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:

September

August 12 — **Perseid Meteor Shower**

August 28 — **Total Lunar Eclipse** early before sunrise

October

October 18 — **Lights on After School!** provides an opportunity to call attention to the importance of afterschool programs. See *Events and Opportunities* below.

October 14-17 — **Pennsylvania Library Association** annual conference.

Special Request to Explorers: In order to provide useful information in the Explore! Newsletter - with*out* information overload - we would like input on what is useful to *you.* Following are a few specific questions, but we would also be interested in knowing about any other ideas you might have for how we can improve the newsletter.

- Do you find it helpful to have the state library conferences listed in the Calendar of Events - or is that something you have known about for months?
- Would information about specialized library conferences be of interest to you? For instance, the *Tribal Libraries and Museums* conference.

- Do you like knowing about space science events, like eclipses, shuttle launches, and missions?

As always, feel free to share anything (we've found chocolate is very comforting) and know that we consider your input invaluable! So, to let us know what you think email:

bnelson@lpi.usra.edu

Volcanos in Maryland?!

Jacqueline Sollers, Explorer Extraordinaire!

Jackie, Branch Manager of the Eldersburg Branch Library in Maryland, has not only been on field trips to Oregon and Montana with the LPI - she has been to the *Moon and Beyond!* Well, not really, but she did attend the 2-day Explore! workshop, *To the Moon and Beyond,* in Maryland two years ago

Since then Jackie has shared Explore! programs at her own library, at state workshops, with home school groups, and at local schools. Go, Jackie! Below are some ways in which Jackie has used Explore! and some ideas for how you, too, can share the excitement of space science with your community!

"At the Eldersburg Branch, our most recent Explore! programs were *Health in Space* and *Rockets*. We had over 30 children. They made UV Man, and protective clothing for him. We made connections to astronauts and the need for protective clothing in space. We are doing a series of programs in September on astronauts.

"The *Rocket* Explore! program is very popular. We have repeated it numerous times, and in the last program we talked about how rockets are fueled. The kids conducted various experiments, like designing the external parts of a rocket using the canisters as rocket bodies. Before they *fueled* their rockets with Alka Seltzer, I had them draw their destination (planet) with chalk in the parking lot. They had to predict how much fuel their rocket needed to reach its destination. Then we added payload (small beads & paper clips) to the film canister.The children predicted how adding payload would factor into the fuel requirements for their rocket. After all the experiments, we discussed how NASA decides when to

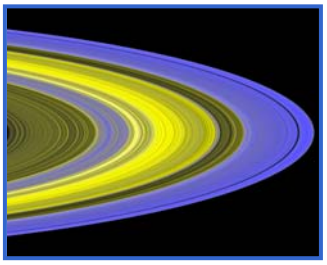
launch a rocket and what calculations are needed to launch a rocket to the Moon or Mars.

"In May I spoke to three 5th grade classes about volcanos and volcanic rocks. I took rock samples to pass around. The kids LOVED the rock samples! I covered the different types of volcanos with them, then the children got to make a volcano of their choice.

"This June, we did the Luna and Moona Lisa puppet show from *To the Moon and Beyond!* for the second time. We had over 60 participants. After the puppet show, the kids knew ALL the answers to the questions the puppeteers asked!! We also let them make a Moon mask after the show for fun."

Jackie has a blast learning and sharing about Earth and Space science with kids, teachers, and parents through the Explore! program! If you would like to contact Jackie for ideas or suggestions on how to enhance your programming through the use of Explore!, you may contact her at: jackies@carr.org

Slide Show: Cassini Does Rings Around Saturn



Lakes, geysers and gigantic storms. These are just a few of the surprises uncovered by NASA's Cassini spacecraft, which is studying Saturn, its moons and rings. A new slide show online at http://www.jpl.nasa.gov/multimedia/slideshows/cassini-200706/ highlights some of the most memorable images from the mission's third year at the ringed planet.

NASA International Polar Year (IPY)

Visit http://ipy.nasa.gov -- your one-stop shop for the latest NASA images and videos on polar exploration combined with a searchable storehouse of related information. This Web site is an essential resource for formal and informal educators interested in the 2007-2009 IPY.

Earth and Space Science Explorers Poster

This poster highlights some of the people featured in the NASA Earth Explorers and NASA Space Science Explorers series of articles on the NASA.gov education pages. Some of the explorers highlighted on this poster are still in school, and some are adults who have chosen science as a career. Download the Earth and Space Science

Explorers poster from the following location
http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Earth_and_Space_Science_Explorers_Poster.html

Google Moon
This Web site allows you to browse the features on the Moon, in commemoration of the first human landing on the Moon: http://moon.google.com/

Star Deck
Michael K. Shepard has produced a set of constellation cards and a Guide to the Constellations, free to educators to download and use. Available at
http://facstaff.bloomu.edu/mshepard/star_deck/star_deck.htm

New Children's Book Releases

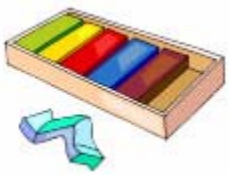
The following are recently released children's books focusing on a particular aspect of Earth or space science. Their inclusion is not intended as an endorsement.

Comets, Stars, the Moon, and Mars: Space Poems and Paintings
Douglas Florian, Harcourt Children's Books, 2007, ISBN 0152053727
The perfect combination of Arts and Science! Fun and catchy poems about solar system objects for ages 9-12, each of which is complemented by an artistic rendering.

Project Constellation (Pocket Space Guide)
Tim McElyea, Collector's Guide Publishing, Inc., 2007, ISBN1894959493
For ages 15 and up, this pocket guide explains NASA's program to replace the shuttle, Project Constellation, and the plans for future space flight.

Life on the Edge
Cherie Winner, Lerner Publications Co., 2006, ISBN 9780822524991
This book explores mysterious microbes that survive, and even *thrive,* in environments that would destroy the strongest of our species, and investigates the implications for the existence of life in alien worlds with similar conditions.

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!

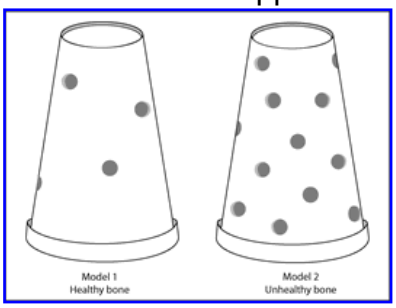
The following activity is the sixth in a series of activities on *Health in Space.* A more detailed version of the activity is available on the Health in Space Web site.

Bones of Contention!

What's Needed?	Who?
For each child: • 1 pencil (slightly sharpened) • 2 Styrofoam cups (the taller, the better)	Children ages 8-13 **How Long?** 15 minutes

Overview

In *Bones of Contention!* children make models representing bones on Earth and bones that have been in space. They discover what happens to bones without proper exercise and nutrition!



Preparation

- Younger children may need assistance poking holes in their cups
- Distribute the materials

Activity

- With the slightly sharpened pencil or stick, poke 5-8 holes, scattered randomly, in one of the cups, and about 25 holes in the other
- Label the cup with fewer holes *Bone on Earth* and the cup with more holes *Bone in Space*
- Stand each of the bones (cups) upside down on a flat surface
- Place your hand, palm down, on top of the Earth Bone and *gently* press down. *Is it difficult or easy to crumple?*
- Now, do the same to the Space Bone and observe how difficult or easy *it* is to crumple

In Conclusion

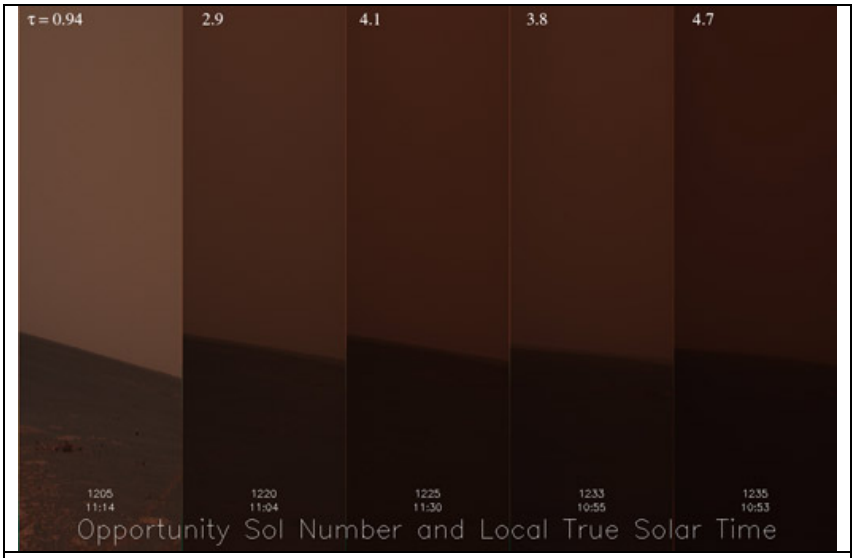
One of the biggest challenges facing space travelers is the loss of bone mass. Bones need physical stress (exercise!) to maintain their health. In microgravity, bones do not get the kind of workout that they do on Earth, and they deteriorate and fracture. To counteract this bone loss, astronauts must spend up to two hours every day exercising and they must get proper nutrition (for example, adequate calcium and vitamin D). And it is not just *astronauts* that need to get enough exercise and calcium. Kids on Earth do, too!

NASA Partners with AGI on 2007 Earth Science Week Earth Science Week is an initiative of the American Geological Institute (AGI). NASA is a partner in the tenth annual Earth Science Week, which will be celebrated Oct. 14-20. The 2007 theme, "The Pulse of Earth Science," will focus attention on geoscience research, such as that associated with the International Polar Year (IPY) and the International Year of Planet Earth (IYPE). Earth Science Week Toolkits include educational resources from AGI, NASA, NOAA, USGS, National Park Service, Smithsonian Institution, and other organizations. To order toolkits and learn about the latest plans for Earth Science week, go to http://www.earthsciweek.org/.

The Solar System and Beyond Webcast
The next program offered by NASA's Digital Learning Network will be September 17 at 12 pm Eastern Standard Time. The Solar System and Beyond focuses on NASA missions and exploration. Participants can choose between two concentrations of either solar system exploration or exploration of the universe. Pre-conference and post-conference activities are available on the Web site.
http://nasadln.nmsu.edu/dln/content/catalog/details/?cid=77

Mission News and Science

Scientists Keep an Eye on Martian Dust Storm
Modified from *http://www.asu.edu/news/stories/200707/20070711_themis.htm*



Time lapse photography shows Mars Rover Opportunity's skies darkening with dust.

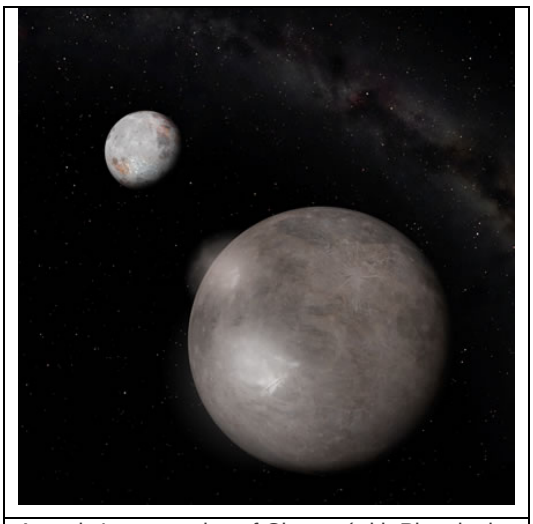
Scientists are monitoring a large dust storm on the Red Planet. The dust storm, which erupted during the last week of June, is affecting operations for all five spacecraft operating at Mars. The fleet includes two NASA rovers on the ground (Spirit and Opportunity), plus three orbiters, two of which belong to NASA (Mars Odyssey and Mars Reconnaissance Orbiter) and one to the European Space Agency (Mars Express). Beginning in the equatorial region west of Meridiani Planum, the storm moved into the heavily cratered southern highlands. It took roughly a week to grow large enough to spread around the planet south of the equator. Dust has now drifted into the northern hemisphere as well.

It is currently summer in the southern Martian hemisphere, when dust storms are more common. For nearly a month, a series of severe Martian summer dust storms has affected the rover Opportunity and, to a lesser extent, its twin, Spirit. The dust in the Martian atmosphere over Opportunity has blocked 99 percent of direct sunlight to the rover, leaving only the limited diffuse sky light to power it. Scientists fear the storms might continue for several days, if not weeks. Mars dust map images are available online at http://themis.asu.edu/dustmaps .

Water on Distant Planet
Modified from *http://www.esa.int/esaCP/SEMBDZI2O3F_index_0.html*
Scientists report the first conclusive discovery of the presence of water vapor in the atmosphere of a planet beyond our Solar System. Astronomers used data from NASA's Spitzer Space Telescope, analyzing infrared light as a previously discovered gas giant, HD189733b, passed in front of its star. As the gas giant's outer atmosphere passed in front of the star, the light seen showed that water vapor in the atmosphere absorbed some of the star light.

Even though this planet has water, it is not a good candidate for alien life. Instead of a rocky planet like Earth, HD189733b is a gas giant, bigger than Jupiter but extremely

close to its parent star, orbiting the star in only 2.2 days. Its atmosphere is almost 1,300 degrees Fahrenheit! Still, this discovery increases hopes for detecting water on rocky planets in the near future.



An artist's conception of Charon (with Pluto in the background). The plumes and brighter spots depicted at left on Charon are thought to be created as water and ammonia hydrate "erupts" from deep beneath the surface. Credits: Software Bisque. Loch Ness Productions, Sky-Skan, Inc.

Pluto's Moon Charon has Geysers
Modified from http://www.gemini.edu/icemachine

Astronomers have detected ice deposits on the surface of Pluto's moon Charon. The observations show fingerprints of fresh water crystals and some ammonia hydrates in patches on the surface, and suggest that liquid water mixed with ammonia from deep inside the moon is spewing onto its surface by geysers, through a process called cryovolcanism.

Charon is very cold, about -650 degrees Fahrenheit. That's too cold, one would think, for liquid water. In some thermal models of Charon, the antifreeze properties of ammonia result in reservoirs of liquid water deep beneath the crust. Some scientists suspect that heat from internal radioactivity creates a pool of melted water mixed with ammonia inside the ice shell. As the water sprays out through the crack, it freezes and immediately "snows" back down to the surface, creating bright ice patches that can be distinguished in near-infrared light.

Cryovolcanism in the outer solar system is a fairly common occurrence. Enceladus (a moon of Saturn) and Europa (orbiting Jupiter) both show evidence of water ice oozing or spewing out from beneath the surfaces. Enceladus and Europa are tidally squeezed by the gravitational forces of their giant planets and in some cases by large nearby moons. This forces water out through cracks. By contrast, Kuiper Belt Objects (KBOs) such as Charon, Quaoar, Orcus, and others are not tidally squeezed. Yet, they seem to show evidence of cryovolcanism.