

NASA Idaho Space Grant Consortium  
Lead Institution – University of Idaho  
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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 NASA Idaho Space Grant Consortium is a Designated Consortium funded at a level of \$730,000 for fiscal year 2008.

## PROGRAM GOALS

To achieve the ISGC vision and mission, the ISGC identified the following goals: (1) promotion and expansion of world-class space and aerospace research expertise in the state's universities and industries, and development of internationally competitive research programs in related disciplines within the state of interest to NASA, the state, and nation. (2) encouragement of highly-capable students, especially women, underrepresented individuals, persons with disabilities, and economically disadvantaged students, to pursue studies and careers in STEM fields. (3) increased exposure to STEM learning opportunities for the general population of Idaho.

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

### NASA EDUCATION: OUTCOME 1- FELLOWSHIPS AND SCHOLARSHIPS

**Goal A-** Maintain and/or increase the diversity of the undergraduate and graduate students receiving ISGC support, entering/remaining in STEM fields, and entering the NASA-related workforce. Metrics:

- Number of applicants/participants in the program, including participation by members of underrepresented groups
- Retention rate in their discipline for ISGC scholars as compared to non-scholars in the same discipline
- Number of scholars and fellows who enter the NASA-related workforce (over time)

**Goal B-** Increasing the research component for ISGC scholars and undergraduate students by involving them in research programs under a faculty mentor. Metrics:

- Number of publications, presentations, patent applications and licenses, press releases, or other media efforts related to scholar/fellow activities
- Number of scholars involved in research activities
- Number of scholars involved in NASA and/or industry internships and/or the NASA Academy

**Goal C-** Improving the communication and collaboration between undergraduates, graduates, ISGC scholars/fellows and NASA-related researchers, NASA centers and industries. Metrics:

- Evaluation of the program by all participants
- Number of scholars and fellows involved in NASA and/or industry internships and/or the NASA Academy
- Number of scholars and fellows who are hired by NASA, NASA contractors, or industries in Idaho (over time)

### Scholarship and Fellowship Program -Goal A – Diversity of Applicants and Participants

- 51 total applications; 47% female, 9% underrepresented groups. 20 new awards provided
- Retention rate of scholars compared to non-scholars – in the 2008-2009 program, 100% of our scholars stayed in the same program as the previous year. At the University of Idaho (where 40% of scholars were located in 2008-2009), approximately 84% (freshman to sophomore) of non-scholars remained in an engineering program; numbers are similar across campus and the state. Clearly, the close connection to a scholar's school and program fostered by program requirements serves as a benefit to ISGC scholars for retention purposes.
- Number of scholars/fellows who enter the NASA-related workforce – 5 students took next step in FY08 (SG participation supported from FY06-FY08 funds)
  - 1 went to work for a NASA contractor; 2 went to work in a STEM positions for non-NASA contractors; 1 went to work for NASA; 1 went to work in a STEM position at a non K-12 Academic institution

### Goal B – Increase Research Component for Scholars/Fellows

- Number of publications, presentations, patent applications and licenses, press releases, or other media efforts related to scholar/fellow activities
  - Publications – 8 (1 journal, 6 conference, 1 dissertation); Presentations – 18; Proposals – 0; Patent – 0; Press releases – 9 (includes internships, scholar events, presentations, etc.).
- 10 of 43 total scholars (23%) were directly related with ISGC research activities. Many other scholars have expressed interest, and it is anticipated this number will continue to increase as the faculty mentor program is further developed.

- 3 scholars and 4 fellows served as NASA interns (44% total).

Goal C – Communication Between Program Participants, NASA, etc.

- Evaluation of the program by all participants – annually, the ISGC hosts two mandatory events for scholars and fellows across the state in order to remain in contact with all scholars/fellows. Scholars and fellows are also required to submit a report each semester commenting on volunteer hour service (scholars) or research progress (fellows). In 2008, Scholars reported being informed about many ISGC programs, and as such, were able to become more involved.
- In 2008, 3 scholars served as NASA interns (19% total).
- Number of scholars and fellows who are hired by NASA, NASA contractors, or industries in Idaho (over time) –5 students took next step in FY08 (SG participation supported from FY06-FY08 funds)
  - 1 went to work for a NASA contractor; 2 went to work in a STEM positions for non-NASA contractors; 1 went to work for NASA; 1 went to work in a STEM position at a non K-12 Academic institution

**NASA EDUCATION: OUTCOME 1- RESEARCH INFRASTRUCTURE**

**Goal A**-Enhancing the research funding from NASA in the state of Idaho. Metrics:

- Number of proposals submitted and funded
- Number of publications and presentations resulting from the ISGC funding
- Number of contacts by NASA researchers with Idaho researchers
- Overall increase in NASA funding statewide each year

**Goal B**- Increasing the number of undergraduate and graduate students, in particular, women and underrepresented individuals, involved in NASA activities. Metrics:

- Number of undergraduate and graduate students involved in NASA projects
- Number of female and underrepresented undergraduate and graduate students and faculty in comparison to the target involvement for faculty and students

**Goal C**- Increasing the collaborations among Idaho researchers, and between Idaho researchers and NASA and/or industry researchers. Metrics:

- Number of collaborations with industry by Idaho researchers and/or students
- Number of contacts by NASA researchers with Idaho researchers and/or students

Goal A – NASA Funding in Idaho achieved by:

- Number of proposals submitted and funded - 5 proposals were submitted due to research funded by the ISGC. Two proposals to NASA (*one funded – NASA EPSCoR*)
- Number of publications and presentations resulting from the ISGC funding –
  - Papers Published – 3 journal and 6 conference papers published; two theses completed; six theses in progress. 7 publications involved current undergraduate or graduate students as co-authors
  - Conference Presentations – 6; Patents – 0 filed
- 3 (JPL, Glenn, and JSC) visits were made by researchers directly supported by ISGC research grants in 2008. Several other researchers have made contact via e-mail and telephone, and have travel planned for the upcoming summer. Multiple contacts with researchers at JPL and NASA Ames have also been made by the ISGC to encourage more student involvement in programs, as well as to encourage senior design projects tied directly with NASA.
- In fiscal year 2008, \$3,232,183 was actually obligated to specific contracts. In comparison to the fiscal year 2007 obligations of \$3,506,449. This decrease in obligations to contracts is contributed, in part, to the continuing resolutions for federal programs. It is anticipated that Idaho will increase or maintain this level of support in fiscal year 2009.

Goal B – Increasing Student Participation (esp. female, underrep.) in NASA programs

- 139 students were directly involved with NASA-related research supported by the ISGC in 2007. 10 students were involved with ISGC research projects (*40% female, 10% underrepresented, 60% graduate, 40% undergraduate*). 16 students interned with NASA (*31% female*), 6 scholars were involved with research programs in their disciplines (*33% female*), and all 9 fellows were involved in NASA research (*22% female, 11% African American, 11% Pacific Islander*). In Idaho RISE, 78 students were involved (*28% female, 6% underrepresented*). 7 students were involved in the Idaho RLEP senior design program at the UI and an additional 14 students were involved in NASA-related senior design projects (*7% female*).
- Number of female and underrepresented undergraduate and graduate students and faculty in comparison to the target involvement for faculty and students.
  - Female students – 37 total students (*27% overall participation*); Underrepresented students – 7 total students (*5% overall participation*); Female faculty – 4 of 13 total (*31%*); Underrepresented faculty – 1 of 13 total (*8%*); Chronicle of Education (*women*) and National Center for Education Statistics (*underrepresented*) figures included in 2008 proposal – 55% female, 8.2% underrepresented

Although the ISGC did not meet the goal for the percentage of female and underrepresented students and faculty, it will continue to pursue new ideas on how to increase these numbers.

Goal C – Increase Idaho / NASA Collaborations

- At least 6 contacts were made with industry in 2008 by Idaho researchers, including with Micron, Boeing, Positron Systems, the INL, and multiple military industries.
- In 2008, the ISGC supported four research projects that included electrical propulsion in low temperature co-fired ceramic materials, the magnetic-filed liquid-phase sintering of magnetic materials below the curie temperature, the radio-protective effects of salt crystal formation in an extreme halophile, and geomorphology, lithospheric structure, and compositional interpretations of small plains-style volcanoes in the Marius Hills Volcanic Complex.
- In 2008, the ISGC continued to work with the NASA Idaho EPSCoR program which was awarded a large, 3 year research project in Idaho - for a total of 2 currently funded in the state.

### **NASA EDUCATION: OUTCOME 1, OUTCOME 2 - EDUCATION**

**Goal A-** Inspiring the next generation of engineers, scientists, and educators by using NASA's missions to involve teachers, and in turn their students, at all levels in STEM activities. Metrics:

- Number of teachers and students involved in ISGC activities
- Number of requests by teachers or students for information about NASA missions
- Number of students involved in NASA internships
- Number of students involved in ISGC activities hired by NASA, a NASA contractor, or related industry (over time).

**Goal B-** Increasing the retention rates in STEM fields by involving students in hands-on activities. Metrics:

- Number of K-12 teachers and students involved in ISGC activities
- The number and percentage increase of higher education students and associated affiliate institutions involved in NASA internships or other ISGC research activities
- Number of publications authored/co-authored by students involved in NASA activities
- Retention rates of students (in their discipline) involved in NASA activities as compared to students not involved in NASA activities

**Goal C-** Increasing the number of students participating in internships with NASA, industry, or NASA contractors. Metrics:

- Number of students involved in NASA internships (both new and returning)
- Number of students involved in ISGC internships hired by NASA, a NASA contractor, or related industry (over time).

#### **Goal A – Inspiring Teachers and Students in STEM**

- Number of teachers and students involved in ISGC activities – teachers: 1,015 at a minimum (*all levels represented*); students: 9,248 at a minimum (*all levels represented*). Programs range from Idaho TECH, FIRST Robotics, FIRST Lego League, Women in Engineering Day, and E-girls programs to career fairs such as the INL Engineering Expo, to educator science workshops and one-day workshops, etc.
- In 2008, the ISGC received over 50 requests from teachers for additional information via telephone, e-mail, or through the ERC. The ERC new website, that is a part of the ISGC main website, receives an average of 110 visits a month.
- In 2008, 16 students interned with NASA – 11 at JPL, 1 at Marshall, 3 at Ames, and 1 at Goddard. Three of these interns were interning with NASA for a second time (2 to JPL, 1 to Ames). Three of these interns were supported by NASA funds outside of the ISGC through direct center support or the USRP program.

#### **Goal B – Increasing Retention Rates in STEM Through Hands-on Programs**

- Number of teachers and students involved in ISGC activities – teachers: 945 at a minimum (*all levels represented*); students: 8,567 at a minimum (*all levels represented*). Programs range from Idaho TECH, FIRST Robotics and Lego League, Women in Engineering Day, and E-girls programs to career fairs such as the INL Engineering Expo, to educator science workshops and one-day workshops, etc.
- In 2008, 16 students interned with NASA from the UI, BSU, Brigham Young University-Idaho, and one student (BSU) interned with an aerospace related industry. 7 scholars were involved with research programs in their disciplines at the UI, NNU, Albertson, and BSU. 63 students were involved with Idaho RISE at ISU, NNU and the UI, and 7 students were involved directly with ISGC Research Initiation Grant programs or supported by a research travel grant at UI, BSU, and ISU. In comparison to 2007, the ISGC supported one more intern (7% increase).
- In 2008, 8 publications (*1 journal, 6 presentations, 1 dissertation*) were completed by students involved as scholar/fellows, as interns, or as members of a research team.

#### **Goal C – NASA Internship Participation**

- 16 students interned with NASA – 11 at JPL, 1 at Marshall, 3 at Ames, and 1 at Goddard. Three of these interns were interning with NASA for a second time (2 to JPL, 1 to Ames).
- To date, two students who served as interns have been hired by NASA JPL, and four by NASA Ames. Three others have received offers but chose to pursue graduate school first. Four previous interns have been hired by private engineering firms, and the others are currently pursuing graduate programs or completing their undergraduate degree.

Overall, the accomplishments in this program were very strong with high participation in programs, internships and research programs, and the majority of metrics met and/or exceeded. Items not reported above that are relevant to the success of this program include:

- The ISGC director has developed a partnership with several individuals interested in promoting Native American initiatives at the University of Idaho. This collaborative relationship has resulted in one proposal (results are not known) to sponsor a summer workshop for Native American high school teachers.
- In 2008, 3 Electrical and Mechanical Engineering senior design teams were supported by ISGC and NASA Ames.
- Idaho RISE (near-space scientific balloon program) hosted its 4<sup>th</sup> symposium on October 20-21, 2008. The goals of the RISE Symposium are to raise awareness of RISE activities throughout Idaho, to better understand the available opportunities for high altitude scientific research from balloons, to share ideas and experiences, to encourage interactions and collaborations, and to discuss possible new directions for the Idaho RISE program.
- In Fall, 2008 Idaho RISE received a grant of \$10,000 from JPL to conduct research into the dynamics and overall stability of a small probe descending under parachute through the stratosphere and troposphere.
- Seven Idaho RISE launches occurred statewide in 2008 (3 UI, 2 NNU, 2 ISU). For the fourth year the University of Idaho offered an interdisciplinary engineering course, ENGR204. The Spring, 2008 ENGR204 course registered 24 students, and 19 students registered for ENGR204 in Fall, 2008.
- Working with Moscow High School, Idaho Space Grant continues to offer a dual enrollment “Near Space Engineering” course for the math-based physics class at the high school. Moscow High School students enrolled in the dual enrollment course receive University of Idaho engineering credits for participating in the near-space program.
- In 2006, the ISGC initiated the Idaho Robotic Lunar Exploration Program (RLEP), working with the Intelligent Robotics Group (IRG) at NASA Ames Research Center. The RLEP program is led by two ISGC graduate fellows and involves undergraduate teams working with the fellows and mentored by a NASA research engineer to design prototype hardware for future robotic exploration of the moon.
- Through collaboration with the ISGC, Idaho National Laboratory provided a \$50,000 grant to support FIRST robotics teams and for the creation of a K-12 STEM pipeline program. This program will begin with FIRST Junior Lego League for grades 1-4, then Idaho TECH for grades 5-6, FIRST Lego League for grades 6-8, FIRST Tech for grades 9-12 and FIRST Robotics for grades 9-12. Informal education programs, such as 4-H after-school robotics, will also be included. Ultimately, the participants would attend an Idaho higher education institution and become involved with Idaho RISE and Idaho RLEP, thus entering the ISGC’s higher education workforce pipeline.
- Continued the Idaho Teaching Engineering to Children (TECH) research and design competition for teachers and 5<sup>th</sup> and 6<sup>th</sup> grade students, with minimal support from ISGC NASA funds.
- Encouraged underrepresented and female junior and senior high school students to pursue higher education in the science and engineering fields through in-kind support of the UI Idaho JEMS program, UI Women in Engineering Day, the INL Hispanic Youth Symposium, and INL Engineering Expo.

**NASA EDUCATION: OUTCOME 3- PUBLIC BENEFIT** (*Informal Education*)

**Goal A-** Inspiring the next generation of engineers, scientists and educators. Metrics:

- Number of participants, and where possible to measure, number of participants from underrepresented groups
- Number of media reports about ISGC activities
- Number of requests from industry or other organizations regarding the ISGC and its activities
- Feedback provided by participants through survey and other post-program evaluation means

**Goal B-** Stimulating public interest in and understanding of STEM disciplines as well as NASA and its missions. Metrics:

- Number of participants in ISGC public service activities, and where possible to measure, number of participants from underrepresented groups
- Number of media reports about ISGC activities
- Number of requests for further information about the topics presented
- Feedback provided by participants through survey and other post-program evaluation means

**Goal A – Inspiring the Next STEM Workforce and Goal B – Stimulating Public Interest and Understanding in STEM achieved by:**

- Approximately 7,584 individuals participated in informal education programs across Idaho in 2008 that were directly supported by the ISGC, either financially or through in-kind support. This number includes parents and general public individuals who interacted in workshops and through hands-on activities at the INL Engineering Expo, BSU Discover Engineering Day, and the UI Engineering Expo.
- The ISGC is aware of 86 media reports that were released in newspapers, online, on television, or on the radio about its programs. These reports ranged from coverage on specific programs to general releases about the ISGC.

**PROGRAM CONTRIBUTIONS TO PART MEASURES**

- **Longitudinal Tracking:** For those students that were significantly supported from FY 08 funds, 1 student is working for a NASA contractor, 2 students accepted STEM positions in industry, 1 is working at a NASA center, and 1 is working in STEM positions at non-K-12 academic institutions. The remaining students have not yet received the degree that they were pursuing while receiving their Space Grant award.
- **Course Development:** The ISGC is working with the College of Engineering at the University of Idaho to explore expanding the Idaho RISE class to a broader audience. Also, For the fourth year the University of Idaho offered an interdisciplinary engineering

course, ENGR204. The Spring, 2008 ENGR204 course registered 24 students, and 19 students registered for ENGR204 in Fall, 2008. Lastly, working with Moscow High School, Idaho Space Grant continues to offer a dual enrollment “Near Space Engineering” course for the math-based physics class at the high school.

- **Matching Funds:** The NASA ISGC has met 92% of its matching requirement. Of the \$547,071 listed in the proposal to be cost shared, \$501,865 has been reported. The remainder of this obligation will be met by the end of the grant year in March.
- **Minority-Serving Institutions:** ISGC collaborated with Dr. Ed Galindo on a proposal for Global Climate Change and worked with two Tribal Colleges, Salish-Kootenai College in Montana, and Comanche Nations College in Oklahoma. Working on that proposal has opened doors with the two colleges and will enable the ISGC to start the dialogue on future collaborations – such as the opportunity for funding from NASA under the Minority Serving Institutes Partnerships project. Also, two new members were added to the ISGC Advisory Board in an effort to increase the participation of underrepresented minority students. Dr. Ed Galindo and Art Taylor, both Native Americans, are taking an active role in helping the ISGC.

## IMPROVEMENTS MADE IN THE PAST YEAR

To better involve and inform the affiliates of the ISGC, the director will host more frequent meetings of the Executive Committee. A second significant change is that the annual meetings will be used to better inform the affiliates about activities of the ISGC over the prior year. With the annual meeting in June, 2008, the ISGC began providing a breakdown by affiliate of scholarships, fellowships, research grants, and special project grants. For 2009, the breakdown will be expanded to include all funding for the ISGC and will show how the funds are used and how the funding was distributed among the affiliates. The ISGC, through better communications, is working to increase the number of applications for activities at all affiliate members. A final improvement is the process for reviewing research initiation grant proposals. The ISGC has contracted with the National Space Grant Foundation to provide an online submission and review process. To remove any internal bias for selection, the 2009 proposals will be reviewed externally and the results of the external review will be discussed with the Executive Committee.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

### Academic Affiliates

University of Idaho – Lead Institution – UI is the state’s principal graduate education and research university.

Boise State University – BSU is an emerging metropolitan research university.

Idaho State University – ISU is a public, higher education institution.

Lewis Clark State College – LCSC is a public, undergraduate college, offers liberal arts and sciences and applied technical programs.

North Idaho College – NIC is a comprehensive community college.

College of Idaho – C of I is a private, liberal arts institution that provides undergraduate education.

College of Southern Idaho – CSI, a public, comprehensive community college

Northwest Nazarene University – NNU is a private, Christian liberal arts university

Brigham Young University – Idaho – BYU’s mission is to build restored gospel of Jesus Christ and provide a quality education

### Informal Education Affiliates

Discovery Center of Idaho - DCI is an interactive science center providing exhibits and educational programs

Palouse Discovery Science Center - brings hands-on science and learning experiences to people of all ages. PDSC is a non-profit.

Warhawk Air Museum & NASA Space Place- teaches how the advancement in technology has had an impact society.

Idaho Mobile Space Station –was designed for grades 5-8, and includes activities, like “Toys in Space,” & access to astronaut food.

Idaho Science Teachers Association – ISTA serves as the Idaho Chapter of the National Science Teachers Association.

Idaho Museum of Natural History - the official state museum of natural history

Idaho Academy of Science –IAS seeks to improve the effectiveness of science education in Idaho

### Governmental and Industrial Associates

Bruneau Dunes State Park – The Park is also home to the Bruneau Dunes Observatory, which houses several telescopes of various sizes that are available for use by the public.

Idaho Division of Aeronautics – The Division of Aeronautics serves to provide the highest quality, effective, efficient, and safe aviation system for all users of services, visiting or residing in Idaho.

Idaho Department of Education –The department works in collaboration with the Idaho Board of Education in order to provide general supervision of Idaho’s educational institutions and public school system.

Craters of the Moon National Monument & Preserve – The Monument and Preserve encompass three major lava fields and 250,000 acres of sagebrush steppe grasslands. The rugged landscape remains remote and undeveloped with only one paved road across the northern end.

Idaho National Laboratory – The Idaho National Laboratory is a science-based, applied engineering national laboratory dedicated to supporting the U.S. Department of Energy’s missions in environment, energy, science and national defense.