

Greetings *Explore!* Community

This newsletter is intended to highlight Earth and space science information and opportunities for informal educators. If you have events, resources, news, or activities to share, or would like to give us feedback, please contact us at explore@lpi.usra.edu.

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April

- April 11-13** Kansas Library Association Conference
- April 11-14** Texas Library Association Conference
- April 15-21** National Library Week
- April 16-18** Connecticut Library Association Conference
- April 17-20** Alabama Library Association Conference
- April 18-20** Tennessee Library Association Conference
- April 24-25** Kansas Library Association Conference

June

- June 5** Messenger Mission Flies By Venus <http://messenger.jhuapl.edu/>
- June 20** Dawn Mission launches <http://dawn.jpl.nasa.gov/>
- June 21** Summer Solstice (first day of summer)
<http://antwpr.gsfc.nasa.gov/apod/ap060621.html>

Spotlight On ...



Regional Planetary Image Facilities

The Regional Planetary Image Facilities (RPIF) were established by NASA to provide access to planetary images and maps for use by the scientific and educational communities. The facilities house imagery and cartographic products from missions such as Apollo, Clementine, Galileo, Viking, Voyager and Mars Global Surveyor. These planetary image facilities are open to the public. The facilities are reference centers for browsing, studying, and selecting lunar and planetary photographic and cartographic materials. Experienced staff can assist scientists, educators, students, media, and the public in ordering materials for their own use. For appointment information and operation hours, contact your nearest facility. More information available at <http://www.lpi.usra.edu/library/RPIF/>



NASA' 21st Century Explorer

NASA's 21st Century Explorer is a 3rd-5th grade standards-based program that uses the Web, animation, and video to introduce science, technology, engineering, mathematics, and NASA space exploration concepts. The site is also available in Spanish. <http://education.jsc.nasa.gov/explorers/index2.html>

Driving to Mars: In the Arctic with NASA on the Human Journey to the Red Planet

William L. Fox, Shoemaker & Hoard, August 2006, ISBN 1593761112

Every July, two dozen scientists set up camp on the rim of the Haughton Crater in Devon Island in the Canadian High Arctic, a setting which duplicates as close as any place on Earth the barren Martian landscape. It's one of a handful of analog environments for Mars — places where the harsh climate, severe geology, and unfamiliar terrain mimic conditions of the planet. Its environment is so hostile that no one has ever colonized more than small areas of its coastline for brief periods, and it's where the NASA practices people on Mars. *Driving to Mars* recounts William L. Fox's three trips to Devon, working with the NASA Haughton-Mars Project. This book tells why we explore, how we see the world, and how we see ourselves in it. The flip sides of a single issue will ultimately determine whether or not we can stay alive on Earth.

In Search Of... Activity from Dawn Mission

The upcoming Dawn mission has many hands-on activities for the classroom, which can be found at http://www.dawn-mission.org/DawnClassrooms/1_hist_dawn/index.asp .

Modeling Asteroids contains hands-on activities that can be used to help students understand what astronomers in the historical readings of the Exploration Section were experiencing as they studied asteroids from Earth. For example, in *In Search Of...* from the module *The History and Discovery of Asteroids*, students become members of the Celestial Police as they hunt for the “missing planet” using star maps that simulate several nights of viewing.

Podcast on Cracking Open the Light from Distant Worlds

NASA astronomers have, for the first time ever, split apart the light from exoplanets, which are planets beyond our solar system, to hunt for molecules in the planets' atmospheres. The landmark achievement is a significant step toward being able to detect possible life on rocky exoplanets and comes years before astronomers had anticipated. Multimedia products online include an audio podcast at:

<http://www.jpl.nasa.gov/multimedia/podcast/spitzer-20070221/> and a Web video at <http://www.jpl.nasa.gov/videos/spitzer/spitzer20070221/> .

New Children's Book Releases

The following are recently released children's books focusing on a particular aspect of Earth or space science. Their inclusion is not intended as an endorsement.



Alphabet of Space

Laura Gates Galvin, Smithsonian Books, February 2007, ISBN: 1592496563

Get ready to blast off for fun and learning with this exciting alphabet book about space! Children will learn all about astronauts, planets, stars, gravity and much, much more with this entertaining look at space from A to Z. 40 pages, Ages 2-5.

Planet Mars

Seymore Simon, Chronicle Books Llc, July 2006, ISBN 0811854043

SeeMore Readers Planet Mars is the most up-to-date book about Mars for young readers, with information and photographs from the 2004 Spirit and Opportunity rovers. SeeMore Readers are designed for every young reader. Large, bright pictures instantly engage readers in the subject. 32 pages, Ages 6-8.

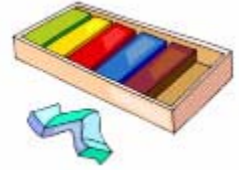
The Jumbo Book of Space

Paulette Bourgeois, Cynthia Pratt Nicolson, Bill Slavin, Kids Can Press, April 2007, ISBN 1554530202

Revealing the secrets of the universe, this book offers down-to-earth explanations of the science behind today's space facts. Readers can also learn how to make their own telescope, make a balloon rocket, look at the sun safely, and cook with the sun's rays. 208 pages, Ages 8-12



Becky Recommends



As the activity designer for several of the *Explore!* modules, I am always on the lookout for great ways to engage children in Earth and space science. The following activity is the fourth in a series of activities on the Moon. All activities in *Becky Recommends!* are designed for tight budgets and tight spaces, and are *always* educational and fun!

UV Man

What's Needed?

For each child:

- 3 UV beads (can be found in craft stores; other sources listed below)
- 2 non-UV beads
- 2 pipe cleaners, preferably white
- Scissors
- Various materials that will "protect" UV Man! from ultraviolet radiation, for example: construction paper, foil, plastic wrap (of various colors), sunscreen, masking tape, paper, cloth, etc.

Sources for UV Beads:

Educational Innovations:

<http://www.teachersource.com/direct/33370>

Phone: 1-888-912-7474 / Fax: 203-229-0740

Steve Spangler Science:

<http://www.stevespanglerscience.com/product/1350>

Phone: 1-800-223-9080

Sundance Solar:

<http://store.sundancesolar.com/enbeaduvsenb.html>

Phone: 603-456-2020 / FAX: 603-456-3298

Who?

Children ages 8-13

How Long?

60 minutes

Play!

1. Introduce the topic of Solar Radiation.
2. Invite the children to construct a UV Man,
 - Cut two pipe cleaners in half.
 - Fold one piece in half; these will be his legs.
 - Connect a second piece to the legs to make his torso
 - Thread the beads onto his torso, alternating white UV beads with non-UV beads. Slide all the beads toward UV Man's legs.
 - Twist the third piece around the torso above the beads to make arms.
 - Form a circle with the last piece and use it for his head.

3. **When the children finish, ask them what they observe.**

- Do you think UV Man's radiation detectors will turn colors if he goes out into the Sun? Why or why not? *Answers will vary*
- Will his radiation detectors turn colors if he goes outside into the shade? Why or why not? *Answers will vary.*



4. Let the children now take UV Man! into the full Sun. What happens to the beads? *The beads become deeply colored, reacting to the intensity of the UV radiation to which they are being exposed.*

5. Return to the room and continue the discussion.

- What happened to UV Man's radiation detectors? *They changed colors*
- What caused UV Man's radiation detectors to change colors? *The ultraviolet radiation from the Sun.*
- What happened to his radiation detectors after coming back inside, and what caused it? *They changed back to white because they were no longer detecting any radiation. UV radiation does not get through the building.*
- What did this experiment tell you about UV radiation and YOU? *Just like UV Man, you are exposed to UV radiation when you are outside.*
- How do we protect ourselves from UV radiation? *Answers may include wearing clothing, using sun block, using umbrellas, or staying inside.*

6. Invite the children to protect UV Man from UV radiation. Provide them with two materials to cover him or protect him in other ways. To get them started, have them make a construction paper poncho or shirt to cover the top UV bead. Have them test additional ways to protect UV Man by covering him with the materials you have provided and taking him outside again.

7. As a group, have the children share their experiments and observations.

8. Share with the children that with UV Man's help they have demonstrated the effects of the Sun's ultraviolet rays on objects (and people!) on Earth. Ask the group to share their thoughts about ultraviolet radiation. Where does it come from? Is it dangerous? How can we protect ourselves from it?

Pennant Design Challenge

NASA, America On-Line, and Mad Science will collaborate to offer a challenge to design pennants to celebrate the upcoming first flight of an Educator Astronaut, Mission Specialist Barbara Morgan on the Space Shuttle Endeavor. Registration will be on-line at

<http://www.KOLExpeditions.com> from March 15 - April 12. The target audience is children ages 6 to 12. The lucky first place winner will be invited to attend the launch with one parent and the winning pennant will fly on-board STS-118.



Events and Opportunities



Space Rocks

An Educator Workshop by Lunar and Planetary Institutes and NASA Astromaterials Research and Exploration Sciences Team Offered at the Harris County Department of Education

Please contact Liliana Maldonado at (713) 696-1306 for registration information. Go to [http://www.hcde-](http://www.hcde-texas.org/default.aspx?name=cpdisRegInfo)

[texas.org/default.aspx?name=cpdisRegInfo](http://www.hcde-texas.org/default.aspx?name=cpdisRegInfo) for more workshop details or to register on-line. May 4, 2007 – *Space Rocks*

This one-day workshop investigates rocks from space - what meteorites and lunar samples tell us about the formation of our solar system and the composition and history of the planets and asteroids from which the rocks originated. Find out where planetary scientists look for meteorites, the “impact” asteroids make on us, and what recent and future missions to comets and asteroids are telling us. Participants will receive presentation materials and hands-on activities for the classroom. Fee: \$75, Audience: Upper Elementary and Middle School Science Teachers

Summer Courses for Teachers in Bar Harbor, Maine

The College of the Atlantic in Bar Harbor, Maine offers graduate credit, residential programs for teachers at all levels. Tuition, room and board are included in the fee.

July 1 - 6: *Teaching from a Portable Planetarium for Earth, Space, and Natural*

Sciences offers instruction in the use of a portable planetarium, content and activities for planetarium use across the curriculum. This course is intended to serve those working in schools, science centers, museums, or colleges that have a planetarium and wish to enhance the expertise of their staff.

July 22-August 3: *Introduction to Astronomy* provides standards-based astronomy pedagogy and content, much of which is presented as hands-on activities that teachers can take straight to their classrooms. For more information, go to

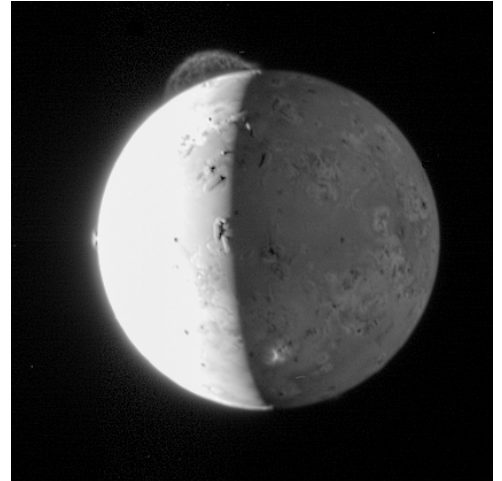
<http://www.coa.edu/html/summercoursefacultybios.htm>

Mission News and Science

New Photos of Eruptions on Io

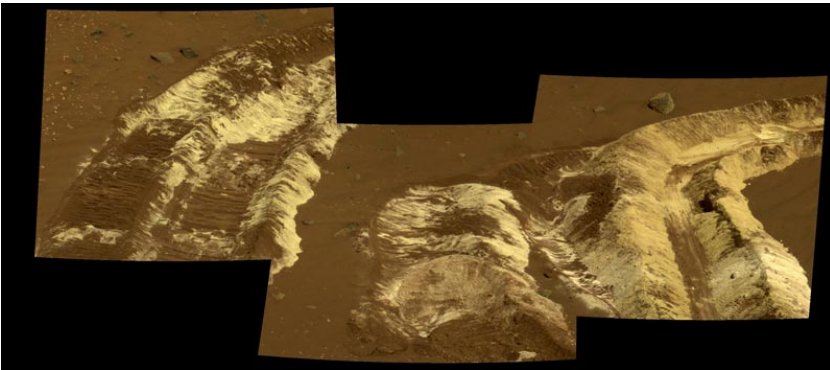
Modified from http://pluto.jhuapl.edu/gallery/missionPhotos/pages/022707_1.html

The first images returned to Earth by New Horizons during its close encounter with Jupiter feature the Galilean moon Io, snapped with the Long Range Reconnaissance Imager (LORRI) at 0840 UTC on February 26, while the moon was 2.5 million miles (4 million kilometers) from the spacecraft. Io is intensely heated by its tidal interaction with Jupiter and is thus extremely volcanically active. That activity is evident in these images, which reveal an enormous dust plume, more than 150 miles high, erupting from the volcano Tvashtar. The plume appears as an umbrella-shaped feature of the edge of Io's disk in the 11 o'clock position. This is the clearest view yet of a plume from Tvashtar, one of Io's most active volcanoes.



Mars Rover Churns Up Questions With Sulfur-Rich Soil

Modified from <http://www.jpl.nasa.gov/news/news.cfm?release=2007-029>



Some bright Martian soil has been uncovered by the NASA Spirit rover. It contains lots of sulfur and a trace of water; the soil could have been produced as sulfur-rich water reached the surface and evaporated, or could have been deposited from volcanic gas vents.

Determining which of those two hypotheses is correct would strengthen understanding of the environmental history of the Columbia Hills region that Spirit has been exploring since a few months after landing on Mars in January 2004. However, investigating the bright soil presents a challenge for the rover team, because the loose material could entrap the rover.

The bright white and yellow material was hidden under a layer of normal-looking soil until Spirit's wheels churned it up while the rover was struggling to cross a patch of unexpectedly soft soil nearly a year ago. Some of the bright soil was dragged along with Spirit by its right front wheel, and Spirit spent some time measuring the composition and mineralogy of these materials. The material is sulfur-rich and consists of sulfate salts associated with iron, and likely calcium. Researchers will watch for more patches of bright soil, and other clues as to the soil's origin.

Cassini Spacecraft Images Seas on Saturn's Moon Titan

Modified from <http://saturn.jpl.nasa.gov/news/press-release-details.cfm?newsID=731>

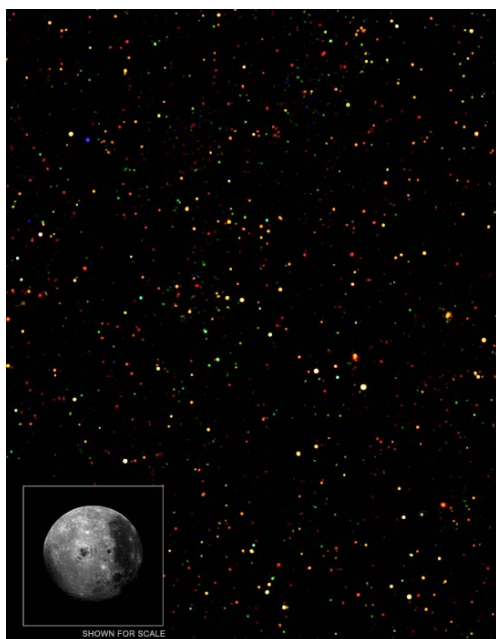
Instruments on NASA's Cassini spacecraft have found evidence for seas, likely filled with liquid methane or ethane, in the high northern latitudes of Saturn's moon Titan. One feature is larger than any of the Great Lakes of North America and is about the same size as several seas on Earth.

Cassini's radar instrument imaged several very dark features near Titan's north pole. The largest dark feature measures at least 100,000 square kilometers (39,000 square miles). While there is no definitive proof yet that these seas contain liquid, their shape, their dark appearance in radar that indicates smoothness, and their other properties point to the presence of liquids. The liquids are probably a combination of methane and ethane, given the extremely cold temperatures and other conditions on Titan and the abundance of methane and ethane gases and clouds in Titan's atmosphere.

The presence of these seas reinforces current thinking that Titan's surface must be re-supplying methane to its atmosphere. This methane cycle on Titan has similarities to the water cycle on Earth, and the erosion and surface features on Titan are similar to some of the features caused by water on Earth, making Titan intriguing to scientists. Due to the new discoveries, team members are re-pointing Cassini's radar instrument during a May flyby so it can pass directly over the dark areas imaged by the cameras.

New Panorama Reveals More Than a Thousand Black Holes

Modified from http://chandra.harvard.edu/press/07_releases/press_031207.html



Astronomers have captured an image of more than a thousand supermassive black holes. These results give astronomers a snapshot of a crucial period when these monster black holes are growing, and provide insight into the environments in which they occur.

The new black hole panorama was made with data from NASA's Chandra X-ray Observatory, the Spitzer Space Telescope and ground-based optical telescopes. The black holes in the image are hundreds of millions to several billion times more massive than the Sun and lie in the centers of distant galaxies. The massive amount of gas and dust falling into these black holes generates huge amounts of radiation. These systems are known as active galactic nuclei, or AGN's.

To obtain this panorama, a team of astronomers scanned a large portion of the sky. Since the biggest black holes power the brightest AGN, they can be spotted at vast distances, even with short exposures. The Chandra image is the largest contiguous

field ever obtained by the observatory. At 9.3 square degrees, it is over 40 times larger than the full moon seen on the night sky. This survey, taken in a region of the Bootes constellation, involved 126 separate pointings of 5,000-second Chandra exposures each. The researchers combined this with data obtained from Spitzer, and Kitt Peak's 4-meter Mayall and the MMT 6.5-meter optical telescopes, both located outside Tucson, Ariz., from the same patch of sky.

The new survey raises doubts about a popular current model in which supermassive black holes are surrounded by doughnut-shaped regions of gas. According to this model, astronomers would expect a large sample of black holes to show a range of absorption of the radiation from the nuclei. This absorption should range from completely exposed to completely obscured, with most in-between. Nuclei that are completely obscured are not detectable, but heavily obscured ones are. Instead, almost all of the black holes were completely exposed or heavily obscured, with very few in-between. This study found more than 600 obscured and 700 unobscured AGN, located between about six to 11 billion light years from Earth.