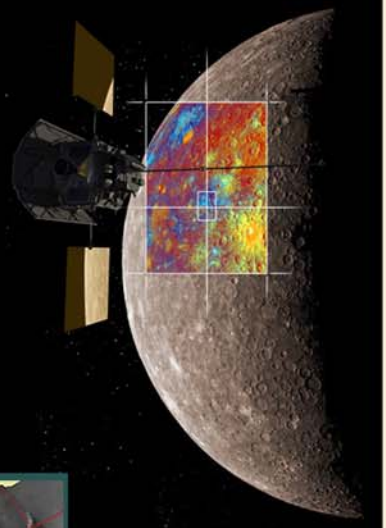
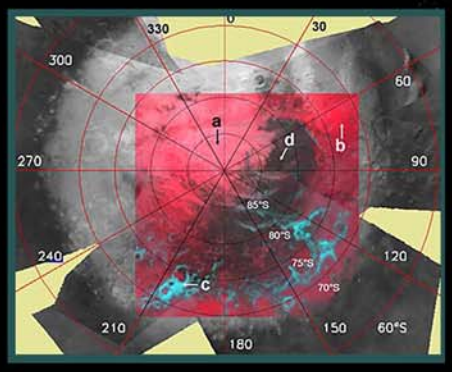
# Mission Updates — Where Are They Now?



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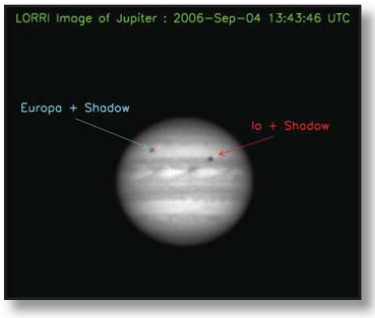
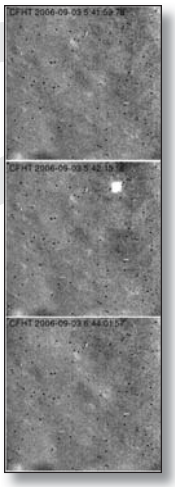
# Mission Updates — Where Are They Now?

## New Horizons




New Horizons is the first mission to the outermost fringes of our solar system — the initial reconnaissance of Pluto-Charon and the Kuiper belt. Planning continues almost as fast as the Pluto-bound spacecraft approaches its first target: Jupiter. The encounter will occur in late February 2007 and will be several times closer than Cassini when it flew by in 2000. This gives the support staff only a short time to design the encounter, which will provide unique information about the jovian system, as well as provide important tests of the spacecraft systems prior to the critical Pluto encounter in 2015. All systems continue to function well on the spacecraft. More information about the New Horizons mission can be found at *pluto.jhuapl.edu*.

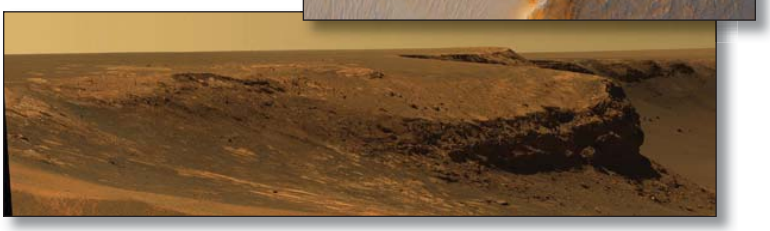
## SMART-1



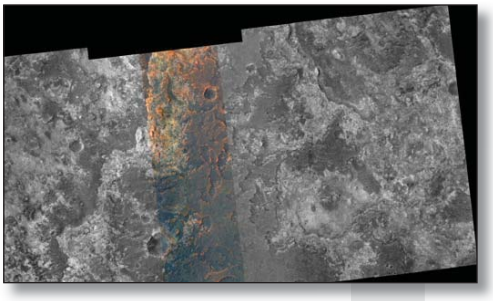
Europe's first lunar mission ended with a bang in September when the probe was directed to crash into the Moon's nearside. Astronomers observed the impact flash in the hopes of analyzing the signal for compositional information. The probe tested low-cost propulsion techniques and a suite of remote sensing instruments as it mapped the Moon's surface. More information about the SMART-1 mission is available at *www.esa.int/SPECIALS/SMART-1/index.html*.

## Mars Exploration Rovers

The two Mars rovers recently returned to operations after a short siesta necessitated by the disappearance of Mars behind the Sun. Spirit has been stationary in the Columbia Hills since spring 2006 because of a stuck wheel. The rover was parked in a position oriented toward the winter Sun in order to maximize power. Opportunity, on the other hand, has been going, and going, and going . . . It arrived at Victoria Crater after a journey of over a year and a half. This crater is similar in size to Arizona's Meteor Crater and may expose sedimentary layers hundreds of feet thick. Opportunity's first views of the crater rim proved to be spectacular. Scientists are examining the crater from the rim, to gain information on the interior and to help plan the rover's path into the interior, several hundred feet down. In a happy coincidence, the High Resolution Imaging Science Experiment (HiRISE) camera onboard the Mars Reconnaissance Orbiter (see next page) came on line and is now providing detailed maps of the crater from above to guide the rover team. More information about the rovers can be found at *marsrovers.nasa.gov*.

## Mars Reconnaissance Orbiter (MRO)



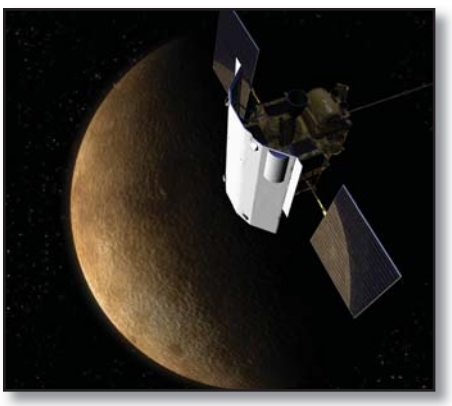
The MRO spacecraft has completed its final orbit adjustments and has now begun routine mapping of the surface. Since joining the other Mars orbiters (Mars Global Surveyor, Mars Odyssey, and Mars Express) in March of this year, the probe has been using the thin upper atmosphere to slow itself down and enter final mapping orbit. In addition to routine monitoring of surface and atmospheric conditions and the ground-penetrating SHARAD radar system, the orbiter will also map parts of Mars at submeter resolutions using the HiRISE cameras. It also features a high-resolution multispectral mineral mapper (CRISM), which will search for sulfates and water-bearing minerals on the surface. For more information about the MRO mission, along with spectacular images obtained by the HiRISE camera, visit *marsprogram.jpl.nasa.gov/mro*.

## Mars Express

Europe's Mars Express spacecraft has been given the go-ahead to continue mapping Mars through at least October 2007. The orbiting spacecraft continues to map the mineralogy and topography of the surface. Global mapping is expected to be nearly complete by the end of this extended mission. Ground-penetrating radar sounding is providing an unprecedented peek at the subsurface down to depths of a kilometer or so. More information about Mars Express is available at *www.esa.int/SPECIALS/Mars_Express/index.html*.

## Venus Express

After succesful orbit insertion in April 2006, this follow-on to Mars Express has been mapping the structure and composition of Venus' clouds and atmosphere in unprecedented detail. Although it does not see the surface very well, Venus Express will provide valuable insights into how our planetary twin evolved so differently from Earth. For more information about the mission, visit *sci.esa.int/venusexpress*.



## Messenger

The spacecraft continues on its long journey to tiny Mercury. It successfully passed by Venus in October and will do so again in June 2007. Although science return is limited during these flybys, both encounters serve to move the spacecraft closer to its final goal of Mercury orbit in 2010. More information about the MESSENGER mission is available at *messenger.jhuapl.edu*.

## An Interview with Jim Green

*Dr. James Green*

The Science Mission Directorate (SMD) at NASA Headquarters is charged with engaging the nation's science community, sponsoring scientific research, and developing and deploying satellites and probes in collaboration with NASA's partners around the world to answer fundamental questions requiring the view from and into space. SMD seeks to understand the origins, evolution, and destiny of the universe and to understand the nature of the strange phenomena that shape it.

At the helm of the Planetary Science Division at SMD is Dr. James Green, who assumed the position of Acting Director in June of this year. Hailing from the same small town in Iowa as another renowned NASA science leader, Dr. Edward Stone (former director of the Jet Propulsion Laboratory), Green was inspired at a young age by NASA and a vision of working for the space agency.

We recently had the opportunity to talk to Green about his new job, his vision for SMD, and the goals he hopes to accomplish during his tenure as Acting Director of Planetary Science.

Green's enthusiasm for the planetary sciences is palpable. At the time of our interview, he had just returned from the annual meeting of the Division of Planetary Sciences, and was bubbling with all the science he had encountered and conversations he had had with the planetary community. "Talking to the community is so important; you cannot do my job sitting in the office, you need to keep lines of communication open," said Green.

Communication has in fact been the hallmark of Green's career at NASA. In his first position at the Marshall Space Flight Center in the 1980s, he created a network of researchers that evolved into an international effort, resulting in a powerful tool for promoting science long before the advent of the Internet. He continued on this path at the Goddard Space Flight Center, where he served as Chief of the Space Science Data Operations Office. His focus on the importance of mission data pervades his thinking today. He has published over 100 scientific papers in peer-reviewed journals and more than 50 technical articles on computer networking and data systems.

From his early days at the University of Iowa, studying with Van Allen and other world-class physicists, to his graduate work on the Hawkeye spacecraft (an early Explorer mission directed at surveying the high-latitude polar regions of the Earth's magnetosphere), Green is heavily grounded in science and the importance of the data that is generated by NASA's science efforts. When asked what he thought were the most challenging and intriguing research questions facing the planetary science community, he responded without missing a beat. "I believe that in the next 10 years we will find life in the solar system; we are [also] getting close to understanding the creation and evolution of planetary systems. This is a question we have pursued for some time, and the data returning from a variety of missions is putting us in a position to get to the answer to this question." In response to the subject of the current NASA focus on lunar exploration, Green replied, "I think the Moon has been a neglected object for some time and we are embarking on a course of action that I hope will, scientifically, allow us to rediscover the Moon." He does note, however, that finding money to support new lunar programs will be difficult given recent cuts in the R&A line.

Green currently has two specific goals that he wants to achieve during his tenure as Acting Director of the Planetary Science Division: to look critically at the balance of future missions, and to develop a more informed method for keeping the R&A programs healthy. "We need to develop metrics that allow us to track each of the R&A lines and infuse money as the science dictates."

We wish Dr. Green well in his new and challenging position, and are gratified to have a scientist of his caliber at the helm at this critical juncture for Planetary Science.

## Workshop on Martian Sulfates as Recorders of Atmospheric-Fluid-Rock Interactions

**October 22–24, 2006, Lunar and Planetary Institute, Houston, Texas**


Sulfate minerals are present across Mars' surface, a fact known since the Viking lander missions in 1976. The presence of sulfate minerals has been definitively confirmed by the Mars Exploration Rovers (MER) Spirit and Opportunity, and by imaging spectrometers on the Mars Global Surveyor and the Mars Expresss orbiters. These platforms have detected many different sulfates — of magnesium, calcium, iron, and potassium in varying hydration states — barely suspected before. Most of these sulfates were unfamiliar to planetary geologists, but do occur in scattered, unusual environments on Earth.

Dr. James Papike of the University of New Mexico convened this workshop as a means of bringing together a disparate group of researchers: The workshop featured invited talks from planetary and mineral spectroscopists, mineralogists, and terrestrial geochemists, with contributed talks across these disciplines. Approximately 100 researchers attended, along with a handful of people involved in management or policy. Participants were excited about the workshop, and the unexpected abundance and utility of sulfate minerals.

The session on spectroscopy from orbit featured results from the OMEGA spectrometer onboard Mars Express, comparisons with airborne spectroscopy on Earth, and a look forward to the CRISM imaging spectrometer. The subsequent session on martian sulfates seen on the surface began with the Viking landers, continuing through to the stunning discoveries of the MER landers, as well as a look at the capabilities that will fly to Mars on the Mars Science Laboratory in 2009. Following next were presentations on sulfate minerals on Earth, emphasizing acid sulfate environments and the jarosite it can produce. Jarosite was shown to be immensely useful in its ability to trap the fluids that formed it, to retain isotopic evidence of its formation environment, and to be dated by potassium-argon methods. The final session addressed more general themes of jarosite crystal chemistry, fluid composition and evolution, and sulfates in martian meteorites, ending with discussion of sample return of sulfates.

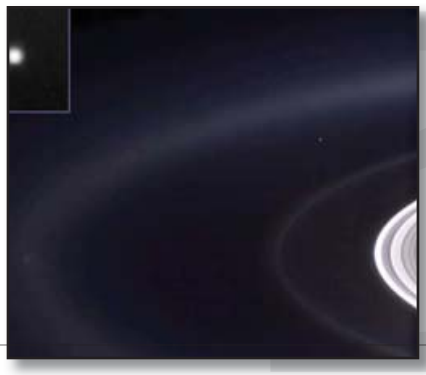
Two of the talks were particularly exciting. C. N. Alpers of the U.S. Geological Survey described the sulfate mineralogy of the Iron Mountain deposit in California, where mine waters are amazingly acidic, with pH values to –3.5! And R. C. Peterson of Queens University in Ontario described a new magnesium-sulfate compound, stable only below 280 K, that could well have formed in the sediments at Mars' Meridiani Planum site, but that would not be found on Earth.

To view the program and abstracts for this workshop, go to *www.lpi.usra.edu/meetings/sulfates2006/pdf/program.pdf*.

## Outer Planets Assessment Group

**November 7–8, 2006, Tucson, Arizona**

In November, advocates of outer planet research and investigations met in sunny Tucson to discuss the status and future prospects for exploration of this vast region. The meeting came hot on the heels of Cassini's latest Saturn discoveries, including dazzling ring observations, methane lakes on Titan, and eruptive water ice plumes on the tiny moon Enceladus. The meeting included presentations on mission status (New Horizons and Juno), radioactive power sources for missions, issues related to dating of surface ages in the outer solar system, and mission feasability studies for Saturn and Jupiter. The meeting broke into focus groups for discussion of specific bodies, including Europa, Enceladus, Titan, and Ganymede (the only satellite known to have its own magnetic field). The next meeting of the Outer Planets Assessment Group is scheduled for early spring.



The Assessment Groups are community-based forums designed to provide input for planning and prioritizing exploration in the coming decades. For more information about the Outer Planets Assessment Group, visit *www.lpi.usra.edu/opag*.

*Not since the Voyager 1 spacecraft saw our home as a pale blue dot from beyond the orbit of Neptune has Earth been imaged in color from the outer solar system. Now, Cassini casts powerful eyes on our home planet, and captures Earth, a pale blue orb — and a faint suggestion of our Moon — among the glories of the Saturn system.*

## NASA Announces Discovery Program Selections

NASA Monday selected concept studies for missions that would return a sample of an enigmatic asteroid, probe the chemistry of Venus' atmosphere, and reveal the interior structure and history of the Earth's Moon.

Also selected for further study are three missions of opportunity that would make new use of two NASA spacecraft that have completed their primary objectives.

"The science community astounded us with the creativity of their proposals," said NASA's Science Mission Directorate Associate Administrator Mary Cleave. "We look forward to the new knowledge of our solar system that these concepts may provide."

Three missions were selected for concept studies:

- The Origins Spectral Interpretation, Resource Identification and Security (OSIRIS) mission would survey an asteroid and provide the first return of asteroid surface material samples to Earth. Michael Drake of the University of Arizona in Tucson is OSIRIS's principal investigator. NASA's Goddard Space Flight Center would manage the project.
- The Vesper mission is a Venus chemistry and dynamics orbiter that would advance our knowledge of the planet's atmospheric composition and dynamics. Gordon Chin of Goddard is Vesper's principal investigator. Goddard would manage the project.
- The Gravity Recovery and Interior Laboratory (GRAIL) mission would use high-quality gravity field mapping of the Moon to determine the Moon's interior structure. Maria Zuber of the Massachusetts Institute of Technology is GRAIL's principal investigator. NASA's Jet Propulsion Laboratory would manage the project.

The three missions of opportunity selected for concept studies are:

- The Deep Impact eXtended Investigation of Comets (DIXI) mission would use the existing Deep Impact spacecraft for an extended flyby mission to a second comet to take pictures of its nucleus to increase our understanding of the diversity of comets. Michael A'Hearn of the University of Maryland in College Park is DIXI's principal investigator.
- The Extrasolar Planet Observations and Characterization (EPOCh) mission would use the high-resolution camera on the Deep Impact spacecraft to search for the first Earth-sized planets detected around other stars. L. Drake Deming of Goddard is EPOCh's principal investigator.
- The Stardust NExT mission would use the existing Stardust spacecraft to fly by Comet Tempel 1 and observe changes since the Deep Impact mission visited it in 2005. In 2005, Tempel 1 made its closest approach to the Sun, possibly changing the surface of the comet. Joseph Veverka of Cornell University in Ithaca, New York, is NExT's principal investigator.

For more information about the Discovery Program, visit *discovery.nasa.gov*.

## NASA Expands DDAP to Include Stardust Sample Analysis

NASA has expanded the Discovery Data Analysis program (DDAP) to include samples collected from the Stardust mission. The objective of the Discovery Data Analysis program (DDAP) is to enhance the scientific return of completed Discovery missions by broadening the scientific participation in the analysis of data and samples collected by those missions. The results of preliminary examination of the Stardust samples will be published soon and NASA is moving forward to allow the broader planetary community access to samples for scientific study.

NASA intends to make 15–25 awards. Notices of Intent are due on January 5, 2007, and full proposals are due January 19, 2007.

*Artist's rendering of the Stardust encounter with Comet Wild 2. Courtesy of NASA/JPL.*

## NASA Approves Mission and Names Crew for Return to Hubble

Shuttle astronauts will make one final house call to NASA's Hubble Space Telescope as part of a mission to extend and improve the observatory's capabilities through 2013.

NASA Administrator Michael Griffin announced plans for a fifth servicing mission to Hubble on October 31 during a meeting with agency employees at NASA's Goddard Space Flight Center. Goddard is the agency center responsible for managing Hubble.

"We have conducted a detailed analysis of the performance and procedures necessary to carry out a successful Hubble repair mission over the course of the last three shuttle missions. What we have learned has convinced us that we are able to conduct a safe and effective servicing mission to Hubble," Griffin said. "While there is an inherent risk in all spaceflight activities, the desire to preserve a truly international asset like the Hubble Space Telescope makes doing this mission the right course of action."

The flight is tentatively targeted for launch during the spring to fall of 2008. For more information about the mission and the Hubble Space Telescope, visit *www.nasa.gov/hubble*.

## NASA's First 3-D Solar Imaging Mission Soars into Space

NASA's twin Solar Terrestrial Relations Observatories mission, known as STEREO, successfully launched October 25, 2006, at 8:52 p.m. EDT from Cape Canaveral Air Force Station, Florida.

STEREO's nearly identical twin, golf-cart-sized spacecraft will make observations to help researchers construct the first-ever three-dimensional views of the Sun. The images will show the star's stormy environment and its effects on the inner solar system, vital data for understanding how the Sun creates space weather.

The two observatories were launched on a Delta II rocket. After receiving the first signal from the spacecraft approximately 63 minutes after launch, mission control personnel confirmed that each observatory's solar arrays successfully deployed and were providing power. NASA's Deep Space Network antennas in Canberra, Australia, received the initial radio signals.

*Artist's depiction of the deployment of the STEREO solar panels. Courtesy of Johns Hopkins University Applied Physics Laboratory.*

## Radar Subsurface Imaging Leads to Discovery of Rare Meteorite

The recent discovery of a 70-kilogram (154-pound) pallasite in a wheat field just east of Greensburg, Kansas, in the Brenham strewn field, was the result of a collaborative effort between the Houston Museum of Natural Science (HMNS), the Lunar and Planetary Institute (LPI), the Rice Space Institute, and the Brenham Meteorite Company. The goal of the team was to develop new methods for finding and archiving meteorites. The team was led by Dr. Carolyn Sumners, senior director of the Astronomy Department at HMNS.

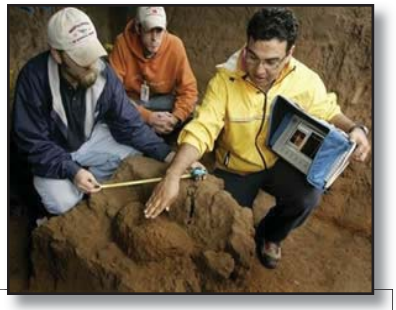
Pallasites are iron-rich meteorites and are very rare, comprising less than 1% of the world's found meteorite collection. What made this discovery particularly important was the method used to find and image the buried meteorite. Dr. Essam Heggy of the Lunar and Planetary Institute, who was responsible for the radar survey, developed an innovative algorithm that combined the use of multiple-frequency ground-penetrating radar (GPR) with three-dimensional polarimetric imaging to more narrowly focus the search, which allowed more accurate and faster reconnaissance of the object and allowed the team to obtain a record of the meteorite in the subsurface before it was extracted from the soil. This approach will allow scientists to maximize the data that was collected during meteorite recovery, which will be of critical importance when trying to model the fall that generated the strewn field.

The Brenham strewn field provided an optimal test site, as a number of large pallasites have been found at this location. Previous meteorite searches at this location relied on the use of metal detectors. However, the history of agricultural use of this land meant that the site contained a significant number of man-made metal artifacts that could not readily be distinguished from potential meteorite locations. A new method was needed that could distinguish meteoritic targets from dozens of other undesirable targets over the 30-acre site. Radar three-dimensional polarimetric imaging was suggested as a means of determining a potential meteorite's precise location and providing geometrical characterization of the buried meteorite before digging began.

Using laboratory electromagnetic characterization on soil samples previously collected from the Kansas soil in the strewn field, along with meteoritic samples from the LPI collection, Heggy identified the optimal penetration depth

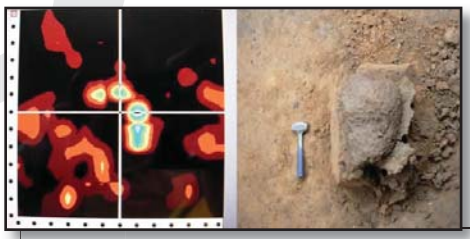
and dielectric contrast between the pallasites and the surrounding soil, and then set the optimal frequency and surveying parameter to search for the potential presence of buried meteorites at the study site.

The survey used a cross-polarized and multiple frequency sounding GPR surveying technique to reduce ambiguities regarding the physical and geometrical properties of the identified object in the subsurface. Once the potential meteorite was located, three-dimensional mapping at three different frequencies and two polarizations of a 6 meter × 6 meter area (20 feet × 20 feet) were performed in order to better establish the orientation of the meteorite in the subsurface. Armed with this knowledge, paleontologists from HMNS were able to fine-tune the extraction process to the precise orientation and location of the meteorite, thereby allowing them to preserve critical information about the impact and date the event of the meteorite strike. Soil samples and organic materials immediately surrounding the meteorite were preserved for dating purposes.



*Dr. Essam Heggy (right) compares an image of a meteorite on his ground-penetrating radar with the actual meteorite while HMNS workers Andy Smith, left, and Chris Flis look on. Photo courtesy of Associated Press/Charlie Riedel.*

Preliminary information obtained at the dig has already dispelled the prevailing wisdom that the Brenham meteorite fall may have occurred 20,000 years ago. The meteorite's location in a Pleistocene epoch soil layer sets the date of the event as closer to 10,000 years ago.



This same radar-polarization and multiple-frequency technique is being proposed for inclusion on the ExoMars Rover mission currently in planning stages by the European Space Agency (ESA). The technique would perform high-resolution shallow subsurface mapping on Mars, which would not only support the planned drilling experiment, but would also reveal crucial information about the sedimentation process in small impact craters.

*Comparison of the meteorite as imaged by the 900-MHz cross-polarized ground-penetrating radar with the actual meteorite retrieved by the paleontology team of HMNS. The dimensions of the meteorite as inferred from the radar signal match that revealed by the dig.*

## Solicitation for Contributions

Contributions to the **Lunar and Planetary Information Bulletin** (LPIB) are solicited from the planetary community and beyond. Articles exploring issues related to planetary science and exploration are welcome. Of special interest are articles describing web-based research and educational tools, meeting highlights and summaries, and descriptions of new space missions that may be of interest to our readers. Peer-reviewed research articles, however, are not appropriate for publication in the LPIB. The LPIB is published quarterly and serves the planetary research community, science libraries, educators, students, and lay readers interested in space-science-related research. Suggested topics can be e-mailed to the editors, who will provide guidelines for formatting and content.

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The Bulletin welcomes articles dealing with issues related to planetary science and exploration. The copy deadline for the next issue is January 12, 2007. Articles or announcements should be submitted via e-mail to *lpibed@lpi.usra.edu*.

To be added to the list to receive notification by e-mail of future issues, please send your e-mail address to *lpibed@lpi.usra.edu*.

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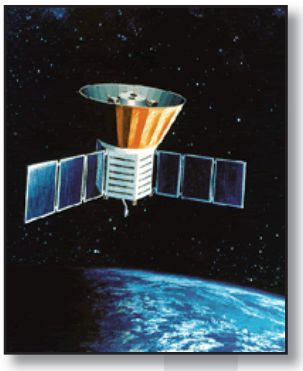
## NASA Scientist John C. Mather Wins 2006 Nobel Physics Prize

The Nobel Prize Committee announced on October 3 that NASA scientist and Goddard Fellow Dr. John C. Mather is this year's recipient of the Nobel Prize for Physics. Mather is currently serving as senior project scientist for NASA's James Webb Space Telescope program. Mather shares the prize with George Smoot of the Lawrence Berkeley National Laboratory in Berkeley, California. They received the award for their work that helped cement the Big Bang theory of the universe and deepened our understanding of the origin of stars and galaxies. Mather and Smoot's work was based on measurements performed with NASA's Cosmic Background Explorer (COBE) satellite, launched in 1989. Together, the scientists could observe the universe in its early stages about 380,000 years after it was born. Ripples in the light they detected helped demonstrate how galaxies came together over time.



*COBE spacecraft. Artwork courtesy of NASA.*

## JPL Director Named One of "America's Best Leaders"

Dr. Charles Elachi, director of NASA's Jet Propulsion Laboratory in Pasadena, California, was honored as one of "America's Best Leaders" by *U.S. News & World Report*, in collaboration with the Center for Public Leadership at Harvard University's John F. Kennedy School of Government.

Elachi and 19 other leaders were featured in the magazine's October 30 issue. The distinguished list includes U.S. Coast Guard Commandant Admiral Thad Allen; New York City Mayor Michael Bloomberg; Berkshire Hathaway, Inc. CEO Warren Buffett; former U.S. Supreme Court Associate Justice Sandra Day O'Connor; and world-renowned architect Frank Gehry.

A selection committee sought leaders who embody and define leadership today and have achieved measurable results in their fields, challenged established processes and inspired a shared vision. The committee was particularly seeking leaders with resilience, adaptability and sustainability who empower others and value their colleagues' personal growth.

*Dr. Charles Elachi. Photo courtesy of NASA/JPL.*

## Ambassador of Exploration Awards

Three distinguished names have been added to the list of NASA's first generation of explorers honored as "Ambassadors of Exploration." The award celebrates the realization of a vision for exploration first articulated 45 years ago by President John F. Kennedy, who was looking to bolster a nation and a fledgling space program. NASA's Ambassadors of Exploration are presented with a unique award that contains a sample of lunar material mounted for public display, designed to recognize the sacrifices and dedication of the astronauts and others who were part of the Mercury, Gemini, and Apollo programs. Named as the latest recipients of this award were Christopher C. Kraft Jr., America's first manned space mission flight director and manager of all the Mercury missions and several of the Gemini missions; former astronaut James (Jim) McDivitt, command pilot for Gemini 4, commander of Apollo 9, and program manager for Apollos 12 through 16; and former astronaut Charles "Pete" Conrad, the third man to walk on the Moon as commander of Apollo 12. Conrad died of injuries sustained in a motorcycle accident in 1999, and his widow accepted the award on his behalf. Awardees are allowed to choose where their awards will be displayed. Kraft's award will be displayed at Virginia Tech's College of Engineering; McDivitt's award will be displayed at the University of Michigan's College of Engineering; and Conrad's award will be displayed at The Museum of Flight, one of the largest air and space museums in the world.

*NASA's Ambassadors of Exploration award contains a lunar sample, along with an inscription that describes the rock as "a symbol of the unity of human endeavor and mandkind's hope for a future of peace and harmony."*

## NASA Announces New Advisory Council Members

NASA Administrator Michael Griffin recently named nine new members to the NASA Advisory Council. "These outstanding individuals will add to an already strong group and will greatly assist Chairman Schmitt in meeting the Council's goals," Griffin said. "The charge of the Council and its six standing Committees is to provide me with the best advice possible in the many areas of NASA programs and activities."

The NASA Advisory Council consists of six committees: Aeronautics, Audit and Finance, Exploration, Human Capital, Science, and Space Operations. Council Chairman Harrison H. Schmitt welcomed the new members. "These accomplished individuals join some of the most experienced and most capable minds in the country serving on the Council, the primary source of outside assistance to Mike Griffin in fulfilling NASA's role in national space policy," Schmitt said. "I am impressed by their accomplishments and look forward to working with them over the next few years." Schmitt was NASA's first scientist astronaut to fly in space and explored the Moon during the Apollo 17 mission. He also served as a U.S. Senator from New Mexico.

Named as Chair of the Science Committee was Dr. Edward David, Science Advisor to the President from 1970 to 1973 and currently the President of EED, Inc. Also named to the Science Committee were Dr. Owen Garriott, a retired scientist astronaut who flew on board the second manned Skylab mission and Spacelab-1, and Dr. Alan Stern, Executive Director of the Space Science and Engineering Division of the Southwest Research Institute.

Named as Chair of the Space Operations Committee was Dr. C. Paul Robinson, President Emeritus and former Director of Sandia National Laboratories. Other members appointed to the Space Operations Committee include Col. Eileen Collins (USAF, Ret.), the first female pilot and commander of the space shuttle, most recently the commander of STS-114; Lt. Gen. (Dr.) Pat Condon (USAF, Ret.), Chairman of the Board of the Air Force Association; Dr. Thomas Jones, a retired scientist astronaut and planetologist who flew four space shuttle missions, installing the centerpiece module of the International Space Station during his final mission; and Admiral Benjamin Montoya, former Chairman, President, and CEO of the Public Service Company of New Mexico and currently the Chief Executive Officer of SmartSystems Technologies.

Dr. John Sullivan, the Director of the Center for Advanced Manufacturing at Purdue University, was appointed to serve on the Aeronautics Committee.

## GSA Award Winners Announced

The Planetary Geology Division of the Geological Society of America is pleased to announce that the 2006 G. K. Gilbert Award has been given to Dr. Michael J. Gaffey of the University of South Dakota. The Gilbert Award is presented annually for outstanding contributions to the solution of fundamental problems in planetary geology in the broadest sense, which includes geochemistry, mineralogy, petrology, geophysics, geologic mapping, and remote sensing. Over the last 30 years, Gaffey has made respected and sustained contributions to the field of planetary science. His work has covered a variety of topics including asteroids, meteorites, comets, the Moon, spectral properties of geologic materials, solar system formation, space resources, and remote sensing of planetary objects.

Also announced were the 2006 winners of the Stephen E. Dwornik Student Research Paper Award. The Dwornik award was begun in 1991 with a generous endowment by Dr. Stephen E. Dwornik, who wished to encourage American students to become involved with NASA and planetary science. The award consists of a plaque and a $500 check, and is given for the best student presentations (one each for poster and oral) at the annual Lunar and Planetary Science Conference (LPSC) held in March. This year, two oral presentations were judged to be equally outstanding, so full awards were presented to Christine McCarthy of Brown University and Michael Ranen of Harvard University. In addition, a single award in the poster category was presented to Justin Filiberto of Stony Brook University (now a postdoctoral fellow at the Lunar and Planetary Institute).

The Pellas-Ryder Student Paper Award, named after Paul Pellas and Graham Ryder, is given jointly by the Meteoritical Society and the GSA Planetary Geology Division. The award is given to an undergraduate or graduate student who is first author of a planetary science paper published in a peer-reviewed scientific journal. The winner of the 2005 Pellas-Ryder award was Dr. James E. Richardson Jr. for his paper entitled "The Global Effects of Impact-induced Seismic Activity on Fractured Asteroid Surface Morphology," published in *Icarus* in 2005. Honorable mention went to Dr. Nicholas J. Tosca for his paper entitled "Geochemical Modeling of Evaporation Processes on Mars: Insight from the Sedimentary Record at Meridiani Planum," published in *Earth and Planetary Science Letters*.

## DPS Award Winners Announced

The Division for Planetary Sciences of the American Astronomical Society announced the 2006 award winners during its 38th annual meeting in October.

The Gerard P. Kuiper Prize for outstanding contributions to the field of planetary science was awarded to Dale P. Cruikshank, Research Scientist at the NASA Ames Research Center in California. Cruikshank pioneered the application of infrared spectroscopy to solar system bodies, developed laboratory techniques that became tools for interpreting the observations, and has been a leader in the design of instruments for remote sensing observations from deep space planetary exploration probes.

Gentry Lee, Chief Engineer for the Planetary Flight Systems Directorate of NASA's Jet Propulsion Laboratory was awarded the prestigious Harold Masursky Award, which recognizes individuals for outstanding service to planetary science and exploration through engineering, managerial, programmatic, or public service activities. Lee was chief engineer for the Galileo project from 1977 to 1988. In his current position, he is responsible for the engineering integrity of all the robotic planetary missions managed by JPL. His major recent work included not only the oversight of all engineering aspects of Spirit and Opportunity, the twin rover missions to Mars that landed in January 2004, but also the implementation of NASA's successful Deep Impact and Stardust missions.

The Carl Sagan Medal for Excellence in Public Communication by a Planetary Scientist was awarded to David H. Grinspoon, the Curator of Astrobiology at the Denver Museum of Nature & Science. Few practicing researchers in planetary science have devoted so much effort to public outreach, and done it so effectively, as Grinspoon. He has a special gift in being able to communicate exciting ideas at the leading edge of planetary and astrobiological research to the interested public. In his prize-winning popular book, *Lonely Planets: The Natural Philosophy of Alien Life*, and his earlier *Venus Revealed*, one encounters amazingly engaging works that seek to place diverse aspects of life in the universe, and of our sister planet, into larger cultural contexts.

The Harold C. Urey Prize for outstanding achievement in planetary research by a young scientist was awarded to Tristan Guillot, a Charge de Recherche of the CNRS at the Observatoire de la Cote d'Azur in Nice, France. Guillot is a recognized expert in radiative transfer and its application to the internal structures of giant planets, both inside and outside our solar system. He has developed unique insights on how to properly treat the influence of strong stellar irradiation on the evolution of the deep convective zones of giant planets, discovering that a thickening radiative zone forms at the surface as the planet's interior cools. Guillot is a young scientist who has demonstrated outstanding achievement with great potential for future success and scientific leadership.

## USRA Announces New President

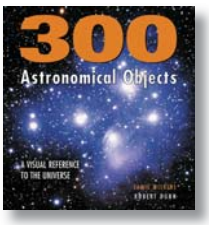
The Universities Space Research Association (USRA) has announced that Dr. Frederick A. Tarantino has been selected as its new President and CEO. Tarantino brings to USRA a strong record of management accomplishments for a major nonprofit laboratory, private industry, and the federal government. USRA is a nonprofit consortium of 100 current member institutions that manages a diverse array of scientific institutes and programs, among which is the Lunar and Planetary Institute.

During his 19-year career with the U.S. Army, Tarantino served as U.S. chair of the joint US-UK working group on space power. He later served as Defense Liaison in the White House Office of Science and Technology Policy, serving as Executive Assistant to the National Security Council Senior Director for Science and Technology, and was later appointed Chief of the Air and Missile Defense Branch in the Office of the Secretary of the Army. Following his military career,Tarantino joined the Bechtel Corporation, where he became President and General Manager of Bechtel Nevada Corporation. After eight years with Bechtel, Tarantino was appointed Principal Associate Director of the Nuclear Weapons Program at the Los Alamos National Laboratory.

Tarantino holds a B.S. degree in Physics from Rensselaer Polytechnic Institute, an M.S. in Nuclear Science from the Air Force Institute of Technology, and a Ph.D. in Nuclear Reactor Physics from MIT.

For more information about USRA and its programs, visit *www.usra.edu*.

## Books —

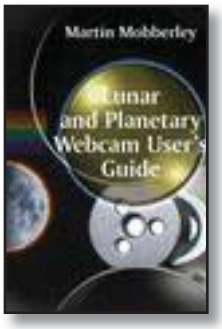



***300 Astronomical Objects: A Visual Reference to the Universe***. Jamie Wilkins and Robert Dunn. Firefly Books Ltd., 2006. 528 pp., Hardcover, $29.95. *www.fireflybooks.com*

*300 Astronomical Objects* is a handy and comprehensive reference to the 300 most interesting celestial objects, providing a tour through the galaxy, from its solar core to its outer limits, with all the highlights and the very latest data about the universe. Convenient data sidebars with each entry provide facts and figures on every object including mass, magnitude, density, radius, rotation period, and surface and core temperatures. An annotated cross-section of the object enhances this information, and a full-page photograph brings the object to life. Additional spreads bring together and explain related objects or phenomena. Topics covered include Mercury's surface, the asteroid belt, 433 Eros, Jupiter's moons, Uranus' rings and moons Ariel and Titania, outer belts and comets, space telescopes, and the International Space Station. This book is a handy reference for the amateur astronomer.

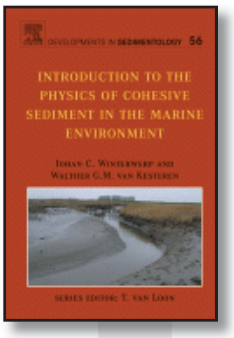

***Kennedy Space Center: Gateway to Space.*** David West Reynolds. Firefly Books, Ltd., 2006. 248 pp., Hardcover, $40.00. *www.fireflybooks.com*

NASA's John F. Kennedy Space Center set the stage for the American adventure in space. Sprawled across 140,000 acres on Florida's Atlantic coast, the center has hosted the succession of rocket launches that have rewritten our knowledge of aeronautics and our very understanding of the nature of the universe. Chosen because of its perfect location, with the wide Atlantic providing a buffer, Kennedy Space Center is now a major tourist attraction appealing to visitors of all ages. This spaceport has served as the departure gate for every American space flight mission and the launching point of hundreds of other advanced scientific spacecraft. Kennedy Space Center will continue to make history as NASA embarks on new adventures in space exploration. This book includes detailed information on the earliest development of rockets in the United States and Germany, the development of rockets and their launch facilities, the missile race and U.S.-Soviet rivalry to be first in space, the great Apollo program and the race to the Moon, the shuttle program, the space station and the Hubble Telescope, and the future of space exploration. Packed with more than 150 spectacular images, *Kennedy Space Center* is the only complete history of this important site.



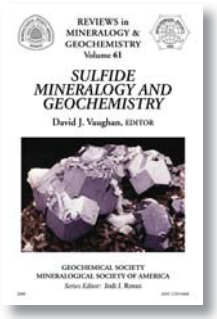

***Lunar and Planetary Webcam User's Guide.*** Martin Mobberley. Springer, 2006. 224 pp., Paperback, $39.95. *www.springer.com*

In the last few years, cheap webcams have revolutionized amateur astronomy by providing a very inexpensive alternative to purpose-made astronomical CCD cameras, which use refrigerated imaging chips and are thus extremely expensive. Webcams are capable of more advanced work than "normal" digital cameras because their simple construction makes it easy to remove the webcam's lens, allowing it to be interfaced directly to a telescope. Using a webcam is not difficult but most amateur astronomers who have tried to do this do not achieve the finest results, despite the webcam's potential. There are numerous imaging and image processing tricks and techniques, and all of them are needed to get the best results. Along with webcam technology has come simple-to-use image processing and enhancement using a PC: The most powerful technique is "stacking," in which the best images (out of hundreds) are selected and summed automatically to provide startlingly good results. This book demystifies the jargon of webcams and computer processing, and provides detailed hints and tips for imaging the Sun, Moon, and planets with a webcam. The author looks at each observing target separately, describing and explaining all specialized techniques in context. Glance through the images in this book to see just how much you can easily achieve by using a webcam with your telescope.




***Introduction to the Physics of Cohesive Sediment Dynamics in the Marine Environment.*** Johan C. Winterwerp and Walther G. M. van Kesteren. Elsevier Science, 2004. 576 pp., Hardcover, $136.00. *www.elsevier.com*

This book is an introduction to the physical processes of cohesive sediment in the marine environment. It focuses on highly dynamic systems, such as estuaries and coastal seas. Processes on the continental shelf are also discussed and attention is given to the effects of chemistry, biology, and gas. The process descriptions are based on hydrodynamic and soil mechanic principles, which integrate at the soil-water interface. This approach is substantiated through a classification scheme of sediment occurrences in which distinction is made between cohesive and granular material. Emphasis is also placed on the important interactions between turbulent flow and cohesive sediment suspensions, and on the impact of flow-induced forces on the stability of the seabed. An overview of literature on cohesive sediment dynamics is presented and a number of new developments are highlighted, in particular in relation to settling and sedimentation, consolidation, bed failure, and liquefaction and erosion of the bed. This book also presents a summary on methods and techniques to measure the various sediment properties necessary to quantify the various parameters in the physical-mathematical model descriptions with a number of examples and case studies included.




***Sulfide Mineralogy and Geochemistry.*** Edited by David J. Vaughan. Mineralogical Society of America, 2006. 714 pp., Paperback, $40.00. *www.minsocam.org*

This text, Volume 61 in the Reviews in Mineralogy and Geochemistry series, provides an up-to-date review of sulfide mineralogy and geochemistry. The emphasis is on such topics as crystal structure and classification, electrical and magnetic properties, spectroscopic studies, chemical bonding, high- and low-temperature phase relations, thermochemistry, stable isotope systematics, and sulfides in biosystems.

***Science, Society, and the Search for Life in the Universe.*** Bruce Jakosky. University of Arizona Press, 2006. 160 pp., Paperback, $17.95. *www.uapress.arizona.edu*

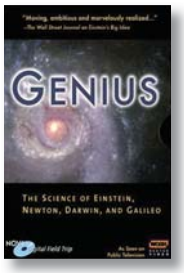
Are we alone in the universe? Are humans unique or part of a greater cosmic existence? What is life's future on Earth and beyond? How does life begin and develop? These questions have inspired wonder and controversy ever since the first people looked up into the sky. With today's technology, we are closer than ever to finding the answers. Astrobiology is the relatively new but fast-growing scientific discipline that involves trying to understand the origin, evolution, and distribution of life within the universe. Public interest stems largely from the deep personal meaning that the possible existence of extraterrestrial life has for so many. In this broadly accessible introduction to the field, Jakosky looks at the search for life in the universe not only from a scientific perspective, but also from a distinctly social one. He addresses topics including the contradiction between the public's fascination and the meager dialogue that exists between those within the scientific community and those outside it, and what has become some of the most impassioned political wrangling ever seen in government science funding.

## *DVDs —*


***Exploring Space: The Quest for Life.*** Produced by PBS, 2006. $29.99. *www.shoppbs.org*

How did life begin? Is there life outside of Earth? Is there a future for humankind on other planets? Each new discovery inches us closer to answering these cosmic questions linking life on Earth with the rest of the universe and renewing our dreams of what lies in the unknown realms of the stars. This two-hour DVD is closed-captioned and features scene selection.

***Genius: The Science of Einstein, Newton, Darwin, and Galileo.*** Produced by NOVA/ WGBH Boston, 2006. 420 minutes, four discs, $49.95. *shop.wgbh.org*




This DVD set includes the NOVA programs *Einstein's Big Idea*, *Newton's Dark Secrets*, *Darwin's Dangerous Idea*, and *Galileo's Battle for the Heavens*. For grades 7 and up.

## FOR KIDS!!!

***Moon in My Room Wall Hanging Light.*** Available from Uncle Milton, 2006. $30.99. *www.unclemilton.com*

This remote-controlled glow-in-the-dark Moon features an authentically detailed lunar moonscape and twelve lunar phases so you can match the Moon in your room to the Moon in the sky. Change it every night as the Moon changes — choose automatic or manual function. This unique light includes an automatic shutoff feature, discovery guide with calendar, Moon phase charts, and instructions. A 15-minute audio CD that provides your own personal guided tour of the Moon is also included. The light requires four AA and two AAA batteries (not included). Moon is 10" in diameter.

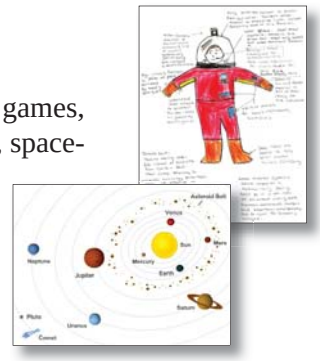
***Kids to Space: A Space Traveler's Guide.*** Lonnie Jones Schorer. Apogee Books, 2006. 384 pp. with CD-ROM, Paperback, $29.95. *www.cgpublishing.com*


Based on an imaginary trip to space with America's school children, *Kids to Space: A Space Traveler's Guide* is a comprehensive collection of children's questions about traveling to and living in space. From black holes to possible destinations, from group dynamics to weightlessness, from medical concerns to space communities, internationally recognized experts in each field provide answers to 100 different categories of student questions, making the book a fascinating space guide, not just for kids but for all who have ever wondered about the universe and dreamed of what it would be like to be a space traveler. A bonus CD-ROM includes a space art slide show from the kids who participated in this book project and features some exclusive music referred to as a "Space Symphony."


***Space Interactive Fabric Calendar.*** Available from The Space Store, 2006. $26.95. *www.thespacestore.com*

Enjoy the wonders of space year round! This fabric calendar features a photo montage of planets and celestial wonders. Ready-to-cut fabric pieces include dates, holidays, months, years, and stars to mark special days. This item is ideal for educators and students! Fabric chart measures 20"w × 24"h, is machine washable, and includes double-hook grip strips and an activity guide.

***NASA for Kids website.*** Online resource. *www.nasa.gov/audience/forkids/home/index.html*



The Kids' Main Page of the NASA website is designed with kids in mind! There are games, activities, and other fun things for NASA kids, including storybooks, coloring pages, space-inspired cooking projects, video clips, vocabulary words, trivia, games, and quizzes. Have fun and learn about the Moon, Mars, and beyond!

## November 2006

1–2 Contributions to Space Exploration: Global Objectives, Plans and Capabilities, Arlington, Virginia. *http://www.astronautical.org/*

2–4 International Symposium Remote Sensing and Pan Ocean Remote Sensing Conference, Bexco, Busan, Korea. *http://www.isrs2006porsec.com/*

2–5 American Society for Gravitational and Space Biology, Arlington, Virginia. *http://asgsb.org/annual_meeting.html*

6–8 Ninth International Workshop on Simulation for European Space Programmes (SESP 2006), Noordwijk, The Netherlands. *http://www.congrex.nl/06c29/main.html*

6–9 Annual Water Resources Conferences, Baltimore, Maryland. *http://www.awra.org/meetings/Baltimore2006/*

6–9 14th AIAA/AHI Space Planes and Hypersonic Systems and Technologies Conference, Canberra, Australia. *http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1276*

6–10 Measuring the Earth II, San Antonio, Texas. *http://www.asprs.org/fall2006/index.htm*

7–8 Second International Young Scientists' Global Change Conference, Beijing, China. *http://www.start.org/YSC/YSC2006.html*

8–9 William Smith 06: Planetary Geosciences, London, England. *http://www.geolsoc.org.uk/template.cfm?name=William_Smith_06*

9–12 Global Environmental Change: Regional Challenges, Beijing, China. *http://www.essp.org/essp/ESSP2006/IOC_index.html*

9–12 SEDS: Space Vision 2006, Orlando, Florida. *http://www.spacevision2006.org/*

13–17 Third European Space Weather Week, Brussels, Belgium. *http://sidc.oma.be/esww3/*

14–17 CAWSES International Workshop on Space Weather Modeling, Yokohama, Japan. *http://www.es.jamstec.go.jp/cswm/*

15–18 Mutual Events of the Uranian Satellites in 2007–2008 and Further Observations in Network, Paris, France. *http://www.imcce.fr/en/publications/colloque_sympo/paris2006/index.php*

20–Dec 1 XVI Canary Islands Winter School of Astrophysics, Canary Islands, Spain. *http://www.iac.es/winschool2006/info.html*

23–24 Canadian Space Agency Astronomy Workshop, Saint-Hubert, Quebec. *http://www.space.gc.ca/asc/eng/events/2006/csaw.asp*

28–30 Astrophysics Enabled by the Return to the Moon, Baltimore, Maryland. *http://www.stsci.edu/institute/conference/moon*

27–31 Second UN/NASA Workshop on the International Heliophysical Year and Basic Space Science, Bangalore, India. *http://www.iiap.res.in/ihy/index.html*

## December 2006

4–5 Remote Sensing for Earth Resources: Exploration, Extraction and Environmental Impacts, London, England. *http://www.grsg.org/meeting.html*

4–6 Second Space Exploration Conference, Houston, Texas. *http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1487*

5–6 Advanced RF Sensors for Earth Observation 2006, Noordwijk, The Netherlands. *http://www.congrex.nl/06c33/main.html*

8–10 Workshop on Early Planetary Differentiation (EPD 2006), Sonoma County, California. *http://www.lpi.usra.edu/meetings/epd2006*

11–15 2006 AGU Fall Meeting, San Francisco, California. *http://www.agu.org/meetings/fm06/*

## January 2007

5–6 Evolution and Exploration of Solar Systems, Irvine, California. *http://www.nasonline.org/site/PageServer?pagename=SACKLER_solarsystems/*

6–10 209th AAS Meeting (Joint with AAPT), Seattle, Washington. *http://cadcwww.hia.nrc.ca/cadcbin/get_meetings?meeting_no=1752*

8–11 45th AIAA Aerospace Science Meeting & Exhibit, Reno, Nevada. *http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1064*

9–10 Mars Exploration Program Analysis Group (MEPAG) Meeting #16, Washington, DC. *http://mepag.jpl.nasa.gov/meeting/jan-07/index.html*

11–12 Third Meeting of the Venus Exploration and Analysis Group (VEXAG), Arlington, Virginia.
http://www.lpi.usra.edu/vexag/3rd_comm_meeting.html

14–18 AMS 4th Symposium on Space Weather, San Antonio, Texas.
*http://www.ametsoc.org/meet/annual/registrationandrates.html*

22–25 Challenges for Solar Cycle 24, Ahmedabad, India.
*http://www.prl.res.in/~djubconf/*

## February

5–8 First GLAST Symposium, Stanford, California.
*http://glast.gsfc.nasa.gov/science/symposium/2007/*

21–23 11th Annual International ISU Symposium "Why the Moon?", Strasbourg, France.
*http://www.isunet.edu/EN/573*

24–28 2nd International Conference, Exhibition on Geo-Resources in the Middle East, Cairo, Egypt.
*http://www.grmena.com.eg/*

27–Mar 1 2nd Space and Society Conference: Space Options for the 21st Century, Noordwijk, The Netherlands.
*http://www.congrex.nl/06a12/*

## March

3–10 IEEE Aerospace Conference, Big Sky, Montana.
*http://www.aeroconf.org/*

5–7 Observing Planetary Systems, Santiago, Chile.
*http://www.sc.eso.org/santiago/science/OPSWorkshop/*

5–8 2007 Planetary Defense Conference, Washington, DC.
*http://www.aero.org/conferences/planetarydefense/index.html*

12–16 38th Lunar and Planetary Science Conference (LPSC 2007), League City, Texas.
*http://www.lpi.usra.edu/meetings/lpsc2007/*

25–28 Space Exploration 2007, Albuquerque, New Mexico.
*http://www.sesinstitute.org/*

25–30 A New Zeal for Old Galaxies 2007, Rotorua, New Zealand.
*http://astronomy.swin.edu.au/nz2007/*