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JPL to map the moon on India mission

The Moon Mineralogy Mapper team, from left. Front row: Carlé Pieters (holding globe) and Bonnie Buratti; second row: Rachel Klima, Stefanie Tompkins, Larry Taylor, Jessica Sunshine, Joe Boardman, Roger Clark, Jim Head; third row: Noab Petro, Matt Staid, Tom Glavich, Alok Chatterjee, Mary White, Robert Green; fourth row: Steven McClard, Cass Runyon, Glenn Sellar, Jack Mustard.

A JPL state-of-the-art imaging spectrometer that will provide the first high-resolution spectral map of the entire lunar surface successfully completed its critical design review this week.

The Moon Mineralogy Mapper, also known as "M3," is one of two instruments that NASA is contributing to India's first mission to the moon, scheduled to launch in late 2007 or early 2008. By mapping the mineral composition of the lunar surface, the mission will both provide clues to the early development of the solar system and guide future astronauts to stores of precious resources.

Chandrayaan-1 is India's first deep-space mission as well as its first lunar mission. "The entire M3 team feels honored to be able to participate," said Project Manager Tom Glavich of JPL.

The instrument is well on its way to being delivered to the Chandrayaan-1 spacecraft integration in Bangalore, India, next March, Glavich said.

A two-year mission, the mapper will characterize and map the lunar surface composition in the context of its geologic evolution by evaluating primary crustal components and their distribution across the highlands; characterizing the diversity and extent of different types of basaltic volcanism; identifying and assessing deposits containing volatiles, including water; mapping fresh craters to assess abundance of small impacts in the recent past; and identifying and evaluating concentrations of unusual/unexpected minerals.

The instrument will accomplish its goals by acquiring spectroscopic measurements of the lunar materials in the visible and near-infrared

regions of the electromagnetic spectrum, while simultaneously mapping the distribution of these

materials across the surface at high spatial resolution. This data will provide a much-needed long-term baseline for future exploration activities.

The mission's observations will address several important scientific issues, including early evolution of the solar system; fundamental processes acting on planets that shape their character; assessment of potential impact hazards to Earth; and assessment of space resources.

From its vantage point in orbit around the moon, the spacecraft will measure the sunlight reflected by all of the rocks and soil over which it passes. It will be sensitive to wavelengths from 430 to 3,000 nanometers, which covers visible light and the near-infrared region (including short-wave infrared). This range is dominated by solar reflection, rather than by heat radiated by the ground lunar surface.

The mapper was selected in 2005 as a NASA Discovery Program instrument of opportunity. The principal investigator is Carlé Pieters of Brown University.

Chandrayaan-1 is a truly international mission, with payloads from Europe as well as the United States. Besides the Moon Mineralogy Mapper, Chandrayaan-1 will include a second NASA instrument, a miniature synthetic aperture radar developed by the Applied Physics Laboratory at Johns Hopkins University that will look for ice deposits in the moon's polar regions.

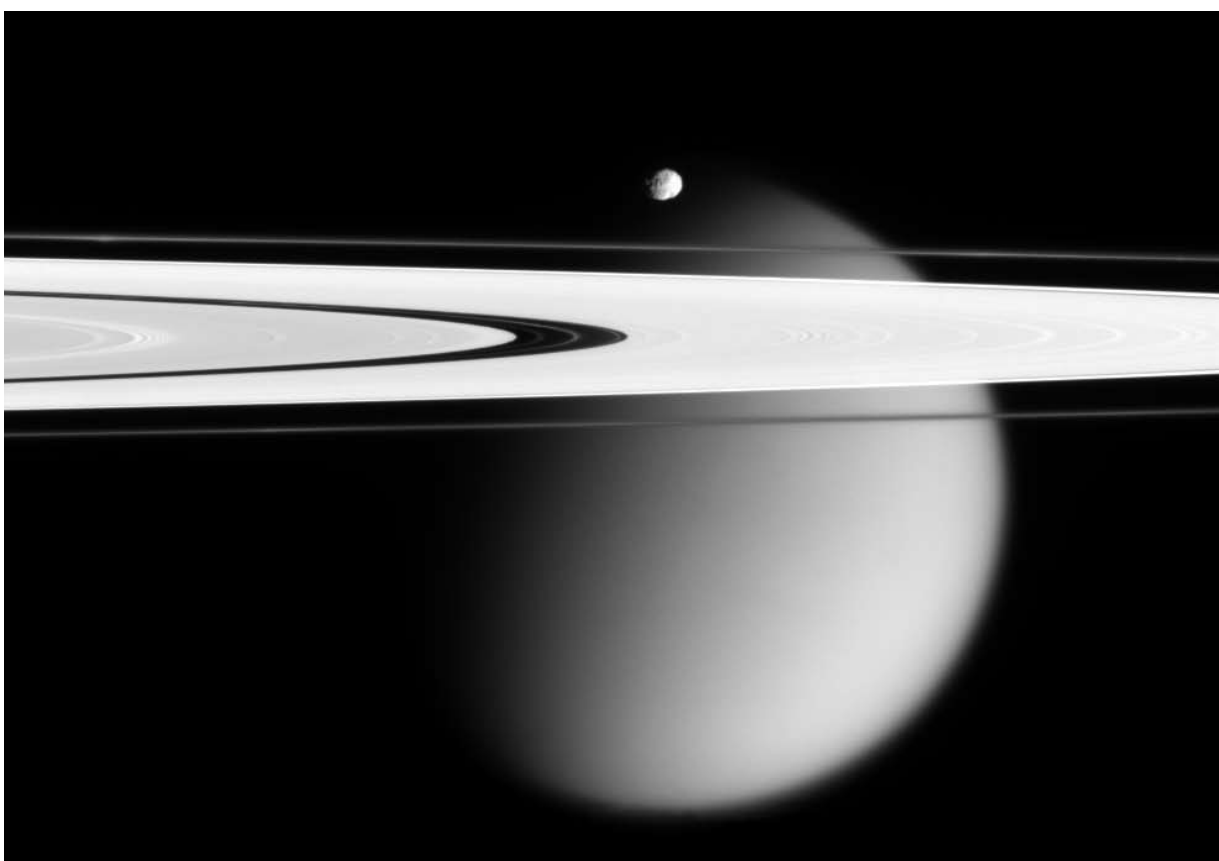
Data from the two instruments will contribute to NASA's increased understanding of the lunar environment as it implements the Vision for Space Exploration, which calls for robotic and human exploration of the moon's surface.

On May 9, NASA Administrator Mike Griffin and his counterpart, Indian Space Research Organization Chairman G. Madhavan Nair, signed two Memoranda of Understanding in Bangalore, India, for cooperation on India's Chandrayaan-1 mission.

"It is my hope and belief that as we extend the reach of human civilization throughout the solar system, the United States and India will be partners on many more technically challenging and scientifically rewarding projects," Griffin said.

Glavich said the next milestone for the mapper team is to send the mission's engineering model electronics to India for spacecraft integration in July.

For more information on the mission, visit <http://moonmineralogymapper.jpl.nasa.gov>.



Cassini reveals stunning Saturn vista

The Cassini spacecraft provided this stunning vista showing small, battered Epimetheus and smog-enshrouded Titan, with Saturn's A and F rings stretching across the scene. The image was taken in visible light with Cassini's narrow-angle camera on April 28.

The prominent dark region visible in the A ring is the Encke Gap, in which the moon Pan and several narrow ringlets reside. Moon-driven features that mark the A ring are easily seen to the left and right of the Encke Gap. The Encke Gap is 325 kilometers (200 miles) wide. Pan is 26 kilometers (16 miles) across.

In an optical illusion, the narrow F ring, outside the A ring, appears to fade across the disk of Titan. A couple of bright clumps can be seen in the F ring.

Epimetheus is 116 kilometers (72 miles) across and giant Titan is 5,150 kilometers (3,200 miles) across.

The image, which captures the illuminated side of the rings, was taken at a distance of approximately 667,000 kilometers (415,000 miles) from Epimetheus and 1.8 million kilometers (1.1 million miles) from Titan.

For more information about the Cassini-Huygens mission, visit <http://saturn.jpl.nasa.gov/home/index.cfm>.

News Briefs



Dr. Daniel McCleese

McCleese named chief scientist

DR. DANIEL MCCLEESE has been named the Laboratory's new chief scientist, effective June 19.

A 30-year JPL employee, McCleese brings extensive experience in the strategic planning of NASA robotic missions, line and program management, as well as considerable experience in the development and execution of scientific instruments.

Currently, McCleese serves as the principal investigator for the Mars Climate Sounder, an instrument on the Mars Reconnaissance Orbiter. He has also served as the Mars Exploration Program chief scientist since 1996. Previously, he managed the Earth and Space Sciences Division and the Planetary Atmospheres Section, and chaired the Mars Expeditions Strategy Group, a NASA advisory panel.

McCleese was a Fulbright Scholar at Oxford University in England, where he received his doctorate in Atmospheric Physics.

McCleese replaces Dr. Tom Prince, who will resume his research and teaching activities as a joint campus/JPL appointment in June.

JPL team wins NASA Center Best

The JPL-led Coupled Layer Architecture for Robotic Autonomy (CLARAty) Team has been awarded the 2006 One NASA JPL Center Best Award for its efforts to foster NASA-wide collaboration. Only the second winner of the award, which is given at all centers and Headquarters, the team was honored for creating and applying a software framework for rapidly integrating innovations in robotics into NASA's flight missions.



From left: Doug Terrier, One NASA team lead; Johnny Stebbenson, acting director of the Organizational Readiness Division of the Office of Program Analysis and Evaluation; Issa A.D. Nesnas, CLARAty team lead and supervisor, Robotic Software Systems; James Cutts, chief technologist, Solar System Exploration Directorate; Richard Volpe, manager, Mobility and Robotic Systems Section.

The team will be recognized at the 2006 JPL NASA Honor Awards Ceremony on June 7.

The One NASA Center Best Award recognizes individuals and teams for significant accomplishments in promoting NASA strategic goals utilizing a One NASA approach, which includes exhibiting One NASA behaviors of making decisions for the common good, collaborating to leverage existing capabilities, and standardization that demonstrates efficiency. Information about the 11 Center Best recipients and their outstanding achievements is available on the One NASA website (<http://onenasa.nasa.gov>).

GERALD SANDERS of Johnson Space Center was selected as the agency "Best of the Best" award recipient. He was recognized for his key role in establishing a coordinated agency program in space resource utilization, more commonly known as in-situ resource utilization, supporting NASA's strategic goal to establish a lunar return program that has the maximum possible utility for later missions to Mars and beyond.

Sanders' award features a map of the United States highlighting all 10 NASA centers, signed by each center director and the NASA deputy administrator.

Willis earns French honor

DR. PASCAL WILLIS of Section 335 has been awarded the prestigious French Academy of Science's Prix Antoine d'Abbadie, an award given for outstanding achievements in geophysics or astronomy.

Willis was recognized for his work in the fields of satellite positioning global positioning, Doppler Orbitography and Radio-positioning Integrated by Satellite (a French navigation system) and Global Navigation Satellite System (a Russian navigation system)

and their applications to high-precision orbit determination, geocenter variation measurements and crustal deformation.

Willis, also a principal investigator on a solid Earth and natural hazard NASA Research Announcement, will end his five-year tenure at JPL in September when he returns to France.

Tibet storms provide pathway

Researchers from JPL, the Georgia Institute of Technology and the University of Edinburgh, Scotland, have found that thunderstorms over Tibet provide a main pathway for water vapor and chemicals to travel from the lower atmosphere, where human activity directly affects atmospheric composition, into the stratosphere, where the protective ozone layer resides.

The researchers performed their analysis using data from the JPL-managed Microwave Limb Sounder instrument on NASA's Aura spacecraft, combined with data from NASA's Aqua and Tropical Rainfall Measuring Missions.

The team found that even though more thunderstorms occurred over India, the storms over Tibet transported nearly three times more water vapor into the lower stratosphere than the more frequent thunderstorms that occur over India.

"This study shows that thunderstorms over Tibet are mainly responsible for the large amount of water vapor entering the stratosphere," said DR. RONG FU, associate professor in Georgia Tech's School of Earth and Atmospheric Sciences, who led the study. "Because Tibet is at a much higher elevation than India, the storms over Tibet are strong and penetrate very high, and send water vapor right into the stratosphere."

The study also found that the same pathway is responsible for transporting carbon monoxide, an indicator of air pollution, into the upper atmosphere.

The findings are published in the Proceedings of the National Academy of Sciences. For more information, visit <http://mls.jpl.nasa.gov>.

Santa Monica third in Science Bowl

Santa Monica High School, a JPL-sponsored team, took third place in the National Science Bowl tournament during the final weekend in April in Washington, D.C. Santa Monica had advanced to the final round after winning a regional competition in March, which JPL co-hosted.

State College Area High School from State College, Pa., won the competition, which is sponsored by the Department of Energy. North Hollywood High School placed second, with Albany High School in Albany, Calif., placing behind Santa Monica in fourth.

In all, more than 12,000 students from 1,800 schools across the country participated in the 65 regionals. The top 16 teams received \$1,000 for their schools' science departments.

For more information about the competition, visit <http://www.doe.gov/news/3572.htm>.

Evacuation drills coming up

During the summer months ahead, JPL employees and contractors can expect to be involved in building emergency evacuation drills, which are required to be conducted on an annual basis.

In order for these drills to be successful, all personnel should know important emergency evacuation information, such as who their building and floor wardens and division/section safety coordinators are, their building's exit ways, evacuation route signs in their building and rally or assembly areas outside of their building. With this knowledge, the evacuation drills should be routine and orderly.

The drills will be coordinated with wardens and safety coordinators to minimize impacts to critical operations. Information regarding these building evacuation drills and what your part is will be prepared for distribution to you over the next several weeks before the drills begin. Should you have any urgent questions, please contact ERIC FULLER at ext. 4-1091 or GREGG ELLERS at 4-2356.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11:30 a.m.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place).

Codependents Anonymous—Meets at noon every Wednesday.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117. For more information, call Randy Herrera, ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

For more information on any of the support groups, call the Employee Assistance Program at ext. 4-3680.

Sunday, May 21

Chamber Music—Baritone James Weaver and accompanist Joanne Kong will perform a free concert at 3:30 p.m. in Caltech's Dabney Lounge. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Wednesday, May 24

"Europa: Mystery of the Ice Moon"—Presented by the Science Division, this Discovery Science Channel film highlights JPL employees Pan Conrad, Lonnie Lane, Wayne Zimmerman, Claudia Alexander and Bob Pappalardo. Producer Dan Birman will introduce the 45-minute, high-definition film, and lead a question-and-answer session at its conclusion. Seating is limited to the first 175 attendees. Held at 11:30 a.m. in von Kármán Auditorium. For more information, e-mail Michele.Judd@jpl.nasa.gov or call ext. 4-4994.

JPL Chorus—Meets at noon in Building 233-303. For more information, call Shary DeVore at ext. 4-1024.

JPL Library Orientation—Stop by Building 111-104 at 11:30 a.m. for an overview of the Library's products and services, and learn how to access numerous electronic resources from

your desktop. For more information, call the reference desk, ext. 4-4200.

JPL Toastmasters Club—Meeting at 5 p.m. in conference room 167. Call Dirk Runge, ext. 3-0465, or visit www.jplcaltechtostmasters.com.

Thursday, May 25

Caltech Architectural Tour—Hosted by the Caltech Women's Club, from 11 a.m. to 12:30 p.m. Free and open to the public. Meet at the Athenaeum front hall, 551 S. Hill Ave. For reservations, call Susan Lee, (626) 395-6327.

Clogging Class—Meets at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

JPL Golf Club—Meeting at noon in Building 306-302.

Wednesday, May 31

JPL Chorus—Meets at noon in Building 233-303. For more information, call Shary DeVore at ext. 4-1024.

JPL Library Orientation—Stop by Building 111-104 at 11:30 a.m. for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the reference desk, ext. 4-4200.

Thursday, June 1

JPL Gun Club—Meeting at noon in Building 183-328.

Friday, June 2

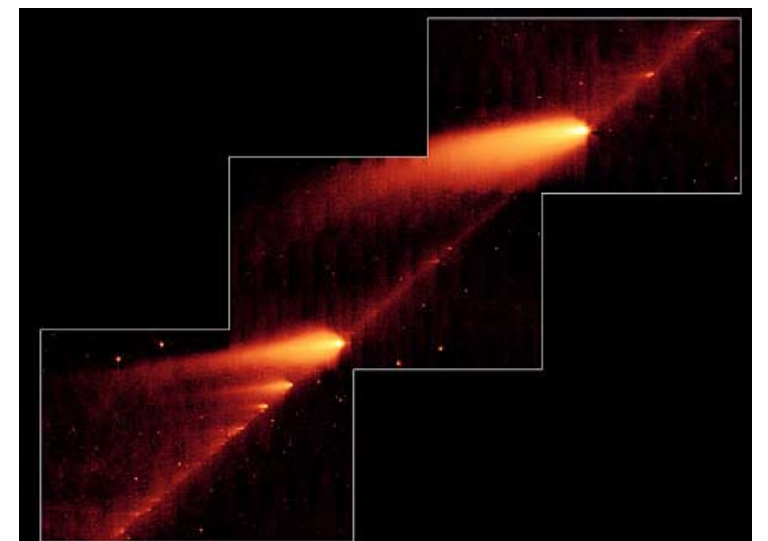
"The Challenge of Landing Humans on Mars"—Mars Exploration Directorate chief engineer Rob Manning will speak at noon in von Kármán Auditorium.



Tuesday, June 6

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-271.



Spitzer shows comet breakup

The JPL-managed Spitzer Space Telescope has snapped a picture of the bits and pieces making up Comet 73P/Schwassman-Wachmann 3, which is continuing to break apart on its periodic journey around the sun. The new infrared view shows several chunks of the comet riding along its own dusty trail of crumbs.

"Spitzer has revealed a trail of meteor-sized debris filling the comet's orbit," said Dr. William Reach of Caltech's Spitzer Science Center. Reach and his team recently observed the comet using Spitzer. The picture can be viewed at <http://www.spitzer.caltech.edu/Media/releases/ssc2006-13/ssc2006-13a.shtml>.

The comet consists of a collection of fragments that file along like ducks in a row around the sun every 5.4 years. This year, the bunch passed by Earth beginning on May 12 before swinging by the sun on June 6. The fragments won't get too close to Earth, about 7.3 million miles, or 30 times the distance between Earth and the moon, but they should be visible through binoculars in the countryside night skies.

Comet 73P/Schwassman-Wachmann 3 should be dimly visible through binoculars on a clear night between the Cygnus and Pegasus constellations through May 28. For more information about viewing the comet or the meteoroids, visit http://science.nasa.gov/headlines/y2006/24mar_73p.htm.

Griffin

visits Lab, sees stable future

NASA Administrator Mike Griffin told an all-hands meeting of JPL personnel on May 18 that he foresees a stable future for the laboratory, but no new major role at least in the near term in NASA's plan to send humans to the moon and beyond.



Tom Wymore / JPL Photolab

By Frank O'Donnell and Mark Whalen

"... I did feel that I could maintain a commitment to a 5,000-person laboratory. I'm committed to a stable, viable, healthy JPL at that level."

"Humans are going to need a lot of robotic assistance," said the administrator.

"I would anticipate there could be a lot of involvement in that at JPL ..."

Given the prospect of a flat NASA budget for the years ahead, Griffin told the Tuesday gathering in von Kármán Auditorium that his biggest challenge has been to find a way to fund missions under the Vision for Space Exploration while maintaining stable workforces at each of the agency's 10 field centers.

He said that the cut in JPL's workforce last fall from 5,400 employees and contractors to about 5,000 was driven by the fact that the previous level was based on expectations of growth in NASA's science programs that couldn't be maintained given the budget cap and his charter to remake NASA's human program. "I felt I had no choice but to nip that in the bud," he said. "I did feel that I could maintain a commitment to a 5,000-person laboratory. I'm committed to a stable, viable, healthy JPL at that level."

Griffin said his biggest immediate challenge has been to find work for NASA's traditional research/aeronautics centers. "I don't have that problem right now at JPL," he said, adding that the lab's current workload appears to be sufficient to keep the workforce stable.

In the future he expects JPL to continue to attract new business by competing for missions, but, "If I think JPL is in danger of falling below having the right amount of work to cover the JPL staff, then I will do as I have done at other places – I will find you a mission. If you can win enough to keep up the level you're at, you don't need me to do anything."

However, he discouraged JPLers from going after major new work that would drive the lab's workforce beyond the current level. "If you kill more than you can eat, I'll probably ask you to send some of that somewhere else."

"A gain in people at one center is a loss in people at another center, or it is a removal of dollars from industry into the federal civil service," said Griffin. "That's not acceptable. And it's not acceptable to be moving people and moving significant numbers of jobs from one center to another."

In response to a question, Griffin also said he hopes Congress will not restore cuts he made in the proposed fiscal year 2007 budget for scientific research and analysis. "I hope Congress won't restore it, because it will come at the expense of a mission," he said. "The budget I put forward is the best budget I can do given all the constraints I have. If you push on the bean bag somewhere, it will pop out somewhere else. There will be other unhappy people, they will just be in other zip codes."

Griffin cited the importance of placing humans and cargo in low-Earth orbit "an essential first step" in the next stage of exploration. "It's got to be done right," he said.

He also said that he sees potential opportunities for JPL for robotic work under the Vision for Space Exploration after he gets over the immediate hump of retiring the shuttle, completing the space station and developing new crewed vehicles. "In part it'll depend on how clever and how innovative your proposals are in response to mission opportunities."

"Humans are going to need a lot of robotic assistance," said the administrator. "I would anticipate there could be a lot of involve-

ment in that at JPL, but I don't want to turn you into a manned spacecraft center."

Griffin thinks the shuttle will complete the 16 scheduled international space station assembly missions as well as a Hubble repair mission.

"If we can get back to our average rate of 4.5 shuttle flights a year, we can finish the station with no problem. But we've got to get over the hump of this next flight (July 1) and have it be successful. That is crucial."

He said the initial return-to-flight missions need to launch in daylight to guarantee good camera viewing of possible foam buildup and other issues. However, he said, in order to complete the international space station it will be essential for some of the upcoming missions to launch at night.

Looking to the next decade, Griffin foresees a human presence on the moon in 2018. "What we do after that depends in part on what people want to do." Possibilities, he said, include developing the capability to have a research station there that would initially permanently staffed, very much like Antarctica.

Griffin foresees a potential human presence on Mars as early as the early to mid 2020s. "To me, the key is getting back into space in a reliable, robust, dependable way with enough lift capacity," he said. "It doesn't matter what Mars mission strategy you use, we already know we're going to need a space-station equivalent mass and will need a million pounds of hardware to go through low-Earth orbit."

Among his other observations in response to questions from JPLers:

— Asking about space collaborations with China, Griffin noted that he will be visiting that country next fall, but "can't predict the outcome. The space station partnership is well forged and long established, and so that's not on the table. Whether there ever could be a visiting vehicle at the space station from the Chinese, I couldn't say right now."

— Griffin believes there are many opportunities for young people interested in joining NASA. He noted that when he and JPL Director Dr. Charles Elachi were at the beginning of their careers 35 years ago, the Vietnam war and NASA's Apollo lunar program were winding down, and "in aerospace you had to scramble hard for any opening at all." By contrast, 25 percent of NASA's current workforce is eligible to retire in the next five years, "which will create openings at the younger end of the pipeline."

— The administrator said he shared concerns raised by a JPLer in the audience that the government's foreign export rules, called International Traffic in Arms Regulations or ITAR, aren't accomplishing their objectives. Intended to prevent the proliferation of technologies that could be used against the United States, the current implementation of ITAR is unintentionally "creating competitors" overseas. "It is preventing us from accessing the best and brightest in the world," said Griffin. "In my capacity as a government official, I am doing what I can do within the purview of my office to try to make" that case.

