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 will be 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 20.

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.

Spitzer shows comet breakup

The JPL-managed Spitzer Space Telescope has snaped a picture of the hillsides 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. 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. 4-2209.

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesday, 11:30 a.m., Building 111-117, (the Wellness Place)

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 111-117 (the Wellness Place)

Coperdoments Anonymous—Meets at JPL 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, 3-6044.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at 111-117 (the Wellness Place)

For more information on any of the support groups, call the Employee Assistance Program at ext. 4-3946.

Monday, May 21

Chamber Music—Baritone James Worthy and accompanist Joanne King will perform a free concert at 3:10 p.m. in Caltech’s Daddy Lounge. For more information, call Shary DeVore at ext. 4-4744 or visit www.events.caltech.edu.

Wednesday, May 24

“Europe: Mystery of the Ice Moon”—Presented by the Science Education Department of the Discovery Science Channel Film Highlights JPL employees Pan Conlee, Zoeliz, Nina Ancheta and Rob Papadopoulos. Producer Dan Lane will introduce the 35-minute, high-definition film and lead a question-and-answer session at the conclusion. Seating is limited to the first 175 attendees. Held at 11:30 a.m. in von Kármán Auditorium. For more information, email mchve@jpl.nasa.gov or call ext. 4-4758.

JPL Chorus—Meets in noon in Building 115-104. For more information, call Shary DeVore at ext. 4-4742.

JPL Library Orientation—Stop by Building 111-114 at 1:30 p.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. 4-2209.

Thursday, May 25

Caltech Architectural Tour—Hosted by the Caltech Alumni Office from 11 a.m. to 12:30 p.m. Free and open to the public. Meet at the Wonderland front hall, 551 S. Hill Ave. For reservations, call Susan Lee, (626) 395-6527.

Ongoing Events Calendar

Spitzer shows comet breakup

The JPL-managed Spitzer Space Telescope has snaped a picture of the hillsides 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 periodic orbit. “Spitzer has performed a free concert at 3:10 p.m. in Caltech’s Daddy Lounge. For more information, call Shary DeVore at ext. 4-4744 or visit www.events.caltech.edu.

Wednesday, May 24

“Europe: Mystery of the Ice Moon”—Presented by the Science Education Department of the Discovery Science Channel Film Highlights JPL employees Pan Conlee, Zoeliz, Nina Ancheta and Rob Papadopoulos. Producer Dan Lane will introduce the 35-minute, high-definition film and lead a question-and-answer session at the conclusion. Seating is limited to the first 175 attendees. Held at 11:30 a.m. in von Kármán Auditorium. For more information, email mchve@jpl.nasa.gov or call ext. 4-4758.

JPL Chorus—Meets in noon in Building 115-104. For more information, call Shary DeVore at ext. 4-4742.

JPL Library Orientation—Stop by Building 111-114 at 1:30 p.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. 4-2209.

Thursday, May 25

Caltech Architectural Tour—Hosted by the Caltech Alumni Office from 11 a.m. to 12:30 p.m. Free and open to the public. Meet at the Wonderland front hall, 551 S. Hill Ave. For reservations, call Susan Lee, (626) 395-6527.

Ongoing Events Calendar

Spitzer shows comet breakup

The JPL-managed Spitzer Space Telescope has snaped a picture of the hillsides 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 periodic orbit. “Spitzer has performed a free concert at 3:10 p.m. in Caltech’s Daddy Lounge. For more information, call Shary DeVore at ext. 4-4744 or visit www.events.caltech.edu.

Wednesday, May 24

“Europe: Mystery of the Ice Moon”—Presented by the Science Education Department of the Discovery Science Channel Film Highlights JPL employees Pan Conlee, Zoeliz, Nina Ancheta and Rob Papadopoulos. Producer Dan Lane will introduce the 35-minute, high-definition film and lead a question-and-answer session at the conclusion. Seating is limited to the first 175 attendees. Held at 11:30 a.m. in von Kármán Auditorium. For more information, email mchve@jpl.nasa.gov or call ext. 4-4758.

JPL Chorus—Meets in noon in Building 115-104. For more information, call Shary DeVore at ext. 4-4742.

JPL Library Orientation—Stop by Building 111-114 at 1:30 p.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. 4-2209.

Thursday, May 25

Caltech Architectural Tour—Hosted by the Caltech Alumni Office from 11 a.m. to 12:30 p.m. Free and open to the public. Meet at the Wonderland front hall, 551 S. Hill Ave. For reservations, call Susan Lee, (626) 395-6527.

Ongoing Events Calendar

Spitzer shows comet breakup

The JPL-managed Spitzer Space Telescope has snaped a picture of the hillsides 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 periodic orbit. “Spitzer has performed a free concert at 3:10 p.m. in Caltech’s Daddy Lounge. For more information, call Shary DeVore at ext. 4-4744 or visit www.events.caltech.edu.

Wednesday, May 24

“Europe: Mystery of the Ice Moon”—Presented by the Science Education Department of the Discovery Science Channel Film Highlights JPL employees Pan Conlee, Zoeliz, Nina Ancheta and Rob Papadopoulos. Producer Dan Lane will introduce the 35-minute, high-definition film and lead a question-and-answer session at the conclusion. Seating is limited to the first 175 attendees. Held at 11:30 a.m. in von Kármán Auditorium. For more information, email mchve@jpl.nasa.gov or call ext. 4-4758.

JPL Chorus—Meets in noon in Building 115-104. For more information, call Shary DeVore at ext. 4-4742.

JPL Library Orientation—Stop by Building 111-114 at 1:30 p.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. 4-2209.
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.

"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 Karman 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, 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. "If I think JPL is in danger of falling behind 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 civil service. That’s not acceptable. And it’s not acceptable to be moving people and moving significant numbers of civil service." 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." "I would anticipate there could be a lot of robotic assistance," said the administrator. "I would anticipate there could be a lot of involvement 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 be 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 unreasonably "creating competitive "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.

Given the prospect of a flat NASA budget for the years ahead, Griffin told the Tuesday gathering in von Karman 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, 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. "If I think JPL is in danger of falling behind 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 civil service," said Griffin. "That’s not acceptable. And it’s not acceptable to be moving people and moving significant numbers of civil service." 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 as 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 will 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-
**FOR RENT**

**ARCADIA** apt., 2 bd. + 2 ba., or 1 bd. + 1 ba., in #2, #3 or #4, top floor. nr. schools & shopping; pictures avail. on request. 626/798-3235.

**MAMMOTH, Meadow Ridge, 2 bd., 2 ba., + family rm., nr. schools & shopping; pictures avail. on request. $2,000/mo., 9222, 626/794-0455 or valeriee@caltech.edu.

**ENSENADA, Baja Calif., beautiful 3-bd. 2-ba. condo, 1,932 sq. ft. with spacious, sun-filled rooms; nr. restaurants, restaurants; rent one or both; upstairs $800-900/mo., downstairs $750/mo. washer/dryer, parking; located steps from bay & white, sandy beach, covered patio, and 3 bd., 2 ba. downstairs, $1,750. 626/794-8787.

**BALBOA ISLAND duplex, weekly May–Aug.; $1,800 per week, $5,000 per month. 626/798-3235.

**MAMMOTH, Meadow Ridge, 2 bd., 2 ba., + family rm., nr. schools & shopping; pictures avail. on request. $2,000/mo., 9222, 626/794-0455 or valeriee@caltech.edu.

**HAWAII, Maui condo, NW coast, ocean front 1,050 sq. ft., 2 bd., 2 ba., with island kitchen privileges or cooked meals; must be 21. 626/794-8787.

**SAN JUAN ISLAND, WA condo, 2 bd., 1 ba., $1,000/mo. plus utilities; female preferred; avail. June 1; $850. 626/794-8787.

**JESSUP** on lower level; big yard, oak trees, great mtn. view. Move-in ready, laundry; no pets, no smoking; owner seeks long-term tenancy, “green living” commitment. 626/576-7333.

**EATON CANYON hillside, cozy 1-bd. apt. at the end of a cul-de-sac, 1 bd. 1 ba., pets considered; more info and pictures available. 626/792-3595.

**REDONDO BEACH house, 3 bd., 2 ba., $1,099/$1,299. 626/576-7333.

**ARCADIA apt., 2 bd. + 2 ba., or 1 bd. + 1 ba., in #2, #3 or #4, top floor. nr. schools & shopping; pictures avail. on request. 626/798-3235.

**MAMMOTH, Meadow Ridge, 2 bd., 2 ba., + family rm., nr. schools & shopping; pictures avail. on request. $2,000/mo., 9222, 626/794-0455 or valeriee@caltech.edu.

**HAWAII, Maui condo, NW coast, ocean front 1,050 sq. ft., 2 bd., 2 ba., with island kitchen privileges or cooked meals; must be 21. 626/794-8787.

**SAN JUAN ISLAND, WA condo, 2 bd., 1 ba., $1,000/mo. plus utilities; female preferred; avail. June 1; $850. 626/794-8787.