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**.

In this issue:

June

21-27 American Library Association Annual Conference in Washington, D.C.

July

9-13 Summer Seminars 2007- Training for AfterSchool Professionals will be in Boston, July 9-13. The registration deadline is June 29.

17-19 21st Century Community Learning Centers (21st CCLC) 2007 Summer Institute in Miami, FL.

Spotlight On ...

Field Test Sites Needed for July!

We are looking for 12 library and after-school programs to test the latest Explore Module – *Mars – Inside and Out!* Through hands-on activities, children will examine Mars and Earth features and investigate the processes that formed them, explore the interior of these planets with edible models, and learn why Earth and Mars are so different! Qualifying programs must be willing to run the program twice with different groups of children between the ages 8 to 13. Each program must have a minimum of 20 participants and is anticipated to require no more than 10 hours of program time. Program format is flexible, but must be completed during the month of July. Participating program providers will have evaluation forms to complete and may have a follow-up phone conversation. Each of the 12 participating programs will receive $700, chocolate, and the unending appreciation of the Explore Team!

Help us shape the next Explore Module!

If interested, contact Becky Nelson (bnelson@lpi.usra.edu) ASAP!

We are working to get programs with a diversity of audiences involved and will confirm participation by 10 June.

Concept to Classroom
Access information, suggestions, guidance, and extensive resources for after-school programs in this series of *free,* on-line, self-paced workshops covering a wide variety of hot topics in after-school education from the Educational Broadcasting Corporation.

SkyTellers *Constellations*
Explore the Native American and Western science story of *Constellations* from LPI's *SkyTellers* program, now available in audio/video format from our Web site. Also available at this Web site are activities, books, and background information about constellations.

NASA and You
NASA and You is a Web page just for students, that highlights upcoming events, contests, internship opportunities, Webcasts and much more.

Black Hole Web Site

Black Holes: Gravity's Relentless Pull is a web-based exhibit developed by Space Telescope Science Institute astronomers in collaboration with Educational Web Adventures. It contains an encyclopedia on black holes and information on a journey into a black hole.

Polar Discovery Project

Woods Hole Oceanographic Institution (WHOI), in partnership with eight museums across the United States, announces "Polar Discovery." This project brings together science centers, natural history museums, world-class oceanographic researchers working in the Arctic and Antarctic, and creative multimedia talent. The project website offers photo essays, videos, animations, audio clips, and a forum for e-mailing questions to researchers at the poles. In addition, the museums have developed exhibits related to polar expeditions and will host public events with live satellite calls from researchers to museum visitors.

Dawn Kids Activities

Encourage the next generation of space explorers with a host of fun activities available through Dawn Kids including a story, spacecraft model, puzzles, an iron-on decal, and more. Dawn is NASA's mission to asteroids (or minor planets) Ceres and Vesta, and is due to launch June 30, 2007.

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.

The Sun

Steele Hill & Michael Carlowicz, Harry N. Abrams, Inc., 2006, ISBN 0810955229. Hill, a NASA solar scientist and Carlowicz, a science writer, team up to bring a new spin on our old friend the Sun for readers 7th grade to adult. Their book includes unparalleled photographs of the Sun, a user friendly style, and a thorough examination of the Sun and the Sun-Earth connection.

Across the Solar System (Amazing Journeys/2nd Edition)

Rod Theodorou, Heinemann, 2006, ISBN 1403487952. Children ages 6-10 journey across the solar system collecting interesting information about our Sun and each planet including its temperature, composition, size, and ability to support life. The book also includes a glossary, a mission timeline, and a list of related books and Web sites.

Planet Earth

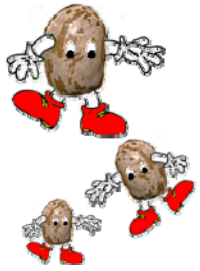
Deborah Chancellor, Kingfisher Young Knowledge Series, 2006, ISBN 0753459345. Chancellor offers a compendium of earth science topics - from volcanos to wind to forest habitats - in a clear, concise format, with colorful graphics for children ages 6-10.

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. All activities in *Becky Recommends!* are designed for tight budgets and tight spaces, and are *always* educational and fun!

Last month's activity, *Sponge Spool Spine*, was the third in a series of activities on *Health in Space!* This month's activity, *Beans in Space,* focuses on *muscle atrophy*, 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/beans.pdf

Beans in Space



What's Needed?

The following materials are for one Beans in Space! activity set:

- 2 opaque non-breakable containers (coffee cans work well)
- Tape (to seal the containers)
- 3 cups of beans (for the Earth can)
- Paper or foam to stuff inside the Earth can so that the beans don't rattle
- Labels for each can
- Paper to cover the containers (optional)

Who?

Children ages 8-13

How Long?

1 minute per child

Overview

In *Beans in Space!* children ages 8–13 perform 20 arm curls with cans that simulate the weight of beans on Earth and the weight of the same number of beans in space. They explore what happens to muscles in space that do not have to fight the force of gravity.

Preparation

- Prepare the two containers of Earth and space beans. There is no reason to have *exactly* 1,559 beans in each of the Earth containers. Placing a specific *number* on the container label, however, will help the children to realize that even though the *weight* of an object may change in space, the *mass* of those objects will remain the same.
- Label the can containing 3 cups of beans“1559 Beans on Earth” and the empty can “1559 Beans in Space.”
- Make sure the lids on the containers are on tight or sealed so there can’t be any peeking!
- Discuss the difference between mass and weight with the children and ask:

  "Do you think objects in microgravity (space) would have the same amount of *mass* as they do on Earth?" (Yes)

  "Do you think they would have the same *weight* in gravity and microgravity?" (No)

  "If objects - and *astronauts* - in microgravity have virtually no weight, would that have an effect on their muscle strength?"

Play!

- Taking turns, invite the children to first lift *both* cans, and ask:

  "Which weighs more, the Earth can or the space can?" (the Earth can)

  "Do the Earth and space cans have the same *mass*?" (Yes, they both have 1,559 beans)

- Then ask them to simultaneously lift both cans up and down 20 times, and ask:

  "Which gave your muscles more of a workout?" (the Earth can!)

- After all the children have taken turns lifting the cans, explain that even though the can of Earth beans had the same *mass* as the can of space beans, *it was heavier* because Earth's *gravity* was pulling on it, and their muscles had to work harder to lift it! Then ask:

  "If your muscles aren't having to do much work at all in space (because you are in microgravity), will your muscles become weaker or stronger?" (weaker)

  "What do you think astronauts can do in space to keep their muscles strong?" (exercise)

- Share that astronauts have to exercise 2-3 hours each day to keep their muscles strong

  "What do you think you can do on Earth to keep *your* muscles strong?

Astronomy Afterschool Program

The Beyond Einstein Explorers' Program (BEEP) is an afterschool/summer program designed to introduce basic concepts about astronomy and the Universe beyond the solar system to middle-school students. Developed by the Astrophysics Science Division at NASA Goddard, BEEP has 12 sessions with hands-on activities in each session. The program is now recruiting participants for summer 2007. A two-day training will be held at NASA Goddard on June 13-14.

***Exploring Space* Lecture**

World-class scholars discuss current missions to the distant realm of the gas giants, the icy Kuiper Belt and beyond. This is the last in a series of free lectures that will be held at the National Air and Space Museum in Washington, D.C. It will be webcast live as well as archived for free viewing online. Mark your calendar for the June 14 lecture - **New Horizons: Exploring the Solar System's Frontier** by Dr. S. Alan Stern.

The National AfterSchool Association is partnering with the National Association of Elementary School Principals to develop and present the AfterSchool Strand at the NAESP Principals' Summer Leadership Institute July 15-19. The AfterSchool Strand includes such topics as quality program standards and alignment between afterschool activities and the school day.

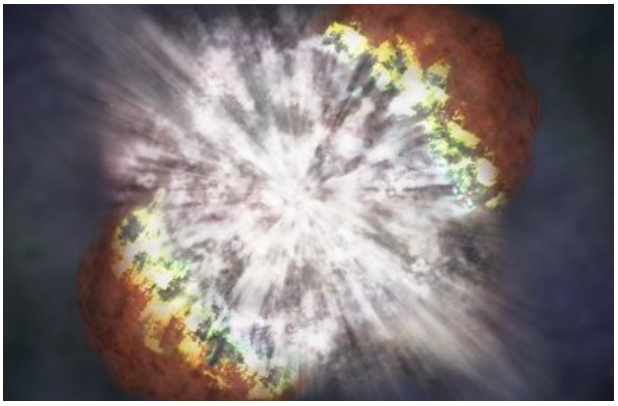
Astronomy from the Ground Up Online Workshop for Museum Educators

This free workshop, May 30 – June 27, 2007 is offered by the Astronomical Society of the Pacific in collaboration with the Association of Science-Technology Centers and the National Optical Astronomy Observatory. Training is through e-mail, videochat, and telephone. Participants receive a free toolkit, learn fun techniques for presenting astronomy and interpreting current events, and become part of the growing Astronomy from the Ground Up community. Applicants must be able to devote around six hours a week for four weeks.

Mission News and Science

The Brightest Supernova Ever

Modified from
http://science.nasa.gov/headlines/y2007/07may_bigsupernova.htm?list812372



Artist's illustration of supernova SN 2006gy

The brightest stellar explosion ever recorded may be a long-sought new type of supernova, according to observations by NASA's Chandra X-ray Observatory and ground-based optical telescopes. This explosion was a hundred times more energetic than a typical supernova, from an enormous star 150 times the mass of our Sun. The observations indicate that the explosions of extremely massive stars in the early universe were a different, more violent type of supernova than those usually observed in the modern universe.

Astronomers think many of the first stars in the Universe were this massive, and this new supernova may thus provide a rare glimpse of how those first generation stars died. The data on the supernova SN 2006gy suggest that spectacular supernovas from the first stars that spew their remains - rather than collapsing to a black hole as theorized - may be more common than previously believed.

NASA Antenna Cuts Mercury to Core, Solves 30 Year Mystery

Modified from http://www.jpl.nasa.gov/news/news.cfm?release=2007-050

Diagram showing the interior structure of Mercury. The metallic core extends from the center to a large fraction of the planetary radius. Radar observations show that the core or outer core is molten.

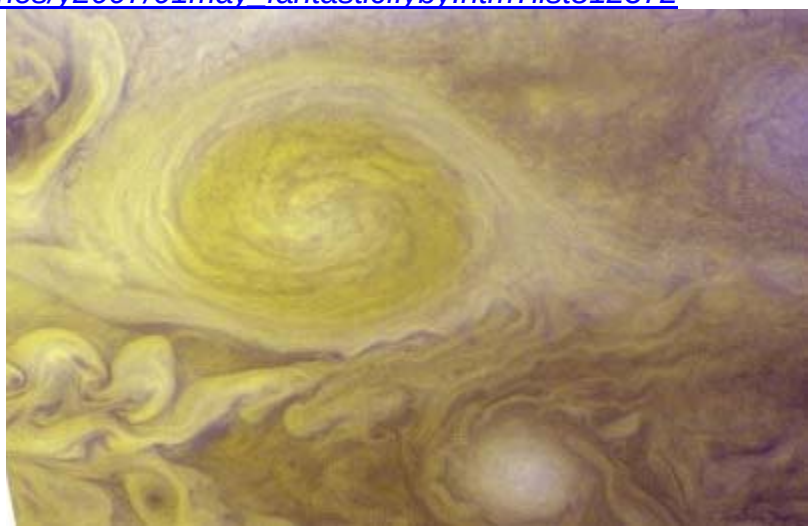
Researchers working with high-precision planetary radars have discovered strong evidence that the planet Mercury has a molten core, changing our view of Mercury's composition and how Mercury and the other planets in our Solar System first formed. The molten core explains the weak magnetic field around Mercury detected by the Mariner 10 spacecraft in 1974 and 1975.

Among Mariner 10's discoveries was that Mercury had its own weak magnetic field - about one percent as strong as that found on Earth. This was unexpected—scientists believe that Earth's magnetic field is generated by a rotating molten outer core, and Mercury was believed too small to have a molten core. Scientists theorized that Mercury consisted of a silicate mantle surrounding a solid iron core. This iron was considered solid - or so the theory went - because small planets like Mercury cool off rapidly after their formation. If Mercury followed this pattern, then its core should have frozen long ago.

In 2002, scientists began pointing some of our most powerful antennas at Mercury. Using the radar echoes off of Mercury's surface, scientists calculated Mercury's spin rate to an accuracy of one-thousandth of a percent. With these data the science team was able to detect tiny twists in Mercury's spin as it orbited the Sun. These small variations were double what would be expected for a completely solid body. This finding ruled out a solid core, so the only logical explanation remaining was that the core - or at the very least the outer core - is molten and not forced to rotate along with its shell.

Flyby of Jupiter

Modified from http://science.nasa.gov/headlines/y2007/01may_fantasticflyby.htm?list812372

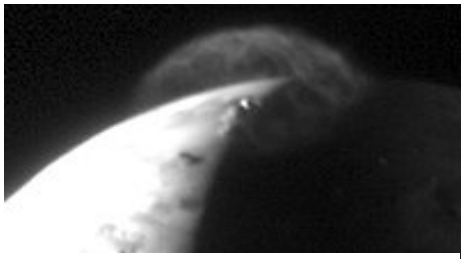


Jupiter's "Little Red Spot."

NASA has released stunning new images of Jupiter and its moons taken by the New Horizons spacecraft. Views include a movie of a volcanic eruption on Jupiter's moon Io; a nighttime shot of auroras and lava on Io; a color photo of the "Little Red Spot" churning in Jupiter's cloudtops; images of small moons herding dust and boulders through Jupiter's faint rings--and much more.

New Horizons came within 1.4 million miles of Jupiter on Feb. 28 in a gravity assist maneuver designed to trim three years off its travel time to Pluto. For several weeks before and after this closest approach, the probe trained its cameras and sensors on Jupiter and its four largest moons.

A highlight of the flyby was the first close-up color scan of the Little Red Spot. This storm is about half the size of Jupiter's larger Great Red Spot and about 70 percent of Earth's diameter. It formed in the late 1990s when three smaller storms collided and merged. The combined storm started out white, but began turning red about a year ago. Using New Horizons data, scientists will be able to search for clues about how these great storm systems form and why they change colors.



The Tvashtar volcano and plume on Io

Of Jupiter's four largest moons, the team focused much attention on volcanic Io, the most geologically active body in the solar system. New Horizons' cameras captured pockets of bright, glowing lava scattered across the surface; dozens of small, glowing spots of gas; and several views of a sunlit umbrella-shaped dust plume rising 200 miles into space from the volcano Tvashtar, the best images yet of a giant eruption from the tortured volcanic moon.

The timing and location of the spacecraft's trajectory also allowed it to spy many of the mysterious, circular troughs carved onto the icy moon Europa. Data on the size, depth and distribution of these troughs, discovered by the Jupiter-orbiting Galileo mission, will help scientists determine the thickness of the ice shell that covers Europa's global ocean.