

Alabama Space Grant Consortium  
Lead Institution: The University of Alabama in Huntsville  
Director: Dr. John C. Gregory  
Telephone Number: (256) 824-6800  
Consortium URL: [www.uah.edu/ASGC/](http://www.uah.edu/ASGC/)  
Grant Number: NNX10AJ80H

## 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 Alabama Space Grant Consortium is a Designated Consortium funded at a level of \$575,000 for fiscal year 2013.

## PROGRAM GOALS

The Strategic Plan and Goals of the Alabama Space Grant Consortium (ASGC) contains the following Vision and Mission Statements. Our specific goals are aligned with the ASGC strategic plan, with NASA's Education Enterprise Strategy and Human Capital Management Plans, and with the recommendation of the President's Commission on Implementation of U.S. Space Exploration.

**Our Mission is:** to inspire, enable and educate a diverse group of Alabama students to take up careers in space science, aerospace technology and allied fields; to play our part in assuring U.S. leadership in space exploration and aerospace technology in the future; to inspire the next generation of space explorers; to bring increased realization of the value of space science and technology to the people of Alabama; and to insure that our message and our programs reach all constituencies in the population of Alabama, especially those traditionally under-represented in the science and engineering professions.

**Our Vision is:** an increased level of appreciation, participation and leadership by all the people of Alabama in the national and international space exploration and aerospace engineering enterprises. The ASGC program has, over the years, selected components in each of the NASA Space Grant national emphasis areas that also fit well with Alabama interests in one, and usually both, of the following senses: 1) there is a clear existing need and interest shown by an Alabama faculty member, a teacher, a group of students, school

system, university, industry, museum, etc.; and 2) there is evident willingness of an Alabama stakeholder to provide matching resources to achieve common objectives with NASA (the ASGC program shows match, or co-funding, mostly from non-federal sources of a ratio of 1:1 for every NASA dollar). *This 'buy-in' by our Alabama partners assures their enthusiasm and commitment to our joint goals.*

**Outcome 1 (Employ and Educate) - *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals, through a portfolio of investments.***

Programs contributing: Fellowship & Scholarship Programs, Research Infrastructure Programs and Higher Education Programs

**a). Fellowship & Scholarship Program Goals**

- Support and maintain our fellowship and scholarship program with high-caliber students;
- Recruit fellows and scholars at all 7 member Ph.D.-granting institutions;
- Each fellowship will be matched by another of equal value using local funds (approved and modified in 2013 to funding 1 full fellowship instead of 2 at each university – the ASGC will fund ½ and the university will fund ½); and
- Actively recruit and support students in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama. The diversity goals of the National program (40% women and 33% underrepresented minority students<sup>1</sup>) are in support of the National Center for Education Statistics (NCES) enrollment in degree granting institutions, by race/ethnicity of student and state of jurisdiction.

**Fellowship & Scholarship SMART Objectives**

- 1). All 7 member Ph.D.-granting institutions will have recruited a minimum of 3 fellows/scholars per university in FY2013.
- 2). In FY2013, each affiliate will continue to match ½ of each fellowship it receives (\$18,500) with the other ½ fellowship to be administered by ASGC at the same value (\$18,500) and will maintain the \$37,000 stipend level to remain competitive with other Federal agencies. (*This brings an additional \$111K of non-Federal funds into the ASGC fellowship program.*)
- 3). All recruited fellow and scholar awardees in FY2013 will have a diversity target level of 33% minority (increased from 25% in 2012) and 40% female participants.

**b). Research Infrastructure Development Program Goals**

- Support a significant number of motivated students and mentors encompassing a wide range of experiences in internships at NASA centers and collaborating industry;
- Recruit a diverse cadre of students to work on mentored research projects at our established REU Programs at Alabama universities;
- Ensure all REU projects funded with NASA funds shall be aerospace science and

---

<sup>1</sup> National Center for Education Statistics (NCES) Fall enrollment in degree-granting institutions, by race/ethnicity of student and state or jurisdiction; [http://nces.ed.gov/programs/digest/d11/tables/dt11\\_239.asp](http://nces.ed.gov/programs/digest/d11/tables/dt11_239.asp)

- technology or STEM focused;
- Support underrepresented faculty or faculty from our MSI members at research opportunities at NASA field centers; and
- Actively recruit and support students and faculty in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama. The diversity goals of the National program (40% women and 33% underrepresented minority students<sup>2</sup>) are in support of the National Center for Education Statistics (NCES) enrollment in degree granting institutions, by race/ethnicity of student and state of jurisdiction.

### **Research Infrastructure Development SMART Objectives**

- 1). A diverse group of 8 students from Alabama Universities will be placed as interns at NASA centers and collaborating industry in FY2013.
- 2). A diverse group of 24 students will be recruited to work on mentored research projects at 3-4 Alabama universities via our Research Experience for Undergraduates Programs in FY2013.
- 3). 1 underrepresented faculty or 1 faculty from our MSI members will be placed at a research opportunity at a NASA field center in FY2013.
- 4). All recruited research infrastructure development participants in FY2013 will have a diversity target level of 33% minority (increased from 25% in 2012) and 40% female participants.

### **c). Higher Education Program Goals**

- Support special courses in Space Hardware Building and Project Management;
- Maintain and grow student *Building Space Hardware* programs throughout the State of Alabama; and
- Actively recruit and support students and faculty in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama. The diversity goals of the National program (40% women and 33% underrepresented minority students<sup>3</sup>) are in support of the National Center for Education Statistics (NCES) enrollment in degree granting institutions, by race/ethnicity of student and state of jurisdiction.

### **Higher Education SMART Objectives**

- 1). Initiate or continue 3 special courses in Space Hardware Building and Project-Management at 3 Alabama universities in FY2013.
- 2). Maintain 15 student building space hardware programs at 6 universities in FY2013, including 4 programs at 2 HBCU's.
- 3). Initiate 1 new student building space hardware program at 1 university or 1 community college in FY2013.
- 4). All recruited higher education participants in FY2013 will have a diversity target level of 33% minority (increased from 25% in 2012) and 40% female participants.

---

<sup>2</sup> National Center for Education Statistics (NCES) Fall enrollment in degree-granting institutions, by race/ethnicity of student and state or jurisdiction; [http://nces.ed.gov/programs/digest/d11/tables/dt11\\_239.asp](http://nces.ed.gov/programs/digest/d11/tables/dt11_239.asp)

<sup>3</sup> National Center for Education Statistics (NCES) Fall enrollment in degree-granting institutions, by race/ethnicity of student and state or jurisdiction; [http://nces.ed.gov/programs/digest/d11/tables/dt11\\_239.asp](http://nces.ed.gov/programs/digest/d11/tables/dt11_239.asp)

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

**Precollege Education Program Goals**

- Support a select set of projects and events that emphasize the development of K-12 teachers, particularly in pre-service and in-service program areas, which encourage young students to prepare for STEM careers;
- Leverage funds with larger contributions from other sources;
- Focus on in-service and/or pre-service teacher training that results in deeper content understanding and/or competence and confidence in teaching STEM disciplines;
- Support science education needs in underserved schools;
- Support NASA Education programs;
- Evaluate programs to insure continuous improvement; and
- Direct programs to underrepresented and underserved populations.

**Precollege Education SMART Objectives**

- 1). 3 in-service and/or pre-service teacher educators will attend teacher educator workshops in FY2013.
- 2). In FY2013, 2 state Regional Science Olympiad and Science Fairs that are supported by the ASGC and held annually at the lead-institution will have over 1,500 participants.

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

**Informal Education Program Goals**

- Actively engage members of the public from traditionally underrepresented groups;
- Bridge the gap between Land and Earth Grant research and geospatial technology and societal needs in Alabama;
- Leverage funding;
- Engage college students in informal education initiatives; and
- Track impacts and evaluate programs success via quantitative and qualitative methods to insure continuous process improvement.

**Informal Education SMART Objectives**

- 1). 1 training workshop on satellite remote sensing and Geographic Information Systems (GIS) technology will be offered in FY2013 by 1 Alabama University.
- 2). In FY2013, support 1 Alabama science center/museum with outreach and teacher education projects.
- 3). Require each group that receives ASGC funding to provide a plan to deliver outreach activities in FY2013.

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

We provide some *anecdotal examples and consortium highlights* of how we are contributing to the 3 outcomes. All comments come from students and/or educators who were supported by the ASGC in FY2013.

### ***NASA Education Outcome 1:***

*Fact: 92% of students significantly supported by ASGC went onto STEM jobs or next steps in STEM disciplines.*

*“Through participating in the Alabama Space Grant program, I have become more dedicated than ever to working in the aerospace industry. I decided to leave my job at General Electric and work at the MSFC Huntsville Operations Support Center in order to use my education to support ISS operations and SLS development.” (Lindsay Shine - 2012 and 2013 ASGC Space Grant Scholar, UAH undergraduate student who now works for Colsa Corporation- NASA MSFC, Systems Engineering Co-op).*

*“I learned many intangibles, the things that you can't get from the classroom. This was my first experience working in a professional environment as opposed to an academic one. I also got the opportunity to meet and make contacts with many practicing engineers in industry.” (John Palmore - 2012 MSFC Propulsion Academy, UA Undergraduate Minor student, now admitted to Cornell University as a Graduate Research Assistant).*

### ***NASA Education Outcome 2:***

*“The Space Grant Program offered me a scholarship to assist in achieving my degree in the field of Education of Mathematics at the middle school and high school level. Currently I am teaching in a high school Geometry and Algebraic Connections classroom introducing mathematics to a new generation that will be entering the college life. I hope to persuade many of these young minds into starting a path involving mathematics.” (Ann Thomas - 2010 Space Grant Scholar, UA undergraduate student who now works for Florence City Schools - Math Teacher).*

*“The REU experiences have helped me gain a better understanding of evaluating progress in student’s academic work, which will help immensely when I pursue my Master’s in Math and Education.” (Andrea Winchester - 2012 and 2013 REU - Research Experiences for Undergraduates, UAH undergraduate student, works as a Student Specialist in the UAH Math Department).*

### ***NASA Education Outcome 3:***

ASGC affiliate, the U.S. Space and Rocket Center in Huntsville, received nearly \$1M grant from NASA to inspire students to enter careers in the field of science. Their proposal *“Engage and Equip to Empower: Building an S-Stem Generation”* was selected to receive \$998,000 over a 4-year grant period. The funding was offered through NASA’s Competitive Program for Science, Museums, Planetariums and NASA Visitor Centers program. The money will be used to develop an International Space Station exhibit called *“Space Station: Science in Orbit.”* The exhibit will allow

the USSRC to showcase the scientific work being done on the ISS. Also, some of the funding will be used to host STEM-con, a 4-day professional development conference for teachers in Huntsville which will offer workshops, hands-on activities and lesson plans and will bring together approximately 70 educators from Alabama, Tennessee, Arkansas, Iowa and Missouri. The space museum said at least 40% of the educators will be from schools in underserved or underrepresented communities and the participants will have the opportunity to earn up to 32 hours of continuing education credits.

ASGC affiliate, Sci-Quest, initiated “Space Day” on 5/4/13 where students were allowed to explore all things outer space. 150 elementary school-aged students were able to take part in several hands-on activities that taught them about rockets, the Solar System and beyond. Sci-Quest also takes their “Roaming Dome” traveling planetarium to various elementary schools throughout the school year, which instructs students about astronomy through digital presentations and movies.

## **PROGRAM ACCOMPLISHMENTS**

*NASA Education Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals (Employ and Educate).* ASGC FY2013 goals in alignment to Outcome 1 were met.

In FY2013, the ASGC provided support for **90** direct/longitudinally tracked student awards and **282** other student participants in the F&S, HE and Research Infrastructure categories.

### **Fellowship & Scholarship**

- A total of 52 fellowships and scholarships were awarded, directly funded, and longitudinally tracked in FY2013 (which is an increase of 7 additional scholarship awards and a decrease of 7 fellowship awards from the previous year necessary to accommodate reduced funding).
  - 6 Research Fellowships for Graduate Students (4 Doctoral; 2 Master’s).
  - 38 STEM Undergraduate Scholarships (25 seniors; 13 juniors).
  - 8 Scholarships for Pre-Service Teachers in Science & Mathematics (4 seniors; 4 juniors).
- All 7 member Ph.D.-granting institutions recruited and awarded fellows and scholars in FY2013 (AAMU, 4 students, AU, 12 students, UA, 4 students, UAB, 8 students, UAH, 6 students, USA, 10 students & TU, 8 students).
- Each member matched each fellowship it received at the same value. This brought an additional \$111K of non-Federal funds into the ASGC Fellowship program.
- Of the 52 F/S awards, 16 were made to underrepresented minority students (30.76%).
- Of the 52 F/S awards, 21 were made to female students (40.38%).
  
- In FY2013, ASGC offered 3 different competitive fellowship and scholarship programs to its affiliate members: Graduate Research Fellowships, Undergraduate Research Scholarships, and Pre-Service Teachers in STEM Scholarships. These programs engaged students in hands-on, aerospace-related research projects and

activities, and facilitated the development of mentor relationships between students, faculty and the NASA community. Special attention is given to women and underrepresented groups.

- The Graduate Research Fellowship students are engaged in mentor-based research at their home university and at a NASA field center location. They use their awards to advance their research and progress toward graduate degrees in space science and engineering. The privilege of doing research with faculty members and engaging in the required extramural experience with a NASA Center have added substantially to the preparation of the students for a career in aerospace fields. Fellowship graduate students are also required to perform an outreach service for the community during their tenure as a NASA Space Grant Fellow.
- The undergraduate scholarships are recruited in the same manner as the graduate fellowships and are awarded to promising junior and senior level undergraduates who express an interest and aptitude for space related careers. The undergraduate recipients, since FY2007, are required to submit a final report that consists of information on the aerospace related research that is being conducted on or around their campus by completing at least four researcher interviews during the scholarship year. Scholars are also required to participate in an outreach activity on or around their campus. Many scholars have taken advantage of opportunities to participate in research with faculty members, but this is not required. Scholarships are awarded in the amount of \$1K per student for the academic year and are renewable once, allowing each of the seven universities to have 6-7 undergraduate scholarships per year. In 1995, the ASGC began offering non-renewable Pre-Service Teacher Education Scholarships of \$1K as a way to encourage secondary education students in their pursuit of math and science education careers.
- All our scholarships and fellowships are awarded competitively at the affiliate level. They are open to U.S. citizens enrolled full time at an affiliate institution (must have a min. 3.0 GPA and a STEM major). Opportunities are publicized through campus visits, print media, on our website and via social media. The application procedure is exactly the same for all students at all affiliates. The on-line application system is administered by the National Space Grant Foundation/Education Programs Support Services. All application forms, transcripts, research abstracts, timelines and recommendation letters are posted on-line. Once the deadline has expired, a summary report is sent to the Consortium office and each Campus Director receives secure access to applications. Applications are evaluated based upon academic achievement, quality of research project (if required), recommendations and evidence of leadership qualities. After the Campus Directors hold their own review committees, the final rankings from each campus are sent to the program office and all awards are voted on and equitable distribution is made.
- Competitiveness: Scholarship and Fellowship programs are open to U.S. citizens enrolled full time at an affiliate institution (must have a minimum 3.0 GPA and STEM major). Opportunities are publicized through campus visits, print media, and social networking. Applications are evaluated based upon academic achievement, quality of research project (if required), recommendations, and evidence of leadership qualities. Final decisions (made by the ASGC Management Council) consider the averaged rankings and the need to ensure equitable distribution.

- F/S Participating Members: AAMU, AU, UA, TU, UAB, USA & UAH.
- *“The NASA Alabama Space Grant Scholarship award allowed me to meet great people and to finish my degree without debt. It also contributed to the job I got immediately after college.” (Amber Kaderbek - 2012 Space Grant Scholar at UA who now works for Science Applications International Corporation - Avionics).*
- ASGC Fellow from AAMU, Dr. Ross Fontenot, graduated in May of 2013, and accepted a position as a Sr. Editor (Reviewing Editor) at Editage, a publication support company and in April of 2014 he will become an Assistant Research Professor of Physics at the University of Louisiana at Lafayette. As an ASGC fellow, he published 20 articles on his research in physics.
- ASGC scholar and member of the UAH Space Hardware Club, Britney Searcy (female), was awarded the Dr. Jan Davis (former female astronaut who attended AU and UAH) Engineering Scholarship in 2013. This scholarship is awarded to female students enrolled in the College of Engineering who are pursuing a degree in Mechanical or Aerospace Engineering. Britney’s relationship with the ASGC was key in her receiving this scholarship.
- 24<sup>rd</sup> Annual Scholarship and Fellowship Awards Ceremony was held at NASA MSFC’s Propulsion Research Laboratory on November 1, 2013. MSFC’s Director of the Office of Human Capital, Ms. Tereasa H. Washington and MSFC’s Associate Director – Technical, Dr. L. Dale Thomas, welcomed the Scholars and Fellows and Mr. Samuel A. Ortega, Manager for the Centennial Challenges Program, was the Guest Speaker for the event. Tours of MSFC’s Advanced Welding and Manufacturing Facility (Stir Friction Welding), the Environmental Control Life Support Systems (ECLSS) Test Facility and the Deep Space Habitat were provided for the awardees.

### **Higher Education**

- Provided support for **4** significant/direct student participants and **259** other students in Higher Education programs.
- Higher Education programs are innovative student-led, hands-on student experiences in STEM disciplines at Alabama universities including space hardware building special courses, Sr. Design courses and project management.
- HE Participating Members: AAMU, AU, UA, TU, USA, UAH, BSCC & SSCC.
- Provided continued support for 3 revised special courses in Space Hardware Building and Project Management.
  - AAMU – EE 470/471: Dr. V. Trent Montgomery, “A Comparative Analysis of Balloon Payload Stabilization Methods”. This course is a required senior design course for students majoring in Electrical Engineering at AAMU. The students were divided into two groups to develop projects that would do a comparative analysis of several methods of stabilizing the payload of a high altitude weather balloon. The students were able to enhance their ability to work in a team, learn the salient components of project management to include time management, organization and partitioning of the project, and the need to set milestones, experiment with test and evaluation techniques, learn the principles of systems engineering and demonstrate a knowledge of cost analysis and engineering trade-offs.



- UAH – EE 494: Dr. Charles Corsetti, “Capstone Engineering Design Course – ECE BalloonSat”). This course is a required senior design course for students majoring in Electrical Engineering (seniors) before graduating at UAH. The course required students to work as teams under the direction of a faculty member to design, fabricate and test their projects. Students were evaluated on their research abilities, problem-solving and decision-making skills, their technical and design skills, and their oral and written communications abilities. This course emphasized the engineering design process as well as the professional development of future engineers. The program had the benefit of enhancing the students experience to address engineering design problems and provide the student with “real world” experience desired by the engineering community. UAH participated in joint BalloonSat launches with AAMU, an HBCU.
- UAH – MAE 490/493: Dr. Robert Frederick & Dr. David Lineberry, “Investigation of a Dielectrophoresis Propellant Management System for Low Gravity Applications”. This course is a senior design course for Mechanical and Aerospace Engineering (MAE) seniors before graduating at UAH. Students from the MAE department designed, built and flew the rocket and payload as part of a two-semester senior design course. The rocket built during this course was used as part of the NASA Student Launch competition. In addition to building the rocket, students were able to use public relation resources to provide outreach STEM activities for local middle school students which to encourage them to pursue science, technology, engineering and mathematics fields of study.
- Provided support for **23 Students Building Space Hardware Programs, or SSP’s**. These SSP’s were in the following areas: BalloonSat, CanSat, CubeSat, Design/Build/Fly, Hovercraft, KSC Robotic Mining (formerly Lunabotics), MSFC Rover Challenge (formerly Moonbuggy), and NASA/MSFC Student Launch (rockets) at 6 universities (AAMU, AU, UA, UAH, USA, and TU) and 2 Community Colleges (Bevill State and Shelton State). This included 4 programs at 2 HBCUs (Moonbuggy, BalloonSat and Student Launch at AAMU, and CubeSat at TU).  
SSP Highlights Include:
  - The ASGC-funded student rocketry team from Alabama A&M (HBCU) in Huntsville, AL received the university-level “Closest to Altitude Award” for coming closest to the specified 1-mile altitude goal during NASA’s annual Student Launch Competition. Their rocket reached an altitude of 5,269 feet - just 11 feet off the mark. The competition took place on April 21, 2013. The team is advised by Dr. Mohamed Seif, Department of Mechanical Engineering. Participating in Student Launch requires commitment and discipline. The program is an 8-month or academic-year commitment with multiple requirements, chief among them a series of reports and reviews, a website, education outreach in the local community, provision of a timeline, a budget and various payload requirements. AU, USA, AAMU, UA and UAH all have been selected by NASA to compete in the 2013-2014 Student Launch Competition that will take place on May 14-18, 2014 on the Bonneville Salt Flats, UT.
  - Two ASGC-sponsored teams won awards during NASA’s Great Moonbuggy Race

Awards Ceremony at the U.S. Space and Rocket Center (USSRC) on 4/27/2013. UAH won the “Systems Safety Award” (for the safest approach to building, testing and racing) and Bevill State Community College Team I., from Sumiton, AL won the “Crash and Burn Award” (for the team that endures the most spectacular vehicle breakdown) during the race. AU, AAMU, UAH and BSCC all plan to compete in the NASA Rover Challenge (former Great Moonbuggy Race) on April 10-12<sup>th</sup>, 2014 at the USSRC.

- AU is currently working on their second CubeSat project after the success of their first one. Their program is really taking off. Their CubeSat and other Space Hardware Building projects currently has 3 rooms dedicated to them within the Physics Dept. Drs. John Klingelhofer, David Beale and J-M Wersinger are their faculty advisors.
- UAH is currently working on their second CubeSat project (ChargerSat-2). This satellite will host a scientific payload that researches nucleate boiling in microgravity. The ChargerSat-2 team has been accepted by NASA for a no-cost microgravity flight onboard a reduced gravity aircraft. This manned experiment will demonstrate the new technologies to the ChargerSat program, namely the boiling instrument operating in reduced gravity and the re-deployable particle deflector. The microgravity flight is expected in 2014. The UAH SHC also is currently working on CanSat, BalloonSat, Planetary Rover, Outreach and Microgravity projects in 2013. Dr. Francis C. Wessling, Dept. of Mechanical & Aerospace Engineering, is their advisor.
- The UAH Space Hardware Club’s ChargerSat-1 (CubeSat) team traveled to Wallops Island, Virginia to watch their satellite launch into orbit aboard a Minotaur 1 rocket on 11/19/2013. The satellite was launched on the U.S. Air Force’s Operationally Responsive Space 3 mission. The ChargerSat-1 has 3 main objectives that will go to improve operations for picosatellites, or miniaturized satellites like the ChargerSat-1. They include improving communications for picosatellite operations, demonstrating passive nadir axis stabilization for altitude control, and improving solar power collection for operations. The UAH SHC is currently comprised of 30 members from more than 7 departments exercising their skills in developing the satellite, ground station and testing program. SHC members will be in constant communication with the ChargerSat-1 to chart its progress for the 2-year duration of its mission, using information that it will send back through radio transceivers and other data collection devices. The teams’ CubeSat went from concept to delivery in 3 years. The SHC is advised by Dr. Francis C. Wessling, UAH Dept. of Mechanical and Aerospace Engineering.
- UAH competed in NASA’s Robotic Mining Competition for the first time in University history at KSC in May of 2013. This Mining Competition is for university-level students to design and build a mining robot that can traverse the simulated Martian chaotic terrain, excavate Martian regolith and deposit the regolith into a Collector Bin within 10 minutes. UA competed for the 4<sup>th</sup> time in a row in NASA’s Robotic Mining Competition at NASA’s KSC. In May of 2013 they came in third place for the Joe Kosmo Award for Excellence (Grand Prize). Their team “The Lunar Tide” competed in collaboration with Shelton State Community College. The team also won first place in the “Systems Engineering Paper Award” as well as first place in the “Slide Presentation and Demonstration Award”. The Lunar Tide is

mentored by Dr. Kenneth Ricks, UA Dept. of Electrical and Computer Engineering.

- ASGC scholar, Ali Hisham, in collaboration with UA and AU created and competed in the “University Hoverbowl Challenge” on 4/27/2013. Two senior design classes at AU and UA designed and built hovercrafts and the race took place at Lake Lurleen in Tuscaloosa on 4/27/13. AU came out victorious. The two teams plan to compete again in 2014.
- ASGC continues to support SSP’s at **community colleges**. Bevill State and Shelton State both have SSP’s and we are currently working with Gadsden State Community College (GSCC) on developing a new SSP in 2014. We also plan to establish a new HBCU Community College partnership with J.F. Drake State Technical College in CY2014. Drake State is located in Huntsville, AL. We plan to do this through collaboration with the Configurable Space Microsystems Innovations and Applications Center (COSMIAC). The ASGC feels this relationship with Drake State will help students learn skills to help build and track space hardware such as BalloonSat’s, CanSat’s and CubeSat’s. The initial meeting with Drake State took place on 12/12/2013 and follow-up meetings have been scheduled.
- ASGC continues to support a Community College Bridge Program in FY2013. Community College students rarely get exposure to research and lab environments prior to transferring to a senior college. Academically, Community Colleges offer affordable alternatives to Universities. In this economy the number of students entering community colleges with engineering as their declared major is growing. This project gives Shelton State Community College (SSCC) students new opportunities and encourages an on-going relationship with UA. This project also provides SSCC students the opportunity to engage in research that will promote their educational goals. Each student is able to choose a particular research project from the list provided by UA’s Campus Director, Dr. John Baker. This project is managed by Ms. Renea Randle (female) Mathematics instructor. In FY2013 SSCC students (including 1 female and 1 underrepresented students) collaborated with UA’s Lunar Rover (formerly Lunabotics) and Student Launch Competition teams.
- ASGC supported 1 team from UA to compete in the American Institute of Aeronautics and Astronautics (AIAA) Design/Build/Fly (DBF) competition. This competition provides undergraduate level college students a unique opportunity to practically implement the knowledge acquired throughout their college education, learning how to work as a team, and designing, testing, building and flying a remote controlled airplane. The competition specifies 3 design challenges, and the team must use the skills gained over the past years to design a radio-controlled aircraft that can meet these challenges. Along with the design challenges, the team is also placed under budgetary and time constraints. This competition provides real-world aircraft design experience for engineering students by giving them the opportunity to validate their analytic studies.
- *“The Alabama Space Grant has allowed me to pursue my academic goals with less of a financial burden with scholarship funding, and sponsorship of Auburn University's Student Space program (AubieSat and the Auburn High Altitude Balloon club) was a wonderful way for me to cement my desire to be in an Aerospace career. The AubieSat and AHAB groups gave me skills experiences that I would not have otherwise had, which have both made me a better student and better candidate in the*

*job market. Participation in these groups contributed to me getting my internships, as well. I would not have had the opportunities that I currently do if Dr. J-M Wersinger, the program leader for AubieSat, did not introduce me to the ULA internship program. The Alabama Space Grant Consortium has affected my college career in a huge way, both through its funding of school programs and its scholarship.” (Stephen Samples - 2012 Space Grant Scholar, AU undergraduate student, United Launch Alliance - Advanced Programs Intern).*

### **Research Infrastructure**

- Provided support for a diverse group of **34** direct/longitudinally tracked student participants and **23** other student participants in Research Infrastructure programs such as the Research Experiences for Undergraduates programs (REU’s) and student research internship programs.
- Student Internships: Internship programs are 10-12 week experiences. They engage high quality graduate and undergraduate students that are interested in STEM fields, as well as other subject areas, in research-focused work environments. ASGC supports student internships annually at NASA Centers and with industrial partners. This is one of the best ways to help students get hired into NASA. Students get a chance to work with NASA scientists and engineers and decide if that is their career of choice. We have begun tracking these students since FY2005 as the typical stipend for an internship is ~\$5-7K and sometimes includes a travel stipend if they are required to travel long distances.
- Student Internship Competitiveness: Interested students apply through the NASA OSSI website or other websites currently accepting applications for summer interns. Mentors at the various NASA Centers or industrial partners make the selections based upon U.S. citizenship, the students application, GPA, letters of recommendation, experience level and best fit for the open position. The ASGC office gives final funding approval.
- Provided support to a diverse group of 28 undergraduates, direct funded students to work on mentored research projects at 3 Alabama universities (UAB, UAH & USA) via our Research Experience for Undergraduates Programs in FY2013. 6 underrepresented (21.42%) and 14 females (50%) were included.
- Research Experiences for Undergraduates (REU) Programs: ASGC supported 3 REU programs at 3 affiliate universities (UAB, UAH and USA) in FY2013. These experiences are like internships, but are hosted at Alabama Research universities, rather than at NASA Centers. Our REU programs are interdisciplinary and involve women and underrepresented minorities. The programs target rising juniors/seniors with a minimum GPA of 3.0. with the applicant process being highly competitive. Stipends paid to the students are typically \$3K-6K for a 10-12 week, full-time experience. REU programs act as an excellent feeder program to various science and engineering graduate programs and hence they form a critical link in the pipeline for Aerospace Workforce Development efforts in Alabama. The programs reach about 50 students per year, but the ASGC only funds students enrolled in STEM fields. REU program managers, all full-time faculty engaged in research, are encouraged to seek out women and minority participants. All of the students prepare and submit final reports and present their work in a talk and poster session. Outcomes of major

importance include entry to graduate school and number of research publications on which the students name appears.

- REU Programs Competitiveness: Students are selected to participate in this program based on academic achievement, leadership, and letter of recommendation and there is a faculty mentor willing to work with the student on a specific research project. An official committee of university faculty members is established at each of the participating affiliate university to select the students and match them with a mentor. These programs are advertised to all STEM departments including diversity organizations.
- AL Student Travel Awards: Student travel awards were given to students to travel to workshops and to travel to various conferences and meetings. Students are able to give presentations and network with other students and professionals.
- AL Student Travel Awards Competitiveness: Students, graduate and undergraduate, are selected after recommendations from student club leaders, Campus Directors at respective universities or by the ASGC Director and/or Assistant Director based on student merit.
- RI Participating Members: AAMU, AU, UA, TU, UAB, USA, UAH & BSCC.
- In February 2014, ASGC received notice that 7 AL students were selected in cohort VI. to be Student Ambassadors as part of the NASA Student Ambassador Virtual Community due to a result of their past student internship and other participation at NASA centers. The students selected were: John Alcorn (UAH), Mark Becnel (UAH), Roberto Dextre (UAH minority male), Patrick Giddens (UAH), Paige Green (AAMU minority female), Shawna King (AAMU minority female) and Markus Murdy (UAH). This brings a total group of 21 NASA Student Ambassadors selected for the state. Through a virtual community, ambassadors interact with NASA, share information, make professional connections, collaborate with peers, represent NASA in a variety of venues, and help NASA inspire and engage future interns. The ambassador website offers the latest NASA news, blogs, and announcements; member profiles, forums, polls, and NASA contact information; and links to cutting-edge research and career resources. This program helps serve the agency's major education goal of strengthening NASA and the nation's future workforce by developing the critical skills and capabilities needed to achieve its mission.
- Provided support for 6 Higher Education students as interns (1 female, 5 male, 4 underrepresented minorities) in the summer of 2013 at NASA Centers. They worked on the NASA MSFC Robotics Academy and the NASA MSGR Programs. We missed our target objective of 8 student interns due to reduced funding.
- *“My NASA Internships have helped define my career and academic goals, and have helped me learn what it takes to succeed in a technical work environment. I have also benefited from getting to know individuals at NASA and in the industry.” (John Alcorn - 2012 NASA MSFC Intern, NASA Goddard Intern and 2013 ASGC Space Grant Scholar, UAH Mechanical & Aerospace Engineering undergraduate).*
- *“My summer NASA internship put me in an environment where others recognized my skills and were able to deal with my disability. Because the environment at NASA is team-oriented, it allowed others on my team to look past my disability and fully integrate me into the team and its work. As a result of this internship, I was hired as a part-time contractor to continue the project plus while continuing my degree*

*studies. My goal after graduation is to get a full-time position with NASA MSFC and help bring recognition to others who have a strong skill-set, that are normally overshadowed by their disability. By having this internship, it has allowed me to gain a respect for my family, my colleagues and myself.” (Glenn Scott Nesbitt, II. - 2013 NASA Internship, UAH Mechanical & Aerospace undergraduate minority student and NASA MSFC Glass Rack Trainer).*

- Provided support to 1 female faculty member from 1 CC (BSCC) to attend and present at the 2013 American Technical Education Association (ATEA) National Conference in Chattanooga, TN on March 20-21, 2013. Maurice Ingle presented on Kinesthetic Learning in Regards to Moonbuggy Building.
- Provided support for 1 AU professor and 2 AU students to attend the CubeSat Developers Conference in San Luis Obispo in April 2013. These students work on AU’s CubeSat Program.
- Provided support for a Tuskegee University, underrepresented, Physics major, Alejandra Sandoval (underrepresented female) to attend the 90<sup>th</sup> Annual Meeting of the Alabama Academy of Science at Samford University, in Birmingham, AL on March 21, 2013. *She won first prize in the oral presentation contest.*
- Assisted the Huntsville Chapter of the National Space Club, the American Astronautical Society and UAH in promoting and recruiting students to participate in the 6<sup>th</sup> Annual Wernher von Braun Memorial Symposium student poster contest that was held in Huntsville on October 7-9, 2013. The contest allows for UAH students to display their research posters and give presentations about their research. The winners: Category 1: Physical and Liberal Sciences (Atmospheric Science and Environment, Space Policy, History, Space Weather and Astrophysics, Space Health), First Place - Deidra Fortenberry Carter, "Promoting Human Health through Manned Space Flight"; Second Place - Zachary Robinson, "Design Reference Space Radiation Environments for Spacecraft Design and Mission Planning". Category 2: Engineering, (Propulsion, Space Hardware, Data Management and Systems), First Place - John Bennowitz, "High Frequency Combustion Instability Suppression through the Application of Varying Bands of White Noise", Second Place - Ayshah Alatawi, "Method and Implementation of Absolute near Cylindrical Wavefront Testing".
- Provided support for 1 Aerospace Engineering student (Mark Becnel, from UAH) to present and participate in a student poster session at the National Council of Space Grant Directors’ Fall Meeting in Charleston, SC on October 2013. The students were also able to tour Boeing that consisted of the 787 Final Assembly building, a Boeing site overview, and an airplane building activity.
- TU aerospace engineering students involved in the department’s GraviTU program were a part of NASA’s micro-gravity experimental education program that took place at NASA’s JSC in Houston, TX on November 2013. This was TU’s second appearance in the program after first being selected initially in 2011. GraviTu students that were selected to participate in the program were: Alejandra Sandoval, Edward C. Moore, Antoine Smith, and Tyrell Yorke. They were assisted by their faculty adviser as well as a NASA mentor who helped guide them through the development stage of their experiment. Their faculty adviser was M. Javed Khan, Professor and Dept. Head of the Aerospace Science Engineering Department; and

their NASA mentor was Dr. N. Ramachandran. Dr. Khan said, *“This is an excellent opportunity for Tuskegee aerospace science engineering students to interact with NASA scientists and engineers while working on a realistic research problem. The students learn about team work, the challenges associated with working on a project, specific deadline, and satisfying external stakeholders’ requirements.”*

**NASA Education Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty. (Educate and Engage).* ASGC FY2013 goals in alignment to Outcome 2 were met.

### **Precollege/K-12**

- Provided support for a 1-week summer program in FY2013 that targeted underrepresented, underserved female high school students (35 students) from the greater Mobile area through an outreach program involving Bioengineering and Chemical Engineering (BEACHES) at the University of South Alabama (USA). The students were provided with opportunities to interact with scientists and engineers at USA with intentions of getting these students into the STEM pipeline and go onto pursue degrees in STEM fields once they graduate high school.
- Provided support for a yearlong program that uses problem solving to educate students in FY2013. The Mobile Mathematics Circle specifically targeted underrepresented, underserved middle and high school students from Mobile County (122 students from 19 schools). This program also organized a Mobile Mathematics Olympiad whose goals were to increase the knowledge and conceptual understanding of students, to help them develop analytical thinking skills, and to educate students to pursue further study and careers in mathematics and science fields.
- Provided support for 448 middle and high school students to participate in the annual North Alabama Science Olympiad held on February 15, 2014 held at UAH. The website for the event is located at: <http://nsstc.uah.edu/scienceolympiad/> The Olympiad consists of middle and high school students from across North Alabama where they working in teams and face more than two dozen thought provoking activities. They will call on scientific knowledge, deduction and analysis to (among other things) launch rockets, design a robot, and build the strongest tower. The top 3 middle and high school teams will advance to compete in the Alabama State Science Olympiad.
- Provided support for 352 elementary, middle, and high school student projects from the public and private schools in 9 counties in North Alabama to compete in the North Alabama Regional Science and Engineering Fair (NARSEF) on March 12-14, 2014 at UAH ([www.narsef.uah.edu](http://www.narsef.uah.edu)). Dr. Shankar Mahalingam is the Fair Director.
- Provided support for 220 student projects (first and second place winners of their regional fairs) in various categories of science and engineering projects from middle and high schools from all 67 counties from the state of AL to participate in the 2014 Alabama Science and Engineering Fair (ASEF) on April 3-5, 2014 at UAH. These events are venues to attract students in informal education initiatives and allow us to leverage our funding with co-sponsors. Members of the public from the entire State of Alabama are present at these events ([www.asef.uah.edu](http://www.asef.uah.edu)). Dr. Vladimir Florinski is the Fair Director.

- Planning to provide support for 8 pre- and in-service teachers to attend the LiftOff 2014: Let's Engineer It! Summer Institute in Houston, TX managed by the Texas Space Grant Consortium in collaboration with the NASA Johnson Space Center and the Middle School Aerospace Scholars Program on July 7-11, 2014 if they are selected and to other institute opportunities around the state.
- Various competitions such as the NASA Student Launch Competition and our ASGC Fellowship and Scholarship programs require outreach components. All ASGC outreach programs target underrepresented and underserved elementary, middle school and high school students and educators from the state.
- We are continuing our work with the UAH Institute for Science Education and the Alabama Mathematics, Science, Technology and Engineering Coalition (AMSTEC) for Education to provide new BalloonSat opportunities for Middle School Students and K-12 educators. Middle school students will be provided with an exciting introduction into the engineering process in the aerospace world of 'design, build, fly and evaluate.' The classroom curriculum will track the BalloonSat experience and the intention is to use this project as a pilot for a feeder-system into the established Alabama Engineering Academy Initiative in area high schools. This opportunity will target schools having high minority participation and they hope to see increased SAT scores in physical science.

***NASA Education Outcome 3:** Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire). ASGC FY2013 goals in alignment to Outcome 3 were met.*

### **Informal Education**

- ASGC affiliate, the U.S. Space and Rocket Center in Huntsville, received nearly \$1 million grant from NASA to inspire students to enter careers in the field of science. Their proposal "Engage and Equip to Empower: Building an S-Stem Generation" was selected to receive \$998,000 over a 4-year grant period. The funding was offered through NASA's Competitive Program for Science, Museums, Planetariums and NASA Visitor Centers program. The money will be used to develop an International Space Station exhibit called "Space Station: Science in Orbit." The exhibit will allow the USSRC to showcase the scientific work being done on the ISS. Also, some of the funding will be used to host STEM-con, a four-day professional development conference for teachers in Huntsville which will offer workshops, hands-on activities and lesson plans and will bring together approximately 70 educators from AL, TN, AR, IO and MO. The USSRC said at least 40% of the educators will be from schools in underserved or underrepresented communities and the participants will have the opportunity to earn up to 32 hours of continuing education credits. The USSRC is among 10 informal learning institutions to received a total of \$7.7 million in grants from NASA.
- ASGC was asked to participate in the Social Media Symposium in Huntsville, AL by our affiliate partner, U.S. Space & Rocket Center (USSRC). It took place on November 6-8, 2013 at the USSRC. We provided ASGC materials to attendees that promoted our Facebook and LinkedIn Social Media Sites and answered questions



regarding how students and others use our social media. This did not cost the ASGC anything in \$'s, and we saw it as an opportunity as free advertising for the ASGC. The ASGC continues to improve upon social media avenues to promote NASA opportunities and ASGC events/accomplishments and to become more engaged with other professional networks, students, faculty and professionals (i.e., Facebook, LinkedIn).

- 1 training workshop on Geosciences and Remote Sensing was hosted by AAMU in FY2013 with 80 participants in attendance from AL, TN, LA and MS.
- ASGC affiliate, Sci-Quest, initiated “Space Day” on 5/4/13 where students were allowed to explore all things outer space. 150 elementary school-aged students were able to take part in several hands-on activities that taught them about rockets, the Solar System and beyond. Sci-Quest also takes their “Roaming Dome” traveling planetarium to various elementary schools throughout the school year, which instructs students about astronomy through digital presentations and movies.
- All ASGC fellows and scholars are required to participate in an outreach activity on or around their campus and we require each group that receives ASGC funding to provide a plan to deliver outreach activities.

### **Miscellaneous**

- Published and disseminated one annual *ASGC newsletter*.
- Created and published our annual *2013 ASGC Student Journal* which features all 52 fellows and scholars with their career goal statements, research, publications, head shots, and a letter from the Director.
- Updated our annual *ASGC Factsheet* which details all 52 fellowship and scholarship awardees, REU students, interns, etc. broken out by their 7 Alabama Congressional Districts, programmatic funding by district breakdown and other photos of various programs that occurred during the funding year.
- ASGC celebrated the 25<sup>th</sup> Anniversary of the National Space Grant Program in October 2013 at the Space Grant Directors’ Meeting in Charleston, SC. A publication, “*NASA National Space Grant College and Fellowship Program Celebrating 25 Years*” was created to focus on each of the state’s programs. ASGC chose to highlight UAB Engineering student, Carrie Schindler (female). The link to the publication can be found here: <http://national.spacegrant.org/>
- Plan to host 24 students from 8 Oklahoma universities on March 17-21, 2014 on tours of NASA MSFC and various labs at the University of Alabama in Huntsville. These students were selected due to their STEM disciplines related to the research and mission of MSFC. They want to learn more about intern and job related opportunities as well as see how we run our Space Hardware Club building operations.

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

### **Student Data and Longitudinal Tracking**

- Students meeting criteria for longitudinal tracking, 90, including:  
Fellowship/Scholarship = 52, Higher Education/Research Infrastructure = 38; 30 of the total awards represent underrepresented minority funding (16 of the 30 are

Fellows and Scholars). During the FY2013 program year, 68 students took next step in FY2013 (SG participation supported from FY2006-FY2013 funds). During the FY2013 program year 18 students are pursuing advanced degrees in STEM disciplines, 1 is seeking a STEM position, 10 accepted STEM positions at NASA contractors, 29 accepted STEM positions in industry, 1 accepted a position at NASA, 5 accepted STEM positions in academia, and 3 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing while they received their Space Grant award.

*Longitudinally Tracked Total Underrepresented = 33.30% (30 students). Meets 33% target.*

*Longitudinally Tracked Total Females = 41.11% (37 students). Meets 40% target.*

### **Minority Serving Institution Collaborations**

- The ASGC currently has 2 universities, Alabama A&M University (AAMU) and Tuskegee University (TU) and 1 community college, Shelton State (SSCC) designated as Minority Serving Institutions that we supported in FY2014. Both AAMU and TU are federally recognized as Historically Black Colleges and Universities (HBCUs). ASGC's Associate Director, Dr. Teresa Merriweather Orok (underrepresented female), is from AAMU along with our Campus Director, Dr. V. Trent Montgomery (underrepresented). Our Campus Director, Dr. Gregory Murphy (underrepresented), represents TU. AAMU is a charter affiliate member of the ASGC and TU became an affiliate member of the ASGC in 2003. Both of these universities are research, Ph.D.-granting institutions. The Campus Director for SSCC is Ms. Renea Randle (female). Both AAMU and TU have members on the ASGC's Policy Advisory Council. ASGC's collaborative interactions and programs with MSI's include:
  - Fellowship and Scholarship programs at AAMU (4 students - 1 fellow, 3 scholars) and TU 8 students – 8 scholars). Of the 52 Fellowship and Scholarship awards distributed in FY2013, 16 fellowships and scholarships were made to underrepresented minority students (30.76%) and the longitudinally tracked total of underrepresented minority students = 33.3% (30 students).
    - Sounding BalloonSat program at AAMU, Drs. Trent Montgomery and John Picarillo.
    - NASA Rover Challenge (formerly Moonbuggy) Program at AAMU, Dr. Amir Mobasher.
    - High powered rocketry program (NASA Student Launch) at AAMU, Dr. Mohammed Seif.
    - Geoscience and remote sensing workshop at AAMU, Dr. Kaveh Heidary.
    - Microgravity Program at TU, Dr. Javed Khan.
    - CubeSat Program (development phase) at TU, Dr. Javed Khan.
    - Bridge Program to place students on the University of Alabama (UA) Robotic Mining (formerly Lunabotics) and NASA Student Launch teams at SSCC, Ms. Renea Randle and Dr. John Baker.
    - Engineering Day at SSCC (April 17, 2014), Ms. Renea Randle organizes a half-day seminar at the end of the spring semester where the students will give presentations detailing their experiences at UA. Other Shelton Students who are

enrolled in the pre-engineering courses will have the opportunity to showcase class projects. Speakers from the University of Alabama and the Alabama Space Grant Consortium are invited and give presentations. Area high school juniors and seniors are also invited to Shelton's campus.

- STEM Day at AAMU (April 12, 2013). AAMU hosts a poster session, panel discussion on STEM, STEAM and STEMAH as well as NASA Rover Challenge (formerly Moonbuggy), NASA Student Launch and BalloonSat demonstrations. STEM Day benefits research, education, public health/health science and the surrounding business communities, as well as north Alabama-area high schools. AAMU students at the undergraduate and graduate levels, along with their mentors/advisors, present posters on various research and senior design projects in STEM disciplines.
- Various competitions such as the NASA Student Launch Competition and our ASGC Fellowship and Scholarship programs require outreach components. All ASGC outreach programs target underrepresented and underserved elementary, middle school and high school students and educators from the state.

### **NASA Education Priorities**

- *Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.*
  - ***Hands-on student experiences Students building Space Hardware Programs, or SSP's, are the major component of the ASGC program. In 2013 we had 23 such programs at 9 campuses (3 of which are MSI's) plus 4 REU programs and the NASA Internship program. All these REU programs and SSP's are authentic hands-on student experiences in STEM fields.***
  - ASGC provided support to 6 interns as participants in a hands-on experience at NASA Centers in FY2013.
- *Diversity of institutions, faculty, and student participants (gender, underrepresented, underserved).*
  - The ASGC currently has 2 universities, Alabama A&M University (AAMU) and Tuskegee University (TU) and 1 community college, Shelton State (SSCC) designated as Minority Serving Institutions that we supported in FY2014. Both AAMU and TU are federally recognized as Historically Black Colleges and Universities (HBCUs). ASGC's Associate Director, Dr. Teresa Merriweather Orok (underrepresented female), is from AAMU along with our Campus Director, Dr. V. Trent Montgomery (underrepresented). Our Campus Director, Dr. Gregory Murphy (underrepresented), represents TU. AAMU is a charter affiliate member of the ASGC and TU became an affiliate member of the ASGC in 2003. Both of these universities are research, Ph.D.-granting institutions. The Campus Director for SSCC is Ms. Renea Randle (female). Both AAMU and TU have members on the ASGC's Policy Advisory Council. ASGC's collaborative interactions and programs with MSI's include:
    - Fellowship and Scholarship programs at AAMU (4 students - 1 fellow, 3

- scholars) and TU 8 students – 8 scholars). Of the 52 Fellowship and Scholarship awards distributed in FY2013, 16 were made to underrepresented minority students (30.76%).
- Sounding BalloonSat program at AAMU, Drs. Trent Montgomery and John Picarillo.
  - NASA Rover Challenge (formerly Moonbuggy) Program at AAMU, Dr. Amir Mobasher.
  - High powered rocketry program (NASA Student Launch) at AAMU, Dr. Mohammed Seif.
  - Geoscience and remote sensing workshop at AAMU, Dr. Kaveh Heidary.
  - Microgravity Program at TU, Dr. Javed Khan in collaboration with NASA JSC.
  - CubeSat Program (development phase) at TU, Dr. Javed Khan.
  - Bridge Program to place students on the University of Alabama (UA) Robotic Mining (formerly Lunabotics) and NASA Student Launch teams at SSCC, Ms. Renea Randle and Dr. John Baker.
  - Engineering Day at SSCC (April 17, 2014), Ms. Renea Randle organizes a half-day seminar at the end of the spring semester where the students will give presentations detailing their experiences at UA. Other Shelton Students who are enrolled in the pre-engineering courses will have the opportunity to showcase class projects. Speakers from the University of Alabama and the Alabama Space Grant Consortium are invited and give presentations. Area high school juniors and seniors are also invited to Shelton's campus.
  - STEM Day at AAMU (April 12, 2013). AAMU hosts a poster session, panel discussion on STEM, STEAM and STEMAH as well as NASA Rover Challenge (formerly Moonbuggy), NASA Student Launch and BalloonSat demonstrations. STEM Day benefits research, education, public health/health science and the surrounding business communities, as well as north Alabama-area high schools. AAMU students at the undergraduate and graduate levels, along with their mentors/advisors, present posters on various research and senior design projects in STEM disciplines.
  - Various competitions such as the NASA Student Launch Competition and our ASGC Fellowship and Scholarship programs require outreach components. All ASGC outreach programs target underrepresented and underserved elementary, middle school and high school students and educators from the state.
- *Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines.*
    - We are continuing our work with the UAH Institute for Science Education and the Alabama Mathematics, Science, Technology and Engineering Coalition for Education to provide new BalloonSat opportunities for Middle School Students and K-12 educators. Middle school students will be provided with

an exciting introduction into the engineering process in the aerospace world of ‘design, build, fly and evaluate.’ The classroom curriculum will track the BalloonSat experience and the intention is to use this project as a pilot for a feeder-system into the established Alabama Engineering Academy Initiative in area high schools. This opportunity will target schools having high minority participation and they hope to see increased SAT scores in physical science.

- *Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.*
  - ASGC continues to support *Students Building Space Hardware Programs, or SSP’s* at community colleges. ASGC programs that develop new relationships and sustain existing relationships with community colleges include:
    - Bevill State and Shelton State both have SSP’s and we are currently working with Gadsden State Community College (GSCC) on developing a new SSP in 2014. We also plan to establish a new HBCU Community College partnership with J.F. Drake State Technical College in CY2014. Drake State is located in Huntsville, AL. We plan to do this through collaboration with the Configurable Space Microsystems Innovations and Applications Center (COSMIAC). The ASGC feels this relationship with Drake State will help students learn skills to help build and track space hardware such as BalloonSat, CanSats and CubeSats. The initial meeting with Drake State took place on 12/12/2013 and follow-up meetings have been scheduled.
    - ASGC continues to support a Community College Bridge Program in FY2013. Community College students rarely get exposure to research and lab environments prior to transferring to a senior college. Academically, Community Colleges offer affordable alternatives to Universities. In this economy the number of students entering community colleges with engineering as their declared major is growing. This project gives Shelton State Community College (SSCC) students new opportunities and encourages an on-going relationship with UA. This project also provides SSCC students the opportunity to engage in research that will promote their educational goals. Each student is able to choose a particular research project from the list provided by UA’s Campus Director, Dr. John Baker. This project is managed by Ms. Renea Randle (female) Mathematics instructor. In FY2013 SSCC students collaborated with UA’s Lunabotics and Student Launch Competition teams.
    - Rover Challenge (formerly Moonbuggy) Program at BSCC, managed by Ms. Maurice Ingle.

## IMPROVEMENTS MADE IN THE PAST YEAR

- Dr. John Baker, UA Campus Director, was recently named head of the Department of Aerospace Engineering & Mechanics in the University of Alabama College of

Engineering. Dr. Baker has taught engineering at the University since 2001 and has been Campus Director for the ASGC since 2004. Before his appointment, Baker was a Professor in the Department of Mechanical Engineering & Adjunct Professor in the Aerospace & Mechanics Department.

- Dr. Francis C. Wessling, Professor in Mechanical & Aerospace Engineering, replaced Dr. Kader Frendi as Co-Campus Director for the lead institution, UAH. He will serve along with Dr. Gerald R. Karr, Professor Emeritus. All other Campus Directors remain the same.
- Two changes on the ASGC Policy Advisory Council took place in 2013. Dr. Carl A. Pinkert, Vice President for Research & Vice Provost at UA took over for the retiring, Dr. Joe Benson, and Dr. Christine Curtis (female), Provost & Executive Vice President for Academic Affairs at UAH replaced Dr. Vistasp M. Karbhari who accepted a new position as President of the University of Texas at Arlington in 2013.
- ASGC celebrated the 25<sup>th</sup> Anniversary of the National Space Grant Program in October 2013 at the Space Grant Directors' Meeting in Charleston, SC. A publication, "*NASA National Space Grant College and Fellowship Program Celebrating 25 Years*" was created to focus on each of the state's programs. ASGC chose to highlight UAB Engineering student, Carrie Schindler (female). The link to the publication can be found here: <http://national.spacegrant.org/>
- The lead institution, UAH, applied for, and was awarded, a NOAA License from the NOAA/NESDIS/Commercial Remote Sensing Regulatory Affairs Dept. The purpose behind the license was to track the UAH Space Hardware Club's ChargerSat-1 (picosatellite) Mission and future student-led, student-built Missions.
- In support of the overall efforts to further diversify the ASGC student population, the Lead Institution is currently facilitating quarterly telecons (started in January 2014) where affiliate directors are able to participate in discussions focused on increasing the diversity of the ASGC student population.
- At our annual ASGC statewide meeting in April of 2014 all attendees will have time set aside specifically to discuss how we can increase our underrepresented and women participants. We plan to also meet and review at the end of next year in November of 2014 to aggregate and report percentages of women and minorities and to see how they are engaged in their programs at their perspective institutions as well as evaluate how well our improvement plan is being executed at each of their affiliate institutions. This will also be an opportunity so share successes, lessons learned, best practices and other issues that may arise with regards to diversity and inclusion.
- All of ASGC's stakeholders were made aware of the new goals and SMART objectives framework that will assist in the growth of our underrepresented participants in ASGC sponsored programs. We are currently in progress of requesting feedback to see what best practices are working at other institutions and discuss what is not working so we can avoid known pitfalls. The goal is to make everyone continually aware of what is important to the leadership of the ASGC and to make the level of accountability to involve all levels of leadership, most notably the Campus Directors at each of our affiliates.
- The ASGC Program Office created and distributed quarterly Director e-Newsletters to ASGC affiliates via email.
- The ASGC student bulletin board located at the lead institution was updated to

include all recent ASGC program promotional materials (i.e., scholarship/fellowship application packages, fact sheets, student journals, internship and other workshop opportunities).

- ASGC list-servs were updated to advertise NASA and other STEM opportunities (i.e., disseminate 2-3 opportunities weekly).
- Continued to improve upon social media avenues to promote NASA opportunities and ASGC events/accomplishments and to become more engaged with other professional networks, students, faculty and professionals (i.e., Facebook, LinkedIn).
- Continued Space Grant Leadership Role – ASGC Director was voted in as ‘Vice Chair’ of the National Space Grant Alliance in FY2011 and became ‘Chair’ in FY2012. This allows for the Director to seek out ways to develop mutually beneficial relationships among private sector organizations, government agencies, colleges and universities and within the Alliance’s membership.
- Increased Engagement with Community Colleges - ASGC continues to support *Students Building Space Hardware Programs, or SSP’s* at community colleges. Beville State (BSCC) and Shelton State (SSCC), a minority serving institution, both have SSPs and we are currently working with Gadsden State Community College (GSCC) on developing a new SSP and to support them with future programs. We are currently working on establishing a new HBCU Community College partnership with J.F. Drake State Technical College in CY2014. Drake State is located in Huntsville, Alabama. The Commission on Colleges of the Southern Association of Colleges accredits Drake State Technical College and Schools (SACS) to award associate degrees, diplomas, and certificates. It is a member of the Alabama Community College System and has an enrollment of 1,258 students with 55% of those students being African-American. The initial meeting with Drake State took place on December 19, 2013 and follow-up meetings have been scheduled.
- Increased Lab Space for Student Projects – Both AU and UAH have increased lab space for their Space Hardware Building Projects. AU now has three dedicated labs in the Physics Building and UAH has four lab spaces in four different buildings (Von Braun Research Hall, M-25 is their main lab, EB 273 is their Space Communications Lab, TH W100 is their Engineering Prototype and Development Lab and OB 307 is their CubeSat Development and Clean Room Space).

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

### Administration

The ASGC collaborates with many institutions across the state in the execution of its programs. We have a closely-knit management team consisting of the campus directors of all the 7 research universities across the state (2 of which are HBCU’s), the CEO of the U.S. Space and Rocket Center and the University Affairs Officer at NASA’s MSFC. We call the home institutions of the Management Team/Council "**Members**" of ASGC and all other partners we call "**Affiliates**". The affiliates tend to come and go, that is they may not participate each year; they may come in for a special opportunity. The provision of these affiliate resources, while very real and valuable, does not mean that these partners have any inclination to participate in the management of the overall program,

and in fact most simply do not have the time to spend finding out about all the other programs in ASGC. **All our “members”** actively participate in management and are interested in what the other members are doing. All 7-research universities in the State of Alabama are full participating members of the ASGC. Full membership is restricted to research, Ph.D. granting universities, but other colleges may be, and are, part-time affiliates. To become a member, an institution must be willing to cost share at least half of any awards received from the ASGC. New affiliates will be added contingent on the availability of additional funds. We have not had to drop any ASGC member to date, but the policy would be to have the ASGC Management Team/Council and the Policy Advisory Council to vote on the dismissal of any member or affiliate member of the ASGC. A formal letter outlining the issues of non-compliance or non-performance, ways to remedy the problems and a timeline of pertinent dates will be established and provided to the non-compliant, non-performing affiliate member. Regarding the addition of any affiliate members, ASGC is inclusive of all educational institutions in the state, so long as the program involved is supportive of NASA’s goals and ASGC’s mission. In Alabama districts where there is no research university, we plan to recruit community colleges and other non Ph.D.-granting universities to act as a focal point for workforce development, interaction with K-12 schools and with industry in their own locales.

The ASGC currently consists of 9 members (from Alabama colleges, universities, and community colleges). Diversity for the ASGC affiliate membership includes 2 female members (22%) and 2 underrepresented members (22%). Seven (7) universities (Members) comprise the ASGC Management Team/Council. Diversity for the ASGC Management Team includes 4 female members (33%) and 3 underrepresented members (25%). The ASGC Associate and Assistant Directors are both females. All of our leaders at our Community College affiliates (Bevill State, Shelton State, and Gadsden State) are female.

Dr. John C. Gregory serves as the Director of the ASGC, Director of the Alabama NASA EPSCoR Program, is member of the ASGC Management Team/Council with full voting rights, an ex-officio non-voting member of the ASGC Policy Advisory Council (PAC) and Professor of Chemistry, College of Science, at the University of Alabama in Huntsville (lead institution). Dr. Teresa Merriweather Orok (underrepresented female) serves as the Associate Director of the ASGC, Chair of the ASGC Policy Advisory Council (PAC), and Executive Director for the Center for Entrepreneurship and Economic Development at Alabama A&M University (HBCU) in Normal, AL. Ms. Debora Nielson (female) is the ASGC Assistant Director, and Ms. Teresa Shurtz (female) is the Program Manager for the Alabama NASA EPSCoR Program.

Dr. Teresa Merriweather Orok (underrepresented female) serves as the Associate Director of the ASGC, Chair of the ASGC Policy Advisory Council (PAC), and as Executive Director for the Center for Entrepreneurship and Economic Development at Alabama A&M University (HBCU) in Normal, AL. Other PAC Members include: Dr. John M. Mason, Jr., Associate Provost & Vice President for Research, Auburn University, Dr. Carl A. Pinkert, Vice President for Research & Vice Provost, the University of Alabama, Dr. Jeffrey A. Engler, Associate Dean for Academic Affairs, the



University of Alabama at Birmingham, Dr. Christine Curtis (female), Provost & Executive Vice President for Academic Affairs, Dr. B. Keith Harrison, Associate Vice President for Academic Affairs, University of South Alabama, and Dr. Shaik Jeelani, Vice President for Research & Sponsored Programs, Tuskegee University. Ex-officio non-voting members of the PAC include: Mr. Patrick Scheuermann, Center Director, NASA MSFC, Dr. Deborah Barnhart (female), CEO, U.S. Space and Rocket Center and Dr. John C. Gregory, Director, ASGC.

#### **Affiliate and Management Council/Team Members (7)**

- **The University of Alabama in Huntsville (UAH)** – (Public, research, Ph.D. degree-granting university). Drs. Gerald R. Karr and Francis C. Wessling, Professor Emeritus and Professor, Department of Mechanical and Aerospace Engineering serve as the Co-Campus Directors and are Members of the Management Council with full voting rights. UAH is also the **lead institution** located in Huntsville and is an active participating member providing financial and supplementary support as part of the required match. UAH is part of the University of Alabama System.
- **Alabama A&M University (AAMU)** – (Public, research, Historically Black, minority serving, Ph.D. degree-granting university). Dr. V. Trent Montgomery (underrepresented), Professor, Department of Electrical Engineering and Computer Science serves as the Campus Director and is a Member of the Management Council with full voting rights.
- **Auburn University (AU)** – (Public, research, Ph.D. degree-granting university). Dr. David G. Beale, Professor, Department of Mechanical Engineering serves as the Campus Director and is a Member of the Management Council with full voting rights.
- **The University of Alabama (UA)**. (Public, research, Ph.D. degree-granting university). Dr. John Baker, Professor and Department Head, Department of Aerospace Engineering and Mechanics serves as the Campus Director and is a Member of the Management Council with full voting rights.
- **The University of Alabama at Birmingham (UAB)**. (Public, research, Ph.D. degree-granting university). Dr. Yogesh K. Vohra, Professor and University Scholar, Department of Physics and Associate Dean of the College of Arts and Sciences serves as the Campus Director and is a Member of the Management Council with full voting rights.
- **University of South Alabama (USA)**. (Public, research, Ph.D. degree-granting university). Dr. John W. Steadman, Professor and Dean, College of Engineering, serves as the Campus Director and is a Member of the Management Council with full voting rights.
- **Tuskegee University (TU)**. (Private, research, Historically Black, minority serving, Ph.D. degree-granting university). It is an independent and state-related institution of higher education. Dr. Gregory V. Murphy (underrepresented), Professor and

Department Head, Electrical and Computer Engineering, serves as the Campus Director and is a member of the Management Council with full voting rights.

### **Minority Serving Institutions (3)**

- **Alabama A&M University (AAMU)** and **Tuskegee University (TU)** are Minority Serving Institutions (as well as HBCUs). **Shelton State Community College (SSCC)** is also an MSI. Working to establish new HBCU relationship with J.F. Drake State in 2013 and 2014.

### **Community Colleges (2)**

- **Bevill State Community College (BSCC)**. (Public, 2-year, associate degree-granting community college). Ms. Maurice Ingle, Instructor, Drafting Design Engineering Technology Department, serves as Campus Director.
- **Shelton State Community College (SSCC)**. (Public, 2-year, minority serving institution, associate degree-granting community college). Ms. Renea Randle, Instructor, Mathematics Department, serves as Campus Director.
- Working to establish new relationships with Gadsden State Community College and J.F. Drake State (HBCU) in 2013 and 2014.

**Government Affiliates** include the NASA Centers, the Alabama Mathematics, Science, Technology and Engineering Coalition for Education (AMSTEC) and the Von Braun Center for Science and Innovation, Inc. (VCSI). All the government affiliate representatives are very involved with the ASGC, attend meetings regularly, and work well with the Director, Assistant Director and other members of the ASGC Management Council/Team. We collaborate with all NASA centers to place student interns and faculty fellows, but due to proximity, we closely have ties with **MSFC**. We partner with them on various projects and programs such as running Advanced Rocketry Workshops that are preparing student teams to participate in the NASA Student Launch Competition. We also manage the NASA Academy, the NASA Propulsion Academy and the NASA Robotics Academies during the summer for MSFC. Our contact at MSFC is Dr. Frank Six, University Affairs Officer. **Alabama Mathematics, Science, Technology and Engineering Coalition for Education (AMSTEC)**. Non-Profit/State. We partner with AMSTEC on various K-12 educator programs, workshops and summits. AMSTEC works closely with the State Department of Education to improve math and science teaching statewide and to make efforts for systematic change of STEM education. Their mission is to provide all students in Grades K-12 with the knowledge and skills needed for success in the workforce and/or postsecondary studies. Our contact person at AMSTEC is Ms. Brenda Terry, Executive Director. **Von Braun Center for Science and Innovation (VCSI)**. Non-Profit/Local. The mission of VCSI is to provide innovative engineering solutions and science applications for NASA, DoD, and other government agencies. Our contact person at VCSI is Mr. Marty Kress, Executive Director. Other government partners include NASA Centers Ames, Glenn, Johnson, Kennedy, Langley, Stennis, and the Jet Propulsion Laboratory.

**Industrial partnerships** include **The Boeing Company, Dynetics, Inc., Wyle Laboratories, STI Electronics, Inc., ADTRAN, Teledyne Brown Engineering and ATK Aerospace Group**. Several industries allow our students to use their facilities for CubeSat testing and training. ASGC continues to improve membership in this area and is working with the lead institution to continuously look for additional partnerships that make sense to improve strengthened student experiences.

**Outreach partnerships** include the **U.S. Space and Rocket Center** and **Sci-Quest Hands-on Science Center**. We partner with the USSRC and Sci-Quest on various K-12 teacher training and informal education projects. Our contact person at the U.S. Space and Rocket Center is Dr. Deborah Barnhart, Chief Operating Officer. Dr. Barnhart is a member of the ASGC Policy Advisory Council and an ex-officio non-voting member of the ASGC Management Council/Team. Our contact person at Sci-Quest is Ms. Angela Giles, Education Director.

**The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) 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.**