FY 2003 PROGRAM PLAN
SOUTH DAKOTA SPACE GRANT CONSORTIUM
http://www.sdsmt.edu/space

In the coming year, the South Dakota Space Grant Consortium (SDSGC) will progressively continue to leverage our growing resources through linkage of research, educational outreach, and public service efforts. Our goals and planned projects for the coming year are described below in the following six categories: Research Infrastructure, Higher Education, K-12 Outreach, Other Public Service, Fellowships and Scholarships, and Administration.

Many of SDSGC's members and affiliates in higher education, government and industry work well together in promoting and conducting education and research at the university and K-12 levels. We plan to expand activities with the two new affiliates that joined the Consortium during the past year.

In addition to this FY2003 Program Plan, a valuable database of SDSGC goals, efforts, and activities is available at the SDSGC website http://www.sdsmt.edu/space/.

The SDSGC has a leadership role in the State/Regional/Local/Tribal Government Involvement (SRLT) Committee's efforts focusing on ways to involve more State/Regional/Local/Tribal Government in Space Grant Consortia activities and to improve the effectiveness of such partnerships. Therefore, the SDSGC will continue to make in-roads with such entities in SD to enhance the mutual exchange of science, technology, and education. As exemplified by the acquisition of funds ($23,784) from the SD Governor's office for the Badlands Observatory telescope project "Dark Skies & Bright Minds" and other such funded projects described in the FY2002 Progress Report, SDSGC will strive to find new sources of additional external funding and matching dollars for Consortium and NASA EPSCoR activities. Such outside funding and the new projects associated with that funding will be used as a measure of success (metrics) by SDSGC in building educational, research, and public service projects in SD.

We will continue to place special emphasis on on-going outreach to Native Americans through our ties with the Tribal Colleges and several of the Native American K-12 schools in South Dakota. Examples include, but are not limited to, 1) SDSGC participation in the "NativeView" initiative described below in the Higher Education section of the Program Plan, 2) partnerships with Sinte Gleska University to assist with the construction of a GIS lab at Sinte Gleska, 3) planning and organizing conferences such as the Intertribal GIS Council conference to be held in Rapid City in June 2003 and the September 2003 Western Regional Space Grant Meeting, also to be held in Rapid City, 4) continued support of the "Earth Systems Connections" K-5 elementary curriculum project (described below in the K-12 Outreach section) which includes Little Wound elementary school on the Pine Ridge Indian Reservation and Woodrow Wilson Elementary school in Rapid City, which has a significant Native American student population, 5) Augustana College's Science Day with significant outreach to Native Americans, 6) the SDSU/Flandreau Indian School Success Academy, and 7) Earth/Space Camp(s) to be held at Native American elementary school(s) on the reservation, and 8) continued support of Native American students at SDSGC member universities through Space Grant fellowships/scholarships.

The SDSGC will continue to focus its educational and research activities on earth system science. This is especially relevant in South Dakota because of the close linkage that many of the state's inhabitants still have with their natural environment. We believe that South Dakota's inherent environmental and ecological heterogeneity provides an excellent opportunity to develop projects that can be directly linked to the programmatic interests of NASA's Earth Science Enterprise. An example of this is South Dakota's NASA EPSCoR project "The Use of Remote Sensing for Monitoring, Prediction, and Management of Hydrologic, Agricultural, and Ecological Processes in the Northern Great Plains". The SD NASA EPSCoR team of researchers developed a research strategy centered on: 1) the establishment of quantitative links between geospatial information technologies and fundamental climatic and ecosystem processes in the Northern Great Plains (NGP), and 2) the development and use of coupled modeling tools, which can be initialized by data from a combined satellite and surface observational network, to provide reliable

predictions and management guidance for hydrologic, agricultural, and ecological systems of the NGP. The focus of the remote sensing research at our three member universities will continue to be on applications to agriculture and natural resources, which comprise the largest economic activities in our state.

We will look for NASA-supported science and engineering programs that haven't yet been implemented in South Dakota, and collaboratively promoting those programs to students, teachers, and the general public in our State. An example of this is the FIRST Robotics Program, which is currently planned to accommodate ten high school teams from within the state of SD in the 2003 competition. There are numerous other NASA-sponsored learning opportunities that would bring more bright young people into the science and engineering world of NASA if additional people in our state were aware of them. We look forward to facilitating this awareness by announcing these opportunities via the SDSGC website and by personal contacts.

Note: For more detailed information on SDSU's work plan for FY2003, the reader is directed to the December 9, 2002 memo from SDSU's Kevin Dalsted included in this report and budget request package submitted to NASA on December 13, 2002. Likewise, Augustana College's "Augustana/NASA Space Grant Budget Notes: Year 3, 2003-2004" are also included in this package.

1) Research Infrastructure

As a "capability enhancement" state in NASA's Space Grant College and Fellowship Program, development of research infrastructure within South Dakota continues as one of the six focus areas of SDSGC activities mentioned above. We feel that the environment in South Dakota for further research infrastructure development is favorable. Specifically related to NASA research, this is evidenced by South Dakota's successful initiation into the NASA EPSCoR Program <http://www.sdsmt.edu/space/nasaepscor/>, which is now in its second year of operation. In addition to SD's core grant for strengthening research infrastructure in the state, we will work in collaboration with our partners on the following two projects funded under NASA EPSCoR. Both research projects are described in more detail in SDSGC's FY2002 Progress Report.

- "Cross-Calibration of Landsat and IKONOS Sensors for Use in Precision Agriculture".
- "Leaf Area Index for Fire Chronosequences of the Black Hills and Southern Siberia: A Comparative Study".

The SD NASA EPSCoR Program acknowledges the importance of building and maintaining effective linkages with NASA collaborators to assure the development of NASA EPSCoR research infrastructure within SD is in areas of strategic importance to NASA's mission. We plan to sustain our collaboration with NASA personnel in follow-up to the 45 trips made to date by SD researchers to form collaborative linkages <http://www.sdsmt.edu/space/nasaepscor/trips.htm>. Various scientists and engineers from SDSGC universities have collaborators at the USGS Earth Resources Observation Systems (EROS) Data Center, which is a key Consortium member located in Sioux Falls, SD. Our Summer Faculty Fellowship program, which both stimulates and augments this connection to the EROS Data Center, will be strengthened by SDSGC Workforce Development fellowships/internships planned for 2003 to EROS, Goddard Space Flight Center, and Horizons, Inc.

SDSGC continued this past year with support for efforts within and outside the state of SD regarding the proposed National Underground Science and Engineering Laboratory (NUSEL) at the Homestake Mine. A 5-year, collaborative proposal has been submitted to the National Science Foundation to convert the Homestake Gold Mine in Lead, South Dakota into a national laboratory (NUSEL) <http://mocha.phys.washington.edu/NUSL/>. During the past 30 years, scientists have developed an amazing way to view the Universe with deep underground neutrino "telescopes". Results from the first solar neutrino experiment, which was initiated by Dr. Ray Davis and his colleagues over 30 years ago with a neutrino detector 4,850 feet underground at the Homestake Mine, have stimulated the "solar

neutrino problem" and multiple investigations worldwide. Dr. Davis shared the 2002 Nobel Prize in Physics for his solar neutrino experiment at Homestake. The results obtained from this growing cadre of underground detectors now promise new insights into the Standard Model of Elementary Particles and Forces. In addition to subterranean physics, a whole range of "underground science" has become evident during the past few years. Specific subterranean research topics include solar, atmospheric, long-baseline, supernova and high energy astrophysical neutrinos, double beta decay, and dark matter searches; precision and sensitive assay of radionuclides (with applications to enforcement of disarmament treaties and environmental effluent studies); materials science and engineering; nuclear astrophysics cross-section measurements; hydrology, seismology, rock mechanics and other topics in geoscience; microgravity experiments via long drop tubes; and the study of the evolution and subsistence of biological organisms under extreme environmental conditions. There is also considerable industrial interest in underground laboratories because of materials activation issues, cosmic-ray-induced error rates in microelectronics, quantum computing, and the production and storage of ultra-pure materials.

With proximity to Mt. Rushmore and the fact that most people find understanding the Cosmos so exciting, NUSEL has the potential to interest additional Americans in science and engineering. In addition to an extensive outreach program for tourists, the proposed NUSEL could potentially provide on-site and distance education curricular experiences for K-Ph.D. students, distance education opportunities for the general public, astrophysical data outreach to scientists around the world, and special participation opportunities for individuals and institutions in regional and national EPSCoR states. The existing outreach network contained within the National Space Grant College and Fellowship Program and the NASA EPSCoR Program will be relied upon extensively for this purpose.

In addition to using SDSGC Program Initiation Grant (PIG) funds described below in the “Higher Education” section of the Program Plan, we will also use about $60,000 from SD’s NASA EPSCoR core grant during the 2003 calendar year to seed meritorious PIG projects that are related to the following NASA-relevant research areas: earth system science, geospatial observational and information technologies and/or space science and engineering. The research landscape within South Dakota universities and colleges is now extremely fertile due to a renaissance that started here about seven years ago. Consequently, properly placed research seeds to initiate new and creative projects can be expected to grow in this environment and thereby provide additional impetus for the research renaissance in South Dakota.

SDSGC will remain involved with the Upper Midwest Aerospace Consortium (UMAC) Public Access Resource Center (PARC) project, which is related to Space Grant by virtue of subject area, and disseminate the practical products of this research to a broad audience via this partnership.

The “Opportunities for State, Local, Regional and Tribal Governments to Utilize NASA and Commercially Developed Data and Capabilities” BAA and the NASA geospatial specialist connection with Land Grant Universities will be investigated for its potential expansion to SD during the next year. Mr. Kevin Dalsted will continue to work on this issue in collaboration with the USDA Cooperative Extension Service and the College of Agriculture at SDSU.

SDSGC will continue to provide administrative assistance for meetings of the Western Research Alliance <http://w-research-alliance.org/>. The objective of this broad based organization is to provide a regional forum for academic researchers, entrepreneurs, state and federal agencies, and local economic developers who are interested in the promotion of research, technology transfer, and business development.

Technical and financial support will be provided for GIS-remote sensing and image processing laboratories at member universities and educational affiliates, including Native American Tribal Colleges. This support is for research and educational projects involving GIS and remote sensing, precision agriculture, algorithm development for NDVI data, plant science, climate change, and land surface processes.

SDSM&T will continue research into the link between land management practices and carbon sequestration potential in South Dakota.

SDSGC will continue providing limited funding to stimulate the publication of NASA-related scientific papers and for similar presentations at research conferences.

Three Science Data Buy proposals to the Stennis Space Center were granted to SDSU in the past. SDSU anticipates additional data buys for eastern South Dakota in conjunction with the NASA EPSCoR project.

2) Higher Education

SDSGC member universities will continue providing graduate, undergraduate, and faculty development fellowships and scholarships. Total awards in these areas over the FY03 project year will be approximately $58,400 of NASA Space Grant funds. With $21,000 in matched scholarships from Augustana College, the total for fellowships and scholarships increases to $79,400. When relevant, we will encourage students and faculty to present/publish the results of their research. The number of publications/presentations will be used as a measure of success (metrics).

We plan to continue funding the SDSGC Program Initiation Grant (PIG) program in 2003, albeit at a somewhat reduced level. We will also continue our efforts to involve faculty and students from SDSGC's Tribal College affiliates in new and ongoing research and education projects with other Consortium institutions. These PIG projects function as a mechanism to build additional research collaboration among Consortium affiliates. Future research and technology projects that arise from PIG project seed funding will be used as a measure of success (metrics) of the SDSGC PIG program. In addition to using Space Grant PIG funds of $3,500, we will also use about $60,000 from SD's NASA EPSCoR core grant during the 2003 calendar year to seed meritorious PIG projects that are related to the following NASA-relevant research areas: earth system science, geospatial observational and information technologies, or space science and engineering (as described above in the "Research Infrastructure" section of this Program Plan).

SDSGC's Deputy Director Tom Durkin will continue to assist James Rattling Leaf of Sinte Gleska University in the planning and organization of the Intertribal GIS Council conference in Rapid City in June 2003. Likewise, James Rattling Leaf is expected to continue helping SDSGC plan the Western Regional Space Grant Meeting to be held in Rapid City in September 2003.

SDSM&T will continue to assist Sinte Gleska University in developing a GIS lab.

SDSGC will continue to support the "SouthDakotaView" initiative, a component of AmericaView, in 2003. AmericaView is a locally controlled and nationally coordinated program to advance the availability, timely distribution, and widespread use of remote sensing data and technology through education, research, outreach, and sustainable technology transfer to the public and private sectors.

SDSGC will continue to support the "NativeView" initiative < http://www.sinte.edu/nativeview/> in 2003. Driven by relevant needs, NativeView is an innovative approach to technology-transfer and empowerment within Indian Country through access to geo-spatial/ spectral data and existing research. Tom Durkin agreed to serve as an SDSGC representative on a working group to assemble a Tribal College Consortium for the NativeView initiative.

Sinte Gleska University requested that SDSM&T's Institute of Atmospheric Sciences teach an introductory freshman-level course in atmospheric science. The course would nominally run 3 hours/day for 4 weeks. About 10 students are anticipated. SDSM&T has agreed to teach the course during summer 2004, if the funding for the course that Sinte Gleska is pursuing is granted.

Graduate and undergraduate students will continue to participate in research efforts at GIS-Remote Sensing and Image Processing Laboratories supported by our Consortium.

SDSGC will continue maintaining and updating its "Educational Opportunities (Higher Ed.)" website <http://www.sdsmt.edu/space/EdOpp-HigherEd.htm>.

At least one student at SDSM&T has expressed interest in applying to the 2003 NASA Academy. If selected, SDSGC intends to support at least one student to the Academy.

SDSGC will continue it's recent successful affiliation with Badlands Observatory, a privately owned facility dedicated to Astronomical Research & Education in Quinn, SD <http://www.sdsmt.edu/space/bo.htm>. It is host to an f/4.8 Newtonian Telescope with a 26" diameter mirror, the largest telescope in the local three-state area. Badlands Observatory participates in the international Spaceguard Foundation, in which participating observatories around the world are cataloguing all of the Near Earth Objects (asteroids) that may represent a global impact hazard to the Earth. The dark skies in western SD, combined with the extremely sensitive research-grade telescope at Badlands Observatory, places the observatory in the company of some of the world's best astronomical research facilities. In the summer of 2002, SDSGC was successful in obtaining $23,784 in State funds from the Governor of South Dakota, Governor William J. Janklow in support of a Badlands Observatory project titled “Dark Skies & Bright Minds”. This project provides for modifications of the 26-inch telescope located at Badlands Observatory in Quinn, SD that will enable it to be used online, via the internet as an educational and research tool. After a pilot project is completed, Observatory Director and Owner Ron Dyvig will be able to determine the maximum number of schools that can be allowed remote access to the telescope during each academic year. In the FY2003 Space Grant budget, SDSGC has budgeted $5,000 in co-funding to help participating schools pay the use-rate costs for remote operation of the telescope.

In a continuing evolution of KC-135 projects that began at SDSM&T in 2000, SDSGC will again participate with a third and fourth NASA Reduced Gravity Student Flight Opportunity Program experiment focusing on solar sails, both of which are multi-institutional experiments that have been selected for flight in the summer of 2003. “Solar sail Operations Linking Academic Researchers” (SOLAR) consists of two experiments (SOLAR Alpha and SOLAR Beta) that will be collaboratively conducted by the following 5 schools: 1) South Dakota School of Mines & Technology, 2) Purdue University, 3) St. Louis University, 4) Colorado School of Mines, and 5) Georgia Institute of Technology. NASA, in conjunction with other research groups, is investigating both solar sail and nanosatellite (nanosat) technologies. A major challenge is the unpacking and deployment of a gossamer solar sail to operational configuration. Possible gossamer sails use a thin polymer membrane or sandwiched carbon microtruss/mylar with a shape memory inflatable support structure. Due to the gossamer structure’s low stiffness, deployment is not fully achieved in Earth gravity conditions. The SOLAR Alpha experiment titled “GOSSAMER SPACECRAFT DEPLOYMENT IN MICROGRAVITY” will investigate the deployment of various solar sail configurations in microgravity. This experiment tests the unfurling of single sails for future use in a final four-sail nanosat assembly and measures the reaction forces acting on the sail support during deployment. A variety of sail designs will be tested to aid in SOLAR’s mission to build a fully functional nanosat. These designs will account for deployment reliability, consistency, and simplicity, with an emphasis on a lightweight sail assembly. The sail displaying the most favorable characteristics will be integrated into the design chosen by SOLAR Beta, the co-dependent nanosat frame experiment. Small, lightweight, single-function satellites, referred to as nanosatellites, are being developed for missions orbiting Earth and, eventually Mars. Common nanosat designs have a frame 10 centimeters on a side and a mass of less than one kilogram. SOLAR is investigating the construction of a nanosat with a deployable solar sail to be used for propulsion and/or communication. The goal is to develop a frame deployment configuration that opens from a cube to a planar support offering stability and attitude control in microgravity. The SOLAR Beta experiment titled “NANOSATELLITE FRAME DEPLOYMENT IN MICROGRAVITY” will investigate the dynamics of the nanosat frame during deployment. The experiment will consist of a series of deployments in microgravity testing various frame configurations and deployment methods. This research and various design aspects are being completed in conjunction with, and dependent on, the solar sail deployment experiment, SOLAR Alpha. The two experiments together build

the framework for future research that combines the most successful designs from both experiments to build an integrated frame and deployable sail. Along with the technical phases, the unique multi-institutional, nationwide team structure of SOLAR will be used to full advantage for its outreach objectives. Primary objectives include the dissemination of experiment design, methods, collaboration efforts, and results to a broad audience including all technical levels. Other objectives will also work toward informing the public of NASA's vision and exciting the next generation about space science, engineering, and exploration.

SDSGC's Workforce Development Program will go into full swing in 2003. In July 2002, SDSGC submitted a $91,882 Workforce Development proposal to NASA and in September 2002 was selected for full funding. SDSGC's program will enlarge and enhance the resource pool, or "pipeline," of well-prepared higher education graduates and faculty that stay connected to or become involved with NASA as employees, contractors, or principal investigators. This will be achieved by involving a broad range of SDSGC members and affiliates to attract and inject highly qualified individuals into the pipeline. It will be accomplished through educational enrichment experiences for undergraduate and graduate students (from SDSGC member institutions, including those SD Tribal Colleges and Universities that have a strong interest in working on NASA-related SMET), university staff, and secondary teachers through course work, workshops and internships. SDSGC's university and college members will establish expanded student and faculty internship programs with three key pipeline organizations: 1) the USGS EROS Data Center, 2) Goddard Space Flight Center, and 3) Horizon's, Inc.

SDSGC plans to again support Tom Campbell's Introduction to Astronomy and Advanced Observational Astronomy courses at SDSM&T.

Augustana College began to develop a relationship with Oglala Lakota College (OLC) in 2002. OLC is one of the Native American Tribal Colleges in South Dakota and an educational affiliate of SDSGC. Augustana College would offer classes that would be available to students and OLC would offer classes that would be available to Augustana College students.

3) K-12 Outreach

In the summer of 2002, SDSGC was successful in obtaining $23,784 in State funds from the Governor of South Dakota, Governor William J. Janklow in support of a project titled "Dark Skies & Bright Minds". This project provides for modifications of the 26-inch telescope located at Badlands Observatory in Quinn, SD that will enable it to be used online, via the internet as an educational and research tool. After a pilot project is completed, Observatory Director and Owner Ron Dyvig will be able to determine the maximum number of schools that can be allowed remote access to the telescope during each academic year. SDSGC agreed to provide $5,000 per year in co-funding (likely to begin in 2003) to help participating schools pay the use-rate costs for remote operation of the telescope. The SDSGC will also continue to serve as the host for The Badlands Observatory's website www.sdsmt.edu/space/bo.htm. This website can be accessed at any time for detailed information about astronomy, the Badlands Observatory, and the astronomical research conducted there. The capabilities of this website will be greatly improved after a gateway to remote operation of the telescope is added, the appropriate equipment and software are installed, and the pilot project described in the funded proposal is activated. A Space Grant fellowship for an SDSM&T student for the Fall '02 and Spring '03 semesters will allow the student to work with Ron Dyvig in support of the telescope project. This project will take advantage of the common attraction that most students have toward space, astronomy, and the study of the universe. NASA and the South Dakota Space Grant Consortium have used the "attention grabbing effect" that space science offers to students as a platform for teaching math, science, engineering, and technology. This program will also take advantage of the dark skies in western South Dakota and Ron Dyvig's extremely sensitive research-grade telescope, which places Badlands Observatory in the company of some of the world's best astronomical research facilities. For these reasons, the educational opportunities potentially available to students within South Dakota through this program are both unique and exciting. Ms. Ashley Nord, a Rapid City Steven's High School student, provides a recent example of how effectively Badlands

Observatory has interfaced with students. Ashley was awarded the top prize at the March 2002 High Plains Regional Science and Engineering Fair for her project that involved astronomical observations performed at the Badlands Observatory under the supervision of Ron Dyvig. This allowed her to compete in the Intel International Science and Engineering Fair in Louisville, KY where she faced the world's best science-fair projects and was a finalist. As a result of her success at the Intel International Science and Engineering Fair, she was honored by having an asteroid named after her. See details at <http://www.sdsmt.edu/space/boNordAsteroid.htm>. Allowing other students to experience the excitement of conducting their own astronomical observations at Badlands Observatory via the Internet under the "Dark Skies & Bright Minds" project will provide them with similar opportunities to expand their scientific interests beyond the classroom.

SDSGC will continue to support the High Plains Regional Science and Engineering Fair at SDSM&T in 2003 by providing judges and organizational assistance. SDSM&T hosts this Science and Engineering Fair on campus, which is consistent with NASA's educational focus on science, math, engineering, and technology.

The important activities to enhance interest in science and engineering topics and careers among elementary and secondary students in South Dakota will continue with the assistance of SDSGC's full time Deputy Director and Outreach Coordinator and part time Space Grant Workforce Development Coordinator at SDSM&T, as well as with those individuals involved in outreach activities at Augustana College and SDSU.

The ninth annual "South Dakota/NASA Space Days 2003" will be supported by SDSGC and hosted by the Kirby Science and Discovery Center and Washington Pavilion in Sioux Falls, SD on May 16-17, 2003. The 2003 Space Days event will be exceptionally large, as Sioux Falls is SD's most populated city and a robust Space Days program is being planned. Former astronaut Col. Sam Gemar is the featured speaker and will give several presentations to students and the public in the Pavilion's Great Hall, which seats 1,800 people. SDSGC was again successful in securing the International Space Station traveling exhibit from JSC, allowing the exhibit to be open for three days. This exhibit was extremely popular and very well received at Space Days 2001 in Rapid City. Many other exhibits on space science, earth science, and technology from SDSGC members and affiliates, the local community, and NASA will be provided at the 2003 event. South Dakota's Solar System Ambassador, Dr. Bob Polcyn, will give several presentations on the sun to students and teachers in the Pavilion's Belbas Theater, which seats 300. In addition to all the Space Days activities that will be open to students and the public free of charge through SDSGC financial support, the Kirby Science Center (which contains several NASA exhibits of its own) will be open to students for a nominal fee.

SDSGC supports Engineer's Week 2003 held on the campus of SDSM&T. SDSGC will provide financial assistance to bring featured speaker Celeste Baine (award winning author of "Is There an Engineer Inside You?" and "The Fantastical Engineer") to campus to speak about women and minorities in engineering.

SDSGC will again participate in the "Student Signatures in Space" Program in 2003 and will maintain strong working relationships with the two NASA Educator Resource Centers (ERC's) in South Dakota to help assure their continuing use by teachers and students.

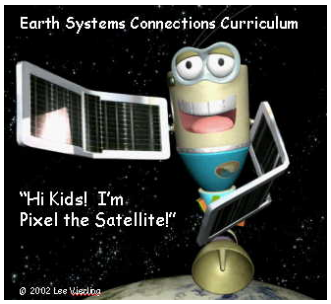
SDSM&T will continue to maintain and update SDSGC's useful "Educational Opportunities (K-12)" website <http://www.sdsmt.edu/space/EdOpp-K-12.htm> for SD teachers, students, and parents.

Teacher workshops in GIS, GPS, and Remote Sensing technology will be held across the State of South Dakota during the summer of 2003 under the UMAC EdPARC project.

SDSGC will help sponsor SDSM&T's Space and Earth Camps for middle/high school teachers/students to be held in the summer of 2003. Topics in the Space Camp include planets and planetary geology; lives of stars; classification, morphology and origin of galaxies; meteorites; comets; the electromagnetic

spectrum; origin and evolution of the solar system and the universe; etc. The workshop is tailored for teachers, students, and amateur astronomers.

The collaborative project titled "Earth Systems Connections" http://www.tandl.vt.edu/esc/ continues to develop curriculum for students in grades K-5. This project is funded by NASA's Earth Science Enterprise and co-developed at SDSM&T, Virginia Tech, and the University of Colorado. The educational goal is to show that the Earth's physical, chemical, biological, geological, economic and cultural systems are intimately intertwined. Earth Systems Connections is a hands on, multifaceted, interactive mathematics, science, and technology curriculum where elementary students are challenged to explore how many of the Earth's systems operate and connect with one another. SDSM&T's Dr. Lee Vierling, the PI of the project, has incorporated Little Wound School on the Pine Ridge Indian Reservation and Woodrow Wilson Elementary School in Rapid City, SD into the project as pilot schools. To motivate children to learn about satellites and remote sensing, Dr. Vierling developed a cartoon character named “Pixel the Satellite” (see image at right) and has produced 10 short animated features for teachers and children to view in concert with or independently of the curriculum. SDSGC provided funds for the addition of Native American video clips into the curriculum of this project, an exciting way to include Lakota culture into a nationally-available curriculum for elementary children.



SDSGC will continue its support for the "Scientific Knowledge for Indian Learning and Leadership" (SKILL) Program on SDSM&T's campus as well as student participation in the local chapter of the American Indian Science and Engineering Society (AISES).

Augustana College's annual Science Day will provide high school juniors and seniors a day filled with hands-on science opportunities/experiences. Special invitations will be sent to Native American and female students.

SDSU will offer the annual Aerospace Career and Education (ACE) Camp in July 2003 and will seek guidance from some of their collaborators on how to locate additional funds and to increase attendance.

With funding from NASA, SDSGC plans to mentor ten high schools throughout South Dakota that will participate in the 2003 FIRST Robotics program, an exciting, nationwide competition that teams professionals and young people to solve an engineering design problem in an intense and competitive way. Mentoring universities for the 10 high school teams from the following towns include SDSU (6 teams), SDSM&T (3 teams), and Augustana College (1 team): Rapid City Central, Rapid City Stevens, Sioux Falls O’Gorman, Sturgis, Sisseton, Brookings, Woonsocket, Watertown, Volga, and Faulkton, SD. Brookings worked toward hosting a “stream-lined” event in 2003 in lieu of the various regional events around the region, but it was cancelled due to low registration. SDSU reports that Brookings will look into holding a “stream-lined” event in 2004.

SDSU’s Dr. MaryJo Lee will continue her efforts to recruit minorities and underserved populations into fields of science, technology, engineering, and math. She successfully coordinated the SDSU/Success Academy program last spring, which is expected to continue in 2003. This year, the program will bring high school freshmen, sophomores, and juniors from Flandreau Indian School to SDSU’s campus for technical workshops with university professors, a meal, and fun activity, all in an afternoon and early evening. The NASA Workforce Development activity will co-support this activity. Dr. Lee will continue to look for related external funding to support her efforts to serve minorities and underserved populations by generating interest in science, math and technology.

Middle and high school science teacher-training workshops in GIS, GPS, and Remote Sensing technology will again be offered in the summer of 2003. While these activities are primarily sponsored by the UMAC EdPARC program, SDSGC has also shared resources in terms of providing funding and instructors from Consortium personnel.

SDSGC will provide a $200 scholarship to Jessica Weidenbach, a H.S. student in Armour, SD, to attend a summer 2003 Space Camp in Huntsville, AL. Ms. Weidenbach attended ACE Camp at SDSU in summer 2002, which inspired her to seek more direct contact with NASA through the Huntsville Space Camp in 2003.

4) Other Public Service

SDSGC will support programs at the Children's Science Center in Rapid City and to school/youth groups by providing staff to conduct 1) astronomy or Starlab Planetarium shows, 2) presentations on remote sensing and the International Space Station, and 3) presentations on SDSM&T's KC-135 reduced gravity student flight opportunities.

SDSGC will continue to support the Community Education Program in the Black Hills by providing a course titled “Introduction to Astronomy and Current Events in Space” taught by SDSGC Deputy Director & Outreach Coordinator Tom Durkin and other SDSGC affiliate representatives. A contract has been signed to provide this popular course in the Spring of 2003.

We will maintain support to the Black Hills Astronomical Society (BHAS) and related Star Parties that are open to the public at Hidden Valley Observatory during the summer of 2003 <http://www.sdsmt.edu/space/BHAS.htm>.

SDSGC will continue supporting StarDate's PBS radio broadcast in South Dakota as part of the McDonald Observatory astronomy program.

Press releases and various informational presentations about Consortium activities, noteworthy celestial events, aerospace programs, etc. will continue to be disseminated to the public by SDSGC.

Dr. Bob Polcyn, retired physician in Hot Springs, SD was accepted as South Dakota’s Solar System Ambassador in 2002 by JPL’s Solar System Ambassador Program. He made about 14 separate presentations to the public and school children on NASA missions, space, and the solar system in 2002. Dr. Polcyn is scheduled as a featured speaker at Space Days 2003 and will remain busy giving other presentations throughout the state in the coming year.

SDSGC's extensive website <http://www.sdsmt.edu/space/> provides excellent resource information to the public. This website will be routinely updated in 2003.

5) Fellowships and Scholarships

SDSGC member universities will continue providing graduate, undergraduate, and faculty development fellowships and scholarships as in previous years. Total awards in these areas over the FY03 project year will be approximately $58,400 of NASA Space Grant funds. With $21,000 in matched scholarships from Augustana College, the total increases to $79,400. When relevant, we will encourage students and faculty to present/publish the results of their research. The number of publications/presentations will be used as a measure of success.

6) Administration

The Consortium will be represented in 2003 at all the National Council of Space Grant Directors' meetings, the Space Grant Western Regional Meeting, and the National Space Grant Conference.

SDSGC has agreed to host the Fall 2003 Western Regional Space Grant Consortium meeting in Rapid City, with assistance from the Nebraska Space Grant and EPSCoR Program. A preliminary website has been set up for this conference at http://www.sdsmt.edu/space/WRSGM.htm.

Dr. Sherry Farwell, Dean of Graduate Education and Sponsored Programs at SDSM&T, will continue as the Consortium Director. Mr. Tom Durkin will continue to serve as SDSGC's full-time Deputy Director and Outreach Coordinator at SDSM&T. Mr. Tom Campbell will serve as the Space Grant Workforce Development Coordinator at SDSM&T. Mr. Kevin Dalsted will continue as the Associate Director at SDSU. Dr. Daniel Swets remains the Associate Director at Augustana College. Gregg Johnson will serve as the USGS EROS Data Center Coordinator for Space Grant Consortium activities.

Some of these meetings of the SDSGC will utilize teleconferencing and the Digital Dakota Network (DDN). We plan to continue meeting at least quarterly to more effectively coordinate and evaluate program progress.

The leadership of the SDSGC will build on our success to date and explore new ways to stimulate further participation by the Tribal College affiliates in Consortium activities. We will continue focusing on competitive allotment of SDSGC funds and the goal of nurturing projects that can attract external support.

Consortium management personnel will be intimately involved with the SD NASA EPSCoR Program's Steering Committee, Technical Advisory Committee, and other activities. Likewise, we will endeavor to improve research collaboration with the USGS EROS Data Center and industry affiliates. We will also continue efforts to promote effective outreach associated with the proposed National Underground Science and Engineering Laboratory at Homestake.

Metrics:

The metrics by which many of the goals mentioned in the six categories above will be measured include, but are not limited to, the following.

1) The number of individuals from SD (student interns, faculty fellows, and others) and NASA that become engaged in the new workforce development project as a consequence of SDSGC activities and funding.
2) The number of undergraduate students and graduate students from SDSGC institutions whose senior capstone or research projects are related to earth system science, space science and/or remote sensing.
3) The number of people that attend SD Space Days 2003 and the related feedback from representative participant groups.
4) The quantity of presentations given by SDSGC members to civic groups, K-12 schools, universities/colleges, state organizations, and the general public.
5) The number of students and teachers that participate in SDSGC-sponsored workshops and courses.
6) The number of reports in newspapers, radio, and TV that describe SDSGC projects and personnel.
7) The number of professional publications and presentations related to SDSGC projects and personnel.
8) Both the continuation of current SDSGC projects and the initiation of new SDSGC activities with Native American institutions in SD.
9) The procurement of new projects and funding that are associated with SDSGC projects and personnel.
10) The preparation of required Space Grant reports and timely responses to other requests from NASA Headquarters and Centers.