

Delaware Space Grant Consortium
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Delaware Space Grant Consortium is a Program Grant Consortium funded at a level of \$535,000 for fiscal year 2008.

PROGRAM GOALS

Utilize NASA funds to serve students and teachers in the State of Delaware in a variety of educational and training projects in areas which are related to STEM-G. At the college level, provide fellowships and scholarships to students attending 2-year and 4-year colleges throughout the State and to aid in professional development of STEM-G related educators. Enhance research opportunities on and off-campus, during the academic year and summer. Recruit and provide support for the education and training of professionals especially women, underrepresented minorities, and persons with disabilities for careers in fields which will meet NASA's needs in the 21st century.

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

(1) In all, an **unprecedented number of 11 graduate students** in Delaware are receiving Fellowship support in FY08: of these, 7 are receiving full stipends, while 4 are receiving support at the level of at least one-half stipend. the full-year stipends are at a higher level than DESGC has ever offered before.

(2) The success of the Graduate Fellowship component of DESGC in FY08 is due in part to our success in obtaining cash matching funds (\$10,500) for the first time from a new source (Bartol Research Foundation).

(3) Our stated metric for diversity in FY08 was to fund **one** Graduate Fellow at DSU. **We exceeded this goal:** DESGC is now funding **two** Graduate Fellows at Delaware's MSU in FY08.

(4) DESGC supported an **unprecedented number of 13 undergraduates as summer researchers!**

(5) Two faculty members from Delaware Technical and Community College attended a Rocket-Launch Workshop at NASA/Wallops (Rock-On!). This was the first time that DESGC has established **contact with Wallops.**

(6) The DESGC Annual Research Symposium, held in November 2008, had the largest number of participants than ever before: there were **22 poster and 8 oral presentations!**

(7) Aerospace Education Specialist from NASA/Goddard Space Flight Center (Sonya Williams) present at our Annual Research Symposium and offered practical advice to students about applying for summer jobs at Goddard.

PROGRAM ACCOMPLISHMENTS

OUTCOME 1

(1) Graduate Fellowships- Summary: In our FY08 proposal, DESGC had set as a **goal**, full funding for 6 graduate fellows. **We exceeded this goal:** in FY08 DESGC is funding 8.5 graduate fellows in response to our call for competitive DESGC fellowships. (The 0.5 was a student who had been funded with half a fellowship in FY07, and his 0.5 funding was carried over to FY08.) Moreover, as part of the RI program, DESGC has provided FY08 funds to a graduate fellow in the UD Marine Studies program, and Higher Education funds are provided to a student in Geography (see Outcome 2). In total, 11 graduate students, of whom 4 are female, are benefitting from DESGC funds in FY08.

(2) Undergraduate Research- In FY08, DESGC supported a larger number of summer researchers than in any previous year. Thirteen students participated with researcher advisors in a variety of Departments: Geography, Mechanical Engineering, and Physics/Astronomy (at UD), and Astronomy/Astrophysics (at Villanova). All reported on their work at the November 2008 DESGC symposium. One of our undergraduate tuition scholars, Jachin Spencer (African-American Electrical Engineering major), did summer research at the Stanford Linear Accelerator in California, and reported on his work at our November 2008 Symposium.

(3) Research Infrastructure

Three components of Research Infrastructure (RI) were funded in FY08, in (a) Marine and Earth Studies (UD), (b) Physics and Astronomy (UD), and (c) Applied Optics Center, (Delaware State University). Reports on these components are provided below. Also discussed in this section is (d) the process of strengthening our research links with NASA centers and (e) strengthening research links with industry.

OUTCOME 2

Higher Education- In this section, we report on (a) graduate fellow in teacher training, (b) balloon program, (c) rocket program, (d) undergraduate tuition scholarships, (e) non-affiliate colleges in the State.

(a) DESGC Graduate Fellow in Teacher Training. In collaboration with the UD Geography Department, DESGC in FY08 provided partial funding to a graduate student (Melanie Schimek) who is expanding teaching resources (specifically, satellite imagery) for DE classroom teachers in support of DE geography standards.

(b) Balloon Program. At DTCC, Dr Lester Link (Engineering Technology) teaches a class in which students build a payload for a sounding balloon. In May 2008, the sounding balloon was launched from Cape Henlopen State Park, equipped with a camera, altimeter, GPS, and transmitter. Unfortunately, the transmitter malfunctioned so they were unable to obtain data, but the experience of building the payload and actually launching the balloon was a tremendous opportunity for the students who participated

(c) DESGC funds two participants at rocket launch from NASA/Wallops. In summer 2008, DESGC supported two faculty members from Delaware Technical and Community College (DTCC) to attend a rocket launch workshop at Wallops. The faculty members, Dr. Lester Link and Mr. Joe Pent, are members of the Engineering & Technology Department on the Dover (Terry) campus of DTCC. For some years, students in their Department have designed and built payloads for small rockets which are launched from a Cape Henlopen State Park every year. As a step up from that program, Dr Link and Mr Pent participated in the *Rock-On* program offered by CSGC/VSGC at Wallops. A report on that program was presented by Mr. Pent at the DESGC symposium in November 2008.

(d) Undergraduate Tuition Scholarships. In FY08, DESGC provided tuition scholarships to 10 undergraduates, 2 at Delaware's 2-year institution (DTCC) (one scholar on each of 3 campuses), 1 at Wilmington University, and 7 at UD. Among the UD students, the awards went to students in the Departments of Electrical Engineering, Chemical Engineering, and Physics/Astronomy. One of the UD awardees (Rylan Conway) was a student in a class which was taught by the DESGC Director: Rylan was near the top of the class, and is now applying to Astronomy graduate schools at some of the most prestigious graduate departments in the country (Yale, Columbia, and several U-California campuses).

Metric: The goal was to spend a total of \$30K for 10 awardees. However, tuition at DTCC is not as large as \$3K per year: for each of our 2 DTCC students, we awarded tuition up to the maximum of full tuition. In FY08, this was \$2K for a full-time student for one year. Therefore, the total expended for undergraduate tuition scholarships in FY08 is \$28K, a few percent *short of the metric* we had set.

Metric (Diversity): The goal was for 2 African-Americans to be in the FY08 funding. We did *not* meet this goal: there is only 1 in our funded group. There was another African-American in the applicant pool, but she failed to provide confirmation of US citizenship, so we could not include her in the awards.

Metric (UD Diversity): The goal was to include at least one African-American awardee on the UD campus: this goal *has been met*.

Metric (DTCC Diversity): The goal was to have at least 1 African-American awardee at DTCC: this goal has *not* been met, because we had no such applicants in our DTCC pool.

Metric (Airway Science at DSU): The goal was to have one aviation student apply for an award. We did *not* meet this goal: no aviation students applied.

Metric (DSU Diversity): The goal was to have at least 1 DSU student be awarded an undergrad tuition scholarship. We did *not* meet this goal: the one student who applied from DSU did not provide confirmation of US citizenship.

Metric (WU): The goal was to have 2 students at Wilmington University on tuition scholarships. We did *not* meet this goal: although 4 applicants were in the pool, the quality of the applications was so low that only 1 of the 4 was successful in competition with the other applicants.

(e) Non-Affiliate Colleges in the State. Of the two colleges in DE which are still not members of DESGC, one seems an unlikely match (a Business school). The other, Wesley College in Dover DE, holds more promise.

Metric: The goal was to have the DESGC Director open a discussion with at least one faculty member at Wesley College. Things got off to a promising start when the grade-school teacher (Ms Tommi Barrett) who contacted DESGC about a summer position at NASA/Langley, presented her report about summer work at the November 2008 symposium. At that point, the DESGC Director learned that Ms Barrett is a Wesley College graduate: upon request. Ms Barrett offered to contact one of her professors at Wesley about DESGC. Unfortunately there have been no further developments. Therefore, the goal has *not* been met.

Precollege Programs- DESGC Programs which are aimed at professional development of teachers are run by (1) Dr Stephanie Wright (DASEF) and (2) Prof. Harry Shipman (UD).

(1) Dr Stephanie Wright (DASEF)- DASEF's standard's based Professional Development in conjunction with information and resource distribution have an impact on educational practice and directly support teachers in their STEM classroom activities.

(i) Quantifying Changes in the Land Using NASA Space-based and Field Measurements
Statewide In-service Workshop for Teachers – 15 educators received training and curriculum materials on Friday, October 10, 2008.

(ii) NASA Missions: Elementary and Middle School Applications in the Classroom
Statewide In-service Workshop for Teachers – 7 educators received training and curriculum materials on November 5, 2008.

(iii) DASEF Distribution of Resources:

Mailings to all Delaware educators (twice per year). The November mailing included the latest updates from the NASA Resource Center on Earth and Space Science to all public, charter, private and parochial schools in the State. DASEF continues to serve as one of the clearinghouses for STEM resources in Delaware.

(2) **Prof. Harry Shipman (UD)**- Considerable progress has been made on organizing and scheduling a workshop on bridging the gap between math and science in K-12 education. An organization which has been meeting for six years, called MASST (=Math and Science Specialist Team), will serve as the organizational home for this workshop. Our plans for the workshop have been shared at several meetings of this group. The group has been extremely supportive of our plans.

OUTCOME 3

Strong statements have been made at some recent national SG meetings by NASA/SG Manager Diane DeTroye concerning the use of Space Grant funds for activities which do *not* fall into the category of Higher Education. In particular, certain activities involving K-12 students and the public would be better classified as falling under the area which NASA classifies as “Informal Education”. The funds which are allocated by NASA for “Informal Education” are distinct from the “Higher Education” funds (which include Space Grant). Because of these statements from SG Manager DeTroye, the DESGC Director decided, in proposing for FY08 funds, to request zero funds for general public and external relations programs.

If the DESGC Director has misinterpreted the statements of SG Manager DeTroye in this regard, the Director would appreciate receiving guidance, so that changes can be made in future budget requests.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PART MEASURES

- **Student Data and Longitudinal Tracking:** Total awards in FY08 = 34; Fellowship/Scholarship = 20; Higher Education/Research Infrastructure = 14. Of the total awards, 3 represent underrepresented minority F/S funding, and 1 is a student with disability (hearing-impaired). In FY08, 2 previously DESGC-funded fellows have accepted STEM positions: one at NASA (GSFC) and one in academia. The 4 graduate students who received DESGC funding in FY07 are still pursuing advanced STEM degrees.
- **Course Development:** None
- **Matching Funds:** In FY08, the matching funds obtained by DESGC included tuition scholarships provided by UD for each competitive graduate fellowship, a donation from Bartol Research Foundation, in-kind match from faculty members associated with DESGC, use-of-equipment match from DSU, and funds from DASEF. The matching funds in FY08 totaled \$400,781. This results in an augmentation of the NASA award (\$535K) by 75%.
- **Minority-Serving Institutions Collaborations:** Delaware’s MSI, Delaware State University, is an active affiliate of DESGC. Two of the DESGC graduate fellows in FY08 are DSU students. One of the DESGC Research Infrastructure grants was awarded to Dr Melikechi, Applied Optics Center, at DSU. Dr Melikechi participates actively in reviewing proposals for undergrad and grad applications for DESGC funding. (One of the seed-grants of the NASA/EPSCOR program was awarded to a DSU faculty member in FY07, and three DSU faculty applied for such grants in FY08.)

Although not formally an MSI, Delaware’s 2-year College (Delaware Technical and Community College: DTCC) has 25% enrollment of Black non-Hispanic students. DESGC has active contacts with one faculty member on each of the four campuses of DTCC, and these contacts have resulted in applications being submitted for undergrad tuition scholarships from 3 of the 4 campuses. We hope that applicants from the fourth campus will apply in FY09.

IMPROVEMENTS MADE IN THE PAST YEAR

Three major changes in resource allocation were made by DESGC in FY08. (i) Increased funding of the Program Coordinator, so that she could spend essentially full-time on DESGC business: this has improved our record on timely response to NASA/HQ requests. (ii) Increased funding of graduate fellows: this has led to an upsurge in DESGC-funded research work in DE, including an unprecedented number of students in DE as a whole, and especially at Delaware’s MSI. (iii) Funding for a new program to bring together the science teachers and the math teachers in the State of DE for the first time. This program involved for the

first time in DESGC a collaboration with the Math/Science Education Resources Center on the UD campus.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

(1) 4-year academic institutions:

(a) The lead institution of DESGC is the University of Delaware [UD]. UD is classified by the Carnegie Foundation for the Advancement of Teaching as a research university with very high research activity. Most of the DESGC graduate fellows are UD students

(b) Delaware State University [DSU], an MSI, and offers bachelor degrees in at least one STEM-G area. The student body is 77% Black non-Hispanic. Two of the currently funded DESGC grad fellows are DSU students.

(c) Wilmington University offers a range of bachelor degrees which includes one or more of the STEM-G disciplines. WU

(d) Villanova University and Swarthmore College, affiliates in nearby PA, provide DESGC-sponsored summer research opportunities for students in physics/astronomy.

(2) 2-year Academic Institution:

(a) Delaware Technical and Community College (DTCC). The student body includes 25% Black non-Hispanic.

(b) Delaware AeroSpace Education Foundation (DASEF). DASEF is an enterprise founded in 1989 by Dr Stephanie Wright (at one time, Delaware's Teacher in Space) to create an exceptional learning environment that inspires children and their families with an appreciation of the Earth and its place in the universe.

(d) NASA Explorer School in Smyrna DE has benefitted from DESGC funding.

(c) Industrial affiliates: ILC Dover (makers of space suits for NASA) and E.I. DuPont and Nemours Chemicals supply active members to DESGC's Advisory Board.