

## 2007 Annual Performance Data

<b>Consortium:</b>	New York Space Grant Consortium
<b>Lead Institution:</b>	Cornell University
<b>Director:</b>	Yervant Terzian
<b>Telephone:</b>	(607) 255-4935, (607) 255-2710
<b>Web site:</b>	<a href="http://astro.cornell.edu/spacegrant">http://astro.cornell.edu/spacegrant</a>
<b>Affiliate members:</b>	Barnard College City College of New York (CUNY) Clarkson University Colgate University Columbia University Lockheed Martin Systems Integration Manhattan College Medgar Evers College (CUNY) Polytechnic University Rensselaer Polytechnic Institute Sciencenter SUNY Buffalo SUNY Geneseo SUNY Stony Brook Syracuse University York College (CUNY)

### 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 New York Space Grant Consortium is a Designated Consortium funded at a level of \$590,000 for fiscal year 2007.

### Program Relevance to NASA

Space Grant consortia build human capital and research expertise to support NASA programs and missions, expand NASA's expertise and educational networks, and bring knowledge and awareness of space to a broad range of constituents in every state. Below are New York Space Grant (NYSG) examples from fiscal year 2007:

- Building human capital and research expertise to support NASA programs and missions:
  - NYSG affiliate Medgar Evers College in Brooklyn, NY, a minority-serving institution, is part of NASA's Aura Tropospheric Emission Spectrometer (TES) validation team. Aura

is one of two NASA Earth-observing satellites launched in July 2004; Aura's instruments study atmospheric chemistry and complex dynamics. TES measures tropospheric profiles of NO<sub>2</sub> and O<sub>3</sub> (ozone). As part of the validation team, Medgar Evers faculty and undergraduate students launch ozonesondes on high altitude balloons and compare their measurements with those recorded during concurrent TES nadir ozone profiles.

- Barnard, Columbia, and Rensselaer students analyze data from NASA's Earth- and space-based telescopes and observatories (e.g., Infrared Telescope Observatory in Hawaii, Chandra Observatory, and the Spitzer Space Telescope).
- CCNY and SUNY Stony Brook students research issues that affect long-duration human spaceflight, such as the effect of mechanical loading on bone maintenance, radiation-induced cell death, and heart arrhythmias.
- Polytechnic and Syracuse students work on NASA-related aerospace and aeronautical engineering projects including spacecraft trajectory design, control strategies for stabilizing a crew escape vehicle after launch abort, and evaluating a new ventilation system concept to improve air quality in aircraft cabins during long-range flights.
- During summer 2007 a NYSG intern at KSC worked on upgrades to software for monitoring the Shuttle Auxiliary Power Unit (APU)/hydraulic systems and alerting flight controllers if any launch commit criteria are violated. His software was used during the STS-118 launch in August 2007.
- Expanding NASA's expertise and educational networks:
  - NYSG helps fund science teacher workshops that incorporate NASA mission material to help middle and high school teachers inspire their students (our future workforce) to pursue majors and careers in science, technology, engineering, and math (STEM).
  - Polytechnic faculty and students mentored NYC-area teachers in mechatronics (mechanical, electrical, and software engineering) during a four-week summer institute designed to develop teachers' skills and confidence in incorporating modern engineering technology into their classroom labs. The participating teachers work at primarily urban middle and high schools that serve large numbers of underrepresented minorities and economically disadvantaged children.
  - NYSG sends NY teachers to NASA-specific teacher development opportunities, such as the National Phoenix Mars Educator Conference at KSC which showed teachers how to connect their students to real-world STEM applications using the excitement of planetary exploration. The teachers got a special treat: watching the Phoenix launch in person!
- Bringing knowledge and awareness of space to a broad range of constituents in NY State:
  - The NYSG-sponsored Space Science Speaker Series at the Museum of Science and Technology in downtown Syracuse, NY attracts a broad cross-section in audience members – from elementary school children to senior citizens. The audiences experience immersive space science presentations, shown on a giant IMAX theater screen, by prominent Cornell faculty engaged in NASA missions and research. They are also given opportunities for one-on-one interaction with the professors after the talks.
  - Columbia hosts regular public open houses at their rooftop observatory. These events, partially funded by Space Grant, provide families from Manhattan and neighboring areas a chance to see the stars amid the bright lights of New York City!

### **Program Benefits to the State**

NYSG programs benefit NY State in many ways. We attract and retain youths in STEM with hands-on activities such as the Sciencenter's science writing contest. Syracuse University and the Museum of Science and Technology run two programs, Central NY Rocket Team Challenge and Bridge Build'Em and Bust'Em, in which middle and high school students learn hands-on engineering principles plus rocket design and safety while building teamwork skills. Approximately 400 students participated in the Rocket Team Challenge: 75 teams from 34 different schools launched their rockets in June 2007. NYSG and SUNY Buffalo partially fund the Buffalo-area Engineering Awareness for Minorities (BEAM) pre-college engineering summer program. This program helps minority students transition from high school to college engineering majors and exposes them to various engineering/technology firms in western NY. NYSG sponsored scholarships for minority and physically or economically challenged middle and high school students from all across NY state to participate in the Cornell Cooperative Extension's 4-H Career Explorations program. This summer program exposes participants to STEM fields and careers, develops their leadership skills, and provides hands-on experiences to youths who otherwise have few opportunities to explore college laboratories, particularly students from rural areas (much of upstate NY is rural).

At the higher education level, NY State is greatly benefited by the leveraging of Space Grant funds to help support NY State Education Department Collegiate Science & Technology Entry Program (CSTEP) scholars' research at Clarkson University. NYSG is helping to stop the "brain drain" afflicting our state by keeping talented engineers within NY with internships at our industrial affiliate Lockheed Martin Systems Integration (LMSI). As a direct result of these LMSI summer internships, many students have received and accepted offers for full-time employment upon completing their Bachelors degrees. Last but not least, though there are no NASA centers in our state, NYSG summer internships offer NY students opportunities to work for NASA at sites across the country. While contributing to current NASA missions and research, NY students form important contacts and networks with mentors and peers that improve their chances for future employment in NASA and industry.

### **Program Goals**

- To offer assistance to graduate students in the sciences and engineering through fellowships and research awards.
- To encourage research at the undergraduate and high school levels by offering advanced degree training.
- To develop and implement scientific and technological classes for ALL students, especially those with an education major or background.
- To encourage, educate, and collaborate with K-12 teachers of science and math.
- To provide opportunities for all those in higher education (undergraduates, graduates, faculty and staff) to exchange ideas and information in workshops, seminars, and meetings.
- To join with industry in order to develop practical research opportunities for faculty and students.
- To develop and implement public programs that offer information about science and technology, particularly NASA-related topics.

### **Program Accomplishments**

- In summer 2007 NYSG fully supported seven undergraduate interns at the following NASA centers: JPL, Kennedy, and Langley. We also funded a record four NY students for the NASA Academy at Goddard, Ames, and Marshall. The Academy is NASA's premiere training and research program for undergraduate and graduate students to hone their technical and leadership skills. We also helped support student interns for the NASA Robotics Academy at Ames and the Summer Aerospace Workforce Development Research Internship Program (SAWDRIP) at Goddard.
- NYSG greatly increased the percentage of under-represented minority students participating in our 2007 higher education, research infrastructure, and fellowships/scholarships programs.
- NYSG hosted the Northeast Regional Space Grant meeting in September 2007. This meeting allowed directors, program staff, and students from nearby consortia to build bridges, exchange ideas, and plan for the bright future of Space Grant.

### **Student Accomplishments**

- A NY graduate student was personally invited by NASA to participate in the Next Generation Exploration Conference-2: *A gathering of emerging leaders to design the future of space exploration*, held at NASA Ames in February 2008. We happily supported his travel to this conference.
- NYSG students presented their work at various conferences such as the American Institute of Aeronautics and Astronautics (AIAA) Northeast Regional Student Conference and the national American Astronomical Society Meeting. Students also co-authored 14 papers, published in journals or conference proceedings, with mentors from their colleges or NASA center internships.
- Longitudinal tracking has shown that NYSG's programs are successful in progressing students along the STEM pipeline while preparing others for immediate STEM employment. Many of our former NYSG students are pursuing advanced STEM degrees at universities around the country, such as CalTech, MIT, UC Berkeley, Purdue, and the University of Michigan. A 2005-06 Space Grant PhD student is employed at the Johns Hopkins University Applied Physics Laboratory, doing work on space-related projects. A 2006-07 Masters student was hired by Northrop Grumman to work on spacecraft design. Several 2006-07 undergraduates are now working at Lockheed Martin, and another is employed by the United Space Alliance as a flight controller at NASA Johnson Space Center. A summer 2006 NASA JPL intern took a job at Draper Laboratories after graduating with a Masters degree; he soon learned that he missed collaborating with the JPL engineers, scientists, and managers he worked with during the summer. Upon contacting his former manager, he is now employed full-time at JPL and commented "I think my whole career will be shaped by it [the Space Grant award]."