Southwest Florida Astronomical Society
SWFAS

The Eyepiece
August 2013

A MESSAGE FROM THE PRESIDENT

Comet ISON is on the way!

Summer is winding down, we had only a few events over the last 2 months.

The City of Cape Coral Parks and Rec Day on July 20th was a nice event. The weather forecast initially did not look good, but we ended up with only partly cloudy skies and had some very nice sunspots and prominences. Tony Heiner, Gary McFall and Victor Solomon manned the telescopes and John MacLean and I spent most of our time indoors handing out items. They had several hundred people attend.

For the August Meeting Alice Mack is doing a program on *Astronomy and Music: A Cosmic Symphony.*

For September I am planning to do a program on Comet ISON.

Moon: Aug New 6th, 1st Quarter 14th, Full 20th, Last Quarter 28th
Sep New 5th, 1st Quarter 12th, Full 19th, Last Quarter 26th

Planets: Mars is now in the morning sky. Jupiter has also entered the morning sky. Venus is in the west in the evening sky. Mercury starts the month in the morning sky having just passed greatest western elongation on July 30th. Saturn is high in the south at sunset. The Perseids peak around Aug 12th, but should be good for several days around this date. The moon will be less than 1st quarter, with the shower being best after midnight, so the moon should not interfere with the best observing times.

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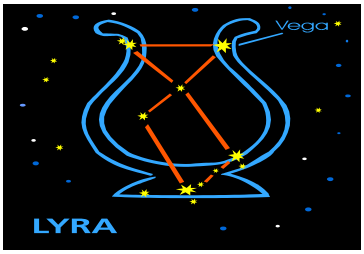
Upcoming Events

- Thurs Aug 1st Monthly meeting at the Calusa Nature Center Planetarium 7:30 PM
- Sat Aug 3rd Club Star Party at Caloosahatchee Regional Park (Dusk -?)
- Thurs Sept 5th Monthly meeting at the Calusa Nature Center Planetarium 7:30 PM

August Meeting



Our next meeting is on Thursday August 1st at 7:30 PM at the Calusa Nature Center Planetarium. SWFAS member Alice Mack will give a program called *Astronomy and Music: A Cosmic Symphony.*
Did you know that Galileo was a musician?
Did you know that the planet Uranus, discovered by musician Hershel, emits musical sounds measured by NASA scientists?
There will be a raffle for a free CD of music composed by a local amateur astronomer. Everyone is welcome to attend.

CRP Star Party Schedule

The remaining Star Parties for 2013 will be August 3, September 14, October 5, November 2, November 30, and December 28.

Occultations: The Fastest Things in the Sky

Caption: A lovely occultation took place when the bright star Spica (upper left) vanished behind the Moon's north polar region on November 30, 1994.

If you often look at the Moon with a telescope, you've probably seen a star or two sometimes shining quite close to it in the background. If you kept watching, maybe you noticed the Moon moving with respect to the star after just a few minutes — dramatic evidence of the Moon's rapid orbital motion around Earth.
But what happens when a background star is directly in the Moon's way? In this case, the Moon appears to plow right over the star and black it out, like a tanker ship running over a candy wrapper. This event is called an occultation, from the Latin *occultare*, "to hide."
Occultations happen often, and they're fascinating to watch. A star appears to creep up to the Moon's edge minute by minute, hangs right on the edge for a number of seconds, and then abruptly snaps out of view. For decades amateur astronomers have made a project of timing the exact moments when occultations occur, producing data with real scientific value.

Sky Collisions

Records of occultations go way back. Aristotle told of the Moon covering Mars on April 4, 357 B.C. — proving that Mars was farther away than the Moon. The suddenness of star occultations offered the first proof that the Moon has no air and therefore cannot support life. If the Moon had an atmosphere, stars would gradually dim as the Moon's edge approached them, the same way the setting Sun dims before it reaches Earth's horizon. Scrutinizing an occultation in 1843, Friedrich Wilhelm Bessel found that a star's light rays did not bend at the Moon's edge by any amount he could measure, a sign that any lunar air could have no more than 1/2000 the density of Earth's atmosphere.
More recently, occultations have been used for several other scientific purposes. For many years, occultation timings gave the most precise fixes that anyone could get on the Moon's orbital motion. Also, many close double stars were first discovered by their stepwise occultations. In

such an event the star drops out of sight on the Moon's edge in two distinct steps, as first one star of the double is covered, then the other — even though the star may look single in the largest telescopes.

Most of these uses for occultations have been superseded by other, more modern techniques. But amateurs still gang up to go on expeditions to timegrazing occultations: when the Moon's edge barely skims a star sideways. During a graze, the star may flash in and out of view several times as lunar mountains and valleys slide in front of it. Timings of grazing occultations can map the Moon's profile very accurately.

Watching the Winking

Half of the Moon's round edge is usually sunlit and half is dark, but as telescope users soon learn, the dark edge can usually be dimly seen because of earthshine weakly lighting the Moon's night regions. (The exception is around the time of full Moon.) It's much easier to watch a star creep up to the dark edge than the bright edge — because stars near the sunlit side generally get swamped by the bright glare in the last minute or so before an occultation.

Fortunately, stars disappear on the dark edge when the Moon is in its waxing phases and thus visible in the evening — when most people do their observing. Stars disappear on the bright edge when the Moon is waning and visible mostly after midnight.

As it travels along its orbit, the Moon takes about an hour to move across the starry background by its own diameter. Therefore, the occulted star pops back into view from behind the Moon's other side up to about an hour later. But even when a reappearance happens on the Moon's dark edge (usually in the wee hours of the morning), you have to be watching the right spot at just the right time.

Asteroid Occultations Too

The Moon isn't the only thing that can pass in front of a star. Anything else in the solar system can too. Occultations sometimes involve asteroids, or "minor planets." These range in diameter from 600 miles down to just a few miles or less. Thousands of them have orbits that are known very precisely. When a faint asteroid is predicted to cross a star that's visible in amateur telescopes, many amateurs mobilize to try to time the moments when the star snaps out of view in the seemingly empty sky and snaps back a few seconds later. Asteroid-occultation paths are not perfectly predictable, so watching for these events can be hit or miss. But if people at enough different locations get good timings, their results will reveal the size and shape of the asteroid's dark silhouette — information that usually can be gained no other way.

Asteroid occultations have had a special fascination for me since the first one that was well predicted, when the asteroid Eros was to cross in front of a bright star on the night of January 24, 1975. Over the years I've attempted to time 25 such events. I got successful timings for 3 (they really are hit or miss), successful negative observations for 15 (meaning the star was definitely not occulted at my location, valuable information worth reporting) — and 7 blown observations due to equipment failure, clouds moving in at the last minute, the star being too faint to follow, or on one embarrassing occasion because I figured the date wrong and got all set up exactly 24 hours too late.

How are timings done? The standard way is to set up a shortwave radio next to your scope outdoors and tune it to a time-signal station like WWV that beeps each second. You record the sound while you watch the star and shout when you see an event. By carefully listening to the tape later, you can determine the time of your shout between beeps to an accuracy of a few tenths of a second. Recently, amateurs have shifted to using small video cameras with their telescopes to record occultations. With the right timing gear, such as certain GPS receivers, the exact time of each video frame can be determined to just a few hundredths of a second.

Getting Predictions

To coordinate all this activity, a group called the International Occultation Timing Association (IOTA) (http://www.lunar-occultations.com/iota/iotandx.htm) has been working diligently for decades. Its Web site is full of news and further information.

To get a year's worth of lunar-occultation predictions generated for your site, e-mail your accurate latitude and longitude and the size of your telescope to Walter Robinson

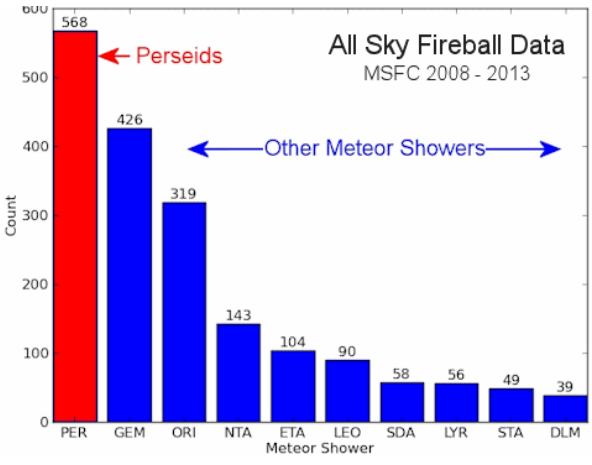
(webmaster@lunar-occultations.com). Predictions of asteroid occultations, along with finder charts and much else about these exciting events, are at Steve Preston's site (http://www.asteroidoccultation.com/).
- by Alan MacRobert, www.skyandtelescope.com/observing/objects/occultations/3427016.html

Regulus Occultation - March 20, 2014 by Asteroid 163 Erigone

Planning to be in the New York City/Long Island area next March? On that date, the bright star Regulus will be occulted by asteroid 163 Erigone. The predicted shadow path sweeps across Long Island and NYC and follows into the center of New York State. This event will not be visible in Florida. The event will only be about 12 seconds long, but it is a rare event. A first magnitude star gets occulted by an asteroid roughly once per decade.
Richard Nugent, the Executive Secretary of IOTA (The International Occultation Timing Association) has an animation of Erigone's shadow passing over maps of the US and the NYC area, if you want some more details about the current predicted occultation track. I'm sure we'll hear more about this event as we get closer.
Nugent's animation: http://www.youtube.com/watch?v=1M_a-0O7WN8
(NOTE: turn down your volume, there's a loud hiss on the recording)
IOTA homepage: http://www.lunar-occultations.com/iota/iotandx.htm
-Mike Weinstein, Connecticut College

Perseid Fireballs

In astronomy, there's nothing quite like a bright meteor streaking across the glittering canopy of a moonless night sky. The unexpected flash of light adds a dash of magic to an ordinary walk under the stars.
New research by NASA has just identified the most magical nights of all. "We have found that one meteor shower produces more fireballs than any other," explains Bill Cooke of NASA's Meteoroid Environment Office. "It's the Perseid meteor shower, which peaks on August 12th and 13th."
Using a network of meteor cameras distributed across the southern USA, Cooke's team has been tracking fireball activity since 2008, and they have built up a database of hundreds of events to analyze. The data point to the Perseids as the 'fireball champion' of annual meteor showers.
A fireball is a very bright meteor, at least as bright as the planets Jupiter or Venus. They can be seen on any given night as random meteoroids strike Earth's upper atmosphere. One fireball every few hours is not unusual. Fireballs become more numerous, however, when Earth is passing through the debris stream of a comet. That's what will happen this August.

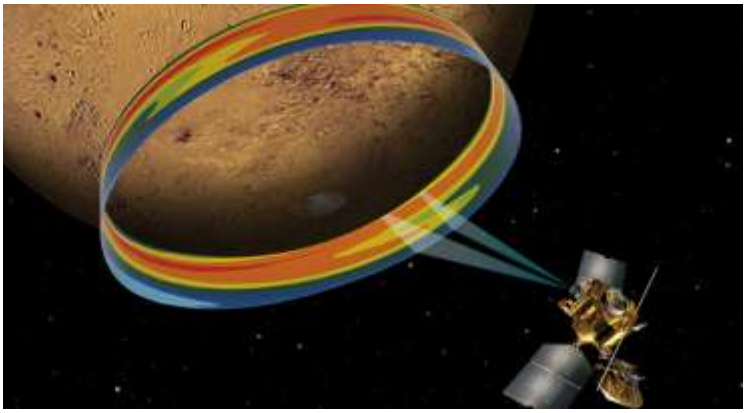


The Perseid meteor shower comes from Comet Swift-Tuttle. Every year in early- to mid-August, Earth passes through a cloud of dust sputtered off the comet as it approaches the sun. Perseid meteoroids hitting our atmosphere at 132,000 mph produce an annual light show that is a favorite of many backyard sky watchers.
Cooke thinks the Perseids are rich in fireballs because of the size of the parent comet.
"Comet Swift-Tuttle has a huge nucleus--about 26 km in diameter," comments Cooke. "Most other comets are much smaller, with nuclei only a few kilometers across. As a result, Comet Swift-Tuttle produces a large number of meteoroids, many of which are large enough to produce fireballs."
Since 2008, the Perseids have produced more fireballs than any other annual meteor shower. The Geminids are a close second, but they are not as bright as the Perseids. "The average peak magnitude for a Perseid observed by our cameras is -2.7; for the Geminids, it is -2," explains Bill

Cooke. "So on average, Geminid fireballs are about a magnitude fainter than those in the Perseids."
Cooke recommends looking on the nights of August 12th and 13th between the hours of 10:30 PM to 4:30 AM local time. Before midnight the meteor rate will start out low, then increase as the night wears on, peaking before sunrise when the constellation Perseus is high in the sky. For every fireball that streaks out of Perseus, there will be dozens more ordinary meteors.
"Get away from city lights," advises Cooke. "While fireballs can be seen from urban areas, the much greater number of faint Perseids is visible only from the countryside."
In total, the Perseid meteor rate from dark-sky sites could top 100 per hour.
That's a lot of magic. Enjoy the show.
- Author: Dr. Tony Phillips| Production editor: Dr. Tony Phillips | Credit: Science@NASA

Bright Explosion on the Moon

Mars Water-Ice Clouds Are Key to Odd Thermal Rhythm



Researchers using NASA's Mars Reconnaissance Orbiter have found that temperatures in the Martian atmosphere regularly rise and fall not just once each day, but twice.

"We see a temperature maximum in the middle of the day, but we also see a temperature maximum a little after midnight," said Armin Kleinboehl of NASA's Jet Propulsion Laboratory.
Temperatures swing by as much as 58° Fahrenheit in this odd, twice-a-day pattern, as detected by the orbiter's Mars Climate Sounder instrument.

The new set of Mars Climate Sounder observations sampled a range of times of day and night all over Mars. The observations found that the pattern is dominant globally and year-round.

Global oscillations of wind, temperature and pressure repeating each day or fraction of a day are called atmospheric tides. In contrast to ocean tides, they are driven by variation in heating between day and night. Earth has atmospheric tides, too, but the ones on Earth produce little temperature difference in the lower atmosphere away from the ground. On Mars, which has only about one percent as much atmosphere as Earth, they dominate short-term temperature variations throughout the atmosphere.

Tides that go up and down once per day are called "diurnal." The twice-a-day ones are called "semi-diurnal." The semi-diurnal pattern on Mars was first seen in the 1970s, but until now it had been thought to appear just in dusty seasons, related to sunlight warming dust in the atmosphere.

"We were surprised to find this strong twice-a-day structure in the temperatures of the non-dusty Mars atmosphere," Kleinboehl said. "While the diurnal tide as a dominant temperature response to the day-night cycle of solar heating on Mars has been known for decades, the discovery of a persistent semi-diurnal response even outside of major dust storms was quite unexpected, and caused us to wonder what drove this response."

He found the answer in the water-ice clouds of Mars. The Martian atmosphere has water-ice clouds for most of the year. Clouds in the equatorial region between about 6 to 19 miles above the surface of Mars absorb infrared light emitted from the surface during daytime. These are relatively transparent clouds, like thin cirrus clouds on Earth. Still, the absorption by these clouds is enough to heat the middle atmosphere each day. The observed semi-diurnal temperature pattern, with its maximum temperature swings occurring away from the tropics,

was also unexpected, but has been replicated in Mars climate models when the radiative effects of water-ice clouds are included.

"We think of Mars as a cold and dry world with little water, but there is actually more water vapor in the Martian atmosphere than in the upper layers of Earth's atmosphere," Kleinboehl said. "Water-ice clouds have been known to form in regions of cold temperatures, but the feedback of these clouds on the Mars temperature structure had not been appreciated. We know now that we will have to consider the cloud structure if we want to understand the Martian atmosphere. This is comparable to scientific studies concerning Earth's atmosphere, where we have to better understand clouds to estimate their influence on climate."
- The full version of this story with accompanying images is at: www.jpl.nasa.gov/news/news.php?release=2013-201&cid=release_2013-201

Dry Ice "Snowboards" on Mars

NASA research indicates hunks of frozen carbon dioxide - dry ice - may glide down some Martian sand dunes on cushions of gas similar to miniature hovercraft, plowing furrows as they go.
"I have always dreamed of going to Mars," said Serina Diniega, a planetary scientist at NASA's Jet Propulsion Laboratory. "Now I dream of snowboarding down a Martian sand dune on a block of dry ice."

Caption: This image from the High Resolution Imaging Science Experiment (HiRISE) camera on NASA's Mars Reconnaissance Orbiter is an example of a type called "linear gullies," which may be explained by slabs of dry ice gliding down the slopes of sand dunes. Image credit: NASA/JPL-Caltech/Univ. of Arizona

Researchers deduced this process could explain one enigmatic class of gullies seen on Martian sand dunes by examining images from NASA's Mars Reconnaissance Orbiter (MRO) and performing experiments on sand dunes in Utah and California.
The hillside grooves on Mars, called linear gullies, show relatively constant width-- up to a few yards, or meters, across - with raised banks or levees along the sides. Unlike gullies caused by water flows on Earth and possibly on Mars, they do not have aprons of debris at the downhill end of the gully. Instead, many have pits at the downhill end.
"In debris flows, you have water carrying sediment downhill, and the material eroded from the top is carried to the bottom and deposited as a fan-shaped apron," said Diniega. "In the linear gullies, you're not transporting material. You're carving out a groove, pushing material to the sides."
Images from MRO show sand dunes with linear gullies covered by carbon-dioxide frost during the Martian winter. The location of the linear gullies is on dunes that spend the Martian winter covered by carbon-dioxide frost. By comparing before-and-after images from different seasons, researchers determined that the grooves are formed during early spring. Some images have even caught bright objects in the gullies.

Scientists theorize the bright objects are pieces of dry ice that have broken away from points higher on the slope. According to the new hypothesis, the pits could result from the blocks of dry ice completely sublimating away into carbon-dioxide gas after they have stopped traveling.
"Linear gullies don't look like gullies on Earth or other gullies on Mars, and this process wouldn't happen on Earth," said Diniega. "You don't get blocks of dry ice on Earth unless you go buy them."
That is exactly what Candice Hansen, of the Planetary Science Institute, did. Hansen has studied other effects of seasonal carbon-dioxide ice on Mars, such as spider-shaped features that result

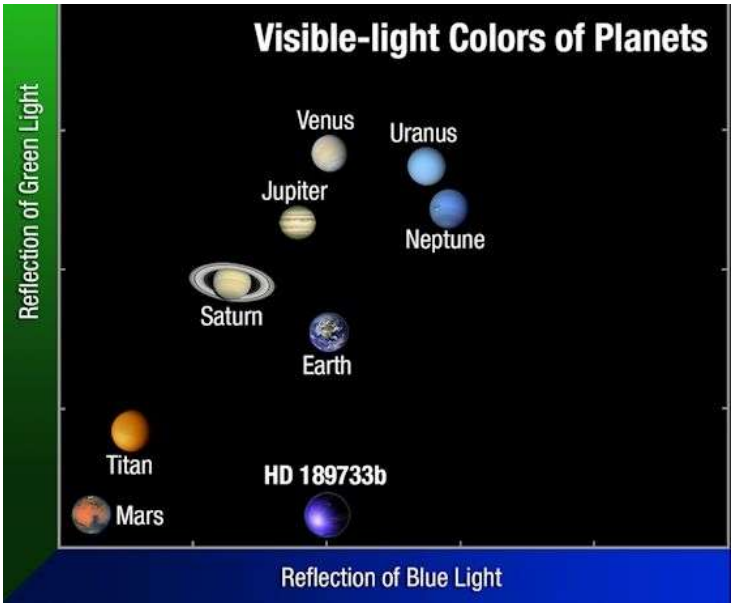
from explosive release of carbon-dioxide gas trapped beneath a sheet of dry ice as the underside of the sheet thaws in spring. She suspected a role for dry ice in forming linear gullies, so she bought some slabs of dry ice at a supermarket and slid them down sand dunes.
That day and in several later experiments, gaseous carbon dioxide from the thawing ice maintained a lubricating layer under the slab and also pushed sand aside into small levees as the slabs glided down even low-angle slopes.
The outdoor tests did not simulate Martian temperature and pressure, but calculations indicate the dry ice would act similarly in early Martian spring where the linear gullies form. Although water ice, too, can sublimate directly to gas under some Martian conditions, it would stay frozen at the temperatures at which these gullies form, the researchers calculate.
"MRO is showing that Mars is a very active planet," Hansen said. "Some of the processes we see on Mars are like processes on Earth, but this one is in the category of uniquely Martian."
Credits: Production editor: Dr. Tony Phillips | Credit: Science@NASA
- http://science.nasa.gov/science-news/science-at-nasa/2013/11jun_snowboards/

Hubble Finds a Cobalt Blue Planet

Astronomers working with NASA's Hubble Space Telescope have deduced the actual color of a planet orbiting another star 63 light-years away. The planet is HD 189733b, one of the closest exoplanets that can be seen crossing the face of its star, and its color is cobalt blue. If seen directly, this planet would look like a deep blue dot, reminiscent of Earth's color as seen from space.

Caption: This artist's concept shows exoplanet HD 189733b orbiting its yellow-orange star, HD 189733. NASA's Hubble Space Telescope measured the actual visible-light color of the planet, which is deep blue. Image Credit: NASA, ESA, and G. Bacon (STScI)

Hubble's Space Telescope Imaging Spectrograph measured changes in the color of light from the planet before, during and after a pass behind its star. There was a small drop in light and a slight change in the color of the light. "We saw the light becoming less bright in the blue but not in the green or red. Light was missing in the blue but not in the red when it was hidden," said research team member Frederic Pont of the University of Exeter in South West England. "This means that the object that disappeared was blue."



Earlier observations have reported evidence for scattering of blue light on the planet. The latest Hubble observation confirms the evidence.

This plot compares the colors of planets in our solar system to exoplanet HD 189733b. The exoplanet's deep blue color is produced by silicate droplets, which scatter blue light in its atmosphere.

Although the planet resembles Earth in terms of color, it is not an Earth-like world.
On this turbulent alien world, the daytime temperature is nearly 2,000 degrees Fahrenheit, and it possibly rains glass -- sideways -- in howling, 4,500-mph winds. The cobalt blue color comes not from the reflection of a tropical ocean as it does on Earth, but rather a hazy, blow-torched atmosphere containing high

clouds laced with silicate particles. Silicates condensing in the heat could form very small drops of glass that scatter blue light more than red light.
Hubble and other observatories have made intensive studies of HD 189733b and found its atmosphere to be changeable and exotic.
HD 189733b is among a bizarre class of planets called hot Jupiters, which orbit precariously close to their parent stars.
HD 189733b was discovered in 2005. It is only 2.9 million miles from its parent star, so close that it is gravitationally locked. One side always faces the star and the other side is always dark. In 2007, NASA's Spitzer Space Telescope measured the infrared light, or heat, from the planet, leading to one of the first temperature maps for an exoplanet. The map shows day side and night side temperatures on HD 189733b differ by about 500 degrees Fahrenheit. This should cause fierce winds to roar from the day side to the night side.
Credits: Production editor: Dr. Tony Phillips | Credit: Science@NASA

High-energy Spy

By Dr. Martin C. Weisskopf

The idea for the Chandra X-Ray Observatory was born only one year after Riccardo Giacconi discovered the first celestial X-ray source other than the Sun. In 1962, he used a sounding rocket to place the experiment above the atmosphere for a few minutes. The sounding rocket was necessary because the atmosphere blocks X-rays. If you want to look at X-ray emissions from objects like stars, galaxies, and clusters of galaxies, your instrument must get above the atmosphere.

Giacconi's idea was to launch a large diameter (about 1 meter) telescope to bring X-rays to a focus. He wanted to investigate the hazy glow of X-rays that could be seen from all directions throughout the sounding rocket flight. He wanted to find out whether this glow was, in fact, made up of many point-like objects. That is, was the glow actually from millions of X-ray sources in the Universe. Except for the brightest sources from nearby neighbors, the rocket instrument could not distinguish objects within the glow.

Giacconi's vision and the promise and importance of X-ray astronomy was borne out by many sounding rocket flights and, later satellite experiments, all of which provided years-, as opposed to minutes-, worth of data.

By 1980, we knew that X-ray sources exist within all classes of astronomical objects. In many cases, this discovery was completely unexpected. For example, that first source turned out to be a very small star in a binary system with a more normal star. The vast amount of energy needed to produce the X-rays was provided by gravity, which, because of the small star's mass (about equal to the Sun's) and compactness (about 10 km in diameter) would accelerate particles transferred from the normal star to X-ray emitting energies. In 1962, who knew such compact stars (in this case a neutron star) even existed, much less this energy transfer mechanism?

X-ray astronomy grew in importance to the fields of astronomy and astrophysics. The National Academy of Sciences, as part of its "Decadal Survey" released in 1981, recommended as its number one priority for large missions an X-ray observatory along the lines that Giacconi outlined in 1963. This observatory was eventually realized as the Chandra X-Ray Observatory, which launched in 1999.

The Chandra Project is built around a high-resolution X-ray telescope capable of sharply focusing X-rays onto two different X-ray-sensitive cameras. The focusing ability is of the caliber such that one could resolve an X-ray emitting dime at a distance of about 5 kilometers!

The building of this major scientific observatory has many stories.

Caption:Composite image of DEM L50, a so-called superbubble found in the Large Magellanic Cloud. X-ray data from Chandra is pink, while optical data is red, green, and blue. Superbubbles are created by winds from massive stars and the shock waves produced when the stars explode as supernovas.

Learn more about Chandra at www.science.nasa.gov/missions/chandra . Take kids on a "Trip to the Land of the Magic Windows" and see the universe in X-rays and other invisible wavelengths of light at spaceplace.nasa.gov/magic-windows.

Dr. Weisskopf is project scientist for NASA's Chandra X-ray Observatory. This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Inventing Astrophotography: Capturing Light Over Time

By Dr. Ethan Siegel

We know that it's a vast Universe out there, with our Milky Way representing just one drop in a cosmic ocean filled with hundreds of billions of galaxies. Yet if you've ever looked through a telescope with your own eyes, unless that telescope was many feet in diameter, you've probably never seen a galaxy's spiral structure for yourself. In fact, the very closest large galaxy to us—Andromeda, M31—wasn't discovered to be a spiral until 1888, despite being clearly visible to the naked eye! This crucial discovery wasn't made at one of the world's great observatories, with a world-class telescope, or even by a professional astronomer; it was made by a humble amateur to whom we all owe a great scientific debt.

Beginning in 1845, with the unveiling of Lord Rosse's 6-foot (1.8 m) aperture telescope, several of the nebulae catalogued by Messier, Herschel and others were discovered to contain an internal spiral structure. The extreme light-gathering power afforded by this new telescope allowed us, for the first time, to see these hitherto undiscovered cosmic constructions. But there was another possible path to such a discovery: rather than collecting vast amounts of light through a giant aperture, you could collect it over time, through the newly developed technology of photography. During the latter half of the 19th Century, the application of photography to astronomy allowed us to better understand the Sun's corona, the spectra of stars, and to discover stellar and nebulous features too faint to be seen with the human eye.

Working initially with a 7-inch refractor that was later upgraded to a 20-inch reflector, amateur astronomer Isaac Roberts pioneered a number of astrophotography techniques in the early 1880s, including "piggybacking," where his camera/lens system was attached to a larger, equatorially-mounted guide scope, allowing for longer exposure times than ever before. By mounting photographic plates directly at the reflector's prime focus, he was able to completely avoid the light-loss inherent with secondary mirrors. His first photographs were displayed in 1886, showing vast extensions to the known reaches of nebulosity in the Pleiades star cluster and the Orion Nebula.

But his greatest achievement was this 1888 photograph of the Great Nebula in Andromeda, which we now know to be the first-ever photograph of another galaxy, and the first spiral ever discovered that was oriented closer to edge-on (as opposed to face-on) with respect to us. Over a century later, Andromeda looks practically identical, a testament to the tremendous scales involved when considering galaxies. If you can photograph it, you'll see for yourself!

Astrophotography has come a long way, as apparent in the Space Place collection of NASA stars and galaxies posters at http://spaceplace.nasa.gov/posters /#stars.

Caption: Great Nebula in Andromeda, the first-ever photograph of another galaxy. Image credit: Isaac Roberts, taken December 29, 1888, published in A Selection of Photographs of Stars, Star-clusters and Nebulae, Volume II, The Universal Press, London, 1899.

Amateur Astronomers: *You are the reason the Night Sky Network is such a powerful tool. Thank you for all of your efforts to educate and amaze the public and yourselves with the wonders of the night sky. Keep up your wonderful work!*

Our High-Energy Universe Telecon was a great success! We are pleased to announce that the audio, as well as the written transcipt and slides, are available for download here: http://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=521

Updates coming soon to Planetquest and Shadows and Silhouettes

We are hard at work updating two of our most popular ToolKits with the latest discoveries. Both PlanetQuest and Shadows and Silhouettes will be updated by the end of summer, and the results shipped to your clubs just in time for the start of the new school year. Marni even makes a cameo appearance in the new videos, right. Some NSN members have been testing and evaluating the new materials, and here's some of what they're saying:

- *"I envision using these cards first to help me plan an observing session for the public, and then to help me give facts about the objects seen, which will initiate more conversation and discussion."*
- *"They are a great resource, especially for new outreach members, but even for those of us who have been doing lots of outreach."*

Stay tuned for more information later this summer!

GoStargaze app has been retired

It is with a bit of sadness that we announce that our GoStargaze app has been retired from the iTunes store. While it was a valuable tool for many, it has become superseded by other applications that can use the map of clubs from the Night Sky Network to let both amateur astronomers and the general public find astronomy e vents and clubs in their areas. Two of those apps are Distant Suns and SkySafari-and unlike the GoStarGaze app, they are available

for **both** Android and Apple (iOS) devices.

New featured articles and activity
We have a new article as well as a new featured activity:

Mercury Rising: Mercury is about to hit its highest point in the western sky in our evenings for 2013. Tips on how to find it, as well as some information on the ongoing Mercury MESSENGER probe, are in this mini feature.

Space Weather Presentation: The sun is full of activity, as those of you who do solar observing are no doubt aware! This PowerPoint helps to illustrate how space weather directly effects our life here on Earth.

Wishing you clear skies!

Vivian White and David Prosper, Night Sky Network Team
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The NASA Night Sky Network is a nationwide coalition of over 425 amateur astronomy clubs. The NASA Night Sky Network is managed by The Astronomical Society of the Pacific.

SWFAS Minutes
May and June Minutes will be published in a future newsletter.

Miss Mitchell Finds a Comet
Maria Mitchell, born 195 years ago this week, is widely recognized as the first American woman astronomer. Mitchell was raised by parents who believed all of their ten children should be highly educated and aspire to greatness, regardless of gender. Her father in particular, an astronomer himself, recognized Mitchell's talent for science and encouraged her endlessly. Mitchell's discovery of a comet in 1847, known as "Miss Mitchell's Comet," earned her worldwide fame, and she later became a professor of astronomy at Vassar College. Today, about 25% of all professional astronomers worldwide are women, and their ranks are growing. This image of a different comet (Comet Lovejoy) was taken from the unique vantage point of the International Space Station.
- The Week in Space calendar

Photos of China's Space Program

Space exploration isn't limited to just a couple rival countries anymore. China has developed a successful manned space program over the past decade or so, as demonstrated in this album of the Shenzhou-10 mission, featured here: http://www.picturecorrect.com/news/rare-photos-of-chinas-manned-space-program/ . The photos offer a rare glimpse inside the country's ambitious program, which, earlier this month, completed a 15-day orbit (its longest mission yet) and docked with the Tiangong-1 Space Laboratory, the first module in a planned permanent space station. The photography on the website captures a range of cultural touchpoints: rumbling takeoffs, expansive command centers, floating astronauts, excited children waving paper airplanes, and most importantly, a triumphant return.

Other potential plans include manned lunar missions and possibly even a manned mission to Mars.

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