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International Observe the Moon Night
Advanced Binocular Double Star Program
From Around the League: Officer Candidates’ Statements
A Whole New View

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Introducing a Jumbo version of S&T’s Pocket Sky Atlas

We wanted a clear and detailed atlas, easy to consult at the telescope.

So, starting with our popular Pocket Sky Atlas, we magnified its 80 charts and added six additional close-up fields, including “Steam from Teapot” and “The Scorpion’s Tail.”

― 8½ by 11½ inches, 136 pages, spiral-bound with stiff and dew-resistant cover

by Roger W. Sinnott

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The Astronomical League 3

This image of the Orion Molecular Cloud Complex comes to us from Matt Harbison of Chattanooga, Tennessee. Matt has been working on shooting on a large scale to capture complete constellations. This mosaic was taken in January and February 2016 using an Atik 383 CCD, Canon 100 mm f/2.8 L lens, Gerd Neumann filter drawer system, and William Optics Star 71 guide telescope. It consists of 5 panels with more than 1,200 individual light, dark, flat, and bias frames. The majestic Barnard’s Loop, Horsehead Nebula, Witch Head Nebula, Angelfish Nebula, and the Small Orion Nebula are all visible. Images were captured with Sequoia GammaProView, calibrated in Photoshop, and then layers edited in Photograph. Matt is a member of the Barnard Astronomical Society.

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Amateur Astronomy Convention—Enhance Your Experience Under the Stars

Amateur astronomy is considered by many members of the public—even by a few amateur astronomers themselves—to be a solitary pursuit, where curious people venture alone under the starry dome to observe obscure celestial features or exotic physical phenomena. One image some may have is that amateurs rarely associate with others.

Why, then, do many people make the effort to attend astronomy conferences and star parties sometimes traveling great distances to do so? Why do many people devote several days of their limited vacation time to attend these gatherings? Why do so many of the people do this year after year?

Could it be that the total experience gained at the eyepiece demands more than just that a view at the eye? Could it be that a more important understanding of what is being seen? Could it be that it requires personality traits of others with whom one has had similar experiences?

A larger sense of discovery

Why not generally recognized about a convention, or any astronomy gathering for that matter, is that it consists of much more than just a collection of talks. Yes, conferences certainly do have educational components where astronomers can speak directly with experts and learn. Yes, attendees commonly meet authorites such as; mathematicians, research scientists, university professors, NASA's space scientists and astronauts, and expert astronomers, sketchers, and imagers. The attendees, however, come away with much more than the experience of just that. With an array of gatherings tailored to various backgrounds, amateurs have a wonderful chance to learn more about the science and art of astronomy, and the art of observing. But, for example, new opportunities for conducting outreach and influencing the young. Club programs for some of the large star parties that I hope to attend in the future, for example, explorations of an astronomical context. Often, there are interesting locations where guests to a convention can picture of what a dark sky looks place—planetaria, science museums, observatories, physics laboratories, and space exploration facilities. These help amateurs understand the nature of astronomy and the role they play within it.

The larger, better-attended events often feature keynote speakers—often others effectively recognized. People find it exciting to speak with this person of note, gaining real insight into the topic at hand.

The Astronomical League Convention, ALCon

Astronomical League Convention is to the star gazing, much more out of the experience than just that. A series of nearly twenty engaging talks dealing with various topics such as; photography and outreach on the National Mall, impacts, planetary exploration, youth research, and more.

The convention is a number of special tours: NASA's Goddard Space Flight Center; the Smithsonian's National Air and Space Museum, including the Udall-Hey-Hall Center collection, and its Udall-Hey-Hall Center. Surface exploration of Mars, and in general, many more.

What might be the most important opportunity for discovery and influencing the young. Where amateurs learn directly from other amateurs. How can you make your club stronger? Here are a few events.

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Light Pollution Myth: There are Too Many Lights to Do Anything About Them

Over the years I have discussed myths in the fight against light pollution, such as “the more light the better,” “outdoor lighting prevents crime.” LED lighting protects the environment, and “there are too many lights to ever solve the light pollution problem.”

Where there are myths, there is often a grain (or more) of truth that started them. For example, you do need enough light to do the task at hand, but too much light produces glare and wastes energy. Sometimes outdoor lighting is needed for a task, like taking out your garbage on a moonlit night. Outdoor lighting can provide a sense of safety and security, but if nighttime lighting was truly good at preventing crime, we would have no inner city crime. Some of the brightest urban areas have the most crime.

LED lighting is the wave of the future, due to the long life of LED emitters, and their being easy to dim or turn off and on as needed. They are also fairly energy efficient. Unfortunately, many outdoor LED systems have been installed with no thought to the nighttime environment. They produce much glare, produce too much light for the task, and produce light in the blue range of the spectrum, which is more annoying and possibly more harmful than light in the orange range of the spectrum.

The hardest myth to battle is that there are too many lights to do anything about light pollution. That is a very tough nut to crack, and on my bad days and nights I sometimes feel that way. If all of those who felt that way...
**Deep Sky Objects**

By Dr. James E. Duro, Keck Educational Association for Science & Astronomy

**Ptolemy’s Cluster**

NGC 4652, also known as M7, is a bright open star cluster that is thought to be about 10,000 light-years away. It is located in the constellation Sagittarius, about 2000 light-years from the galactic center. M7 is a large open star cluster that contains 300 stars, spanning 1.3 degrees. The brightest stars in the cluster are resolved with an integrated magnitude of 3.3, easily seen with a small observing site. The cluster was described by Ptolemy in the year 130 AD as a "cloud" following the star Scorpio. The brightest star in M7 is HR 6658, a magnitude 7.9 yellow giant. The second brightest star is HR 6659, a magnitude 8.2 yellow giant. NGC 4652 is thought to be 800 to 1000 light-years away, roughly half the distance to M6. For members who are looking to add to their library, the Book Service is definitely the place to go! The accompanying image of M7 was taken with a Stellarvue SV102/7.8 photometric refractor with a TeleVue 0.8x field flattener/reducer. The mount was an Orion German equatorial, and a SBIG STL-2000XM CCD camera with a 5-minute exposure was used. North is up and west is to the right. The cluster is a rich Milky Way star field, with thousands of stars visible in a small telescope. The globular star cluster NGC 6452 is a spectacular object to view in a small telescope, with hundreds of stars visible in a 6-inch f/5 Newtonian. The brightest star in Ptolemy’s cluster is magnitude 10. NGC 6452 shines at magnitude 10 and has a diameter of 21.5 arcminutes. It is a globular cluster, which is much brighter than the open M7. The cluster contains 10,000 stars, and its diameter is about 200 light-years.
10, 25, and 50 Years of the Astronomical League’s Magazine
By Mike Stewart, Astronomical League Historian

May 1966
Southern Cross Observer
The Southern Cross Observatory was founded in 1930 when S. Lynn Rhorer, a winter visitor from Atlanta, brought with him a 5-inch Alvan Clark refractor which he set up on the grounds of the old Royal Palm Hotel in downtown Miami and invited all to look—free!

It is said that the police looked upon this activity with some concern and one evening took Rhorer to headquarters where he managed to convince the sergeant that he really didn’t need a license, since there was no charge for looking through the telescope.

Rhorer added another Clark refractor each year until there were six. He gathered a number of local devotees who became the “volunteer” staff of the open-air observatory.

After Rhorer’s death in 1929 it appeared that the project would come to an end, but Rhorer’s will left the equipment to the staff provided they set up a corporation to continue the project. The Southern Cross Astronomical Society was thus incorporated in 1930.

Our members still throw a pillar in many clubs’ monthly activities, and some observers can relate to Mr. Rhorer’s encounter with law enforcement during an observing session.

The Southern Cross Astronomical Society is one of many astronomical clubs formed in the United States during the twenties and thirties. The SCAS and Herschel certificates, will enjoy the new perspective

Announcing the Astronomical League’s Binocular Messier Club

The Astronomical League is pleased to introduce its new Binocular Messier Club. The Binocular Messier Club is for beginning observers as well as experienced amateurs.

Beginning observers will find that it doesn’t take an expensive telescope to do serious astronomical work. Just a simple pair of binoculars, no matter what the size, cost or condition. On the other hand, experienced amateurs, even though they may already have the AL’s telescopic Messier and Herschel certificates, will enjoy the new perspective

June 2006
Aegean Eclipse

It was my third time. The third time that I have planned, schemed and dreamed of going to a total eclipse of the sun—well it’s just darn hard to explain how very special

June 18th | 10am – 6pm

At OPT: 918 Mission Avenue

Oceanside California

• Have your questions answered by the experts from dozens of exhibitors
• More than $15,000 in Raffles and Free Giveaways
• Fun activities for kids of all ages
• Special one day only pricing
• Support a deserving nonprofit astronomy organization

For more information or to pre-register:
Jackie Beucher, Star Party Chair, hoasp@ask.org

THE 12TH ANNUAL SOUTHERN CALIFORNIA ASTRONOMY EXPO!
Maria Mitchell
19th Century Astronomer

By Ann House, member of the Salt Lake Astronomical Society and former Astronomical League Secretary

Photos by Ann House and family

Maria Mitchell was born on July 4, 1818, in Nantucket, Massachusetts. From the very beginning of her life, Maria Mitchell had an interest in the natural sciences. As a young girl, she observed the Moon, the planets, and the stars, and she was fascinated by the unknown. She was one of 10 children in a family that valued education and believed in equality regardless of gender. Her parents were Quakers who valued education and believed in equality regardless of gender. She came from a heritage of educated ancestors, including Benjamin Franklin among them. Maria’s father built his own observatory on the island where she also became a teaching assistant. She later opened her own school and allowed non-white children to attend, quite scandalous at the time.

Maria was a self-taught astronomer. She conducted original research and photographed the Sun and her favorite planets, Jupiter and Saturn. She was an unusual professor for her day, rousing her students at night to join her in the observatory and teaching them the telescope. The observatory also became a gathering place for discussions about politics and women’s issues, and Maria was a strong advocate for women’s rights.

Maria’s father built his own observatory on the island, which was connected to the Atheneum, which offered her a place to live and work. Maria’s father also built his own observatory.

Maria Mitchell wrote, “I cannot expect to make astronomers of those who do not sincerely desire to study the science; but I expect that you will improve yourselves in the course of the lecture, and that you will continue to study the science even after the lecture is over.” Maria was a dedicated teacher and her students became astronomers, including Antonia Maury (Harvard College Observatory) and Mary Watson Whipple (Mitchell’s successor at Vassar College).

Today, on the island of Nantucket, exists the Maria Mitchell Association, dedicated to promoting her legacy of exploration, education, and research. While astronomical research continues each summer with visiting students and scholars and an observatory open to the public, the observatory also facilitates recognition and study of the ocean and harbor. More information can be found at www.marinamitchell.org.

Maria Mitchell’s books and photographic plates in the observatory on Nantucket.

Introduction

In 2009, I purchased a Sky Quality Meter. Based on information from the manufacturer, the instrument is only sensitive to visible light. Each instrument is calibrated using a NEXT traceable light meter and the precision of each meter is believed to be ±10%. They also claim that the half width at half maximum (HWHM) of the angular sensitivity is about 10 degrees. Therefore, if the instrument reads 20.0, then one square arcsecond of the sky has a brightness value equal to that of a magnitude 20.0 star. I interpret the uncertainty to be ±0.1 on the instrument readout, however, I was not small enough at the beginning of the study period. I will discuss trees later and I spent most of my study were recorded along with the sky brightness. The study was going on, I decided to look for any correlation between sky brightness and temperature.

Sky Brightness Versus Month

The data were broken up by the month of measurement. The mean sky brightness for each month is shown in Figure 2. A typical monthly standard deviation of 0.2 mag/arcsec². Therefore, the monthly differences are only marginally meaningful. The sky was brightest in September. This may be due to a combination of home football games and the town festival, which takes place on the third weekend in September. Both of these events led to increased light levels bringing on the summer Milky Way is also high in September, as there are no events to block the view of the sky at zenith. In mid-2015, the limbs are at least several degrees from the zenith. However, the percentage of sky not blocked by the horizon—over a period of ten years, the sky brightness decreased—this is, the sky darkened—over time as a magnitude 20.0 star. I have been just above the horizon, but tree limbs may have been present. This is a difficult to separate any monthly trends, and measuring the brightness near the zenith, it seems to rule out zodiacal light being a contributor to the variability of the sky brightness.

Other Trends

Two other trends were examined. Figure 3 illustrates how measured sky brightness changed with the temperature. Essentially, the sky tended to be brighter at warmer temperatures. It is, however, difficult to separate any monthly influence from the temperature influence. The mean sky brightness for all readings before 5:00 UT was 19.94 mag/arcsec² and the corresponding value for 5:00 UT and later was 20.09 mag/arcsec². The standard deviation for both means is near 0.2 mag/arcsec², so the difference is only marginally meaningful. The sky was brightest in September. This may be due to a combination of home football games and the town festival, which takes place on the third weekend in September. Both of these events led to increased light levels bringing on the summer Milky Way is also high in September, as there are no events to block the view of the sky at zenith. In mid-2015, the limbs are at least several degrees from the zenith. However, the percentage of sky not blocked by tree limbs may have been present. This is a difficult to separate any monthly trends, and measuring the brightness near the zenith, it seems to rule out zodiacal light being a contributor to the variability of the sky brightness.

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WANDERERS IN THE NEIGHBORHOOD

2015: Year of the Dwarf Planet

By Berton Stevens

The year 2015 was very exciting for dwarf planets. Two spacecraft each studied a different dwarf planet in very different parts of our Solar System. The New Horizons mission took a close-up look at the dwarf planet (134340) Pluto, while the Dawn mission cased into orbit around the first dwarf planet to be discovered, (1) Ceres, discovered in 1801. It then proceeded to start mapping this dwarf planet in great detail. Ceres is the only dwarf planet that orbits the Sun within the asteroid belt between Mars and Jupiter. All the other dwarf planets, including Pluto, orbit the Sun out beyond the orbit of Neptune. This category was created by the International Astronomical Union in 2006 when it became clear there were other objects beyond Neptune that rivaled Pluto’s size. Rather than add more planets to our Solar System’s roster, astronomers decided to reclassify Pluto into this new category. The five known dwarf planets are shown here at the same scale as our Moon. Dwarf planets are not the only objects to reach hydrostatic equilibrium. Our Moon and many other moons have become spherical as well. The difference is that they orbit a planet instead of orbiting the Sun directly.

The two spacecraft that explored dwarf planets in 2015: New Horizons is upper left; Dawn in the lower center. The most obvious difference is the New Horizon’s lack of solar panels since the sunlight is too weak in the outer Solar System to power the spacecraft. Instead, a radioisotope thermal generator (protruding from the left side of the spacecraft) provides power from the decay of plutonium dioxide. This power source was used because Pluto is too far from the Sun to use solar arrays. New Horizons is the fastest spacecraft to leave Earth, travelling at 36,373 miles per hour. The different designs also meant different mission profiles. Dawn used its ion engines to slow down, orbit Vesta, and then do the same at Ceres. It could then perform detailed measurements of each object. New Horizons had to be as light as possible, so there were no rockets to slow it down as it flew past Pluto. New Horizons had to make its observations from 240 miles away, while New Horizons was 7,750 miles away from Pluto at closest approach. The two spacecraft were still able to provide much new information about these two dwarf planets. Images have shown major differences between the surfaces of these two dwarf planets. Ceres has many more impact craters than Pluto. The impacts that formed these craters, along with contraction of the planet, caused stresses that induced troughs in the crust of Ceres. These troughs are visible all over Ceres’ surface, frequently near the larger craters. Pluto also has troughs, but Pluto’s were probably formed by the sublimation or evaporation of nitrogen ice from a deep layer that may be up to a few miles thick. This layer is exposed on the left side of Pluto’s “heart,” the basin informally named Sputnik Planum, 620 miles (1000 km) across. Since this layer is exposed on the Sun in Sputnik Planum, the nitrogen ice can sublime into nitrogen gas and then condense back into ice on the surrounding mountains. The newly formed nitrogen ice flows down the mountains as a glacier, forming many of the geological features seen by New Horizons.

Some of the nitrogen escapes the Sputnik Planum basin and helps form the atmosphere surrounding the dwarf planet. New Horizons saw layers of haze in Pluto’s atmosphere as it looked back at Pluto occulting the Sun after the close encounter. A complete understanding of Pluto’s haze still eludes astronomers. Ceres has an atmosphere as well—it is very thin, and composed mostly of water. The bright spots first seen as Dawn approached Ceres in the crater Occator appear to be composed of a type of magnesium sulfate called bradydrite, similar to what we know of as epsom salt. The magnesium sulfate is left behind on the surface as the water-ice it was dissolved in sublimates. This mixture, like the nitrogen-ice on Pluto, comes from a subsurface layer of briny ice that is exposed by impacts from small asteroids. There are over 120 of these bright spots scattered all over Ceres’ surface. This indicates that this subsurface layer covers most of the planet. Dawn has observed a haze that fills Occator when the Sun is overhead. The haze is not visible when the Sun is low in Occator’s sky.

Other studies from Dawn have shown that Ceres contains ammonia–rich clays. The existence of these ammonia–bearing clays implies that Ceres may have formed in an area of the young Solar System rich in ammonia and nitrogen. This would have been far out in the cold outer Solar System far away from the Sun’s heatwave. Even with all their differences, perhaps these two dwarf planets formed in the outer Solar System not too far from each other before they went their separate ways. New Horizons is still sending back its close-encounter observations to Earth at the slow data rate required by its great distance and its lightweight communication equipment. Dawn is orbiting Ceres and it is also sending back new data. Both spacecraft still have much to tell us about the dwarf planets they have visited.

Berton Stevens is co-director of the Desert Moon Observatory (http://dm448.twilight.com/dm448). Berton is also the Planet Center #448, Berton Stevens at Planetarium.com. You can follow him on Twitter (https://twitter.com/bertontwilight).
A ROCKET GARDEN

Ken Diller, Brevard Astronomical Society

The first event BAS supported was the space shuttle Atlantis rollover held on November 2, 2012, a perfectly clear, sunny day. Hundreds of visitors and former space shuttle workers witnessed the daytime, final rollover of the space shuttle Atlantis orbiter from the Vehicle Assembly Building to its new home 10 miles away, the Atlantis exhibit facility in the KSC Visitor Complex. In anticipation of a large crowd, BAS set up solar telescopes in Space Florida’s Exploration Park, the location along the rollover pathway chosen by KSC officials to provide a festive half-day for close-up viewing of the shuttle Atlantis. Amongst all the awe and wonder of a space shuttle approaching, we found ourselves surrounded by a steady flow of visitors viewing our nearest star through club members’ solar telescopes. On that day, the Sun exhibited a steady flow of visitors viewing at the two previous events—this time for the space shuttle Atlantis exhibit grand opening on April 24, 2015. Off to the other side, a minute away, two full-scale replica solid rocket boosters with external tank greeted visitors to activities inside the shuttle Atlantis exhibit. While preparing for the event, the excitement level within BAS was at an all-time high. With KSC Visitor Complex staff requesting as many telescopes as possible, central Florida astronony clubs, including Brevard Astronomical Society, Kennedy Space Center Amateur Astronomers, Melbourne Astronomical Society, Central Florida Astronomical Society, and the Amateur Astronomy Club of Embry-Riddle Aeronautical University came together to provide over 30 telescopes for a night of stargazing.

Astronomy clubs, planned in advance to reduce lighting while keeping safety in mind. Several facility lights and path lamps were dimmed, and visitors, mainly the kids, were given small red stick-lights. In addition, the Kennedy Space Center and the Visitor Complex reside in what’s generally considered a remote area of the county, overlapping the 140,000-acre Merritt Island National Wildlife Refuge. This combination of location and dimly lit rockets allowed for reasonably dark skies.

Along with a favorably clear sky that night, and 500 guests eager to observe and learn about the night sky, the Hubble Space Telescope’s 25th anniversary event proved to be another successful and most enjoyable experience involving local astronomy clubs and the KSC Visitor Complex. As KSC Visitor Complex consumer events specialist Ryan Beltier and staff shouted “Thank you astronomers!”, it culminated a night filled with guests, staff, and volunteers expressing appreciation for astronomy outreach support. BAS president John Small also acknowledged that BAS is committed to “sharing the wonders of the universe” with visitors to KSC and throughout the Florida space coast community as a whole. While BAS also conducts various local astronomy outreach events supporting schools, scouts, and county parks, our proximity to the spaceport has allowed us the fortunate opportunity to support stargazing adventures at the KSC Visitor Complex. BAS extends its sincere thanks to the KSC Visitor Complex team for the pleasure of sharing views of the universe with Floridians and visitors alike in a unique setting, the Rocket Garden.
The night sky contains great beauty, some of it visible. In a recent Reflections (Vol. 6, Issue 6, June 2016), Michael Dennen contrasts the concepts of beauty and sublimity. The former is something seen and understood, while the latter is something unseen and understood in an “aha” moment as a piece of the puzzle is seen. In the image, we are presented with a new way of seeing the sky.

In this context, not everything beautiful is sublimity. Not all, our poet and artist notes, can be understood in every cycle of careful reading. And he adds other terms, like awe, feeling, and inspiring awe. Then I know what I am seeking, the more the more it is, in respect to the understanding of the beauty by and sublimity. It is an eagerness to know how the thoughts are formed in the mind of the writer. For Shakespeare, according to my background knowledge, the beauty and sublimity is something that is unseen and understood in a “aha” moment as a piece of the puzzle is seen. We are presented with a new way of seeing the sky.

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Candidate Statement for the Office of the Executive Secretary of the Astronomical League: Ron J. Kramer

In 2011, I read a small piece in the Reflector, which was serving as an editor. At the time, it was a semi-edited book publisher and active in local astronomical activities, having been a member of the Astronomical League for several years through affiliation with the Astronomical Society of Lawrence County. This sounded like a good way to get more involved in my hobby and submit a resume. A few telephone interviews later, the offer was made, and I eagerly accepted the last thing on my mind was what lay ahead in the near future.

As a member of the ASC, I have chatted with several officers, members, and affiliated societies for several years. I am aware of the needs and desires of the ASC, as well as the strengths of the executive secretary, and was the editor of their monthly newsletter, the High Desert Observer.

For several years, I became the Reflector’s editor, charted ACL2015, and have been following other League activities. Many new friends and colleagues have been made along the way, and I believe it is time to consider the opportunities within the League that will aid in our future growth and success.

To that end, I respectfully submit my application for the position of Executive Secretary of the Astronomical League. Having worked closely with our national officers, members, and affiliated societies for several years, I am aware of the needs and desires of the League, as well as the strength of the executive secretary.

Candidate Statement for the Office of the Vice President of the Astronomical League: Bill Bogardus

Through the vision of the Horkheimer Charitable Fund, the Astronomical League is again offering a free Library Telescope to a lucky Astronomical League club in each of the ten AL regions. We had 23 entries last year’s drawing.

The Library Telescope consists of an Orion 4.5-inch StarBlast Dobsonian (or equivalent) and a Celestron 28-40 mm eye-piece (or equivalent), along with a nameplate commemorating the late Jack Horkheimer. The value of this opportunity is approximately $1,500, the potential of the program is enormous.

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The Astronomical League was established to bring amateur astronomy back to the cities, to both areas that are affected by heavy light pollution. A program called “backyard astron- omers” as cities grow, so did light pollution, and amateur astronomers were forced to drive further and further out into the country to escape the sky glow from light pollution. The Urban Astronomy Observing Program was created to allow those who want to enjoy the wonders of the heavens from the comfort of their homes to do so, and to maximize their observing experience despite the presence of heavy light pollution. In addition to the Moon and planets, a plethora of deep sky objects can be enjoyed with a poor urban sky, and it only takes a small, medium-sized telescope to enjoy them. This program will introduce you to them and the pleasures of convenient, backyard observing.

Terry Trees, PhD
Urban Observing Program Coordinator

Can’t see the Milky Way? The Urban Observing Program is for you!

It’s a clear sky right and you want to observe. However, you live in a city and you don’t have the time or energy to drive to your favorite dark sky location. So—how about your backyard?The Urban Astronomy Observing Program was established to bring amateur astronomy back to the cities, to both areas that are affected by heavy light pollution. A program called “backyard astronomers” as cities grow, so did light pollution, and amateur astronomers were forced to drive further and further out into the country to escape the sky glow from light pollution. The Urban Astronomy Observing Program was established to bring amateur astronomy back to the cities, to both areas that are affected by heavy light pollution. A program called “backyard astronomers” as cities grow, so did light pollution, and amateur astronomers were forced to drive further and further out into the country to escape the sky glow from light pollution. The Urban Astronomy Observing Program was established to bring amateur astronomy back to the cities, to both areas that are affected by heavy light pollution. A program called “backyard astronomers” as cities grow, so did light pollution, and amateur astronomers were forced to drive further and further out into the country to escape the sky glow from light pollution.

Submit your completed entry form, found at www.astroleague.org/southwest/university/urban-observing-program, to them and the pleasures of convenient, backyard observing. The Library Telescope being presented. The tele-
Before qualifying for the Advanced Binocular Double Star Program, it’s a requirement that you complete the original Binocular Double Star Program. The original program is a very good way to get experience observing double stars through binoculars before you move on to the more challenging targets in the Advanced program. These two programs give you extensive lists of targets that are not visible from sources where we typically observe with binoculars. I have always enjoyed telescopic double stars observing, but prior to doing these programs, it would never have occurred to me to try observing double stars with binoculars. Both programs were very enjoyable, well-conceived, and well organized.

When I sent my Advanced log and notes to Bob Kerr, the program’s coordinator, he suggested I share my thoughts with other members who might benefit from them.

Both binocular double star programs consist of a nice mix of double and multiple stars of varying magnitudes, colors, and amounts of separation. The main difference between the two programs is that the Advanced program requires you to split doubles within 10 arcseconds, whereas in the original, where handheld binoculars may be an option in the original program, and multiple stars of varying magnitudes, colors, and amounts of separation, it would never have occurred to me to try observing double stars with binoculars. I have always enjoyed telescopic double stars observing, but prior to doing these programs, it would never have occurred to me to try observing double stars with binoculars. Both programs were very enjoyable, well-conceived, and well organized.

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COSMOLARUM CASTILLO DE HORNOS DE SEGURA, ANDALUSIA, SP

International Observe the Moon Night (InOMN) is a worldwide, public celebration of lunar science and exploration held annually since 2010. One day each year, everyone on Earth is invited to observe and learn about the Moon together, and to celebrate the cultural and personal connections we all have with Earth's nearest neighbor. The seventh annual International Observe the Moon Night is October 8, 2016. Go look at the Moon, and invite your family, friends, and community to join you!

Each year, thousands of people participate in InOMN at museums, planetaria, schools, universities, observatories, parks, businesses, and backyards around the world. Any astronomy club, interested group, or individual can host an InOMN event; events range from small family gatherings to community events drawing hundreds of visitors. InOMN events do not need to follow a set agenda; hosts can tailor their events to match their observing expertise at their InOMN events.

The Moon is a gateway to the Solar System and beyond, so hosts are encouraged to also observe and discuss planets and other celestial objects and events. InOMN 2016 provides a perfect opportunity to highlight another Moon-related event not to be missed in North America the following summer: the total solar eclipse of August 21, 2017.

Participating in InOMN can help astronomy clubs and other organizations reach new and underserved audiences, build public interest and confidence in astronomical observing, and build and sustain public interest in space exploration. The InOMN website (observethemoonnight.org) has resources to help event hosts, including step-by-step suggestions for hosting an InOMN event, customizable flyers, presentation materials, suggestions for activities, certificates of participation, evaluation materials, and links to information about lunar science and exploration as well as to connect with lunar enthusiasts around the world through social media.

The InOMN team also offers professional development for hosts, highlighting NASA lunar and planetary science research that hosts can share with their visitors. The InOMN evaluation team holds training sessions before and after InOMN to help hosts effectively evaluate their events. There is a common baseline survey for hosts and participants. The InOMN evaluation team can also create customized surveys with additional specific questions for even more feedback about their events.

By Andrea Jones
Director, International Observe the Moon Night

observing experience. Many astronomy clubs around the world host InOMN events, but if your or your local club would rather not lead an event, consider partnering. Libraries, schools, museums, and other organizations eagerly partner with astronomy clubs to provide telescopes and observation expertise at their InOMN events.

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By Andrea Jones
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August 21, 2017, Solar Eclipse
On August 21, 2017, there will be a total eclipse of the Sun visible from the United States (and only the United States!). The path of totality, which is called the “American” total eclipse is only about 60 miles wide and goes from a beach in Oregon to a beach in South Carolina, crossing the country diagonally.

The partial eclipse will be visible to 50 million people in the other parts of the U.S. and North America. The National Science Teachers Association (NSTA) is making available a popular-level introduction to help explain the eclipse, and how to view it, to students and the public. The free 8-page booklet is available as a PDF file at nsta.org/publications/press/extrafiles/solarscience/ SolarEclipseInsert.pdf.

The eclipse information comes from a new book for educators, titled Solar Science, which includes 45 hands-on learning experiences (and lots of background information) about the Sun, the Moon, the sky, the calendar, the seasons, and eclipses.

You can see the full table of contents and some sample activities at static.nsta.org/ docs/9R550North.pdf.

A revised and updated bibliography on eclipses in general, and the 2017 eclipse in particular, (with sources of maps, trips, observing sites, weather predictions, etc.) is now available at astronomy.org/eclipse.
This image of a gigantic sunspot was taken on April 11, 2016. This sunspot could swallow our entire Earth. Bob Runyan took a chance and combined 2x and 1.9x Barlow lenses to capture this image using his ZWO ASI120MM and SolarMax II 60 setup. This image is from the best 20% of 1000 frames and was processed using Autostakkert!, RegiStax, and Photoshop. It was taken from his AstroAsylum dome observatory in Shelton, Nebraska. Runyan is a member of Platte Valley Astronomical Observers and the Astronomical League.

Al Marcella, a member of the Astronomical Society of Eastern Missouri, recently visited the Northwest Territories, Canada, and was fortunate to have witnessed one of nature’s most beautiful events: the Northern Lights. He used a Nikon D300 with a Nikon 12–24 mm f/4.5 lens set at 12 mm to make this 40-second exposure on a rather cold night (–38°C).

The first time we see a celestial event is always a great experience. Garvis DiLorio of the Mohawk Valley Astronomical Society was determined to have his first lunar eclipse etched in stone (or at least photons). This montage of 12 black-and-white images taken during various stages of the eclipse, plus a color image of totality, shows great creativity. Garvis captured the event from his backyard in Upstate New York on September 27, 2015, with a Canon 1000D with an IDAS LPS-D1-EOS light pollution filter mounted to a Celestron 8” Edge HD with an Astrozap 3” focuser and a Losmandy G11 mount.

The Pelican Nebula (IC 5070) has been a target for many astrophotographers. This image, by Clement Elechi of the Roanoke Valley Astronomical Society, was taken on October 16, 2015. He used a Canon 1D Mark III with a 35mm f/1.4 lens to make this 10-minute exposure with a Canon 10mm f/2.8 lens mounted to a Meade 14” LX200.

The Solar Maximum Mission (SMM) was a joint NASA-ESA mission to image the Sun with high temporal and spatial resolution. The mission operated from April 1980 to May 1989. During its operation, SMM recorded the most active solar minimum period in solar history, when the Sun was relatively quiet. The mission provided valuable insights into solar physics and space weather phenomena. It continues to be a significant source of data for understanding solar activity and its impact on the Earth.

InOMN is usually held in the fall, when the Moon is around first quarter. Fall in the Northern Hemisphere is generally a good time for InOMN, because of school schedules and the weather, and a first quarter Moon is visible in the afternoon and evening, a convenient time for most hosts and participants. Furthermore, the best observing is typically along the dusk/dawn terminator, where shadows are the longest, not at full Moon. The InOMN team creates a new Moon map each year showing the exact phase it will be on InOMN, and highlighting a few features of interest with high-resolution images and captions. While hosts are encouraged to hold InOMN events on the announced date, we understand that this isn’t always possible—inOMN materials are editable so that hosts can change the date and add the location of their events.

The InOMN Coordinating Committee is led by NASA’s Lunar Reconnaissance Orbiter Education and Communications Team, with representatives from NASA’s Solar System Exploration Research Virtual Institute, the Lunar and Planetary Institute, the Planetary Science Institute, the Astronomical Society of the Pacific, and CosmoQuest. Our partners include the Science Festival Alliance and Google Lunar X Prize. To learn more about International Observe the Moon Night, register your InOMN event, and access InOMN resources, visit observethemoonight.org.

Moon viewing at Seagrave Memorial Observatory (credit: Jim Hendrickson, Seagrave Memorial Observatory, Rhode Island, 2015)

The Minnesota Astronomical Society was founded in 1950 to promote public interest in astronomy, to provide opportunities for the exchange of information and ideas among amateur astronomers, and to carry on other activities of a similar nature. The society consists of more than 200 members living in Minnesota and adjacent midwestern states. It has an active chapter in St. Paul and publishes a newsletter, Star Paths. The society also runs a successful radio observatory and operates a planetarium and observatory in St. Paul. The society’s annual meeting is held in St. Paul, and its newsletter is distributed to members around the world. The society has been instrumental in promoting astronomy education and outreach in the region. It has been a leader in promoting the importance of astronomy education, and it has been involved in many successful public outreach programs. The society has been a leader in promoting the importance of astronomy education, and it has been involved in many successful public outreach programs. The society has been a leader in promoting the importance of astronomy education, and it has been involved in many successful public outreach programs.
Editor’s Note: Congratulations to all these esteemed amateur astronomers who have achieved these awards, as illustrated by the Hubble image. If you have questions about an award, please contact the corresponding Observing Program chair. Their contact information can be found on the Observing Program website at www.astroleague.org/observing. If further assistance is required, please contact the corresponding Observing Program coordinators.

Advanced Binocular Double Star Observing Program
No. 11, Dick Francis, Neville Public Museum Astronomy Club, Member-at-Large; No. 13, Dick Francis, Northern Virginia Astronomical Society; No. 17, John O. "Sandy" Sapers, Member-at-Large, No. 14, George J. Roberson, Member-at-Large.

Arg Peculiar Galaxies Northern Observing Program

Asterism Observing Program
No. 32, Vincent "Bud" Pendergraft, Member-at-Large; No. 33, Nina Chevalier, San Antonio League of Sidewalk Astronomers.

Binocular Double Star Observing Program
No. 96, Robert Pit, Birmingham Astronomical Society, No. 97, Michael D. Douglas, Twin City Amateur Astronomers.

Binocular Messier Observing Program

Deep Sky Binocular Observing Program
No. 175, Cris Wagner, Shepway-Boss helicopter; No. 176, V. Michael Parent, Member-at-Large; No. 177, Michael Overaker, Star City Astronomy Network, No. 178, Robert Bournique, Member-at-Large.

Earth Orbiting Satellite Observing Program (EOSOC)
No. 94, Mike Hotaling, Saginaw, Michigan, Space Aliens, No. 95, Michael D. Douglas, Member-at-Large; No. 96, David M. Douglass, Imaging, East Valley Astronomical Society, No. 97, John R. "Sean" Baillie, Member-at-Large; No. 98, Roy R. Troxel, Member-at-Large.

Herschel II Observing Program
No. 2719, John Richard-Laming, Member-at-Large; No. 2720, William K. Kowalczyk, Member-at-Large, No. 2721, Hector Richards, Member-at-Large; No. 2722, Jack Mellott, Honorary, Member-at-Large; No. 2723, James C. Sanders, Honorary, Member-at-Large; No. 2724, Steve Coltrin, Regular, Member-at-Large; No. 2725, Bryan Harkage, Member-at-Large.

Messier Observing Program
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Deep Sky Binocular Observing Program
No. 175, Cris Wagner, Shepway-Boss helicopter; No. 176, V. Michael Parent, Member-at-Large; No. 177, Michael Overaker, Star City Astronomy Network, No. 178, Robert Bournique, Member-at-Large.

Herschel II Observing Program
No. 571, Paul Harrington, Member-at-Large; No. 572, Dan Thomas, Atlanta Astronomy Club, No. 573, Forest Holly, Tucson Amateur Astronomical Society; No. 574, Mark Bailey, Member-at-Large; No. 575, Marilyn Perry, Member-at-Large; No. 576, Mark Jones, Saint Louis Astronomical Society, No. 577, Jim Forden, Member-at-Large; No. 578, Larry Elson, Member-at-Large; No. 579, Paul Sanders, Kansas City Astronomical Observers; No. 580, Dee Friese, Atlantic Astronomical Society; No. 581, Steve Burdett, Member-at-Large.

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July 8–10
Conner Prairie Star Party
Conner Prairie, Fishers, Indiana
www.connerprairie.org/starparty
July 8–10
Green Bank Star Party
Green Bank, West Virginia
www.gbfoundation.org
July 8–10
Hobbie Shop Star Party
Jacksonville, Florida
www.hobbie.com
July 8–10
John conservation Society of North Carolina Star Party
Green Mountain, North Carolina
www.jconserv.org
July 8–10
Library of Congress Star Party
Washington, D.C.
www.loc.gov
July 8–10
New Mexico Star Party
Santa Fe, New Mexico
www.nmstarparty.com
July 8–10
Ohio Valley Star Party
Cincinnati, Ohio
www.ohiovalleystarparty.com
July 8–10
Prairie Skies Star Party
Wisconsin Observers Weekend
July 6–9
Rocky Mountain Star Stare 2016
Gardner, Colorado
www.rms2016.org
July 6–9
Silverton Astronomy Club of Phoenix
Astronomy Association
2016 Grand Canyon Star Party
June 4–11
St Louis Astronomical Society of Missouri
St Louis, Missouri
www.astromiss.org
July 6–9
StarQuest 2016
Frosty Acres Ranch, Adin, California
www.starquest2016.org
July 6–9
The Great Wall of Stars
Morgantown, West Virginia
www.greatwallofstars.com
July 6–9
The Staff extends a heartfelt thank you.
www.prairieskies.org
July 6–9
To have your star party or event listed,
please send the details, including dates,
to: starparty@astroleague.org
July 6–9
Virginia Astronomical Society
2016 Bootleg Astronomy Star Party
June 3–5
July 6–9
Green Bank Star Quest
NRAO, Green Bank, West Virginia
www.gbfoundation.org
July 6–9
Moster House Star Party
Boston, Massachusetts
www.mosterhouse.com
July 6–9
Northern Wisconsin Star Party
Merrill, Wisconsin
www.nwsp.org
July 6–9
The League's online store is available at the website,
www.astroleague.org. Click on the link for the store on the top right of the home page. The online store includes the latest shipping cart technology and accepts credit cards. Shipping & handling (S&H) is calculated at checkout. Merchandise is also available by mail order, payable by check. Please select your items, add the applicable S&H fee, and mail your order to: Astronomical League Sales
9201 Ward Parkway, Suite 100
Kansas City, MO 64114
If you have questions about the merchandise, or discounts on bulk orders, please call the League office, 816-655-SKY, or email: leaguesales@astroleague.org.
Mid-East Region of the Astronomical League
MERAL ANNUAL MEETING
In conjunction with the Green Bank Star Quest
NRCS, Green Bank, West Virginia
Saturday, July 9, 2016
Nominations are open for some MERAL officer positions.
RPS Rear Prize for MERAL member attendance.
Here is your chance to give back to the hobby that has given you so much!
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The Astronomical League invites its members to submit astrophotography for publishing in the *Reflector*. When sending photos, please include a brief explanation telling us when and where the photo was taken, your club affiliation, what equipment was used, and any computer processing that was involved.

Comet US10 Catalina was discovered in October 2013 by the Catalina Sky Survey in Tucson, Arizona. Initially visible from the Southern Hemisphere, it made its way into northern morning twilight skies throughout December 2015. Reaching naked-eye visibility on November 15, it made its closest approach to Earth on January 17 at some 68 million miles away. This very speedy visitor (more than 100,000 miles per hour) will most likely slingshot out of our solar system in the future.

These two images were taken by Gregg Ruppel of the St. Louis (Missouri) Astronomical Society on December 2, when it was about 15° above the St. Louis horizon. The camera was an ST8300C, 18 x 180 seconds, and the telescope was a Takahashi FSQ-106. The upper image is a colored picture of the comet, while the lower image is a grayscale negative. Note that the negative shows additional detail as compared to the positive image.