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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Spotlight on *Explorers!*	Events and Opportunities
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May

May 2 – 4 Maryland Library Association in Ocean City http://www.mdlib.org/conference/index.htm

May 4 Space Day! Find out more at: http://www.spaceday.org

May 8 Delaware Library Association in Dover http://www2.lib.udel.edu/dla-crld/conf/index.htm

May 8 – 9 Explore! To the Moon and Beyond with NASA's LRO Mission! A two-day workshop in Denver, Colorado offered by the Lunar & Planetary Institute

June

June 5 Messenger Mission Flies By Venus http://messenger.jhuapl.edu/

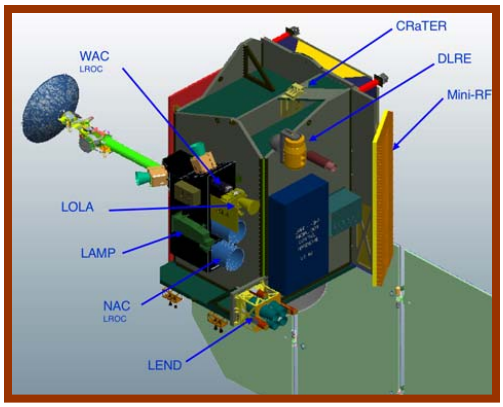
June 20 Dawn Mission launches http://dawn.jpl.nasa.gov/

June 21–27 American Library Association Annual Conference, Washington, D.C. http://www.ala.org/ala/eventsandconferencesb/annual/2007a/home.htm

June 21 Summer Solstice (first day of summer) http://antwrp.gsfc.nasa.gov/apod/ap060621.html

Spotlight On ...

ARIZONA LUNAR LIBRARIANS!



Twenty librarians from Arizona explored the Moon this month! Well, not *directly,* but they did discover a lot about it and received first-hand information about the Lunar Reconnaissance Orbiter (LRO) Mission to the Moon in 2008! The Lunar Librarians left the two-day workshop, presented by the Education Teams from the Lunar and Planetary Institute and the LRO Mission, armed with new activities, materials, and PowerPoint presentations on lunar geology and the LRO Mission. Dr. Mark Robinson from Arizona State University, the Principal Investigator for the LRO Camera that will be on board the **Lunar Reconnaissance Orbiter** spacecraft, gave impressive and informative talks both days of the workshop. Below are some of the comments and plans for *To the Moon and Beyond!* shared by participants:

Participants search for a slice of "Moon Pie"

"*To the Moon and Beyond!* was one of the most useful workshops I've attended. Very cool."

"It was very interesting and I know we'll be using it!"

I plan on using *To the Moon and Beyond! " …*in July - after our Summer Reading Program - to celebrate the Apollo Anniversary - maybe do a *Space Month!*"

I will use *To the Moon and Beyond! "…*to *launch* next school year."

"I will use the Moon puppet as a craft for a preschool program next weekend!"

The LRO will launch in fall 2008.
What be a great centerpiece for a program next year on our return to the Moon!

Jet Propulsion Lab Video "What's Up"

There's a new video feature debuting on the JPL Web pages. The new monthly feature, called "What's Up" will highlight an astronomical viewing opportunity everyone can enjoy, usually even without a telescope, and even in the most light polluted sky. The video is only about 2 minutes long, and is tied into a NASA mission each month. The video is on the JPL home page: http://www.jpl.nasa.gov/ and on the Solar System Exploration page at http://solarsystem.nasa.gov/index.cfm.

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.

Postcards from Pluto: A Tour of he Solar System

Loreen Leedy, Holiday House, (revised edition) June 2006,ISBN 823420655

Younger readers will find Postcards from Pluto an entertaining excursion through the solar system with plenty of provisions for humor. Leedy uses fun and unforgettable characters to provide an enjoyable, and cogent, learning experience for small children.

Is Pluto a Planet?: A Historical Journey through the Solar System

David A. Weintraub, Princeton University Press, October 2006, ISBN 0691123489

Weintraub's book is for adult readers who wonder if there is a good enough explanation for demoting *poor Pluto* to the category of *dwarf planet,* as well as for those who wish to add ammo to their arsenal of reasons to defend that decision.

Exploring Space (Explore Your World)

Marie Kolaczek, Firefly Books, August 2006, ISBN 1554070066

Pop-ups, fold-outs, transparency overlays, books-within-books, and more will surprise and delight 4 - 8 year olds on every page of Kolaczek's book. *Explore Your World* is a new series that covers topics pertaining to science, nature, and technology for young readers.

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. Last month's activity, UV Man!, addressed UV radiation in space and on Earth and was the first in a series of activities on *Health in Space!* This month's activity, Sponge Spool Spine, focuses on *spinal elongation*, one of the effects of microgravity. A more detailed version of the activity may be found at: http://www.lpi.usra.edu/education/explore/space_health/space_stations/sponge_spool.shtml. All activities in *Becky Recommends!* are designed for tight budgets and tight spaces, and are *always* educational and fun!

Sponge Spool Spine

Who?
Children ages 8-13

How Long?
Approximately 30 minutes

What's Needed?
The following materials are for one *Sponge Spool Spine*:

- A tall, *clear* (not translucent) container filled ¾ full with water (a clear 2-liter soda bottle with the top few inches cut off works well)
- 1 pencil (*slightly* sharpened)
- A ruler
- Scratch paper and writing utensils
- 2 pipe cleaners
- 3-4 small wooden spools (may be purchased at craft stores)
- 3-4 circular sponge cut-outs, about the size of a dime. Regular sponges will work, but for truly astounding results use super compressed sponges (may be purchased at specialty household goods stores such as William Sonoma).
- 1 circular sponge cut-out about the size of a half-dollar for a Sponge Spool Spine head (optional)

Play!

1. Build Sponge Spool Spine

- Cut the sponges into small squares first. You can round off the edges to form circles if you wish. Make sure the sponges are completely dry!
- Using a slightly sharpened pencil, poke holes in the center of the sponge discs.
- If you are working with older children, you can have them prepare the sponges. Plan for extra time. Prepare the sponges ahead if the activity is being done with young children.

- You are creating a model of your spine. The sponges represent the discs in your spine. The wooden spools represent the bones - your vertebrae. Your discs are the cushions between your vertebrae.
- Push the pipe cleaner through the 3 sponge discs and 3 spools, alternating the discs and spools.
- Wrap half a pipe cleaner above the discs and sponges to make arms. Make legs below the discs and sponges – be sure to leave an inch or so of space between the arms and legs and the spine!
- If you want, add a sponge disc to the top of the pipe cleaner to form a head!

Did you know Earth's gravity pulls on your whole body? We are not aware of it, but that pull causes the softer discs between our vertebrae to compress.

In microgravity, there is nothing to pull on us to compress our spines. But our spines cannot completely pull apart because our body acts like a container and holds our bones and muscles and fluid together.

2. Measure the length of the sponge spine with a ruler and record your measurement (do not include the ends of the pipe cleaner in your measurement – only the spools and sponges).

3. Gently lower the Sponge Spool Spine into the water and observe what happens.
What would happen if you were under water and let your body go limp? Would you float? Do you think floating under water is a good model for floating in space? What do you think the water in this container represents? (Microgravity)

Astronauts grow taller in space - sometimes as much as 2 inches!! They also suffer from headaches, back aches, and dizziness at times because their tissue and nerves stretch.

4. Remove your Sponge Spool Spine from the water and measure his spine now.
What happened? Did Sponge Bob's spine get longer when it was placed in microgravity (the water)? If your Sponge Spool Spine has a head, did it swell?

How do you think you would feel if *your* body suddenly grew a couple of inches and your face and head puffed up?

☺

ExxonMobil Bernard Harris Summer Science Camp 2007

The Bernard Harris Summer Science Camp (BHSSC) is a program of The Harris Foundation. This camp program was developed as a collaborative effort of the Harris Foundation, the Houston Independent School District, the University of Houston (UH) and the Southwestern Oklahoma State University (SWOSU), designed to support economically and/or socially disadvantaged students (middle school through high school) with limited opportunities. This year the foundation has teamed with the ExxonMobil Foundation to increase the impact and expand the reach of the program to twenty (20) campuses nationally. Information and applications for all campuses are available at: http://theharrisfoundation.org/programs/summersciencecamp/index.htm; many of the application deadlines are in April.

National Air & Space Museum Exploring Space Lecture Series Online

This year's theme, Journey Through the Outer Solar System, features current NASA missions in the distant regions of the solar system. Each lecture will also be available online the day following the live event. The following upcoming lectures are scheduled for 8:00 p.m. EST at the National Air & Space Museum in Washington, D.C. at the Lockheed Martin IMAX Theater. Tickets are free but are required. For more information and to reserve tickets, visit http://www.nasm.si.edu/events/lectures/esls/esls.cfm.

May 8 – "Expedition to the Ringed Planet: Cassini Explores Saturn, Its Rings, and the Fountains of Enceladus." Carolyn Porco, Cassini Imaging Team Leader

June 14 – "New Horizons: Exploring the Solar System's Frontier." Alan Stern, Principle Investigator, New Horizons

Bring "Space Day" To Your Library!

Space Day will be held on May 4, 2007. This annual event uses space-related activities to build skills and inspire students in math, science, engineering, and technology. New downloadable lessons, information and ideas on planning a Space Day event are now available at the Space Day website, http://www.spaceday.org/index.html.

Discovery Science Channel's "SPACE WEEK"

Discovery's Science Channel will celebrate "Space Week" from May 6–12 by showing space-related documentaries each evening. The centerpiece of the week is the premiere of STARSHIP ORION, which will air at 9 p.m. on Tuesday, May 8, and again at 10 p.m. on Saturday, May 12. Orion is the space vehicle that will replace the space shuttle and take humans back to the moon and beyond.

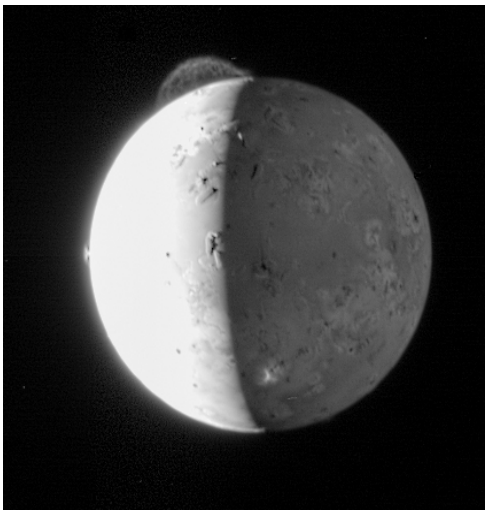
Space Rocks
An Educator Workshop by Lunar and Planetary Institutes and NASA Astromaterials Research and Exploration Sciences Team
Offered at the Harris County Department of Education
Please contact Liliana Maldonado at (713) 696-1306 for registration information. Go to http://www.hcde-texas.org/default.aspx?name=cpdisRegInfo for more workshop details or to register on-line. May 4, 2007 – *Space Rocks*

This one-day workshop for formal and informal educators 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. Fee: $75, Content level: Upper Elementary and Middle School

Mission News and Science

New Photos of Eruptions on Io

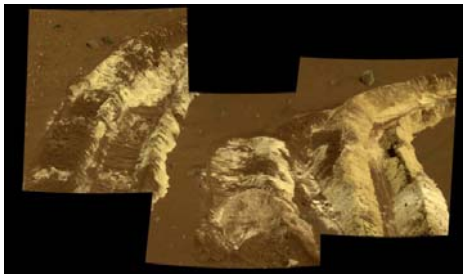
Modified from http://pluto.jhuapl.edu/gallery/missionPhotos/pages/022707_1.html



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

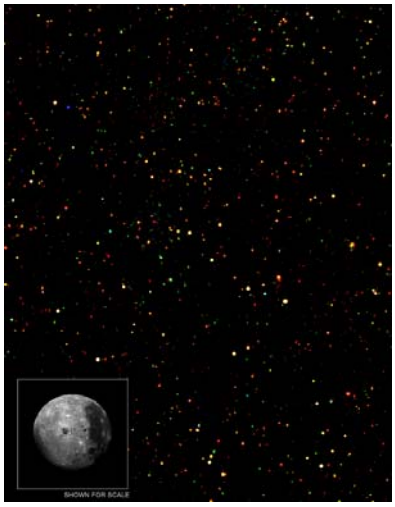
Instruments on NASA's Cassini spacecraft have found evidence for seas, likely filled with liquid methane or ethane, in the high northern latitudes of Saturn's moon Titan. One feature is larger than any of the Great Lakes of North America and is about the same size as several seas on Earth.

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 Tuscon, 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.