students. Thirty eight percent of the participants were minority students and 26% were female. Three teams from the event went to the international competition in the Georgia Dome. This was the first time First Tech Challenge students from Oklahoma had been able to compete internationally.

Three students from OSU were sponsored by Space Grant, and were selected as interns at OSGC Industrial Affiliate, Frontier Electronic Systems: The first three are Eric Lovell (BSEE), Shannon Sewell (BSEE), and Donald Stutson (MSEE). About her experience, Shannon wrote, "This internship was everything I was hoping for and so much more. The hands on experience I was able to get at Frontier will be the one thing that stands out on my resume the most." Eric wrote, "It is great being part of a friendly and talented engineering team, and I am constantly learning new skills every day." Donald wrote, "I've been able to see up close how engineering projects are managed and executed… …The students get to add fresh blood to their companies while the company gets to train future employees."

JSC Summer Internship:
Erin Heap, a Southern Nazarene University Senior pursuing a bachelor's degree in Biology, was selected to be a summer intern at Johnson Space Center in Houston, Texas; she is working on an NSBRI funded project, 'Development of Countermeasures to Aid Functional Egress from the Crew Exploration Vehicle Following Long-Duration Spaceflight.' According to Heap, "The part I got to play was exciting and challenging because it's not like reading a textbook or taking a test, you're actually doing science with real people and real data."

Daniel B. Pardue was supported by both NASA Space Grant and NASA EPSCoR funds to work as an R&D intern at an ETS-Lindgren facility in Durant, OK. Daniel, a Native American student from a small rural town, gained valuable research experience and confidence. He has graduated with a B.S. degree in Chemistry, and is now working on his Ph.D. at U. North Texas. His supervisor (Ron Workman) at ETS-Lindgren had the

following to say about Daniel Pardue and the NASA OSGC support of Daniel as an intern: "Daniel, working in our Research and Development lab has been a tremendous asset to us. While working for us Daniel has been involved with several projects including in the development of new substrates for anechoic absorber, quality control procedures development, current process improvements, and bi-product utilization. We feel that this relationship has been a complete success and hope to be able to utilize more Southeastern Oklahoma State University students in the future." Mr. Workman and Dr. Paiva are applying for state (OCAST) funding for future interns.

Anthony L. Banks was heavily supported by NASA Space Grant funds as a student researcher, with tuition waivers, to participate in NASA tours, and to prepare to take the graduate admissions exam (GRE). Anthony, a Black student from a small town in rural OK, graduated with a B.S. degree in Chemistry and minor in Safety, and is now applying to an industrial hygiene program at OU-HSC, in OKC. In addition to regular tuition costs, Space Grant funds helped pay for graduate school admissions testing and application fees.

A research project ("Cultivation of Algae for Biofuels") was supported, with space grant funding being used to purchase some algae strains and growth media, and to employ student researchers, for pay and for research credit. Instead of the planned 1 student participant, 4 helped to collect algae samples and to grow algae cultures indoors, and to begin analysis of algae composition as it relates to fuel production. The US Airforce has declared an interest in pursuing jetfuel and biodiesel derived from algae, and algae are also among the simplest plants that could be grown on Moon or Mars bases to produce liquid fuels. Preliminary data from this work directly helped N.Paiva at SEOSU to write and obtain a small research grant for $24,984 from Oklahoma NSF-EPSCoR entitled "Evaluation of filamentous freshwater algae as a bioenergy source" awarded in July 2010 and starting August 1, 2010. The new funds will help support student workers and collaborations with labs at OSU and OU-Norman.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

Sasakwa Tutoring Program: Initiated in concert with Oklahoma's first NASA Explorer School, the Sasakwa Tutoring Program in mathematics continues to be a successful partnership between ECU and Sasakwa Public Schools. This partnership between mathematics majors from ECU and students in Sasakwa Public Schools has provided Sasakwa students more than just mathematics tutoring. These students are encouraged to do well in school, think about post secondary education degrees, and dream about the future beyond academia. On the flip side, mathematics students from ECU benefit from the "real-world" experience by being in a teaching and mentoring environment, as well as establishing future contacts and resources and a better chance for employment within their field.

Kyler Johnson
Major: Mathematics (Teacher Certification)

OSGC Support: Recipient of a NASA scholarship to support the tutoring program at Oklahoma's first NASA Explorer School, Sasakwa
"This school year, I have had the opportunity to work with students from Sasakwa Public Schools through the NASA Fellowship Program. The school allows me to work with several individuals in the third through twelfth grade on their mathematics skills. The students may bring homework to complete, flash cards to practice skills, or they may just need to hear a lecture from a previous math class one more time. It has been unimaginably rewarding to be a small portion of these students' success in their mathematics class, and in effect, a small portion of their success in their overall educational endeavors. Not only has this helped me in my pursuit to be a mathematics teacher, whether high school or college, but it has also allowed me a greater passion for students and learning in general, as well as making contacts for future employment. Thank you NASA for this enriching opportunity. "

Quotes from KSC Trip (Jan. 12 – 15, 2010) Participants:
"Meeting with an astronaut (John Blaha) was a great experience. I found out that he lived in the same town as some of my close family which really brought it close to home for me. It helped me realize that anything I could possibly want to do is within my reach." - Nikki King, Oklahoma State University

"I loved getting to meet new people, learn about NASA - how you don't have to be a rocket scientist to work there - and all the different things that people at NASA have learned to do in technology today." - Lindsay Porter, Southwestern Oklahoma State University

"This trip was absolutely incredible in that it was very career defining and expanded my knowledge of what possibilities there can be in regards to being a straight Mathematics major. It was very inspiring and I can't wait to build upon this opportunity that was given to me!" - Kandi Archer, Southwestern Oklahoma State University

SWOSU sponsored three female students to the workforce development event at Kennedy Space Center. One of these students became so excited that she returned to campus and began research of the impact of a rocket explosion on the pad.

Courtland Park, a SNU senior who received NASA funds to participate in a career fair, stated "NASA workforce funds allowed me to go to the citywide career fair where STEM and non-STEM related companies were present. Going to the fair opened up my eyes to career options and companies I never knew existed."

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission
The Women in Science Conference (February 9) was a great success. Over 300 young women, from elementary school to high school age, attended the conference at the Science Museum Oklahoma and participated in STEM activities such as hands-on

science stations, career-planning sessions, and a panel discussion with women in STEM fields.

PROGRAM ACCOMPLISHMENTS

Outlined below are program accomplishments not addressed in the previous section.

Outcome 1
Fellowship/Scholarship

Total fellowships/scholarships awarded for 2009 totaled 285. The demographic breakdowns were 64.2% female, 48.4% male, and 41.4% to underrepresented groups. Fellowships and scholarship funding support almost all activities of the OSGC including Research Infrastructure, Workforce Development, Higher Education, Precollege, and General Public.

Research Infrastructure

Fourteen total research infrastructure programs were conducted in 2009. Four different affiliates initiated, or participated in these activities: Oklahoma State University, Center for Spatial Analysis, Southeastern Oklahoma State University, and Southern Nazarene University. Research infrastructure project support typically falls in the category of "seed funding" intended to support faculty and students who will develop more significant research activities in NASA-related interest areas. Examples include: Optically stimulated luminescence (OSL) from the Antarctic Dry Valleys, Studies of soaring behavior of birds applied to unmanned aircraft, Trophic habitat and ecosystem niche modeling, Landfill impacts analysis, 3D lightning and storm structure analysis, CyberCommons for Ecological Forecasting, Spatial-Social Network Analysis of Historical Events, CFD modeling of aeroelasticity. Also, RI funding at OSU was leveraged with that from 4 other entities, including three Oklahoma industries, to win a proposal to develop a new airfield for unmanned aircraft research and education.

Some additional RI activities of the consortium not outlined in the previous section include:

The RI cost-share commitment from affiliate CSA, has led to the following outcomes: (1) formalized the new Geoinformatics program and submitted a program proposal for an interdisciplinary graduate program in Geoinformatics, (2) mentoring undergraduate and graduate students involving in Space Grant Research Infrastructure (RI) projects; (3) submitted proposals that leverage findings out of RI projects and successfully won 4 new research grants in 2009-2010; (4) submitted 8 manuscripts among which 6 published in 2009-2010; and (5) 3 student presentations in international conferences.

Dr.Wayne Trail and Dr,Tony Stein supervised three students for the Astronomical Spectroscopy Project. This project is a nation-wide web-based collaboration in the

collection of quality astronomical data. They presented their work at the SWOSU scholarly activity fair.

The Technology Department and the Computer Science department cooperated to host the First Tech Challenge robot contest for high school students. Mr. Brad Bryant of the Technology Department collaborated with Dr. Andy Arena from Oklahoma State University on two Balloon Sat launches.

Dr. Mark Micozzi will acquired high resolution satellite imagery for curriculum development in remote sensing and other geospatial technologies. This demonstrated the integrated education applications of science, technology, engineering, and mathematics for use in the student-learning activities in concert with NASA-related materials and information resources from NASA's Earth Observation System (EOS).

On October 9-11, 2009, faculty and students from ECU travelled to Osage Hills State Park, Oklahoma so that students could test their geotechnical skills in a place they know nothing about. Dr. Mark Micozzi taught the students how to integrate classroom instruction with field research in geography using geospatial technologies. This includes the geographic study of landscapes using the suite of geotechniques taught in the Department of Geography and Cartography at East Central University. Students are trained in the geographic arts and sciences and then apply geotechnical courses in data collection, geographic information systems, remote sensing, cartography, and research design.

Higher Education

Twenty different OSGC projects were under the category of Higher Education. All academic affiliates as well as one of the industrial affiliates, participated in these projects: University of Oklahoma, Oklahoma State University, Cameron University, Langston University, East Central University, Southern Nazarene University, Southeastern Oklahoma State University, Southwestern Oklahoma State University, Frontier Electronic Systems.

Example projects included the geographic study of landscapes using the suite of geotechniques where students are trained in the geographic arts and sciences and then apply geotechnical courses in data collection, geographic information systems, remote sensing, cartography, and research design. A Geoinformatics Colloquium Series – 6 invited speakers throughout the academic year on GIST research and developments. AGIS Day Geocache Contest to expose students to geospatial information technologies and raise awareness of career and education opportunities and a series of 4 events for recruiting, informal and student service events for new BA/ BS program in Geoinformatics. One affiliate sponsored a robot design course for high school students. This contest was staffed by university students who were required to build and program their own robot to learn skills necessary to mentor high school teams. A history of NASA rocketry course was developed for presentation to students enrolled in the Cheyenne & Arapaho Tribal College. The MoonBuggy project was a team of 11 students

and 2 instructors who participated in the MoonBuggy competition sponsored by Marshall Space Flight Center in Huntsville, Alabama. This Oklahoma team placed fifth in the competition. OSU Design/Build/Fly teams placed first and second in the worlds largest collegiate aerospace design contest.

Some additional HE activities of the consortium not outlined in the previous section include:

$22,000 of fellowships supported students from all OSGC university affiliates to attend the geospatial summer institute. The activity involved over 30 students as well as 3 faculty members.

For Mission to Planet Earth (MTPE) 2010 there were 18 teachers from across Oklahoma and Texas. It is an aerospace education summer institute for 3rd – 9th grade educators which focuses on the excitement of NASA's Earth Science Enterprise to motivate students. Course topics cover history of space flight, basic principles of flight, classroom application of remote sensing, unmanned and manned satellites, living and working in space, lunar rocks, hands-on rocketry, and model rocketry. Guest lecturers include researchers, scientists, NASA specialists in classroom application of remote sensing, Oklahoma NASA Space Grant Consortium presenters, and NASA Aerospace Education Specialists.

Thelma Wallace at HBCU Langston University, advertised for Scholarships by posting flyers on campus, screening applicants and selecting scholarship recipients for the 2009-2010 school years. As a result of this activity thirty five (35) students applied and twenty-eight students received scholarships. Thelma collaborated with the chemistry, biology, math, and education department to host a research day activity on campus. Invitation was sent to area public schools to attend. There were fifty (50) teachers from surrounding areas that attended. The hosted a luncheon program after the research day activity to make teachers aware of the NASA-OSGC mission and how they can get involved. Scholarship students scheduled an awareness day on campus where they presented their poster sessions and oral presentations and. One hundred (100) Langston students attended. Assisted students from the Agriculture and Education Department for summer programs offered at OU. Two (2) students benefitted from the Remote Sensing workshop and One (1) student for the summer teaching program.
We have been successful in providing opportunities for Langston students to participate in summer programs sponsored by NASA and other schools that offer research summer programs. Last year along we had seven (7) scholarship students to participate in research projects in other states. Three (3) students attended Educational workshops that dealt with preparing lesson plans for students in the STEM area. Randy Hunt conducted hands on experiments in Rocketry workshop for the teachers and students at Coyle Middle School.

Dr. Randy Hunt took two (2) Scholarship students to Kennedy Space Center to enhance their knowledge of space related opportunities and to meet with personnel to network on internships and job opportunities for Langston University.

Twelve (12) Scholarship students participated in research Day in the Southern part of Oklahoma. Students gained exposure and knowledge of the different kind of research being conducted from a student and faculty point of view. Fifty (50) Langston University students attended and participated.
Travel sponsored by OSGC for students from Marcus Garvey to attend Langston University to present their Science projects and to participate in hands on experiments in the classroom. As a result of this projects student have are being engaged in activities that focus on STEM opportunities for the future.

Workforce Development

Workforce Development efforts focus on three different objectives: Internships for students with NASA, as well as STEM industries (particularly those in Oklahoma), seed-funding for collaborative projects between academia and industry, and career services activities including trips with students to NASA centers. All affiliates participate in Workforce Development projects.

Some additional WD activities of the consortium not outlined in the previous section include:

In the past year, FES was fortunate to have three terrific student interns sponsored by Space Grant, each of whom elected to accept FES' offers for continued employment following the completion of their respective engineering degrees. With the experience these three gained as interns, they each easily transitioned into effective full-time employees who are making immediate contributions to the successful execution of projects supporting DoD and NASA aerospace contracts. This summer, two other Space Grant interns have provide excellent support to design/development jobs for the International Space Station and for a US Navy program.

The first three are Eric Lovell (BSEE), Shannon Sewell (BSEE), and Donald Stutson (MSEE). Eric initially worked on production test equipment related to a missile program, and later worked on a test set and software for testing wiring harnesses for a satellite program. Shannon worked on a test box and cables for testing fuse modules for a satellite program. Eric and Shannon have recently transitioned to a new program to work on the design and development of simulation equipment to support an unmanned aerial surveillance system. Donald initially worked on production test equipment for a US Navy fighter jet cockpit display. After completing that effort, Donald has worked on parts and circuit analyses to support the design of a unit for the international space station.

A one-hour course targeted to reach students in the Cheyenne and Arapaho Tribal College to study rocket history, design, and flight.

Dr. Mark Micozzi and Mr. Todd Essary attended several Oklahoma Space Grant meetings/functions during the year and Mr. Todd Essary traveled to several conferences involving workforce development and career development.

Mr. James Wallace, Director of Career Services at Langston University, held two (2) career fairs that included aerospace industries. Approximately six hundred (600) students benefitted from attending the Career Fairs. He is presently working with other industries in providing internships and job opportunities for our students. We have placed several students in aerospace related internships and employment. A scholarship student is presently working with Mr. Wallace to research industries as possible contacts for opportunities. We will continue to provide information and opportunities to students in the aerospace industry.

The SEOSU PI Nancy Paiva and Career Services Director Scott Hensley both attended OSGC meetings in Norman, OK. The PI also took 3 students on a tour of NASA Kennedy Space Center's Space Life Sciences Lab, where they observed aquatic plants being cultivated for NASA projects, among other projects.

Outcome 2
Precollege

Four precollege projects were conducted in 2009 involving four affiliates: Cameron University, Langston University, University of Oklahoma, and STARBASE Oklahoma, Inc.

Funds received for programs were used to work with underrepresented minority K-12 student's sponsor a science fair at the Marcus Garvey Charter School in Oklahoma City, OK Langston University worked with 40 students from 4th thru 8th grade to assist them in preparing for their annual science fair held in May 2010. Student's who received scholarships were paired with two students to assist them with their projects during the fall and spring semester. They also judged the Science Fair held in Crescent Oklahoma where there were over 100 students that entered the science fair. The scholarship students also tutored at Coyle elementary school two days a week the subject areas were math, science, and reading and technology. Scholarship students collaborated with the math department on campus to volunteer their time to help with the Summer Math and Science Academic. There were forty students from across the state of Oklahoma who participated in this program. During the Summer Bridge program and the LINC program, scholarship students worked 20 hours a week in the classroom using STEM lesson plans to ensure that high school students were prepared to enter college this semester. The last four years Langston University have benefitted from this program because at least 35% of the students who participated have entered Langston University.

K.I.D.S. Space Camp was in introduction to the various career fields that NASA has to offer for students in the elementary level 3-6th grade during the Summer 2010 semester. STARBASE is a STEM Education program that focuses on elementary and middle school students and teachers in schools that are traditionally considered at-risk, have high minority populations and represent low income areas. There are nine STARBASE classrooms across the state including three focusing on the Native American population. Between the STARS STEM educational enrichment program for 5th graders and the

STARBASE 2.0 pilot (an after-school mentoring STEM club) for 6th and 7th graders, STARBASE serves grades 5-7 (students and teachers) with inquiry-based, hands-on applications of STEM subject areas that make the program unique among programs in the state. The STARBASE STEM Education program meets many national and state STEM-related academic standards and addresses STEM workforce/career exploration STARBASE had 10 short term professional dev workshops for teachers, and 3 long term. 233 inservice educators, 25 preservice, 4312 direct participants.

Outcome 3
General Public/External relations

CSA conducted GP/ER activities in 2009 including:

The requested fund was used to support two kinds of activities: (1) campus-wide activities at the University of Oklahoma to promote geospatial awareness, including the promotion of the new degree programs in Geoinformatics; and (2) GIS day at the capitol in the State of Oklahoma, where we worked closely with the state GIS council to develop state-wide geospatial information infrastructure for legislative support, emergency and asset management, and infrastructure development (such as state-wide broadband networks).

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking:

Student Data and Longitudinal Tracking: Total awards = 172; Fellowship/Scholarship = 125, Higher Education/Research Infrastructure = 47 of the total award represent 36.6% underrepresented minority F/S funding. During the FY09 program year 7 graduated and are pursuing advanced STEM degrees, 2 accepted STEM positions at a NASA contractor, 6 accepted STEM positions in industry, 1 accepted a STEM position in K-12 academia, 3 accepted STEM positions in academia, and 17 went on to non-stem fields.

For all students that were significantly supported in the period spanning FY06-FY09, 16 graduated and are pursuing advanced STEM degrees, 3 accepted STEM positions at a NASA contractor, 15 accepted STEM positions in industry, 2 accepted a STEM position in K-12 academia, 5 accepted STEM positions in academia, and 36 went on to non-stem fields. The remaining students have not yet received the degree that they were pursuing while the received their Space Grant award.

- Course Development:

Two *new degree programs* were developed with support from NASA funds. In addition, three new courses were developed with the assistance of NASA funds.

New Degree Programs: 2

University: Oklahoma State University
Titles:
MS in Mechanical and Aerospace Engineering *Option in Unmanned Aerial Systems*
PhD in Mechanical and Aerospace Engineering *Option in Unmanned Aerial Systems*
The graduate options added to these degree programs are unique in the country and were a cooperative effort between NASA Oklahoma Space Grant, and the Oklahoma EDGE program. Including four Oklahoma industrial partners.

New Courses: 3
Universities: University of Oklahoma, Southwestern Oklahoma State University
Courses:
COMSC 20111 NASA Rocketry. A study of the history of rocket development and design.
GIS 4653 GIS and Spatial Programming. Introduces students to geocomputation concepts, spatial programming skills and computational approaches to spatial data services and spatial problem solving.
GIS 4953 Geoinformatics. Capstone Seminar Introduction to contemporary research challenges in geoinformatics and formulating a research question and proposal which will guide the student in senior research project design, implementation and presentation to address fundamental or applied problems with spatial thinking

- Matching Funds:

Non-fellowship NASA funds for FY2009 were $585,000. Matching funds from other sources for FY 2009 totaled $691,029. Of that number, the lead institution matched $234,766, Academic Affiliates matched $368,008, and other State Government matched $88,255.

Leveraging of NASA funds was even more significant. For example, the joint EDGE/NASA OSGC effort leveraged approximately $20,000 of NASA funding in the form of fellowships, faculty support, and consumables, and resulted in a $900,000 effort involving 4 other Oklahoma industries.

- Minority-Serving Institutions:

Langston University (an HBCU) is one of the charter members of the Oklahoma Space Grant Consortium. As such, one of the OSGC Associate Directors is from Langston, and sits on the executive committee which reviews all major decisions, and provides direction to the entire consortium. Langston also has numerous programs in fellowships and scholarships and higher-education which are outlined in the summary reports above.

IMPROVEMENTS MADE IN THE PAST YEAR

The most significant improvement involving consortium management and procedures for FY 2009, was to create a yearly conference involving all affiliates to specifically discuss and update:

- NASA Goals and Objectives
- Space Grant Goals and Objectives
- Oklahoma Space Grant Goals and Objectives
- Oklahoma Space Grant Strategic Plan

It was determined that this was very important in making sure that all affiliates are aware of the goals and objectives for the year, and can adjust their programs as appropriate. It also provides affiliates an ability to have direct involvement in OSGC strategic planning.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Academic Affiliates

Cameron University

- Regional university
- Fellowships/scholarships, Higher-Ed, Pre-College
- Native-American outreach

East Central University

- Regional university
- Fellowships/scholarships, Higher-Ed, Pre-College
- Native-American outreach

Langston University

- HBCU
- Fellowships/scholarships, Higher-Ed, Pre-College
- African-American outreach

Oklahoma State University

- Research university
- Fellowships/Scholarships, Research Infrastructure, Higher-Ed, Workforce Development

Southeastern Oklahoma State University

- Regional university
- Fellowships/scholarships, Research Infrastructure, Higher-Ed
- Native-American outreach

Southern Nazarene University

- Private university
- Fellowships/scholarships, Higher-Ed

Southwestern Oklahoma State University

- Regional university

- Fellowships/scholarships, Research Infrastructure, Higher-Ed

University of Oklahoma
- Lead Institution
- Fellowships/Scholarships, Research Infrastructure, Higher-Ed, Workforce Development

Institutional Affiliates

Applications Engineering Program
- Identifies potential collaborations between industry and academia
- Workforce Development

Center for Spatial Analysis
- Higher-Education, Pre-College, Research Infrastructure

Industrial Affiliates

Frontier Electronic Systems Corporation
- STEM Internship opportunities

Science Applications International Corporation
- STEM Internship Opportunities

City Government Affiliate

Norman Economic Development Coalition
- Workforce Development activities

Informal Science Education Affiliate

STARBASE Oklahoma
- Pre-College

Stafford Museum
- Pre-College, General Public outreach