NASA Idaho Space Grant Consortium
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 **$575,000** for fiscal year 2011.

PROGRAM GOALS

In order to consistently evaluate the Idaho Space Grant Consortium annually, the vision, mission and goals of the strategic plan are used as a guide for all programs developed and facilitated through the ISGC.

The vision of the Idaho Space Grant Consortium is to be the voice of NASA in the state of Idaho. To achieve this vision, the mission of the ISGC is to use a strong and active constituent base to provide easily accessible, highly flexible programs that focus on current and ongoing NASA initiatives that will benefit researchers, K-12 teachers, K-16 students, industry, the general public, the state of Idaho and ultimately, NASA.

To achieve the ISGC vision and mission, the ISGC identified the following goals: (1) maintain an active statewide network of universities, colleges, industries, governmental agencies and informal education organizations with interests and capabilities in STEM related fields; (2) build strong partnerships with NASA field centers; (3) encourage cooperative programs among educational institutions, industry, all levels of government and other space grant consortia; (4) encourage interdisciplinary training, research, and public service programs related to the NASA Mission Directorates; (5) develop a strong workforce by recruiting and training professionals, especially underrepresented individuals, for careers in STEM; and (6) promote strong science, technology, engineering, mathematics and

education from kindergarten through university levels, using formal and informal science programs.

Fellowships and Scholarships

- Improve the communication and collaboration between undergraduates, graduates, ISGC fellows, and aerospace researchers, NASA engineers and scientists, and NASA centers.

  The ISGC has worked to enhance communications and collaborations between students and researchers over the past year. More students have been involved with a more diverse combination of projects at many different NASA centers. This past year students have been placed for internships as well as academic year research projects at 5 of the NASA centers (including JPL).

- The total number of undergraduate and graduate students proposing for ISGC support through the ISGC fellowship and scholarship programs will increase by 10% per year through 2015
  - **Metric:** Number of undergraduate students submitting applications for ISGC scholarships.

    In 2010-2011 the ISGC received 57 scholarship applications and in the 2011-2012 grant year the ISGC received 33. We are continuing to find new avenues to advertise and recruit applicants for this program. We have been working closely with the Idaho State Department of Education to announce the scholarship to high schools around the state. We have also made applications available at FIRST Tech competitions in Idaho and the Idaho Science and Aerospace Scholarship participants. Our affiliates also work to advertise the application in undergraduate STEM classes as well as science center camps and public showings. We have recently closed the application period for 2012-2013 and we received 65 applicants this year so our efforts to increase the amount of applicants seem to be working.

  - **Metric:** Number of graduate students submitting applications for ISGC fellowships.

    The number of fellowship applications received in 2010-2011 was 10 and in 2011-2012 we received 8. This ISGC is continually working to increase visibility at affiliate institutions as well as better advertising to graduate students around the state. We will continue striving to increase applicants through University Graduate Colleges and Science and Engineering Departments. We have recently closed the application period for 2012-2013 and we received 16 applicants.

- By 2015, the diversity of the undergraduate and graduate students receiving ISGC support through the scholarship and fellowship program will meet or exceed the demographics of the state of Idaho.
    - **Metric:** Number of underrepresented graduate and undergraduate students receiving ISGC support.

State Demographic	
Black	**.6%**
American Indian and Alaska Native	**1.4%**
Asian	**1.2%**
Native Hawaiian and Other Pacific Islander	**.1%**
Hispanic	**11.2%**
Women	**49.8%**

*Based on 2010 Census

The ISGC supported 13% underrepresented and 38% women undergraduate and graduate students through Scholarships and Fellowships in the 2011-2012 grant year. The ISGC is working closely with the offices of diversity at the affiliate organizations as well as the state department of education to identify areas in the state of high populations of underrepresented individuals to target for program advertising.

- By 2015, 50% of ISGC scholars will be involved in NASA related research through programs such as but not limited to the Idaho Research Involving Student Engineers and Educators (RISE), Robotic Lunar Exploration Program (RLEP), and rocket launch opportunities such as RockOn!
    - **Metric** Number of ISGC Scholars involved in NASA related undergraduate research.

      Number of scholarship recipients involved in research activities – 19 of 37 total (51%) were directly related with ISGC research activities.

Research

- The total number of undergraduate and graduate students proposing for ISGC research support in aerospace and space science fields will increase by 10% per year through 2015.
    - **Metric** Number of undergraduate students submitting proposals for ISGC research support.

      During the 2011-2012 grant year the ISGC supported two Microgravity teams to participate in the Microgravity University at

Johnson Space Center. The total number of undergraduate students on these teams was 16. We will continue to work to increase the numbers of undergraduate students proposing for ISGC research support.

- **Metric** Number of graduate students submitting proposals for ISGC research support.

  The ISGC funded three graduate student proposals for travel to conduct field research. We will continue to work to increase the numbers of graduate students proposing for ISGC research support such as NASA center visits or travel to national conferences.

- By 2015 proposals for research support (including student research support) in aerospace and space science fields will be received from at least five institutions of higher education in Idaho each year.
  - **Metric** Total number of higher education institutions proposing for ISGC research and travel grants.

    Five of the higher education affiliate institutions proposed for ISGC research and travel grants during the 2011-2012 grant year.

- By 2015 ISGC will provide research support to students from at least five higher education institutions within Idaho per year.
  - **Metric** Number of higher education institutions with students receiving ISGC research funding.

    Five of the higher education affiliate institutions received funding to support student research during the 2011-2012 grant year.

- By 2015 the total number of proposals for external NASA research funding will increase by 10%.
  - **Metric** Total number of proposals submitted for NASA research funding.

    Five proposals were submitted by ISGC researchers to NASA in the 2011-2012 grant year.

- Each year, all Research Seed Grants will include undergraduate students.
  - **Metric** Total number of ISGC Research Seed Grant proposals submitted for research funding.

    Eight proposals were received by the ISGC for the 2011-2012 grant year.

- **Metric** Number of undergraduates supported by ISGC Research Seed Grant awards.

  A total of 36 undergraduate students were supported by ISGC research projects.

- By 2015 the percentage of women and underrepresented minority individuals participating in the ISGC research infrastructure programs will meet state percentages.
  - **Metric** The total number of participants in ISGC research infrastructure programs.

    The total number of participants in ISGC Research Infrastructure programs was 53 (this includes faculty, undergraduate and graduate students).

  - **Metric** The number of women and underrepresented minorities participating in ISGC research infrastructure programs.

    Of the 53 people included in the ISGC Research Infrastructure program 18 of them were either underrepresented or women (34%).

Higher Education

- By 2015 interdisciplinary and collaborative undergraduate courses will be offered at five higher education institutional affiliates in Idaho.
  - **Metric** Number of higher education institutional affiliates offering interdisciplinary and collaborative undergraduate courses

    Currently three institutions of higher education are offering interdisciplinary and collaborative undergraduate courses. University of Idaho offers Near-Space Engineering to students of all disciplines. Northwest Nazarene University offers a similar course that is tied to the high-altitude balloon program. Also, Boise State University offers a hands-on introductory engineering course geared at freshman in STEM disciplines.

- By 2015 the percentage of women and underrepresented minority individuals participating in ISGC higher education programs will meet or exceed state percentages.
  - **Metric** The total number of participants in ISGC higher education programs

    Total number of undergraduate and graduate students in ISGC Higher Education programs in the 2011-2012 grant year was 75.

- **Metric** The number of underrepresented minorities participating in higher education programs.

  The total number of underrepresented minorities participating in ISGC higher education programs in 2011-2012 was five (7%). The state percentage for underrepresented individuals based on the 2010 census is 14.5% including Asian. The ISGC is working with the offices of diversity and other multi-cultural organizations at the higher education institutions to increase the diversity in our programs.

- **Metric** The number of women participating in ISGC higher education programs

  The total number of women participating in ISGC higher education programs in 2011-2012 was 18 (24%). The state percentage for women based on the 2010 census is 49.8%. The ISGC is working with women faculty and administrators as well as institution chapters of the Society of Women Engineers and the Women's Center at the higher education institutions to increase the participation of women in our programs.

- By 2015 the total number of students participating in ISGC undergraduate research programs will increase by 15%.
  - **Metric** Number of ISGC scholars participating in ISGC undergraduate research programs each year.

    In 2011-2012, ten out of the 37 scholarship recipients participated in ISGC undergraduate research. Last year we awarded 40 scholarships and 18 scholars participated in ISGC undergraduate research programs. Even though there has been a decrease in participation, many other scholarship recipients were active participants in faculty research.

- By 2015 the number of higher education institutions participating in the ISGC RLEP, RISE, and/or rocket launch opportunities will be at least five.
  - **Metric**: The number of ISGC education affiliates with teams participating in Idaho RISE.

    Currently we have three institutions actively participating in the Idaho RISE - University of Idaho, Northwest Nazarene University, and Idaho State University.

- **Metric**: The number of ISGC education affiliates with teams participating in Idaho RLEP.

  Currently the University of Idaho is the only affiliate institution participating in Idaho RLEP. When this program was created the ISGC intended to spread it state wide. However, after discussing this with affiliates it was decided that this funding would be used to support other similar programs that affiliates had begun. For example, Boise State University has begun a very successful Microgravity program. Therefore, even though there is only one RLEP program in the state, we supported two other similar programs in addition to the University of Idaho RLEP program.

- **Metric:** The number of ISGC education affiliates with teams participating in rocket launch opportunities such as RockOn!.

  In the 2011-2012 grant year two education affiliates participated in RockOn!. Northwest Nazarene University and Idaho State University sent representatives to the RockOn! Workshop in 2011.

- By 2015 the number of undergraduate and graduate students applying for summer and/or academic year internship programs with NASA or in aerospace industry will increase by 15%.
  - **Metric** The number of undergraduate and graduate students applying for ISGC-sponsored NASA and aerospace internship programs.

    Our baseline as set in year one of funding is 40 applicants. In the 2011-2012 grant year 42 students applied for internships. This is a 5% increase.

- By 2015 the percentage of women and underrepresented minority individuals placed at a NASA center or in aerospace internship programs will meet state percentages.
  - **Metric** The total number of participants in ISGC-sponsored NASA and aerospace internship programs.

    In 2011-2012 the ISGC supported 9 students for internships at NASA centers.

  - **Metric** The number of women and underrepresented minorities participating in ISGC-sponsored NASA and aerospace internship programs.

    Of the nine students supported, one was female (11%), one was underrepresented (11%), and one was disabled (11%). The state

demographics based on the 2010 census are as follows: women – 49.8%, underrepresented – 17% including Asian. The ISGC will continue to strive to increase the women and underrepresented individuals participating in our programs by working with the offices of diversity and multi-cultural affairs at the higher education institutions as well as advertising to the local chapters of student organizations such as Society of Women Engineers, National Society of Black Engineers, and OELA.

- Engage 9 students from 3 higher education institutions in rocket flight opportunities.
    - **Metric** Number of students participating in rocket flight opportunities such as Rock On!.

      The ISGC supported six students whom designed a two-fold experimental payload to launch on the 2012 RockSat-C Program

    - **Metric** Number of institutions involved.

      The six students who are involved are from Northwest Nazarene University. Idaho State University is also working on the capabilities to have an experiment launch on a rocket in 2013.

- Have two student led flight experiments that will fly by 2012 in a rocket flight opportunity.
    - **Metric** Number of student led flight experiments.

      In 2012 Northwest Nazarene University has been accepted to launch a payload as part of the RockSat-C program. Idaho State University is also working on the capability and is planning to launch a payload in 2013.

K-12 Education

- By 2015 the number of pre-service teachers participating in ISGC STEM initiatives will increase by 10% per year.
    - **Metric** Number of pre-service teachers participating in ISGC STEM initiatives.

      The ISGC had 72 pre-service teachers who assisted with the facilitation of or participated in the Summer of Innovation student workshops.

- The number of Special Project Grant proposals received from K-12 education affiliates will increase to five per year by 2015.
    - **Metric** Number of Special Project Grant proposals received from K-12 education affiliates.

      The ISGC funded two Special Project Grants during the 2011-2012 grant year. One to Jennifer Pollard at Genesee School to support the Near Space Engineering project (Idaho RISE) for the high school physics students and the other was awarded to Pat Blount at Moscow High School to fund travel to the Great Plains Super Launch Conference in Colorado Springs, CO.

- The number of Idaho teachers, students, and schools participating in ISGC Pre-College programs will increase by 10% by 2015.
    - **Metric** Number of Idaho schools participating in ISGC Pre-College programs

      Our baseline as set in year one of funding is 183 schools. In year two of our grant the number of school increased to 188. This is a 2.7% increase.

    - **Metric** Number of students participating in ISGC Pre-College programs

      Our baseline as set in year one of funding is 1,421 students. In year two of our grant 1,667 students participated. This is a 17% increase in student participants.

    - **Metric** Number of teachers participating in ISGC Pre-College programs

      Our baseline as set in year one of funding is 210 teachers. In year two of our grant 185 teachers participated in our programs. This is a decrease of 12%. The total number of teacher led team activities reduced this year causing the number of teachers to decrease.

- Visit the teachers from at least 6 schools that were a part of the 2010 IMU-SOI Summer of Innovation during the 2010 academic year.
    - **Metric** Number of schools visited
      The ISGC SOI program staff was in contact with all the teachers who participated in the 2010 workshops. In addition to email and phone contact 3 schools visits were made to follow up with SOI teachers. After further interest was shown, 2 school visits were made

establishing contact with new teachers interested in the program. These schools were provided with MARS boxes, containing materials and NASA curriculum to assist them in implementing STEM into their classrooms. MARS boxes were also sent to 7 SOI sites throughout the states of Idaho, Montana, Utah, California and Wyoming.

- Have 70% of the teachers that were a part of the IMU-SOI program implement NASA Curriculum in their classroom in 2010.
    - **Metric** Number of teachers using NASA curriculum.

      Although some of the data is still be evaluated, through contact with teacher participants we can show that 80-90% of teachers who participated in SOI workshops in 2010 have implemented some or the entire NASA curriculum experienced during the workshops.

- Engage 60 students with an intensive learning experience based on NASA curriculum at two school districts.
    - **Metric** Number of students participating in program.

      Through the workshops in Salmon and Orofino, we reached 98 students in summer 2011.

    - **Metric** Number of school districts program offered.

      The program was offered in two school districts but students were recruited from at least 10 school districts surrounding the service areas.

- Engage 25 teachers in intensive learning workshops based on NASA curriculum at two school districts.
    - **Metric** Number of teacher engaged in program.

      Through Summer of Innovation workshops, we reached 30 teachers in the 2011-2012 grant year.

    - **Metric** Number of school districts program offered.

      The workshops were held in two school districts, however we recruited teachers from approximately 10 districts.

- The total number student teams that participate in Idaho TECH will reach 60 teams in FY 2010.
    - **Metric** Number of teams participating in Idaho TECH

During FY 2011, the ISGC had 42 teams participate in the Idaho TECH: Mars Rover Challenge. For FY 2012 we are working to increase the number of teams by implementing school visits to discuss the program with teachers and parents as well as presenting at venues such as Idaho Science Teachers Association annual conference and Partners in Education conference.

- The total number of student teams participating in *FIRST* Lego League will reach 300 teams in FY2010
    - **Metric** Number of teams participating in *FIRST* Lego League
      Idaho had only 151 teams (approximately 1000 students) participate in FIRST Lego League in FY2011. Although we did not reach our goal of 300 teams, Idaho's FIRST programs are growing each year and we anticipate many more teams in FY 2012.

- The total number of student teams participating in *FIRST* Tech Challenge will reach 35 teams in FY 2010
    - **Metric** Number of teams participating in *FIRST* TECH Challenge

      Idaho had only 30 teams (approximately 200 students) participate in FIRST Tech Challenge in FY2011. Although we did not reach our goal of 35 teams, Idaho's FIRST programs are growing each year and we anticipate more teams in FY 2012.

Informal Education

- The number of Special Project Grant proposals received from informal education affiliates will increase to five per year by 2015.
    - **Metric** Number of Special Project Grant proposals received from informal education affiliates

      We received one proposal from an informal education affiliate in the 2011-2012 grant year. The ISGC supported Discovery Center of Idaho's proposal for 2011 summer program Idaho Space Days. We have been working closely with our informal education affiliates to revise our special project program to meet their needs.

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

Outcome #1 (Employ and Educate)

- 23 students took next step in FY11 (SG participation supported from FY06-FY11 funds)
    - 8 are pursuing advanced degrees in STEM disciplines

- 1 accepted a STEM position at a NASA contractor
- 12 accepted STEM positions in industry
- 1 accepted a STEM position in academia
- 1 went on to a position in a non-STEM discipline

Outcome #2 (Educate and Engage)

- In 2011, the ISGC continued to award scholarships on a graduated funding scale. As scholars continue within the STEM field and continue to meet the requirements of the scholarship program, their funding increases each year. The goal is to reward students who continue to remain in the STEM fields and perhaps provide an added incentive for students to remain in STEM.
- A dual enrollment class with Moscow High School continued to involve high school students and teachers in the ISGC RISE program. This class enrolled 23 students for the fall 2011/spring 2012 semesters.
- A dual enrollment class was established with Genesee High School to integrate Idaho RISE into the physics class. 17 students registered and received college credit for taking this class
- Six seniors in Mechanical Engineering and Electrical Engineering along with 2 graduate students participated in the ISGC's Robotic Lunar Exploration Program (RLEP). This program is a senior design capstone project that is linked to NASA Ames Intelligent Robotics Group.
- Idaho TECH is a program for 4th, 5th and 6th grade students. In 2011, 42 teams participated from around the state. Idaho TECH is a part of the Idaho ROKS pipeline program. This program is a collaboration between the University of Idaho's Colleges of Engineering, Agriculture and Life Sciences, 4H – Extension, and the NASA ISGC.
- The NASA ISGC in collaboration with the University of Idaho will host an Idaho Science and Aerospace Scholars capstone event in early June. We anticipate 18 students from northern Idaho to attend this one-day event.

Outcome #3 (Engage and Inspire)

- The NASA ISGC collaborated with the Clearwater Valley Upward Bound program for a weeklong engineering workshop. Nineteen students participated in hands-on Idaho RISE workshop in the summer of 2011.

PROGRAM ACCOMPLISHMENTS

Idaho RLEP / NASA Ames

The Idaho Robotic Lunar Exploration Program (RLEP) was developed with the Intelligent Robotics Group (IRG) at NASA Ames Research Center in 2006. Each year, the Idaho RLEP program is led by two ISGC graduate fellows and involves undergraduate teams working with the fellows and mentored by NASA research engineers to design prototype hardware for future robotic exploration of the moon. As advisors and technical mentors to a University of Idaho senior engineering

design team, the RLEP fellows gain experience in project management and leadership, engineering design, research and development, technical communications, and networking. The hardware developed under the Idaho RLEP program provides Ames researchers with the opportunity to identify engineering design issues and constraints preliminary to the definition, design, and development of actual hardware.

In 2011, the TensegriTeam engineering senior design team, comprising seven students from electrical and computer engineering, mechanical engineering, and Bio/Ag Engineering designed a robotic tensegrity system. Tensegrity is a unique class of structures composed of axially loaded compression elements encompassed within a network of tensile elements and with similarities to biological systems and with improved compliance over traditional robots. The goal of the TensegriTeam project was to design and build a tensegrity module capable of controllable shape change as a proof-of-concept for the feasibility of tensegrity robots. In April, 2012, TensegriTeam spent two days at NASA Ames for technical presentations of the tensegrity robot to NASA Engineers and project sponsors, including NASA technical mentors from the Intelligent Robotics Group Dr. Terry Fong and Mr. Vytas SunSpiral.

A new development in the 2011 Idaho RLEP program is the first woman RLEP fellow.

ROSES SMD Education Proposal Review / NASA Ames

Idaho Space Grant Assistant Director Dr. David H. Atkinson was asked to participate as a member of a ROSES SMD Education program review panel held at the NASA Lunar Sciences Institute at NASA Ames in November 2011.

Atkinson Senior Research Fellowship / JPL, NASA Ames

Dr. David H. Atkinson, Assistant Director of the NASA Idaho Space Grant Program received a two-year senior research fellowship at JPL. During the first year of his fellowship, June, 2011-June, 2012, Dr. Atkinson helped lead a study of a future Saturn probe mission to be proposed by JPL under the New Frontiers program in 2016. Dr. Atkinson under an Idaho Space Grant Research Seed Grant developed elements of the Saturn probe mission concept. A number of NASA JPL and Ames research scientists and engineers continue to work with Dr. Atkinson including (from JPL) Dr. Torrence Johnson, Dr. Thomas Spilker, Dr. Linda Spilker, Dr. Christopher Webster, Mr. Kim Reh, and Mr. Jon Sims, and (from NASA Ames) Dr. Anthony Colaprete, Dr. Raj Venkatapathy, and Ames Director of Science, Dr. Michael Bicay.

While at JPL Dr. Atkinson hosted several Idaho researchers at JPL to pursue possible future research collaborations, and worked closely with Linda Rodgers in the JPL Education office to provide the opportunity for five Idaho students to intern at JPL during the summer of 2012.

Idaho Near Space Engineering Program / NASA Ames

For the seventh year the University of Idaho offered a two-semester interdisciplinary engineering course, ENGR205/ENGR206. The Idaho RISE Near Space Engineering team continues to work with Marc Murbach, a research engineer at NASA Ames Research Center on several different flight projects. For the past several years, the University of Idaho balloon team has continued to develop and provide a flight capability for testing of Snowflake, an autonomous parafoil system capable of flying to a pre-programmed landing site. Snowflake was developed by the Naval Postgraduate School and NASA Ames Research Center. Research engineers from NASA Ames involved in the project include Marc Murbach, Josh Benton (a University of Idaho engineering graduate), and Kenny Boronowsky (now at SpaceX).

In 2011 there were three University of Idaho RISE launches – April, August, and October. A flight of the Ames Snowflake system is currently scheduled for mid-May, 2012.

The Idaho Near Space Engineering team has developed several new capabilities over the past year, including tracking of the Snowflake payload using a small chase plane, developing and the capability to communicate with and track the balloons by a satellite communication system. Students from several new disciplines participated in the Near Space Engineering program, including from Art and Architecture.

Planning is underway to fly the new Ames satellite communication system on a suborbital launch from NASA Wallops Flight Facility in Virginia. This system was developed with significant support from the Idaho Near Space Engineering Team, and several NASA ISGC summer interns working at NASA Ames in 2011.

Idaho Near Space Engineering Program / Moscow and Genesee High Schools

Idaho Space Grant continues to offer University of Idaho ENGR205/ENGR206 Near Space Engineering as a dual enrollment course to the math-based physics class at Moscow High School. Moscow High School dual enrollment students receive University of Idaho engineering credits for participating in the Near Space Program, and students who continue to the University of Idaho, participate in the University Near Space Engineering program, and declare an engineering major, are eligible for a RISE student scholarship.

New in 2011 is the addition of Genesee High School to the University of Idaho Near Space Engineering dual enrollment program. Genesee High School is planning its first launch for mid-May, 2012 in tandem with a launch by Moscow High School. The Moscow and Genesee high school balloon teams fly student-designed experiments to altitudes of approximately 100,000 feet.

Spaceward Bound / NASA Ames

In 2011 Idaho Space Grant participated with NASA Ames educators and researchers to offer Idaho Spaceward Bound to Idaho primary and secondary teachers. Approximately 13 teachers received continuing education credits by participating in the one-week Spaceward Bound Idaho program. During Idaho Spaceward Bound 2011, researchers from Idaho State University, the University of Idaho, Idaho

educators, and researchers from NASA Ames at eight geologic sites of high interest as planetary analogues in Idaho conducted field research. Planning is currently underway for Idaho Spaceward Bound 2012. During Spaceward Bound 2012, Idaho teachers will again work alongside NASA researchers at sites of particular geologic interest identified during Spaceward Bound 2011.

LADEE / NASA Ames

For the third year, Idaho students worked as summer interns at NASA Ames Research Center, supporting engineering design, development, test, and analysis of structures and subsystems as part of the NASA LADEE (Lunar Atmosphere Dust and Environment Explorer) program.

Mars Hopper / NASA Ames

Dr. John Crepeau of the University of Idaho Mechanical Engineering Department was funded under an Idaho Space Grant Research Seed Grant to study the design of engineering subsystems to support a possible future Mars lander and surface mobility mission known as a Mars Hopper. During the course of the project study, Dr. John Crepeau met with a number of NASA Ames planetary scientists and research engineers with interests in Mars exploration, including Chief of the Planetary Systems Branch, Dr. Jeffery Hollingsworth, Dr. Chris McKay, Dr. Anthony Colaprete, Dr. Jen Heldmann, Dr. Ginny Gulick, Dr. Jeff Moore, Dr. Ted Roush, Dr. Carol Stoker, Dr. Aaron Zent, Dr. Butler Hine, Mr. Marc Murbach, and Mr. Larry Lemke. Several significant opportunities for collaboration developed from these meetings that continue to be pursued.

Patch Antenna Research / JPL

In 2011, Mr. Kamal Oudrhiri, a radioscience engineer at JPL, hosted University of Idaho electrical engineering student Carlos Gonzalez. Based largely on the research performed by Mr. Gonzalez, possible research collaboration is being developed. Mr. Oudrhiri is again hosting Carlos for a summer, 2012 internship at JPL, has agreed to be a member of Carlos's electrical engineering graduate committee, and will visit the University of Idaho for research discussions and to present a research colloquium in fall, 2012. The research collaboration is in the area of small (Microstrip) antennas for very small or miniature satellites such as CubeSat, PicoSat, and NanoSat.

To summarize the accomplishments of the Idaho Space Grant Consortium:

- Successful disbursement of scholarships and fellowships throughout the state involving the Idaho higher education institutions and encouraging underrepresented students to take part in the program.
- Successfully involve undergraduate students in NASA related research projects, senior design projects, and internships with NASA centers across the country.
- Involve research faculty in NASA's missions and goals through seed funding and travel grants to visit NASA centers to initiate collaborations.

- Educate and involve K-12 students and teachers in NASA projects through Summer of Innovation, Spaceward Bound, Idaho TECH, and small grant opportunities.
- Support and involve Idaho affiliates through yearly meetings, personal visits, and small grant opportunities.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Student Data and Longitudinal Tracking:

Total awards = 106; Fellowship/Scholarship = 45, Higher Education/Research Infrastructure = 61; 6 of the total award represent underrepresented minority F/S funding. During the FY11 program year, 8 are pursuing advanced degrees in STEM disciplines, 1 accepted a STEM position at a NASA contractor, 12 accepted STEM positions in industry, 1 accepted a STEM position in academia, and 1 went on to a position in a non-STEM discipline. The remaining students have not yet received the degree that they were pursuing while the received their Idaho Space Grant award.

- Percentage of students whom have taken their next step and have been successfully tracked though their next step or last year of SG support.
    - 80% for 2006
    - 100% for 2007
    - 100% for 2008
    - 91% for 2009
    - 100% for 2010
    - n/a for 2011 – all participants sill enrolled
    - 94% for 2006-2011
- 92% of students significantly supported by went onto next steps in STEM disciplines

- Diversity:

In our fellowship and scholarship program, the selection committees have paid particular attention to recruiting and selecting students from underrepresented minority groups. Our work with the Summer of Innovation program has increased the exposure of the Idaho Space Grant Consortium to a diverse audience across the state. Although direct funding from the Space Grant Augmentation serviced areas that are mostly first-generation, low income students, we expect to see the results of our work with these middle school students and other underrepresented minority students from across the state in the coming years.

- Minority-Serving Institutions:

Although there is no minority serving institutions in the state of Idaho, the ISGC has continued to develop its relationship with Salish-Kootenai College in Montana. Through the work of the Director (Navajo) and Associate Director, Ed Galindo (Yaqui), connections between this Tribal College and the ISGC have been established. Salish-Kootenai College is also a partner on the ISGC Summer of Innovation grant.

- NASA Education Priorities:

Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.

The Idaho Space Grant continues to run a state-wide robotics competition for 4-6 graders called Idaho TECH: Mars Rover Challenge. This competition allows teams of students to design and assemble a robot made from Legos and other materials that will navigate a number of different challenges. These challenges include a hill climb, blind driving, rock collection, speed competition, and obstacle course that force the students develop a robot that is multidimensional. Include in the competition is judging based on the notebook that describes their process throughout the school year, their poster that displays their work, and their presentation on their design, challenges, and solutions. This provides a hands-on student experience in both science and engineering in their robot designs.

The Idaho Summer of Innovation (SOI) has also enabled 5-9th graders to experience NASA-related, STEM focused hand-on activities during a week--long camp experience. Although the Idaho SOI was from a NASA grant separate from the ISGC, the ISGC Director and Associate Director were the PI's on this project, and it was implemented by the ISGC office. The focus was to encourage students to enter the STEM fields using NASA educational curriculum that cover rockets, robotics, cosmology, exercise and nutrition, aeronautics, and similar hands--on activities during the week. The ISGC will continue to search for outside funding to continue the great work that has started in the many communities that we have reached with the Summer of Innovation. We believe it will directly impact the ISGC by creating a pipeline of students from tribal reservations, Hispanic populations, and/or low--income, rural areas that will become future students of the ISGC.

Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering.

In addition to student activities associated with the Summer of Innovation, teacher workshops were also provided to the sites in the summer of 2011 to help teachers infuse NASA curriculum into their classrooms. The online community continued to develop the website to give teachers another resource of curriculum and experiments to integrate into their classrooms. The online experiment of the month has been a successful example of how the SOI program has provided teachers with activities that they can add to their classroom. Many teachers have made several inquiries to Associate Director Galindo on items or expertise needed for their classroom projects.

The ISGC, in collaboration with NASA Ames supported teachers to participate in Spaceward Bound Field Expeditions in Idaho in June of 2011. During this weeklong trip, teachers were immersed in authentic scientific fieldwork so that they could bring that experience back to their classrooms. NASA Ames Education Specialists also worked with teachers to develop curriculum related to human exploration of remote and extreme environments. In the summer of 2012 teachers will be returning to Craters of the Moon, Worswick Hot Springs, and Shoshone Ice Caves for follow--up visits.

Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.

Each summer the ISGC collaborates with the Clearwater Valley Upward Bound program to engage their students in a week long, hands-on engineering workshop. In this grant year, the high school students designed, fabricated, and launched payloads on a high-altitude balloon. Each team's payload included and accelerometer, temperature and pressure sensors as well as a unique experiment created by the students themselves. Other programs the ISGC has supported specifically designed for secondary students are e--girls, sponsored by Boise State University, and JEMS at the University of Idaho.

Develop new relationships with community colleges as well as sustain and strengthen existing institutional relationships with community colleges.

The ISGC is currently working with College of Southern Idaho (CSI) and North Idaho College (NIC) to develop STEM projects for teachers. Currently, science faculty at CSI and NIC has been developing hands on science boxes (called MARS boxes) that teachers can build and use for their own classroom. CSI and NIC are working with Dr. Galindo to develop on-line STEM experiment's that will inspire the next generation of teachers and students. The two community colleges are located in the north (NIC) and south (CSI) part of our state and this will help ensure state-wide STEM coverage.

Research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen).

The ISGC has supported several projects that are appropriate to NASA's unique capabilities. The following projects have been supported:

- Exploration of Saturn with Planetary Entry Probes
- Titan Aerial Vehicle for In--situ and Airborne Titan Reconnaissance (AVIATR)
- Precipitation Detector for proposed Titan Aerobot Mission
- Flywheel Energy Storage for future lunar surface missions
- Robotic Lunar Exploration Program (RLEP) -- Mobile Tensegrity

Research and activities in Environmental Science and Global Climate Change to better understand Earth's environments.

Researchers in Idaho proposed and were awarded a Global Climate Change grant. The ISGC is collaborating with this research group and will assist with recruitment of teachers and the organization of teacher workshops on the University of Idaho campus.

Diversity of institutions, faculty, and student participants.

Strategies that are overarching throughout Idaho Space Grant are competitiveness, diversity, and geographical distribution. All program funding opportunities, including research support, and scholarships and fellowships, will continue to place a high priority on competitiveness, with every effort to provide equable geographic distribution throughout the state. Additionally, Idaho Space Grant will continue to place a very high priority on recruitment and retention of underrepresented individuals, and will work towards engaging a diverse cadre of researchers, undergraduate and graduate students, K--12 students, and the general public participating in or impacted by ISGC programs. To provide for the most effective possible recruiting of potential program participants, Idaho Space Grant will strive to foster relationships with organizations that support underrepresented groups throughout the state.

Idaho is a large, rural state with a widely dispersed population, a growing number of underrepresented minorities, and lack of an in--state minority serving institution. Providing opportunities to students, educators, and communities in the most rural locations, and attracting participation from individuals from underrepresented groups, Native American and Hispanic students in particular, remain as high priorities and central challenges. Recent appointments at the University of Idaho and the signing of a Memorandum of Understanding (MOU) with 10 area tribes have opened the dialog for building strong, meaningful and sustainable relationships with Tribal colleges in the west, and these efforts will certainly continue. Contacts made with Salish--Kootenai College in Montana may allow the ISGC and Montana Space Grant to work collaboratively in serving this tribal college.

Enhance the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.

The ISGC continues to competitively award seed funding to faculty at research institutions around the state so help them develop their research geared towards NASA priorities. The purpose of the funding is to provide new faculty a start in their research within NASA's programs or established faculty that are redirecting their research to align with NASA's priorities. The goal is then for faculty and institutions to develop strong relationships with NASA's centers and the scientists and engineers at each center so that they can continue collaborative research efforts once the duration on the seed grants are complete.

Another item that the ISGC has continued to develop is the importance for Idaho's faculty to personally visit scientists and engineers at NASA centers. It is believed that a direct conversation between the faculty and those at NASA will help better focus the faculty's research so that it directly aligns with NASA priorities and they have a direct link in developing proposals for NASA funding. It has been observed that those faculty that have strong ties within NASA have stronger proposals and are more likely to be funded through the ISGC or NASA EPSCoR. In 2011, we funded four faculty members from two different Universities to travel to different NASA centers to establish collaborations.

IMPROVEMENTS MADE IN THE PAST YEAR

The most significant change made this year from last year focused on our Idaho TECH – Mars Rover Challenge. Our events held in Southeastern and Southwestern Idaho has seen significant decreases in the number of teams participating. This is primarily due to the increased success of the FIRST Lego program in Idaho. It was decided to only hold one statewide event in Idaho to reduce the amount of time, travel, and funding used to travel to these other locations. The overall number of teams that participated in Idaho TECH did decrease, but not significantly that would justify reinstituting the program in these other locations. We believe that this provides a good balance of continuing to serve students and teachers of 4 – 6th graders and being mindful of people's time and finances.

In the past year the ISGC has also added a new affiliate member. The Eastern Idaho Engineering Council performs educational and charitable activities in the areas of engineering, science and technology. Their mission and goals complement those of the ISGC and make the consortium a stronger group.

The Idaho RISE program has also made an effort to be more interdisciplinary and has started to integrate art and architecture into the class. Art and Architecture students have begun to look at the art of engineering and science and plans for an art installation about engineering and science is slated for the fall. The RISE program has also integrated more science in the program. This year the students have been working with the College of Natural Resources and the Aquaculture Research Center to integrate a habitat for fish on the payload. This experiment will

lead to research of sustainability of food sources on long duration space flight as well as on the International Space Station.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Academic Affiliates:

University of Idaho – Lead Institution – Founded in 1889, the University of Idaho is the state's flagship higher-education institution and its principal graduate education and research university, bringing insight and innovation to the state, the nation and the world. University researchers attract nearly $100 million in research grants and contracts each year; the University of Idaho is the only institution in the state to earn the prestigious Carnegie Foundation ranking for high research activity. The university's student population includes first-generation college students and ethnically diverse scholars. Offering more than 150-degree options in 10 colleges, the university combines the strengths of a large university with the intimacy of small learning communities.

Boise State University – BSU is an emerging metropolitan research university of distinction achieving its vision through academic excellence, public engagement, a vibrant culture and exceptional research. Reflecting the character of Idaho's capital city – a center of business, government, technology, health care and the arts, BSU is the largest university in Idaho with 19,667 students.

Idaho State University – ISU is a public, higher education institution in Southeast Idaho, with academic programs in business, pharmacy, and the health professions, teach education, engineering, arts and sciences, and applied technology training through the College of Technology. ISU provides undergraduate and graduate educational services to approximately 13,000 students annually.

Lewis Clark State College – Founded in 1893, LCSC is a public, undergraduate college with a history born of vision and commitment to people. The college serves a highly diverse population, providing educational opportunities to over 3000 students from more than thirty states and twenty countries. LCSC offers instruction in the liberal arts and sciences, professional areas tailored to the educational needs of Idaho, and applied technical programs that support the state and local economy.

North Idaho College – Founded in 1933, NIC is a comprehensive community college located on the spectacular shores of Lake Coeur d'Alene and the Spokane River. This public, higher education institution provides quality educational opportunities through offering associate degrees in more than 35 transferable academic majors and technical certificates or associate of applied science

degrees in 26 professional-technical programs. NIC serves approximately 4,400 students annually.

College of Idaho – Founded in 1891, The College of Idaho provides a curriculum that is grounded in the liberal arts in a challenging, intimate academic setting. C of I is a private, liberal arts institution that provides an undergraduate education for more than 800 students in Caldwell.

College of Southern Idaho – CSI, a public, comprehensive community college, provides educational, social and cultural opportunities for a diverse population of South Central Idaho. In this rapidly changing world, CSI encourages students to lead enriched productive and responsible lives. The College of Southern Idaho is one of the fastest growing institutions of higher education in the state. CSI serves approximately 7,000 students annually.

Northwest Nazarene University – Founded in 1913, NNU is a private, Christian liberal arts university fully committed to an educational process that pursues both intellectual and spiritual development. NNU is committed to providing its students, both undergraduate and graduate, with an acquaintance with the major fields of knowledge through a study in the liberal arts. NNU serves approximately 1,400 students annually.

Brigham Young University – Idaho – BYU-Idaho's mission is to build testimonies of the restored gospel of Jesus Christ, provide a quality education, prepare students for lifelong learning, and maintain a wholesome academic, cultural, social and spiritual environment. This four-year private university, which is affiliated with The Church of Jesus Christ of Latter-day Saints, attracts students from all 50 states and more than 30 foreign countries. It currently serves approximately 11,000 students annually.

Informal Education Affiliates

Discovery Center of Idaho - DCI is an interactive science center providing exhibits and educational programs that offer authentic, sensory experiences making the sciences, math and technology tangible.

Palouse Discovery Science Center - The Palouse Discovery Science Center brings hands-on science and learning experiences to people of all ages. PDSC is a non-profit organization whose purpose is to further the public's understanding of science and technology through the use of educational programs, exhibits, teaching collections, and activities which emphasize the physical participation of individuals. The Center's offerings support and enhance science in both formal (such as school systems) and informal situations involved with life-long learning.

Warhawk Air Museum & NASA Space Place - The WAM Education Center, including the NASA Space Place Club, is a place where students of all ages can

come to learn about World War II History from the warfront to the home-front and how the advancement in technology has had an impact on our society. Students will have an opportunity to learn about the changes that have occurred in America since the advent of man's first flight through the current aerospace developments.

Idaho Mobile Space Station – The IMSS was created in collaboration with the Idaho Dairy Council, ISGC, and former astronaut Tom Jones, among others. A converted semi-truck trailer was used to construct a portable Station that resembles components of the Shuttle, including a robotic arm, exercise bike, and an aviation flight computer program. The Station was designed for grades 5-8, and includes activities both in and out of the Station, such as "Toys in Space," access to astronaut food, etc.

Idaho Science Teachers Association – ISTA serves as the Idaho Chapter of the National Science Teachers Association. ISTA's membership includes science teachers, administrators, and scientists from across the state of Idaho. ISTA focuses on continually enhancing science education in Idaho, awarding outstanding science teachers in the state, and serving as a clearinghouse for resources through use of workshops, conferences, a newsletter, and a website.

Idaho Museum of Natural History - It is the mission of the Idaho Museum of Natural History to actively nurture an understanding of and delight in Idaho's natural and cultural heritage. As the official state museum of natural history, it acquires, preserves, studies, interprets, and displays natural and cultural objects for Idaho residents, visitors, and the world's community of students and scholars. The Museum also supports and encourages Idaho's other natural history museums through mentoring and training in sound museological practices.

Idaho Academy of Science – The IAS was organized in 1958 to further the cause of science and science education in Idaho. The IAS seeks to improve the effectiveness of science education in Idaho, and to promote public understanding and appreciation of the sciences and applied technology in the modern world. It is the only statewide organization in Idaho that embraces all scientific disciplines.

Eastern Idaho Engineering Council - This council was established in September 2001 to perform educational and charitable activities in the areas of engineering, science and technology; to provide a coordination role for inter-society events; to provide a resource upon which the member societies can draw for help in planning and executing various functions and events; to provide a forum for dialog and debate among the actively participating eastern Idaho sections of professional engineering societies; and to provide a single point of contact for outside entities that would like to obtain assistance or support from the engineering community.

Governmental and Industrial Associates

Bruneau Dunes State Park – The dunes at Bruneau Dunes State Park are unique in the Western Hemisphere. The Park is home to the largest single-structured sand dune in North America, with a peak 470 feet above the lakes. 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. To this end, the division plans and implements necessary and desired products, programs, and services to develop, encourage and foster an outstanding aviation system that meets the current and future requirements of a growing and diverse Idaho aviation public.

Idaho Department of Education – Idaho's Department of Education was organized in 1891. Today, the Department is organized into an administrative section and six bureaus, and holds responsibility in a variety of areas. 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 – Craters of the Moon is one of the best places in the world to see the awesome effects of volcanism. Established by Presidential proclamation in 1924, 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 – In operation since 1949, 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. Its mission is to deliver science-based; engineered solutions; complete environmental cleanup responsibly and cost effectively; provide leadership and support to optimize the value of EM investments and strategic partnerships; and enhance scientific and technical talent, facilities, and equipment. The INL works with higher education institutions, researchers, industry, and with students of all levels in a variety of capacities.