

# Voyages

IN SPACE SCIENCE EDUCATION AND PUBLIC OUTREACH

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## Chicago 2004—Were You There?

Philip Sakimoto (NASA Headquarters),  
Charles McGruder (Western Kentucky University),  
Lynn Narasimhan (DePaul University),  
and Jenny Gutbezahl (Lesley University)

Had you been there, you might have resonated with the sentiments expressed by one of the more than 200 scientists who came to the Chicago Hilton on June 28–29, 2004, for Chicago 2004: A Workshop To Foster Broader Participation in NASA Space Science Missions and Research Programs. "I hope that some day, other astronomy and physics meetings will look like this, especially in terms of the diversity of people."

The diversity was indeed astounding. In the evaluation surveys, 40 percent of the participants identified themselves as African Americans, 15 percent as Hispanic or Latino, 4 percent as Native Americans, and 40 percent as females. Such a remarkable balance between minorities and nonminorities and between males and females is perhaps unprecedented for a space science workshop.

Having a balance was essential to carrying out the workshop's primary goal: to seed personal contacts among a much more diverse community of investigators than has traditionally been active in NASA space science missions.

Also necessary to achieving this goal was having a balance between scientists who were already actively involved in NASA space science research and those who would like to become actively involved. Remarkably, this balance was achieved as well. Roughly half of the survey respondents reported having prior funding from NASA space science missions or research programs (exclusive of funding that had not been obtained through minority university or other special access programs).

The workshop was based on a simple premise. Successful collaborations in the sciences are invari-



The Chicago 2004 co-conveners (l to r): Charles McGruder, Lynn Narasimhan, and Phil Sakimoto

ably built on the foundation of personal contacts. Therefore, seeding such personal contacts is a logical first step toward increasing the participation of underrepresented minorities and other underrepresented groups in NASA space science activities.

The agenda was crafted to help the participants find new contacts with similar or complementary scientific interests. It began with preliminary briefings that were necessary to bring everyone to a common understanding and language about how NASA space science missions and research are conducted. Participants heard from NASA Headquarters space science program managers about how NASA's space science objectives are established, what those objectives are, and what approaches are used to achieve them. They also learned about the solicitation process and heard stories from people who had been through the process.

The crux of the workshop, however, was the mingling that occurred; ample time had been set aside for this purpose. There were small group discussions, poster sessions, walk-around meals, and



Chicago 2004 participants Eric Christian (on left) and Gibor Basri share some thoughts.

a special evening at the Adler Planetarium—all designed with the express purpose of allowing the participants to meet each other, learn about each others' experiences and dreams, and explore potential partnerships. Throughout the workshop, members of the NASA Space Science Education Support Network were present, making introductions, starting conversations, serving as facilitators, and generally helping everyone find others with similar interests.

From the participants' reactions, this approach was remarkably successful. Virtually all (96 percent) of the survey respondents said they had made new contacts at the conference. Of these, 65 percent said that they expected the contacts to be useful. Fifty percent of the respondents said that the conference was effective at providing opportunities to form partnerships leading to broader participation in future space science missions and research programs, and 75 percent said the conference met or exceeded their expectations.

In the words of one participant, "I met so many people I ran out of cards, and I brought a bunch! I may have some really good research collaboration possibilities." And, according to another, "The problem quickly became not the cultivation of collaborative research efforts, but the choice!"

Chicago 2004 was an experiment that, fortunately, turned out to be successful. Much of that success

can be attributed to the way in which the workshop was conceived and carried out. It grew out of years of discussions between NASA's Office of Space Science and the leaders of professional organizations of minority scientists, such as the National Society of Black Physicists, the National Society of Hispanic Physicists, and the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers. As a result, the workshop's basic premise, goals, and agenda were all based heavily on insights and suggestions from minority scientists.

The strong turnout and the remarkable balances among participants were the results of an intense publicity and recruiting campaign that was carried out through a vast interlocked network spawned by the NASA Space Science Education Support Network and by NASA Headquarters discipline and program scientists. The evaluation results indicate that approximately 70 percent of the people who came to Chicago came because of a personal contact, presumably initiated through this recruiting network. The publicity flyers, brochures, listservs, and official Web site played much smaller roles in getting participants to come.

The largest factor in Chicago 2004's success was the attitudes of the participants themselves. Those who came were extremely interested in making new contacts and developing new partnerships. Their outgoing enthusiasm was clearly evident in all of the workshop activities.

What happens next depends on the participants. It is now up to them to take the initiative to follow up on their new contacts and to develop them into true partnerships and research collaborations. Follow-up evaluation surveys will tell us if this is being done.

## UPDATES

### ViewSpace at 5 Years

John Stoke (Space Telescope Science Institute, Office of Public Outreach)

Five years ago, ViewSpace premiered as a way for museums and planetaria to exhibit the Hubble Space Telescope's amazing images by using low-cost computer hardware to present images themed into "story" segments.

Three years later, the ViewSpace team began delivering content via the Internet (rather than CD), allowing for very frequent updates. They have expanded ViewSpace beyond its Hubble focus, featuring SOHO, Chandra, Spitzer, Mars Exploration Rovers (MERs), and Cassini-Huygens. ViewSpace ran in “All Mars” mode during the weeks following the MER landings.

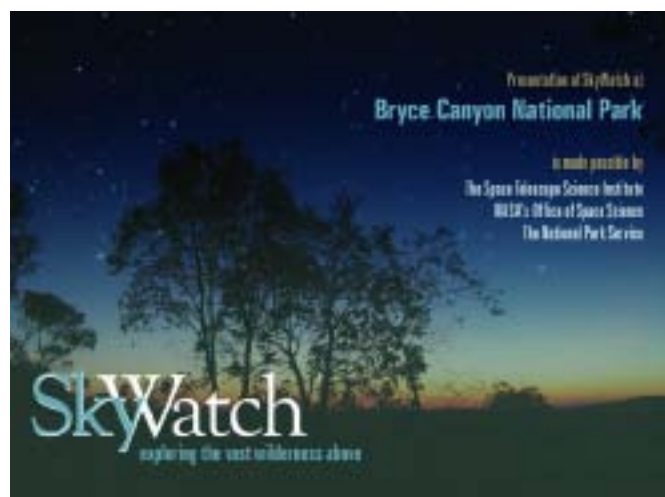
This year, the team will unveil new programs created with the Origins Forum, highlight the Deep Impact comet rendezvous, and present a survey of radio astronomy. Currently about 50 venues are using the Internet version, with more signing up all the time.

During the past year, an evaluation team conducted interviews with personnel at dozens of ViewSpace venues. All said they would recommend the program to their colleagues, and all support the expanded mission coverage. They also offered feedback that will help to improve the product.

The ViewSpace team is exploring a number of future enhancements, including the following:

- A menu mode that lets an educator access segments for live presentations;
- On-demand printouts of take-home information sheets and charts;
- Opportunities for live, two-way video chats with astronomers; and
- Expanded content collaborations with other NASA missions.

Perhaps the best evidence of success is that ViewSpace has just spawned a spinoff! SkyWatch will share much of its progenitor’s content, but will be formatted to serve the needs of national and state park visitor centers, nature centers, and other sites for night sky interpretation.

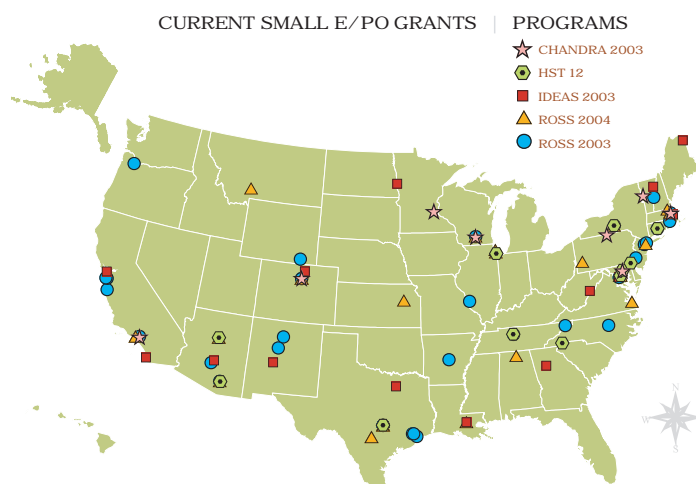


Related Web sites:  
<http://hubblesource.stsci.edu>

## ROSS E/PO 2004 Awards

Larry Cooper (NASA Headquarters)

NASA’s Science Mission Directorate is pleased to announce the selection of 35 education and public outreach (E/PO) proposals for supplementary funding for the winners of ROSS (Research Opportunities in Space Science) awards in 2003–2004. These proposals are receiving \$605K in first-year funding. A total of 99 E/PO proposals were submitted in conjunction with the ROSS parent research project (approximately a 20 percent participation rate). Combined with prior ROSS E/PO awards and the E/PO awards from the IDEAS program and Guest Investigator programs of Hubble and Chandra, there are over 100 currently active small grant E/PO projects underway across the country.



## EDUCATION PRODUCTS

### “Breathing Space”

Jeanne Gerulskis and Kathryn Perry (Christa McAuliffe Planetarium, Concord, NH)

The Christa McAuliffe Planetarium (CMP) in Concord, NH, is engaged in a project entitled “Breathing Space.” This project looks at the planets and moons in our solar system—specifically at factors that cause climates to be stable or to change, including internal factors like volcanism and external factors such as solar effects. By looking at these factors throughout our solar system, CMP creates a conceptual baseline by which one can better understand what role humans play in changing Earth’s climate and what nonhuman factors impact climate.

With support from NASA’s STEREO and the Solar Terrestrial Probe E/PO programs, the NH Space Grant

Consortium, The Troupe (Windham, NH), and scientific assistance from the University of New Hampshire, Plymouth State University, and the New England Science Center Collaborative, CMP created a multimedia planetarium show, curriculum packet, teacher workshops, public workshops, and demonstrations.

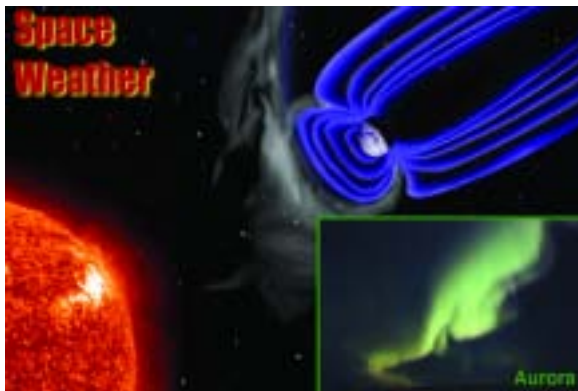
Geared toward middle school students and public audiences, the “Breathing Space” show brings viewers along on an exploration of the climates of Earth and its neighbors with Zeek and Seth, two teen skateboarders. As they attempt to research climate change for their science project, Zeek and Seth are led on a wild ride through a virtual solar system by cyber-guide Amanda. After its initial run at the CMP, the planetarium show will be available to schools and planetariums as both a planetarium show and a video (in DVD format).

The “Breathing Space” curriculum packet, accessible via CMP’s Web site, <http://www.starhop.com>, has a variety of activities geared toward K–12 grade levels (please e-mail [jgerulskis@starhop.com](mailto:jgerulskis@starhop.com) for the password).

## Lenticulars in Outreach

Steele Hill (NASA Goddard Space Flight Center)

Steele Hill of the Solar and Heliospheric Observatory (SOHO) has found a novel way to use lenticulars in his outreach efforts. The word “lenticulars” is not a commonly used one, and many people are unfamiliar with it. Basically, as you turn a lenticular image in your hand, or pass a large one, it seems to come to life. Lenticular images can convey the illusion of 3-D and/or video motion. Lenticular graphics are made up of two parts: a lenticular screen (or lens), and a flat printed image. The lens feels like grooved Plexiglas. The grooves and ridges of the lens are



actually lenticules, which focus your sight on different parts of the underlying picture. The printed picture consists of multiple pictures in TIF format printed in alternating lines.

Steele found that the cost of lenticulars had dropped to about \$.35 to \$.70 each, depending on the quantity printed—affordable for use in outreach products!

The first 6” x 4” card developed shows a solar storm in 10 frames as it blasts from the Sun. The card’s back has images, explanatory text, and a URL. The most common reaction to it has been, “Cool!” People were quickly engaged; they keep these. A 3-D Sun card has been equally well received with over 50,000 distributed.

Recently, Steele has developed a “Space Weather” card. The motion card shows a solar storm that impacts the magnetosphere, pours energy in on Earth’s far side, and generates aurora. A Web site was specifically developed to explain, extend, and support it.

To take the engagement potential further, the program has purchased several poster-sized lenticulars of the 3-D Sun and is getting requests for more from other venues. There may be a perfect lenticular opportunity in your outreach future. Contact Steele Hill at [steele.hill@gsfc.nasa.gov](mailto:steele.hill@gsfc.nasa.gov) for more information.

## Navigator Rolls Out 3-D Mall Kiosk

Randal K. Jackson (Jet Propulsion Laboratory)

Over the summer, the Navigator Program’s new “PlanetQuest 3-D” interactive kiosk completed a successful pilot run in the central atrium of The Oaks shopping mall in Thousand Oaks, CA. This innovative E/PO product, first displayed at a Jet Propulsion Laboratory open house, uses 3-D visualization technology to communicate Navigator science themes (to detect and characterize Earth-like planets outside our solar system) through animations, videos, and activities.

Each exhibit visitor is invited to sign the “electronic guestbook” via the computer keyboard. Hundreds of positive comments and e-mails were received, including the following:

“Very cool display. I hope it gets kids interested in science.”

“Entire exhibit is stunning! Keep me on your mailing list!”



Shoppers interact with the "PlanetQuest 3-D" kiosk at The Oaks shopping center in Thousand Oaks, CA, on July 9, 2004.

"This is great! When are you coming to Oklahoma?"

"I'm chillin like a villan like Bob Dillin and thinkin this is the coolest thing ever!!!!" (sic)

The mall marketing department expressed its faith in the appeal of the content by investing its own funds to construct a 49' x 7' backdrop about the search for new planets and life beyond Earth.

The Navigator Program is exploring an expanded partnership with the Macerich Company that would result in a nationwide tour of the PlanetQuest 3-D exhibit. The Macerich Company operates 52 shopping centers in 21 states that receive 470 million visitors per year.

"This partnership gives us the opportunity to engage new audiences who may not attend science museums or visit NASA Web sites," said Randal Jackson, Navigator's interactive media producer.

The kiosk is available for loan to central libraries, shopping centers, and other public spaces. For information on hosting the free exhibit, contact Randal at [randal.k.jackson@jpl.nasa.gov](mailto:randal.k.jackson@jpl.nasa.gov).

## Tabletop Planet-Finding Demo

Alan Gould (Lawrence Hall of Science)

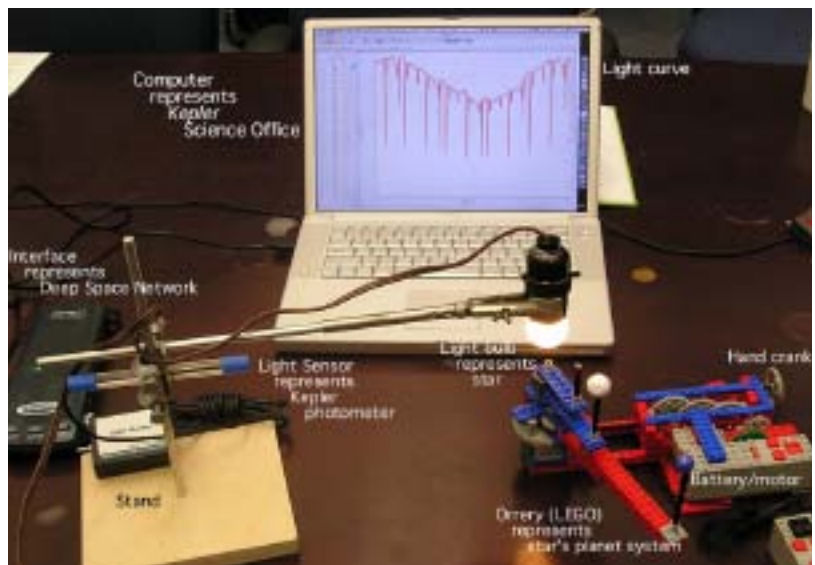
The Kepler E/PO team has created a tabletop planet-finding transit demonstration that illustrates how the NASA Kepler mission science team will discover

Earth-size planets around other stars. For the demo, the design includes a LEGO® model that represents a planet system and can be set in motion with either a hand crank or electric motor. Other components of the model are as follows:

- Light bulb at the center of the apparatus representing the star (an M dwarf);
- Light sensor representing the Kepler spacecraft photometer;
- Interface box representing NASA Deep Space Network; and a
- Computer representing the Kepler Science Office.

The planet-finding transit demonstration is an inexpensive version of the planet-finding component of the Space Science Institute's "Alien Earths" exhibit, which is scheduled to debut at Lawrence Hall of Science at the University of California, Berkeley, in early 2005.

The transit demonstration model was featured at the SETI Institute booth for the Association of Science and Technology Centers (ASTC) conference, September 17–21, 2004, and the Kepler booth at



A model of the Kepler planet-finding transit demonstration.

the American Astronomical Association (AAS) conference in Denver, May 31–June 3, 2004. It was well received at both events; several astronomy professors visiting the Kepler booth at AAS said they would love to have the demonstration, not just for planet transits, but to illustrate other phenomena, such as eclipsing binary stars.

Plans for the Kepler demonstration model are posted at <http://www.lawrencehallofscience.org/kepler/>.

## Traditions of the Sun: A New Children's Book

Karin Hauck  
(NASA's Sun-Earth Connection Education Forum)

Traditions of the Sun invites children to explore the commonalities between ancient and modern-day Sun watchers. Seeking to understand the mysteries of the Sun has been a primary motivator for Sun watchers over time. The ancient structures of Chaco Canyon, built starting 1,000 years ago by the ancestors of today's Pueblo people, fascinate those who study ancient cultures. Why did the landscape of the Southwest inspire Native Americans to make use of the horizon so effectively? Archaeoastronomers believe the inhabitants were expert skywatchers who understood the patterns of the Sun, Moon, and stars. This knowledge is reflected over and over again in the alignments of their buildings and sandstone drawings.

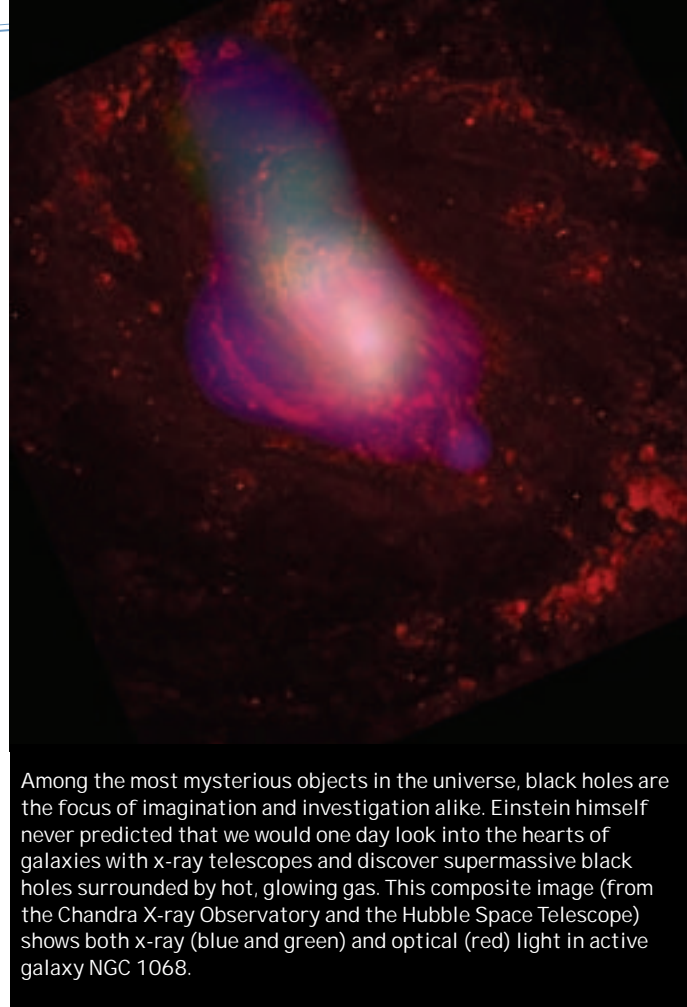
A collaboration between the Sun-Earth Connection Forum (SECEF), Ideum, Native American experts, Sun-Earth Connection scientists, and Chaco Canyon National Park, Traditions of the Sun is a "coffee table" book, gorgeously photographed, and geared to arousing the curiosity of fourth and fifth graders. It is richly complemented by an indepth media viewer at <http://traditionsofthesun.org>.

### EDUCATION PROGRAMS

## Public Audiences To Get "Inside Einstein's Universe" in 2005

Erika Reinfeld  
(NASA's Universe Education Forum)

It was in 1905 that Albert Einstein published several papers including his theory of special relativity and his famous equation  $E=Mc^2$ , which together changed the way we think about space, time, matter, and energy. The NASA-Smithsonian Universe Education Forum is joining the international celebration of the centennial of Einstein's "miracle year" by offering a portfolio of highly visual, dramatic, interactive learning resources, especially for use by museums, science centers, planetariums, and other science education organizations.



Among the most mysterious objects in the universe, black holes are the focus of imagination and investigation alike. Einstein himself never predicted that we would one day look into the hearts of galaxies with x-ray telescopes and discover supermassive black holes surrounded by hot, glowing gas. This composite image (from the Chandra X-ray Observatory and the Hubble Space Telescope) shows both x-ray (blue and green) and optical (red) light in active galaxy NGC 1068.

Throughout 2005, informal education institutions across the country will use the rich resources of NASA's space science research missions to take audiences on a journey through the cosmos as we now know it. Participating institutions will have the opportunity to investigate questions about space and time, questions that Einstein predicted and that NASA is still exploring today.

Did the universe have a beginning? What happens at the edge of a black hole? Will space expand forever?

Using interactive live presentations, audiences will journey through the expanding universe to the beginning of time, using the telescopes of NASA as their own private time machines. They will tour amazing black holes through incredible images, visualizations, and hands-on demonstrations.

The Universe Forum invites scientists to connect with host institutions across the country and bring current science investigations "Inside Einstein's Universe" to audiences of all ages. Participating scientists will gain access to a unique set of resources for use in 2005 and beyond.

For more information about the "Inside Einstein's Universe" program, visit <http://cfa-www.harvard.edu/seuforum/einstein/>. Our program complements the American Physical Society's "World Year of Physics" celebrations (<http://www.physics2005.org>).

## "Topics in Modern Astronomy" Workshop at Norfolk State University

Beth Jacob (NASA Goddard Space Flight Center)

With NASA Goddard Space Flight Center (GSFC) support, 25 middle and high school science teachers and 13 amateur astronomers gathered at the Norfolk State University (NSU) planetarium on June 21–22 to learn ways to bring modern astronomy into the classroom. One of the aims of the annual workshop was to better prepare educators to teach content addressing the Virginia State Standards of Learning requirements. The workshop also supports the Back Bay Amateur Astronomers' numerous community education efforts.

Drs. Carlos Salgado, Floyd Miller, and Mahbub Kandaker developed and presented the workshop, as they have since 2002. GSFC provided 6 of the 10 speakers, with presentations covering topics from cosmology and dark energy to gamma-ray bursts, black holes, and even a student theater project. GSFC scientists Drs. David Thompson, Eric Christian, Louis Barbier, Koji Mukai, and Ilana Harrus also featured the GLAST, Astro-E2, Voyager, and Swift missions, among others. E/PO

specialist Beth Jacob presented NASA opportunities available to educators and distributed over 30 different NASA educational materials.

NASA's Minority University Research and Education Program (MUREP) initiative provided funding for the GSFC-NSU partnership to enhance minority education in the space sciences. Norfolk State is a Historically Black College/University (HBCU), and many of the teachers were from inner-city schools. With MUREP support, NSU began offering a minor in astronomy in the fall of 2004, one of the first HBCUs to do so. The University of Virginia also has partnered with NSU to develop a telescope allowing students to study optical transient phenomena, and it offers Ph.D. opportunities to NSU astronomy minor graduates.

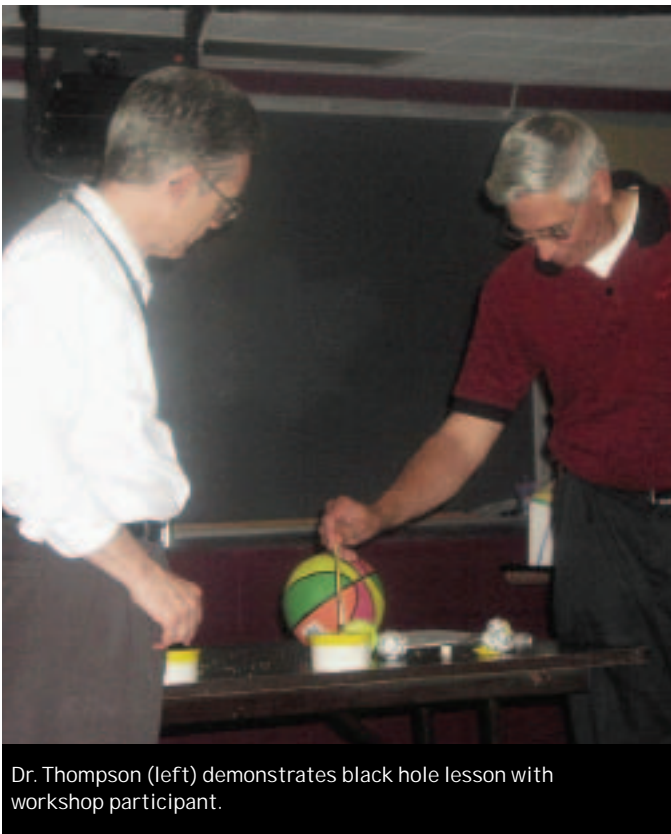
## Team Launches After-School Astronomy Clubs Web Site

Lou Mayo  
(NASA Goddard Space Flight Center)

Through a NASA IDEAS Grant, Lou Mayo from NASA's Sun-Earth Connection Education Forum has teamed with the Maryland Science Center and Baltimore and Montgomery County schools to develop a nationwide support system for After-School Astronomy Clubs (ASACs). These clubs provide students, families, and even whole communities with a unique opportunity to experience the wonders of astronomy outside of the traditional school day. Through this grant, ASACs across the country will become part of a growing community and be able to share their ideas, challenges, and approaches with other clubs, as well as gain access to NASA space science education resources.

Teachers can register their clubs online through the ASAC Web site (<http://afterschoolastronomy.org>) and communicate with other clubs through an online newsgroup, as well as online ASAC conferences. Additionally, they can share stories and resources, search for answers to questions, and publicize their activities and accomplishments.

The team is working on professional development workshops for teachers wanting to start an ASAC. The workshops will be piloted at the Maryland Science Center in the fall of 2005 with participation from Baltimore and Montgomery County schools. Teachers who register their clubs will be eligible for a startup grant from Raytheon.



Dr. Thompson (left) demonstrates black hole lesson with workshop participant.

## The Sun Also Rises

David Alexander (Rice University) and Karin Hauck (NASA's Sun-Earth Connection Education Forum)

Solar Week (<http://www.solarweek.org>) is a collection of games, lessons, and activities focusing on the Sun-Earth Connection and aimed at middle and high school students. Originating in 2000 as a daughter site to the successful Yohkoh Public Outreach Project (<http://www.lmsal.com/ypop/>), Solar Week is now a success in its own right with over 20,000 students participating since its inception. A specific goal of Solar



Week is to encourage middle school girls to pursue science. Students of both genders interact online with female solar physicists acting as role models and mentors; all of the scientists participating in Solar Week are women, and a key topic is careers in science. Participating students learn about the Sun-Earth interaction via a series of daily topics and through an online question-and-answer session with the scientists. Solar Week, now a joint project of SECEF and Rice University, occurs biannually with the next session scheduled for February 28–March 4, 2005.

## The Chandra Science Summer Program 2004

Irene Porro and Charlotte Zeamer (MIT Center for Space Research)

The 2004 Chandra Science Summer Program was a 2-week educational program designed to promote the academic achievement in space science of high school students from Boston public schools. The program was



Students of the Chandra Science Summer Program pose next to their 3-D model of the universe inspired by the Chandra image of the Cassiopeia A supernova remnant.

the result of the work of the MIT Center for Space Research E/PO Office in collaboration with the Boston 2:00–6:00 After-School Initiative, and it was funded by a NASA Chandra E/PO grant. Over two weeks, scientists from MIT joined a very diverse student body in a series of activities designed to encourage curiosity, questioning, and exploration. Students learned about the size and scale of the objects in the universe, the origins and evolution of the universe, the life cycle of stars, and the discoveries that the Chandra X-ray Observatory and the other NASA Great Observatories make possible by observing different regions of the electromagnetic spectrum. The program recruited students who completed their 9th-, 10th-, or 11th-grade year in Boston public schools in June 2004, and the selection process was based on a lively and well-articulated interest in science, space, and learning in general, as expressed in a well-written application essay.

## HETE SUMMER INSTITUTE 2004: Tracing the Structure of the Universe—What Do We Know? How Do We Know It? How Can We Use It in the Classroom?

Irene Porro and Charlotte Zeamer (MIT Center for Space Research)

The HETE Summer Institute was a 1-week program designed to increase teachers' understanding of key topics related to the structure and evolution of the universe theme and to provide a context in which many of the Massachusetts Department of Education science content learning standards can be met.

To this end, the teachers had the extraordinary opportunity to interact with HETE scientists on a daily basis and participated in discussions guided by a master educator on strategies to use the



material presented with students of all ages and backgrounds in a number of subject areas including physics, chemistry, math, literacy, and the arts.

Among many interesting comments written by the teachers at the end of the institute, one was particularly meaningful, "I learned that science involves the use of the imagination, and not to be afraid to look at ideas in an unconventional way, using concepts from other fields of studies to draw analogies for greater understanding." Thanks to pupils like this, the HETE instructors are looking forward to the next summer institute!



Karen Spaulding, Mentor Teacher for the Cambridge public schools, facilitates a session on bringing space science to a diversity of classrooms and subject areas.

## Affordable Modular Museum Exhibitry Brings the Science to the People

Jackie Wong and Karin Hauck  
(NASA's Sun-Earth Connection Education Forum)

NASA's SECEF led a panel session on affordable and replicable exhibit modules at the ASTC annual conference in September 2004.

Museum exhibits are a great way to communicate current NASA science to the general public, but ordinary exhibits can be costly and difficult to replicate and distribute, and they tend to suffer from wear and tear and out-of-date content. The session brought together NASA content providers, experts in exhibit design, and representatives from large and small science centers in a panel to explore solutions for a more flexible and affordable alternative.

Session leader Isabel Hawkins and session coordinator Jackie Wong (both from SECEF) invited Ben Burress from Chabot Space and Science Center and Flavio Mendez from Maryland Science Center to

demonstrate the needs and effective uses of current NASA space science in a museum setting. While these exhibits and public programs are highly engaging and effective, they are often out of the financial reach of smaller science centers. As an alternative, John Stoke from Space Telescope Science Institute introduced the concept of exhibit modules that can accommodate a high turnover of content while reducing the cost of exhibit infrastructures.

The session attracted a large group of museum professionals, as well as NASA E/PO personnel who joined the discussion and provided feedback to the IDEAS grant-funded project to develop a computer-based component as a first step to meet the needs of museums and reach more audiences.

## STUDENTS TEACHING STUDENTS: High School Students as Astronomy Educators

Amie Gallagher (Raritan Valley Community  
College Planetarium)

Most astronomy clubs are about doing science projects. An IDEAS grant allowed us to create a new twist: focus on education by training high school students as astronomy educators and empower them to teach astronomy to elementary students. In addition to increasing their own astronomy knowledge, this club promotes life skills such as working together, public speaking, community service, teaching, mentoring, becoming a role model, and so on.

The Voorhees High School Astronomy Club members were first trained by our team of astronomers and educators in the fall of 2000. The students learned how to use and maintain StarLab, a portable planetarium funded through the grant. They also learned how to use telescopes and were provided with a 4-hour training using hands-on activities. In subsequent years, seasoned members trained new members.

Club members plan and run "Star Parties" for elementary students and their families. Afterwards, the high school students visit the elementary classrooms three times and conduct different activities and lessons each time.

Club membership increases each year, and the Voorhees High School astronomy elective has expanded from one to two classes with a waiting list. In a traditionally male club, nearly 80 percent of members are now female. Some members have gone on to study astrophysics or education, or both.

## Space Science Workshops in Northeastern Montana

Donna Minton  
(S2N2 Representative for Montana)

Space Science Network Northwest (S2N2) held five K–12 teacher workshops at the Educational Improvement Through Technology (EdITT) Conference on August 11–12 in Poplar, MT, a small town on the Fort Peck Indian Reservation in the remote northeastern corner of the state. Poplar Middle School recently became a NASA Explorer School (<http://explorerschools.nasa.gov/portal/site/nes/>). Approximately 50 teachers from towns across eastern Montana attended the workshops.

S2N2 Montana representative Dr. Donna Minton presented two workshops on the basics of scientific ballooning, which involved assembling and experimenting with helium-filled balloons and balloon payload requirements. Dr. Julie Lutz, S2N2 Director, presented three workshops: Space Science Across the Curriculum (elementary), Astrobiology (middle, high), and Stars, Galaxies, and the Universe (middle, high). Participant evaluations of the workshops commented on the engaging nature of the space science materials and the hands-on activities. Teachers also expressed great pleasure at having the chance to experience professional development in space science.

## UPCOMING WORKSHOP: “How To Provide an Effective Education Workshop for Scientists”

Cheri Morrow (Space Science Institute)

Spend 3 days in beautiful Boulder, CO, learning how to provide an effective education workshop for scientists! With funding from NASA and the National Science Foundation, the Space Science Institute (SSI) will be hosting a special leadership course next spring during the last week in April entitled, “How To Provide an Effective Education Workshop for Scientists.” This 3-day course is intended for E/PO leads and managers who are tasked with providing scientists (e.g., at their home institutions or



An SSI workshop participant interacts with elementary school students.



Workshop participants assemble and experiment with helium-filled balloons.

on research science teams) with meaningful ways to contribute to E/PO efforts. Dr. Cherylynn Morrow will serve as the lead facilitator of the course. Additional “special guest” presenters will enrich the program. The course will offer participants the techniques and resources necessary to design and implement their own half-day or full-day education workshop for scientists. Course content is based on 10 years of experience in providing successful workshops, seminars, and conference sessions for scientists in education. The course prerequisite is attendance at one of SSI’s previous 4-day education workshops for scientists, engineers, and E/PO leads (or equivalent experience). For more information, contact Christy Edwards at [edwards@spacescience.org](mailto:edwards@spacescience.org).

## SUPPORT NETWORK PROFILE

This is the sixth in a series of articles that highlights the contributions of the space science E/PO support network. The 12 groups that make up the support network are involved in coordinating and integrating the NASA space science E/PO program. They provide a point of entry for individuals and organizations wishing to participate in the space science E/PO program. A brochure describing the support network can be found at [http://spacescience.nasa.gov/education/resources/ecosystem/brochure\\_low\\_res.pdf](http://spacescience.nasa.gov/education/resources/ecosystem/brochure_low_res.pdf).

## A New Vision Transforms MARSSB

**Karin Irwin**  
(NASA's Mid-Atlantic Region Space Science Broker)

With NASA's transformation and its vision for space exploration, the Mid-Atlantic Region Space Science Broker (MARSSB) has responded with a transformed structure of its own. MARSSB has created a new strategic vision, developed an outcome-driven operational plan, and added two new team members. MARSSB now includes Adam Tarnoff, principal investigator, and Karin Irwin, acting educational outreach liaison/analyst. They join Dr. Laurie Ruberg, program manager, and Dr. Stanley Jones, senior program advisor. Tarnoff directs the strategic planning and implementation of MARSSB's vision. Ruberg continues her work with needs assessments for preservice teaching faculty and students as well as supports E/PO efforts. Jones's role is to maximize the MARSSB presence in the Mid-Atlantic region's E/PO community. Irwin coordinates public relations, brand management, and communications.

Drawing on their roots in cognitive science and instructional design, the newly reconstituted MARSSB team brings a research-oriented perspective to the broker/facilitator process. MARSSB is responding to NASA's call for a better understanding of the needs of educators through its continued investigation of what scientists need to participate in E/PO and how educators can easily access space science resources. A 2004 analysis of the space science education needs of preservice teacher educators in minority-serving institutions has already generated exciting results that have been used to increase the presence of NASA materials in these programs throughout the Mid-Atlantic region. MARSSB also is implementing a new set of evaluation measures to bet-



The MARSSB team (from left): Karin Irwin, Dr. Stanley P. Jones, Dr. Laurie Ruberg, and Adam Tarnoff.

ter understand the impact of its activities on the collective efficacy of the regional space science education community. The new MARSSB team plans to apply this needs assessment and program evaluation information by using this data to ensure that all brokered relationships receive the full support they need to become robust and self-sustaining.

In addition to its needs assessment and evaluation activities, MARSSB has partnered with its parent organization, the NASA-sponsored Classroom of the Future, to provide ongoing assistance to space science E/PO programs seeking to develop high-quality educational products capable of passing the new NASA-wide educational product review. Participants in the program will enter an online environment, dubbed the Virtual Design Center, in which E/PO leads, instructional designers, education researchers, education practitioners, and space scientists can collaborate on E/PO programs for the mutual benefit of all parties.

MARSSB is excited about the opportunity to build synergy between NASA mission scientists and educators at a time when the space science support network is transitioning to a more mature stage and is focusing on achieving an even higher standard of quality and measuring impact.

## CHANGES AT NASA

### SMD Transformation

In the past few months, NASA has transformed its structure to implement the new Vision for Space Exploration. This transformation has fundamentally restructured the former Enterprises and Codes into Mission Directorates. Of particular interest to our readers is the merger of the Earth and Space Science Enterprises into a single Science Mission Directorate (SMD). Our E/PO programs also are being merged into one integrated program. We are excited about this opportunity to work with our Earth science colleagues and look forward to bringing you an even more vibrant SMD education program in the coming months.

## ON THE HORIZON

### ASTRO-E2 COMPETITION: Observe the Universe with the Latest NASA X-Ray Observatory!

**Illana Harrus**  
(NASA Goddard Space Flight Center)

The Astro-E2 E/PO group is opening the doors of research to a team of highly motivated, independent high school students. From January to April 2005, the program will accept and review observing proposals from high school teams for the use of data 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 February 2005. The main instrument on board, a micro-calorimeter, distinguishes very small differences in the energy of x-ray photons by measuring their heat.

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*For more information, please contact  
competition-astroe2@athena.gsfc.nasa.gov  
or see: <http://astroe2lc.gsfc.nasa.gov>*

## Ancient Observatories, Timeless Knowledge

**Karin Hauck**  
(NASA's Sun-Earth Connection Education Forum)

Come along as NASA's SECEF explores the knowledge, worldviews, and technology of both ancient and modern Sun watchers. Our theme for 2005 will focus on the fascinating humanmade solar alignments that mark the equinoxes and solstices. We are working with an expert advisory committee, born of a rewarding alliance between Native American experts and Sun-Earth Connection scientists.

In partnership with the Exploratorium, Ideum, and NASA Connect, SECEF will produce video and Webcasts for formal and informal education audiences nationally. The programs will feature Chaco Canyon (New Mexico), Hovenweep (Utah), and



Ancient observatory at Chichen Itza, Mexico.

Chichen Itza (Mexico). The December 21 (winter solstice) Webcast at Chaco Canyon is archived at <http://www.exploratorium.edu/chaco/>. The other live event will be Webcast on March 20, 2005 (the spring equinox), from the Yucatan in Mexico.

Our goal is that participants will benefit from the following key understandings:

- The Sun is a dynamic, magnetic star that impacts Earth and other planets in our solar system.
- Sun watchers over time have sought to understand the mysteries of the Sun.
- Human beings from diverse cultures have viewed the Sun as the source of life.
- Human beings use technology (past, present, and future) to understand the Sun and the universe beyond.
- Light has always provided a means of investigating the universe.

Sun-Earth Day on March 20, 2005 (<http://sunearthday.nasa.gov>), will feature a rich variety of materials around this theme. Register and receive a packet of information on Sun watching across the ages. Also, visit our new media viewer at <http://traditionsofthesun.org>.

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 space science E/PO program, contact Anita Krishnamurthi, editor, at [Anita.Krishnamurthi@nasa.gov](mailto:Anita.Krishnamurthi@nasa.gov). Prior issues of *Voyages* are online at <http://spacescience.nasa.gov/education/news>.