



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

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Issue 8

### Reaching Out to Girl Scouts

*Rosalie Betruie, NASA Jet Propulsion Laboratory*

For the past 2 years, the Girl Scouts of the USA (GSUSA) and NASA Office of Space Science (OSS) have been building an informal working relationship in space science. On March 12, 2003, the initiation of a more formal relationship was made through the signing of an agreement between GSUSA and the NASA Jet Propulsion Laboratory. The agreement is the first step in an anticipated evolving formal collaboration at the national level that will be managed by the NASA OSS Solar System Exploration (SSE) Education and Public Outreach (E/PO) Forum. The relationship is intended to be inclusive of the science content and E/PO activities throughout the OSS program and serve as an integrated entry-point to GSUSA for OSS activities.

Mutual goals are to raise the comprehension and interest of science-related topics among the girls, leaders, and leader-trainers and to encourage the girls and women to pursue careers in science, technology, engineering and mathematics (STEM). Through this relationship, GSUSA provides the opportunity for OSS E/PO efforts to 1) reach its 2,800,000 girls and almost one million adult members; 2) access established programs that include the underserved population such as migrant worker's daughters, American Indian daughters, etc.; 3) join GSUSA and partners such as science museums, rural communities; and 4) gain leverage for greater impact. In return, GSUSA will have the potential to utilize the learning and discovery aspects of both OSS's science results (what we are learning), and the technology (how we are exploring and learning) to inspire girls and women to explore careers in STEM disciplines and improve science literacy. The SSE E/PO Forum's responsibilities are to work with OSS to 1) ensure scientific accuracy; 2) facilitate access to unique resources

(people and facilities); and 3) otherwise help enhance GSUSA programs that support their ultimate goal of making girls strong, self-confident, and independent women.

Cooperative efforts envisioned may include training and education of leaders, internship and



*GSUSA workshop participants observe crustal material samples and infer the history of the "mystery" planet.*

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mentoring programs, communication (magazines, Web sites, and newsletters), special events, and program evaluation.

Because adult leaders and volunteers are uncomfortable with science, a major task is to make science comfortable and fun for the trainers, leaders, volunteers, and ultimately the girls. Therefore the initial national-level focus will be on direct contact with the adult membership of GSUSA, through “train-the-trainer” workshops. Building on a pilot workshop in 2002, the first OSS-wide effort under this agreement will be a 4-day national Girl Scout trainer workshop in New York in November 2003, including activity presentations representing all OSS themes. From this OSS-wide effort will come a “menu of workshops” to offer the Girl Scouts across the country. A support/mentoring program is also being developed for Girl Scout adult and youth members that attend a NASA workshop or a GSUSA event with NASA content.

Working through this agreement will enhance the opportunities for E/PO contributions and participation in GSUSA/NASA activities at the national level. Communication through the OSS E/PO community about national as well as individual local efforts with GSUSA can be facilitated through this collaboration, resulting in leveraging opportunities, resource sharing, and sharing of lessons-learned. For further information on this collaboration, please contact Rosalie Betrue at [Rosalie.Betrue@jpl.nasa.gov](mailto:Rosalie.Betrue@jpl.nasa.gov).

## *Updates*

### **FY 2002 – A Year of Transition**

Last year marked yet another period of strong growth in the Office of Space Program education and public outreach (E/PO) program. Over 100 OSS missions and programs; 1,000 OSS-affiliated scientists, technologists, and support staff; and 500 institutional partners contributed to the E/PO efforts. 70 new products were developed and more than 3,500 events associated with 330 discrete projects were carried in FY 2002. The events were held in every state, several territories and foreign countries and represented more than 20% increase over the number reported in FY 2001. The complete descriptions of the events and projects along with the contributing scientists, missions, programs, and institutions are reported

in the FY 2002 OSS E/PO Annual report which is available online at <http://spacescience.nasa.gov/education/>. Printed copies may be requested from Dr. Philip Sakimoto at [philip.j.sakimoto@nasa.gov](mailto:philip.j.sakimoto@nasa.gov).

In 2002 OSS also received feedback on E/PO from several sources including the OSS E/PO Conference (see *Voyages*, issue 6), the Space Science Advisory Committee’s E/PO Task Force, and the Lesley University Program Evaluation and Research Group (PERG). These groups pointed to the Annual Report statistics as evidence of substantial progress and of the national impact of the OSS E/PO program. At the same time, the feedback pointed to the need to build greater coherence into the OSS E/PO program, and the need to pay greater attention to the impact it is having on its intended audiences. In response, OSS entered FY 2003 with renewed commitments to program improvements such as building a space science curriculum framework to guide the development and dissemination of OSS E/PO materials, providing professional development opportunities for personnel engaged in OSS E/PO efforts, and providing even greater opportunities for an increasingly diverse population to participate in space science missions, research, and E/PO programs.

The Task Force and PERG reports may be obtained at

<http://spacescience.nasa.gov/education/resources/evaluation/index.htm>.

### **ViewSpace**

*Space Telescope Science Institute (STScI)*

As detailed in *Voyages*, issue 3, ViewSpace is a multimedia astronomy product for planetarium lobbies and similar venues. John Stoke, creative force behind the ViewSpace program at STScI notes continued progress in the development and expansion of ViewSpace. Originally distributed to sites on a CD, an “online” version of ViewSpace is now being tested at eight sites around the country. The online version enables much more frequent updating of video players – as often as several times a day when there’s breaking space science news. ViewSpace Online interleaves “long shelf life” regular features with topical programming that will grow to include “Astronomy Picture of the Day” and “The Sky Tonight.”

On the programming front the ViewSpace team has expanded the scope of its content beyond products solely inspired by Hubble. Producer Bryan Preston, in collaboration with Dr. Steele Hill from the SOHO project, produced Helios, an overview of the many faces of the Sun. Soon production will begin on an infrared astronomy program authored by Doris Daou of the Space Infrared Telescope Facility. Cassini's Ring World will also be coming to ViewSpace [see companion article on page 6]. Additional collaborations with other OSS missions are being considered.

For more information please contact John Stoke, at the STScI Office of Public Outreach at [stoke@stsci.edu](mailto:stoke@stsci.edu).



*ViewSpace installation at the Bishop Museum, Honolulu, Hawaii*

## **Space Science Media Needs of Science Center Professionals**

*Karen Meyer, University of California Berkeley*

With increased awareness of the role that science centers play in presenting space science to the public, NASA's Office of Space Science has initiated research into the user needs of science center communities. As part of this effort, the Sun-Earth Connection Education Forum interviewed twenty-nine science center professionals to explore ways to better meet their media needs. ("Media" refers to images, animations, simulations, and videos, etc., available via the X%b.) The results are reported in "Space Science Media Needs of Science Center Professionals," which is available online at <http://cse.ssl.berkeley.edu/spacescience.pdf>. Below is a brief summary of key recommendations:

- Continue to invest in science centers by providing professional development of science center professionals, providing access to mission scientists and technicians, developing joint products and programs, and streamlining NASA Web sites for more consistent search results;
- Upgrade Mission Web sites to include media thumbnails and full resolution media, improve site search functionality, and support streamlined searches between NASA Web sites;
- Develop "Best of" galleries of space science media products;
- Develop space science media descriptors (metadata protocols);
- Develop video sequences, using Hubble's "ViewSpace" as a model;
- Develop resources with ties to culture and history;
- Develop tools that allow the public to explore 3D data sets; and
- Expand and enhance the "Space Science Portal" (<http://spacescienceportal.org>) Web site.

For more information about this research or the implementation of these recommendations, please email Karen Meyer at [karena@ssl.berkeley.edu](mailto:karena@ssl.berkeley.edu) or Isabel Hawkins at [isabelh@ssl.berkeley.edu](mailto:isabelh@ssl.berkeley.edu).

## **Live From the Aurora –Sun-Earth Day 2003**

*Elaine Lewis, NASA Goddard Space Flight Center*

On March 18, 2003, thousands of people participated in Sun-Earth Day 2003. At science museums, schools, and star parties in North America and Europe participants talked with researchers, and observed the Sun with telescopes connected to the Internet. They learned about the beautiful displays of the aurora (the Northern and Southern Lights), space weather and catastrophic power outages, as well as the cultures of peoples living at northern latitudes.

Leading up and on Sun-Earth Day NASA Centers, NASA Educator Resource Centers and nearly 140 museums held events, or conducted training for science teachers, students, and for the public. During February and March more than 8,000 teachers participated in education workshops related to the science of the Sun-Earth Connection. In addition 182 events were supported by amateur astronomers.

"Living With A Star," a solar science documentary was broadcast on February 11th.

This program helped prepare students for “Live From the Aurora – Sun- Earth Day 2003”, by providing graphically-rich content and exciting science to capture the interest of students and teachers.

“Live From the Aurora” aired on March 18th, featuring real-time interaction between NASA researchers on location at Poker Flat Research Range, Alaska—the world’s premier site to study the aurora with sounding rockets. Youngsters stayed up late at night to participate through Webcasts at the Maryland Science Center, Baltimore, Maryland; Chabot Space & Science Center, Oakland, California; Fernbank Science Center, Atlanta, Georgia; and The Imaginarium, Anchorage, Alaska. During the broadcast and for one hour afterward viewers could submit questions to a panel of NASA and University of Alaska/ Geophysical Institute experts on the aurora by going to “On-Air” in the INTERACT section of the P2K/LIVE FROM THE AURORA Web site, <http://passporttoknowledge.com/sun/main.html> . More than 150 Question and Answer pairs are now archived online.

The Web site, <http://sunearth.gsfc.nasa.gov/sunearthday>, provided additional resources to support educators, museums, and scientists for this year’s event. A new feature was added in January, the “Student Observation Network (SON).” Through the network students can track a solar storm and predict an aurora. Activities, Web quests, and a multimedia gallery were all created to support and enhance this year’s Sun- Earth Day and the ongoing SON effort.

The public Sun-Earth days, now in their third year, were created to communicate the excitement of the fast-moving field of solar science and research into the Sun’s effects on Earth.

The NASA Sun-Earth Connection Education Forum (SECEF) and Passport to Knowledge (P2K) jointly developed Sun-Earth Day, 2003 and its theme “Live from the Aurora.” SECEF translates and interprets the research results from NASA’s solar science missions for educators and the public through training programs and educational products. P2K is the longest-running series of interactive learning adventures on public TV.

## **IDEAS Abound**

*Heather Bradbury, Space Telescope Science Institute*

The Initiative to Develop Education through

Astronomy and Space Science (IDEAS) Grant Program is one component of NASA’s Office of Space Science (OSS) Education and Public Outreach program. The IDEAS objective is to enhance science, mathematics and/or technology education in the United States for K-14 students, teachers and the general public by promoting partnerships that explore new ways to make astronomy and space science educational and stimulating. IDEAS provides start-up funding to innovative, creative education and public outreach programs that feature active collaboration between astronomers/space scientists and formal education/informal education professionals. This year’s IDEAS Grant Program drew 78 proposal submissions from 33 states and 1 U.S. Territory. The number of proposals submitted increased by 32% from the previous year. Fifteen proposals were accepted for funding, amounting to approximately \$600,000 and the ratio of funded proposals was ~1:5. The largest number of funded proposals (11) was in the area of educator workshops and curricular materials development for K-12. The next opportunity for submitting an IDEAS proposals will be October 24, 2003. IDEAS is administered by the Space Telescope Science Institute (STScI) on behalf of NASA OSS. For program information and proposal abstracts, please see the IDEAS Web site at <http://ideas.stsci.edu> .

## **The Space Place Networks with Amateur Astronomers**

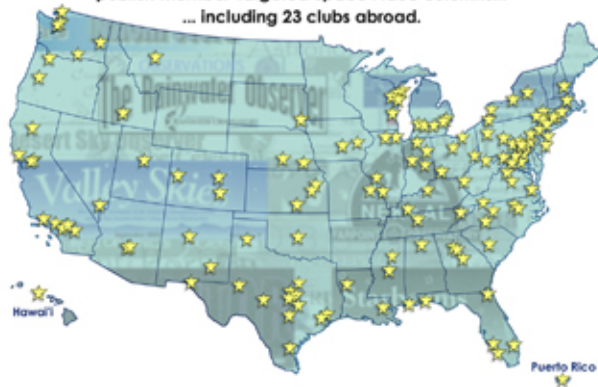
*Nancy Leon and Diane Fisher, NASA Jet Propulsion Laboratory*

Amateur astronomers can be wonderful messengers for spreading the excitement of space science and technology in their communities. NASA’s Space Place outreach program, administered by the New Millennium Program at JPL, has been cultivating partnerships with these highly motivated hobbyists. There are hundreds of community-based amateur astronomy clubs throughout the country and many of these clubs publish monthly newsletters for their members.

The Space Place program is now working with over 150 amateur astronomy clubs across the United States, as well as several clubs in Canada, England, and New Zealand. These clubs, with a total membership of over 25,000, receive original

## 156 Amateur Astronomy Clubs

publish member-targeted Space Place columns...  
... Including 23 clubs abroad.



monthly columns for their newsletters especially written for their well informed adult readership. Some of the topics of the columns to date have been:

- Voyager spacecraft now seeking the heliopause.
- Advances made by the Apollo Program as necessary steps toward today's sustainable space programs and the miniaturized technologies being validated by the New Millennium Program.
- Introduction of the mission of the new Galaxy Evolution Explorer (GALEX) spacecraft.
- The combination of careful planning and creative improvisation that enabled the Deep Space 1 mission to far exceed its original goals.

Each column includes a Web link to a NASA site giving more information on the topic or mission. In addition, a link directs readers to a related activity or fun fact on the Space Place Web site for children at <http://spaceplace.nasa.gov>.

### Creative Collaborations

*The Hubble Space Telescope Formal Education Team*

Who? What? When? Where? Why? - these questions are a newspaper reporter's mantra. Reporters must answer them to convey the entire story to readers. Like reporters, education researchers must answer similar questions when evaluating the effectiveness of educational programs. The Formal Education Team at the Space Telescope Science Institute in Baltimore, MD, has been evaluating the effectiveness of its Amazing Space education program, which uses the Hubble Space Telescope's (HST) discoveries to inspire and educate about the wonders of the universe. The team has been asking such

questions as: 1) Who is using Amazing Space, 2) How are they using it, and 3) How has the program affected student performance and attitudes? The team has answered the first two questions, discovering, for example, that more than 274 US school districts and 175 colleges and universities are using Amazing Space.

Now the team is beginning to answer the third broader question: "How has Amazing Space impacted student performance and attitudes about science?" Answering this question is time consuming, requiring the assistance of education researchers from across the country. Therefore, the Formal Education Team's goal for the next year is to forge creative partnerships with education researchers and graduate students at universities and colleges to collect comprehensive information from many students. "These creative partnerships between the astronomy and education communities will provide us with extensive information on how HST education products are impacting students across the country," says Bonnie Eisenhamer, the Formal Education Team manager.

The team already has identified several possible partnerships with universities that are exploring the impact of Amazing Space on teaching science and technology. One potential partner is Towson University in Towson, MD, a college just a few minutes away from the institute. A Towson professor of curriculum and instruction is using Amazing Space as an engaging use of media in a class on how to teach with computer-assisted instruction and has collected data on its effectiveness. Another possible partnership is with professors and graduate students at the University of Nebraska. The graduate students are using Amazing Space specifically, the activity "Mission Mastermind" - to teach technology to fifth grade science students. "I love that this project exposes the students to a present-day technological design," writes Amy Wilson, a fifth-grade teacher and University of Nebraska graduate student. "It's a real-life experience that actively involves every learner in the classroom." The Formal Education Team also is working with education researchers at McRel (Mid-continent Research for Education) to study student performance. Located in Aurora, CO, McRel provides products and services primarily to K-12 educators.

To better serve students, the Formal Education Team has launched "Capture the Cosmos," a new

section of the Amazing Space Web site specifically for students and the general public. The site offers astronomy themed information, activities, and materials especially packaged for a broader audience. To visit "Capture the Cosmos," go to <http://amazing-space.stsci.edu> and follow the link.

## *New Educational Products*

### **Countdown to Ring World**

*Alice Wessen, NASA Jet Propulsion Laboratory*

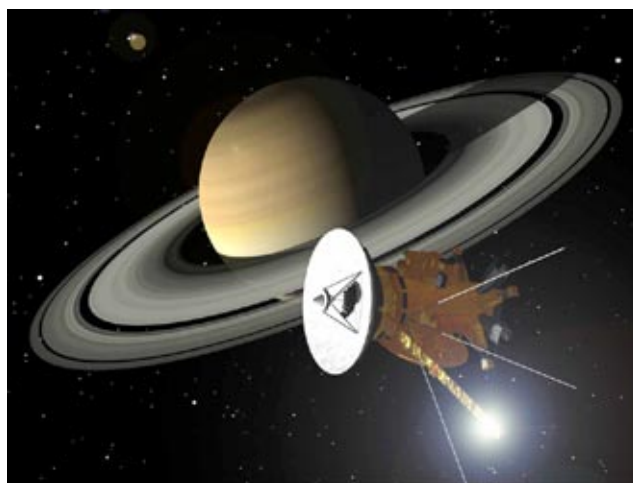
In the summer of 2004, a remarkable spacecraft will rendezvous with Saturn, one of the most fascinating planets within our solar system, seeking to understand its nature, history, and moons. The four-year orbital tour will be one of the most complicated planetary exploration missions ever performed. It is anticipated that we will be surprised many times as we explore the depths of the marvelous enigma that is the Saturn system.

To tell the story of the international Cassini/Huygens mission, a team led by NASA's Jet Propulsion Laboratory has produced a planetarium show called *Ring World*. Written by Dr. Bill Gutsch, former head of the Hayden Planetarium and produced by Brian Sullivan of Salt Lake City, Utah, *Ring World* was available to every planetarium in the United States in May 2003.

The show is narrated by John Billingsley, who plays Doctor Flox on Star Trek Enterprise. It tells the story of the journey and the history of the Cassini/Huygens mission. Images for the show were created by veteran space artists with over 20 years experience producing planetarium shows as well as creating illustrations for several past, present and future NASA missions. Technical advisors included Rob Landis of Cassini-Huygens Mission Support and Operations, Dr. Ellis Miner and Dr. Linda Spilker of the Cassini science team, and Robert Mitchell, Program Manager for the Cassini-Huygens mission. To share this story with the largest possible audience, a single screen DVD

presentation will also be made available for youth groups, libraries, community colleges, and classrooms across the United States by the start of the 2003/2004 school year. The Deep Space Network is a partner in this undertaking and copies will also be available to the Deep Space Network's visitor centers in: Goldstone, California; Madrid, Spain; and Canberra, Australia. In response to international interest from Japan, Europe and Canada, a version will also be made available for translation in October 2003. The Space Telescope Science Institute will be incorporating *Ring World* into a ViewSpace production [see companion article, page 2].

A second planetarium show is planned for the 2005/2006 timeframe. Through a series of personal stories, the show will capture the excitement of the scientists and mission staff as they await the initial data and images from the Cassini-Huygens mission. For further information on Cassini/Huygens, visit their Web site at <http://saturn.jpl.nasa.gov>. For information on obtaining a Planetarium Show Kit or DVD, please contact Brian Sullivan at [codysey2001@netscape.net](mailto:codysey2001@netscape.net) or (801) 350-8340.

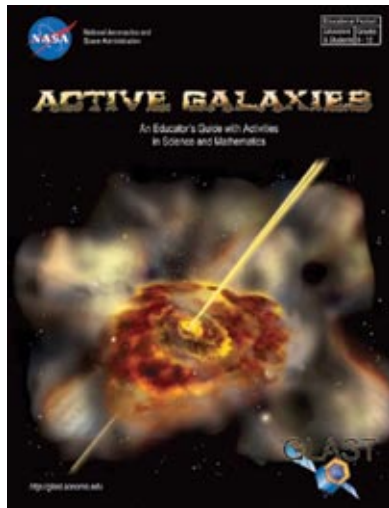


*Artist illustration from the Ring World Planetarium Show.*

The Cassini/Huygens mission is a joint endeavor by the National Aeronautics and Space Administration (NASA), which provided the orbiter, and the European Space Agency (ESA), which supplied the Huygens probe. The Italian space agency (Agenzia Spaziale Italiana, or ASI) provided hardware systems for the orbiter spacecraft and instruments.

## Active Galaxies– Educator Guide with Activities in Science and Mathematics

Lynn Cominsky and Philip Plait, Sonoma State University

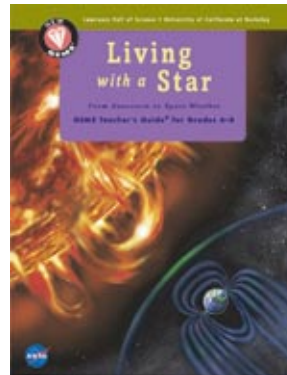


The NASA Education and Public Outreach group at Sonoma State University has developed *Active Galaxies*, a new educator guide with a set of three hands-on classroom activities based on the science of the Gamma-ray Large Area Space Telescope (GLAST) mission. The standards-based activities use various properties of black holes in distant galaxies to engage grades 9-12 physical science and mathematics students. In the first activity, “**Building Perspectives with Active Galaxies**,” the students use inexpensive materials to build a model of a supermassive black hole and its nearby environment. Using basic math and science skills, they analyze their model from different geometric perspectives, comparing it to real images of active galactic nuclei. The second activity, “**Zooming In on Active Galaxies**,” involves the use of a beautifully illustrated poster depicting the core of an active galaxy with jets. The students first test the limits of the small angle approximation, then use the small angle formula to calculate the height of their fellow students by measuring their distance and apparent size in degrees. They then use this knowledge to measure the size of the radio lobes and accretion disk of the active galaxy on the poster, using methods similar to those used by real astronomers. In the third activity, “**Light Travel Time and the Size of Active Galaxies**,” the students analyze a plot of a real gamma-ray flare from an active galaxy. They use the rise and decay times of the flare (together with the speed of light) to calculate the size of the flare region, and extrapolate various other properties of the flare. The activity guidebook and accompanying poster can be ordered through the Sonoma State University E/PO Web site at <http://epo.sonoma.edu/orderformpublic.html>.

## Living with a Star: From Sunscreen to Space Weather: A New GEMS Teacher Guide® for Grades 6–8

Karin Hauck, University of California Berkeley

The *Living with a Star* teacher guide was released in April 2003 as part of the Lawrence Hall of Science award-winning Great Explorations in Math and Science (GEMS) Series. This middle school guide, produced by NASA’s Sun-Earth Connection Forum and the UC Berkeley Lawrence



Hall of Science, examines the Earth’s relationship to the dynamic Sun. The guide provides a series of activities for students to help them understand aspects of the Sun-Earth system that affect life and society. A key goal of the guide is to make students aware of the risks of living with our nearest star, the Sun, and how “space weather” impacts astronaut safety, satellite operations, power grids, and communications. Over the course of this unit students engage in activities that lead them to discover for themselves the potential risks of living with a star, and about many important and useful concepts in space science, earth science, physics, technology, and health science.

In *Living with a Star*, students become solar scientists, studying fascinating and lesser-known aspects of the Sun and Earth and the connections between the two. Challenged to resolve a confounding mystery on Earth, in which strange things happen in the sky and to technology on the ground, students use research techniques, data collection and analysis to identify the likely culprit, the Sun! To confirm their suspicions, students investigate the full array of solar output, and discover that a whole spectrum of electromagnetic energies, as well as a continuous wind of solar energetic particles, sweep past our planet every day. They learn that Earth is bombarded much more intensely by these energies and particles during periods of high solar activity.

In activities about risks from solar radiation, students discover that Earth is naturally protected from most of the Sun’s harmful effects by two shields - our atmosphere and magnetosphere. They do research, gather data, make and interpret

graphs, gauge risk factors, and engage in a simulation activity. In the process, they gain valuable experience in risk assessment; making considered choices and assessing priorities now and in the future—for themselves, their communities, and the planet as a whole.

In a “Space Weather” game, much of what students have learned throughout the unit comes together. Arrayed around a model Sun, students represent Earth at different points in its orbit and also different characters—a person on Earth, a Space shuttle astronaut, and a Mars Mission crew member. Game cards and a spinner atop the Sun indicate when and where flares and coronal mass ejections are discharged. The students record and graph the solar events and the possible harmful effects on the characters. They finish with an enhanced realization of the importance of understanding and predicting solar storms.

The guide includes a companion CD that provides access to NASA space weather information, satellite imagery, movies, scientist interviews, and other multimedia resources. The CD contains background materials, classroom activities, and the latest NASA images and research from SEC missions, and can be used by itself or together with the guide. There is also a Web site that can be accessed at <http://www.lhsgems.org/lws>.

The guide will be distributed nationally through an existing network of more than 75 GEMS sites that offer professional development and training on how to use the guides to teachers in their regions. For more information about the GEMS guide, please visit <http://www.lhs.berkeley.edu/GEMS/GEMSIwas.html>.

### **Touch the Sun—Solar-B Curricular Materials and Educator Workshops**

*Benjamin Burress, Chabot Space & Science Center*

Chabot Space & Science Center has developed *Touch the Sun* curricular materials and educator workshops that use hands-on instrument building and measurement activities with inexpensive, everyday materials to introduce the science and technologies of satellite-based solar astronomy. The curricular materials are designed for grades 8 to 12 (adaptable for grades 5 to 7) and were developed by Chabot staff in support of the Lockheed-Martin Solar-B education and public



*Workshop participants make pinhole camera measurements to calculate the Sun's diameter.*

outreach program. The package features seven activity units that parallel the scientific and satellite engineering processes through building, making measurements with, and analyzing data from simplified Sun- and light-measuring instruments. Using the scientific goals of the Solar-B mission and the capabilities of the spacecraft, *Touch the Sun* encompasses activities focused on instrumentation (Spectroscope and Polarimeter), observation (Sunspot Tracker, Sundial, and Pinhole Camera), and satellite engineering (Shoebox Satellite). All of the activities emphasize precision in construction and measurement, as well as instrument redesign to improve the quality of data. The curricular materials are aligned with national science and mathematics standards, and received an Exemplary rating from the annual NASA Educational Products Review. The *Touch the Sun* educator guide is available in PDF format at <http://www.chabotspace.org/vsc/exhibits/solarb/educationresources>.

A three-day *Touch the Sun* workshop is also offered each summer at Chabot Space & Science Center. The workshop's primary focus is to conduct the activities and promote group discussions on the best ways of integrating them into existing curricula. The workshop also includes an introduction to modern solar astronomy and take-away kits of optical materials and educational resources for participants. For more information on *Touch the Sun*, please contact Benjamin Burress at [BBurress@ChabotSpace.org](mailto:BBurress@ChabotSpace.org).

### **NASA Resources In Other Languages**

*Dr. Teresa J. Kennedy, University of Idaho*

Using NASA materials in other languages provides teachers working with English Language Learners (ELL's) the opportunity to assist their students to acquire English literacy skills in the regular classroom while at the same time providing these students with access to high



quality science information in their first language. The K-12 student body found in many of our nation's schools currently represents a large growth in the number of students whose native language is not English. Moreover, new figures released in January 2003 by the Census Bureau reported that the Hispanic population, the nation's largest minority group, is now roughly at 37 million, up 37% from Census 2000.

NASA education materials are the means to create an enriched science program that actively includes all students regardless of their first language, enhance the academic achievements of the entire student body, integrate literacy skills in reading and writing with scientific inquiry, and specifically provide ELL's the opportunity to learn grade level curriculum. In addition, NASA materials in other languages are wonderful resources that can also be used at Family Science Nights to involve the whole community as well as provide a means for family members who speak little or no English the opportunity to become involved in their child's education.

A comprehensive list of over 50 NASA programs and resources in Spanish and many other languages was recently compiled for the Astronomical Society of the Pacific newsletter, "The Universe in the Classroom" and can be found online at <http://www.astrosociety.org/education/publications/tnl/60/spanish.html>.

Also, see [http://www.uidaho.edu/ed/nasa\\_renc](http://www.uidaho.edu/ed/nasa_renc) for an updated version of the article mentioned above that is regularly revised as new NASA materials in languages other than English become available. Click on the link *Materials in Other Languages* to access the updated version. For a list of the languages that are spoken in the K-12 schools in your state see <http://www.ncela.gwu.edu/states/reports/statedata/2001/index.html>. For more information, contact Dr. Teresa Kennedy at [tkennedy@uidaho.edu](mailto:tkennedy@uidaho.edu).

## *Educational Programs*

### **Chandra - Science After School Pilot**

*Irene Porro, Massachusetts Institute of Technology Center for Space Research*

"It's great to see so many of our teens get excited about science," said Boston Mayor Thomas M. Menino when asked about the *Chandra - Science*

*After School Pilot* attended by 7th through 9th graders from Boston after school sites in the Fall 2002. The initiative, led by Dr. Irene Porro of the E/PO Office of the MIT Center for Space Research (CSR), was a result of efforts by Chandra scientists, the staff of the Museum of Science (MoS), Boston and the staff of Mayor Menino's **Boston 2:00-to-6:00 After School Initiative**, a division of Boston Centers for Youth and Families.

The *Science After School Pilot* was the first of a series of E/PO initiatives to offer local youth an opportunity to explore their interest in science in ways that are appealing and that reinforce the learning that takes place during the school day. The program consisted of six sessions at the MoS with each session featuring a presentation on the exciting discoveries made by Chandra. Students engaged in hands-on activities prior to the presentation which was held in the museum's Current Science and Technology (CS&T) Center. Afterwards they visited museum exhibits related to the science topic of that day.

The program is a natural outgrowth of the CSR E/PO Office's approach which is to facilitate the direct involvement of CSR scientists with students and the public. More than 30% of CSR scientists regularly participate in E/PO initiatives. The Pilot also benefited from an ongoing partnership between CSR and MoS and contributed to the effort of the CS&T Center to reach children from underrepresented groups in the local community. "This was a very successful joint venture, and we hope that more scientists and after-school organizations will see this center as a place [to] get together and talk about science and technology as a means of inspiring young people," said Tania Ruiz of the CS&T Center.

That is exactly what happened, as demonstrated by two of the students that participated in the Chandra writing contest, a specific program component to foster the communication skills of the students. "This program was really helpful. It was a good source to use for my science class. It increased my interest in paying more attention to my lessons," wrote one student, who received a special mention award for her essay. Another student wrote, "It was amazing for me to see these professors actually take their time to lecture and perform detailed demonstrations right in front of me. [They] were doing what I wanted to be doing: Being Scientists. That is one of the major goals I

want to accomplish in my life, and now I am much closer to being there." Mayor Menino praised the impact of this E/PO program in promoting new learning opportunities for urban youth beyond the regular classroom time, and concluded, "The *Chandra - Science After School Pilot* is an important initiative in our efforts to ensure that youth of all ages have access to exciting, educational resources and activities during out-of-school time." For more information on this and other CSR E/PO initiatives, contact Irene Porro at [iporro@space.mit.edu](mailto:iporro@space.mit.edu) or visit <http://space.mit.edu/CSR/outreach>.

*Minority University  
Education and Research  
Partnership Initiative*

*This is the fifth in a series of articles which highlights the programs of the institutions participating in NASA's Minority University Education and Research Partnership Initiative in Space Science (described in *Voyages*, issue 2)*

**Los Angeles Students get SMARTT**  
*John P. Sepikas, Pasadena City College*

With the help of NASA's Office of Space Science under the Minority University Education and Research Partnership Initiative Program, [Pasadena City College](#) (PCC), a two year collegiate institution, now has the opportunity to participate in space science research, engage in outreach to the Los Angeles area, and involve the local American Tongva tribe. The program at PCC is called SMARTT for Scientists Mentoring Astrophysics Research Teams of Tomorrow. The first component of SMARTT is outreach to the local community to educate and explain the science of infrared astronomy. Some of the outreach efforts have been conducted at the PCC planetarium which presents programs to several thousand students and their teachers every year. Other efforts are presentations to schools, community centers and Native American tribes. The largest outreach effort has been with the Griffith Observatory and Planetarium in Los Angeles, which is one of the largest in the country. Outreach programs with the Observatory have continued during its renovation and the SMARTT program

will be assisting in the construction of an infrared astronomy exhibit and providing an infrared camera to Griffith Observatory for its reopening in 2004. Students and faculty from PCC's engineering department will play a lead role in the design and construction efforts.

SMARTT staff member and Tongva tribe member, Glenn Miller, presents a telescope to the son of the chief of the Tongva tribe.



The second program component is outreach efforts which are specifically focused on the Los Angeles based Native American Tongva tribe. These are highly focused activities to integrate with existing and well established Native American programs while being especially respectful of local customs and traditions. The primary goals of these efforts are to 1) identify and mentor promising, young Native American science students who could join the research group, and 2) increase the awareness of the community of these NASA sponsored activities. To accomplish these goals the SMARTT program, with some of its Tongva staff members, set up a math/science tutoring program for high school and college students at the local Tongva community center. These efforts are just now bearing fruit with its first Native American student joining the program officially. The program has also donated a telescope to the Haramokngna American Indian Cultural Center to assist in teaching of astronomy to Native American youth.

The third component of the grant is to develop

a long term research capability at PCC for students, faculty and local Native Americans to participate in the Space Infrared Telescope Faculty (SIRTF) mission. Scientists from SIRTF, NASA Jet Propulsion Laboratory and the SIRTF Science Center at California Institute of Technology have been providing mentoring and training in the science and operation of SIRTF. As pointed out by Program Director, John P. Sepikas, "This training would have been impossible for the faculty to obtain at a two year college in any other manner and will be applied for decades to come to many students and teachers." The PCC research group should get its first SIRTF observing opportunity in late 2003.

### **NOTICE: NASA Office of Education and Office of Space Science Solicit Proposals**

Based on the successes and achievements of the current participants in the *Minority University Education and Research Partnership Initiative in Space Science* (a number of which have been described in *Voyages*), NASA released a new solicitation on April 1, 2003 for proposals from U.S. based minority institutions interested in developing their academic and research capabilities in NASA-related space science. NASA-sponsored space science researchers and research groups are strongly encouraged to participate as partners in such effort to be led by minority institutions. The full text of the solicitation may be found at [http://research.hq.nasa.gov/code\\_s/nra/current/NRA-03-OSS-03/index.html](http://research.hq.nasa.gov/code_s/nra/current/NRA-03-OSS-03/index.html).

## *Profiles of Scientists in Education and Public Outreach*

*This profile is based on excerpts of an April interview with Dr. Kathryn Flanagan about her involvement in Education and Public Outreach (E/PO). Contributed by Dr. C. Morrow, C. Edwards and P. Dyches, Space Science Institute.*

### **Current Professional position:**

I'm a research scientist at the Center for Space Research (CSR) at the Massachusetts Institute of Technology (MIT). I am part of the instrument team for the Chandra High Energy Transmission Gratings. My primary background is in instruments and hardware. My current science interest is high resolution x-ray spectroscopy of supernova remnants.



*Dr. Kathryn Flanagan*

### **Description of Kathryn's E/PO roles:**

I direct the education efforts at CSR and my E/PO role is both managerial and direct. We're just finishing the *Chandra-Science After School Pilot* (see companion article, page 8), a program that merged seven MIT grants on Chandra into one coherent E/PO program. We brought about 70 students from Boston area after school programs to the Museum of Science for several visits. Each time, a different scientist would give a talk on their specialty and we then worked with the students on an activity illustrating that particular specialty. The follow-on to this program will be a two week summer program at MIT and the Museum of Science. The students will do a research project and make a presentation at the end.

### **Comments on time commitments to the project:**

On this project, my direct involvement hasn't really been at any higher level than the other scientists who are presenters. I'm giving my own talk on supernova remnants in a few weeks. We have a remarkable individual, Irene Porro, who is 100% dedicated to facilitating and taking care of the day-to-day details, so I get to work in the program as a contributing scientist. My oversight doesn't take a huge amount of time.

### **On balancing E/PO and other professional activities:**

With E/PO activities, there is as much opportunity as you have energy to provide, so you have to reign yourself in if you want to find balance with the science that you are doing. I have an extremely supportive Principle Investigator, Professor Claude Canizares, who is also the Associate Provost of MIT. The new director at

CSR, Professor Jacqueline Hewitt, is also very supportive of our E/PO efforts.

### **Challenges to her E/PO involvement:**

From a scientist's point of view, the challenge is to balance E/PO with your other responsibilities. E/PO is very seductive – it takes everything you have got and gives it back. A second challenge, from a management point of view, is finding a way to keep an anchorperson who can make it easy for the individual scientists to give a little of their time on a regular basis. It's so helpful to have somebody with expertise, who can steer you toward the difference between formal and informal education and help you forge partnerships; someone who can help implement it on a local level.

### **Her most important impact on the program:**

When we do E/PO we're feeding the spirit, but it's really hard to measure that. The payoff is really in individuals. You would be amazed at the kind of impact it can make on a child, just to see the possibility of becoming a scientist. Remember, we are older versions of the kids sitting in front of us.

### **Kathryn's words of wisdom about E/PO:**

You just have to start somewhere. It's quite amazing. The next thing you know, somebody is coming to you and giving you an opportunity, and another and another. It depends on the level of involvement and what you would like to do. If you would like to speak in a classroom, I guarantee you will find a classroom to speak in. If you want an organized effort, start with your OSS Broker/Facilitator and the local folks that do this sort of thing. There's no shortage of opportunities that come once you open your eyes to it.

## *On the Horizon*

### **Venus Transit**

*Sten Odenwald, NASA Goddard Space Flight Center*

For 6 hours on June 8, 2004, the planet Venus will slide across the face of the sun. Not since 1889 have the inhabitants of Earth been treated to this rare astronomical spectacle. From the east coast of North America, we will see the last 90

minutes of this rare transit event [<http://sunearth.gsfc.nasa.gov/eclipse/transit/venus0412.html>]. The Venus transits of 1761 and 1769 provided critical data leading to an accurate determination of the distance from the earth to the sun (the Astronomical Unit) and the scale of the Solar System. The OSS Sun-Earth Connection Education Forum is spearheading a collaboration of NASA missions, public and private observatories, and science museums to observe this historic event. Among the planned formal and informal education activities will be student measurements of Venus's parallax and calculation of the Astronomical Unit; spacecraft observations of the transit; and collaborations with amateur astronomers and public observatories to photographically record the event. If you are interested in contributing your own unique resources to this national and international education effort, please contact Dr. Sten Odenwald at [odenwald@mail630.gsfc.nasa.gov](mailto:odenwald@mail630.gsfc.nasa.gov) for more details.

### **Physics Teaching Resource Agent Training**

In partnership with the American Association of Physics Teachers (AAPT), NASA OSS will present a workshop at the next Physics Teaching Resource Agent (PTRA) training session, July 28 to August 1 in Madison, Wisconsin. PTRA is a "train the trainers" program sponsored by AAPT and the National Science Foundation. This joint SECEF/SEUEF workshop will focus on how scientists "see" different regions of the electromagnetic spectrum, and the different objects and phenomena we see. A number of SEU and SEC missions will participate in presenting how different types of detectors work, and what we learn by looking at astronomical objects in different wavelength bands. Missions are also contributing educational materials and hands-on activities which the participants will pass on to other teachers through workshops in their home communities. For more information see <http://www.aapt.org/PTRA/>.

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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](mailto:Larry.P.Cooper@nasa.gov). Prior issues of *Voyages* are online at <http://spacescience.nasa.gov/education/news>.