



Catskills
Astronomy
Club

Catskills Astronomy Club News

June, 2008

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Club News:

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6/1/08

Club News:

The observation sessions scheduled for May 3rd and 10th were canceled due to poor weather forecasts.

June observation sessions are scheduled for the 7th and 28th.

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

The club has selection of astronomy books and DVDs in our library to lend to members. A Meade eight inch reflector and Edmund three inch reflector are also available 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: 2008-089

May 29, 2008

NASA Phoenix Mars Lander Puts Arm and Other Tools to Work

TUCSON, Ariz. - NASA's Mars lander is returning more detailed images from the Martian surface and is now preparing its instruments for science operations.

Phoenix transmitted a 360-degree panorama of its frigid Martian world, freed its nearly 8-foot robotic arm, tested a laser instrument for studying dust and clouds, and transmitted its second

weather report on Wednesday evening.

"We've imaged the entire landing site, all 360 degrees of it. We see it all," said Phoenix principal investigator Peter Smith, University of Arizona, Tucson. "You can see the lander in a fish-eye view that goes all the way out to the entire horizon "We are now making plans for where to dig first, and what we'll save for later."

Commands were communicated to Phoenix to rotate the robotic arm's wrist to unlatch its launch lock, raise the forearm and move it upright to release the elbow restraint.

"We're pleased that we successfully unstowed the robotic arm. In fact, this is the first time we have moved the arm in about a year," said Matthew Robinson of NASA's Jet Propulsion Laboratory in Pasadena, Calif. The arm deployment brings the Phoenix mission to a significant milestone.

"We have achieved all of our engineering characterization prerequisites, with all the critical deployments behind us," said JPL's Barry Goldstein, Phoenix project manager. "We're now at a phase of the mission where we're characterizing the science payload instruments. That's a very important step for us."

After a health check that tests the arm at a range of warmer and colder temperatures, the titanium and aluminum arm will soon be tasked with its first assignment: to use its camera to look under the spacecraft to assess the terrain and underside of the lander.

The robotic arm will later trench into the icy layers of northern polar Mars and deliver samples to instruments that will analyze what this part of Mars is made of, what its water is like, and whether it is or has ever been a possible habitat for life.

Another milestone for the mission included the activation of the laser instrument called light detection and ranging instrument, or lidar.

"The Canadians are walking on moonbeams. It's a huge achievement for us," said Jim Whiteway Canadian Science lead from York University, Toronto. The lidar is a critical component of Phoenix's weather station, provided by the Canadian Space Agency. The instrument is designed to detect dust, clouds and fog by emitting rapid pulses of green laser-like light into the atmosphere. The light bounces off particles and is reflected back to a telescope.

"One of the main challenges we faced was to deliver the lidar from the test lab in Ottawa, Canada, to Mars while maintaining its alignment within one one-hundredth of a degree," said Whiteway. "That's like aiming a laser pointer at a baseball at a distance from home plate to the center field wall, holding that aim steady after launch for a year in space, then landing," he added.

Lidar data shows dust aloft to a height of 3.5 kilometers (2 miles). The weather at the Phoenix landing site on the second day following landing was sunny with moderate dust, with a high of minus 30 degrees Celsius (minus 22 degrees Fahrenheit) and a low of minus 80 (minus 112 degrees Fahrenheit).

The Phoenix mission is led by Smith at the University of Arizona with project management at JPL and development partnership at Lockheed Martin, Denver. International contributions come from the Canadian Space Agency; the University of Neuchatel, Switzerland; the universities of Copenhagen and Aarhus, Denmark; Max Planck Institute, Germany; and the Finnish Meteorological Institute. For more about Phoenix, visit: <http://www.nasa.gov/phoenix> .

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News Release: 2008-088

May 29, 2008

Scientists Hold Seance for Supernova

Astronomers have unearthed secrets from the grave of a star that blasted apart in a supernova explosion long ago. By decoding ghostly echoes of light traveling away from the remains of a supernova called Cassiopeia A, the scientists have pieced together what the star looked like in life, and ultimately how it met its demise.

The discovery, made using primarily NASA's Spitzer Space Telescope and Japan's Subaru telescope on Mauna Kea in Hawaii, represents the first time astronomers have been able to resurrect the life history of a supernova remnant in our own galaxy.

"Cassiopeia A lies in our cosmic backyard and offers the sharpest view of what is left hundreds of years after a supernova explosion," said Oliver Krause of the Max Planck Institute for Astronomy in Germany, lead author of a paper about the discovery appearing in this week's Science. "The echoes of light we found around Cassiopeia A provide us with a time machine to go back and see its past."

Cassiopeia A is one of the most explored objects in our sky and the subject of more than 1,000 scientific papers. It is the burnt-out corpse of a massive star that ended its life in a fiery supernova about 11,300 years ago. In fact, until recently, it was the youngest supernova remnant in our Milky Way galaxy (the new record holder, G1.9+0.3, was recently discovered using NASA's Chandra X-ray Observatory and other ground-based telescopes). Because Cassiopeia A is 11,000 light-years from Earth, the light from its explosion would have reached Earth, sweeping right past it, about 300 years ago.

Astronomers had thought this supernova light was never to be seen again, until 2005, when Krause and his colleagues discovered hints of it still bouncing around clouds surrounding the remnant (<http://www.spitzer.caltech.edu/Media/releases/ssc2005-14/index.shtml>). Using Spitzer-

zer's infrared eyes, they found so-called infrared echoes, which occur when a flash of light from the supernova blasts through clouds, heating them up and causing them to glow in infrared. As the light rolls outward, the infrared echoes continue to flare up and travel away from the star (see new movie of this effect at http://www.nasa.gov/mission_pages/spitzer/multimedia/20080529-anim.html).

In the new study, the astronomers used Cassiopeia A's infrared echoes to hone in on faint visible-light echoes with Subaru and other ground-based telescopes. Visible-light echoes, known simply as light echoes, occur when visible light from the supernova scatters off dust. Unlike infrared echoes, they are direct signals from the graves of exploded stars, bearing all the information about the nature of the original blast.

Next, the astronomers had to act quickly because these echoes can fade within weeks. They used Subaru's spectrometer instrument to break the light apart and reveal signatures of atoms present when Cassiopeia A exploded. The resulting spectrum of light revealed hydrogen and helium -- telltale signs that Cassiopeia A was once a huge red supergiant star whose core collapsed in a rare supernova referred to as Type IIb. Previously, scientists did not know the supernova class to which Cassiopeia A belonged.

"This is an exciting result," said Alex Filippenko of the University of California, Berkeley, a supernova expert not affiliated with the study. "Cassiopeia A has been studied extensively with many telescopes over a wide range of wavelengths. It is gratifying that we finally know what kind of star exploded so long ago."

The findings also offer insight into another mystery shrouding Cassiopeia A. When Cassiopeia A's original star erupted, the event should have been widely witnessed on Earth as a bright star lighting up the sky. The most likely possible sighting is by the Astronomer Royal John Flamsteed in 1680, but he made just one observation of a dim star. The fact that almost no one saw the event is a classic problem in supernova lore.

Now that astronomers have learned how Cassiopeia A was forged, they think they might know why its death went unnoticed. "Type IIb supernovas fade quickly," said co-author George Rieke of the University of Arizona in Tucson. "This, plus a few cloudy nights, might explain the historical enigma around Cassiopeia A."

Recently, astronomers using Chandra, ESA's XMM-Newton Observatory and the Gemini Observatory in Chile, were able to use light echoes to identify the origins of a supernova outside our galaxy. That study, together with the new one, demonstrates the power of light echoes for conjuring up the "ghosts" of long-dead stars.

Other co-authors include Stephan Birkmann and Miwa Goto of the Max Planck Institute for Astronomy; Tomonori Usuda and Takashi Hattori of the National Astronomical Observatory of Japan in Hawaii; and Karl Misselt of the University of Arizona. NASA's Jet Propulsion Laboratory,

Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the California Institute of Technology, also in Pasadena. For more information about Spitzer, visit <http://www.spitzer.caltech.edu/spitzer> and <http://www.nasa.gov/spitzer> . For more information about Subaru, operated by the National Astronomical Observatory of Japan, visit <http://subarutelescope.org> .

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Image Advisory: 2008-069

April 29, 2008

NASA Spacecraft Tracks Raging Saturn Storm

PASADENA, Calif. -- As a powerful electrical storm rages on Saturn with lightning bolts 10,000 times more powerful than those found on Earth, the Cassini spacecraft continues its five-month watch over the dramatic events.

Scientists with NASA's Cassini-Huygens mission have been tracking the visibly bright, lightning-generating storm--the longest continually observed electrical storm ever monitored by Cassini.

Saturn's electrical storms resemble terrestrial thunderstorms, but on a much larger scale. Storms on Saturn have diameters of several thousand kilometers (thousands of miles), and radio signals produced by their lightning are thousands of times more powerful than those produced by terrestrial thunderstorms.

Color images of the storm are available at: <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini> and <http://ciclops.org> .

Lightning flashes within the persistent storm produce radio waves called Saturn electrostatic discharges, which the radio and plasma wave science instrument first detected on Nov. 27, 2007. Cassini's imaging cameras monitored the position and appearance of the storm, first spotting it about a week later, on Dec. 6.

"The electrostatic radio outbursts have waxed and waned in intensity for five months now," said Georg Fischer, an associate with the radio and plasma wave science team at the University of Iowa, Iowa City. "We saw similar storms in 2004 and 2006 that each lasted for nearly a month, but this storm is longer-lived by far. And it appeared after nearly two years during which we did not detect any electrical storm activity from Saturn."

The new storm is located in Saturn's southern hemisphere--in a region nicknamed "Storm Alley" by mission scientists--where the previous lightning storms were observed by Cassini.

"In order to see the storm, the imaging cameras have to be looking at the right place at the right time, and whenever our cameras see the storm, the radio outbursts are there," said Ulyana Dyudina, an associate of the Cassini imaging team at the California Institute of Technology in Pasadena, Calif.

Cassini's radio plasma wave instrument detects the storm every time it rotates into view, which happens every 10 hours and 40 minutes, the approximate length of a Saturn day. Every few seconds the storm gives off a radio pulse lasting for about a tenth of a second, which is typical of lightning bolts and other electrical discharges. These radio waves are detected even when the storm is over the horizon as viewed from Cassini, a result of the bending of radio waves by the planet's atmosphere.

Amateur astronomers have kept track of the storm over its five-month lifetime. "Since Cassini's camera cannot track the storm every day, the amateur data are invaluable," said Fischer. "I am in continuous contact with astronomers from around the world."

The long-lived storm will likely provide information on the processes powering Saturn's intense lightning activity. Cassini scientists will continue to monitor Storm Alley as the seasons change, bringing the onset of autumn to the planet's southern hemisphere.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of Caltech, manages the Cassini mission for NASA's Science Mission Directorate, 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. The radio and plasma wave science team is based at the University of Iowa, Iowa City.

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NEWS RELEASE: 2008-068

April 23, 2008

Mars Exploration Rover Status Report

A small motor in the robotic arm of NASA's Mars Exploration Rover Opportunity that began stalling occasionally more than two years ago has become more troublesome recently.

Rover engineers at NASA's Jet Propulsion Laboratory, Pasadena, Calif., are diagnosing why the motor, one of five in the robotic arm, stalled on April 14 after much less motion that day than in the case of several earlier stalls. They are also examining whether the motor can be used and assessing the impact on Opportunity's work if the motor were no longer usable.

The motor controls sideways motion at the shoulder joint of the rover robotic arm. Other motors provide up-and-down motion at the shoulder and maneuverability at the elbow and wrist. A turret at the end of the arm has four tools that the arm places in contact with rocks and soils to study their composition and texture.

"Even under the worst-case scenario for this motor, Opportunity still has the capability to do some contact science with the arm," said JPL's John Callas, project manager for the twin rovers Opportunity and Spirit. "The vehicle has quite a bit of versatility to continue the high-priority investigations in Victoria Crater and back out on the Meridiani plains after exiting the crater."

The performance of the motor in the past week is consistent with increased resistance in the electrical circuit, such as from degrading of wire in the winding, rather than a mechanical jam. Additional tests are planned for checking whether the apparent resistance is localized or intermittent.

Opportunity and Spirit landed on Mars in January 2004 to begin missions originally planned for three months. They have continued operating for more than four years, though each with some signs of aging.

Opportunity's balky shoulder motor began stalling occasionally in November 2005. The motor could still be operated by applying increased voltage. Engineers assessed it has an increased likelihood of becoming unusable, however, so the team changed its standard procedures for stowing and unstowing the arm.

Until then, on days when the arm would not be used, the team kept it stowed, resting on a hook under the front of the rover deck. Motion of the stall-prone shoulder motor is necessary to unstow the arm, so if the motor were to become unusable with the arm in the stowed position, the arm could not be deployed again. With diminished confidence in the balky motor, the team began unstowing the arm at the end of each day's drive rather than leaving it stowed overnight. This keeps the arm available for use even if the motor then stops working.

This spring, Opportunity is crossing an inner slope of Victoria Crater to reach the base of a cliff portion of the crater rim, a promontory called "Cape Verde." On April 14, Opportunity was backing out of a sandy patch encountered on the path toward Cape Verde from the area where the rover descended into the crater. As usual, the commands included unstowing the arm at the end of the day's short drive. The shoulder motor barely got the arm unstowed before stalling.

"We'll hold off backing out of the sand until after we've completed the diagnostic tests on the motor," Callas said. "The rover is stable and safe in its current situation, and not under any urgency. So we will take the time to act cautiously."

JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Exploration Rover project for the NASA Science Mission Directorate, Washington. Additional information about Spirit and Opportunity is available online at <http://www.nasa.gov/rovers>.

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Saturn Does the Wave in Upper Atmosphere

Two decades of scrutinizing Saturn are finally paying off, as scientists have discovered a wave pattern, or oscillation, in Saturn's atmosphere only visible from Earth every 15 years.

The discovery of the wave pattern is the result of a 22-year campaign observing Saturn from Earth (the longest study of temperature outside Earth ever recorded), and the Cassini spacecraft's observations of temperature changes in the giant planet's atmosphere over time.

The Cassini infrared results, which appear in the same issue of *Nature* as the data from the 22-year ground-based observing campaign, indicate that Saturn's wave pattern is similar to a pattern found in Earth's upper atmosphere. The earthly oscillation takes about two years. A similar pattern on Jupiter takes more than four Earth years. The new Saturn findings add a common link to the three planets.

Just as scientists have been studying climate changes in Earth's atmosphere for long periods of time, NASA scientists have been studying changes in Saturn's atmosphere. Glenn Orton of NASA's Jet Propulsion Laboratory in Pasadena, Calif., says patience is the key to studying changes over the course of a Saturnian year, the equivalent of about 30 Earth years.

"You could only make this discovery by observing Saturn over a long period of time," said Orton, lead author of the ground-based study. "It's like putting together 22 years worth of puzzle pieces, collected by a hugely rewarding collaboration of students and scientists from around the world on various telescopes."

The wave pattern is called an atmospheric oscillation. It ripples back and forth within Saturn's upper atmosphere. In this region, temperatures switch from one altitude to the next in a candy cane-like, striped, hot-cold pattern. These varying temperatures force the wind in the region to keep changing direction from east to west, jumping back and forth. As a result, the entire region oscillates like a wave.

A "snapshot" of the hot-cold temperature patterns in Saturn's atmosphere was captured by the Cassini Composite Infrared Spectrometer. Along with Earth-based data, the "snapshot" also uncovered other interesting phenomena. Among them: the temperature at Saturn's equator switches from hot to cold, and temperatures on either side of the equator switch from cold to hot every Saturn half-year.

Mike Flasar, co-author of the Cassini paper, and principal investigator for Cassini's Composite Infrared Spectrometer at NASA's Goddard Space Flight Center, Greenbelt, Md., said that Cassini helped define this oscillation in combination with the ground observation campaign.

"It's this great synergy of using ground-based data over time, and then getting up close and personal with the oscillation in Saturn's atmosphere through Cassini," said Flasar. "Without Cassini, we might never have seen the structure of the oscillation in detail."

Cassini scientists hope to find out why this phenomenon on Saturn changes with the seasons, and why the temperature switchover happens when the sun is directly over Saturn's equator.

More information on the Cassini-Huygens mission can be found at: <http://saturn.jpl.nasa.gov>, and <http://www.nasa.gov/cassini>.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of the California Institute of Technology in Pasadena, manages the Cassini mission for NASA's Science Mission Directorate, Washington, D.C. The Cassini orbiter was designed, developed and assembled at JPL. The Composite Infrared Spectrometer team is based at NASA's Goddard Space Flight Center, Greenbelt, Md.

-- Written by Diya Chacko

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Mid Evening Observing Highlights for June

Saturn and Mars are low in the western sky. Jupiter is near the horizon in the southeast. The bright star Arcturus is almost directly overhead. The keystone of Hercules is high in the east. Leo is setting in the west. The bright stars Vega, Deneb, and Altair are rising in the east. These three stars form the summer triangle. The bright star Antares is rising in the southeast. The bright star Spica is in the southwest. The Big Dipper can be seen in the northwestern sky. Scorpius is rising in the southeast. New moon occurs on June 3rd and full moon occurs on June 18th. The summer solstice begins on June 20th at 7:59 PM EDT. On June 30th at sunset a conjunction of Mars, Saturn, and the bright star Regulus in Leo will occur. The image below shows this alignment at around 10:00 PM that evening.



Member Photos:

The image below was afocally taken by John Kocijanski with an Olympus D550 digital camera through a 13mm Televue Nagler eyepiece using the club's Meade 826 reflecting telescope. It shows the southern highlands of the moon as well as the fault escarpment called the Straight Wall. The Straight Wall is in the right center of the image.



NASA Space Place

Ozone, the Greenhouse Gas

We all know that ozone in the stratosphere blocks harmful ultraviolet sunlight, and perhaps some people know that ozone at the Earth's surface is itself harmful, damaging people's lungs and contributing to smog.

But did you know that ozone also acts as a potent greenhouse gas? At middle altitudes between the ground and the stratosphere, ozone captures heat much as carbon dioxide does.

In fact, pound for pound, ozone is about 3000 times stronger as a greenhouse gas than CO₂. So even though there's much less ozone at middle altitudes than CO₂, it still packs a considerable punch. Ozone traps up to one-third as much heat as the better known culprit in climate change.

Scientists now have an unprecedented view of this mid-altitude ozone thanks to an instrument aboard NASA's Aura satellite called the Tropospheric Emission Spectrometer—"TES" for short.

Most satellites can measure only the total amount of ozone in a vertical column of air. They can't distinguish between helpful ozone in the stratosphere, harmful ozone at the ground, and heat-trapping ozone in between. By looking sideways toward Earth's horizon, a few satellites have managed to probe the vertical distribution of ozone, but only to the bottom of the stratosphere.

Unlike the others, TES can measure the distribution of ozone all the way down to the heat-trapping middle altitudes. "We see vertical information in ozone that nobody else has measured before from space," says Annmarie Eldering, Deputy Principal Investigator for TES.

The global perspective offered by an orbiting satellite is especially important for ozone. Ozone is highly reactive. It is constantly being created and destroyed by photochemical reactions in the atmosphere and by lightning. So its concentration varies from region to region, from season to season, and as the wind blows.

Data from TES show that ozone's heat-trapping effect is greatest in the spring, when intensifying sunlight and warming temperatures fuel the reactions that generate ozone. Most of ozone's contribution to the greenhouse effect occurs within 45 degrees latitude from the equator.

Increasing industrialization, particularly in the developing world, could lead to an increase in mid-altitude ozone, Eldering says. Cars and coal-fired power plants release air pollutants that later react to produce more ozone.

"There's concern that overall background levels are slowly increasing over time," Eldering says. TES will continue to monitor these trends, she says, keeping a careful eye on ozone, the greenhouse gas.

Learn more about TES and the science of ozone at tes.jpl.nasa.gov/. Kids can get a great introduction to good ozone and bad ozone at spaceplace.nasa.gov/en/kids/tes/gases.

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