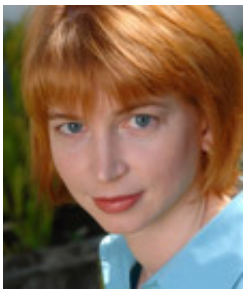
The Planetary Society Blog
By Emily Lakdawalla



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 »

Weblog Archive

May. 7, 2009 | 10:53 PDT | 17:53 UTC

NASA 2010 Budget: Strong Support for Science and Exploration
Permalink: http://www.planetary.org/blog/article/00001930/

by Susan Lendroth

Planetary Society board members gave a thumbs up to the proposal for NASA's 2010 budget that was released today, with Executive Director Lou Friedman commenting that the Administration's "strong support for science and exploration makes it clear that President Obama indeed wants the American space program to inspire the world with new discoveries."

From increased funding for Earth science to development of the new Ares/Orion launch vehicles to robotic missions to other worlds, the new budget encompasses a broad and robust exploration program. However, the one area where we would have liked greater emphasis was Mars exploration. As Planetary Society President Jim Bell said, "It is the only other world capable of supporting life that is within the reach of human explorers; the planet should be the target of a robust robotic program to pave the way for future human missions." Read more.

May. 5, 2009 | 14:47 PDT | 21:47 UTC

Take us to our leader...
Permalink: http://www.planetary.org/blog/article/00001929/

by Jim Bell

Jim Bell joined The Planetary Society's Board of Directors in 2005 and became President of the Board in 2008. A professor of astronomy at Cornell University, Bell is also the lead scientist for the Pancam color imaging systems on the Mars Exploration Rovers. Find out more about Jim

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NASA seems like a ship adrift in the doldrums these days. Since past Administrator Mike Griffin stepped down along with most other high-level Bush Administration officials in January, NASA has been led by Acting Administrator Chris Scolese. I don't personally know Chris, but from all accounts that I've read and heard he appears to be doing a capable job trying to keep the agency moving towards the goals set out by the previous Administration, while trying to anticipate how those goals will change in the new Administration. However, in the absence of specific new announced NASA policy objectives, and given the present and near-term fiscal climate in Washington, Chris' job must seem relatively impossible. Despite the challenges, though, he seems determined to soldier on: responding forthrightly

to requests for Congressional testimony, paying careful attention to shuttle and other flight projects, and trying to buoy morale throughout the space community. He's clearly passionate about his work, and about space exploration. But Chris's position right now is only as a caretaker. Like the rest of us, he's waiting for a new Administrator to be chosen.

The Administrator of NASA is nominated by the President and must be confirmed by the Senate, just like other Administrators of major Federal agencies and Cabinet-level officials (although NASA doesn't have a seat on the Cabinet). I find myself wondering why the Obama administration hasn't gotten around to this yet. Is NASA just not that important to the President, or to the country? While I'm biased, of course, that seems hard for me to believe. I recall watching speeches where Mr. Obama recalls fondly going to see, as a child, the Apollo lunar astronauts return to port in Honolulu after splashdown. There's a twinkle in his eye when he tells the story -- the magnitude of the endeavor for our species, and the sheer heroism of the astronauts themselves, clearly made an impression on him when he was young. He knows that we need to push ourselves out into the space frontier. He knows that the world needs such heroes. He seems to get it. Why, then, the delay in putting someone at the helm to lead our nation in this enterprise?

I've read that part of the "problem" has been Congressional dissatisfaction with some of the individuals who have been vetted by the Obama Administration as potential nominees. For example, it was widely reported not too long ago that Senator Bill Nelson from Florida has a sort of "litmus test" for the NASA Administrator, requiring him or her to be a strong advocate of human spaceflight. Of course one can never know how accurate such reports are, but if true it is perhaps not surprising -- Senator Nelson was a Shuttle astronaut himself, and obviously there are a large number of space-related jobs and businesses in Florida. His motivation might be to "look out for his own" on many levels, then. While it is the responsibility of every member of Congress to look out for their constituents in ways like this, at some point one has to wonder whether the potential negative impacts at NASA of the lack of direction and clear Presidentially-approved leadership offset any gains that individuals in Congress might hope to achieve by getting "their guy" promoted to the top.

Maybe a more pragmatic concern that I have about this delay in picking the NASA Administrator relates to the fact that the proposed NASA budget for fiscal year 2010 has been formulated over the past few months in the absence of input and guidance from this new Administrator. The details of that new NASA budget are going to be announced very soon. I'd like to imagine that Chris Scolese and his cadre of Associate Administrators have been helping to formulate this budget in some detail -- almost certainly with the guidance and support of key individuals in the White House, Office of Management and Budget, and even the Office of the Science Advisor. This new budget will be the first tangible, public expression of how the President views NASA (and especially whether NASA will be seen as having a role in the President's top key areas of energy and education), and how the Administration intends to change (or not) the priorities of the agency. Developing these policies and budgets without inputs from and the approval of a permanent Administrator could make it very awkward for whomever is eventually chosen to enthusiastically and aggressively implement those policies, making it difficult for that person to actively work towards getting that budget approved in Congress.

Maybe the plan will be to promote Chris Scolese to permanent Administrator, or to nominate someone else who has indeed been active behind the scenes in formulating the new proposed budget. That would help to alleviate the potential awkwardness of bringing in a new person who wasn't involved in putting "the new plan" together. Maybe it's all been figured out by clever people with political savvy who know what they're doing and are doing it this way in the best interests of NASA and the country. Maybe their marketing and PR people are telling them to wait to announce the new Administrator until the President makes a big splash speech in July to commemorate the 40th anniversary of the Apollo 11 Moon landing. Honestly, I don't have a crystal ball for any of this. Still, I'm trying to be optimistic and believe that someone at or near the top is paying attention to NASA and treating the issue of leadership of the agency as a national priority. For my part, I think it's time for the Administration to step it up and give NASA some clear direction, leadership, and a following wind to fill the sails...

[Incidentally, all of these opinions above are my own -- they don't represent any officially-sanctioned statements or policies from the Society's staff or Board of Directors, on which I serve as President.]

May. 4, 2009 | 09:46 PDT | 16:46 UTC

Fly me to the Moon...

Permalink: http://www.planetary.org/blog/article/00001928/

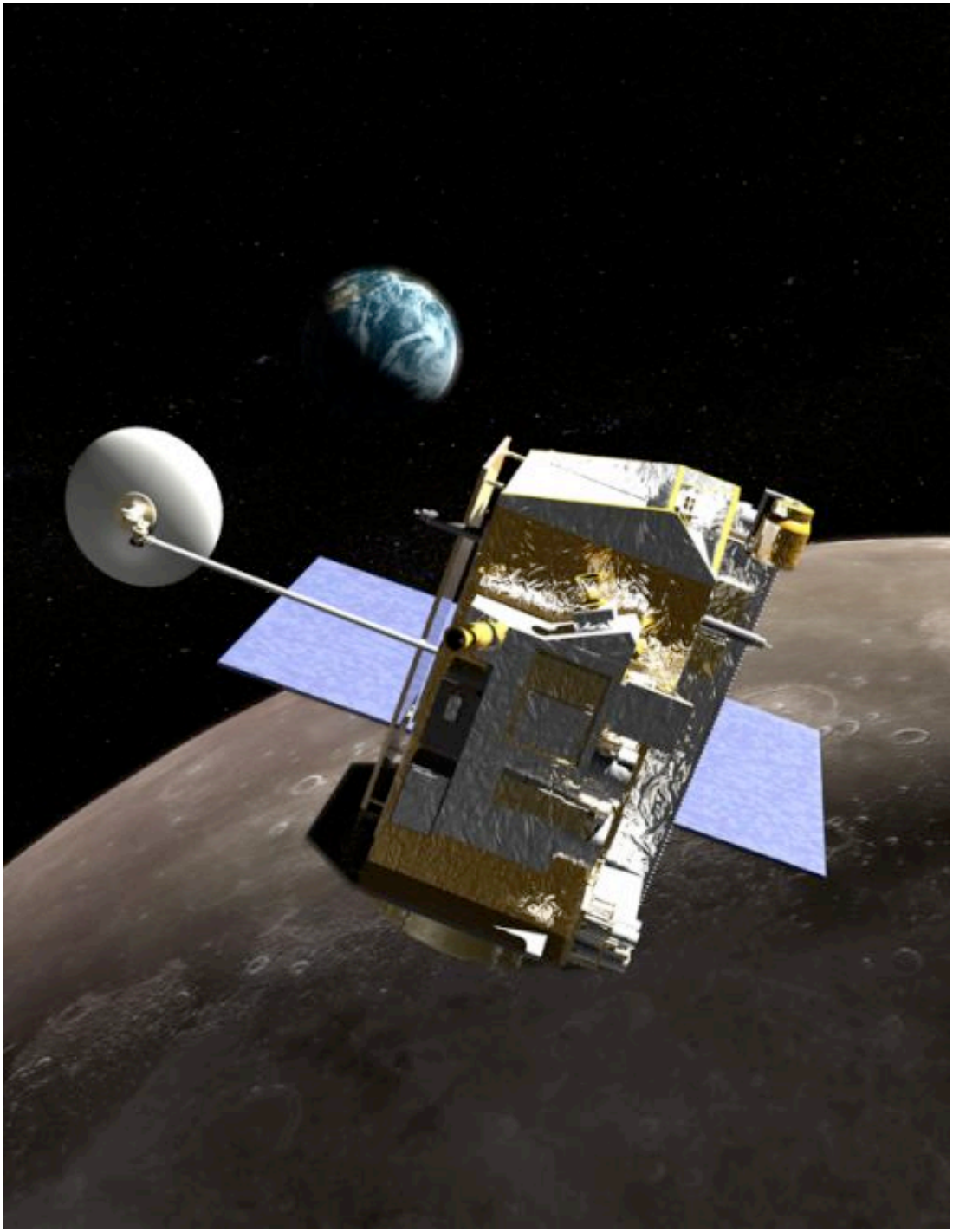
by Jim Bell

Jim Bell joined The Planetary Society's Board of Directors in 2005 and became President of the Board in 2008. A professor of astronomy at Cornell University, Bell is also the lead scientist for the Pancam color imaging systems on the Mars Exploration Rovers Spirit and Opportunity and has written two books about his Mars work: Postcards from Mars and Mars 3-D: A Rover's Eye View of the Red Planet. He has also been actively or previously involved as a science team member of the NASA Near-Earth Asteroid Rendezvous, Mars Pathfinder, Mars Odyssey, Comet Nucleus Tour, Mars Reconnaissance Orbiter, Lunar Reconnaissance Orbiter, and Mars Science Laboratory missions. His research interests focus on the geology, chemistry, and mineralogy of planets, moons, asteroids, and comets. When not taking pictures on Mars, Jim enjoys woodworking, gardening, writing, and playing as much softball as possible in the short Upstate New York summers. His most recent book is a collection of images and essays about lunar exploration called "Moon 3-D: The Lunar Surface Comes to Life".

First off, hi again everyone! It's a great pleasure to be asked once again to help fill in for Sanaya and Anahita Lakdawalla's mom Emily on The Planetary Society's Weblog this week. I'm constantly amazed by how many people tell me that they turn to this page for the latest "insider" information on planetary exploration, and, probably like you, I'm in awe of Emily's ability to keep up with it all! If you're a Planetary Society member, this kind of special seating in the space exploration theatre is one of the many perks of membership. If you're a regular reader of this page but you're *not* a member of The Planetary Society, please consider joining and supporting the continued work that Emily and others do to keep you so well informed about planetary exploration.

I've been thinking a lot about the Moon lately. Most specifically, a new robotic lunar exploration mission called Lunar Reconnaissance Orbiter (LRO) is set to launch in about a month. While a main goal of the mission is to search for potential landing sites and resources for future human explorers on the Moon, lately I've been thinking mostly about the way that this mission is likely to completely revolutionize lunar science. I'm involved as a Participating Scientist in the mission, which means that I wasn't on the original team that wrote proposals back in 2004 to put instruments on LRO, but instead I proposed a science investigation and was selected by NASA to join one of the instrument teams later (in 2007). The Participating Scientist program is a great way that NASA has come up with to give everyone in the community (and not just U.S. citizens!) a chance to get involved with spacecraft instrument teams through a competitive proposal selection process. It's an especially useful career entry path for young people in planetary science--this is how I was able to get involved in the Mars Pathfinder and NEAR missions back in the 1990s, for example, when I was green and relatively fresh out of grad school (sigh...).

My LRO Participating Scientist proposal was to join the Lunar Reconnaissance Orbiter Cameras (LROC) science team, a group of lunar geologists, geophysicists, and geochemists led by Prof. Mark Robinson at Arizona State University. Mark and I were in graduate school together, and so it's been rewarding to see him advance in his career from a grunt graduate student in the trenches to the leader of a camera team on a major NASA mission. Mark is part artist, part explorer, part engineer, and still, part grunt-really enjoying getting his hands dirty in the nitty-gritty of planetary imaging, mapping, and geomorphology.



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LRO at the Moon

An artist's conception of the Lunar Reconnaisance Orbiter (LRO) in orbit around the Moon.
Credit: Chris Meaney, NASA Television

LROC is actually three cameras: a wide-angle low resolution color camera called the WAC (for Wide Angle Camera), and two side-by-side narrow angle cameras (you guessed it: NAC) that take high resolution monochrome images. The WAC will

image the entire Moon in seven colors from the UV through the visible and at a scale of about 100 meters per pixel. The NACs, when used together, image a swath of the Moon about 10 km wide at a spatial scale of only 50 *centimeters* per pixel-or about 25 times higher than the highest-resolution lunar orbital imaging presently available. Over the course of about a two year nominal mission orbiting the Moon, these cameras are scheduled to return more than 20 TeraBytes (20 million million bytes) of photographic data back to Earth. When it's all processed and calibrated and mosaicked and archived it will be an astounding planetary data set, with something like 100 times more data than from any previous mission.

I'm especially excited about seeing those 50 cm/pixel images of the Moon. I remember the days before Mars Global Surveyor (MGS) when all we had to work with were Mars images from the Viking Orbiters at a scale of tens to hundreds of meters per pixel (I know, poor us). Mars is, of course, fascinating and diverse at that scale, and many new discoveries were made from the Viking data. However, when Mike Malin's Mars Orbiter Camera (MOC) was trained on the planet and started returning images at 150 cm/pixel resolution, everything changed. MOC images, and subsequent even higher resolution imaging from Alfred McEwen's 25 cm/pixel High Resolution Imaging Science Experiment (HiRISE) camera on the Mars Reconnaissance Orbiter (MRO), have completely revolutionized our understanding of Martian geology and climate history. It's like a magic window opens up to planetary scientists when you cross an imaging threshold near and below the scale of 1 meter per pixel. MOC beamed the magic back to us for nearly a decade; HiRISE is still beaming it back to us every day.

What kinds of lunar surface features and processes will we discover at 0.5 meters per pixel in the LROC images? Mars showed us gullies and deltas and fine-scale layers and tiny new craters. What might we expect on the Moon? Probably not water-related features, but who knows. Small comet impact sites? Water ice deposits in permanently shadowed polar regions? I think we'll see a whole new range of volcanic, impact, and tectonic features on the Moon revealed at this scale. And we know for certain that we'll see at least one brand new crater, because one of the mission's experiments, called LCROSS, will intentionally smash projectiles into a shadowed polar region to search for evidence of buried water there using images and spectroscopy. That's likely to be a spectacular event, thinking back to the fireworks from the Deep Impact mission's similar impact encounter with Comet Tempel-1 in 2005. My own planned LRO research, conducted with colleagues Matt Pritchard and Ole Gustafson here at Cornell, will focus on small-scale features that indicate past pyroclastic ("fire fountaining") volcanic eruptions on some parts of the Moon, and on globally mapping and analyzing a variety of tectonic features (faults, wrinkle ridges, scarps, etc.) at this unprecedented scale. What's fun to think about is that we're going to see things that we *didn't* expect to see, once we open our lunar eyes at that scale. Bring on the magic! Bring on the lunar science revolution!

LRO's Atlas V rocket is being stacked up at Cape Canaveral, and fueling of the spacecraft itself will begin this week. The countdown clock is starting, heading for the opening of our launch window on June 2. LRO is a joint effort between the human and robotic exploration sides of NASA, and as such is the first tangible step in NASA's new "Vision for Space Exploration" plan that began in 2004. Will the mission ultimately end up advancing that Vision--which, as we all know, is under intense Congressional and Administration scrutiny these days--or some other version of that Vision, perhaps like the one that The Planetary Society has been advocating recently, which envisions human exploration of the Moon as just one facet of a broader, international program leading to human exploration of Mars?

In the meantime, let's get that first step moving on June 2. Go LRO!

Apr. 30, 2009 | 15:55 PDT | 22:55 UTC

Final Update from Planetary Defense Conference

Permalink: http://www.planetary.org/blog/article/00001927/

by Bruce Betts

At the Planetary Defense Conference in Granada, Spain -- in addition to talking a lot about finding near Earth objects (NEOs) -- there has also been a lot of discussion about what to do if we actually detect one headed toward Earth, an area often called mitigation. What we can do depends upon how far in advance we detect the object and figure out if it is going to hit Earth (or likely hit Earth), and how big it is. A lot more options open up when an object is identified far in advance, hence the reason there is so much focus on finding and tracking NEOs.

Unless we have a warning time of at least a decade (more for a large asteroid), most scientists and engineers agree that, at

this point, the only option is nuclear weapons. The usual concept is to detonate a nuclear weapon a few tens or hundreds of meters from the NEO, which will vaporize some of its surface. That vaporized rock act like a rocket jet, moving the NEO in the opposite direction. This concept needs a lot of work, though scientists feel they understand the physics of the nuclear explosion extremely well. What isn't well understood is the upper surface of a NEO: solid, fluffy, rubble-pile. Each surface will have a different effect. Then, there is the challenge of getting the nuclear weapon to the asteroid -- possibly very quickly -- and detonating it at the right place.

For objects of a few hundred meters or smaller, one may be able to use kinetic impact alone and slam a spacecraft, preferably heavy, into the NEO at very high speed.

If there is more lead time, one can use slower impulse methods ranging from gravity tractors, where we actually use the spacecraft's gravity to slowly tug the asteroid. Many more exotic methods were also discussed, from laser ablation creating jets, to tethers, etc. In all cases, these deflection methods need more work and study.

Finally, if we have little warning, days for instance, all we can do is attempt to evacuate the area that will be affected.

At this conference, there was more emphasis on the case of very short time frame small object impacts than there has been in the past. Part of the reason was because of two small impacts that occurred in the last couple years (since the last Planetary Defense Conference). Asteroid 2008 TC3 was discovered less than 2 days before it impacted over Sudan. But, there were enough observations to generate a prediction of where it would hit. It was the first time a natural object had been observed in space before it entered the Earth's atmosphere, and as a bonus, portions of the space rock were recovered. Though it was a very small object that broke up and caused no more damage than scattering meteorite fragments, it demonstrated that current NEO surveys have a chance to observe a NEO "at the last minute" during its so-called death plunge. This type of observation requires particularly quick action, and for an object much larger than 2008 TC3, would ideally allow time for evacuations.

The other impact reported at the conference occurred a couple years ago in Peru -- the Carantas impact. There are indications that it was a relatively small object (2 to 5 meters) that would not have been predicted to make it through the atmosphere in one piece, yet it created a 14 meter crater in a dry river in a field. It occurred at 3800 meters altitude, and the blast wave knocked a man off a bicycle and a bull to the ground.

There is also discussions beginning with emergency management agencies across the world about this issue, but lots more is needed. They would be the ones involved in evacuations, and post-disaster assistance.

The bottom line is still that impact is a low probability any given day, but it definitely will happen eventually. As I've seen at this conference, we can plan for and perhaps even prevent such an impact, but it will take more investment and work.

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