

**The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD – this document) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.**

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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 South Carolina Space Grant Consortium (SCSGC) is a Capability Enhancement Consortium funded at a level of \$430,000 for fiscal year 2014.

### **PROGRAM GOALS**

All goals and objectives for the individual programs support the South Carolina Space Grant Consortium (hereafter SCSGC) strategic plan, created in April 2008.

#### **Consortium Goals**

The SCSGC has six goals to accomplish its mission statement. All of our research, education, and public outreach programs fulfill one or more of the goals listed below.

**GOAL 1.** To increase access, understanding, development, and utilization of resources in four primary areas: Science, Aeronautics, Human Exploration and Operations, and Space Technology

**GOAL 2.** To encourage cooperative programs among colleges and universities, state organizations, business and industry, and pre-college interests

**GOAL 3.** To enhance interdisciplinary research, education and public service activities

**GOAL 4.** To recruit and train students, educators, and professionals, especially women and underrepresented groups

**GOAL 5.** To promote a strong science, mathematics, engineering and technology base throughout all levels of South Carolina education

**GOAL 6.** To facilitate statewide communication of NASA opportunities and programs

## **I. Consortium Management**

**GOAL 2:** To encourage cooperative programs among colleges and universities, state organizations, business and industry, and pre-college interests.

**GOAL 6:** To facilitate statewide communication of NASA opportunities and programs.

**Objective I.1:** (Reporting) The Management Team will provide timely reporting and responses to NASA Headquarters regarding Consortium operations and finances.

**Outcome Indicator:** *All reports will be submitted on time and in accordance with NASA guidelines.*

**Objective I.2:** (National Network) The Management Team will work to strengthen relationships with NASA Centers, the national Space Grant network, and the state's NASA EPSCoR Program.

**Outcome Indicators:** *Each year at least three students will participate in an internship program at a NASA Center and all faculty research projects are required to have a strong relationship with NASA scientists at one of the NASA Centers. The SCSGC Director and/or Program Manager will be present at biannual national Space Grant meetings. The SCSGC Director and Program Manager also serve as the Director and Program Manager for the SC NASA EPSCoR Program.*

**Objective I.3:** (Consortium Network) The Management Team will faithfully represent the diverse interest and resources of the Consortium member institutions and affiliates.

**Outcome Indicators:** *The roles and responsibilities of Consortium Management, member institutions, and all categories of affiliate organizations were established with the inception of the SCSGC and were updated in 2004 and again in 2006 and 2011. Relevant electronic communication is sent to all member institutions, affiliates, and interested parties, as appropriate.*

**Objective I.4:** (State government) The Management Team will ensure that Consortium programs are aligned with state and federal priorities.

**Outcome Indicators:** *Members of the Management Team provide annual reports to representatives of state and federal government on Consortium activities.*

**Objective I.5:** (State industry) The Management Team will foster interaction between the Consortium and state industries involved in aerospace, *earth and space science* and related technologies.

**Outcome indicator:** *Facilitate at least one student or faculty project with an industry partner in South Carolina.*

**Objective I.6:** (Link to public) The Management Team will seek to maintain and improve the effectiveness of the Consortium as the link between the public and NASA in the state.

**Outcome indicator:** *Consortium website is updated on a weekly basis to reflect new opportunities within and/or related to NASA.*

**Objective I.7:** (Increase resources) The Management Team will pursue opportunities to increase the resources available to the Consortium, to broaden participation within the state, to collaborate with other state Consortia in areas of mutual interest and capability, and to assure long-term sustainability.

**Outcome indicator:** *SCSGC serves as a clearinghouse for information on funding and research opportunities from NASA and other agencies that support STEM-related research and education, especially in areas of aerospace and earth and space science. All targeted announcements of opportunity released from NASA will be disseminated through electronic communication and the SCSGC website each year. The Management Team will coordinate*

*submission of proposals to NASA and other agencies on projects in STEM research and education. Encourage collaborative proposals each year to NASA or other agencies.*

**Objective I.8:** (Diversity) The Management Team will ensure diversity in all Consortium programs and activities by seeking to include women, underrepresented minorities, and persons with disabilities.

***Outcome indicator:** Diversity will be ensured in all aspects of the Consortium and participation by underrepresented groups will increase. NASA content or other STEM educational opportunities for faculty and students are expanded within the state.*

**Objective I.9:** (Evaluation) The Management Team will continually monitor and seek to improve the quality and effectiveness of the SCSGC program.

***Outcome indicator:** In consultation with the Campus Directors, the Management Team will continue to determine appropriate data collection and evaluation procedures that are consistent with available resources. The Consortium website was redesigned in 2011 so that evaluation data could be collected through online surveys and compiled for analysis by the Management Team.*

## **II. Fellowship/Scholarship Program**

**GOAL 4: To recruit and train students, educators, and professionals, especially women and underrepresented groups.**

**Objective II.1:** (Competitiveness) Ensure the fair distribution of funds to member universities and educational affiliates.

***Outcome indicator:** SCSGC will forward NASA's Annual Call for Fellowship/Scholarship applications to all higher education members and affiliates, and hold a competitive peer-review of submitted proposals for selection of awardees. Awards will reflect the diversity of the Consortium's membership and statewide balance.*

**Objective II.2:** (NASA Center ties) SCSGC will offer hands-on, tangible research experiences to student research fellowship awardees at NASA Centers.

***Outcome indicators:** SCSGC will maintain or increase the number of SC students involved with NASA Center Internships; however this is based annually on the SCSGC budget from NASA. 100% will make a presentation at the SC Academy of Sciences (SCAS) meeting or at a national meeting. 100% will provide feedback to their Campus Director and make campus presentations.*

**Objective II.3:** (Industry ties) SCSGC will offer hands-on, tangible research experiences to student research fellowship awardees at aerospace and related science and technology industries.

***Outcome indicator:** At least one student will receive supplemental funding through SCSGC each year.*

**Objective II.4:** (Mentoring and professional development) SCSGC will provide mentoring and professional development experiences to student researchers, which will develop skills that contribute to the future STEM workforce.

***Outcome indicator:** 100% of awardees graduate from college; 100% make a presentation at the SC Academy of Science or at a National meeting within a year of receiving the award; 80% produce a paper or abstract with their mentors within a year of receiving the award; and 50% continue on to graduate school and pursue a NASA-related discipline.*

**Objective II.5:** (Diversity) SCSGC will ensure funding for fellowships and scholarships to women, underrepresented minorities, and persons with disabilities through intensive marketing

techniques (e.g., personal visits, direct faculty contacts, email) to encourage women and minority students to apply for funding.

**Outcome indicator:** *Awards to women and minorities will equal or exceed previous year applicants. At least 15 student awards will be awarded annually within underrepresented groups.*

**Objective II.6:** (Longitudinal tracking) All students who have received significant fellowship or scholarship assistance from SCSGC will be longitudinally tracked through first employment or beginning of advanced degrees.

**Outcome indicator:** *Continue arrangements with National Space Grant Foundation to include SCSGC in the longitudinal tracking system so that students funded can continue to be tracked in subsequent years at least through first-employment.*

**Objective II.7:** (Evaluation) The SCSGC will develop methods to document, measure, and assess the impact of the fellowship and scholarship programs in conjunction with its implementation of an overall evaluation strategy (see Obj. I.9).

**Outcome indicator:** *Adjustments are made to the SCSGC fellowship and scholarship program to strengthen activities that are working and drop or improve activities that are not having the intended impact.*

### **III. Research Infrastructure**

**GOAL 3: To enhance interdisciplinary research, education and public service activities; to encourage cooperative programs among colleges and universities, state organizations, business and industry, and pre-college interests**

**Objective III.1:** (Research proposals) Increase the number of research proposals submitted by SCSGC institutions in fields aligned with NASA's mission and vision.

**Outcome indicator:** *At least eight research awards are distributed among appropriate SCSGC institutions each year. 100% of the REAP recipients submit proposals to NASA or another federal agency within two years. 50% of the REAP recipients submit new proposals which are funded within two years. 100% of the REAP recipients give presentations and submit papers within a year after the end of the grant. 80% of the presentations and papers include students*

**Objective III.2:** (Research support) Support new and developing research, especially multidisciplinary and collaborative projects, in fields aligned with NASA's mission and vision.

**Outcome indicator:** *50% submit proposals for a SCSGC REAP Research Grant or similar program. 100% of the REAP recipients develop presentations and papers within two years. 80% of the presentations and papers include students.*

**Objective III.3:** (Collaborations) Build research collaborations both within and outside the state.

**Outcome indicator:** *SCSGC will support at least one planning trip to a NASA Center each year from SCSGC. Submit REAP Research Grant proposal within two years of the travel/planning award.*

**Objective III.4:** (Diversity) Increase the participation of women and underrepresented groups in statewide research programs and facilitate their subsequent entry into STEM careers.

**Outcome indicator:** *SCSGC will sponsor activities that encourage women and students from underrepresented groups to enter STEM careers.*

**Objective III.5:** (Evaluation) The Consortium will develop methods to document, measure, and assess the overall impact of the research infrastructure programs including implementation of an overall evaluation strategy (see Obj. I.9).

*Outcome indicator: Adjustments will be made to the research infrastructure program to strengthen activities that are working and drop or improve activities that do not have the intended impact.*

#### **IV. Higher Education**

**GOAL 1: To increase access, understanding, development, and utilization of resources in four areas: science, aeronautics, human exploration and space technology; to enhance interdisciplinary research, education and public service activities.**

**Objective IV.1:** (Curriculum and NASA content) Contribute aerospace and space and earth science materials to the higher education community in South Carolina.

*Outcome indicator: SCSGC will distribute announcements of opportunities for education and curriculum enhancement in NASA-related fields to faculty at member institutions.*

**Objective IV.2:** (Student Research) Provide research opportunities where students gain hands-on knowledge of scientific methods and processes, gain understanding of the importance of teamwork and experience the exhilarating feeling of discovery. Spark student interest in continuing NASA-relevant research in graduate school and/or to enter the STEM workforce by working on NASA-related endeavors.

*Outcome indicator: 100% of the participants are exposed to current NASA research and 100% make presentations about their research experience at SC Academy of Science or a national meeting within one year of award.*

**Objective IV.3:** (Industry involvement) Establish and maintain linkages between SCSGC, higher education and industry in South Carolina by encouraging educational partnerships between the state's academic institutions and private industry.

*Outcome indicator: At least two collaborative proposals will be funded, promoting partnerships between industry and academic affiliates in South Carolina.*

**Objective IV.4:** (Diversity) Increase the participation of women and underrepresented groups in all aspects of SCSGC's higher education program.

*Outcome indicator: SCSGC will sponsor activities that encourage women and students from underrepresented groups to enter STEM careers.*

**Objective IV.5:** (Evaluation) The Consortium will develop methods to document, measure, and assess the impact of the higher education programs in conjunction with its implementation of an overall evaluation strategy (see Obj. I.9).

*Outcome indicator: Adjustments will be made to the higher education program to strengthen activities that are working and drop or improve activities that do not have the intended impact.*

#### **V. K-12 (Precollege) Education/Public Service**

**Goal 5: To promote a strong science, mathematics and technology base throughout all levels of South Carolina education.**

**Objective V.1:** (NASA dissemination) Contribute aerospace and space and earth science materials to the formal and informal education communities in South Carolina.

*Outcome indicator: SCSGC will distribute announcements of opportunities for education and curriculum enhancement in NASA-related fields to formal and informal educators across the state; Maintain and update the SCSGC website to provide opportunities and information to formal and informal education groups as well as the general public.*

**Objective V.2:** (Pre-service Educators) SCSGC will increase the number of quality educators pursuing STEM education degrees.

**Outcome indicator:** *SCSGC pre-Service awardees will be tracked to see how many complete their degree programs and become science and math teachers in SC. At least two awardees will pursue a career teaching STEM fields. SCSGC will also query their use of NASA educational materials in the classrooms.*

**Objective V.3:** (Science and education events) The SCSGC will support activities of scientific discovery across the state and will support NASA's commitment to renewing a spirit of exploration and discovery and will use the excitement of space exploration to promote this policy to the general public.

**Outcome indicator:** *SCSGC staff will develop and host opportunities to promote NASA throughout the state of South Carolina. In 2012, the SCSGC will host several statewide events to celebrate Space Grant's 25<sup>th</sup> anniversary and will host educator workshops and a few talks promoting use of NASA data and current results from NASA's missions.*

**Objective V.4:** (Diversity) Increase the participation of women and underrepresented groups in all aspects of SCSGC's pre-college/general public program.

**Outcome indicator:** *SCSGC will sponsor activities that encourage women and students from underrepresented groups to enter STEM careers.*

**Objective V.5:** (Evaluation) SCSGC will develop methods to document, measure, and assess the impact of the pre-college/public service programs in conjunction with its implementation of an overall evaluation strategy (see Obj. I.9).

**Outcome indicator:** *Adjustments will be made to the pre-college/public service program to strengthen activities that are working and drop or improve activities that do not have the intended impact.*

### **PROGRAM/PROJECT BENEFIT TO OUTCOMES (1, 2, OR 3)**

All Year 22 (2014-15) SCSGC projects are still on-going with the exception of the 2014 Palmetto Research Academy and NASA Summer 2014 Internships.

#### ***Outcome 1: Employ and Educate – SCSGC will contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals***

- In 2014, SCSGC funded 4 faculty and 16 students as follows: 3 faculty for research support and infrastructure; 1 faculty for an education research project. 2 graduate students, 6 undergraduate students, 3 Minorities in STEM (MIST) awards, 1 Kathy Sullivan Fellowship, 1 Bridging the Future Scholarship, and 3 NASA internships were awarded. Palmetto Research Academy awards: 4 faculty mentors and 8 students.

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

- SCSGC is working closely with 2 undergraduate students who are Blind/Visually impaired and 1 teacher who is Deaf. We also support a variety of professional development opportunities.

#### ***Outcome 3: Engage and Inspire – Build strategic partnerships and linkages with STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.***

- **Formal Education:** The SCSGC continues to support / offer professional development opportunities for teachers, and are often invited to present during other Professional Development workshops at the school and school district level.

- **Informal Education:** The SCSGC works closely with the SC State Museum, The Children's Museum, The Halsey Institute of Art and the Lowcountry Hall of Science and Math, and new partners: Dome Education and Roper Mountain Science Center. SCSGC was a part of the grand opening of the Telescope gallery, 4-D theater, planetarium and a dedicated NASA exhibit space at the SC State Museum in August, 2014. Together, SCSGC and our partners promote STEM literacy and raise awareness of NASA's mission and resources in South Carolina.

### **SCSGC PROGRAM ACCOMPLISHMENTS**

All of our programs are currently in progress and are scheduled to end on June 25, 2015 with the exception of the NASA 2014 Internships and the Palmetto Research Academy. The SCSGC annual goals and objectives address NASA Education Outcomes 1, 2 and 3:

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

- Fellowships and Scholarships – 24 students: SCSGC funded 2 graduate students, 6 undergraduate research awards, 3 NASA Center internships, 3 Minorities in STEM (NEW), 1 Kathy Sullivan Fellowship, 1 Bridging the Future scholarship, and 8 Palmetto Academy student awardees.
- Research Infrastructure - SCSGC funded 4 REAP faculty projects, for a total of \$57,000. These 4 projects involve 49 participants, ranging from faculty, undergraduate students, teachers and k-12 students. Of these 49, 17 are underrepresented minorities. Eighteen of these are undergraduate and graduate students, and 6 of these are either female and/or African American.
- Higher Education – SCSGC funded 4 faculty Palmetto Research Academy (PRA) projects at 4 SC Universities. 8 students participated. Projects ranged from earth science, biomedical science, bioengineering, physics/astronomy, and materials science.

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

- SCSGC is supported the College of Charleston's participation in the *National Solar Spectrograph Competition (NSSC) for 2014*: 1 faculty mentor, 6 students.

#### ***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 SCSGC has a variety of partners: Palmetto Scholars Academy (PSA), Trident Technical College, Orangeburg-Calhoun Technical College, Dome Education Portable Planetarium and Roper Mountain Science Center. Through these partnerships, students and faculty at the technical schools are eligible for all SCSGC programs. We are communicating with a potential new Native American partner.

### **PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES**

- **Diversity** - Of our 15 member institutions, four are HBCU's. Of our 6 Educational Partners, two are Technical Colleges, three are informal institutions/museums and one is a K-12 Gifted and Talented school. Each of our affiliate institutions serves underrepresented communities. Of our 15 member institution campus directors, four are female, one is African American and three are Asian.

- **Minority-Serving Institutions** - SCSGC continued nurturing relationships with the statewide community/ technical college system. Currently 4 HBCUs are members of SCSGC. We are exploring a fifth.
- **NASA Education Priorities** - Four programs in 2014 involved hands-on student research experiences involving 10 faculty, 18 graduate and undergraduate students, 11 in-service teachers and 10 k-12 public school students. SCSGC continues to support a two-semester course, involving science-interested students at CofC teamed with senior undergraduate engineering students at the University of Alabama – Huntsville to design and propose a planetary mission to a location in the solar system. Former undergraduate students involved in this course have all gone on to pursue a STEM-related career, received a NASA internship and/ or to graduate school for a Masters and Ph.D. SC Space Grant presented several NASA-related topics to pre-service teachers as part of a course on *Space Science for Teachers*. Half of the students in the class are planning to teach middle school. A similar course will be offered on *Earth Science* this summer. SC is a leader in aerospace science with the USC / McNAIR program that focuses on materials and aeronautics design. The SCSGC continues its relationships with the statewide community/ technical college system: Trident Technical College, Orangeburg-Calhoun Technical College, and Denmark Technical College. We are talking with a Tribal College about future partnership. Dr. Adem Ali at the College of Charleston is working with students to develop a comprehensive dataset containing water quality and radiometric measurements from a diverse set of locations in the US Virgin Islands and South Carolina. The Palmetto Academy project hosted by the Citadel focuses on developing a suborbital telescope camera engineering test-bed to fly aboard the XCOR Aerospace's Lynx spacecraft. The Citadel team successfully developed a mounting system for their telescope, as well as a design (and prototype) for a payload box for their electronics.

#### IMPROVEMENTS MADE IN THE PAST YEAR

Overall, the SCSGC has become more involved in the national space grant network; the Director was selected as a National Space Grant Alliance board member and was re-selected as the Science Mission Directorate space Co-lead and member of the SG Foundation Board. Discussions continue with local industry such as Boeing SC, Google Charleston and more.

#### PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

**Member institutions:** Benedict College, private, liberal arts College, HBCU; Coastal Carolina University, public, liberal arts College; The Citadel, public military College; Claflin University, independent, liberal arts College, HBCU; Clemson University, research-one University; College of Charleston, public, liberal arts College; Francis Marion University, public, liberal arts minority-serving institution (40%); Furman University, private, liberal arts College; Lander University, public, liberal arts University, minority-serving institution (24%); Medical University of South Carolina, research-one medical University; Presbyterian College, private, liberal arts College; South Carolina State University, land-grant public College, HBCU; University of South Carolina, research-one University; University of the Virgin Islands, public, liberal arts, HBCU; Wofford College, independent, liberal arts College

**Educational Partners:** South Carolina State Museum, informal education; Trident Technical College, Charleston, SC; Orangeburg-Calhoun Technical College, Orangeburg, SC; Palmetto Scholars Academy, Charter school for the Gifted & Talented, Charleston, SC; Dome Education



Portable Indoor Planetarium Program, Mt. Pleasant, SC; Roper Mountain Science Center,  
Greenville, SC