



Lunar Librarian Newsletter

November 2008

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LRO News



Thermal Vacuum Testing

In November, LRO thermal vacuum testing continued. We completed balance testing, where we confirm the performance of our temperature control system. We reconfigured the chamber for cycling, hooking up extra equipment to the Orbiter in order to perform a full set of electrical testing. Currently, LRO is back under vacuum.

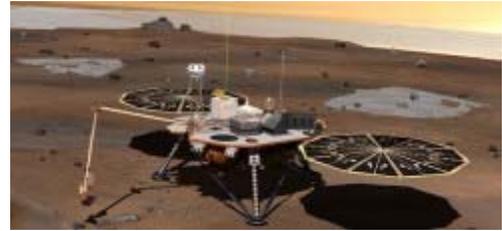
Our balance testing uncovered a mistake in the analysis of the power dissipated in the solar array gimbals. Our gimbals were getting much hotter than we expected, so we will add an extra radiator and test it out after Thanksgiving. We have also worked through a couple other problems uncovered by the rigors of the thermal vacuum test. Overall, the Orbiter is doing well. We have completed hot cycle #1, and some operations testing. We are currently executing cold cycle #2. We will perform four cycles.

The orbiter in the thermal vacuum chamber, above. The -X end of the spacecraft has red covers over the thrusters. The high-gain antenna (HGA) boom is in its deployed configuration. The Orbiter's z-axis is pointed down, just like it will be in orbit around the moon. Behind, you can see some scaffolding that was used during the set-up, with the wall of the chamber behind that. A bag covers the HGA, the boom, and the Orbiter to keep the flight hardware clean. The bagging was removed just before pump-down.

NASA News

Mars Phoenix Lander Mission on the Red Planet has Come to an End.

After more than five months of operation, NASA's Phoenix Mars Lander has stopped communicating with NASA's Mars Odyssey orbiter on November 2nd. The last communication from Phoenix was a brief signal. This was an anticipated event due to the decline in sunlight at the arctic landing site. With the reduction of sunlight, the solar arrays are unable to collect the power necessary to charge batteries that operate the lander's instruments. The sunlight was also limited by a dustier sky, more clouds and colder temperatures as the northern Mars summer approaches autumn.



The Phoenix Lander launched on August 4, 2007 and landed on Mars' northern hemisphere May 25, 2008. Its landing was farther north and any previous spacecraft has landed on the surface of Mars. Phoenix Lander dug, scooped, baked, sniffed and tasted the Red Planet's soil. As a result, the presence of water-ice on the Martian subsurface was confirmed, initially detected by NASA's Mars Odyssey orbiter in 2002. More than 25,000 pictures of sweeping vistas to near the atomic level using the first atomic force microscope ever used outside Earth were taken by the Phoenix cameras.

Phoenix's preliminary science goal was the study of the Martian arctic environment and if it would be favorable for microbes. "Findings include documenting a mildly alkaline soil environment unlike any found by earlier Mars missions; finding small concentrations of salts that could be nutrients for life; discovering perchlorate salt, which has implications for ice and soil properties; and finding calcium carbonate, a marker of effects of liquid water."

These findings also support the quest for learning about the history of water on Mars. This was accomplished by excavating soil above the ice table, revealing at least two distinct types of ice deposits; observing snow descending from clouds. The Martian weather was also observed in coordination with NASA's Mars Reconnaissance Orbiter performing simultaneous ground and orbital observations on a mission-long weather record, with data on temperature, pressure, humidity and wind; observations of haze, clouds, frost and whirlwinds;

"Phoenix provided an important step to spur the hope that we can show Mars was once habitable and possibly supported life," said Doug McCuistion, director of the Mars Exploration Program at NASA Headquarters in Washington. "Phoenix was supported by orbiting NASA spacecraft providing communications relay while producing their own fascinating science. With the upcoming launch of the Mars Science Laboratory, the Mars Program never sleeps." http://phoenix.lpl.arizona.edu/11_10_pr.php

Science News



NASA Science News has published several articles last month. Please follow the links to read the full stories. Check out our RSS feed at <http://science.nasa.gov/rss.xml>!

Solar Cycle Update: The Sun Shows Signs of Life

A flurry of new-cycle sunspots in October 2008 may signal the beginning of the end of Solar Minimum. http://science.nasa.gov/headlines/y2008/07nov_signsoflife.htm?list907815

NASA Begins Hunt for New Meteor Showers

NASA astronomers have set up a monitoring station to scan the night sky for unknown or unexpected meteor showers--and they're finding more than they bargained for. In only two months of observing, the newly commissioned system has captured a flurry of meteors from an unknown comet and an object from the asteroid belt exploding like 500 lb of TNT. See the movies in today's story. http://science.nasa.gov/headlines/y2008/10nov_sentinel.htm?list907815

Hubble Directly Observes a Planet Orbiting Another Star

NASA's Hubble Space Telescope has taken the first visible-light snapshot of a planet circling another star. The planet, called 'Fomalhaut b', orbits the bright southern star Fomalhaut located 25 light-years from Earth. http://science.nasa.gov/headlines/y2008/13nov_fomalhaut.htm?list907815

Discovered: Cosmic Rays from a Mysterious, Nearby Object

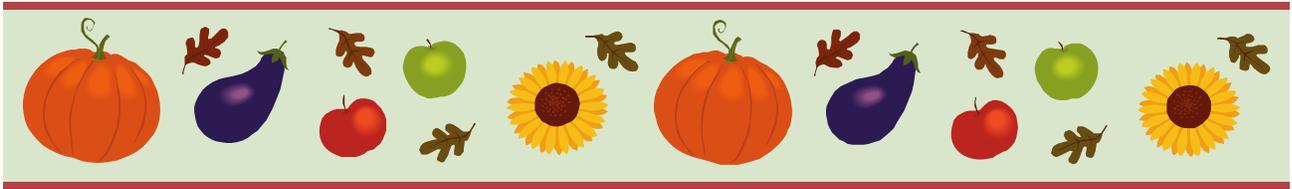
An international team of researchers has discovered a puzzling surplus of high-energy electrons bombarding Earth from space. The source of these cosmic rays is unknown, but it must be close to the solar system and it could be made of dark matter. http://science.nasa.gov/headlines/y2008/19nov_cosmicrays.htm?list907815

Solar Wind Rips Up Martian Atmosphere

The solar wind appears to be ripping big chunks of air from the atmosphere of Mars. This could help solve a longstanding mystery about the Red Planet. http://science.nasa.gov/headlines/y2008/21nov_plasmoids.htm?list907815

Spectacular Conjunction

Venus and Jupiter are converging for a spectacular three-way conjunction with the crescent Moon, a rare gathering some astronomers are calling 'the sky show of the year.' Today's story tells when and where to look. http://science.nasa.gov/headlines/y2008/24nov_skyshow.htm?list907815



Librarian News

The LRO EPO team will soon be sending out the request for information pertaining to LRO's launch. As of right now, the official launch date is **April 24, 2009**. Please note this may change.



Links of the Month...

- **DEM: DOWNLOADING AND ANALYZING.** This 20-page step-by-step lesson walks a user through downloading a Digital Elevation Model from the USGS seamless data server, formatting it, projecting it, and using it within a 2-D ArcMap session and a 3-D session using 3-D Analyst. In addition, National Land Cover Data (NLCD), Digital Orthophotoquads (DOQ), and Digital Raster Graphic (DRG) data are also downloaded and used. Derivative products are created from the data, including contour lines, slope, aspect, hillshade, and TIN. Software: ArcGIS 9.2 with Spatial Analyst and 3D Analyst.
http://edcommunity.esri.com/arclessons/search_results.cfm?id=367
- **ORION MODEL.** Here are three websites that have directions for making a model of the constellation Orion, showing that the stars we see in the constellation are really nowhere near each other.
 - <http://www.astrosociety.org/education/publications/tnl/21/constellations2.html>
 - http://www.haydenplanetarium.org/downloads/universe/activities/3-D_Constellation_Modeling.pdf
 - http://www.space.com/spacewatch/070124_ns_far_constellations.html
- **A GLOBAL MAP OF HUMAN IMPACTS TO MARINE ECOSYSTEMS,** National Center for Ecological Analysis and Synthesis. Many people may wonder what happens in the vast stretches of the world's oceans. For some, it is simply a matter of "out of sight, out of mind". Fortunately that is not the attitude at the National Center for Ecological Analysis and Synthesis at the University of California, Santa Barbara. For one of their latest projects, they decided to estimate and visualize the global impact humans are having on the ocean's ecosystems. Visitors to the site can view the map, learn about the methodology used to create the map, and also read about their datasets. Their findings were also recently reported in Science magazine, and users can view supplementary findings which appeared in that piece. As it stands, this map provides "critical information for evaluating where certain activities can continue with little effect on the oceans, where other activities might need to be stopped or moved to less sensitive areas, and where to focus efforts on protecting the last pristine areas."
<http://www.nceas.ucsb.edu/GlobalMarine>

Monthly Activity

Sweat It Out

The activity is from NASA's **Kids Science News Network™**

<http://ksnn.larc.nasa.gov/activity/activity.cfm?unit=phoenix2&concept=life%20science&enterprise=&title=Is%20water%20important%20for%20all%20living%20things?>

Background information is available at: <http://ksnn.larc.nasa.gov/webtext.cfm?unit=phoenix2>

This activity is modified and used with the permission of the [AIMS Education Foundation](http://aimsedu.org) (<http://aimsedu.org>). Find it in the AIMS Publication, Jaw Breakers and Heart Thumpers.

BACKGROUND

Liquid water is critical to the survival of most living things. In some organisms, up to 90% of their body mass comes from water. Many fruits and vegetables are more than 75% water.

PURPOSE

To analyze and compare a variety of fruits and vegetables based upon the mass of water in these foods

MATERIALS

For each student:

Data Collection Chart -- (design this chart as a class prior to the activity)

For each group:

Balance

wax paper

paper plates

a variety of fruits and vegetables

For the teacher:

potato peeler and/or sharp knife

PROCEDURE

Part One

1. As a group, discuss the fruits and vegetables you'd like to use for this experiment.
2. Ask students to bring in the foods.
3. Begin this experiment on a Monday or Tuesday so that students may make at least daily observations.

Part Two

1. Discuss setting constants for this experiment. As a group, decide whether you're going to peel each fruit and vegetable. Cut slices from each fruit and vegetable for your test samples.
2. Before beginning the experiment, predict which foods will lose the most mass due to water loss.
3. Demonstrate how to use the balance to measure the mass of the wax paper and paper plate. Place the wax paper on the paper plate so the paper plate doesn't absorb water from the sample.
4. Record the mass of the wax paper and paper plate. The mass will be a constant.
5. Give each group several slices of a food sample to observe and measure.
6. Students should record these observations in the data collection chart.
7. For at least four days, students will make daily observations of the food sample. They will not only describe any changes to the sample but will measure the sample daily.
8. Calculate daily changes in the mass of the food samples.
9. Graph these results.

CONCLUSIONS

1. What did you and your classmates do to keep the testing conditions the same? (Controlling variables)
2. Why is it important to keep testing conditions the same way?
3. How did the mass of the foods change? What caused these changes?
4. Organize the foods that were tested to show those that lost less water compared to those that lost the most water. Based upon this list, predict what other foods might lose as much mass.
5. Since human beings have a high percentage of water in their bodies, how do we replace water that is lost through sweating?

EXTENSIONS

1. Calculate the average loss of water for each food.
2. What foods should lose the least amount of water? Create an experiment to test water loss.
3. Find out about food the astronauts eat in space.
4. Explore the effect of temperature on the mass loss of fruits and vegetables.