Astronomy Club News

August, 2004

John Kocijanski, Editor

Catskills Astronomy Club News

8/1/04

Club News:

The July 10th observation session was held. Four people attended. The International Space Station was seen. The July 17th observation session was canceled due to poor weather.

The observation sessions for August are on the 7th and 14th.

Our club will be hosting a scout group on the 14th. Club members are encouraged to come to the session to show our young guests some "heavenly wonders".

Highpoint Scientific in Montague, NJ will be having a special event this month. Here is a description from their website.

Burgess Optical Day - Saturday August 28th - 10 am. - ?

Come meet the crew from Burgess Optical and you will be treated to a plethora of new products that are sure to be revolutionary. Refreshments will be served, door prizes will be given away, and a star party is planned, weather permitting.

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

Each month the photo section of our newsletter will highlight the telescopes and equipment of club members. If you have a photo of your scope or equipment and a brief description of it that you would like to contribute please send it to John at kocis@verizon.net.

The club has selection of astronomy books, Stardate audio CDs, a Macintosh computer with astronomy software, 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.

IImage Advisory: 2004-187 July 29, 2004

Titan's Purple Haze Points To A Fuzzy Past

Encircled in purple stratospheric haze, Saturn's largest moon, Titan,

appears as a softly glowing sphere in this colorized image taken on July 3, 2004, one day after Cassini's first flyby of that moon. Titan has a dense atmosphere composed primarily of nitrogen with a few percent methane. The atmosphere can undergo photochemical processes to form hazes.

Images like this one reveal some of the key steps in the formation and evolution of Titan's haze. The process is thought to begin in the high atmosphere, at altitudes above 400 kilometers (250 miles), where ultraviolet light breaks down methane and nitrogen molecules. The products are believed to react to form more complex organic molecules containing carbon, hydrogen and nitrogen that can combine to form the very small particles seen as haze.

This ultraviolet view of Titan has been falsely colored. The main body is colored pale orange as seen in true color images. Above the orange disc are two distinct layers of atmospheric haze that have been brightened and falsely colored violet to enhance their visibility. It is not currently understood why there are two separate haze layers. This and other questions await answers as the four-year Cassini tour continues, with many more planned flybys of Titan. The upcoming October 2004 flyby of Titan will be 30 times closer than that of July 2.

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 Office of Space Science, Washington, D.C. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging team is based at the Space Science Institute, Boulder, Colo.

For this and other images and information about the Cassini-Huygens mission, visit http://saturn.jpl.nasa.gov and http://www.nasa.gov/cassini . Images are also available at the Cassini imaging team home page, http://ciclops.org .

Credit: NASA/JPL/Space Science Institute

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RELEASE: 2004-184 July 16, 2004

NASA's Mars Rovers Roll Into Martian Winter

As winter approaches on Mars, NASA's Opportunity rover continues to inch deeper into the stadium-sized crater dubbed "Endurance." On the

other side of the planet, the Spirit rover found an intriguing patch of rock outcrop while preparing to climb up the “Columbia Hills” backward. This unusual approach to driving is part of a creative plan to accommodate Spirit’s aging front wheel.

Spirit, with an odometer reading of over 3.5 kilometers (2.2 miles), has already traveled six times its designed capacity. Its right front wheel has been experiencing increased internal resistance, and recent efforts to mitigate the problem by redistributing the wheel’s lubricant through rest and heating have been only partially successful.

To cope with the condition, rover planners have devised a roundabout strategy. They will drive the rover backward on five wheels, rotating the sixth wheel only sparingly to ensure its availability for demanding terrain. “Driving may take us a little bit longer because it is like dragging an anchor,” said Joe Melko, a rover engineer at NASA’s Jet Propulsion Laboratory, Pasadena, Calif. “However, this approach will allow us to continue doing science much longer than we ever thought possible.”

On Thursday, July 15, Spirit successfully drove 8 meters (26 feet) north along the base of the Columbia Hills backward, dragging its faulty wheel. The wheel was activated about 10 percent of the time to surmount obstacles and to pull the rover out of trenches dug by the immobile wheel.

Along the way, Spirit drove over what scientists had been hoping to find in the hills — a slab of rock outcrop that may represent some of the oldest rocks observed in the mission so far. Spirit will continue to drive north, where it likely will encounter more outcrop. Ultimately, the rover will drive east and hike up the hills backward using all six wheels.

“A few months ago, we weren’t sure if we’d make it to the hills, and now here we are preparing to drive up into them,” said Dr. Matt Golombek, a rover science-team member from JPL. “It’s very exciting.”

For the past month, the Spirit rover has been parked near several hematite-containing rocks, including “Pot of Gold,” conducting science studies and undergoing a long-distance “tuneup” for its right front wheel.

Driving with the wheel disabled means that corrections might have to be made to the rover’s steering if it veers off its planned path. This limits Spirit’s accuracy, but rover planners working at JPL’s rover test facility have come up with some creative commands that allow the rover to auto-correct itself to a limited degree.

As Spirit prepares to climb upward, Opportunity is rolling downward.

Probing increasingly deep layers of bedrock lining the walls of Endurance Crater at Meridiani Planum, the rover has observed a puzzling increase in the amount of chlorine. Data from Opportunity's alpha particle X-ray spectrometer show that chlorine is the only element that dramatically rises with deepening layers, leaving scientists to wonder how it got there. "We do not know yet which element is bound to the chlorine," said Dr. Jutta Zipfel, a rover science-team member from the Max Planck Institute for Chemistry, Mainz, Germany.

Opportunity will roll down even farther into the crater in the next few days to see if this trend continues. It also will investigate a row of sharp, teeth-like features dubbed "Razorback," which may have formed when fluid flowed through cracks, depositing hard minerals. Scientists hope the new data will help put together the pieces of Meridiani's mysterious and watery past. "Razorback may tell us more about the history of water at Endurance Crater," said Dr. Jack Farmer, a rover science-team member from Arizona State University, Tempe.

Rover planners are also preparing for the coming Martian winter, which peaks in mid-September. Dwindling daily sunshine means the rovers will have less solar power and take longer to recharge. Periods of rest and "deep sleep" will allow the rovers to keep working through the winter at lower activity levels. Orienting the rovers' solar panels toward the north will also elevate power supplies. "The rovers might work a little bit more every day, or a little bit more every other day. We will see how things go and remain flexible," said Jim Erickson, project manager for the Mars Exploration Rover mission at JPL.

JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Exploration Rover project for NASA's Office of Space Science, Washington.

Images and additional information about the project are available on the Internet at http://marsrovers.jpl.nasa.gov and http://athena.cornell.edu .

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NEWS RELEASE: 2004-186 July 29, 2004

NASA Selects Future Mission Concepts For Study

NASA has selected nine studies, including one from the Jet Propulsion Laboratory in Pasadena, Calif., to investigate new ideas for future mission concepts within its Astronomical Search for Origins Program.

Some of the new mission ideas will survey one billion stars within our

own galaxy; measure the distribution of galaxies in the distant universe; study dust and gas between galaxies; study organic compounds in space and investigate their role in planetary system formation; and create an optical-ultraviolet telescope to replace NASA's Hubble Space Telescope.

The products from these concept studies will be used for future planning of missions complementing the existing suite of operating missions, including NASA's Hubble and Spitzer Space Telescopes, and developmental missions such as the James Webb Space Telescope and Terrestrial Planet Finder.

Each of the selected studies will have eight months to further develop and refine concepts for missions addressing different aspects of Origins Program science. The Origins
Program seeks to address the fundamental questions: "Where did we come from?" and "Are we alone?" NASA received 26 proposals in response to this call for mission concepts.

The selected proposals and their principal investigators are:

— A Background Limited Infrared-Submillimeter Spectrograph for Spica: Revealing the Nature of the Far-Infrared Universe, Matt Bradford, JPL, Pasadena, Calif. The study will enable far-infrared spectroscopy of the galaxies that make up the far-infrared background out to distances of some of the farthest galaxies known today. Its spectral surveys will chart the history of creation of elements heavier than helium and energy production through cosmic time. (Note: Spica is a Japanese mission).

— Origins Billion Star Survey, Kenneth Johnston, U.S. Naval Observatory, Washington. The survey will provide a complete census of giant extrasolar planets for all types of stars in
our galaxy and the demographics of stars within 30,000 light-years of the Sun.

— The Space Infrared Interferometric Telescope, David Leisawitz, Goddard Space Flight Center, Greenbelt, Md. This imaging and spectral Michelson interferometer operating in the mid- to far-infrared region of the spectrum. Its very high angular resolution in the far-infrared will enable revolutionary developments in the field of star and planet formation research.

— Cosmic Inflation Probe, Gary Melnick, Smithsonian Astrophysical Observatory, Cambridge, Mass. The probe will measure the shape of cosmic inflation potential by conducting a space-based, near-infrared, large-area redshift survey capable of detecting galaxies that formed early in the history of the universe.

— High Orbit Ultraviolet-visible Satellite, Jon Morse, Arizona State University, Tempe. This mission will conduct a step-wise, systematic investigation of star formation in the Milky Way, nearby galaxies and the high-redshift universe; the origin of the elements and cosmic structure; and the composition of and physical conditions in the extended atmospheres of extrasolar planets.

— Hubble Origins Probe, Colin Norman, Johns Hopkins University, Baltimore. This mission seeks to combine instruments built for the fifth Hubble servicing mission: Cosmic Origins Spectrograph and Wide Field Camera 3. This new space telescope at the forefront of modern astronomy will have a unifying focus on the period when the great majority of star and planet formation, heavy element production, black-hole growth and galaxy assembly took place.

— The Astrobiology Space Infrared Explorer Mission: A Concept Mission to Understand the Role Cosmic Organics Play in the Origin of Life, Scott Sandford, Ames Research Center, Moffett Field, Calif. This is an mid- and far-infrared space observatory optimized to spectroscopically detect and identify organic compounds and related materials in space, and understand how these materials are formed, evolve and find their way to planetary surfaces.

— The Baryonic Structure Probe, Kenneth Sembach, Space Telescope Science Institute, Baltimore. The probe will strengthen the foundations of observational cosmology by directly detecting, mapping and characterizing the cosmic web of matter in the early universe, its inflow into galaxies, and its enrichment with elements heavier than hydrogen and helium (the products of stellar and galactic evolution).

— Galaxy Evolution and Origins Probe, Rodger Thompson, University of Arizona. The probe will observe more than five million galaxies to study the mass assembly of galaxies, the global history of star formation, and the change of galaxy size and brightness over a volume of the universe large enough to determine the fluctuations of these processes.

More information on NASA's Origins Program is available on the Internet at: http://origins.jpl.nasa.gov/ .

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Image Advisory: 2004-185 July 22, 2004

Saturn's Rings Offer A Fresco Of Color

With shimmering pinks, hues of gray and a hint of brown, a newly

released image of Saturn's rings resembles a fresco where nature is the painter. The Cassini spacecraft captured this exquisite natural color view a few days before entering orbit around Saturn.

The images that make up this composition were obtained from Cassini's vantage point beneath the ring plane with the narrow angle camera on June 21, 2004. The image was taken at a distance of 6.4 million kilometers (4 million miles) from Saturn.

The brightest part of the rings, curving from the upper right to the lower left in the image, is the B ring. Many bands throughout the B ring have a pronounced sandy color. Other color variations across the rings can be seen. Color variations in Saturn's rings have previously been seen in Voyager and Hubble Space Telescope images. Cassini images show that color variations in the rings are more distinct in this viewing geometry than they are when seen from Earth.

Saturn's rings are made primarily of water ice. Since pure water ice is white, it is believed that different colors in the rings reflect different amounts of contamination by other materials, such as rock or carbon compounds. In conjunction with information from other Cassini instruments, Cassini images will help scientists determine the composition of Saturn's ring system.

In the 1980s, two Voyager spacecraft flew by Saturn as did Pioneer 11 in 1979. Those fly-by missions raised tantalizing questions that can now be addressed by Cassini's planned four year tour. Scientists have waited 25 years for an opportunity to answer these questions.

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Image credit: NASA/JPL/Space Science Institute
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Image Advisory: 2004-182 July 15, 2004

Cassini Exposes Saturn's Two-Face Moon

The moon with the split personality, Iapetus, presents a perplexing appearance in the latest images snapped by the Cassini spacecraft.

One hemisphere of the moon is very dark, while the other is very bright. Scientists do not yet know the origin of the dark material or whether or not it is representative of the interior of Iapetus.

Iapetus (pronounced eye-APP-eh-tuss) is one of Saturn's 31 known moons. Its diameter is about one third that of our own moon at 1,436 kilometers (892 miles). This image was taken in visible light with the Cassini spacecraft narrow angle camera on July 3, 2004, from a distance of 3 million kilometers (1.8 million miles) from Iapetus. The brightness variations in this image are not due to shadowing, they are real.

During Cassini's four-year tour, the spacecraft will continue to image Iapetus and conduct two close encounters. One of those encounters, several years from now, will be at a mere 1,000 kilometers (622 miles).

Iapetus was discovered by the Italian-French astronomer Jean Dominique Cassini in 1672. He correctly deduced that the trailing hemisphere is composed of highly reflective material, while the leading hemisphere is strikingly darker.

This sets Iapetus apart from Saturn's other moons and Jupiter's moons, which tend to be brighter on their leading hemispheres. Voyager images show that the bright side of Iapetus, which reflects nearly 50 percent of the light it receives, is fairly typical of a heavily cratered icy satellite. The leading side consists of much darker, redder material that has a reflectivity of only about 3 to 4 percent.

One scenario for the outside deposit of material has dark particles being ejected from Saturn's little moon Phoebe and drifting inward to coat Iapetus. One observation lending credence to an internal origin is the concentration of material on crater floors, which is suggestive of something filling in the craters.

Iapetus is odd in other respects. It is in a moderately inclined orbit, one that takes it far above and below the plane in which the rings and most of the moons orbit. It is less dense than many of the other satellites, which suggests a higher fraction of ice or possibly methane or ammonia in its interior.

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Credit: NASA/JPL/Space Science Institute

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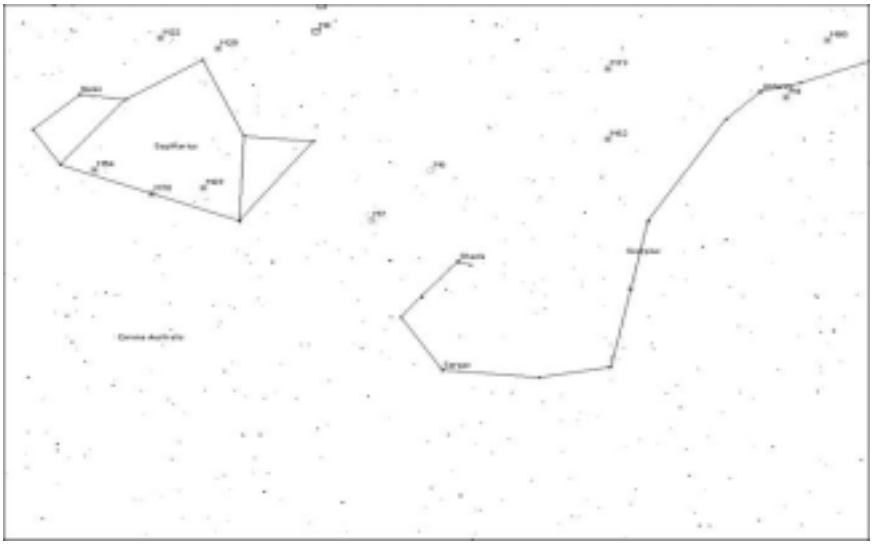
Middle Evening Observing Highlights for August

The Milky Way stretches across the sky from south to north. Sagittarius is in the southern sky. The globular cluster M22 can be seen at the top right of the "teapot". Slightly west of the "teapot" is M8, the Lagoon Nebula. Closer to the southern horizon and west of the "teapot" M6 and M7 can be seen. Both are open clusters in Scorpius. The Great Square of Pegasus is rising in the east. To the northeast of the Great Square the constellation of Andromeda can be seen and just above its center is M31, the Andromeda Galaxy. The bright star Arcturus is in the western sky. Uranus is in the southeastern sky in Aquarius. Neptune can be found in Capricorn. The image below shows the location of M6 and M7 as well as other Messier objects in that area of the sky.



Full moon is on August 16th and new moon is on August 30th.

The Perseid meteor shower peaks on August 12th. Some Perseids are visible from July 23rd to August 20th. They are at about a quarter of their maximim intensity from August 9th to August 14th. A nearly new moon will make for better viewing. The shower may even be better than expected. Check out the link below.

http://skyandtelescope.com/observing/objects/meteors/article_1289_1.asp

NASA Space Place

Waiting for Cassini's "Safe Arrival" Call

The evening of June 30, 2004, was nail-biting time at Cassini Mission Control. After a seven-year journey that included gravity assist flybys of Venus, Earth, and Jupiter, Cassini had finally arrived at Saturn. A 96-minute burn of its main engine would slow it down enough to be captured into orbit by Saturn's powerful gravitational field. Too short a burn and Cassini would keep going toward the outer reaches of the solar system. Too long a burn and the orbit would be too close and fuel reserves exhausted.

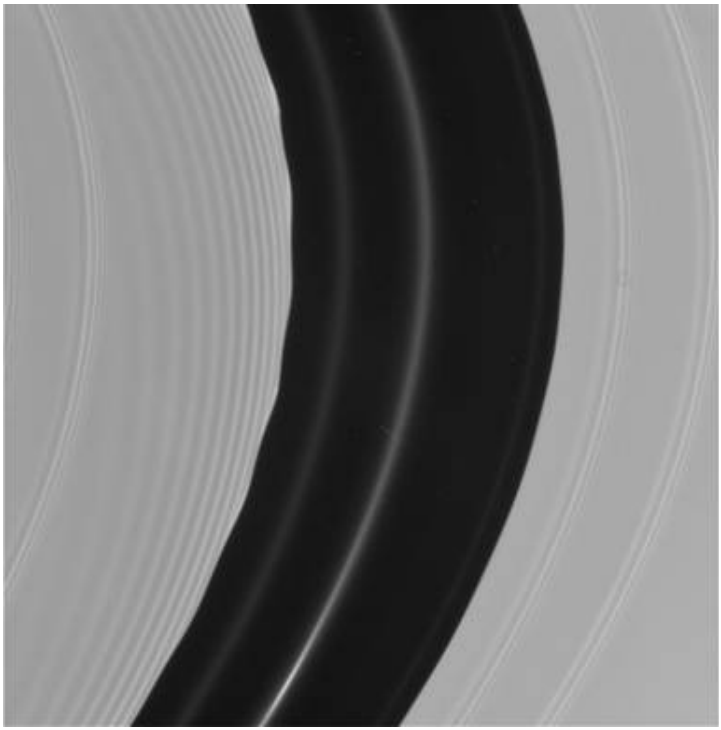
According to Dave Doody, a Cassini Mission Controller at the Jet Propulsion Laboratory (JPL) in Pasadena, California, there was a good chance the Earth-bound Cassini crew would have to wait hours to learn whether or not the burn was successful. Of the three spacecraft-tracking Deep Space Network (DSN) complexes around the globe, the complex in Canberra, Australia, was in line to receive Cassini's signal shortly after the beginning of the burn. However, winds of up to 90 kilometers per hour had been forecast. In such winds, the DSN's huge dish antennas must be locked into position pointed straight up and cannot be used to track a tiny spacecraft a billion miles away as Earth turns on its axis. "The winds never came," notes Doody.

The DSN complex at Goldstone, California, was tracking the carrier signal from Cassini's low-gain antenna (LGA) when the telltale Doppler shift in the LGA signal was seen, indicating the sudden deceleration of the spacecraft from the successful ignition of the main engine. Soon thereafter, however, Goldstone rotated out of range and Canberra took the watch.

After completion of the burn, Cassini was programmed to make a 20-second "call home" using its high-gain antenna (HGA). Although this HGA signal would contain detailed data on the health of the spacecraft, mission controllers would consider it a bonus if any of that data were actually captured. Mostly, they just wanted to see the increase in signal strength to show the HGA was pointed toward Earth and be able to determine the spacecraft's speed from the Doppler data. If possible, they also wanted to try to lock onto the signal with DSN's closed-loop receiver, a necessary step for extracting engineering data.

Normally it takes around one minute to establish a lock on the HGA signal once a DSN station rotates into range. Having only 20 second's worth of signal to work with, the DSN not only established a lock within just a few seconds, but extracted a considerable amount of telemetry during the remaining seconds.
"The DSN people bent over backwards to get a lock on that telemetry signal. And they weren't just depending on the technology. They really know how to get flawless performance out of it. They were awesome," remarks Doody.
Find out more about the DSN from JPL's popular training document for mission controllers, Basics of Space Flight (www.jpl.nasa.gov/basics) and the DSN website at deepspace.jpl.nasa.gov/dsn. For details of the Cassini Saturn orbit insertion, see www.jpl.nasa.gov/basics/soi. Kids can check out The Space Place at spaceplace.nasa.gov/en/kids/dsn_fact1.shtml to learn about the amazing ability of the DSN antennas to detect the tiniest spacecraft signals.

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



Caption:
Right after entering Saturn orbit, Cassini sent this image of the part of the Encke Gap in Saturn's rings. Image credit NASA/JPL/Space Science Institute.