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NATIONAL AERONAUTICS & SPACE ADMINISTRATION

Voyages in Education and Public Outreach
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The Mars Public Engagement Program

Michelle Viotti, Jet Propulsion Laboratory

The excitement over the landing of twin rovers on Mars had been building for months, nurtured by initial education and public outreach activities during the 7-month flight to Mars. The expected wave of public attention came, as the world watched live television and web broadcasts, holding a collective breath during the critical six minutes of entry, descent, and landing. Within days, there were thousands of emails wishing congratulations that ranged in tone from the spunky to the spiritual. And then came the questions!

Opportunity looks back at its lander--its home for the six-month cruise to Mars. Rover tracks, bounce marks, and airbad retraction marks are visible around the lander. The calibration target or sundial, which both rover panoramic cameras use to verify the true colors and brightness of the red planet, is visible on the back end of the rover.

In January and February of 2004, marsoutreach@jpl.nasa.gov received some 30,000 emails (last year, emails totaled a more manageable 1,500). While noticeable trends in questions helped the Mars Public Engagement team answer in large batches, it's been a fun challenge to keep up, as so many people have sent back images they've examined themselves, asking "What's this specific feature?" and "Can you tell me more about that?" Even three months into the mission, the interest remains at levels previously unseen with other missions at this stage.

Internet hits are now over nine billion, with 70 million unique visitors. Within a few weeks, visitors to the rover site first exceeded NASA's yearly traffic, and then yearly traffic to all government Web sites. Continued visits may set records for the longest sustained "event" in internet history and even the Guinness Book of World Records has inquired about statistics! As science team member Jim Rice has said, "I love seeing the web statistics and answering emails. It's incredibly meaningful to know that

On the Inside

people care—particularly when you're living on 'Mars Time' and working weird hours. It's a realboost at 3 o'clock in the morning."

The long-term continuation of return visits to the Web site is in large part due to the science team's decision to make images from the rover available to the public as soon as the information is received on Earth. Often, space missions have awaiting period for the public release of images and data sets so that the science team has sufficient time to conduct research and report their findings through peer-reviewed journals. However, as Steve Squyres, Principal Investigator from Cornell, has emphasized, "We wanted the world to have as close to the same experience as we do—awe and excitement at seeing the pictures as soon as they arrive." That early commitment—and a lot

A Mars Visualization event at the Exploratorium in San Francisco, CA

of technical preparation work to convert the coded data received from the rover into web-formatted images ready within minutes—enabled Mars Public Engagement to establish a Mars Museum Visualization Alliance, colloquially known as "Mars Viz." The intent of the alliance was to create another assured point of access to the images and data for the public, one that reached nationwide to the communities in which people live. Not only do the member museums, science centers, and planetaria offer big-screen facilities for viewing the images from Mars in all their high-resolution glory, they also have knowledgeable staff who can authentically answer questions and provide innovative programming that brings recent science results to their interested visitors. Says Jon Elvert, president of the International PlanetariumSociety, "For me, the magic is being able to put the live stuff into our daily programming. Then the planetarium truly becomes a learning center."

The alliance, now at 108 members, began two years ago in discussions with a working group of a small number of museum professionals who had an interest in Mars and an expertise in presenting multimedia products to audiences. The upfront investment was in taking the time to listen and to respond to what they wanted and then create various technical approaches to meet those desires. The months of preparation really paid off— the museum community has reported record attendance for Mars events, with sold-out crowds even in snowy conditions. Even at the end of March, teachers had committed to driving some 300 miles to attend a Mars educator workshop sponsored by their "local" science center.

On the formal education front, over 40,000 educators signed up online to receive the Earth-Mars comparison poster and a robotics education poster featuring the rovers that will soon make its debut. Over 700 students from around the country participated directly in the mission and have gone out themselves to peer teach or to give public talks, extending our reach even further. Over 30 competitively selected students had the opportunity to work with the mission team directly in rover field tests in the California desert prior to landing and in science operations during the mission. As a result of their experience and a heightened sense of academic self-confidence, many are now considering careers in science and engineering. "This experience changed my life" is frequently heard from participants and initial tracking shows they're sticking with it in college.

The big challenge is to bring this life-changing experience to many more students. A new pilot program that involves students directly in Mars missions is the Mars Exploration Student Data Team, a real-time, distance-learning program. Connected across thousands of miles, students from 53 competitively selected schools form a "virtual research team." Organized in three sub-teams—Rover Watch, Storm Watch, and Orbit Watch—they use orbital data collected by the Mars Odyssey and Mars Global Surveyor spacecraft to study weather, temperature, dust, landforms, and crossover orbits at the landing sites. The students have designed their own experiments and will be presenting their results at a science colloquium

hosted by the Mars Space Flight Facility at Arizona State University. It's an example of students being able to participate in authentic science as it happens at Mars and is a prototype for future efforts that directly involve students in exploration and discovery. The students are so excited about their research that they are voluntarily staying on for the rovers' extended mission, which is expected to last into the summer.

Even at the lower grades, teachers are reporting student progress as a result of interest in the rovers. New classroom activities called "Roverquest" enable students to follow along with mission discoveries as they happen and compare Mars to Earth. Anecdotally, an elementary-school teacher sent in a report from a student who hadn't been interested in schoolwork throughout the year, but had voluntarily gone home and written a 5-page report (with pictures!) that hadn't even been assigned.

An educator workshop where 170 teachers worked on a sundial activity that correlates with the sundials(marsdials) carried by each rover.

Direct participation and correlation to their own lives is key to student interest and it doesn't always take sophisticated, technology-rich programs to spur engagement. A popular new program called "Rock Around the World" encourages students to send in a rock from their region. Newly recruited undergraduate geology students get experience in doing spectral analysis on the rocks so that each person can find out the composition of their rock and see how it compares to those being studied by the rovers. It's been so popular that the post office has already deliveredalmost 4,000 rock samples from around the country.

All of these and other activities have centered on the two visions for the Mars Public Engagement Program: to share the adventure and to make Mars a real place. As one California parent reported, "My son's third-grade class is so excited about the rovers. At his birthday party, I had all the kids bring a rock to send in. Thanks for making it come alive in our own backyard!"

Updates

Farewell to Jeff

Dr. Philip Sakimoto, Acting Director, Space Science E/PO Program

After nearly 10 years spent conceiving, developing, and nurturing the NASA Space Science Education and Public Outreach (E/PO) Program, Dr. Jeffrey Rosendhal has left his position as Director of Space Science E/PO to become NASA's Assistant Associate Administrator for Programs in the Office of Education. In his new role, Jeff will contribute greatly to the development of NASA's overall education program; however, his influence on and guidance of the Space Science E/PO program will be sorely missed.

Jeff leaves behind a program that has grown to become one of the world's largest and most respected education programs in space science. He has caused clear changes in the attitudes of space scientists towards being involved in education. Early skepticism has turned into positive support for engaging in E/PO throughout the space science community.

The key to Jeff's success is that he did it right. He relied on external advisors and education experts at every step of the planning, and he established a carefully orchestrated network of Education Forums, regional Broker/Facilitators, mission E/PO specialists, space science researchers, and external partners to carry out those plans.

It now falls to me to guide the NASA Space Science E/PO program during this transition period. Doing so will require even more reliance on the expertise, entrepreneurship, and enthusiasm of the extended network that has become the NASA Space Science E/PO family. It's easy to look like a great manager when you have a team full of superstars.

June 8, 2004 : TheTransit of Venus

Sten Odenwald, NASA Goddard Space flight Center

On Tuesday morning June 8, 2004 Venus will transit the Sun as viewed from Earth. Not since December 6, 1882 has the celestial geometry been favorable for such a sight. It was only through transit of Venus observations that we finally understood the true scale of our solar system and the universe beyond. Although the scientific usefulness of the transit of Venus has been eclipsed by other more precise methods, we still use this approach in the 21st century to study the atmospheres of planets orbiting distant stars.

The transit of Venus is the NASA Sun-Earth Day theme for 2004. Through a variety of high-impact programs, teachers and students are learning about the history, mathematics and science behind this rare event. They also learn about the difference between Earth and Venus in terms of their magnetic fields and interactions with the solar wind. The programs began with NASA/CONNECT "The Venus Transit" on March 18th. On Sun-Earth Day, March 19th, Planet Quest featured a live panel discussion Webcast "Venus and the Search for Habitable Planets." On March 23, Nortel Network's Kidz Online featured a Webcast describing the science and history behind the transit and how to safely observe it. Earth and Sky Radio will feature a radio program on this event during the week before June 8. The culminating activity will be a live Webcast of the entire 6-hour transit, produced by NASA and the Exploratorium from Athens, Greece.

Visit http://sunearthday.nasa.gov for more details about the transit of Venus and NASA's involvement. Regular updates of what museums and science centers are planning to do can also be viewed at the "What's Happening in Museums" page. Details about the satellite, transponder, and Web URL where the program can be viewed will be available in mid-May at the Sun-Earth Day "Television and Live Webcast" link. Webcast information is also available at http://sunearth.gsfc.nasa.gov/sunearthday/2004/vt_webcasts_2004_1.htm. Scientists can register at the Sun-Earth Day Web site to help museums and schools make the public experience of this event a memorable and enriching one.

NASA is a Hit with After School Providers

Shari Asplund, Jet Propulsion Laboratory

The OSS Support Network's Community-Based Organizations Working Group sponsored a NASA delegation to the National School Age Care Alliance (NSACA) annual conference in Tampa, FL, Feb. 26 - 28, 2004. The conference was attended by about 2,500 attendees from the out-of-school-time community nationwide, including representatives from community-based organizations, school-based programs, military bases, and private programs.

The OSS booth was staffed by Shari Asplund (NASA, JPL), representing the Solar System Exploration Forum; Julie Lutz, (S2N2 broker, Seattle, WA); Kathryn Guimond (SERCH broker, Charleston, SC); Laurie Ruberg, (MARSSB broker, Wheeling, WV); and Kay Tobola, (materials curation group, JSC, Houston, TX). The booth featured handouts for after school providers from missions and programs in all four OSS education forums and an opportunity to speak to nearly all of the 400 participants who visited. There was great interest and enthusiasm from the after school community for NASA's products and activities. Though many were developed for use in formal education classrooms, most can be adapted for informal education settings such as after school programs.

Julie Lutz and Kay Tobola conducted a workshop on NASA Space Science activities and resources. Julie spoke about NASA missions and destinations and led some hands-on demonstrations of fun activities appropriate for this community.

Space Weather Center Web site Redesign

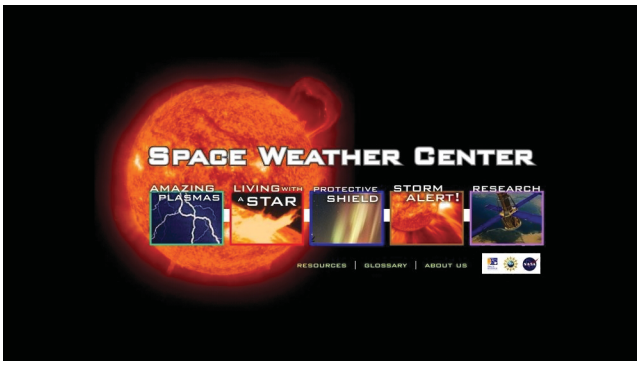
Paul Dusenbery, Space Science Institute

The Space Weather Center Web site was originally launched in 1999 in support of the 1,000 square foot nationally touring science exhibit of

the same name. While the exhibit has since retired, the Space Weather Center Web site continues to be one of the most comprehensive and accessible space weather information resources available online today.

A redesigned site was launched in April with a fresh new look, and a number of online interactive activities that help communicate some of the basic concepts related to space weather. The overall structure of the site tells the space weather story, beginning with the plasma state of matter and a thorough introduction to the Sun–the place where space weather begins.

Other areas of the site continue the story, focusing on auroras and storms in Earth's magnetic field and space weather forecasting and research/modeling. Visitors also can access additional resources, such as a space weather FAQ, links, and a glossary. The site may be accessed at http://www.spacesciencecenter.org and is intended for general audiences, i.e., the space interested public.



The NASA SEU Educator Ambassadors Program

Dr. Philip Plait, Dr. Lynn Cominsky, and Sarah Silva NASA Education and Public Outreach Group at Sonoma State University

The NASA E/PO Group at Sonoma State University (SSU) is proud to announce the addition of 14 new Educator Ambassadors (EAs) for the Structure and Evolution of the Universe (SEU) theme. The EA program consists of exceptional educators—chosen via a highly-competitive national search—who help design, test, and disseminate activities based on SEU science.

Coordinated at SSU, the program now consists of 23 EAs who contribute to the E/PO from six different SEU missions (GLAST, Swift, XMM-Newton, LISA, GALEX, Astro-E2) and NASA Goddard's High Energy Astrophysics Science Archive Research Center. These EAs teach math, science, and technology classes from elementary grades through high school and college at their home institutions in more than 20 states.

During 2002-2003, the original cohort of 11 EAs gave over 100 workshops attended by more than 14,500 teachers in the United States and Canada. We will be holding a training workshop for the new group of EAs in July 2004.

More information about the program is at http://epo.sonoma.edu/ambassadors.

New Exhibit

NASA and Lockheed Martin Make Contribution for Astrobiology Exhibits in Yellowstone

Ms.Christine Giannas, Yellowstone Park Foundation and Catherine Tsairides, NASA Ames Research Center

How does life begin and evolve? Is there life elsewhere in the Universe? What is the future of life on Earth? These fundamental questions make up the science of astrobiology, and some of NASA's top scientists are trying to answer them in—of all places—Yellowstone National Park. Microscopic organisms that have inhabited Yellowstone's hot springs for billions of years tell the story of life on Earth, and could eventually lead to the discovery of life on other planets. Soon, Yellowstone visitors will be able to learn about this amazing area of research.

A $66,000 grant to the nonprofit Yellowstone Park Foundation, from Lockheed Martin Corporation and the Ames Research Center team of the NASA Astrobiology Institute, will fund the development of permanent, outdoor exhibits in several locations throughout Yellowstone. The exhibits will interpret Yellowstone's hot springs as extreme habitats for amazing life forms, and help the Park's three million annual visitors understand the importance of protecting these rare hydrothermal features.

Scientists are looking at both living thermophiles, the microscopic organisms living in the Park's hot springs, and the fossil remains of

White Elephant Back Annex spring, near Mammoth Hot Springs in Yellowstone National Park.

thermophiles that lived up to four billion years ago. Comparing the fossil record from Yellowstone to rocks collected by the Mars Rovers, Spirit and Opportunity, may enable us to recognize evidence of past life on Mars.

New Educational Products

Cool Cosmos: Portal to the Invisible Universe

Michelle Thaller, Spitzer Science Center

Shortly after the launch of the Spitzer Space Telescope, the Infrared Processing and Analysis Center (IPAC) unveiled its new public Web site, *Cool Cosmos* (http://coolcosmos.ipac.caltech.edu). The attractive, interactive site allows visitors to explore many aspects of infrared science, as well as the larger concept of looking at the universe in all parts of the electromagnetic spectrum. Educators can download posters, classroom activities, and entire curriculum modules in our "Resource" section, or view step-by-step instructions for experiments designed to make invisible light accessible to students of all levels. The most popular site in our "Image Gallery" is the *Infrared Zoo*, featuring infrared camera images of dozens of animals, as well as tutorials about how animals adapt to different thermal environments. For a direct link to scientists, kids can submit questions to our *Ask an Astronomer* site. Some of the questions are selected for our *Ask an Astronomer* video series, which features IPAC scientists answering questions from the public. These short, two-minute videos combine graphics and animations with the experience of hearing a real scientist talk about their interests and careers. One of our segments, "Why Doesn't the Moon Fall Down?" won a Telly award in 2003. Come explore *Cool Cosmos*, and the invisible universe!

Extreme Solar System Exploration – Teachable Moments in 2003-2006

Leslie Lowes, Jet Propulsion Laboratory

Over the next several years, more than a dozen spacecraft are scheduled to launch, to orbit, collect samples from, and/or land on numerous Solar System bodies. These robotic explorers will comprise the most advanced scientific space fleet ever assembled and will advance our understanding of where our Solar System came from and how we came to be here. Clues to these mysteries are scattered among our nine planets and the multitude of moons, comets, and asteroids. NASA just landed two rovers on Mars, flew a spacecraft through the tail of a comet, plans to probe the rings and moons of Saturn, and return tiny fragments of the Sun to Earth. Other spacecraft will be launched to Mercury, the asteroid belt, and Pluto and the Kuiper Belt region. These robotic explorers are charting a course that will take humanity back to the Moon and beyond.

This series of mission events can provide "teachable moments," drawing the interest of the public, educators, and students to current events in science and space exploration. We emphasize the challenges of traveling to these distant worlds and harsh environments with an "Extreme

Exploration" theme. The Solar System Exploration (SSE) Education and Public Outreach Forum and our mission and research E/PO leads have prepared audience-focused packages and training based on this theme. Drawn from existing resources, educational packages containing an overview presentation, exploration timeline, solar system lithos, and age-appropriate K-12 classroom activity sets are available electronically from our Web site. Limited hardcopy versions are provided for hands-on training, such as our short courses at regional and national teacher conferences. For the museum and planetarium community, a compilation of relevant existing animations and videos is available.

Trained on these materials, the Solar System Ambassadors (general public) and Solar System Educators (K-12 education) are available for presentations. Our Solar System Community Nights kit is available for use in small towns and inner city settings. Through our national relationship with the Girl Scouts of the USA, their trainers and leaders will also be familiarized with the concepts behind this period of "Extreme Exploration" in the Solar System.

More information on the products and training is available at http://solarsystem.nasa.gov/education

For further information, contact the SSE Forum Co-Director at Leslie.Lowes@jpl.nasa.gov.

Explore Mars with MarsQuest Online

James Harold, Space Science Institute

The MarsQuest Online Web site (http://www.marsquestonline.org) enables the public, educators, and students to gain a sense of what it's like to explore another world. Visitors to the site can examine the most recent rover images from within navigable panoramas, following the rovers as they move across the Martian surface. Visitors can also engage in a variety of online activities, including driving a rover, flying in 3D over Martian terrain, and solving Mars Mysteries. Resources for educators and families, including the Family Guide to Mars, are also available for downloading.

MarsQuest Online is funded by the National Science Foundation and developed through collaboration between TERC, the Space Science Institute in Boulder, Colorado, and the Jet propulsion laboratory. Mirroring of the site is provided by the University Corporation for Atmospheric Research, Boulder, Colorado, and the San Diego Supercomputing Center.

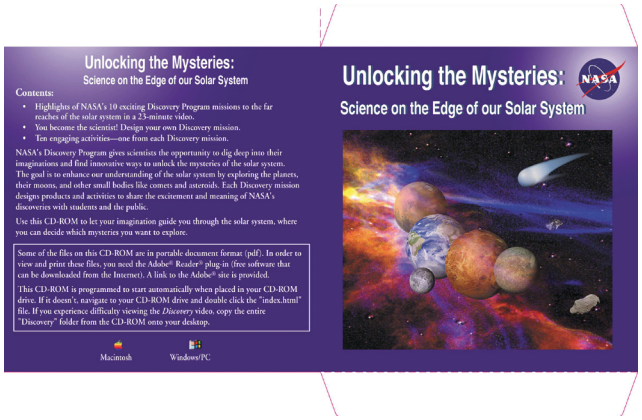
Unlocking the Mysteries: Science on the Edge of the Solar System

Shari Asplund, Jet Propulsion Laboratory

NASA's Discovery Program has a new education product for students to design their own Discovery science investigation. Based on the award-winning video, "*Unlocking the Mysteries*," this new product features the 23-minute video about the ten Discovery missions, then encourages students to think about the mysteries they want to explore. They become the scientists and engineers as they learn the different skills and abilities needed to design a mission and achieve its goals.

This education module is written for grades 5-8 classroom teachers. It could also be used in after school programs or camps. It contains a Teacher Guide, supporting materials, and a list of Internet Resources which includes ten additional activities, one from each Discovery mission. It was developed by Mid-continent Research for Education and Learning (McREL) in Aurora, CO.

It is available in DVD or CD-ROM format or on the web at http://discovery.nasa.gov/education.html. For more information, contact shari.e.asplund@jpl.nasa.gov.

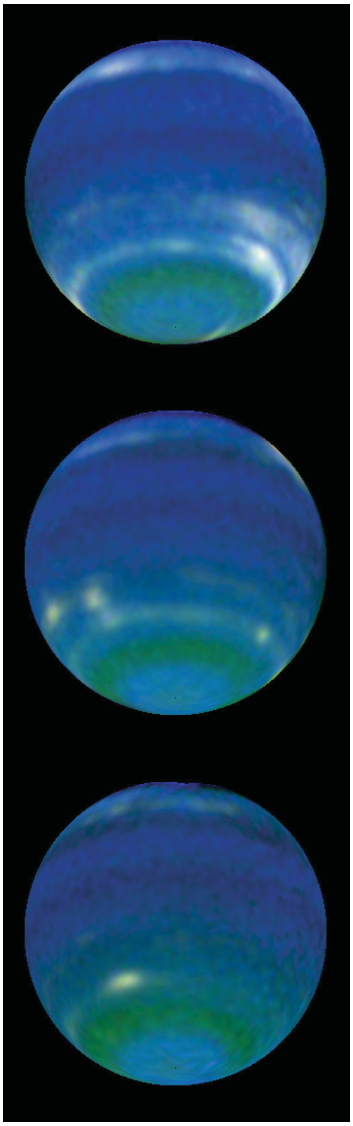


Educational Programs

Imaging Neptune: A NASA ROSS E/PO Program

Rosalyn A. Pertzborn, Lawrence A. Sromovsky and Sanjay S. Limaye, University of Wisconsin

Recent, dramatic observations from the Hubble Space Telescope (HST) have shown significant observable changes in Neptune's atmosphere. These exciting images have created unique E/PO opportunities for the predominantly rural Midwest region, thanks to the ROSS supported research of Dr. Lawrence A. Sromovsky of the University of Wisconsin-Madison's Space Science and Engineering Center (SSEC). The sequence of HST Images of Neptune taken in 1996, 1998, and 2002 indicate significant changes in the absolute reflectivity and width of high altitude cloud bands.



Images of Neptune taken by the Hubble Space Telescope show the dramatic changes in the brightness and width of high altitude cloud bands.

The scientific value and visual impact of the Neptune HST images taken over a relatively short timeframe provide a critical "hook" that enables both formal and informal E/PO opportunities. Are changes in width and brightness caused by Neptune's seasons? What causes the unusual behavior of the "New Great Dark Spots?" How long will the observable changes continue?

Scientific questions raised by planetary scientists in response to the HST observations can easily be aligned to educational themes for K-12 and general public audiences. Most notably, students/teachers presented with these images raise questions that are almost identical to the questions posed by scientists, thus creating the basis for inquiry-based learning!

A sample "Imaging Neptune" event in Spring 2003, at the Barlow Planetarium in Appleton, WI attracted over 400 students from surrounding rural schools where they had the opportunity to share in the excitement of discovery and raise the same intriguing questions posed by Dr. Sromovsky. Presentation materials developed by the E/PO team were highly rated, with a standing invitation to participate in future events. The UW-Madison Speakers Bureau provided leveraged support for advertising and travel as a "UW-On-the-Road" program. A similar general public event, was given at the UW-Space Place, an off site space science outreach facility which primarily serves minority and low-income families.

The "Imaging Neptune" effort exemplifies the educational impact a researcher can make by bringing the excitement of space science research to rural, underserved communities for a relatively small investment. Plans for teacher in-service training are underway with the Rockford, Illinois, Unified School District, and will expand upon the resources developed under the "Imaging Neptune" program.

One World, Many Worlds: Searching for Life on Earth and Other Planets
An Astrobiology Workshop for Massachusetts Secondary School Teachers.

Irene Porro, MIT Center for Space Research

The goal of this program is to increase teachers' understanding of key topics in astrobiology and to provide a practical context in which science can be taught with an interdisciplinary approach. The program consists of ten weekly meetings during which the participants are introduced to TERC's Educator Resource Guide "Life on Earth and Elsewhere?" and meet with scientists from the

Harvard-Smithsonian Center for Astrophysics (CfA). The scientists engage in informal conversations with the participants, contributing the latest news in the discovery of planets in other solar systems and introducing the participants to new theories on the formation of solar systems. The workshop is part of the Infrared Optical Telescope Array E/PO program and is offered at CfA in Spring and Fall 2004. For more information, http://cfa-www.harvard.edu/cfa/oir/IOTA/EPO/ or contact Irene Porro at iporro@space.mit.edu.

Tracing the Structure of the Universe: What Do We Know? How Do We Know It? Can We Use It In the Classroom?

Irene Porro, MIT Center for Space Research

The MIT Center for Space Research will host a five-day summer program designed to expose teachers to current space science research associated with NASA's High Energy Transient Explorer (HETE) mission. The goal of this "2004 HETE Summer Institute," is to increase teachers' own understanding of key topics related to the structure and evolution of the universe theme and to specifically provide a context in which several of the Massachusetts Department of Education science learning standards can be met.

The Institute will be held at the MIT Center for Space Research August 2-6 2004. To apply and for additional information contact Irene Porro at iporro@space.mit.edu or http://space.mit.edu/CSR/outreach/.

Observe the Universe with the latest NASA X-ray observatory! Astro-E2 Competition

Ilana Harrus, Goddard Space Flight Center

The Astro-E2 E/PO group is opening the doors of research to a team of highly motivated and independent high-school students. From December 2004 to February 2005, we will accept and review observing proposals from high-school teamsfor usingdata from the Astro-E2 X-ray satellite.

Each entry will describe a research project and an astronomical observation (anything from black holes to supernova remnants) to be carried out by Astro-E2. The winning team will work with professional astronomers and present their results at a summer meeting of the American Astronomical Society.

Astro-E2 is an observatory to be launched in Feb 2005 from Japan. The main instrument on-board, a micro-calorimeter, distinguishes very small differences in the energy of X-ray photons by measuring their heat. For more information, see: http://astroe2lc.gsfc.nasa.gov

Deep Impact Mission's Small Telescope Science Program

Lucy McFadden and Stephanie McLaughlin, University of Maryland, Astronomy Department; Gary Emerson, Ball Aerospace and Technologies Corp.

Comet Tempel 1 is the target of NASA's **Deep Impact Mission**. As the comet approaches the inner solar system, it will brighten considerably and undergo significant changes in its activity such as beginning jet activity, producing water etc. While project collaborators at large telescopes will provide professional level data, they cannot provide continuous coverage as they may have other observing commitments or close due to bad weather.

The Small Telescope Science Program (STSP) is a collaborative effort among amateur astronomers, professional astronomers, and private observatories spread out around the world to complement the mission observations. The goal is continuous monitoring to help understand the activity changes along the comet's orbit. Comet Tempel 1 will be visible through amateur astronomers' small telescopes by the time of impact in July 2005. The Deep Impact team is thrilled to engage the public in their mission with this hands-on opportunity for amateur astronomers. For more information visit http://deepimpact.umd.edu/stsp

Profiles of Scientists in Education & Public Outreach

This profile is based on excerpts of an interview with Dr. Phil Scherrer, about his involvement in Education and Public Outreach (E/PO). Dr. Cherilynn Morrow (Space Science Institute or SSI) designed the interview questionnaire. SSI's Preston Dyches edited the responses in May, 2003.

Current Professional position:

Professor of Physics (research faculty) at Stanford University. I'm the PI for two instruments: the Michelson Doppler Imager on the Solar and Heliospheric Observatory (SOHO) spacecraft and the Helioseismic and Magnetic Imager for the Solar Dynamics Observatory. I'm also director of the Wilcox Solar Observatory.

Description of Phil's work in E/PO:

Essentially all of the projects I'm involved with have E/PO components. It amounts to a reasonable base of funding, so we're able to do a lot. Fortunately there are a number very dedicated staff members to assist with the various projects. I also act as coordinator for several press releases per year, including Space Science Updates for NASA. These are significant efforts that take a good deal of preparation.

Phil's time commitment:

I spend about five percent of my time doing the paid part of my E/PO work. On the volunteer side, I do about one public lecture per year. There's also a 4-H astronomy club here that draws kids from about four different schools, and I meet with them once a month.

The biggest challenges to his E/PO involvement:

Learning how to present things to people who don't have a detailed science background is a challenge. You have to put your material into a form that is valuable to someone, without doing it in a condescending way.

I think it's important to go to classrooms and give talks from time to time, to see where the target is, just like it's important to talk to the press. We're not journalists. Sometimes you'll realize that, for example, you're talking about flows underneath sunspots that you're able to measure, and their question is, "What's a sunspot?" You need the contact to keep the context, so that you can communicate. It's a struggle sometimes to get others to use language and metaphors that are accurate. It's unfortunate when a story gets a good deal of coverage but contains visualizations oras "Sun-Earth connection" people that many areas of physics don't have .The things we're talking about *can* be described to somebody, and the audience can see how it relates to their lives. Many of the things done in the physics department are so obscure that it would be very difficult to peak somebody's interest, but you can look at the Sun and see a sunspot. Keeping balance is also important, because it's fun to do E/PO and you can get carried away.

His greatest positive impact on the project:

It's hard to tell the impact you're having on the grand scale, but on the individual scale you can. There are several kids that we've really connected with, and I think the work we've done with them has been an important part of their education. It doesn't matter whether they grow up to be scientists or not, because we've given them a focus of interest outside of school and shown them what they are capable of.

What he gets out of his participation:

It's certainly more personally satisfying than some of the things we have to do! We've distributed about 15,000 hand-held spectrometers to students across the country. They're simple–just a poster that you cut, fold and tape together–but the thought that so many kids can go out and look at a streetlight and see what it's made of is great. It says that something's cooking out there.

Phil's words of wisdom about E/PO:

As the PI of a major project, take E/PO not simply as a duty, but embrace it as a key part of your activities. With a larger project you have an opportunity to actually make a big impact. The challenge we all have is how to deal with the little bits of funding that are available and how to make them useful. That's difficult with smaller projects, but you just have to be proactive and look for ways to get your stuff out there, because people are interested. They want to know.

NASA OSS Support Network Profiles

This is the fifth in a series of articles that highlights the 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 NASA 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 .

NESSIE SIGHTINGS ON THE RISE

William H. Waller, Museum of Science, Boston

The job of Broker/Facilitator as part of NASA's Space Science Education and Public Outreach (E/PO) Support Network is conducted mostly in the background, well beyond the spotlights. So it is with NESSIE – the New England Space Science Initiative in Education. Like our serpentine namesake, NESSIE operates mostly below the surface, with only modest indications of our presence. In one sound-bite, our mission can be described as "fostering partnerships in cosmic discovery."

Engaging Scientists:

Space scientists bring expertise, authenticity, and excitement to the educational process. To engage space scientists in E/PO throughout New England, we are trying several approaches — including personal contacts, visits to universities, presentations and consultations at professional meetings, and a quarterly newsletter dubbed FINESSE – Folio of Information for New England Space Scientists in Education.

Getting Back to Basics:

Another major challenge in space science education is to determine and communicate "best practices" that are based on sound research in science education. A positive step in this direction was recently published in the Astronomy Education Review (see http://aer.noao.edu). "Learning about the Earth's Shape and Gravity: A Guide for Teachers and Curriculum Developers," by Lori Agan and Cary Sneider, (NESSIE's PI), reveals multiple modes of perception, and features ways *to enable age-appropriate learning.*

Enriching Educators:

The number and variety of educators in New England is truly astronomical – encompassing college faculty, K-12 teachers, curriculum developers, publishers, planetarium directors, museum educators, park interpreters, amateur astronomers, scout leaders, and parents. To serve all of these constituencies, we have learned to concentrate our efforts on a few particular needs, while providing general access to educational resources through our web site (see http://www.mos.org/nessie).

In the last two years, we have focused on facilitating workshops for K-12 teachers and community educators, many of which followed the Project ASTRO and Family ASTRO models of co-training scientists and educators (see http://www.astrosociety.org/education.html). This year, we are concentrating on science educators at small 2- and 4-year colleges by co-sponsoring a major symposium on teaching introductory astronomy. Cosmos in the Classroom 2004 will be held from July 16-18 at Tufts University in Medford, MA (see http://www.astrosociety.org/events/cosmos.html).

Team members of NESSIE. From L to R: Cary Sneider (PI), Cathy Clemens (Co-I), Bill Waller (Co-I), and Vaughan Ramon (staff assistant)

On the Horizon

Genesis Mission Spacecraft Returns to Earth

Jacinta Behne, McRel

Making a dramatic entrance on September 8, 2004, NASA's Genesis Sample Return Capsule (SRC) returns to Earth in an astonishing mid-air capture over the Utah Test and Training Range. In anticipation of this exciting event, the Genesis mission Education and Public Outreach team has lots of opportunities for classroom and public engagement. Museums, science centers, and planetariums will serve as the hosts for a series of summer educator academies, leading up to a September 8 public sample return event in Salt Lake City. For learning materials, fun kids' activities, and more mission information, visit http://genesismission.jpl.nasa.gov/.

Simulated helicopter snag ofthe Genesis Sample Return Capsule

Alien Earths: Searching for Planets and Life around Distant Stars

Paul Dusenbery, Space Science Institute

The Space Science Institute and its partners are developing a 3,000 square-foot traveling exhibition, called Alien Earths, that will bring origins-related research and discoveries to students and the American public. Alien Earths will have four interrelated exhibit areas: Our Place in Space, Star Birth, PlanetQuest, and Search for Life. The exhibit's size will permit it to visit medium-sized museums in all regions of the country. It will begin its three-year tour (managed by the Association of Science-Technology Centers) to nine host museums and science centers in early 2005 at the Lawrence Hall of Science in Berkeley, California. In addition to the exhibit, the project includes workshops for educators and docents at host sites, as well as a public Web site that will use exhibit content to delve deeper into origins research.

Chicago 2004 Needs You!

Dr. Philip Sakimoto, Co-Chair, OSS Diversity Coordinating Committee

On June 28-29, 2004, several hundred scientists will gather for a landmark event in Chicago. Leading space science researchers and a diverse array of professional scientists in related fields will meet to discuss areas of mutual scientific interests and to form partnerships for future space science missions and research opportunities.

Should you come? If you are an established space science researcher and you recognize the importance of broadening the diversity of participants in NASA's space science missions and research programs: YES! If you are a minority or minority university scientist who is interested in space science: YES! If you are in a position to positively influence the membership of future space science research teams: YES!

Success of the Chicago 2004 workshop depends upon individual scientists taking the time and effort to make it a success. It is a top priority of the NASA Office of Space Science. **Partial travel support is available with travel grant applications due by April 16.**

For more information, visit
http://analyzer.depaul.edu/Chicago2004/

Chicago 2004: Be There!

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 the editor Anita Krishnamurthi, at Anita.Krishnamurthi@nasa.gov. Prior issues of *Voyages* are online at http://spacescience.nasa.gov/education/news.