

# Lunar Librarian Newsletter

## June 2006

### LRO News

PRESS RELEASE: 06-224

#### NASA SET TO LAUNCH LUNAR RECONNAISSANCE ORBITER IN 2008



After successful completion of its mission confirmation review on Wednesday, May 17, NASA's Lunar Reconnaissance Orbiter project has been given the authority to proceed to the implementation phase.

The confirmation review represents NASA's formal decision for authorizing additional work and sets the project's cost estimate. The mission was deemed to be within budget and on schedule to launch in October 2008.

After a 30-year hiatus, the orbiter represents NASA's first step towards returning humans to the moon. The spacecraft will spend an unprecedented year mapping the moon from an average altitude of approximately 30 miles. It will carry six instruments and one technology demonstration to conduct investigations specifically targeted at preparing for future human exploration.

The orbiter is being built at NASA's Goddard Space Flight Center in Greenbelt, Md. The instruments are being provided by various organizations throughout the U.S. and one in Russia. The instruments will generate a global map of the moon; to determine which potential landing sites are free from hazards; to measure light and temperature patterns at the moon's poles; to search for potential resources, such as water; and to assess the deep-space radiation environment and its potential effects on humans.

The next spacecraft milestone is the critical design review, scheduled for later this year. This review represents the completion of detailed system designs and marks the transition into the manufacturing, assembly, and integration phase of the mission development cycle.

For information about NASA's exploration efforts and the Lunar Reconnaissance Orbiter mission, visit: <http://www.nasa.gov/exploration>

## NASA News

### Ozone Garden at Goddard's Visitor Center

In April, the Aura Education and Public Outreach team installed the Aura Air Quality Garden at Goddard Space Flight Center's Visitor Center. Aura is an Earth Observing Satellite (EOS) that studies air quality. The ozone monitoring garden is full of plants that scientists have found to be ozone-sensitive. When exposed to high levels of ozone, each of these plants shows damage on their leaves. Older leaves have the most damage. Plants with ozone damage have very fine colored spots on the upper surfaces of their leaves, and some leaves also turn yellow. Currently, three species of plants reside in the garden – cut-leaf coneflower, cardinal flower, and white dogwood. The garden will be planted with Black-eyed Susan and common milkweed in the coming weeks. In addition to its use as an ozone monitoring station, the Aura Air Quality Garden will be used as a teaching tool for schools that visit Goddard. For more information on the use of plants as ozone monitors, please visit the Hands on the Land website.



[http://www.handsontheland.org/monitoring/projects/ozone/bio\\_mon.cfm](http://www.handsontheland.org/monitoring/projects/ozone/bio_mon.cfm)

### Science News

NASA Science News has published several articles last month. Please follow the links to read the full stories.

#### **The Pull of Jupiter**

Right now, Jupiter is having a close encounter with Earth. The giant planet is very bright in the night sky and looks terrific through backyard telescopes.

[http://science.nasa.gov/headlines/y2006/04may\\_jupiter.htm?list199364](http://science.nasa.gov/headlines/y2006/04may_jupiter.htm?list199364)

#### **Breathing Moonrocks**

The Moon has plentiful oxygen for future astronauts. It's lying on the ground. NASA researchers have developed a prototype device that can extract breathable oxygen from lunar soil.

[http://science.nasa.gov/headlines/y2006/05may\\_moonrocks.htm?list199364](http://science.nasa.gov/headlines/y2006/05may_moonrocks.htm?list199364)

#### **Long Range Solar Forecast**

The Sun's "Great Conveyor Belt" has slowed to a record-low crawl, which has important implications for future solar activity: Solar Cycle 25 peaking in 2022 could be one of the weakest in centuries. [http://science.nasa.gov/headlines/y2006/10may\\_longrange.htm?list199364](http://science.nasa.gov/headlines/y2006/10may_longrange.htm?list199364)

### **In Search of Crater Chains**

What happens when a fragmented comet hits the surface of a planet? It makes a chain of craters. Researchers are looking for evidence of these crater chains here on Earth--and finding them in some unexpected places.

[http://science.nasa.gov/headlines/y2006/12may\\_craterchains.htm?list199364](http://science.nasa.gov/headlines/y2006/12may_craterchains.htm?list199364)

### **Hard-nosed Advice to Lunar Prospectors**

A 22-year veteran of prospecting and mining on Earth has some no-nonsense advice for lunar explorers. [http://science.nasa.gov/headlines/y2006/22may\\_beaty.htm?list199364](http://science.nasa.gov/headlines/y2006/22may_beaty.htm?list199364)

### **Good News and a Puzzle**

Earth's ozone layer appears to be on the road to recovery, but the reasons why aren't fully understood. [http://science.nasa.gov/headlines/y2006/26may\\_ozone.htm?list199364](http://science.nasa.gov/headlines/y2006/26may_ozone.htm?list199364)

### **An Alignment of Stars and Planets**

Something remarkable is about to happen in the evening sky. Three planets and a star cluster are converging for a close encounter you won't want to miss.

[http://science.nasa.gov/headlines/y2006/30may\\_starsandplanets.htm?list199364](http://science.nasa.gov/headlines/y2006/30may_starsandplanets.htm?list199364)

## **Librarian News**

Here's what's going with some of the librarians who participated in the workshops

### **Delaware:**

Milton Public Library partnered with ILC-Dover to present an outreach program on Space Day, Wednesday, May 3, 2006. Approximately 40 children, ages 3-5, participated in the program. The guest speaker was Janet Ferl, a Design Engineer at ILC-Dover.

### **Maryland:**

In Harford County, science programming may become a big initiative.

### **Pennsylvania:**

After the workshops in February, Bethel Park Public Library held a space program for teens. "The teens enjoyed making the lunar modules out of a variety of foods and icing. Of course they ate them!"

Eccles-Lesher Memorial Library held a LRO day. Their activities included: the story of how the Moon was formed, making craters, discussion about LRO and making one out of food, building and launching rockets.

## **Upcoming:**

Bethel Park Public Librarians are planning on having space programs with a women's shelter. They are planning on doing several of the activities from the workshops. The actual age range of the children who may attend is unknown.

Pittston Memorial Library is planning on having space programs the week of July 17<sup>th</sup>.

Dillsburg Area Public Library is planning a four week space camp, independent of their usual summer activities. They are planning on having a geologist and a former teacher speak.

## **What's going on at your library??**

Email Heather, [heather\\_weir@ssaihq.com](mailto:heather_weir@ssaihq.com), with your library's space program activities by June 20, and it will be included in the next Lunar Librarian Newsletter.

## **Did you know?? Where can I find??**

### **Lunar Soil Simulants:**

The Lunar soil, used at the workshop, was purchased through ORBITEC. They offer both Lunar and Mars simulants. Their website is: <http://www.lunarmarssimulant.com/>. The contact person Becky used is:

Marty Gustafson  
ORBITEC  
[gustafsonm@orbitec.com](mailto:gustafsonm@orbitec.com)  
(608) 229-2787  
<http://www.lunarmarssimulant.com/>

## **Monthly Lunar Activity**

### **“How big is the Moon? How far away is the Moon?”**

#### **Purpose**

These questions are often asked by children, but do they really understand the answers? This activity takes a look at helping children better understand the size difference between the Earth and the Moon. Also, children will gain a better understanding of how far away the Moon's orbit is from the Earth.

## Material

- Images of the Earth and Moon.  
You may want to laminate these images.
- 13 feet of string, marked in 1 foot intervals.  
You may want to tie a knot at the '0' and '13' foot marks.

## Overview

### *Comparing the Moon to the Earth*

The Moon is 3476 km or 2159.89 miles in equatorial diameter. The Earth on the other hand is 12756 km or 7926.21 miles in equatorial diameter. So the Moon is approximately 73% smaller than the Earth. At the end of the activity, you will find images of the Moon and of the Earth scaled down to 3.476 cm and 12.756 cm respectively. This scaling allows children to better understand how much bigger the Earth is than the Moon.

### *Are we there yet?*

Did you know the Moon is 384,400 km or 238,855 miles from the Earth! It will take LRO about **4 days** to get to the Moon. This is such a great distance, but it's difficult to truly comprehend. By using the scaled images, children will be able to better understand how far away the Moon is from the Earth. In this portion of the activity the scaled distance from the Earth to the Moon would be 12.6 feet.

## Activity

Invite the children to guess how far away they think the Moon would be from the Earth if they were the size of the images. Have one child hold one end of the string with the Moon at the zero point. Ask them to walk away from the image of the Earth that you are holding until they have reached the distance they think would be comparable to the actual distance. (As the facilitator, hold the string carefully, but not obviously, between the 12 and 13 foot markers. If you have all the string gathered up, it makes it a little more difficult for the children to figure out where they expect you to say stop.) In most cases, children guess a lot closer to the Earth than what it really is. Have the child continue to extend the string by walking further from the image of the Earth until the distance between the two images is 12.6 feet.

Depending on the age of the children involved in this activity, they may or may not know about the International Space Station (ISS). Once they have completed the above portion of the activity, have them estimate where the ISS would be located in comparison to the Earth. The ISS is 360 km above the Earth's surface. On the scale used in this activity, it would be located approximately .14 inches from the Earth.

