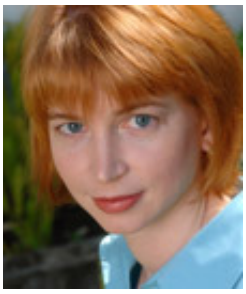
The Planetary Society Blog
By Emily Lakdawalla



Welcome to The Planetary Society's Blog, a guide to interesting stuff going on in space science, space exploration, and space advocacy. Have any comments? Send an email!

From May 4 to July 31, 2009, The Planetary Society Weblog will feature a variety of guest bloggers from around the world of space exploration, as Emily Lakdawalla will be on maternity leave.

We hope you enjoy hearing from these different voices.

Guest blogger schedule »

RSS 2.0

Weblog Archive

Jun. 17, 2009 | 08:54 PDT | 15:54 UTC

LRO's Eye on the Moon

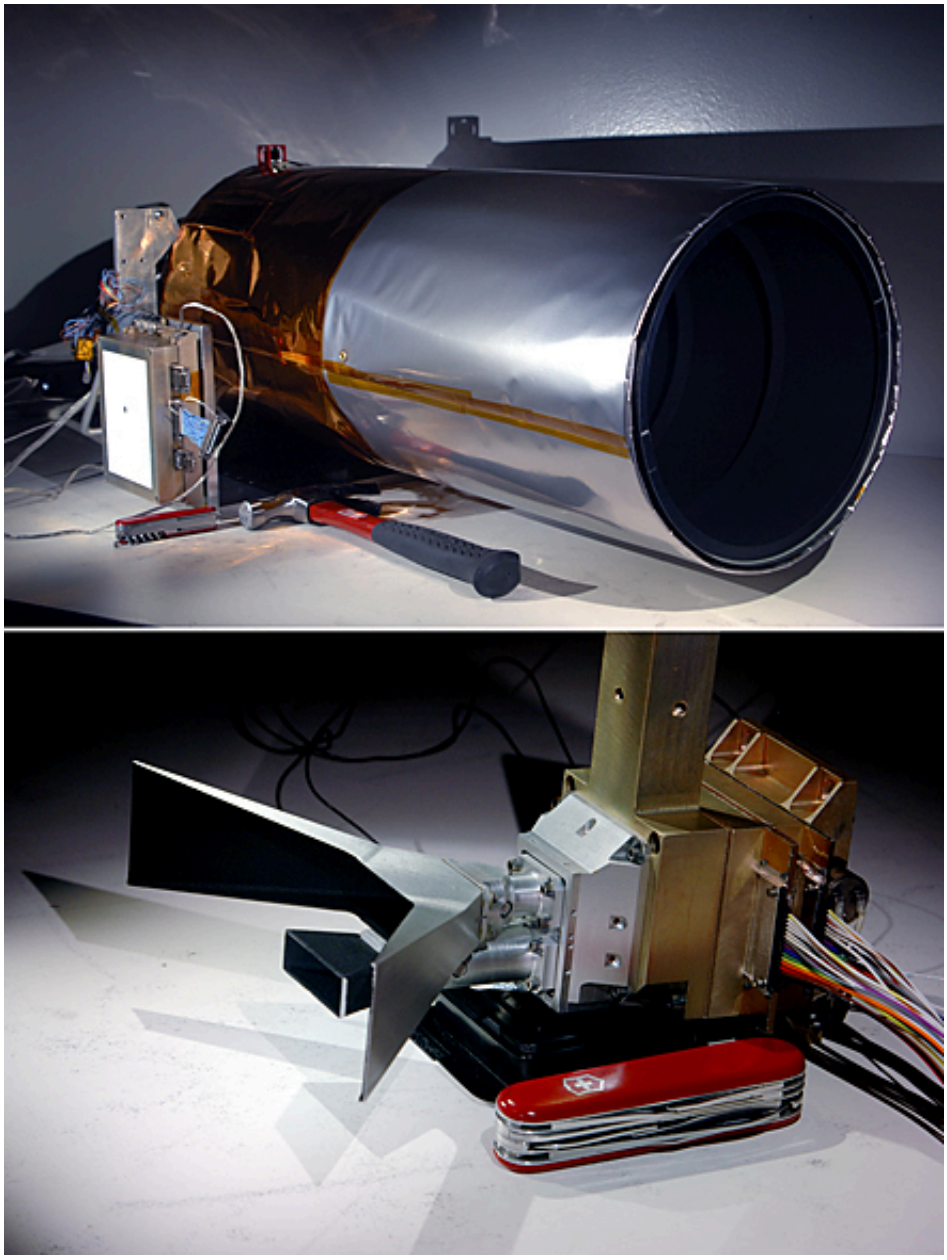
Permalink: http://www.planetary.org/blog/article/00001989/

by Timothy Reed

Since I have an intellectual and professional passion for high resolution optical systems that travel to other worlds, I'm excited by Thursday's anticipated launch of the Lunar Reconnaissance Orbiter and its complement of instruments, including the Lunar Reconnaissance Orbiter Camera (LROC) that will capture select portions of the Moon's surface at 0.5-meter resolution.

The LROC consists of three components, a Wide Angle Camera (WAC) and two Narrow Angle Cameras (NACs), built by Malin Space Science Systems of San Diego, CA.

On Monday I wrote about the gravity issues that can affect high-resolution imagers, and the photos I included may have left you with the impression that all high-resolution optical systems that are launched into space are very large pieces of hardware. Below are photos of the LROC NAC and WAC.



LROC Cameras

Above: Narrow Angle Camera, Below: Wide Angle Camera.
Credit: Malin Space Science Systems, Inc.

As you can see, the higher-resolution NAC is about 10 inches in diameter and 2 feet long, and the WAC is downright tiny! In general, you can roughly gauge the maximum resolution of an optical system by the size of its aperture--the bigger the aperture, the higher the resolution. For comparison, the HiRISE imager aboard the Mars Reconnaissance Orbiter (MRO) has an aperture of 500mm, while the NAC has an aperture of 195mm, but they can both (roughly) resolve something the size of a beach ball. What's the difference that allows a much smaller instrument to provide approximately equal resolution? Because LRO is orbiting the Moon at a pulse-pounding 50 km altitude!

MRO orbits Mars at about 300km altitude, and as such stays above the atmosphere which, while very thin and tenuous, is sufficient to slow the spacecraft at low enough altitudes. In fact, the atmosphere was useful in that respect--MRO's orbit was

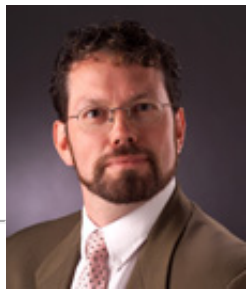
circularized on arrival at Mars by dipping into the Martian atmosphere over the course of 550 orbits with a minimum altitude of about 100km. But the Moon's lack of atmosphere allows LRO to zip over the surface at half that altitude. The LROC NAC cameras can have a lower angular resolution and still acheive comparable spatial resolution because the objects they are imaging are so much closer.

The LROC cameras derive heritage from similar instruments also built by Malin Space Science Systems, currently aboard MRO. The WAC derives heritage from the Mars Color Imager (MARCI) and the NAC from the Context Camera (CTX). On MRO, MARCI and CTX provide lower-resolution, wider-field images. As an engineer, though, I understand the meaning of heritage--it means "We only had to change a few thousand things."

When it comes to images from other worlds, I'm familiar with the profound sense of awe and inspiration that a handful of pixels can produce. I had the good fortune to work assembling and testing the Pancam Mast Assemblies for both Mars Rovers, as well as the HiRISE imager. The much-published image of Victoria Crater with the Opportunity Rover at its edge was very rewarding and professionally satisfying for me--a piece of hardware I built was taking a picture from orbit of another piece of hardware I built *on another planet!* One of the products that will come out of the LROC will be images of the Apollo hardware left there 40 years ago. LROC will not only provide site certification, morphology, topography, and mapping, but I expect a little thrill of involuntary nostalgia and reverie (reminiscent of the madeleines in Proust's *Remembrance of Things Past*) when I view those small bunches of pixels showing the Apollo LEMs.

Much more has been written on the mission objectives, specifications, and details of LROC and LRO than I can summarize here--some excellent web resources detailing LROC are the LROC page at Malin Space Science Systems, an extended abstract (PDF) from the Lunar and Planetary Institute, Houston, TX, and a specifications page from Arizona State University. Information about all of LRO's instruments and mission objectives can be found at LRO Overview: The Instrument Suite and Mission (PDF) and an excellent article from Herbert J. Kramer's *Observation of the Earth and its Environment*.

Timothy Reed is an optical engineer living in Boulder, Colorado. He worked for 20 years developing spaceflight imaging systems and was a major contributor to HiRISE, JWST, NICMOS, QuickBird, Space Shuttle microgravity payloads, and the Pancam mast on the Spirit and Opportunity rovers. He is currently working in the field of holographic optical data storage, and pursuing graduate studies in atmospheric science at the University of Colorado. Timothy has acted in classical theatre for several decades, won medals in luge competitions, and been the voice of a cartoon character.



Jun. 16, 2009 | 21:29 PDT | Jun. 17 04:29 UTC

Space Politics Alert: U.S. Human Space Flight Plans Committee

Permalink: http://www.planetary.org/blog/article/00001988/

by Charlene M. Anderson

The Review of U.S. Human Space Flight Plans Committee, chaired by Norm Augustine, is holding its first public meeting on June 17, from 9 am to 5 pm, EDT – and you can watch it live over the Internet.

This is the group taking an independent look of NASA's human space flight plans, including the Constellation program and the choice of launch vehicles to take people to the International Space Station, the Moon, and Mars. The Obama Administration will use the committee's findings to help determine if their space policy will change the direction set by the Bush Administration in their 2004 Vision for Space Exploration.

NASA TV will be web-casting the meeting at:
http://www.nasa.gov/ntv

You can also watch it on Ustream:
http://www.ustream.tv/nasatelevision

In an early round of congressional review, NASA's 2010 exploration budget was cut by $670 million, pending the Augustine committee's deliberations. The White House has asked them to report their findings in August, so events are moving fast, and each meeting could be critical to the final outcome.

The Planetary Society has already submitted to the committee our vision for the future, outlined in Beyond the Moon: A New Roadmap for Human Space Exploration, created with input from a team of space experts and our members.

So, watch the Augustine committee meeting, if you can. For more background, visit the committee's official web site at http://www.nasa.gov/offices/hsf/home/index.html.

Jun. 16, 2009 | 09:12 PDT | 16:12 UTC

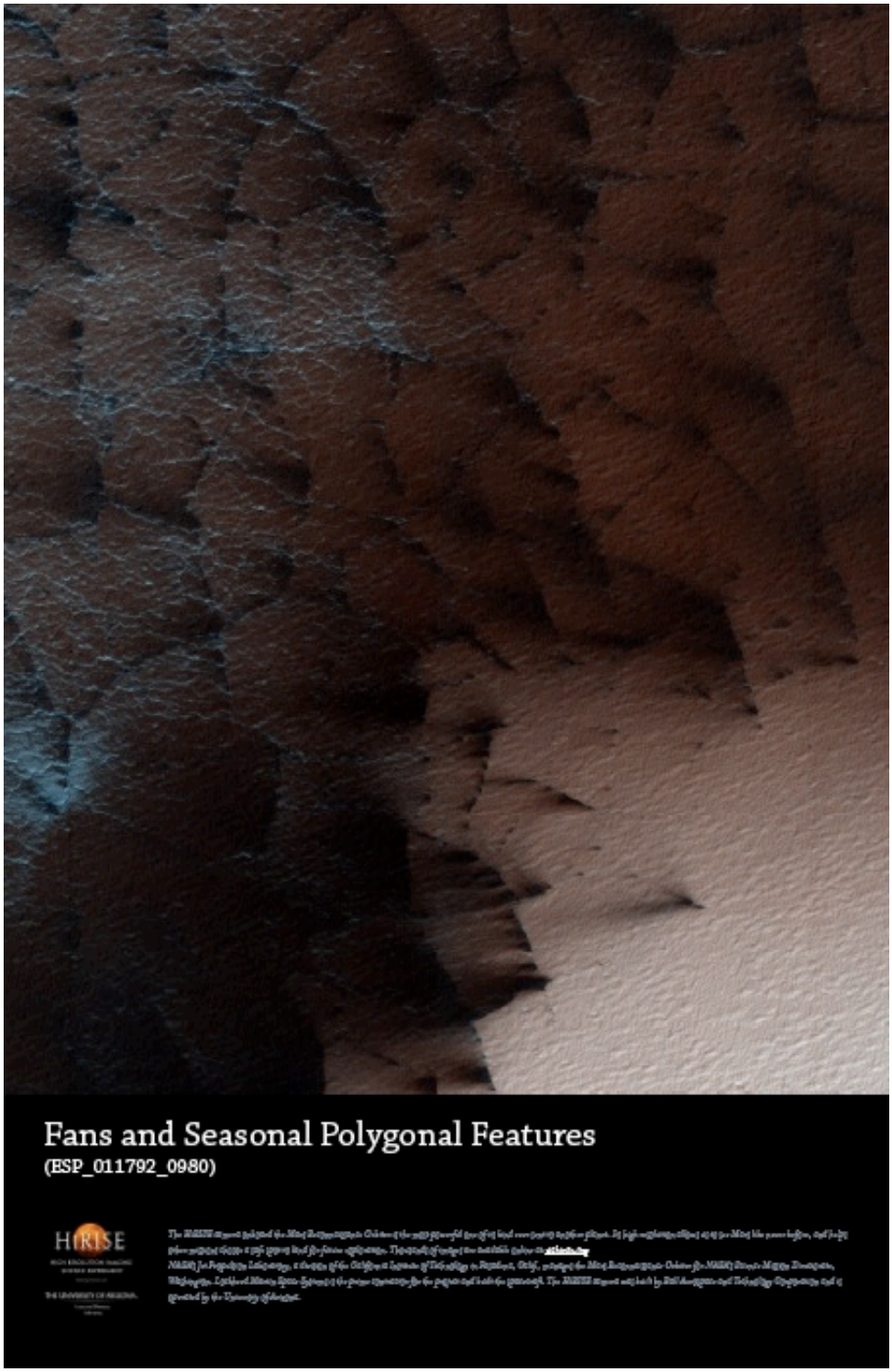
HiFlyers

Permalink: http://www.planetary.org/blog/article/00001987/

by Timothy Reed

The HiRISE website is one of my regular stops when I need my fix of planetary images. And if you like to surround yourself with samples of the latest releases of images from Mars, the HiRISE Team has made available a series of "HiFlyers"--11x17 color PDF posters that you can print. These little snippets of the landforms of an alien world are beautiful just by themselves as abstract art, but are interwoven--for me, at least--with the pride of accomplishment and the excitement of scientific discovery and exploration.

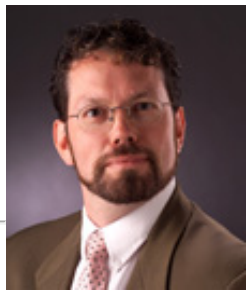
Images like this remind us what we can do.



HiFlyers Posters

11x17 inch RGB-color PDF posters like this are available from the HiRISE web site. Credit: NASA / JPL / University of Arizona

Timothy Reed is an optical engineer living in Boulder, Colorado. He worked for 20 years developing spaceflight imaging systems and was a major contributor to HiRISE, JWST, NICMOS, QuickBird, Space Shuttle microgravity payloads, and the Pancam mast on the Spirit and Opportunity rovers. He is currently working in the field of holographic optical data storage, and pursuing graduate studies in atmospheric science at the University of Colorado. Timothy has acted in classical theatre for several decades, won medals in luge competitions, and been the voice of a cartoon character.



Jun. 15, 2009 | 16:44 PDT | 23:44 UTC

LRO & LCROSS: 1 Day Launch Delay

Permalink: http://www.planetary.org/blog/article/00001986/

by Ken Kremer

NASA managers decided today to delay by one day the June 17 dual launch of the Lunar Reconnaissance Orbiter (LRO) and Lunar Crater Observation and Sensing Satellite (LCROSS) in order to accommodate a postponed launch attempt by Shuttle Endeavor. The lunar pair are now set to blast-off together on board an Atlas V rocket on Thursday, June 18, from Cape Canaveral Air Force Station, Florida. There are three late afternoon launch opportunities at 5:12 PM, 5:22 PM and 5:32 PM EDT.

The change in plans is due to overlapping launch windows for LRO/LCROSS and the likewise high priority STS-127 Space Shuttle Endeavour construction flight to the International Space Station. The conflict arose when the June 13 launch of Endeavour was scrubbed in the final hours of the countdown because a leak was discovered in the gaseous hydrogen venting system outside the shuttle's external fuel tank. The system is used to carry excess dangerous hydrogen safely away from the launch pad and prevent an explosion.

The launch windows for both missions are extremely tight and closes for both after Saturday June 20. Generally a turnaround time of 48 hours is required between launches to reconfigure all telemetry and tracking systems and hardware on the Air Force Eastern range to support a launch. The best way to maximize launch opportunities for both missions is by attempting a morning launch for Endeavour on June 17 and an afternoon launch of LRO on June18.

Endeavour's leak is similar to what happened during the first launch attempt of shuttle Discovery's STS-119 mission in March. Technicians are using the same repair method, which led to Discovery's successful launch on its next attempt. Internal seals in the Ground Umbilical Carrier Plate (GUCP) are being changed out. GUCP is attached to the external tank. The repair work is going well and the countdown should resume at 1:15 PM Tuesday afternoon at the T-11 hour point.

The current weather outlook for LRO launch on June 18 is 60% favorable due to possible afternoon thunderstorms and cumulous clouds. Launch processing is underway. If liftoff is postponed to Friday, the launch times are 6:41PM, 6:51PM and 7:01 PM. Saturday's opportunities are 8:08 PM, 8:18 PM and 8:28 PM. All times EDT.

Click to enlarge >

LRO / LCROSS Ready To Go

Technicians completed connections between the LRO and LCROSS spacecraft and the Atlas V rocket at Launch Complex 41 at Cape Canaveral Air Force Station in Florida.
Credit: NASA / Dimitri Gerondidakis

Check out my earlier reports: LRO & LCROSS Up-Close Tour, LRO & LCROSS Up Close Tour: Part 2, Hunting for Lunar Water and LRO & LCROSS Up Close Tour: Poised on Atlas V Rocket at Launch Complex 41

Browse the Weblog Archive »

We need your help.
Please donate to support our blog, website, and podcast.

Sign up for email updates!

Email address: Subscribe

(optional) Your name: