

FY08 Progress Report
California Space Grant Consortium (CaSGC)
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CaSGC 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 California Space Grant Consortium (CaSGC) is a Designated Consortium funded at a level of \$730,000 for fiscal year 2008.

CaSGC PROGRAM GOALS

- Budgetary emphasis on Higher Education scholarships and fellowships;
- Providing only "seed" funding for research infrastructure and facilitating partnerships (matching funds from partners) between industry, government, and academic partners;
- Providing only "seed" funding for aerospace science and engineering curriculum development at the higher education level (matching funds from academic institutions);
- Forming community partnerships for K-12 and public outreach projects -- CaSGC plays "only" a facilitating and aerospace content provider role;
- Providing a coordination and facilitating environment between academia and NASA Centers for partnerships in research, workforce development (Human Capital), and education at all levels (non-Space Grant Project funding)

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

NASA Education Outcome 1: “Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals (Employ and Educate)”.

A. CaSGC FY 2008 Fellowship/Scholarship Program

The preliminary results for the FY 2008 period indicate that the CaSGC will award approximately 187 fellowships and scholarships. The CaSGC will continue to meet or exceed its SMART goals of:

- Annually increasing the number of scholarships/fellowship awards by 10%
- Awarding, at least, 25% of the awards to female students; and
- Exceeding a level of 20% for awards to underrepresented minorities.

B. CaSGC FY 2008 Higher Education Program

The CaSGC has allocated approximately 14.5% of the FY 2008 NASA Space Grant funds to the Higher Education Program Element and when combined with the non-federal match funds, provides over 36.2 % of the total CaSGC funds.

Each affiliate contributes unique expertise in both aerospace-related science and engineering. The CaSGC affiliates currently direct 12 of the 13 California aerospace engineering programs. As the initial founding members of the CaSGC, UCSD, UCLA, and UCB have taken the lead in creating interdisciplinary undergraduate learning environments that include both engineering and science curricular programs and experiential learning student – mentor projects. Also, each affiliate coordinates these CaSGC efforts with the minority science and engineering programs on each campus.

C. CaSGC FY 2008 Research Infrastructure Program

In FY 2008, the CaSGC continued to focus its resources on facilitating and coordinating educational and “Human Capital” aspects of aerospace-related research & development. The CaSGC Strategic Plan and SMART goals have focused the CaSGC resources in the following areas:

- Providing research Fellowships/Scholarships to CaSGC affiliates;
- Partnering with the University of California System on Centers of Excellence;
- Facilitating teaming arrangements between CaSGC affiliates on NASA Mission Directorate-related research programs;
- Facilitating and managing research project teaming between CaSGC affiliates and NASA Centers (NASA ARC, DFRC, JSC, JPL) and industry;
- Coordinating and managing student/mentor and faculty research experience programs at NASA Centers (particularly at NASA ARC and NASA Dryden).

For FY 2008, the approximate Research Infrastructure funding source data are as follows: 1. NASA Space Grant Funds = \$70,000 – approximately 9.6% of CaSGC funds, 2. Non-Federal = \$800,000; 3. Other Federal Funds = \$900,000. The non-Federal funds are primarily derived from state funding through the University of California Centers of Excellence program in which Space Grant is a founding partner.

The quantitative SMART goals for FY 2008 Research Infrastructure were to increase the program levels by several percent. The interdisciplinary, aerospace-related partnership programs, facilitated and coordinated by the CaSGC, involving the NASA Centers, Industry and the affiliate research universities have increased by at least 5%.

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)

CaSGC FY 2008 Precollege Education Programs:

Throughout California the CaSGC provided management support and small funding assistance to affiliate campus Teacher Education & Training and Outreach Programs. The K-12 education and outreach programs within the three large California higher education systems (University of California, California State University, and California Community College Systems) are immense programs serving large K-12 pre-service and in-service teacher populations. State and National Standards for science and math curriculum guide each of these programs and each participates in annual evaluations and assessments. In addition, each of these institutions is carrying out numerous programs that focus on encouraging underrepresented pre-college students (minorities and women) to select STEM careers.

NASA Education Outcome 3: Informal Education: Build strategic linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA’s mission (Engage and Inspire)

The primary strength of the CaSGC Public Service Element is the use of websites to reach the public. The websites are very successful but this does not replace the hands-on events (student – mentor projects) and the community face-to-face interactions.

CaSGC PROGRAM ACCOMPLISHMENTS

NASA Education Outcome 1 Impacts/Results: Scholarships – Fellowships; Higher Education; and Research Infrastructure

Scholarships/Fellowships: The preliminary results for the FY 2008 period indicate that the CaSGC will award approximately 187 fellowships and scholarships. The CaSGC will continue to meet or exceed its SMART goals of:

- Annually increasing the number of scholarships/fellowship awards by 10%
- Awarding at least, 25% of the awards to female students; and
- Exceeding a level of 20% for awards to underrepresented minorities.

Higher Education: The CaSGC has allocated approximately 14.5% of the FY 2008 NASA Space Grant funds to the Higher Education Program Element and when combined with the non-federal match funds, provides over 25 %

of the total CaSGC funds. Each of the CaSGC affiliate campuses has extensive programs for recruitment and/or participation of women, underrepresented minorities, and persons with disabilities that are utilized by Space Grant to execute both its curricular as well as student – mentor programs.

One of the important strengths of the CaSGC Higher Education Program is that with a relatively small budget but with a strong management facilitation – coordination role, significant impacts/results can be achieved. Each of the CaSGC curricular programs was developed and certified under standards imposed by the California University Systems and national evaluation and certification organizations. The engineering and science departments on the affiliate campuses annually review all curricular programs. All of the CaSGC student–mentor projects are peer-reviewed before funding is given and impacts/results reports are required. The CaSGC Strategic Plan goals and Diversity goals are annually compared against impacts/results. CMIS summary reports indicate that these goals have been met and that the CaSGC is satisfying many of the aerospace needs of California.

Research Infrastructure: For FY 2008, the quantitative SMART goal for Research Infrastructure was to increase the program levels by several percent. The interdisciplinary, aerospace-related partnership programs, facilitated and coordinated by the CaSGC, involving the NASA Centers, Industry and the affiliate research universities have increased by at least 5%. The CaSGC Strategic Plan has focused its resources on facilitation, coordination, and management activities as the most productive way to significantly impact the large existing aerospace-related research infrastructure in California. The CaSGC, through its Research Infrastructure partnerships, has coordinated a unique array of successful aerospace-related programs including:

- Space Grant/University of California Centers of Excellence (CaSGC affiliates – UC Berkeley, UC Davis, UC Los Angeles, UC Santa Barbara, UC Santa Cruz, UC San Diego)
- CaSGC’s Cooperative Research Programs at NASA Centers;
 - NASA ARC Education Associates Program (Research Experience Intern Program serving Space Grant consortia across the nation) (<http://edassoc.arc.nasa.gov>);
 - NASA ARC Space Portal research partnership – Commercial Space Partnerships, International Space Station National Laboratory (<http://spaceportal.arc.nasa.gov>);
 - AERO Institute at NASA Dryden Flight Research Center – UAV research, Suborbital Remote Sensing research (<http://aeroi.org>);
- Biotechnology Space Research Alliance (BSRA – <http://BSRAportal.org>) Private – public partnership for biotech research on the International Space Station National Lab.

NASA Education Outcome 2 Impacts/Results: Precollege

The FY 2008 impact of the CaSGC Precollege Education Program is indicated by the quantitative growth (above 5%) both in the demand for CaSGC affiliate participation in university and informal education programs and the sharp increase in budget from outside sources. The main strength of the program is the extensive network of partnerships the CaSGC has forged with the K-12-related organizations within our affiliate universities, Space Grant Education & Enterprise Institute (SGEEI), and with the California-based NASA Centers. A weakness is that the CaSGC contribution is so small that we have difficulty influencing any of the critical decisions made on professional development of teachers and STEM curriculum. The metrics used to determine the impact of the CaSGC precollege program consists of documenting the number of programs, workshops, partnerships, and participants for all of the CaSGC affiliates.

NASA Education Outcome 3 Impacts/Results: General Public and External Relations Programs

Public Service & External Relations: Starting in 1989, the CaSGC has taken the position that the Public Service Element would be best served by carefully “seeding” this program area with small amounts of NASA CaSGC funds (FY 2008 @ 3.7% of funds) but considerably more people resources (faculty, students, and research staff). In the FY 2008 period, this strategy has resulted in a noticeable statewide impact and has influenced state and private investment toward the SMART goals by increasing Space Grant + non-federal match to 4.5% of total funds).

In FY 2008, the CaSGC partnered on the following programs:

NASA Future Forum in California; California STEM Coalition; Space Grant Education & Enterprise Institute’s Rendezvous Science Center, San Diego Teacher Resource Center, San Diego ECO Education Center, First Robotics, Hispanic Literacy Project; Biotech Science Gala & San Diego Science Festival; AIAA Space 2008 Education Alley; UCSD TIES Engineering Community outreach; Commercial Space Outreach Workshops at NASA Ames; RosettaSpace Education Project for the ISS National Lab

The CaSGC Public Service Programs have provided an effective means of promoting an understanding of science, technology, engineering, and mathematics (STEM) disciplines. The metrics used to determine success in the state are as follows: 1. Visits to websites; 2. Increases in the number of General Public and student participants; 3. Number of articles and features in the media; and 4. Attendance at community projects.

PROGRAM CONTRIBUTIONS TO PART MEASURES

Student data and Longitudinal Tracking: The FY 2008 CaSGC Student data and Longitudinal Tracking indicates that 187 awards were given for all Program Elements. Of the 187 CaSGC awards, 47 or 25.1% were given to female students, 38 or 20.3% to minority students, 140 or 74.9% to undergraduate students, 17 or 9.1% to Masters level graduate students, and 30 or 16% to PhD level graduate students.

In FY 2008, the number of significant awards (\$5,000 or more) was given to 38 students. Of the 38 CaSGC significant awards, 11 or 28.9% were given to female students, 8 or 21.1% to minority students, 4 or 10.5% to undergraduate students, 10 or 26.3% to Masters level graduate students, and 24 or 63.2% to PhD level graduate students.

The CaSGC initiated full Longitudinal Tracking in FY 2007. Since only two years (FY 2007 and FY 2008) have been tracked for significant student awards, the majority of students are continuing BS, MS, or PhD degrees in STEM fields. Of those that have graduated, 2 are employed by Aerospace contractors and 2 are employed by STEM-related non-aerospace companies. It is anticipated that in the next several years we will see a number of PhD students entering the workforce at academic institutions and at NASA.

Course Development: In FY 2008, the CaSGC initiated a new curricular effort (called *MSI SPACE*) involving affiliates (Minority Serving Institutions) from the California State University System (CSU Los Angeles), the University of California System (UC San Diego), and the Community College System (Pasadena City College and East LA College). The programs major emphasis is on STEM curricula and student – mentor projects (Uninhabited Aerial Vehicles – UAVs) that would target and engage underrepresented minorities in STEM-related education and careers. The *MSI SPACE* team will share facilities, curricula over e-learning networks, and personnel.

Matching Funds: The FY 2008 CaSGC program was structured to respond to a funding profile that has Space Grant funding at \$730,000 with total matching funding at \$5,131,270 (ratio of 1 to 7) and total matching funding (excluding Other Federal) at \$2,700,000 (Ratio of 1 to 3.7).

Minority Serving Institutions: In FY 2008, the CaSGC has initiated two new student – mentor projects specifically focusing on minority students in STEM career development. The first project is a joint effort between the Maine Space Grant Consortium and the CaSGC affiliate, CSU Long Beach, that involves minority students from Maine and California working on the development of a high performance rocket designs and science payloads. The second project involves STEM – career minority students from CaSGC affiliate, California State University, Los Angeles (CSULA), along with two of the largest Hispanic Serving Community Colleges in Los Angeles, Pasadena City College and East LA College. The project involves UAV development and testing in partnership with NASA Dryden. Quantitative impacts will be reported at the end of the 2008 summer session.

IMPROVEMENTS MADE IN THE PAST YEAR

In FY 2008, a greater effort was given to actively engage as many CaSGC affiliates as possible in the STEM workforce projects. In regard to affiliate management, we reviewed each of the affiliates in terms of participation and made changes in campus directors/coordinators where it was determined that improvement was needed. We have had some significant success in recruiting industry to participate in CaSGC programs involving commercial space (particularly true for Commercial Space Transportation and biotechnology research on the ISS National Laboratory). As part of this activity we have made inroads into other state and federal agencies (NIH, Agriculture Department, Veterans Affairs, California Economic Development, Department of Labor).

In FY 2008 we have fully implemented our improvement plans for documenting all projects and Longitudinal tracking of our student awardees. Although the CaSGC has partnered with a number of institutions on K-12 programs, we are still not impacting this area sufficiently. It is approaching a crisis level and there does not seem to be a solution in sight. We will be carefully evaluating our participation (financially and management-wise) in this area in FY 2009.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

<u>CaSGC Affiliate</u>	<u>Institution Type</u>	<u>Key Characteristics</u>
UC San Diego	Lead CaSGC University	Research University offering BS, MS, PhD
UC Los Angeles	CaSGC MSI University	Research University offering BS, MS, PhD
UC Berkeley	CaSGC MSI University	Research University offering BS, MS, PhD
UC Davis	CaSGC University	Research University offering BS, MS, PhD
UC Santa Cruz	CaSGC University	Research University offering BS, MS, PhD
UC Santa Barbara	CaSGC University	Research University offering BS, MS, PhD
UC Irvine	CaSGC MSI University	Research University offering BS, MS, PhD
UC Riverside	CaSGC MSI University	Research University offering BS, MS, PhD
Stanford University	CaSGC University	Research University offering BS, MS, PhD
Santa Clara University	CaSGC University	Research University offering BS, MS, PhD
Univ. Southern Calif.	CaSGC University	Research University offering BS, MS, PhD
CSU Long Beach	CaSGC MSI University	4-year University offering BS, MS
Univ. of San Diego	CaSGC University	Research University offering BS, MS, PhD
CSU Los Angeles	CaSGC MSI University	4-year University offering BS, MS
CSU Sacramento	CaSGC MSI University	4-year University offering BS, MS
CSU San Bernardino	CaSGC MSI University	4-year University offering BS, MS
CalPoly SLO	CaSGC University	4-year University offering BS, MS
CalPoly Pomona	CaSGC University	4-year University offering BS, MS
San Jose State	CaSGC University	4-year University offering BS, MS
San Diego State Univ.	CaSGC University	4-year University offering BS, MS
Pomona College	CaSGC University	4-year University offering BS, MS
CSU Fresno	CaSGC MSI University	4-year University offering BS, MS
Azusa Pacific Univ.	CaSGC University	4-year University offering BS
Grossmont - Cuyamaca	CaSGC Community C.	2-year Community College
SD Supercomp. Ctr.	CaSGC affiliate	Research Center at UCSD funded by NSF
Astro Soc. Of Pacific	CaSGC affiliate	Astronomy Research & Education Resource

In addition to the CaSGC Affiliates and their contributions to all of the CaSGC Program Elements, a number of other private and public institutions have played significant roles in the execution of the following CaSGC projects:

<u>CaSGC Project Name</u>	<u>CaSGC Partner</u>	<u>Role in Project Execution</u>
1. ARC Education Associates	SGEEI & NSGF	Provided management services
2. UCSD UAV Project	Gen. Atomics Northrop Grumman	Industry mentors & funds Industry mentors & funds
3. MSI SPACE Project	Pasadena City College East LA College	Manages minority students Manages minority students
4. ARC Space Portal	SGEEI Commercial Space Ind.	Mentors & funds Mentors & funds
5. COTS Program	SpaceX & SGEEI NASA Ames	Mentors, management, & funds IPA Mentor
6. DFRC AERO Institute	Palmdale NASA DFRC SGEEI	Building & Facilities Mentors & funds Management & funds
7. Biotech ISSNL	BioCom Industry SGEEI NASA Ames	Mentors & funds Management & funds Mentors & funds
8. Rocket Projects	Garvey Space Flometrics, Inc. NASA MSFC	Mentors & funds Mentors & funds Mentors
9. San Diego STEM	SD Science Alliance BioCom Institute SGEEI	Mentors & funds Mentors & funds Management & funds
10. Remote Sensing Project	UC Office of Research UC Davis Water Resources Agency	Funds & Management Facilities & mentors Mentors & resources