

South Dakota Space Grant Consortium
SD School of Mines & Technology
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PROGRAM DESCRIPTION

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

PROGRAM GOALS

The following goals are taken from SD Space Grant Consortium (SDSGC) Strategic Plan, v. 2007/2008, 26p.

Consortium Management: To ensure quality and fairness in all Consortium programs and alignment with the needs of NASA, the member and affiliate organizations, and the state of South Dakota.

Fellowship/Scholarship: To administer a fellowship/scholarship program that offers educational and research opportunities to students from diverse backgrounds who are pursuing degrees in fields of science, technology, engineering, and mathematics (STEM) that align with NASA's mission and those of SDSGC members and affiliates.

Research Infrastructure: To promote the improvement of research programs and capabilities of SDSGC members and affiliates with an emphasis on the fields of aerospace, earth science, and supporting STEM disciplines.

Higher Education: To build interdisciplinary programs at the state's institutions of higher education that are aligned with NASA's mission and goals and to support related programs that serve to strengthen STEM education in South Dakota.

Diversity of Participants: To model diversity in all Consortium programs and activities, with an emphasis on Native Americans, who make up the state's largest minority group.

Workforce Development: To use the Consortium's statewide network of scientists, engineers, and educators to provide talented students a pathway to careers that will contribute to a highly-trained and diverse workforce for NASA and expand the nation's research and development capacity.

Longitudinal Tracking: Acquire and maintain accurate longitudinal data on students and faculty who have received significant support from SDSGC in order to assess the impact of the support on the individual's education, career, and professional development.

Minority Serving Institutions: To ensure that Minority-Serving Institutions in South Dakota, which are exclusively Tribal Colleges and Universities, are represented in the planning and implementation of all Consortium programs.

Precollege: To provide educators with NASA content and related professional training and to increase student awareness and access to educational and career opportunities in aerospace, earth science, and supporting STEM disciplines.

Public Service: To enhance public scientific literacy in aerospace and earth science; to complement community efforts in STEM education; and to inspire citizens of diverse backgrounds through the excitement of scientific exploration and discovery.

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

Jacci Bloom, 2007 graduate of South Dakota School of Mines and Technology (SDSM&T) with an M.S. in Technology Management and former Space Grant fellow, **gained employment at NASA in 2008** as a

Project Manager in the Information Resources Directorate at Johnson Space Center. While a Space Grant student fellow during summer 2006, Jacci completed the NASA Academy at Marshall Space Flight Center. Her research project at Marshall was titled "Tribal Earth Science Technology and Education." (Outcome 1)

SDSGC was awarded a **NASA INSPIRES Tier 2A** grant for a project titled "*NASA SOLAR Institute (Space Observation, Learning and Research)*." The grant will provide 50 students, largely Native American, with a college-preparatory experience in STEM fields during summer 2009. (Outcome 2)

South Dakota Space Days 2008 held in Watertown, SD, reached 2,000 people with hands-on STEM educational activities and experts in the fields of aerospace, earth science, and engineering, including Astronaut Mike Fossum and other NASA specialists from JSC, KSC, and GRC. (Outcome 3)

PROGRAM ACCOMPLISHMENTS

NASA Education Outcome 1 Accomplishments

Fellowships/Scholarship

Sixty (60) applications were received from students from five of the Consortium's universities in competition for the \$135,000 in NASA funding available through the FY2008 Fellowship/Scholarship Program, 18 (30%) of whom were Native American. **Forty-three (43) student awardees** were selected for funding and have been awarded a total of \$105,000 in Space Grant fellowships/stipends as of this writing in February 2009. The remaining \$20,000 in FY2008 fellowship funding is pending student notification of NASA and industry internships in summer 2009. Six of the 43 student awardees were graduate level and 37 undergraduate. Four students conducted summer 2008 internships, although their funding came from FY2007 fellowship funds: one co-op at NASA KSC, two at aerospace industries, and one at the Naval Shipyards at Bremerton, WA.

Nine (9) of the 43 students selected for funding in FY2008 (21%) were Native American, more than double the Consortium's target of 10% of awards to minority students. Six of the 10 funded Native American students attend Tribal College affiliate Oglala Lakota College (OLC).

Research Infrastructure

SDSGC awarded two Project Initiation Grants to promote research in NASA-related fields. The awards went to (1) the Department of Electrical Engineering at South Dakota State University (SDSU) for a collaborative project with NASA Glenn Research Center titled "*Initiation of a New Research Infrastructure for Space Power Generation*," and (2) the Department of Geology and Geological Engineering at SDSM&T for a project titled "*Establishment of C-Band and L-Band InSAR Processing Capabilities at SDSM&T*."

Higher Education

SDSGC established a new scholarship titled "**NASA Native Engineer/Scientist Scholarship**." The \$7,000 scholarship was awarded to a Native American female student at SDSM&T majoring in Industrial Engineering. This higher education NASA scholarship will augment similar efforts to recruit and retain minority students in STEM disciplines.

SDSGC selected two university student ambassadors, one from Augustana College and one from SDSM&T, to participate in **NASA's International Year of Astronomy Student Ambassadors Program**.

SDSGC supported three **multi-disciplinary university student teams** to participate at national competitions in 2008 including SDSM&T's **Aero Design Team**, **Robotics Team**, and **Unmanned Aerial Vehicle Team**.

NASA Education Outcome 2 Accomplishments

Precollege

SDSGC continued its formal partnership with **St. Francis Indian School** to enhance STEM education for underrepresented Native American students on the Rosebud Indian Reservation and prepare them for college. The SDSGC funding provided for summer research at Yellowstone National Park, student travel

to seven colleges and technical schools, a science fair, high school rocketry classes, middle school robotics activities, and various space programs provided by SDSGC staff during the school year.

SDSGC continued its support of **precollege robotics programs**. The following accomplishments are provided as examples: (1) Through the financial support of SDSGC and staffing by SDSGC and a NASA Aerospace Education Specialist, a consortium of teachers involved with First Lego League (FLL) robotics competitions **formed the “South Dakota Robotics Association” in 2008**. SDSGC provided FLL Programming Sessions for 90 precollege students (12 teams) and five FLL coaches were trained in robotics by NASA AESP during summer 2008 at SDSGC-funded teacher-training “robotics academies.” Four teams qualified for the FLL Iowa State Tournament in Ames, IA, in January 2009. As a result of these efforts, plans are now underway to host a 2009 state competition in South Dakota. (2) SDSGC supplied funding and organizational support for four **NASA Summer 2008 Teacher Academies**. The two-day teacher-training academies were hosted by SDSGC informal education partners in cooperation with NASA AESP staff from Johnson Space Center.

Through its subcontract and partnership with the SD Discovery Center, SDSGC continued to support five highly successful **Women in Science (WIS) Conferences** held throughout South Dakota. WIS conferences reached 1,112 girls in 2008, 117 of whom were Native American (11%), and 186 teachers and adult volunteers.

The Consortium helped sponsored two, week-long residential **Space Adventures Camps** during July 2008 for 21 middle school and 6 high school students from SD, TX, CA, IA, ND, and WY. **NASA’s Dr. Ted Gull**, astrophysicist from Goddard Space Flight Center, and native South Dakotan, presented. SDSGC provided scholarships for 11 students, five of whom were Native American.

SDSGC headquarters staff provided an additional **21 precollege informal education programs** since the completion of the FY2007 progress report, reaching **1,435 students as direct participants** (485 elementary, 500 middle school, and 450 high school), 25% of whom are Native American. These events were held at civic organizations, museums, and various schools including South Dakota’s NASA Explorer Schools.

NASA Education Outcome 3 Accomplishments

Public Service

SDSGC sponsored **South Dakota Space Days 2008 “Spaceship Earth: Celebrating 50 Years of Exploration”** on Oct. 16-17, 2008, in Watertown, SD. Approximately 2,000 students, teachers, and members of the general public attended the event the two-day event, which was organized and hosted by SDSGC affiliate Lake Area Technical Institute and the Watertown school system. Students visited with experts in aerospace, aeronautics, earth science, engineering, computer science, physics, and other STEM fields about their careers and took part in 16 different hands-on educational programs (“missions”). In addition to the cadre of NASA staff that accompanied NASA’s Exploration semi-tractor trailer exhibit from JSC, NASA experts included: 1) **Astronaut Mike Fossum**, a former South Dakota resident who had recently returned from a summer 2008 mission (STS-124) to the International Space Station (ISS), 2) **Dr. Jack Bacon**, Systems Integrator for the ISS Program at NASA JSC, 3) **Dr. Ray Wheeler**, plant physiologist at NASA KSC, 4) **Jim Simek** from NASA GRC, and 5) **Angelo Casaburri** of NASA AESP.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking: Total Fellowship/Scholarship awards in FY2008 = 43; 10 of the total awards were underrepresented minority students. For those students that were significantly supported from FY2008 funds, all 43 of them are still enrolled in the degree that they were pursuing while the received their Space Grant award.

Total Fellowship/Scholarship awards in FY2006-2008 = 119; 24 of the total awards were underrepresented minority students. For all students that were significantly supported in the period spanning FY2006-FY2008, five students graduated and are pursuing advanced STEM degrees, three students are working for NASA contractors, three students accepted STEM positions in industry, one is

working at a NASA center, and one is working in a non-STEM position. The remaining students have not yet received the degree that they were pursuing while they received their Space Grant award.

- **Course Development:** One new M.S. program was developed with NASA support. As a result of a SDSGC Program Initiation Grants in FY2007-2008, SDSM&T has formally converted its M.S. in Computer Science from a broad survey degree to an interdisciplinary program in **Robotics and Intelligent Autonomous Systems (RIAS)**. The new program will promote additional growth in robotics education at both the university and precollege level and increase the number of graduates in computer science and engineering that go on to pursue STEM careers.

- **Matching Funds:**

<u>NASA Funds</u>	<u>Fellow./Scholar.</u>	<u>Match Required</u>	<u>Match Provided</u>	<u>Ratio</u>
\$535,000	\$135,000	\$400,000	\$400,000	1:1

- **Minority-Serving Institutions:** Two Consortium members are **MSI Tribal Colleges** and one is a **minority-focused Tribal College**. James Rattling Leaf of Tribal College affiliate **Sinte Gleska University** remained on the SDSGC Management Team throughout FY2008. In a successful attempt to **further strengthen STEM feeder programs at Oglala Lakota College (OLC)**, SDSGC's Consortium Development Competition project was funded in the amount of \$177,000. This multi-institution project to *"Increase Minority Participation in Higher Education in STEM Disciplines Responsive to NASA Needs"* provides an opportunity to reinforce the Consortium's partnership with OLC.

IMPROVEMENTS MADE IN THE PAST YEAR

In an effort to **recruit qualified minority students** from SDSGC's Tribal College affiliates to apply to FY2008 fellowship/scholarship program, SDSGC designated a new Space Grant representative at OLC and Deputy Director Tom Durkin presented the fellowship program to 35 students enrolled in OLC's Science Engineering and Math program. These efforts resulted in a **record number of 12 applications from OLC students**, four times higher than any previous annual call for student applications! Nine (9) of the 43 students selected for funding (21%) were Native American, **more than double the Consortium's target of 10% of awards to minority students**. Six (6) of those nine Native American student awardees attend OLC, a minority-serving institution. Overall, 18 of the 60 student applicants to the Consortium's fellowship/scholarship stipend program (30%) were Native American, two-thirds of whom attend OLC.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

SDSGC is a statewide network of 19 member and affiliate organizations from education, industry and government. The Consortium's nine-member Management Team consists of representatives of a cross section of the membership including SDSM&T (the Lead organization), SDSU, Augustana College, USGS National Center for Earth Resources Observation and Science (EROS), Sinte Gleska University, SD Discovery Center and Aquarium, Kirby Science Discovery Center, and the Journey Museum. The full membership consists of the following educational, industrial, and government affiliates.

Educational Affiliates

- South Dakota School of Mines and Technology (Lead Institution, state university BS-PhD, science and engineering)
- South Dakota State University (state university BS-PhD, agricultural and STEM institution)
- Augustana College (four-year private liberal arts and professional college)
- South Dakota Discovery Center and Aquarium (science center)
- Black Hills State University and Center for the Advancement of Mathematics and Science Education (four-year, state liberal arts institution)
- The University of South Dakota (state university BS-PhD, medicine, law, fine arts, business)
- Dakota State University (state university, Associates-PhD, computer management and information)

- Badlands Observatory (private observatory, astronomical research/education)
- Black Hills Astronomical Society (astronomical society)
- Kirby Science Discovery Center (science center and museum)
- The Journey Museum (museum)
- Lower Brule Community College (minority-serving, two-year college)
- Oglala Lakota College (Tribal College, AA-MS with STEM majors)
- Sinte Gleska University (Tribal College, four-year institution)
- Lake Area Technical Institute (technical institute, Associates of Applied Science degrees, programs in robotics and aviation maintenance)

Government Affiliate

- USGS Center for Earth Resources Observation and Science “EROS” (data management, systems development, and research field center; Land Processes Distributed Active Archive Center for NASA’s Earth Observing System)

Industrial Affiliates

- Raven Industries (engineered films, high-altitude balloons, GPS products)
- RESPEC (consulting & services: engineering, IT, water & natural resources)
- Science Applications International Corporation “SAIC” (scientific, engineering, and technology applications company)