



Catskills Astronomy Club News July, 2007

John Kocijanski.....Editor
Jim McKeegan.....President
John Kocijanski.....Vice-President
Lisa Brody.....Treasurer
Bud Wertheim.....Secretary

Club News:

7/1/07

The observation session scheduled for June 9th was held at Walnut Mountain Park. Fifteen people attended. Early in the evening we were able to view three planets in sky. Jupiter, Saturn, and Venus were all visible at the same time. Jupiter showed its atmospheric banding and four moons. Saturn gave a beautiful view of its rings and atmospheric bands. Venus showed a slight crescent phase. As the sky darkened many deep sky objects were observed. A number of globular clusters were viewed including M13 and M92 in Hercules as well as M10 and M12 in Ophiuchus. Throughout the evening many satellites and a few meteors were seen.

The observation session scheduled for June 16th was canceled due to poor weather. The observation sessions for July are on the 7th and 14th.

Anyone interested in submitting an astronomical observation, photograph, or equipment review for the newsletter, please contact John at kocis@verizon.net.

The club has selection of astronomy books, NASA software and DVDs, Stardate audio CDs, and a Meade eight inch reflector for members to borrow. Please contact John at 791-5240 or kocis@verizon.net if you are interested in borrowing any of these.

Astronomy News:

Here are some articles from various NASA sources that might be of interest.

NEWS RELEASE: 2007-070

June 28, 2007

NASA Mars Rover Ready For Descent Into Crater

PASADENA, Calif. - NASA's Mars rover Opportunity is scheduled to begin a descent down a rock-paved slope into the Red Planet's massive Victoria Crater. This latest trek carries real risk for the long-lived robotic explorer, but NASA and the Mars Rover science team expect it to provide valuable science.

Opportunity already has been exploring layered rocks in cliffs around Victoria Crater. The team has planned the descent carefully to enable an eventual exit, but Opportunity could become trapped inside the crater or lose some capabilities. The rover has operated more than 12 times longer than its originally

intended 90 days.

The scientific allure is the chance to examine and investigate the compositions and textures of exposed materials in the crater's depths for clues about ancient, wet environments. As the rover travels farther down the slope, it will be able to examine increasingly older rocks in the exposed walls of the crater.

" While we take seriously the uncertainty about whether Opportunity will climb back out, the potential value of investigations that appear possible inside the crater convinced me to authorize the team to move forward into Victoria Crater, " said Alan Stern, NASA associate administrator, Science Mission Directorate, NASA Headquarters, Washington. " It is a calculated risk worth taking, particularly because this mission has far exceeded its original goals."

The robotic geologist will enter Victoria Crater through an alcove named Duck Bay. The eroding crater has a scalloped rim of cliff-like promontories, or capes, alternating with more gently sloped alcoves, or bays.

A meteor impact millions of years ago excavated Victoria, which lies approximately 4 miles (6 kilometers) south of where Opportunity landed in January 2004. The impact-created bowl is half a mile (800 meters) across and about five times as wide as Endurance Crater, where Opportunity spent more than six months exploring in 2004.

The rover began the journey to Victoria from Endurance 30 months ago. It reached the rim at Duck Bay nine months ago. Opportunity then drove approximately a quarter of the way clockwise around the rim, examining rock layers visible in the promontories and possible entry routes in the alcoves. Now, the rover has returned to the most favorable entry point.

" Duck Bay looks like the best candidate for entry, " said John Callas, rover project manager, NASA's Jet Propulsion Laboratory, Pasadena, Calif. " It has slopes of 15 to 20 degrees and exposed bedrock for safe driving."

If all of its six wheels continue working, engineers expect Opportunity to be able to climb back out of the crater. However, Opportunity's twin rover, Spirit, lost the use of one wheel more than a year ago, diminishing its climbing ability.

" These rovers are well past their design lifetimes, and another wheel could fail on either rover at any time," Callas said. " If Opportunity were to lose the use of a wheel inside Victoria Crater, it would make it very difficult, perhaps impossible, to climb back out."

"We don't want this to be a one-way trip," said Steve Squyres, principal investigator for the rovers' science instruments, Cornell University, Ithaca, N.Y. " We still have some excellent science targets out on the plains that we would like to visit after Victoria. But if Opportunity becomes trapped there, it will be worth the knowledge gained."

The Jet Propulsion Laboratory manages the Mars Exploration Rover project for NASA's Science Mission Directorate.

For more information on the Mars Rovers, visit:

<http://www.nasa.gov/rovers>

Visuals describing this decision and the anticipated science can be viewed at:

http://www.nasa.gov/mission_pages/mer/070628

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NEWS RELEASE: 2007-065

June 14, 2007

Cassini Finds Saturn Moons Are Active

Saturn's moons Tethys and Dione are flinging great streams of particles into space, according to data from the Cassini mission to Saturn. The discovery suggests the possibility of some sort of geological activity, perhaps even volcanic, on these icy worlds.

These results appear in this week's issue of the journal *Nature*. The Cassini mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency.

The particles were traced to the two moons because of the dramatic outward movement of electrically charged gas, which could be mapped back to the moons' orbits in the magnetic environment of Saturn. Known as plasma, the gas is composed of negatively charged electrons and positively charged ions, which are atoms with one or more electrons missing. Because they're charged, the electrons and ions can become trapped inside a magnetic field.

Saturn rotates in just 10 hours and 46 minutes. This sweeps the magnetic field and the trapped plasma through space. Just like a child on a fast-spinning merry-go-round, the trapped gas feels a force trying to throw it outwards, away from the center of rotation.

Soon after the Cassini spacecraft reached Saturn in June 2004, its instruments revealed that the planet's hurried rotation squashes the plasma into a disc, and that great fingers of gas are being thrown out into space from the disc's outer edges. Hotter, more tenuous plasma then rushes in to fill the gaps.

Now, Jim Burch, team member of the Cassini Plasma Spectrometer at the Southwest Research Institute, San Antonio, Texas, and his colleagues have made a careful study of these events using the instrument. They have found that the direction of the ejected electrons points back towards Tethys and Dione. " It establishes Tethys and Dione as important sources of plasma in Saturn's magnetosphere," said Burch.

Until this discovery, the only moons of Saturn known to be active worlds were Titan and Enceladus. " This new result seems to be a strong indication that there is activity on Tethys and Dione as well, " said Andrew Coates from the Mullard Space Science Laboratory, University College London, co-author and member of the Cassini Plasma Spectrometer team.

Activity is a draw for planetary scientists, as it means that the planet has yet to become geologically dead or is perhaps being supplied with energy. The activity on Enceladus was detected first by Cassini's Dual Technique Magnetometer. This led the flight team to schedule a particularly close pass of Enceladus, which revealed a wealth of data about Enceladus' alien geysers - and spectacular pictures, too.

" The best results arise when we combine a variety of data sets to understand the observations, " said Michele Dougherty, Imperial College, London, who is principal investigator of the magnetometer.

Future flybys of Dione and Tethys will allow the magnetometer team and the other instrument teams a close-up look at the moons. Before that happens, the teams have to go back and search for further signs of activity in the data already collected during the Tethys and Dione flybys of 2005.

In addition, having detected the electrons, they will try to determine the composition of the Tethys and Dione plasma using ion data.

More information on the Cassini mission is available at: <http://www.nasa.gov/cassini>, <http://saturn.jpl.nasa.gov> and <http://saturn.esa.int> .

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter was designed, developed and assembled at JPL. The Cassini Plasma Spectrometer team is based at the Southwest Research Institute in San Antonio. The magnetometer team is based at Imperial College in London, working with team members from the United States and several European countries.

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Feature

June 13, 2007

Spitzer Searches for the Origins of Life

Astronomers suspect the early Earth was a very harsh place. Temperatures were extreme, and the planet was constantly bombarded by cosmic debris. Many scientists believe that life's starting materials, or building blocks, must have been very resilient to have survived this tumultuous environment.

Now, NASA's Spitzer Space Telescope has learned, for the first time, that organic molecules believed to be among life's building blocks, called polycyclic aromatic hydrocarbons, can survive another type of harsh setting, an explosion called a supernova. Supernovae are the violent deaths of the most massive stars. In death, these volatile objects blast tons of energetic waves into the cosmos, destroying much of the dust surrounding them.

The fact that polycyclic aromatic hydrocarbons can survive a supernova indicates that they are incredibly tough – like cosmic cockroaches enduring a nuclear blast. Such durability might be further proof that these molecules are indeed among life's building blocks.

Achim Tappe of the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass., used Spitzer's infrared spectrograph instrument to detect abundant amounts of polycyclic aromatic hydrocarbons along the ridge of supernova remnant N132D. The remnant is located 163,000 light-years away in a neighboring galaxy called, the Large Magellanic Cloud.

" The fact that we see polycyclic aromatic hydrocarbons surviving this explosion illustrates their resilience," says Tappe.

These intriguing molecules are comprised of carbon and hydrogen atoms, and have been spotted inside comets, around star-forming regions and planet-forming disks. Since all life on Earth is carbon based, astronomers suspect that some of Earth's original carbon might have come from these molecules – possibly from comets that smacked into the young planet.

Astronomers say there is some evidence that a massive star exploded near our solar system as it was just beginning to form almost 5 billion years ago. If so, the polycyclic aromatic hydrocarbons that survived that blast might have helped seed life on our planet.

Tappe's paper was published in the December 10, 2006, issue of *Astrophysical Journal*.

NEWS RELEASE: 2007-068

June 21, 2007

NASA Prepares for Performing New Science on the Moon

WASHINGTON -- NASA has selected proposals, including two from the Jet Propulsion Laboratory in Pasadena, Calif., for future lunar science activities. In addition, the agency has established two new programs that will enhance research made possible by the Vision for Space Exploration.

The proposals and programs are part of an effort by NASA to develop new opportunities to conduct important science investigations during the planned renewal of human exploration of the moon.

In a highly competitive selection, NASA chose seven proposals from more than 70 submissions under the Lunar Surface Science Opportunities Program. These newly funded efforts in the space science community will complement two new programs established in the Science Mission Directorate's Planetary Sciences Division at NASA Headquarters in Washington: the Lunar Advanced Science and Exploration Research Program and the Lunar Reconnaissance Orbiter Participating Scientist Program.

The seven selected proposals will result in advanced development for simple, autonomous instrument packages deployed on the lunar surface by astronauts. Such "suitcase science" packages could open up a wide variety of research applications regarding the moon and the lunar environment.

Some of the funded efforts will help scientists better understand the lunar dust that creates problems for astronauts on the moon. Other studies will provide a better understanding of the moon's interior, look for natural resources on the lunar surface and use lasers to provide precise information about the position of the moon and its features.

" The proposals we received show that the scientific community is excited about the opportunity to capitalize on the nation's planned lunar outpost. The moon has much to teach us about itself, the history of our solar system, and even the history of the sun. In the future, more and more scientists will be able to participate in lunar research as we focus attention on Earth's fascinating satellite," said Alan Stern, associate administrator for NASA's Science Mission Directorate.

The two selected proposals from JPL are:

-- "Autonomous Lunar Geophysical Experiment Package"--William Banerdt, principal investigator

-- "Lunar Laser Transponder and Retroreflector Science"--Slava Turyshev, principal investigator

The other selected proposals are:

-- Goddard Space Flight Center, Greenbelt, Md., " Volatile Analysis by Pyrolysis of Regolith on the Moon using Mass Spectrometry"--Daniel Glavin, principal investigator

-- Goddard Space Flight Center, " Seismology and Heat flow instrument package for Lunar Science and Hazards"--Patrick Taylor, principal investigator

-- Southwest Research Institute, Boulder, Colo., " Lunar Radiation Environment and Regolith Shielding Experiment"--Donald Hassler, principal investigator

-- U.S. Army Engineer Research and Development Center, Fort Wainwright, Ark., " Lunar Suitcase Science: A Lunar Regolith Characterization Kit"--Jerome Johnson, principal investigator

-- Ball Aerospace and Technologies Corp., Boulder, Colo., "Autonomous Lunar Dust Observer"--Christian Grund, principal investigator

Under the planned Lunar Advanced Science and Exploration Research program, proposals will be solicited for investigations to increase knowledge of the moon while also providing necessary information for humans to live and work there. Studies may include simulations and laboratory work to better understand the lunar environment and its hazards, such as dust and radiation. The program also will support analysis of existing lunar data, including the Apollo and robotic mission data archives, and work to understand the origin and evolution of the moon.

In the upcoming Lunar Reconnaissance Orbiter Participating Scientist Program, NASA will select researchers to perform detailed investigations using instruments aboard the spacecraft during its first years in lunar orbit. Proposals for both programs are due Sept. 7, 2007.

Lunar Reconnaissance Orbiter is NASA's next orbital mission to the moon. Launch is planned in late 2008. It will orbit the moon for at least one year, providing data to accelerate opportunities for future science missions and human exploration.

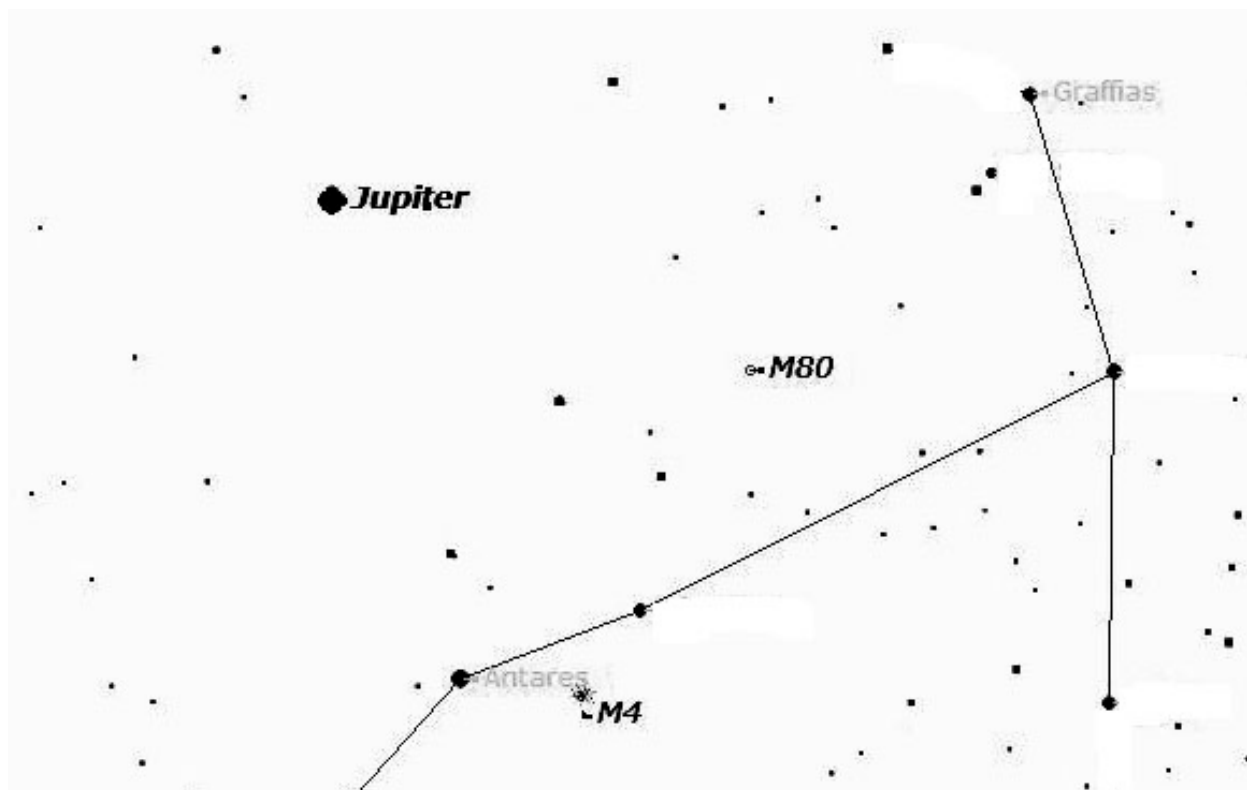
Details on NASA's lunar research programs are available at:

<http://www.nasa.gov/exploration>

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Middle Evening Observing Highlights for July

Antares is in the southern sky in the constellation Scorpius. It has an orange. The globular cluster M4 can be found just to the west of it. Spica is in the western part of the sky in the constellation Virgo. Arcturus is in the western sky in the constellation Bootes but it is higher in the sky than Spica. Arcturus has a “ginger ale” tint. Vega, Deneb, and Altair are in the eastern sky. They form the asterism known as the Summer Triangle. Vega is in the constellation Lyra. Deneb is in the constellation Cygnus (the Northern Cross). Altair is in the constellation Aquilla. The Keystone of the constellation Hercules is almost directly overhead (in the zenith). The plane of our galaxy (the Milky Way) stretches from the south to the north across the sky. Jupiter is in the southeastern sky in Scorpius. The Southern Delta Aquarid meteor shower is visible from mid July to mid August with peak activity on July 28 or 29 July. The meteors radiate from the constellation Aquarius. Full moon will occur on July 30th. New moon is on July 14th. The image below shows the location of Jupiter and Antares in Scorpius as well as the globular star clusters M4 and M80. The double star Graffias is also shown.



NASA Space Place

Chew on This

The Mars robotic rovers, Spirit and Opportunity, are equipped with RATs, or Rock Abrasion Tools. Their purpose is to abrade the surface patina off the Mars rocks so that the alpha x-ray spectrometer can analyze the minerals inside the rocks, rather than just on the surface.

But future robotic missions to Mars will be asked to go even further below the surface. Scrapers and corers will gather rock samples of substantial size, that, in order to be analyzed by a spectrometer, will need to be crushed into a fine powder.

Crushing rocks on Mars? Now there's a problem that brings to mind a multitude of possible approaches: Whack them with a large hammer? Squeeze them until they explode? How about just chewing them up? It was with this latter metaphor that the planetary instrument engineers struck pay dirt—so to speak.

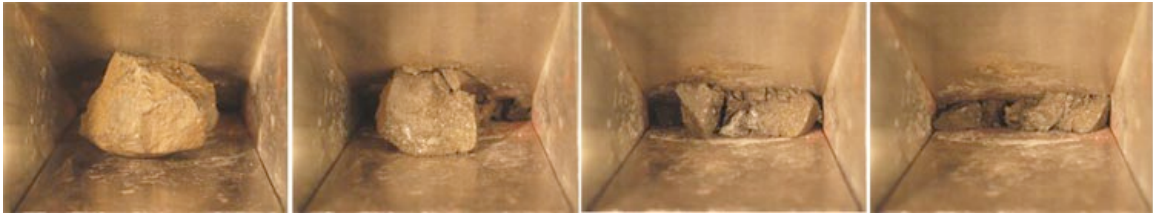
Thanks to NASA's Planetary Instrument Definition and Development Program, a small group of NASA engineers came up with the Mars Rock Crusher. Only six inches tall, it can chew the hardest rocks into a powder.

The Mars Rock Crusher has two metal plates that work sort of like our jaws. One plate stays still, while the other plate moves. Rocks are dropped into the jaw between the two plates. As one plate moves in and out (like a lower jaw), rocks are crushed between the two plates. The jaw opening is larger toward the top and smaller towards the bottom. So when larger rocks are crushed near the top, the pieces fall down into the narrower part of the jaw, where they are crushed again. This process repeats until the rock particles are small enough to fall through a slit where the two plates are closest.

Engineers have tested the Mars Rock Crusher with Earth rocks similar to those expected to be found on Mars. One kind of rock is hematite. The rusted iron in hematite and other rocks help give Mars its nickname "The Red Planet." Another kind of rock is magnetite, so-called because it is magnetic. Rocks made by volcanoes are called basalts. Some of the volcanoes on Mars may have produced basalts with a lot of a mineral called olivine. We call those olivine basalts, and the Rock Crusher chews them up nicely too.

Visit www.jpl.nasa.gov/technology to read the latest about other NASA technologies for exploring other planets and improving life on this one.

This article was written by Diane K. Fisher and provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption:

Looking down on the jaws of the Mars Rock Crusher, we see a magnetite rock get crushed into smaller and smaller particles.