Astronomy Club News

January, 2004

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Catskills Astronomy Club News

1/1/04

Club News:

The December 27th observation session was held. The lock on the gate leading into Walnut Mountain Park was discovered to be broken so it was not possible to enter the park that night. The caretaker of the park confirmed that he was having problems with the lock. We used an alternate site suggested by Alvin Schultheis instead. The site was in Pennsylvania near Narrowsburg. The site darker than Walnut Mountain but not as accessible. The sky condition was good and the temperature was not biting cold. Four members attended all bringing Celestron SCTs. We observed many deep sky objects including the Orion Nebula (M42), an open cluster in Gemini called M35 and its NGC companion, the globular cluster M79, the galaxy NGC 891, and a planetary nebula called the Eskimo Nebula. We also viewed Saturn and at least four of its moons. The highlight of the evening was viewing the comet C2002 T7 Linear. The evening ended due to the telescopes and eyepieces frosting over.

The Town of Liberty was called about the gate problem and they said the lock would be fixed and the combination would be the same.

The December 20th session was canceled due to a poor weather forecast. The weather turned out to be fine though.

The proposed 2004 observation dates are shown below. Alternate dates will be announced as needed.

1/17, 1/24, 2/21, 2/28, 3/13, 3/20, 4/17, 4/24, 5/15, 5/22, 6/12, 6/19, 7/10, 7/17, 8/7, 8/14, 9/11, 9/18, 10/9, 10/16, 11/6, 11/13, 12/4, 12/11

2/14 moved to 2/28 due to Valentines Day

Some members who attended the dinner meetings that were held

last winter have expressed interest in repeating this again when the weather looks poor for an observation session. When an opportunity arises for a dinner meeting the membership will be contacted via email.

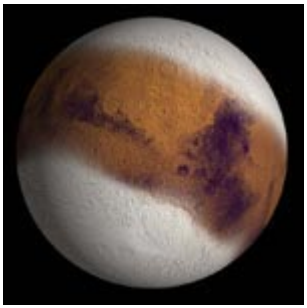
The club has selection of astronomy books, Stardate audio CDs, a Macintosh computer with astronomy software, and a Meade 8 inch reflector for members to borrow. Please contact John at 791-5240 or kocis@catskill.net if you are interested in borrowing any of these.

Astronomy News:

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

News Release: 2003-169 December 17, 2003

Mars May be Emerging From an Ice Age



NASA's Mars Global Surveyor and Mars Odyssey missions have provided evidence of a recent ice age on Mars. In contrast to Earth's ice ages, a martian ice age waxes when the poles warm up and water vapor is transported toward lower latitudes. Martian ice ages wane when the poles cool and lock water into polar icecaps.

The "pacemakers" of ice ages on Mars appear to be much more extreme than the comparable drivers of climate change on Earth. Variations in the planet's orbit and tilt produce remarkable changes in the distribution of water ice from polar regions down to latitudes equivalent to Houston or Egypt. Researchers, using NASA spacecraft data and analogies to Earth's Antarctic Dry Valleys, report their findings in the Thursday, Dec. 18 edition of the journal Nature.

“Of all the solar system planets, Mars has the climate most like that of Earth. Both are sensitive to small changes in orbital parameters,” said planetary scientist Dr. James Head of Brown University, Providence, R.I., lead author of the study. “Now we’re seeing that Mars, like Earth, is in a period between ice ages.”

Discoveries on Mars, since 1999, of relatively recent water-carved gullies, glacier-like flows, regional buried ice and possible snow packs created excitement among scientists who study Earth and other planets. Information from the Mars Global Surveyor and Odyssey missions provided more evidence of an icy recent past.

Head and his co-authors from Brown (Drs. John Mustard and Ralph Milliken), Boston University (Dr. David Marchant) and Kharkov National University, Ukraine (Dr. Mikhail Kreslavsky) examined global patterns of landscape shapes and near-surface water ice mapped by the orbiters. They concluded that a covering of water ice mixed with dust mantled the surface of Mars to latitudes as low as 30 degrees, and is now degrading and retreating. By observing the small number of impact craters in those features and by backtracking the known patterns of changes in Mars’ orbit and tilt, they estimated the most recent ice age occurred just 400,000 to 2.1 million years ago, very recent in geological terms. “These results show that Mars is not a dead planet, but it undergoes climate changes that are even more pronounced than on Earth,” Head said.

Marchant, a glacial geologist who has spent 17 field seasons in the Mars-like Antarctic Dry Valleys, said, “These extreme changes on Mars provide perspective for interpreting what we see on Earth. Landforms on Mars that appear to be related to climate changes help us calibrate and understand similar landforms on Earth. Furthermore, the range of microenvironments in the Antarctic Dry Valleys helps us read the Mars record.”

Mustard said, “The extreme climate changes on Mars are providing us with predictions we can test with upcoming Mars missions, such as Europe’s Mars Express and NASA’s Mars Exploration

Rovers. Among the climate changes that occurred during these extremes is warming of the poles and partial melting of water at high altitudes. This clearly broadens the environments in which life might occur on Mars."

According to the researchers, during a martian ice age, polar warming drives water vapor from polar ice into the atmosphere. The water comes back to ground at lower latitudes as deposits of frost or snow mixed generously with dust. This ice-rich mantle, a few meters or yards thick, smoothes the contours of the land. It locally develops a bumpy texture at human scales, resembling the surface of a basketball and also seen in some Antarctic icy terrains. When ice at the top of the mantling layer sublimes back into the atmosphere, it leaves behind dust, which forms an insulating layer over remaining ice. On Earth, by contrast, ice ages are periods of polar cooling. The buildup of ice sheets draws water from liquid-water oceans, which Mars lacks.

"This exciting new research really shows the mettle of NASA's 'follow-the-water' strategy for studying Mars," said Dr. Jim Garvin, NASA's lead scientist for Mars exploration. "We hope to continue pursuing this strategy in January, if the Mars Exploration Rovers land successfully. Later, the 2005 Mars Reconnaissance Orbiter and 2007 Phoenix near-polar lander will be able to directly follow up on these astounding findings by Professor Head and his team."

Global Surveyor has been orbiting Mars since 1997, Odyssey since 2001. NASA's Jet Propulsion Laboratory, a division of the California Institute of Technology, Pasadena, manages both missions for the NASA Office of Space Science, Washington, D.C. Information about NASA's Mars missions is available on the Internet at: http://mars.jpl.nasa.gov.

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Dec. 8, 2003

Rings Around The Planets: Recycling Of Material May Extend

Ring Lifetimes

Although rings around planets like Jupiter, Saturn, Uranus and Neptune are relatively short-lived, new evidence implies that the recycling of orbiting debris can lengthen the lifetime of such rings, according to University of Colorado researchers.

Strong evidence now implies small moons near the giant planets like Saturn and Jupiter are essentially piles of rubble, said Larry Esposito, a professor at CU-Boulder's Laboratory for Atmospheric and Space Physics. These re-constituted small bodies are the source of material for planetary rings.

Previous calculations by Esposito and LASP Research Associate Joshua Colwell showed the short lifetimes for such moons imply that the solar system is nearly at the end of the age of rings. "These philosophically unappealing results may not truly describe our solar system and the rings that may surround giant extra-solar planets," said Esposito. "Our new calculations of models explain how inclusion of recycling can lengthen the lifetime of rings and moons."

The observations from the Voyager and Galileo space missions showed a variety of rings surrounding each of the giant planets, including Jupiter, Saturn, Uranus and Neptune. The rings are mixed in each case with small moons.

"It is clear that the small moons not only sculpt the rings through their gravity, but are also the parents of the ring material," said Esposito. "In each ring system, destructive processes like grinding, darkening and spreading are acting so rapidly that the rings must be much younger than the planets they circle."

Numerical models by Esposito and Colwell from the 1990's showed a "collisional cascade," where a planet's moons are broken into smaller moons when struck by asteroids or comets. The fragments then are shattered to form the particles in new rings. The

rings themselves are subsequently ground to dust, which is swept away.

But according to Colwell, “Some of the fragments that make up the rings may be re-accreted instead of being ground to dust. New evidence shows some debris has accumulated into moons or moonlets rather than disappearing through collisional erosion.”

”This process has proceeded rapidly,” said Esposito. “The typical ring is younger than a few hundred million years, the blink of an eye compared to the planets, which are 4.5 billion years old. The question naturally arises why
rings still exist, to be photographed in such glory by visiting human spacecraft that have arrived lately on the scene,” he said.

”The answer now likely seems to be cosmic recycling,” said Esposito. Each time a moon is destroyed by a cosmic impact, much of the material released is captured by other nearby moons. These recycled moons are essentially collections of rubble, but by recycling material through a series of small moons, the lifetime of the ring system may be longer than we initially thought.”

Esposito and former LASP Research Associate Robin Canup, now with the Southwest Research Institute’s Boulder branch, showed through computer modeling that smaller fragments can be recaptured by other moons in the system. “Without this recycling, the rings and moons are soon gone,” said Esposito.

But with more recycling, the lifetime is longer, Esposito said. With most of the material recycled, as now appears to be the case in most rings, the lifetime is extended by a large factor.

”Although the individual rings and moons we now see are ephemeral, the phenomenon persists for billions of years around Saturn,” said Esposito. ”Previous calculations ignored the collective effects of the other moons in extending the persistence of rings by recapturing and recycling ring material.”

Esposito, the principal investigator on a $12 million spectrograph on the Cassini spacecraft slated to arrive at Saturn in July 2004, will look closely at the competing processes of destruction and re-capture in Saturn's F ring to confirm and quantify this explanation. Esposito discovered the F Ring using data from NASA's Voyager 2 mission to the outer planets launched in 1978.

News Release: 2003-158 December 2, 2003

Mars Rovers Head for Exciting Landings in January

NASA's robotic Mars geologist, Spirit, embodying America's enthusiasm for exploration, must run a grueling gantlet of challenges before it can start examining the red planet. Spirit's twin Mars Exploration Rover, Opportunity, also faces tough martian challenges.

"The risk is real, but so is the potential reward of using these advanced rovers to improve our understanding of how planets work," said Dr. Ed Weiler, associate administrator for space science at NASA Headquarters, Washington, D.C.

Spirit is the first of two golf-cart-sized rovers headed for Mars landings in January. The rovers will seek evidence about whether the environment in two regions might once have been capable of supporting life. Engineers at NASA's Jet Propulsion Laboratory, Pasadena, Calif., have navigated Spirit to arrive during the evening of Jan. 3, 2004, in the Eastern time zone.

Spirit will land near the center of Gusev Crater, which may have once held a lake. Three weeks later, Opportunity will reach the Meridiani Planum, a region containing exposed deposits of a mineral that usually forms under watery conditions.

"We've cleared two of the big hurdles, building both spacecraft and launching them," said JPL's Peter Theisinger, project manager for the Mars Exploration Rover Project. "Now we're coming up on a third, getting them safely onto the ground."

Since their launches on June 10 and July 7 respectively, each rover has been flying tucked inside a folded-up lander. The lander is wrapped in deflated airbags, cocooned within a protective aeroshell and attached to a cruise stage that provides solar panels, antennas and steering for the approximately seven month journey.

Spirit will cast off its cruise stage 15 minutes before hitting the top of the martian atmosphere at 5,400 meters per second (12,000 miles per hour). Atmospheric friction during the next four minutes will heat part of the aeroshell to about 1,400 C (2,600 F) and slow the descent to about 430 meters per second (960 mph). Less than two minutes before landing, the spacecraft will open its parachute.

Twenty seconds later, it will jettison the bottom half of its aeroshell, exposing the lander. The top half of the shell, still riding the parachute, will lower the lander on a tether. In the final six seconds, airbags will inflate, retro rockets on the upper shell will fire, and the tether will be cut about 15 meters (49 feet) above the ground.

Several bounces and rolls could take the airbag-cushioned lander about a kilometer (0.6 mile) from where it initially lands. If any of the initial few bounces hits a big rock that's too sharp, or if the spacecraft doesn't complete each task at just the right point during the descent, the mission could be over. More than half of all the missions launched to Mars have failed.

JPL Director Dr. Charles Elachi said, "We have done everything we know that could be humanly done to ensure success. We have conducted more testing and external reviews for the Mars Exploration Rovers than for any previous interplanetary mission."

Landing safely is the first step for three months of Mars exploration by each rover. Before rolling off its lander, each rover will spend a week or more unfolding itself, rising to full height, and scanning surroundings. Spirit and Opportunity each weigh about 17 times as much as the Sojourner rover of the 1997 Mars Pathfinder mission. They are big enough to roll right

over obstacles nearly as tall as Sojourner.

“Think of Spirit and Opportunity as robotic field geologists,” said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the rovers’ identical sets of science instruments. “They look around with a stereo, color camera and with an infrared instrument that can classify rock types from a distance. They go to the rocks that seem most interesting. When they get to one, they reach out with a robotic arm that has a handful of tools, a microscope, two instruments for identifying what the rock is made of, and a grinder for getting to a fresh, unweathered surface inside the rock.”

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. For information about the Mars Exploration Rover project on the Internet, visit http://mars.jpl.nasa.gov/mer .

For Cornell University’s Web site about the science payload, visit http://athena.cornell.edu .

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News Release: 2003-170 Dec. 18, 2003

NASA Releases Dazzling Images From New Space Telescope

A new window to the universe has opened with today’s release of the first dazzling images from NASA’s newly named Spitzer Space Telescope, formerly known as the Space Infrared Telescope Facility.

The first observations, of a glowing stellar nursery; a swirling, dusty galaxy; a disc of planet-forming debris; and organic material in the distant universe, demonstrate

the power of the telescope's infrared detectors to capture cosmic features never seen before.

The Spitzer Space Telescope was also officially named today after the late Dr. Lyman Spitzer, Jr. He was one of the 20th century's most influential scientists, and in the mid-1940s, he first proposed placing telescopes in space.

"NASA's newest Great Observatory is open for business, and it is beginning to take its place at the forefront of science," said NASA's Associate Administrator for Space Science, Dr. Ed Weiler. "Like Hubble, Compton and Chandra, the new Spitzer Space Telescope will soon be making major discoveries, and, as these first images show, should excite the public with views of the cosmos like we've never had before."

"The Spitzer Space Telescope is working extremely well. The scientists who are starting to use it deeply appreciate the ingenuity and dedication of the thousands of people devoted to development and operations of the mission," said Dr. Michael Werner, project scientist for the Spitzer Space Telescope at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

Launched Aug. 25 from Cape Canaveral, Fla., the Spitzer Space Telescope is the fourth of NASA's Great Observatories, a program designed to paint a more comprehensive picture of the cosmos using different wavelengths of light.

While the other Great Observatories have probed the universe with visible light (Hubble Space Telescope), gamma rays (Compton Gamma Ray Observatory) and X-rays (Chandra X-ray Observatory), the Spitzer Space Telescope observes the cosmos in the infrared. Spitzer's unprecedented sensitivity allows it to sense infrared radiation, or heat, from the most distant, cold and dust-obscured celestial objects. Today's initial images revealed the versatility of the telescope and its three science instruments. The images:

— Resembling a creature on the run with flames streaming behind

it, the Spitzer image of a dark globule in the emission nebula IC 1396 is in spectacular contrast to the view seen in visible light. Spitzer's infrared detectors unveiled the brilliant hidden interior of this opaque cloud of gas and dust for the first time, exposing never-before-seen young stars.

— The dusty, star-studded arms of a nearby spiral galaxy, Messier 81, are illuminated in a Spitzer image. Red regions in the spiral arms represent infrared emissions from the dustier parts of the galaxy where new stars are forming. The image shows the power of Spitzer to explore regions invisible in optical light, and to study star formation on a galactic scale.

— Spitzer revealed, in its entirety, a massive disc of dusty debris encircling the nearby star Fomalhaut. Such debris discs are the leftover material from the building of a planetary system. While other telescopes have imaged the outer Fomalhaut disc, none was able to provide a full picture of the inner region. Spitzer's ability to detect dust at various temperatures allows it to fill in this missing gap, providing astronomers with insight into the evolution of planetary systems.

— Data from Spitzer of the young star HH 46-IR, and from a distant galaxy 3.25 billion light-years away, show the presence of water and small organic molecules not only in the here and now, but, for the first time, far back in time when life on Earth first emerged.

JPL manages the Spitzer Space Telescope mission for NASA's Office of Space Science, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. Major partners are Lockheed Martin Corporation, Sunnyvale, Calif.; Ball Aerospace & Technologies Corporation, Boulder, Colo.; NASA's Goddard Space Flight Center, Greenbelt, Md.; Boeing North America (now DRS Technologies, Inc.) Anaheim, Calif.; the University of Arizona, Tucson; and Raytheon Vision Systems, Goleta, Calif. The instrument principal investigators are Dr. Giovanni Fazio, Harvard-Smithsonian Center

for Astrophysics, Cambridge, Mass.; Dr. James Houck, Cornell University, Ithaca, N.Y.; and Dr. George Rieke, University of Arizona, Tucson.

The images are available at http://www.spitzer.caltech.edu and http://photojournal.jpl.nasa.gov . Additional information about the Spitzer Space Telescope is available at http://www.spitzer.caltech.edu/ .

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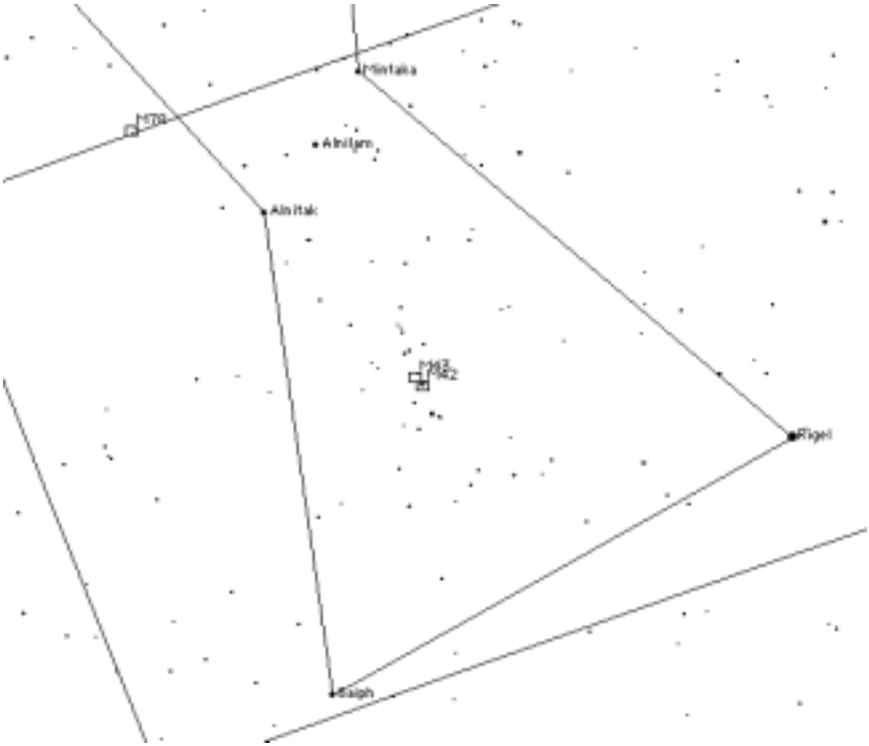
Mid Evening Observing Highlights for January

Saturn can be found in the eastern sky in Gemini. Orion is prominent in the eastern sky. Below the three stars in Orion's belt the Orion Nebula (M42) can be seen. Auriga and Taurus are high in the sky. The bright star Aldebaran can be found in Taurus in the eastern part of the sky next to Saturn. The Andromeda Galaxy (M31) is in the western sky. The Great Square is setting in the western sky. The Double Cluster in Perseus can be found close to the zenith. The Milky Way stretches from the southeast to northwest. Full moon is on January 7th and new moon is on January 21st. The Quantratid meteor shower will peak on the 4th. The radiant for this shower is found just west of the Big Dipper's handle.

The image below shows the locations of the Orion Nebula (M42), its companion nebula M43, and the reflection nebula M78. The star Mintaka is a wide double star. The star Alnitak is a tight double star. Rigel is also a double star. All three can be observed through a small telescope.



Observations and Photographs

If you are interested in submitting an observation or photograph please contact John at kocis@catskill.net.

BARLOW BOB'S CORNER

Barlow Bob is a member of the Rockland Astronomy Club. What do you observe on a snowy holiday season? Observe colored Christmas lights through any nebula filter. You will notice that certain color lights disappear, when viewed through a nebula filter. These types of filters only allow certain waves of light to pass through, blocking other waves. You can also observe the orange Hanukka Menorah lights Hold a holographic diffraction grating in back of the nebula filter and you will see the spectrum of the incandescent colored lights, a sodium / mercury street light or fluorescent light. You will notice that certain spectrum emission lines disappear. If you impress Santa, he may leave the TV 102.

NASA Space Place

So Little Time, So Many Galaxies

By Dr. Tony Phillips

Fourteen billion years ago, just after the Big Bang, the universe was an expanding fireball, white hot and nearly uniform. All of space was filled with elementary particles and radiation. “Soupy” is how some cosmologists describe it.

Today the universe is completely different. It’s still expanding-even accelerating-but there the resemblance ends. The universe we live in now is “lumpy.” Great cold voids are sprinkled with glowing galaxies. In galaxies, there are stars. Around stars, there are planets. On one planet, at least, there is life.

How we got from there to here is a mystery.

Finding out is the goal the Galaxy Evolution Explorer, “GALEX” for short, a small NASA spacecraft launched into Earth orbit April 28, 2003. GALEX carries an ultraviolet (UV) telescope for studying galaxies as far away as 10 billion light-years.

”GALEX is a time machine,” says astronomer Peter Friedman of Caltech. Because light takes time to travel from place to place, pictures of distant galaxies reveal them as they were in the past. “GALEX is investigating the evolution of galaxies over 80% of the history of our universe.”

The Hubble Space Telescope can see faraway galaxies, too, but GALEX has an advantage: While Hubble looks in great detail at very small regions of the sky, GALEX is surveying the entire sky, cataloging millions of galaxies during its 2-year mission.

GALEX is a UV mission for a reason. Friedman explains: “UV

radiation is a telltale sign of star birth." Stars are born when knots of gas condense in interstellar clouds. The ones we see best are the big ones-massive stars that burn hot and emit lots of UV radiation. "These stars are short-lived, so they trace recent star formation."

Understanding star formation is crucial to studies of galaxy evolution. When galaxies collide, star formation surges. When galaxies run out of interstellar gas, star formation wanes. In galaxies like the Milky Way, spiral arms are outlined by star-forming clouds. The shapes of galaxies, their history and fate Š they're all connected by star formation.

Even life hinges on star formation, because stars make heavy elements for planets and organic molecules.

"Our measurements of UV radiation will tell us both the rate at which stars are forming in galaxies and the distances of the galaxies," says Friedman.

How did we get here? GALEX will show the way.

Find out more about GALEX at www.galex.caltech.edu. For children, visit The Space Place at spaceplace.nasa.gov/galex_make1.htm and make a beautiful galactic mobile while learning about some of the different shapes galaxies can take.

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

Caption:

This image of Messier 101 (M101), aka the "Pinwheel Galaxy," was taken in two orbits of GALEX on June 20, 2003. M101 is 20 million light years away.

The 2004 dues are due

Please snip off the voucher and return it as soon as possible. Thank you,

Bud Wertheim, Treasurer

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