



Voyages in Education and Public Outreach An Office of Space Science Newsletter

January 2004

Issue 10

MUCERPI-2003 Awards Announced

Phil Sakimoto, NASA Headquarters

The second series of awards in NASA's Minority University and College Education and Research Partnership Initiative in Space Science (MUCERPI) program was announced in September 2003. The MUCERPI program is an Office of Education and Office of Space Science (OSS) initiative to actively engage minority institutions in developing substantial space science capabilities leading to active and full participation in major OSS science and education programs. This year's selections include eight Historically Black Colleges and Universities (HBCU), five Hispanic-Serving Institutions (HSI), two Tribal Colleges and Universities (TCU), and one Minority-Predominant Institution (MPI).

All institutions will improve their academic capabilities in space science at various levels in the educational system, including 14 who are developing undergraduate courses or degree programs, 3 who are developing graduate courses or degree programs, 13 who are developing precollege outreach or teacher training programs, and 6 who are engaging in Public Outreach activities. Eight of these institutions will also be developing research capabilities in space science through partnerships with major space science research institutions.

Each of the MUCERPI-2003 awards is a three-year grant of up to \$275,000 per year over the period from January 1, 2004, to December 31, 2006. More than 50 major OSS-sponsored research or educational institutions will be active partners in these projects. The awardees are -

HBCU's:

Alabama A&M University, Dr. Arjun Tan
Fisk University, Dr. Arnold Burger
Hampton University, Dr. M. Patrick McCormick
Norfolk State University, Dr. Carlos W. Salgado

North Carolina A&T State University,
Dr. Abebe Kebede
South Carolina State University,
Dr. Donald K. Walter
Southern University, Baton Rouge,
Dr. J. Gregory Stacy
University of the District of Columbia,
Dr. Abiose O. Adebayo

HSI's:

California State University at Los Angeles,
Dr. Charles W. Liu
California State University at San Bernadino,
Dr. Susan Lederer



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University of Houston–Downtown,
Dr. Penny Morris-Smith
University of Puerto Rico at Mayagüez,
Mr. Rafael Fernandez
University of Texas at El Paso,
Dr. Ramon E. Lopez

MPI:

Medgar Evers College, Dr. Leon P. Johnson

TCU's:

Salish Kootenai College, Dr. Timothy S. Olson
Southwestern Indian Polytechnic Institute,
Mr. Kirby Gchachu

Additional information about the projects undertaken by these institutions may be found at http://research.hq.nasa.gov/code_s/nra/current/NRA-03-OSS-03/winners.html.

Perspectives

The Space Science Minority University Initiative – The First Three Years

Phil Sakimoto, NASA Headquarters

After three years of hard work, fifteen minority universities engaged in groundbreaking efforts to build space science capabilities on their campuses in partnership with the NASA Office of Space Science (OSS) have reported a remarkable set of success stories.

Collectively, the institutions report being engaged in research collaborations with 10 NASA space science missions or suborbital projects and in nearly 50 working partnerships with major space science research groups. In academic programs, they have established 25 new or redirected space science faculty positions, 12 new or revised space science degree programs that nearly 100 students have selected, and 68 new or revised space science courses with a total enrollment to date of nearly 1,800 students. They also engaged in a wide variety of teacher training, precollege outreach, and public outreach programs.

These outcomes show that NASA's Minority University and College Education and Research Partnership Initiative (MUCERPI) in Space Science has been remarkably successful. Perhaps the most significant key to this success is OSS's active role in providing guidance and in engaging the community of OSS-sponsored researchers to serve as active partners in collaborations with the minority institutions involved in this program.

The results clearly demonstrate that vibrant academic and research programs in astronomy and space science can be built at minority institutions provided that sponsoring Agencies offer serious opportunities to do so.

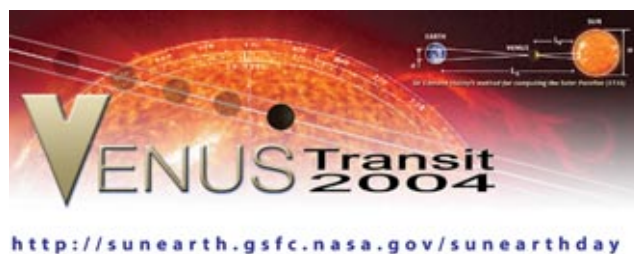
For a full list of these institutions and articles on many of their projects see <http://spacescience.nasa.gov/education/news/index.htm> or the OSS E/PO Annual Report at <http://ossim.hq.nasa.gov/ossepo/>.

Updates

Venus Transit 2004

Troy Cline, Sun-Earth Connection Education Forum

On June 8th, 2004 a rare celestial event of historical scientific importance will occur when the silhouette of the planet Venus once again crosses the face of the Sun as seen from the Earth. This event, the transit of Venus, last occurred in 1882, so no one alive today has ever witnessed it. In celebration of the event, the Office of Space Science education and public outreach program will offer activities and resources that are suitable



for use in classrooms and museums.

Leading up to the actual transit event, everyone is invited to participate in Sun-Earth Day 2004-Venus Transit. The Web site <http://sunearth.gsfc.nasa.gov/sunearthday> has been developed to provide the resources and opportunities for participation. Students and teachers are invited to join NASA's Sun-Earth Connection Education Forum (SECEF) and NASA's Planet Quest Program [<http://planetquest.jpl.nasa.gov/>] to learn all about the transit of Venus during a live broadcast from NASA's Jet Propulsion Laboratory. This interactive discussion will focus on what the transit can teach us about the search for planets beyond our solar system (over 100 have been

discovered so far). Taped video segments and interviews will also cover how to watch the transit safely, the impact of past transits in history, and why Venus would be a deadly place to live. The event can be viewed as a Webcast for schools with high-speed Internet access, or a broadcast for those with satellite receivers on March 19th.

For the actual transit event, join SECEF and San Francisco's *Exploratorium* for a live Webcast on June 8, 2004. They will travel to Granada, Spain to visit the Sierra Nevada Observatory for a clear and unobstructed view of this amazing and rare event. Museums and community groups around the United States and the world will tune in as they explore the role of past transits in the history of astronomy and how the Venus transit was used to calculate the distance from the Earth to the Sun, called the Astronomical Unit (A.U.). The program will present cutting edge research on Sun-Venus and Sun-Earth interactions, and how NASA plans to use similar transits to detect extrasolar planets. During the time of the transit, professional and amateur astronomers all over the world will be waiting with sophisticated ground based telescopes as well as spacecraft that will view the transit in a myriad of wavelengths. A partnership with *Telescopes In Education* (TIE) and *Virtual Telescopes In Education* (VTIE) will provide images of the event. The transit will be viewed by a suite of solar observatories from Nova Scotia down to Uruguay. Images of the transit from these sites will be made available in near real time on the Venus Transit Web site so that students may make their own calculations of the A.U. and the size of our solar system. Data will be stored on the VTIE archives system allowing students to propose observing experiments, make observations, analyze their results, and publish their findings online.

For American history buffs, school bands, and museum kiosks, John Philip Sousa's *Transit of Venus March*, written in 1883, has been re-performed by the Virginia Grand Military Band. The audio music file and band scoring will be available at the Sun-Earth Day 2004 Web site. The Smithsonian Institution will be also featuring an exhibition of rare books related to the transit called "Chasing Venus" at the Museum of American History in Washington D.C. from March 2004 to April 2005.

Cosmic Questions

Mary Dussault, Structure and Evolution of the Universe Forum

On October 2, 2003 the National Geographic Society held an opening-night event celebrating the arrival of the exhibition *Cosmic Questions: Our Place in Space and Time* [see Voyages 7, January 2003] at the Society's Explorers Hall in Washington D.C. Attending the event were scientists, science educators, congressional staffers, and officials from many national organizations that fund and promote science research and education. The program included remarks by Terry Garcia, Executive Vice President of the National Geographic Society; Lawrence Small, the Secretary of the Smithsonian Institution; Barry Van Deman of the National Science Foundation, David Bohlin from NASA's Office of Space Science, and NASA astronaut Donald Pettit. Professor Edward "Rocky" Kolb, cosmologist at Fermilab and professor of astrophysics at the University of Chicago, gave the featured presentation about current and future research in cosmology, which prompted a lively question and answer period from the audience.

The Cosmic Questions exhibition was developed by the Harvard-Smithsonian Center for Astrophysics (CfA), and sponsored by the NSF and by NASA through the Structure and Evolution of the Universe Education Forum at the CfA.



Guests at the Cosmic Questions exhibit opening at National Geographic Society's Explorers Hall use a near-infrared camera to see what their eyes cannot. The exhibition contains many examples of multi-wavelength observing. Photo Credit, Mark Thiessen. Copyright National Geographic Society.

Space Place Web Site Combines Kids, Cartoons, and the Cosmos

Nancy Leon, NASA Jet Propulsion Lab

Cartoon characters Kate and Carlos invite animated versions of real NASA scientists and engineers to appear on "Space Place Live," the newest addition to the educational Web site, *Space Place*. The premiere talk show guest is Dr. Kip Thorne, a California Institute of Technology astronomer working on the Laser Interferometer Space Antenna mission. [The mission will observe gravitational waves from binary stars both inside and beyond our galaxy, including gravitational waves generated in the vicinity of the very massive black holes found in the centers of many galaxies.]



Kate and Carlo welcome Dr. Kip Thorne to "Space Place-Live".

Space Place guests are animated, approachable, and communicate positive messages about science, technology, and math as related to the space program through friendly, hands-on activities.

A link to the new series can be found at <http://spaceplace.jpl.nasa.gov/index.shtml>.

Farewell Galileo

Shannon McConnell, NASA Jet Propulsion Lab

They gathered at museums and coffee houses, NASA centers and schools. Some cheered. Some bid a fond adieu to an old friend. Others choked back tears as the clock counted down to zero. The *Galileo* spacecraft had spent 8-years immersed in the intense radiation of Jupiter studying the planet, its rings, moons, and vast magnetic field and was now beaming its last bits of information back to Earth while people across the country shared memories of the mission's successes and challenges.

In addition to the September events at NASA Jet Propulsion Laboratory, where hundreds of past project members gathered to share and watch the final Doppler signal disappear, Solar System Ambassadors invited the public to programs held nationwide to participate in the excitement of and the ending of a successful mission. Slide presentations showing the mission's greatest hits, animation of the spacecraft's final moments, and live Doppler feed from mission control bounced off screens in restaurants, schools, and every imaginable location thanks to the enthusiasm of Solar System Ambassadors. Many of the Ambassadors felt especially connected to the mission since the Ambassador Program was originally founded as a nationwide network supporting the *Galileo Mission*.

As *Galileo* himself gave us new visions into our solar system and the Jovian planet, the *Galileo Mission* has given us new visions for the future and new understandings of our largest planet in our solar system. Thanks for the ride *Galileo* — you will be remembered fondly.



Solar System Ambassador, Dr. Ron Hobbs presented *Galileo* highlights at the 125th Street Grill in Seattle, Washington.

What are Astronomers Doing?

What are Astronomers Doing? (<http://mcdonaldobservatory.org/research>) is a weekly updated Web site detailing current research at McDonald Observatory. Each week, visitors can find descriptions of all observing projects on Observatory telescopes. A "NASA Astronomer

of the Week" feature was recently added through an Office of Space Science ROSS E/PO supplement award. Thus far, the site has featured astronomers working on SIRTf, SIM, and Near-Earth Asteroids projects. Each write-up is accompanied by a biography of the astronomer or engineer in charge. Site-related classroom activities aligned with national science education standards are under development. For more information, visit <http://whatareastronomersdoing.org>.

Future Venues for Space Science Exhibits

Cosmic Questions

[<http://www.astc.org/exhibitions/cosmic/dcosmic.htm>]

February 1, 2004 - August 31, 2004
Ontario Science Centre
Toronto, Ontario, Canada

Hubble Space Telescope - New Views of the Universe

[<http://www.sites.si.edu/exhibitions/>]

April 3, 2004 - June 13, 2004
Kalamazoo Aviation History Museum
Kalamazoo, Michigan

October 16, 2004 - December 26, 2004
Challenger Space Science Center
Peoria, Arizona

January 22, 2005 - May 31, 2005
Minnetrista Cultural Center
Muncie, Indiana

MarsQuest

[<http://www.astc.org/exhibitions/mars/imars.htm>]

February 1 - April 30, 2004
The New Detroit Science Center
Detroit, Michigan

Office of Space Science Welcomes Anita Krishnamurthi

Dr. Anita Krishnamurthi has joined the Office of Space Science Education and Public Outreach (E/PO) program on assignment from the University of Maryland, College Park. She was previously a Program Officer in the Office on Public Understanding of Science (OPUS) of the National Academy of Sciences in Washington, DC,

where she managed various informal science education programs targeted at adults. She has also done technology outreach with the Boulder Community Network in Boulder, Colorado.

In Anita's earlier life as a stellar astronomer, she worked on angular momentum evolution in low mass stars using a combination of theoretical modeling and observations of open clusters such as the Pleiades. She received her Ph.D. from The Ohio State University and went on to postdoctoral research at the University of Colorado at Boulder, working on X-ray emission from very low-mass objects using the Chandra X-ray Observatory.

During her stint at NASA Headquarters, Dr. Krishnamurthi will be working with several projects including *Project Prometheus*, *Living With a Star*, and *Beyond Einstein* to help develop their E/PO programs.

Awards

OSS Sponsored NASA CONNECT Program Wins Regional Emmy Award

Nahide Craig, Space Sciences Laboratory (SSL), Berkeley

On June 21, 2003, the NASA CONNECT program, "Data Analysis and Measurement: Having a Solar Blast!" received a regional Emmy award in the Children/Youth Program category. In the program, students learn how NASA researchers study the Sun and use satellite technology to understand the Sun-Earth connection. They also learn about three satellites currently monitoring the Sun—SOHO, ACE, and IMAGE and about RHESSI, a satellite that studies high energy solar flares. By conducting hands-on and Web activities, students make connections between NASA research and the mathematics, science, and technology they learn in their classrooms.

NASA Goddard Space Flight Center scientists Dr. Eric Christian, Dr. Sten Odenwald, and Dr. Terry Kucera and Dr. Michelle Larson of the University of California at Berkeley are featured in the program. The Sun-Earth Connection Forum funded the program, with Steele Hill, Brian Dennis, Sten Odenwald and Elaine Lewis as the consultants for the program.

More information is available at NASA CONNECT : <http://connect.larc.nasa.gov>.

New Exhibit

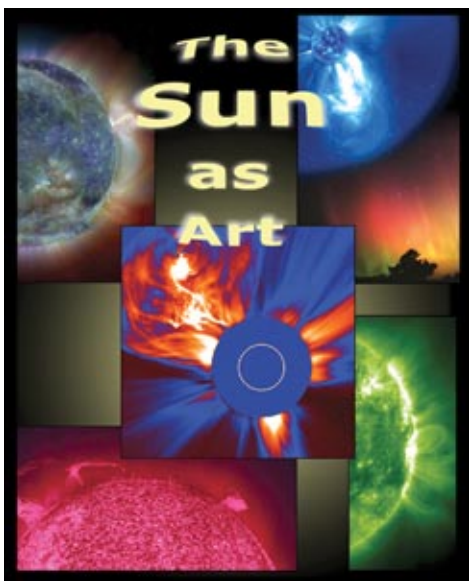
The Sun as Art 2003

Steele Hill, NASA Goddard Space Flight Center

The new "Sun as Art" exhibit presents novel ways of looking at the Sun, made possible by advances in imaging technology and sophisticated spacecraft engineering. Its goal is to entertain while generating interest in the Sun, a star that is usually taken for granted as a simple ball of fiery gas that changes very little. The exhibit's 21 framed images show a very different and dynamic picture. The images were assembled by Steele Hill, SOHO (Solar and Heliospheric Observatory) media specialist.

Students in particular seem to be inspired by the show. A number of elementary and middle school classes describe recent science/art projects in which they draw their own Suns with quite imaginative results after seeing some of these images and others from SOHO.

After its run at the NASA Goddard Space Flight Center Visitor's Center, the exhibit will be available in 2004 for loan to other venues. Thus far, Exploration Place in Wichita, Kansas and Penn Harris Madison Planetarium and Air/Space Museum in Granger, Indiana have signed up to exhibit the show and NASA Explorer Schools [<http://explorerschools.nasa.gov>] plan to circulate parts of the exhibit. The images are on the Web in two resolutions and as a QuickTime movie at <http://soho.nascom.nasa.gov/pickoftheweek/old/SunAsArt/>. Steele Hill can be reached at steele.hill@gsfc.nasa.gov.



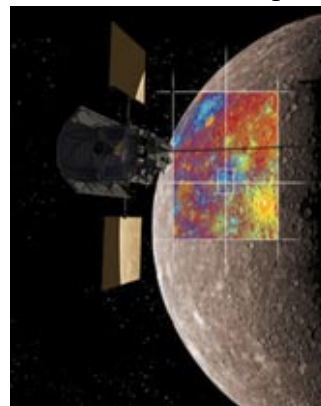
New Educational Product

Staying Cool

Challenger Center for Space Science Education

The MESSENGER Education Modules [http://btc.montana.edu/ceres/MESSENGER/MEMS_SciProc.htm] are diverse packages of educational materials developed for the MESSENGER mission to Mercury. *Staying Cool* is the first of several education units to be developed.

The focus of this unit is to examine how science can be used to solve problems related to staying cool in a hot environment. MESSENGER will operate in and explore the high temperature, high-radiation environment near Mercury. It needs



some of the sunlight and radiation to meet the scientific goals of the mission, but too much can be quite disastrous to the instruments of the spacecraft.

Staying Cool unfolds through a story constructed around three questions:

- How can we study Mercury? [by using light and particle radiation both reflected and emitted from Mercury.]
- Are there any problems we might face? [too much light and particle radiation can be dangerous.]
- Are there ways to solve these problems? [we can use a variety of means to stay cool.]

Each grade level component of the *Staying Cool* unit consists of three lessons, each intended to answer one of the above questions. At all grade levels the story is the same, but the lessons chosen explore phenomenology relevant to the specific science standards associated with a grade level. The content and concepts are far broader than MESSENGER science and engineering, as they should be if these educational materials are to be relevant to the curriculum. The Messenger story is used simply as one vehicle to address a broad curriculum, which includes an understanding of, e.g., light, heat, shadows, and energy transfer.

Educational Programs

MESSENGER Trains New Educator Fellows *Challenger Center for Space Science Education*

In May 2004, NASA will launch the MESSENGER (Mercury Surface Space ENvironment, GEOchemistry and Ranging) spacecraft to study the planet Mercury. MESSENGER [<http://messenger.jhuapl.edu>] will be the first spacecraft to observe Mercury from orbit. Its observations will allow us to see the whole surface of the planet for the first time.

An important element of the MESSENGER Education and Public Outreach effort is the Educator Fellowship Program, managed by Challenger Center. A group of Educator Fellows who are master science teachers is being developed to disseminate information and train other teachers across the nation.

Nineteen Educator Fellows were selected in April 2003 and eleven more will join the program in the spring of 2004. The first MESSENGER Fellowship Training Workshop was held at the Challenger Center [<http://www.challenger.org>] in Alexandria, Virginia, on June 23-27, 2003. During the workshop, the Fellows were trained on the MESSENGER Education Module unit, *Staying Cool*, and Challenger Center's *Voyage* education materials. The Fellows were impressed with the wealth and quality of the materials. Some comments included, "This has been inspiring, exciting, great!" and "I became excited about being part of this project."



2003 MESSENGER Fellows.

Educator Fellows receive a kit including presentation materials and planning tools to help them get started. Each Fellow will train a minimum of 120 teachers per year. Over the 11-year program lifetime, more than 27,000 teachers are expected to be trained, which can translate into classroom activities for more than 1,000,000 students.

For more information about the MESSENGER Educator Fellowship Program, visit <http://btc.montana.edu/ceres/MESSENGER/epomain.htm> or contact Lizzie Taylor, etaylor@challenger.org.

Rutgers Astrophysics Institute

Kathy Lestition, Chandra X-ray Center, Smithsonian Astrophysical Observatory

For the last seven years, teams of physics teachers and students from New Jersey high schools have forsaken other summer plans to participate in a 4-week program at Rutgers Astrophysics Institute (RAI) where they explore the X-ray Universe through NASA satellites. Created in a partnership between education and science professionals by Professors Eugenia Etkina (Rutgers Graduate School of Education) and Terry Matilsky (Rutgers Department of Physics and Astronomy), the program provides an intensive, hands-on immersion experience to approximately 25 students and 12 teachers each year. RAI is co-sponsored by Rutgers University Office of Continuous Education and Outreach, the Education Foundation of America, and NASA's Chandra X-Ray Center.

The main objectives of the program are to involve high school students and their teachers in authentic research in X-ray astrophysics using innovative teaching methods and by doing so, to improve the overall level of science teaching in the participating schools. During the first two weeks of the four-week program, basic physics and astronomy concepts are introduced. The emphasis is on inquiry-based learning, so that the students and teachers begin to appreciate concepts such as the differences between data collection and analysis, and model building and model testing. The next two weeks are spent learning to access NASA archival databases through the Internet, examining X-ray sources with data from Chandra, EXOSAT and other satellites. The program continues with a project that the student teams

explore on their own during the following year. Six scheduled Saturday meetings at Rutgers bring together University faculty, who work with the student-teacher teams as they explore their projects. Plans for future development include a Web based distance learning course at Rutgers, which will enable a wider audience to experience the thrill of using NASA satellite data in a meaningful way.

Further information about the Rutgers ASI program can be found at <http://xray.rutgers.edu/asi>. Connection to the Chandra Education Virtual Observatory software can be found at <http://chandra-ed.cfa.harvard.edu>.



Students use data to reconstruct the Hertzprung Russell Diagram during the RAI summer program.

Students Across The Country Take A "Journey To The Beginning Of Time"

Mary Dussault, Structure and Evolution of the Universe Forum

What was before the Big Bang? That's the question students from Boston asked Princeton University's WMAP scientist Dr. David Spergel in a multi-point interactive videoconference on October 15, 2003. Produced by the Adler Planetarium and sponsored by the Structure and Evolution of the Universe (SEU) Education Forum, the "Journey to the Beginning of Time" distance-learning event involved hundreds of middle and high-school students at several museum and planetarium sites nationwide including the Adler; Boston's Museum of Science; the Ecotarium of Worcester, Massachusetts; and the Chabot Space and Science Center in Oakland, California.

Adler's "Cyberspace" technology team used the production as a pilot project to evaluate the benefits and challenges of using interactive

videoconferencing to support conversations and interactions between NASA scientists and many students nationwide. The museums that participated in the pilot program received a package of pre-and post visit activities and materials, as well as a loan of videoconferencing equipment. Several scientists and E/PO specialists from SEU missions assisted in the event by visiting their local participating museums. Lindsay Bartolone, Adler educator and WMAP E/PO specialist was the host for the event. The one-and-a-half-hour live program included a presentation by Dr. Spergel on evidence for the Big Bang; an interactive "Tour of the Universe" game that asked students in each site to predict the sequence of destinations in a tour out in space and back in time; and a live question and answer session with Dr. Spergel. While the pilot program revealed several challenges to this technical medium, one outcome was clear — students and teachers enjoyed and wanted more of the direct Question and Answer interaction with the scientist.

What was Dr. Spergel's answer to the Boston student? That scientists just don't know what was before the Big Bang, but are working on ways to explore what kind of physics might have powered such an event.

Chandra/GEAR UP Summer Program

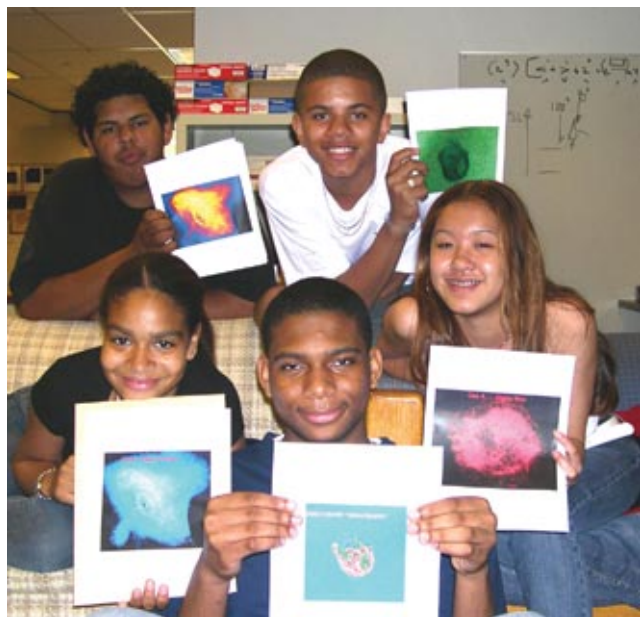
Dr. Irene Porro, MIT Center for Space Research (CSR)

A group of extremely motivated high school students from the Boston Public Schools participated in the Chandra/GEAR UP Summer Program in June-July 2003. The initiative, directed by Dr. Irene Porro of the MIT Center for Space Research (CSR), was the result of a collaboration between CSR, Museum of Science, Boston (MoS) and GEAR UP in Boston. MIT scientists met with the students, introduced them to Chandra's new discoveries, and engaged in activities and museum explorations to investigate the properties of the electromagnetic spectrum and to learn about the life cycle of stars.

The program benefited from collaborations with various local institutions: scientists from the Harvard-Smithsonian Center for Astrophysics and amateur astronomers from the Amateur Telescope Makers of Boston contributed to a star gazing party organized with the support of the Structure and Evolution of the Universe (SEU) Education

Forum; and scientists and educators from the MIT Haystack Observatory engaged the students in radio observations with the Haystack Small Radio Telescope.

For their final project the students worked on science presentations that were featured at an event hosted by the MoS and attended by family members, museum staff, and Chandra scientists. On that occasion Paula Clark, Project Director for GEAR UP in Boston, expressed the appreciation of her staff and students: "The support and encouragement by the teachers and mentors from MIT and the Boston Museum of Science was extraordinary. I know that their interest and encouragement has made an impact on the lives and futures of all the students who participated in the program."



Students show the results of their first experience with the Chandra Education Data Analysis Software.

Imagine Mars

Stephenie Lievens, NASA Jet Propulsion Laboratory

Imagine Mars, co-sponsored by NASA and the National Endowment for the Arts, is a Web based project engaging elementary school students in science and technology through the arts, letters, and humanities.

One of the best examples of using *Imagine Mars* comes from R.K. Mellon Elementary School, Ligonier, Pennsylvania, where Art teacher Linda O'Sullivan led her classes in a yearlong *Imagine Mars* project. They kicked-off the 2002/03 school year by constructing and "launching" a rocket to Mars. Over the following months students wrote

songs, choreographed Mars dances, designed a mission flag and created murals. Their extensive project engaged students in each of the 5 *Imagine Mars* project steps (reflect, imagine, discover, create and share) and led students to a better understanding of the elements of community, the planet Mars, and the value of artistic expression.



Second grade students at R.K. Mellon Elementary School complete their *Imagine Mars* project.

With the 2003/04 school year well underway, *Imagine Mars* is again engaging teachers and students across the country. To bring this program to the teachers with whom you interact, visit the Web site at <http://imaginemars.jpl.nasa.gov> or contact Stephenie Lievens at 818-393-6729.

Wyoming Astronomy Camp

Dr. Kathleen Harper, University of Wyoming

This last summer the Wyoming Broker/Facilitator from the Space Science Northwest group [S2N2 <http://www.s2n2.org>] sponsored the first annual Wyoming Astronomy Camp on the campus of the University of Wyoming (UW) in Laramie. In June and July thirty children from the Boys and Girls Club in Casper, Wyoming attended two, 3-daylong camps. NASA-funded astronomy researchers Chip Kobulnicky, Danny Dale, and Mike Pierce, and S2N2 representative Kathleen Harper, as well as a number of UW graduate and undergraduate students coordinated camp activities. Students built spectrometers using a Sun-Earth Connection kit. They observed the Sun in H-alpha wavelengths and filtered visible light through the STAR (*Students Teaching and Research*) telescope. In the evening, the group viewed the stars in the very

dark night skies of Wyoming at the Red Buttes Observatory, 12 miles south of town and captured CCD images of distant celestial objects including galaxies and planetary nebulae. The next day, the students participated in physics experiments, built and launched model rockets, and took a virtual tour of the solar system. The students also had a tour of the UW's 2.3 meter infrared telescope facility.

With only one university in this very rural state, first hand exposure to science research and the university environment can make a strong impression on high school students. One student was overheard telling another "I learned so much today." "That makes it all worthwhile," says Kobulnicky. Plans are underway to expand the program next summer with support for an OSS ROSS education and public outreach grant.



Wyoming Astronomy Camp students making true-color images of the spiral galaxy M51.

Support Network Brokers Partner with Solar System Educators from Coast to Coast

The Brokers of Space Science Network Northwest (S2N2) and the Mid-Atlantic Region Space Science (MARSSB) collaborated with the Solar System Educators Program [<http://www.ssep.org>] to provide space science workshops in their regions.

S2N2 worked with the Space Grant Consortia of Washington and Oregon to offer *Astounding Astronomy*, to middle and high school teachers Held July 21-25 at the University of Washington, *Astounding Astronomy* featured content and activities on planets, stars, galaxies, and the Universe. The program addressed Washington and Oregon science standards. Participants did lesson plans based on NASA Office of Space

Science educational materials. Presenters included NASA Jet Propulsion laboratory Solar System Educator Debby Salter, NASA Aerospace Education Services Program representative Brian Hawkins, several University of Washington faculty and graduate students, and Julie Lutz, S2N2 director.

MARSSB established a partnership with the Mid-Atlantic Region Space Grant Association, Virginia Space Grant Consortium, and the Solar System Educators Program to provide space science workshops in Maryland, Kentucky, New York, Pennsylvania, and West Virginia. Space science researchers offered a glimpse into active space science research and Solar System Educators demonstrated inquiry-based activities that support student interest in and understanding of space science concepts.

"Teachers were hungry for this information," reported Ruth Ruud, a Solar System Educator from Pennsylvania. Third-grade teachers from Cairo Elementary in Cairo, New York, shared these comments about the workshop: "I came away with a number of great activities that I can use in my class ... I plan to integrate all of the activities into my program."

At a workshop co-hosted by the West Virginia Space Grant Consortium and the NASA Educator Resource Center in Fairmont, West Virginia, teachers learned ways to bring NASA scientists and engineers into their classrooms through videoconferencing.

Find out more from S2N2 at <http://www.s2n2.org> and MARSSB at <http://marssb.cet.edu>.



Astounding Astronomy 2003 Workshop participants build their own simple cardboard tube telescopes.

NASA OSS Support Network Profiles

This is the fourth in a series of articles which highlights contributions of the organizations of the NASA OSS E/PO Support Network (ESN). The 12 groups which make up the Support Network are involved in coordinating and integrating the OSS E/PO program. They provide a point of entry for individuals and organizations wishing to participate in the OSS E/PO program. A brochure describing the Support Network can be found at http://spacescience.nasa.gov/education/resources/ecosystem/brochure_low_res.pdf.

The Sun-Earth Connection Education Forum Jim Thieman, NASA Goddard Space Flight Center

The Sun-Earth Connection Education Forum (SECEF) is a partnership of NASA Goddard Space Flight Center and the University of California Berkeley with teams working at both locations. SECEF has the responsibility of inspiring students and the public using the latest discoveries in the sciences in the Sun-Earth Connection (SEC) theme area, in particular: how the Sun as our nearest star works; how it varies; and how it affects the near-Earth environment as well as the other planets in the solar system. The scientists will excitedly tell you about their latest discoveries involving the ionosphere, magnetosphere, aurora, bow shock, solar wind, corona, flares, sunspots, solar storms, etc. SECEF works together with many dedicated SEC scientists and education professionals to spread their excitement and the new knowledge gained.

SECEF has developed a number of approaches to promote SEC science based on specific needs of the education community. For example, in the formal classroom education area there were very few products on SEC subjects in the K-4 grade levels. Resources like the *Auroras* book, *Our Very Own Star*, the *Sun* book, and materials from the *Eye on the Sky* program were facilitated for filling this gap. Another example is the *Student Observation Network* (SON) which was created specifically as an interactive hands-on science set of activities to enable students to understand how events on the Sun can affect our environment on Earth. Students see the variability of the Sun

through their own observations and by monitoring the observations made by others. They also study the effects of the Sun's variability on the Earth's magnetosphere through direct observations of Earth's magnetic field variability and the generation of aurora.

In public outreach and informal education SECEF has worked with science centers, museums, planetariums, amateur astronomers, girl scouts, and solar system ambassadors. These types of partnerships are especially useful for the annual "big event" which is used to promote SEC science on a national level. Participating groups are provided educational materials and training to talk about SEC science in programs they conduct in their localities. In 2001 and 2002 these events were solar eclipses. Auroras were featured in 2003. In 2004 the transit of Venus across the Sun (see page 2 for more information) will be the central topic. In 2005 the theme will be "Ancient Observatories". Big events are also promoted for use in formal classroom settings. Teachers can sign up at a SECEF Web site [<http://sunearth.gsfc.nasa.gov>] to receive a packet of educational materials relevant to the event.



The picture from the Chaco Canyon "ancient observatory" shows most of the present SECEF team with the exception of Nate James, Lori Persichitti, and Bryan Stephenson. Pictured are, left to right, Jim Thieman, Karin Hauck, Sten Odenwald, Carol Lunsford, Ruth Paglierani, Carolyn Ng, Rich Vondrak, Lou Mayo, Elaine Lewis, Don Robinson-Boonstra, Karen Meyer, Darlene Park, Greg Schultz, Isabel Hawkins, Igor Ruderman, and Troy Cline. The dedicated efforts of this group working together with SEC missions, scientists, educators, volunteers and many others has made the excitement of NASA Sun-Earth Connection discovery an inspiration to both the explorers of tomorrow and the citizens of today.

On the Horizon

Museums Selected for PBS/NOVA'S Origins Series.

Thomas Levenson, Origins Series Executive Producer.

Outreach for the *Origins* project, centered around a prime-time, four part PBS/NOVA series, achieved a significant milestone in September 2003 with selection of ten science center partners. The centers will create ten city-wide events in coordination with the series premiere, to be followed up with a minimum of one year of museum and community activities. This outreach effort has been funded by NASA's Office of Space Science and by the National Science Foundation's Informal Science Education program.

The television series tells the story of the evolution of a living cosmos. Program one focuses on cosmic origins from the Big Bang to the emergence of potential habitat. Program two looks at the earth's pre-biological history and Program three continues with the story of the origin of life here and its evolution to complexity. Program four focuses on the search for life beyond earth. The series host is Dr. Neil deGrasse Tyson, director of the Rose Center at the American Museum of Natural History. Broadcast is slated for fall 2004.

The Pacific Science Center in Seattle is creating the outreach effort for the series. Its materials focus on one core theme — how do scientists learn about things that are distant in space, time, or both — and it explores that theme in modules that focus on exploring light and the rock record.

The ten partner centers selected are:

Adventure Science Center - Nashville, Tennessee
American Museum of Natural History - New York, New York

Chabot Space & Science Center - Oakland, California

Explorit Science Center-Davis, California

Fernbank Science Center-Atlanta, Georgia

Franklin Institute-Philadelphia, Pennsylvania

Hooks Discovery & Learning Center-Indianapolis, Indiana

International Museum of Art & Science-McAllen, Texas

Museum of Science and Industry-Tampa, Florida
St. Louis Science Center-St. Louis, Missouri

Chicago 2004- A Workshop To Foster Broader Participation In NASA Space Science Missions And Research Programs

Phil Sakimoto, NASA Headquarters

A diverse cadre of scientists, assembled from a broad range of institutions, is essential to the future success of NASA space science missions and research programs. —Dr. Edward J. Weiler, NASA Associate Administrator for Space Science

Currently envisioned NASA space science missions span the next several decades, during which time substantial turnover in the scientific workforce and changes in the Nation's demographics will occur. To prepare for this future, OSS is sponsoring a workshop aimed at bringing together NASA personnel, current OSS-funded scientists and educators, and a diverse array of scientists and educators who are interested in participating in future OSS missions and research programs. The workshop will be held at the Hilton Chicago on June 28-29, 2004.

A specific goal of the workshop is to seed personal contacts among a much more diverse community of investigators than has traditionally been active in NASA space science missions. Consequently, underrepresented minority scientists and educators in relevant disciplines, scientists and educators at minority institutions, and all current and prospective investigators interested in expanding the diversity of investigators on their future science teams are particularly encouraged to attend. In addition, all participants are expected to gain insights and contacts leading to a better understanding of how the NASA space science program is organized, planned, and conducted; how missions and research programs are conceived; how mission and research teams are formed; and how successful proposals are constructed.

For further information, visit <http://analyzer.depaul.edu/Chicago2004>.

If you would like to receive an electronic copy of future newsletters, contribute an article or just have questions about getting involved with the NASA OSS E/PO Program, contact Larry Cooper, Editor, at Larry.P.Cooper@nasa.gov. Prior issues of *Voyages* are online at <http://spacescience.nasa.gov/education/news>.