The North Star

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MnSGC BalloonSat--High Altitude Balloon Program

Students from the University of Minnesota, Concordia College, and the College of St. Catherine successfully launch the most recent in a series of Balloon Satellite technology projects October 25, 2003 near Blooming Prairie High School.

The MnSGC BalloonSat is the Minnesota Space Grant Consortium's high altitude balloon program that was started in January, 2003 by Dr. William Garrard, Director of the MnSGC. MnSGC BalloonSat was created to provide an accessible vehicle for student payloads to reach near space. The BalloonSat system is intended to provide a quick turnaround time for scientific projects, allowing students to design, build, and fly their own payloads within a short period of time.

The BalloonSat system consists of a helium-filled weather balloon from which a parachute and payload are suspended. The command module is reusable and student experiments typically contain data collection equipment such as altimeter, temperature guage, accelerometer, and a camera.

The system payload also includes GPS and radio transmission capability so that it can be tracked in flight. When the desired maximum altitude is reached, a signal is sent to cut loose the parachute and payload, which then descends and is recovered by a team on the ground.

Students are involved in every aspect of the BalloonSat program: science, engineering, and operations. They design payloads, participate in the launch and recovery process, lead teams or missions, and design new engineering aspects of the program.

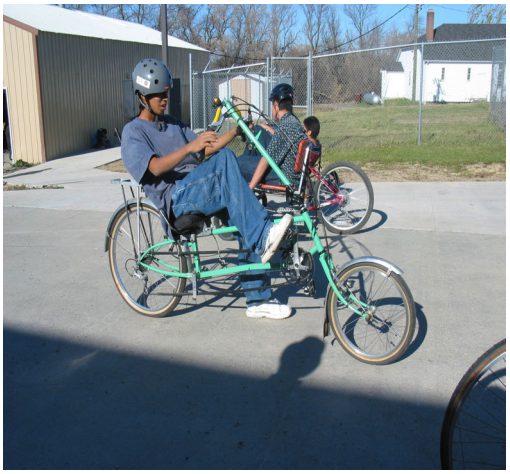
Invaluable initial training was provided by the Iowa Space Grant Consortium and Dr. Bill Byrd, its Director. BalloonSat workshops were provided by the Colorado Space Grant Consortium to MnSGC Affiliate Member faculty from the University of Minnesota, Concordia College, and the College of St. Catherine. Kevin Sweeney, the student coordinator, completed his MS in AEM and is now employed by Irwin Aerospace in CA.

The MnSGC BalloonSat team extends its appreciation for all of the assistance provided in the initial design process, on-going documentation and project organization. For more information on the BalloonSat program, please see: www.aem.umn.edu/msgc/BSAT/

Reach for the Sky

The Reach for the Sky program is a three-year outreach math and science program funded by the Toyota Foundation and the Institute of Technology (IT) at the University of Minnesota, MnSGC/NASA, and 4-H/Extension. For three days each month, IT and Extension graduate students, faculty, and staff travel to the White Earth Reservation to teach hands-on physics and engineering projects to Reservation high school youth at the Ojibwe Circle of Life School.

This year's project on Human Powered Vehicles (HPV) involved redesigning bicycles for speed. In the spring of 2003, students at the Circle of Life School successfully constructed human powered vehicles from discareded bicycle parts and raced their designs in an attempt to determine which was the most aerodynamic. The racing event was a huge success. Circle of Life teens will go on to the National Human Powered Vehicles ice race in Lindstrom, MN on January 24, 2004. May 7, 2004 is the date for the upcoming annual Circle of Life road race.



NASA Academy Letter

The following letter is from 2003 NASA Academy intern Seth Koterba, of Concordia College. The letter provides a window into the rich research experience provided by the NASA Academy Program. Seth received the 2003 NASA Academy Research Award for his work. Congratulations Seth!

Dear Minnesota Space Grant Consortium,

I would like to take this opportunity to thank you for supporting my participation in the 2003 NASA Academy at Goddard Space Flight Center. Without your assistance, I could not have attended this amazing program, which I believe will benefit me for the rest of my life. I have learned so much about not only my own individual project, but also about team interaction, the structure of NASA, the history and future of space exploration, the involvement of private industry in the space sector, and a wide variety of other aspects relating to the space program.

To give you some idea of the amazing experience that I have had this summer, please allow me to tell you a little about what kept me busy this summer. Foremost was my individual project. I worked in the Optical Systems Alignment and Test Group in the Optics Branch. My project was titled 'An Interferometer for Low Uncertainty Vector Metrology.' This project involved the design of a new instrument that will be used during the integration and test schedule of future spacecraft to measure small changes in orientation between critical components of spacecraft. This instrument will utilize the sensitivity of interferometery to provide measurements that are two orders of magnitude more precise than the current measurement technique. After I was provided with the basic theory of how this instrument might work, I was given the task of designing the instrument. I created parts using a CAD program and created a full model of the instrument. After finalizing the design, I submitted the drawings to machinists at Goddard, who are now building these components. To find out more about my project you can check out my poster and other materials online at http://academy.gsfc.nasa.gov/2003/ra/koterba/research.html

I also worked on a group project. Four choices were made available to us, all of which combined aspects from both science and engineering disciplines. We decided on a project concerning precision formation flying, specifically a pathfinder for the future Stellar Imager mission. Stellar imager will be an interferometer designed to study magnetic dynamo of distant stars, with the hope of applying the obtained knowledge to the study of the sun. The challenges involved in getting numerous spacecraft to fly together at fixed separations of less than a centimeter are immense. While everyone learned a lot about many technical aspects of satellite design, the most instructive skill we developed was the ability to work as a team and to integrate everyone's needs into a single finished product. The science and engineering teams constantly traded information back and forth in an effort to make certain every aspect of the desing was addressed.

Another great aspect of the Academy was the excellent aray of speakers that we got to hear from, including: Peter Diamandis, space industry mogul and found of the X-prize; Russ Werneth, supervisor for the Hubble's servicing missions; Jake Garn, former United State senator and astronaut; as well as many others. We also had the opportunity to visit other NASA centers as well as companies involved in different aspects of space exploration.

Again, thank you for supporting my NASA Academy experience. It was a life-changing experience for me. Sincerely, Seth Koterba

NASA Internship Letter

The following letter was received from another Concordia College/NASA intern, Luke Van Roekel, about his experience at Goddard Space Flight Center during the summer of 2002:

Dear Minnesota Space Grant Consortium,

To begin with, I would like to thank you for all of the wonderful opportunities you have given to me and for the continuing support of my academic work. This summer was an absolutely fantastic experience. This summer I ended up working with a government oversight team, supervising the construction of the GOES spacecraft. I was asked to work with the Systems Engineer, who oversees how everything is proceeding and makes sure there are no flaws anywhere. The summer basically consisted of learning how NASA runs a project from start to finish.

Throughout the summer, I did research about potential problems facing spacecraft. I compiled a list and went through the test plan for the current spacecraft to see if there were any holes in the test plan. I went through test plans for three major subsystems: propulsion, attitude control, and instrumentation. I also looked at the overall spacecraft integration and test plans. The amount of documentation on each of these areas was enormous: about 20 test plans of 100+ pages each. The detail in the plans was astounding. The plans tell what order they were going to turn on the switches, the interval between turning on the switches, etc.

After finishing my research, I compiled my top five remaining risks for the GOES project. Getting information that was designated as 'limited release' or higher was difficult. I complete my paper in under ten weeks and it is now available in the GOES library for reference.

While at Goddard, I had the opportunity to tour the campus and the magnetics testing facility (very impressive). I also was able to take a trip to Kennedy Space Center in Florida.

Again, I am so grateful for the chance to work at NASA and to make a lot of new connections while there. Thank you again for supporting me in my education and career.

Sincerely, Luke Van Roekel

Former NASA Academy Intern Now Roving Mars!

Emily Eelkema, NASA Academy Intern (1998) and UM-TC graduate in Aerospace Engineering and Mechanics from the University's Institute of Technology, is part of the team at Jet Propulsion Lab (JPL) in California that is monitoring the current Mars mission. Emily joined the Mars Rover operations team last month and is very happy to 'have a rover to drive around for the next 3-6 months.' Congratulations Emily! More information is available from: http://marsrover.jpl.nasa.gov/home/index.html.

More Information on the NASA Academy is available at:

http://www.nasa-academy.nasa.gov/

NASA sets new Science, Technology, Engineering and Mathematics (STEM) Goals for 2008

Goal 6: Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics (STEM).

Objective 1: Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities.

Outcomes: _By 2008, increase by 20% student participation in NASA instructional and enrichment activities targeting NASA related STEM disciplines; increase by 20% the number of elementary and secondary educators utilizing NASA-related STEM materials and programs in the classroom; increase by 20% family involvement in NASA-sponsored elementary and secondary education programs; align 90% of NASA elementary and secondary programs with state and local STEM educational objectives.

Objective 2: Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.

Outcomes: By 2008, attain a statistically significant increase in the number and diversity of students graduating in NASA-related fields; attain a statistically significant increase in the number of faculty in higher education institutions who receive first-time awards in NASA research and development; increase by 20% the number of institutions receiving NASA research and development grants and contracts that link their research and development to the institution's school of education; increase by 10% the number and diversity of students conducting research utilizing unique NASA assets.

Objective 3: Increase the number and diversity of students, teachers, faculty, and researchers from underrepresented and underserved communities in NASA-related STEM fields.

Outcomes: By 2008, increase by 20% underrepresented/ underserved NASA-sponsored students who are pursuing academic degress in NASA-related STEM areas; increase by 20% the number and diversity of teachers and faculty from underrepresented/underserved communities and institutions who are participating in NASA-related STEM learning environments; increase by 20% the number of underrepresented/underserved researchers and minority serving institutions that compete for NASA Research Announcements (NRAs), contracts, and grants; increase family involvement in underrepresented/underserved NASA sponsored student programs.

Objective 4: Increase student, teacher, and public access to NASA education resources via the establishment of e-Education as a principal learning support system.

Outcomes: By 2008, identify and implement 4 new advanced technology applications that will significantly impact NASA e-learning; demonstrate the effectiveness of NASA digital content materials in targeted learning environments; establish a technology infrastructure that meets citizen demand for NASA learning services.

Goal 7: Engage the public in shaping and sharing the experience of exploration and discovery.

Objective 1: **Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research and exploration missions.**

Outcomes: By 2008, establish a national program to engage the informal education community with NASA Science and Technology; provide instructional materials derived from NASA research and scientific activities that meet the needs of NASA's targeted informal education partners; provide professional development for NASA's targeted informal education partners.

Showcase: Macalester College

The Geology Department at Macalester College continues to conduct undergraduate research in the Earth Sciences with the help of the NASA Space Grant Consortium. This past year two students supported by the MnSGC went on to graduate school: Alex McKiernan conducted stress-strain analysis in Precambrian quartzites of WI in an effort to better understand the early history of the North American craton, and Elizabeth Hajek studied the ancient sediments of southwestern Minnesota in order to characterize the depositional environments along the eastern shore of the Cretaceous Interior Seaway. Both students presented their research at the national meeting of the Geological Society of America, and both are now enrolled as masters candidates in the Department of Geology and Geophysics at the University of Wyoming.

This past summer another student funded by NASA Space Grant, Christopher Dwyer, began his research in the Late Cretaceous of Montana. Chris will focus on the diagenesis of fossil bone in an effort to identify specimens suitable for stable isotope analysis. Chris has already worked to obtain his sample and he will spend the winter analyzing the geochemistry of his sample (see http://www.macalester.edu/geology/).

Workforce Development Scholarship Winners 2003-2004

The Workforce Development Scholarship Award is a new award this year that is designed to encourage students who have clear career goals that include working for NASA. Eligible students must be full time and U.S. citizens. Recipients are:

Victor Acosta - Augsburg College, Physics Major
Austin Murch - UM-TC, Aerospace Engineering Major
Jessie Hakes - College of St. Catherine, Engineering Major
Stephanie Soffa - UM-TC, Aerospace Engineering Major

Consortium-Wide Scholarship Winners: 2003-2004

The Consortium-wide Scholarship Program supplements the MnSGC scholarship program by providing additional scholarship funding across Affiliate Institutions based upon competitive criteria. Consortium-wide Scholarships are awarded each May. Deadline for applications is April 1st. For more information, see the scholarship section of the MnSGC website at: www.aem.umn.edu/msgc.

Victor Acosta - Augsburg College, Physics Major
Maria Bigwood - UM-TC, Aerospace Engineering Major
Martha Boyer - UM-TC Physics Major
Rayna DeMaster - UM-TC, Physics Major
Brady Foreman - Macalester College, Geology Major
Brad Froehle - UM-TC, Physics Major
Carolyn Garcia - Concordia College, Physics Major
Matthew Gmach - UM-TC, Aerospace Engineering Major
John Gregoire - Concordia College, Physics Major
Seth Koterba - Concordia College, Physics Major
Catherine Micek - University of St. Thomas, Math Major
Jason Miller - Concordia College, Physics Major
Austin Murch - UM-TC, Aerospace Engineering Major
Miranda Pihlaja - Bethel College, Physics Major
Stephanie Soffa - UM-TC, Aerospace Engineering Major

MnSGC Faculty News

Alec Habig wins McKnight Land-Grant Professorship Award for Career Development

Alec Habig, Physics Professor at UMD, was recently awarded a prestigious McKnight Land-Grant Professorship. The McKnight Land-Grant Professorship program is a program of career development awards for junior faculty. It is a two-year appointment that includes a research grant in each of the two years to be used at the recipient's discretion for expenditures directly related to their research and scholarly activities. In addition, each Professor is awarded either a supplementary research grant of a year's leave to pursue research during the second year of the award. More on Dr. Habig's research program is available on his webpage at: http://neutrino.d.umn.edu/~habig/

Martin Johnston on Board of new College of Science and Engineering at UST

Martin Johnston, Professor of Physics at UST, is on the task force for the newly formed College of Engineering at the University of St. Thomas, effective July 1, 2004. The undergraduate program in Engineering, now housed in the College of Arts and Sciences, will join the graduate program in Engineering and Technology Management to form this new college. The College of Engineering will continue the existing focus of combining applied and professional studies in the use of technology to better the human condition. It will also be positioned to address the growing shortage of engineers in the United States and specifically in Minnesota.

Mark Engebretson on Decadel Study for NSF

Mark Engebretson, Professor of Physics at Augsburg College, served as Vice-Chair of a National Academy of Sciences panel that reviewed education efforts related to solar and space physics. Recommendations from the Panel include:

1. Establish a program of 'bridged positions' that provide partial salary, startup funding, and limited research support for four new faculty members per year for five years matched by an increased emphasis on Solar and Space Physics (SSP) research and hardware development at Colleges and Universities.
2. Federal agencies that fund SSPshould set aside funds to support undergraduate research in SSP, either as a supplement to existing grants or as standalone programs.
3. Fund three (3) Resource Development Groups to develop educational resources (esp. at the undergraduate level) needed by SSP community, to disseminate resrouces and to provide other services to the SSP community.
4. Continue current K-12 education and outreach efforts. However, a careful evaluation of lessons learned over the past few years (particularly regarding the involvement of scientists in EPO activities) is needed and there should be increased coordination of NASA EPO efforts with other large projects in science education reform, especially NSF initiatives. See: http://www.nas.edu for more information.

New MnSGC Advisory Board in 2003-2004

A new MnSGC Advisory Board has formed to review the activities and proposals of the MnSGC. The Board met in the fall of 2003 and will meet with the MnSGC Executive Committee in the spring of 2004. Members for 2003-2004 are:

Joseph Mueller, AEM graduate and NASA Academy alumnus, now working for Princeton Satellite.

Sarah Kralewski, AEM graduate and formerly with the Alaska Space Grant, now working for B.F. Goodrich in Eagen.

Rod Reeve, AEM graduate, works for Phoenix Solutions in Crystal.

Kristi Rollag-Wangstad, former Communications Director for Alliant TechSystems, now with Padilla-Spear-Beardsley in Minneapolis.

MnSGC Student Highlights

Augsburg Senior a Goldwater Winner

Victor Acosta, Augsburg College Senior, was one of 300 students nationwide in the fields of mathematics, science, and engineering to win the prestigious Barry M. Goldwater Scholarship for 2003-2004. The scholarship covers costs of tuition, fees, books, and room and board up to $7.500. Acosta is a native of New York City, as McNair Scholar--a national scholarship program for minority students interested in science careers named for Ronald E. McNair, the African-American astronaut who died in the 1986 space shuttle Challenger explosion. For the past two years, Acosta has carried out independent and team research on thin magnetic films in the solid state physics lab with Professor Ambrose Wolf. He has received internships with the U.S. Dept. of Energy's Stanford Linear Accelerator Center and at the University of California-Berkeley. Victor has received several MnSGC scholarship awards during his studies at Augsburg College.

AEM Senior Gives Commencement Address

Richard Johnson, graduate of the Department of Aerospace Engineering and Mechanics at the University of Minnesota-TC gave the Student Commencement Speech in the spring of 2003. Richard's remarks were tied to the 100th Anniversary Celebration of Flight for the year 2003. He concluded by saying: "An airplane represents a significant investment. Likewise, the degrees we earn today will signify the time, money, and effort we have put forth to earn the status of college graduate. As we depart the University, we will be flying into troubled skies. If we can climb through it, we are going to be alright. It will be a challenge, but that pressure will foster innovation. Follow your dreams, the technologies will be there to support you." Richard was a also a recipient of several MnSGC scholarships through the Consortium-Wide Scholarship and Fellowship Program (see: http://www.aem.umn.edu/msgc and 'scholarships').

Bethel Student Receives Seaborg Nobel Travel Award

Bethel College senior Luke Granlund of Roseville, MN was awarded the 2003 Glenn T. Seaborg Nobel Travel Award by the Swedish Council of American (SCA). The award, which provides for Granlund to participate in the 2003 Nobel Prize ceremonies, is presented annually to an outstanding college science or mathematics major attending one of the five American colleges founded by Swedish immigrants. Granlund, whose interest is quantum computing, graduated summa cum laude in May, 2003,with a B.S. in physics and computer science. He is currently pursuing a Ph.D. in physics at Michigan State University. Luke has been the recipient of several MnSGC scholarship awards.

BSU students discover space 'blog'

Is it a new star? A new galaxy, perhaps? No, not even! The new web blog hosted by BSU Space Studies majors is keeping pace with the latest thing in self-publishing on the web. Sponsored by blogspot.com, anyone can develop a blog for the Internet. Blogs contain rants, raves, announcements, information, poetry--you name it! Like the stars in the galaxy, blogs are not peer reviewed except by you the blog-gazer! Check it out at! The BSU space blog can be sited at: http://bsuspacegrant.blogspot.com/ (Note: Internet publishing restrictions do apply when the blog is connected to an official college or university website).

Announcements

Minnesota Academy of Science Announces New Scholars of Distinction Science Award

The *Standard of Distinction in Science* recognizes and acknoweldges exceptional accomplishment, achievement, and performance in science. It is given to high school students who have exceeded the requirements for graduation standards in the sciences in Minnesota. The Standard of Distinction in Science recognizes students who 1) have acquired a substantive base of scientific knowledge that reflects a broad and effective integration of scientific content and principles across several disciplines, 2) can place science and technology within the context of society and history; and 3) can effectively use scientific principles and methods to advance research in particular areas of science or to identify and address significant current issues confronting society. The award is sponsored by the MN Academy of Science (www.mnacadsci.org), Hamline University, and Intermediate District 287. For more information contact: Karen Newell at knewell@int287.k12.mn.us or 763-550-7263.

MnDOT Aeronautics Aviation Education Project Receives National Award

The National Association of State Aviation Officials (NASAO) presented Raymond Rought, Director of the MnDOT Office of Aeronautics, and Janese Thatcher-Buzzell, Manager of the Aviation Education Section, an award for the most innovative aviation education program in the nation for her *Aviation Career and Education Promotion* program. The *MnDOT Aviation Career and Education Promotion* program achieves its goals to further interest in aviation careers through a three-part plan consisting of a billboard design, a brochure, and a website. The program makes information about all technical aviation careers available to the public on a single website (www.avcollege.info) and provides descriptions and photographs of aviation related careers, as well as contact information and resource links.

Two NASA Explorer Schools Awarded in MN

Anwatin-BrynMawr School in Minneapolis and Crossroads Elementary School in St. Paul were both awarded NASA Explorer School status in 2003-2004. NASA Explorer Schools Program (NES) provides a unique relationship between schools and NASA to 'inspire the next generation of explorers." The program is designed to provide customized, extended professional development for educators. It also provides authentic mathematics and science experiences for students and their families. Selected schools receive a $10,000 grant for the purchase of science and technology tools to support their implementation plan. More information on the NES program is available at: www.explorerschools.nasa.gov.

NASA Means Business!

NASA and the Texas Space Grant Consortium are hosting the sixth annual *NASA Means Business Competition* that is designed to attract teams of undergraduate students in science, engineering and other fields, such as: advertising, marketing, communications, sociology/psychology, fine arts, and journalism. A cash award of $1,000 is given to the winning team, in addition to travel expenses for each finalist team to attend the International Space Station Orientation and the Customer Engagement Conference. Grand Prize is a trip to D.C. to present your work! Competition guidelines are posted at: http:// www.tsgc.utexas.edu/nmb/.

Announcements

Chicago 2004 Workshop

The Chicago 2004 Workshop is designed to 'foster broader partcipation in NASA space science mission and research programs.' The workshop is being offered to scientists in institutions of higher education to ensure the future success of NASA space science missions and research programs. The workshop will be held at the Hilton Chicago, June 28-29, 2004. For more information on who should attend, registration, and brochure see: http:// analyzer.depaul.edu/Chicago2004.

Penn State Educator Workshops

Penn State is once again offering a series of workshops for science educators in middle school and high school. Workshops include offerings in earch and space science, biology and astrobiology, physics and chemistry. Teachers may ear graduate credits and ACT 48 hours. Visit the website at: http://www.outreach.psu.edu/C&I/Science4Educators/ or call 800-778-8632 for more information.

Space Science Institute

The Space Science Institute in Boulder, CO offers several excellent workshops for a wide range of K-12 educators, administrators, scientists and students. More information on current offerings is available at: http://www.-si.colorado.edu or contact Dr. Cheri Morrow at 303-492-7321 or via email at camorrow@colorado.edu

Nebraska Space Grant Develops Dataslate Educational Outreach Project

The NASA Nebraska Space Grant Consortium (NSGC) has collaborated on the production of 1,000 DataSlate CDs for distribution and use across the U.S. DataSlate is an award-winning software product specifically designed for teachers by NASA's Jet Propulsion Laboratory (JPL) with assistance from the University of Nebraska at Omaha (UNO) and the University of Nebraska at Lincoln (UNL). The CD is a product of the Consortium for the Application of Space Date to Education (CASDE). The goal of the CASDE is to utilize NASA's immense amount of data and technology to stimulate and challenge K-12 students in science, mathematics, and technology. DataSlate software allows users to easily navigate through large imagery data sets, including Nebraska, and to overlay and examine two data sets simultaneously. Users can move around the images, zoom into different levels, and use a variety of embedded measurement tools to examine feaatures such as distance, angel, and the global positioning system (GPS). The CD and teacher guide are available free of charge to individual teachers requesting the software from a school address. Contact Franci Addy at the UNO College of Education at 402-554-3839 or faddy@mail.unomaha.edu. More information on DataSlate resources is at http://ois.unomaha.edu/casde/index.html.

Mars Madness Websites:
http://marsrover.jpl.nasa.gov/home/index.html
http://www.space.com/marsrover
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