



# Astrophysics Division EPO Update

Presented to the

## **Astrophysics Subcommittee**

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January 29, 2008



# Astrophysics Education and Public Outreach

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- Embedded E/PO programs into everything we do
  - Mission E/PO activities currently coordinated by Origins and SEU Forums
- Astrophysics component in SMD programs
  - NASA Earth and Space Science Fellows (7 Astrophysics Fellows + 6 GSRP)
  - Opportunities in Science Mission Directorate Education and Public Outreach (4 proposals with Astrophysics content)
- Astrophysics component in Office of Education programs
  - EPSCoR (1 Astrophysics proposals funded by OE, 1 by SMD)
- International Year of Astronomy
- Hubble Servicing Mission 4 E/PO



# Astrophysics Education and Public Outreach: Special Event

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*Touch the Invisible Sky* Braille book containing tactile and visual images from Hubble, Spitzer and Chandra released in a ceremony at the National Federation of the Blind, Baltimore MD, on January 15, 2008

<http://www.baltimoresun.com/news/local/annearunde/bal-md.blind16jan16,0,295804.story>



## IYA Background

- Celebrates astronomy and its contributions to society and culture
- Encourages all citizens to discover the universe for themselves
- Highlighted by the 400th anniversary of Galileo's use of a telescope for astronomical observations
- January 1, 2009 - December 31, 2009

*Mission E/PO leads have identified IYA as a priority focus area*



## US Goal for IYA 2009

*To offer an engaging astronomy experience to every person in the country, nurture existing partnerships and build new connections to sustain public interest.*



## Seven Major US Themes

- Looking Through a Telescope
- Dark Skies Are a Universal Resource
- Astronomy in Arts, Entertainment & Storytelling
- Research Experience for Students, Teachers, and Citizen-Scientists
- Telescope Kits & Optics
- Sharing the Universe Through New Technology
- The Universe for Classrooms and Families



## NASA's Strategy for IYA

- Align with US themes and goals
- Capitalize upon public interest in NASA missions and discoveries
- Strengthen existing interest in products and programs
- Engage new audiences, partners, and underserved and underrepresented communities
- Increase the connectivity and impact of individual products and programs

Planning effort currently involves Astrophysics, Planetary Science, and Heliophysics Divisions



## Desired Outcomes

- Authentic observations for a significant fraction of the population
- Increased awareness of space science, including common misconceptions
- Increased interest in and support for science and science education
- New partnerships that enable better coordination across and beyond NASA





## SMD's Approach

- Individual missions will give existing E/PO programs an IYA “flavor”
- Special cross-mission E/PO projects will supplement individual mission E/PO activities
- Efforts are coordinated through the Education Forums and aligned to US IYA themes
- Monthly topics will be tied to high-interest mission, celestial, or historical events

Website portal: [astronomy2009.nasa.gov](http://astronomy2009.nasa.gov)



## NASA Calendar Highlights



- New capabilities enabled by *Hubble Space Telescope* Servicing Mission 4
- First Light for SOFIA
- Mission launches scheduled for late 2008 - 2009
  - Kepler and WISE
  - Mars Science Laboratory
  - Solar Dynamics Observatory
- Companion payload to *Lunar Reconnaissance Orbiter* impacts the Moon





## SMD Contributions to US Themes: Looking Through a Telescope

- Star parties and events hosted by *Night Sky Network* amateur astronomy clubs
- Personal guest observer accounts for *MicroObservatory* online telescopes

*Special Project: Observing with NASA (STEM inquiry using robotic telescopes, SMD image data and an e-learning infrastructure)*



## **SMD Contributions to US Themes: Science Centers, Observatory Visitor Centers, & Planetaria**

- IYA-themed *ViewSpace* multimedia programming
- Spitzer planetarium show
- Special public unveiling of large scale prints from Hubble, Spitzer, and Chandra

*Special Project: A NASA Great Observatories National Image Unveiling (collaboration between Hubble, Spitzer and Chandra)*



## SMD Contributions to US Themes: Classrooms and Families

- Expanded content for *Amazing Space's* "Telescopes from the Ground Up"
- Coordinated IYA-themed workshops and presentations involving mission scientists and educators
- Special IYA-themed exhibit panels, educational resources, and a speakers bureau for libraries
- IYA-themed *Sun-Earth Day*
- *Special Project: Libraries as a Pathway to Engaging Tomorrow's Explorers (Partnership with the American Library Association supports community goal of reaching new audiences)*
- *Special Project: Sun-Earth Day 2009: "International Year of Astronomy: The Sun - Yours to Discover" (Sun-Earth Day 2009 celebrates Galileo's first telescopic observations of sunspots by extending IYA activities to daytime astronomy. )*



## **SMD Contributions to US Themes: Sharing the Universe Through New Technology**

- Dynamic podcasts, vodcasts, and multimedia resources from a variety of space science missions
- *Special Project: “Are We Alone?” (One-hour SETI Institute radio and podcast programs supporting IYA themes)*



[www.astronomy2009.us](http://www.astronomy2009.us)  
*[US2009yearofastronomy@gmail.com](mailto:US2009yearofastronomy@gmail.com)*



# Education and Public Outreach: Hubble Servicing Mission 4

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## **The HST is the 'people's tool' for exploration**

- Invites/engages the broad possible audiences in its mission
- Has touched all aspects of our lives
- Is accessible to all via diverse information dissemination modes

## **The HST is today's 'greatest explorer'**

- Reveals the stories of the universe, continuously
- Has 'rewritten textbooks' via confirmation/refuting of accepted knowledge/theories

## **The SM4 Mission will enhance the observatory & ensure frontier science through 2013**

- Showcases human accomplishments from ability to vision to creative problem solving to commitment to achieve the unique Mission activities
- Puts into place advanced technology that improves discovery power of observatory by 10 to 70 times
- Bridges frontier science through 2013 and launch of JWST
- Allows a suite observatory views in multi-wavelengths (Chandra, Spitzer, Hubble)

The Education/Outreach products, services and experiences are designed so that once completed, participants will be able to 'tell a neighbor, friend or colleague' about these incredible impacts of the Hubble Space Telescope.





# Education and Public Outreach: Hubble Servicing Mission 4

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## Education activities -

- **Professional development activities that increase knowledge and advance use of HST STEM information and data in classrooms and informal education environments**
- **Student activities that involve students in every phase of the SM-4 mission and its results**
- **A sequence of activities – pre-launch; during SM4; post-launch**
- **Activities designed for mutually beneficial internal/external partnerships & collaborations**

**These activities fit into a timeline beginning 6 months in advance of launch, hitting a peak during launch, and continuing to build momentum post-launch through 2009. Culminating activities may be the grand openings of the SM4 IMAX film at a variety of venues and/or International Year of Astronomy events.**

**The 18 month+ time line capitalizes on the expected first evidence of capabilities of the new instruments released to the public two months post-launch with a second set of images released 4 months post-launch. 2009 is the International Year of Astronomy. Announced by the United Nations, there are several major events in planning stages by various astronomy organizations. Premier of the SM4 IMAX film is expected to be in January 2010. The 18month+ time line is ideal for substantial, captivating activities that broaden participation in HST education endeavors.**

**A series of ‘capstone’ activities from a Hubble Assignment Book to launch conferences, a ‘one time’ Hubble in the Classroom International Educator Conference, participation in a significant IYA event, and a series of SM4 IMAX film openings invite potential for impressive numbers of participation yielding remarkable results.**



# Education and Public Outreach: Hubble Servicing Mission 4

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- SM4 Public Communications Plan Coordinator: Don Savage reports to Michael Griffin.
- SM4 E/PO Tiger Team formed by GSFC Education Office - includes HQ Office of Education, SMD, SOMD representatives
- All NASA Centers will participate in HST E/PO incorporating material in their education plan.
- Office of Education infrastructure offered for SM4 activities. E.g. incorporate HST education material into Explorer Schools.
- Leverage off NASA outreach events such as NASA's 50th anniversary; NASA booth at National Folklife Festival, Washington D.C., June 2008; NASA's participation in IYA.



# Education and Public Outreach: Hubble Servicing Mission 4

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## Candidate high Impact SM4 activities involving thousands of students

- *Hubble Week*: A series of educational activities made available to museums, schools, universities, related to servicing being done that day during SM4.
- Nickelodeon show featuring HST in a teacher/student contest.
- Schools enter contest for *Hubble Day* – submit a multimedia project about HST/SM4 and the winners get to meet all of the SM4 astronauts.
- Announce well in advance of SM4 launch at least one ERO object, something that is spectacular and scientifically intriguing; sponsor a nationwide contest for students within a certain grade range to study the context and significance of the object and make a short documentary video about it, the video culminating in a zoom-in on a black box that is the placeholder for the real, still-to-come HST ERO image. Winner is selected a month before launch and gets a free VIP trip to the launch.



# IYA Special Projects

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## BACKUP



NASA National Aeronautics and Space Administration | NASA SCIENCE

+ Visit NASA.gov  
+ Contact NASA

HOME NEWS & EVENTS CALENDAR MULTIMEDIA HISTORY OF NASA SCIENCE ASTRONOMY

## International Year of Astronomy 2009

Discover the Universe with NASA During the 2009 International Year of Astronomy!

In 2009 we celebrate the 400th anniversary of Galileo's first observations of the universe through a telescope. In honor of

Additional links:

- International Year of Astronomy 2009
- American Astronomical Society
- International Astronomical Union
- International Year of Astronomy 2009 (United States)

+ USA.gov - The U.S. government's official web portal.  
+ Freedom of Information Act  
+ Budgets, Strategic Plans and Accountability Reports  
+ The President's Management Agenda  
+ Privacy Policy and Important Notices  
+ Inspector General Hotline  
+ Equal Employment Opportunity Data Posted Pursuant to the No Fear Act  
+ Information-Dissemination Priorities and Inventories

NASA Official: Hashima Hasan  
Last Updated: November 6, 2007  
+ Contact NASA

**International Year of Astronomy web site  
Astronomy2009.nasa.gov**

- Soft-Launched 1/1/08 (limited distribution, password-protected)
- 2008 Phased deployment milestones:
  - January 2008: Launch five-page “foundation site”
  - March 2008: Flash timeline
  - Autumn 2008: Launch interactive events calendar
  - Thru year-end 2008: Regularly add new content



## Special Project: Observing With NASA

*STEM inquiry using robotic telescopes, SMD image data, and an e-learning infrastructure*

- SAO to provide NASA audiences with universal, on-demand access to MicroObservatory Telescope Network
- Partnership with STScI to link proven NASA curriculum support materials to on-line telescope investigation opportunities
- Target audiences: teachers/students grades 5-9; museum & afterschool staff running informal ed programs; SMD EPO program managers
- IYA-themed special observing projects for 2009 link Galileo's legacy to ongoing NASA SMD discoveries in planetary science and astrophysics.





## Special Project: A NASA Great Observatories National Image Unveiling

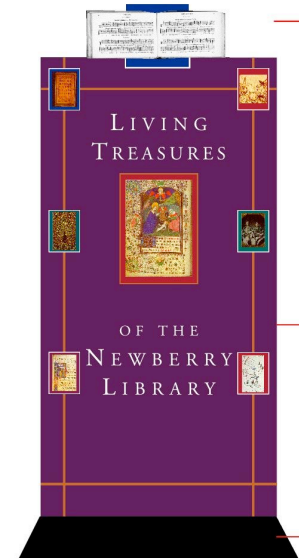
- Collaboration between Hubble, Spitzer, & Chandra
- Provide minimum of 50 USA museums, planetariums, and schools with:
  - Large-scale prints of multi-wavelength observation of the same celestial object.
  - Interpretive resources demonstrating the value and significance of multi-wavelength astronomy.
  - Resources to help generate press coverage on “unveiling day”
- A Continuing “Payoff”
  - Prints will remain on display throughout IYA
  - Students and Public will be encouraged to make their own observations via Night Sky Network star parties and CFA’s MicroObservatory.
- Modeled after successful Hubble unveilings in 2005 & 2006





## Special Project: Libraries as a Pathway to Engaging Tomorrow's Explorers

- Partnership with the American Library Association (ALA) supports community goal of reaching new audiences
- STScI, SAO, and the ALA will provide 40 libraries with:
  - IYA-themed low-cost traveling exhibit panels
  - Collections of educational resources
  - Scientist speaking activities
  - Professional development for librarians and scientists
- The project will
  - Facilitate interactions between libraries and local schools
  - Communicate SMD contributions to science and technology
  - Illustrate STEM career paths
  - Increase audience ability to find and use SMD content and resources







# Sun-Earth Day 2009: “International Year of Astronomy: The Sun – Yours to Discover”

Sun-Earth Day 2009 celebrates **Galileo’s first telescopic observations of sunspots** by extending IYA activities to **daytime astronomy**.

Sun-Earth Day 2009 will feature:

- ***Let’s Observe the Sun Safely Program:***

Advancing IYA’s goal of “Bringing astronomy to the citizens of Planet Earth” by enabling thousands of people to look through solar telescopes and homemade instruments.

- ***Telescopes for Solar Discovery:***

Providing access to NASA’s solar scientists and data through vodcasts and webcast

- ***Participation in IYA’s proposed global events:***

Such as a 24 Hours of Astronomy day, a Global Astronomy Website, and Universe Awareness

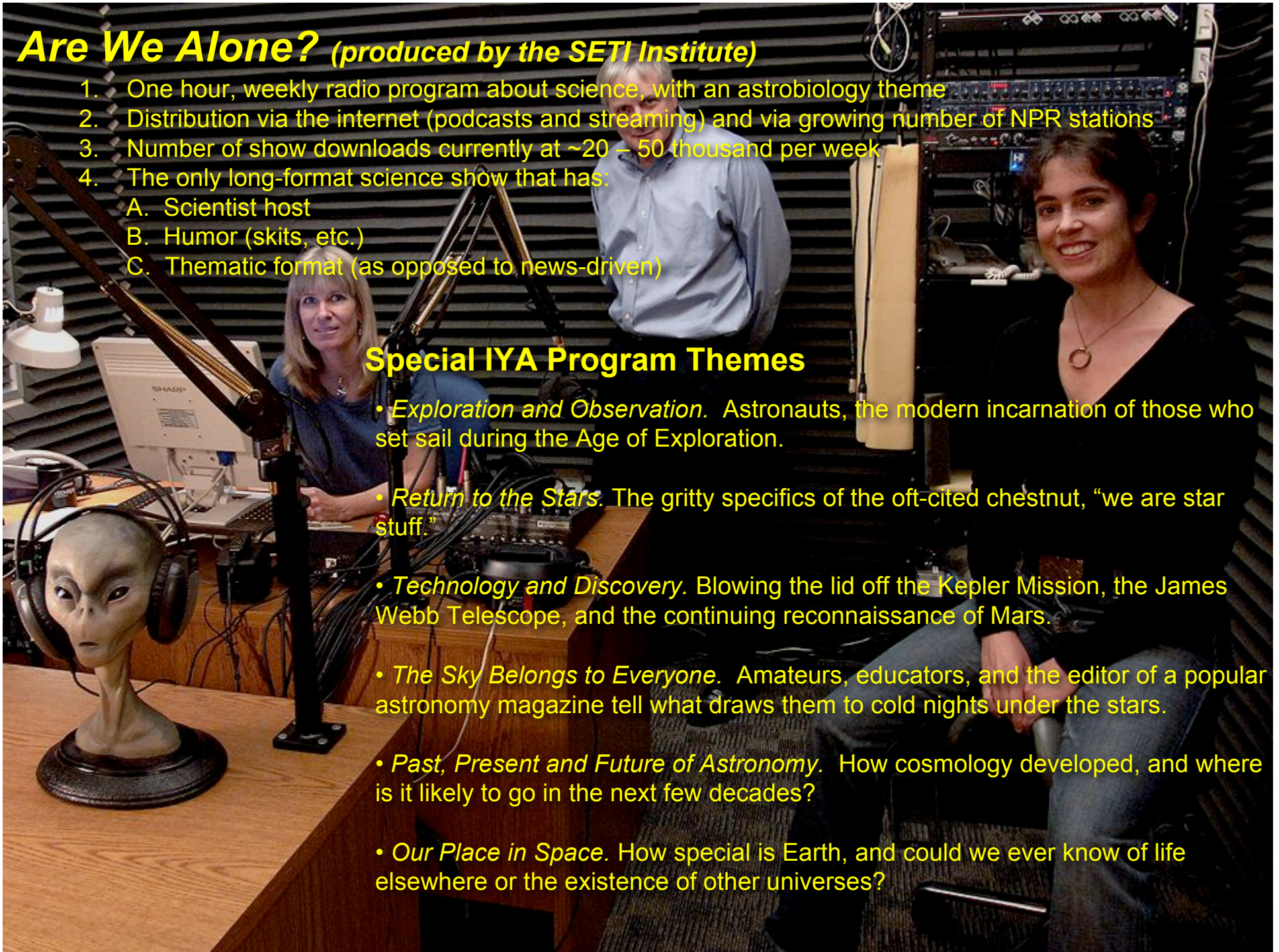


## **Are We Alone? (produced by the SETI Institute)**

1. One hour, weekly radio program about science, with an astrobiology theme
2. Distribution via the internet (podcasts and streaming) and via growing number of NPR stations
3. Number of show downloads currently at ~20 – 50 thousand per week
4. The only long-format science show that has:
  - A. Scientist host
  - B. Humor (skits, etc.)
  - C. Thematic format (as opposed to news-driven)

### **Special IYA Program Themes**

- *Exploration and Observation.* Astronauts, the modern incarnation of those who set sail during the Age of Exploration.
- *Return to the Stars.* The gritty specifics of the oft-cited chestnut, “we are star stuff.”
- *Technology and Discovery.* Blowing the lid off the Kepler Mission, the James Webb Telescope, and the continuing reconnaissance of Mars.
- *The Sky Belongs to Everyone.* Amateurs, educators, and the editor of a popular astronomy magazine tell what draws them to cold nights under the stars.
- *Past, Present and Future of Astronomy.* How cosmology developed, and where is it likely to go in the next few decades?
- *Our Place in Space.* How special is Earth, and could we ever know of life elsewhere or the existence of other universes?





# Education and Public Outreach: Mission Highlights

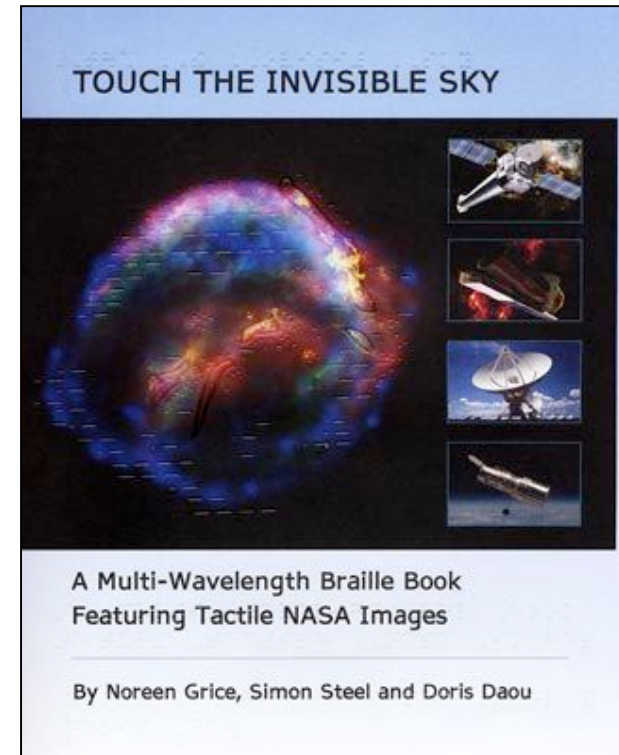
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**BACKUP**



# Touch the Invisible Sky

- Uses Braille, large print, and tactile images from the Hubble Space Telescope, Spitzer Space Telescope, Chandra X-ray Observatory, and ground-based telescopes
- Introduces readers of all visual abilities to the concept of the electromagnetic spectrum
- Explores how different observatories complement each others' findings
- Available through the National Federation of the Blind, Library of Congress repositories, and a wide range of public institutions
- Created through a Chandra E/PO supplemental grant and a collaboration between Spitzer, Chandra, HST, and the Origins and Universe Education Forums





# Touch the Invisible Sky

“Touch the Invisible Sky” was unveiled at a ceremony at the National Federation of the Blind on January 15, 2007.



Image credit: Baltimore Sun



# Astrophysics in the Classroom

## Building Awareness

The Astrophysics Division's mission E/PO programs recognize the importance of supporting the needs of current and future educators. They provide a range of virtual and face-to-face professional development experiences at local, regional, and national venues. These offerings facilitate access to current SMD science and related E/PO materials, and an understanding of how to use mission science in the classroom in age appropriate ways. Mission E/PO programs leverage opportunities with each other, external partners, and larger education initiatives to extend their impact. Recent activities include:

Remote Sensing from Earth to the Limits of the Known Universe - Chandra representatives held a 4-day workshop for Lake County CA school district members at Taylor Observatory, Kelseyville, CA, June 18-22. The workshop was attended by 21 teachers, observatory staff, and school district technology staff.

The High Energy Universe - Glast/SWIFT/XMM-Newton staff presented workshops for Chicago area teachers at the Adler Planetarium in Chicago on September 10th, in conjunction with the Astronomical Society of the Pacific's national E/PO conference. The workshops were part of the Adler Open House, and featured the new Active Galaxies pop-up book.

Montana State Teacher's Association Conference and Yellowstone Field Trip - The National Astrobiology Institute (NAI) Montana State University Team took part in the 2007 Montana Education Association (MEA) Conference held in Belgrade Montana, October 18-19, 2007. Focusing on Yellowstone thermal environments, NAI scientists and educators interacted with over 200 teachers.

Project ASTRO Partnerships - SOFIA representatives gave a presentation on August 3rd regarding planetary science and the SOFIA program to 25 scientist/teacher partner pairs in a summer training workshop for the Astronomical Society of the Pacific Project ASTRO teams.

Pre-Service Teacher Workshops - On October 22<sup>nd</sup>, the STScl Office of Public Outreach (OPO) formal education team presented two elementary school pre-service teacher training workshops to students from Villa Julie College. These future teachers were challenged to consider and rethink their ideas about the Solar System based upon new views in planetary science and to consider how these ideas could be adapted to teach in classroom situations.



# Astrophysics in the Classroom

## Curriculum Support

The science curricula chosen by school districts have a pivotal impact on the content and experiences students have in the classroom. The Astrophysics Division's missions support the education community and curriculum developers by providing access to cutting edge mission science and E/PO materials. Highlights:

Great Explorations in Math and Science (GEMS) Space Science Sequences (SSS) - Multiple missions and Education Forums have partnered with the Lawrence Hall of Science to support the development of connected sequences of space science education materials for grades 3-5 and grades 6-8. The project provides coherence for space science education content, in response to recommendations from the 2003 Space Science Advisory Council Education and Public Outreach Task Force. Mission E/PO programs and Education Forums have provided input on the science content, supplied mission E/PO activities for incorporation into the sequences, included GEMS activities in their educator workshops, and provided formative evaluation services for the LHS. The sequence for grades 3-5 has been completed and published through Carolina Biological. The sequence for grades 6-8 is in the final stages of production.

Amazing Space - STScI's *Amazing Space* program delivers curriculum support tools to users in all 50 states, including 40 of the 100 largest school districts. Materials are integrated into state and local curricula due to their attention to educator needs (e.g. education standards, literacy, misconceptions, and use of content). The Ohio Resource Center for Mathematics, Science, and Reading (ORC), has recommended *Amazing Space's* "Myths vs. Realities" to help elementary level teachers prepare their students to take the Grade 5 Ohio Achievement Test. The ORC specifically recommends *Amazing Space's* "Myths vs. Realities" to help Ohio elementary teachers identify student misconceptions as they relate to understanding the Solar System. The ORC was established in 1999 by the Ohio Legislature to provide Ohio's preK-16 teachers and teacher educators with high-quality Internet-based resources in the areas of mathematics, science, and reading.



## Museums and Science Centers

The E/PO programs associated with the Astrophysics Division's missions have longstanding partnerships with museums and science centers across the country. Exhibits and shows are designed with the needs of both small and large institutions - and their school and public audiences - in mind. Highlights include:

ViewSpace - ViewSpace is an internet-fed, self-updating, permanent exhibit developed by STScI (HST/JWST) and available to institutions of any size. The award-winning multimedia program brings research from a wide range of astronomy missions and probes to nearly 180 science centers, museums, planetaria, and nature centers nationwide. Recently developed ViewSpace programs include: "URANUS: A World of Surprises" (produced in collaboration with the SETI Institute), "A New View of Antarctica," and "Hunting for Other Earths".

Alien Earths Traveling Exhibition - This 3000 square foot traveling exhibition, funded by NSF and Astrophysics Division missions, represents a collaboration between Kepler, Navigator, Spitzer, SOFIA, the NASA Astrobiology Institute, and STScI (HST and the Origins Forum). It consists of four interrelated areas: Our Place in Space, Star and Planet Formation, Planet Quest, and Search for Life. The exhibition has recently visited the Turtle Bay Exploration Park, Redding, CA, and is slated for the Virginia Museum of Natural History, Martinsville, VA (Feb 1-Apr 30, 2008), and the Cleveland Natural History Museum, Cleveland, OH (Jun 1- Aug 31, 2008).

Astrobiology Museum Exhibit. The NASA Astrobiology Institute (NAI) is co-sponsoring the exhibit "The Science of Aliens" at the Whitaker Center for Science and the Arts in Harrisburg, PA. The exhibit, focusing on astrobiology topics such as solar system exploration and extreme environments, was developed by the Museum of London and has a twin copy currently on tour in Europe. The exhibit is open in Harrisburg through November 18<sup>th</sup>, and then moves on to Canada in the Spring of 2008.





## Engaging Local Communities

Night Sky Network - The Night Sky Network is a nationwide coalition of amateur astronomy clubs that bring the science, technology, and inspiration of NASA missions to their communities through a partnership between the Astronomical Society of the Pacific (ASP), Navigator, Kepler, Suzaku, GLAST, Swift, XMM, and the Origins, Universe, and Solar System Exploration Education Forums. Goddard's Astrophysics Science Division, as part of an ongoing partnership between the Suzaku E/PO team and Sonoma State University, is currently working with the ASP to develop a new supernova-themed outreach toolkit. Eight amateur astronomers representing clubs from Maryland to Maine alpha-tested a series of prospective activities, and feedback was collected from the participants as well as the Suzaku EPO team for further refinement of the toolkit. Night Sky Network clubs have held over 7300 events reaching more than 630,000 people since March 2004.

Beyond Einstein Explorers' Program (BEEP) - The BEEP program is an after school opportunity now underway in 12 sites across the U.S. and 1 site in Australia. The BEEP team offered training at GSFC this year to a diverse group of participants, including after school program leaders from 5 institutions in Washington DC, an E/PO program coordinator from Cornell University, a LISA scientist from Stanford University, 2 AESPs from GSFC, and an Observatory Manager from the University of Maryland. The BEEP manual has been finalized and disseminated (available at [http://beyondeinstein.nasa.gov/beep07/beep07\\_manual.html](http://beyondeinstein.nasa.gov/beep07/beep07_manual.html))

Goddard Astrophysics Science Division (ASD) Family Science Night - Family science night is an opportunity for adults and children to enjoy science-related tasks in a fun environment, learning from NASA program leaders and each other, and becoming more excited about science in the process. ASD staff prepared and led the first event for the 2007-2008 season on September 20, entitled "How Big? How Far? How Old?" for a dozen families. Members of the media from WAMU radio and the Washington Post were present, and both reported on the event.



## New Media

The Astrophysics Division's mission E/PO programs provide opportunities for the public to explore cutting edge mission science and technology through a variety of new media and technologies. Highlights:

### **Podcasts:**

Chandra Video Podcasts - E/PO staff representing the Chandra mission have released a score of Chandra video podcasts including "The Truth and Lies about Black Holes", and "In a Galaxy Far, Far Away and Also Those Nearby". Chandra staff promoted the podcasts at the Communicating Astronomy to the Public (CAP) conference (Oct. 8-11, 2007) with a presentation about podcasting. Chandra E/PO professionals also introduced a new Chandra HD Podcast episode at a special astronomy visualization session at the Adler Planetarium in parallel with the Astronomical Society of the Pacific national E/PO conference. The team received the Pirelli International award for physics in May 2007 for their podcast work.

### **Websites:**

Dark Energy Website: The STScI Office of Public Outreach debuted a new section, *Dark Energy*, within its HubbleSite website ([http://hubblesite.org/hubble\\_discoveries/dark\\_energy/](http://hubblesite.org/hubble_discoveries/dark_energy/)). This is the first in what will be a series of discovery sections on topics that will represent HST's main scientific contributions. The goal is to create a "library" of HST's legacy on the web. HubbleSite conveys HST science and technology to over 2 million visitors each month. The Webby Awards, the leading international honor for the Internet, selected HubbleSite for the Best Science Website of 2007. HubbleSite also won the accompanying People's Voice Award, where the public can vote for their favorite website.



## Acknowledgments

Contributors to this presentation:

Denise Smith, STScI - Origins Forum Lead

Mary Dussault, SAO - SEU Forum Lead

John Stoke, STScI - PI for "Unveiling the Universe"

Edna De Vore, SETI Institute - PI for "Alien Earths" podcasts

Isabel Hawkins, UC Berkeley - Co-I for "Sun-Earth Day"

Doris Daou - NASA HQ SMD E/PO

Mario Livio, STScI - SM4 ideas

Bonnie McClain - SM4 E/PO Tiger Team Lead