DEEP SKY TREASURES

Presented by the Cincinnati Observatory Center and the Xavier University Center for Excellence in Education

2014

DEEP SKY TREASURES

Presented By:

CINCINNATI OBSERVATORY

XAVIER UNIVERSITY
CENTER FOR EXCELLENCE IN EDUCATION

The Cincinnati Observatory Center, Friends of the Observatory, and Xavier University present the 2014 Deep Sky Treasures Calendar. The twenty deep sky images included in this calendar showcase the magnificent photos of five of our talented astro-photographers: Eric Africa, Fred Calvert, Steve & Sue Rismiller, and Scott Gainey.

As the birthplace of American astronomy, the Cincinnati Observatory has a long history of providing an inspired vision of wonders of the cosmos. Our founder and first director, Ormsby MacKnight Mitchel, was a professor at the Cincinnati College in 1842. Mitchel's lectures on astronomy were so eloquent and enlightening that students invited family and friends to attend. This enthusiasm blossomed into a series of public lectures that culminated in the plan by Mitchel to build the nation's first significant astronomical observatory here in Cincinnati. The tradition of seeking and sharing celestial awareness, begun 172 years ago by Mitchel and the forward-thinking citizens of Cincinnati, is alive and thriving at the Observatory today, with the same passion to learn and teach about the mysteries of the universe.

Many scientific achievements have taken place at the Observatory, advancing the knowledge of the cosmos and other areas of study. The Observatory has a rich educational schedule with day and evening classes to reach students of all ages. The Cincinnati Observatory and a large number of dedicated volunteers support the educational and special programs at the Observatory, in schools and at many public locations. Our astronomy evening programs offer lectures and telescope viewing for the public, and a chance to hear the "WOW" as someone gets a first look at Saturn's rings, Jupiter and its moons, or some other larger-than-life wonder in the sky.

Our goal in this calendar is to display another level in the observing experience of amateur astronomers. With many hours of hard work, the five astro-imagers represented in this calendar have reached out and captured an essence of the magic out there for us to linger on. We can contemplate and marvel with a quiet smile at the extraordinary beauty created as the universe unfolds. Many of these images were taken in the greater Cincinnati area, using privately owned telescopes and imaging equipment.

Caution: Prolonged viewing of these images could result in unusual amounts of curiosity and uncontrollable urges to learn more about astronomy. For information on how to treat this condition, contact the Cincinnati Observatory Center at (513) 321-5186, or visit our website: www.cincinnatiobservatory.org.

"We show you the past for a better vision of the future!"

1842

Ormsby MacKnight Mitchel founded the Cincinnati Observatory.

11-1/4" Merz und Mahler Telescope

1843

John Quincy Adams laid the cornerstone of the first Observatory. The hill upon which it was erected was renamed Mt. Adams in his honor.

1873

The Observatory was relocated to Mt. Lookout. The new Observatory building was designed by Samuel Hannaford, who would later design Cincinnati's Music Hall.

1904

The Observatory acquired the 16" Alvan Clark & Sons Telescope, now located in the Herget Building of the COC campus.

1991

Friends Of The Observatory was established, offering benefits, activities and educational opportunites for aspiring astronomers and their families.

2014

In 1998, the Cincinnati Observatory Center was incorporated to assume control of the Observatory and now provides educational programs, lectures and other events of astronomical value.

For the most up to date activities information visit our website: www.cincinnatiobservatory.org

ASTRO-PHOTOGRAPHY ARTISTS

ERIC AFRICA

Eric has been interested in astronomy since he was a child, but he did not take up the hobby until the apparition of the spectacular comet Hyakutake in 1996. He ventured into astrophotography in 1997 when another bright comet, Hale-Bopp, made its appearance.

Eric started off photographing solar system objects, first with film then with digital cameras. That was followed in 2003 with digital photography of deep space objects using astronomy-specific digital cameras. This has been the medium that he has embraced since.

Eric's work has been featured in the following Ohio-area art exhibits:

The View from Dione (http://www.absolutearts.com/artsnews/2005/05/09/32988.html), Columbus, Ohio, May 2005.

Cluster at the Mockbee (http://steadystrain.com/clusterfaq/), Cincinnati, Ohio, July 2005.

The World at Night, Cincinnati, Ohio, October 2009.

Eric lives in West Chester. He images from his backyard or from a remote observatory in New Mexico. His work can be seen and he can be contacted through a website featuring his astrophotography, www.skiesbyafrica.com.

FRED CALVERT

Cold Spring Observatory

An aircraft mechanic, pilot and photographer, Fred became interested in astronomy and aviation during the era of the Mercury, Gemini and Apollo Space Programs, when he was nine years old. Starting in 2003, he spent three years building his own private observatory in Cold Spring, Kentucky where he does visual observing, astronomical research, hunts for supernovae and makes "pretty pictures" like the ones for this calendar.

Fred's images have appeared in Astronomy Magazine,

Sky & Telescope Magazine, international astronomy publications and numerous books on amateur astronomy.

Images for this year's calendar were taken at Cold Spring Observatory; Kitt Peak National Observatory; The Cincinnati Observatory Center and remotely using telescopes located in Nerpio, Spain & New South Wales Australia.

His images in the 2014 calendar are dedicated to his observing partners of fifteen years, his puppies Max and Samantha who both recently passed.

Fred lives in Northern Kentucky with his wife Ann.

Observatory Web Site: http://www.coldspringobservatory.org

STEVE & SUE RISMILLER

Sue and Steve both have enjoyed astronomy from an early age before they met. Steve's earliest recollections of astronomy include looking at the sky with his family and seeing those early satellites of Echo and Echo II. His grandfather's description of the passage of Comet Halley in 1910 inspired him to build his first telescope. Through the years, Steve has built many telescopes ranging in size from 3" to 20". In the 1980's, they designed and built their Starfield Observatory in northern Kentucky. Sue and Steve have traveled to observe five total Solar Eclipses. In 2006 & 2007 they retired and Steve continued observing and imaging the Sun with Hydrogen-Alpha filters. Steve and Sue were successful in observing and imaging the Transit of Venus in 2004 as well as 2012.

Steve enjoys imaging the Sun, moon, and planets. Many of his images have been published in the local media, TV, several books on solar observing, and on the internet.

You can see more of his work at: http://home.fuse.net/starfield

SCOTT GAINEY

In the small Indiana farm town where Scott grew up, the Milky Way galaxy and its numerous star clusters shone crisp and clear in the dark sky, with occasional meteor showers or Northern Lights as a special treat. Scott was 13 when he had his first view through a telescope: a friend showed him Saturn through a 2" refractor, and his passion for observational astronomy was born. At age 24 years, a night high in the mountains above Lake Tahoe, under the perfect dark sky sparkling with bright stars, he renewed his love of the night sky.

Now retired, Scott devotes much of his free time to volunteer work for the Cincinnati Observatory Center. Scott felt that the beautiful images produced by COC members deserved recognition and should be shared with the public. So began the Deep Sky Treasures Calendar series, published every two years as a tribute to the skill and hard work of our imagers, and to inspire the viewer with the magnificence and beauty of our universe.

2013 OCTOBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
September 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	November 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**1**	**2**	**3**	**4**	**5** *Star Gaze at Stonelick State Park**
6	**7** *Saturn 1.9° N. of Moon*	**8**	**9** *Mercury greatest elongation*	**10**	**11**	**12** *International Observe the Moon Night*
13	**14** *Mars 1.0° N. of Regulus* *Columbus Day*	**15** *Eid Al-Adha*	**16** *Venus 1.6° N. of Antares*	**17**	**18** *Harvest Moon*	**19**
20	**21** *Orionids Meteor Shower*	**22** *Orionids Meteor Shower*	**23**	**24**	**25**	**26** *Stargaze at Stonelick State Park**
27	**28**	**29**	**30**	**31** *Halloween*	*All events are Universal Time unless otherwise specified.* ** Stonelick events are weather dependent*	

M31
The Great Galaxy in Andromeda

Eric Africa

M31, the Andromeda Galaxy, is one of the showpiece objects of the night sky. Inspiring images of this majestic galaxy have graced many books on astronomy, including the first book I read on the subject, "The Universe" from the Time-Life Nature series.

It was referred to as the Andromeda Nebula until early in the 20th century, when astronomer Edwin Hubble measured its distance from us and established that the universe is populated with millions (estimated today at billions) of galaxies like our own Milky Way.

M31 is visible to the naked eye, though it is best seen at a dark site. This makes it the farthest object (almost 3 million light-years) visible without a telescope. Even from that distance, the galaxy appears to be six times the width of the Full Moon from our perspective!

This image was shot from a remote observatory in New Mexico with a 4" telescope (Takahashi FSQ-106) and astronomy CCD camera (SBIG STL-6303) for a total imaging time of more than 11 hours.

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2013 NOVEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			October 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	December 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**1** *Venus greatest elongation* *Mercury in inferior conjunction*	**2** *Stargaze at Stonelick State Park** *Spica 0.8° S. of Moon*
3 *Daylight Savings Time Ends* *Total Eclipse of Sun*	**4** *Al Hijira* *Taurids Meteor Shower*	**5** *Taurids Meteor Shower*	**6** *Saturn in conjunction with Sun*	**7**	**8**	**9** *Comet and Meteor Night*
10	**11** *Veterans Day*	**12**	**13**	**14**	**15**	**16** *Leonids Meteor Shower*
17 *Leonids Meteor Shower*	**18** *Mercury greatest elongation*	**19**	**20**	**21**	**22**	**23** *Watch for Comet Ison*
24	**25**	**26** *Mercury 0.3° S. of Saturn*	**27** *Hanukkah (start)*	**28** *Comet Ison closest approach to the Sun* *Thanksgiving*	**29** *Spica 0.9° S. of Moon*	**30** *Stargaze at Stonelick State Park**

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

Comet Machholz C/2004 Q2

Fred Calvert, Cold Spring Observatory

Comet Machholz is a long-period comet discovered by Donald Machholz on August 27, 2004.

It reached naked eye brightness in January 2005. Unusually for such a relatively bright comet, its perihelion was farther from the Sun than the Earth's. This image was taken in December 2004.

Comets are small icy Solar System bodies which, when close enough to the Sun, will display visible coma and tails. As of January 2011 there are a reported 4,185 known comets.

Comet nuclei are known to range from about 100 meters to more than 40 kilometers across. They are composed of rock, dust, water ice, and frozen gases such as carbon monoxide, carbon dioxide, methane and ammonia. Because of their low mass, comet nuclei do not become spherical under their own gravity, and thus have irregular shapes.

This image was taken at Kitt Peak National Observatory using a Televue (480mm f6.3) telescope, SBIG ST10XME CCD camera piggybacked to a Meade 16" LX200.

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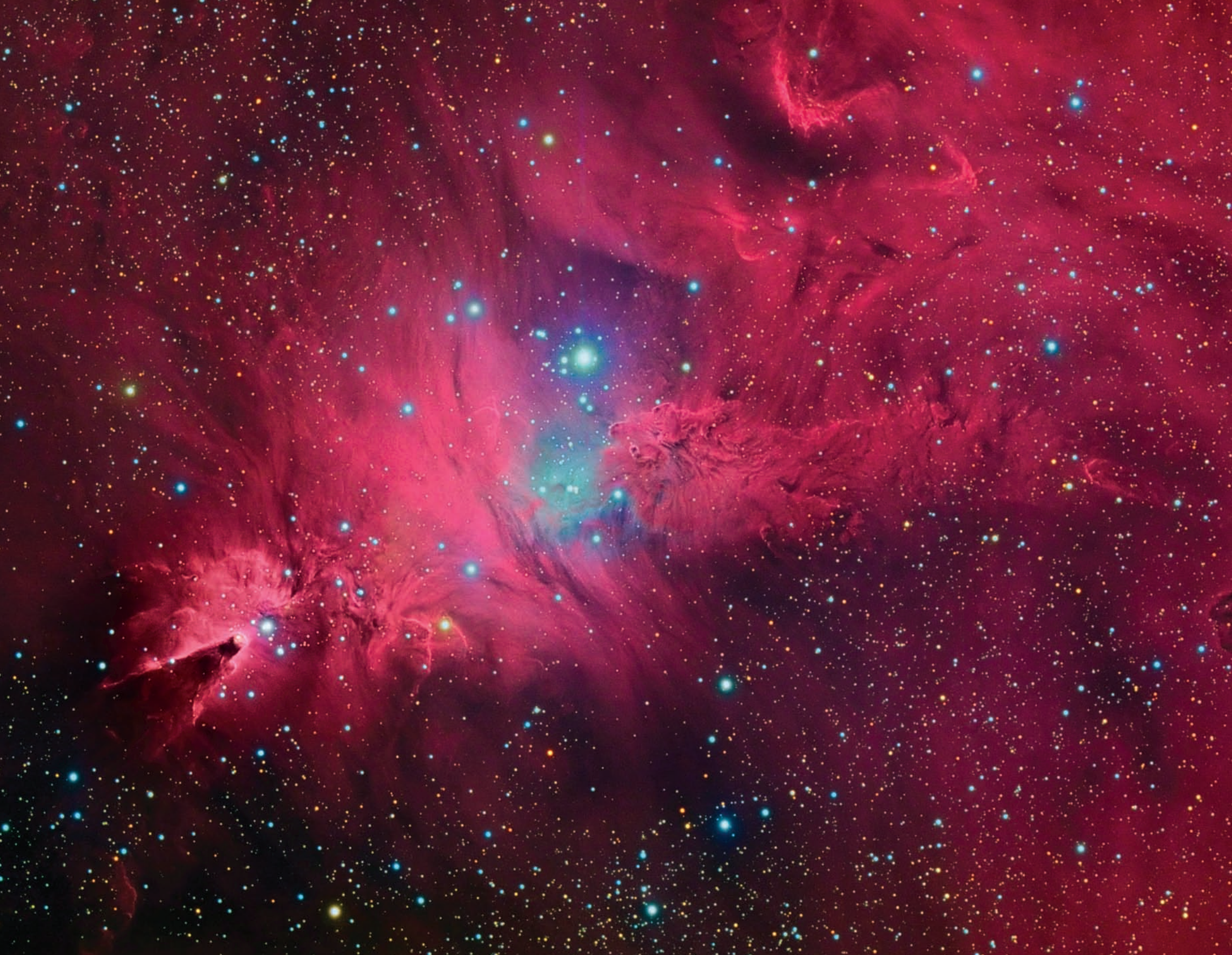

2013 DECEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 Saturn 1.3° N. of Moon	**2**	**3**	**4**	**5**	**6**	**7** Stargaze at Stonelick State Park*
8	**9**	**10**	**11**	**12**	**13**	**14** Geminids Meteor Shower
15 Luminaria Night	**16**	**17**	**18**	**19**	**20**	**21** Solstice
22	**23**	**24** Christmas Eve	**25** Christmas Day	**26**	**27** Spica 1.1° S. of Moon	**28** Stargaze at Stonelick State Park*
29 Saturn 0.9° N. of Moon Mercury in superior conjunction	**30**	**31** New Year's Eve				

November 2013

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3	4	5	6	7	8	9
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17	18	19	20	21	22	23
24	25	26	27	28	29	30

January 2014

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

The Cone, the Fox Fur and the Christmas Tree

Eric Africa

This group of objects lies in the constellation Monoceros (the Unicorn), and is about 2,600 light-years away. The Christmas Tree Cluster is the group of bright blue stars at the center of the image. The Fox Fur Nebula is the aptly-named emission/dark nebula near the blue reflection nebula in the center. And the appropriately-named Cone Nebula is the dark nebula towards the lower left.

This group of objects is catalogued as NGC 2264. The stars of the Christmas Tree comprise about 600 stars that are 1-4 million years old. The red emission nebulae are clouds of hydrogen gas ionized by the radiation from the hot young stars in the area. The blue reflection nebulae are dust clouds reflecting light from the nearby bright stars. And the dark nebulae are cold clouds of dust blocking light from the stars inside or behind them.

This view of the region was taken from the dark skies of New Mexico with a 5" diameter refracting telescope (Takahashi TOA-130F) and astronomy CCD camera (SBIG STL-6303) for a total imaging time of about 16 hours.

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2014 JANUARY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	December 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	February 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	**1** New Years Day	**2**	**3** Quadrantids Meteor Shower	**4** Stargaze at Stonelick State Park* Jupiter Night
5	**6**	**7**	**8**	**9**	**10**	**11** Jupiter Night
12	**13**	**14**	**15**	**16**	**17**	**18**
19	**20** Martin Luther King Day	**21**	**22**	**23**	**24**	**25** Stargaze at Stonelick State Park*
26	**27**	**28**	**29**	**30**	**31** Mercury greatest elongation E.	*All events are Universal Time unless otherwise specified.* ** Stonelick events are weather dependent*

M42 Orion Trapezium Cluster

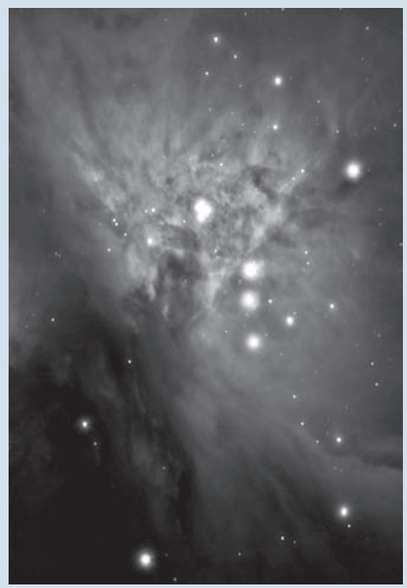
Fred Calvert & Scott Gainey, Cincinnati Observatory Center

The Constellation Orion and the Orion Nebula are among the most recognizable constellations and nebulae in the Northern skies. Just step outdoors on any crisp winter morning and the nebula can be seen naked eye as a gray patch just below Orion's belt.

The Trapezium Star Cluster is formed directly out of the nebula. The stars are positioned about 1.5 light-years from each other and are responsible for much of the illumination of the surrounding nebula. The cluster of 5 bright stars pictured here was first discovered by Galileo Galilei in 1617.

This image was taken at the Cincinnati Observatory Center using the 1904 Alvan Clark & Sons 16" Refractor Telescope. The luminance (B&W) image below was taken with a Santa Barbara Instrument Group (SBIG) ST-1602 CCD Camera that was donated to the Cincinnati Observatory by SBIG. The color data was obtained with an SBIG ST-2000XM CCD Camera and CFW-8 filter wheel using Red, Green and Blue Filters.

This image of M42 is the first deep space CCD color image published using the Cincinnati Observatory Center 1904 Alvan Clark & Sons 16" Refractor Telescope.



2014 FEBRUARY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				January 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	March 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 *Stargaze at Stonelick State Park**
2	3	4	5	6	7	8
9	10	11	12	13	14 *Valentine's Day*	15 *Venus greatest illuminated extent* *Galileo's 450th Birthday*
16	17 *President's Day*	18	19	20	21 *Saturn 0.3° N. of Moon*	22 *Stargaze at Stonelick State Park**
23	24	25	26 *Venus 0.4° S. of Moon*	27	28	

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

IC 2177
The Seagull Nebula

Eric Africa

IC 2177, or the Seagull Nebula, is a large nebula complex in the constellation Monoceros (the Unicorn). Technically, IC 2177 is the designation for just the seagull's "wings". The "head" has its own designation, NGC 2327 (aka Gum 1 or Sharpless 292, among others). Other objects are classified and designated within this field of view. Enough to show that this is a very rich section of sky!

The bulk of the objects in this image are emission nebulae, which are clouds of hydrogen gas ionized by the radiation from nearby hot young stars. Darker regions such as the "ribbon" near the seagull's "beak" are dark nebulae, which are clouds of dust blocking light from stars behind them.

Here's a challenge: can you find the dark nebula "bunny rabbit"?

This image was shot from a remote observatory in New Mexico with a 4" telescope (Takahashi FSQ-106) and astronomy CCD camera (SBIG STL-11000) for a total imaging time of almost 16 hours.

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2014 MARCH

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				February 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	April 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**1** *Stargaze at Stonelick State Park**
2	**3** *Uranus 2° S. of Moon*	**4**	**5**	**6**	**7**	**8**
9 *Daylight Saving Time begins*	**10**	**11**	**12**	**13**	**14** *Mercury greatest elongation W.*	**15**
16	**17** *St. Patrick's Day*	**18**	**19**	**20** *Equinox*	**21** *Saturn 0.2° N. of Moon*	**22** *Venus greatest elongation W.* *Mercury 1.2° S. of Neptune* *Lyrids Meteor Shower* *Stargaze at Stonelick State Park**
23 *Lyrids Meteor Shower* **30**	**24** **31**	**25**	**26**	**27**	**28**	**29** *Stargaze at Stonelick State Park**

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

M101
The Pinwheel Galaxy

Fred Calvert, Cold Spring Observatory

Messier 101, also known as the Pinwheel Galaxy, is a face-on spiral galaxy 21 million light-years away in the constellation Ursa Major and was first discovered by Pierre Méchain on March 27, 1781.

The Pinwheel is a large grand design spiral galaxy with a diameter of 170,000 light-years, seventy percent larger than our Milky Way.

A grand design spiral galaxy is a type of spiral galaxy with prominent and well-defined spiral arms that extend clearly around the galaxy through many radians and can be observed over a large fraction of the galaxy's radius. Approximately 10 percent of spiral galaxies are classified as the grand design type.

About 3000 extremely bright H II (red regions) can be seen in M101. H II regions usually accompany enormous clouds of high density molecular hydrogen gas contracting under their own gravitational force, where stars form. They are ionized (causing them to glow) by large numbers of extremely bright and hot young stars.

This image was taken remotely from Cold Spring Observatory using a Planewave 12.5"Corrected Dall-Kirkham Astrograph Telescope and SBIG 6303E CCD Camera located in Nerpio, Spain.

Presented By:

CINCINNATI OBSERVATORY

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2014 APRIL

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
March 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	May 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**1**	**2**	**3**	**4**	**5**
6	**7** ◐	**8** *Mars at opposition*	**9**	**10** *Marsapalooza*	**11** *Marsapalooza*	**12** *Venus 0.7° N. of Neptune* *Marsapalooza*
13	**14** *Mars closest approach*	**15** ○ *Total Lunar Eclipse* *First day of Passover*	**16**	**17** *Saturn 0.4° N. of Moon*	**18** *Good Friday*	**19**
20 *Easter*	**21**	**22** ◑ *Last Day of Passover*	**23**	**24**	**25**	**26** *Stargaze at Stonelick State Park** *Mercury in superior conjunction*
27 *Uranus 2° S. of Moon*	**28**	**29** ● *Annular Eclipse of Sun*	**30**		*All events are Universal Time unless otherwise specified.* ** Stonelick events are weather dependent*	

M13 The Hercules Globular Cluster

Fred Calvert, Cold Spring Observatory

Messier 13, The Hercules Globular Cluster, is a globular star cluster of about 300,000 stars in the constellation of Hercules and was discovered by Edmond Halley in 1714, and catalogued by Charles Messier on June 1, 1764.

M13 is 25,100 light-years away from Earth and is about 145 light-years in diameter.

In 1974 a radio message called The Arecibo message, which was written by Dr. Frank Drake of SETI fame and Carl Sagan, containing encoded information about the human race, DNA, atomic numbers, and Earth's position, was beamed to M13 from the Arecibo Radio Telescope, with the hope that it would be received by a potential extraterrestrial civilization. It will reach the cluster 25,000 years from now.

Unfortunately, the stars of M13, that the message was aimed at, will no longer be in that location when the message arrives because all objects in the universe are moving.

This image was taken at Cold Spring Observatory using a Meade LX200ACF Telescope and SBIG ST2000XM CCD camera, AO7 Adaptive Optics Unit, CFW-8 Color Filter Wheel with clear, red, green and blue filters.

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2014 MAY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
All events are Universal Time unless otherwise specified. ** Stonelick events are weather dependent*		April 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 June 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**1**	**2**	**3** *Stargaze at Stonelick State Park**
4	**5** *Eta Aquarids Meteor Shower*	**6**	**7**	**8**	**9**	**10** *Saturnday* *Saturn at Opposition* *Astronomy Day*
11 *Mother's Day*	**12**	**13**	**14** *Saturn 0.6° N. of Moon*	**15**	**16**	**17**
18	**19**	**20**	**21**	**22**	**23**	**24** *Stargaze at Stonelick State Park** *Uranus 1.9° S. of Moon*
25 *Mercury greatest elongation E.*	**26** *Memorial Day*	**27** *Isra and Mi'raj*	**28**	**29**	**30**	**31** *Stargaze at Stonelick State Park**

M27
The Dumbbell Nebula

Fred Calvert, Cold Spring Observatory

Messier 27 (NGC 6853) is a typical planetary nebula and is located in the constellation Vulpecula (The Fox). It was the first planetary nebula ever discovered. On July 12, 1764, Charles Messier discovered this new and fascinating class of objects, and describes this one as an oval nebula without stars.

The distance is rather uncertain, but it is believed to be around 1200 light-years. Despite its class, the Dumbbell Nebula has nothing to do with planets. It consists of very rarefied gas that has been ejected from the hot central star (well visible on this photo), now in one of the last evolutionary stages. The gas atoms in the nebula are excited (heated) by the intense ultraviolet radiation from this star and emit strongly at specific wavelengths. The central star of M27 is quite bright at magnitude 13.5, and it is an extremely hot blueish subdwarf dwarf star.

Around 6 billion years from now our Sun might go through the same process, adding new materials to the universe for creation of new stars.

This image was taken using a 10 "Meade LX200ACF telescope and SBIG ST2000XM CCD Cameras with Sulfur II, Hydrogen Alpha and Oxygen III narrowband filters.

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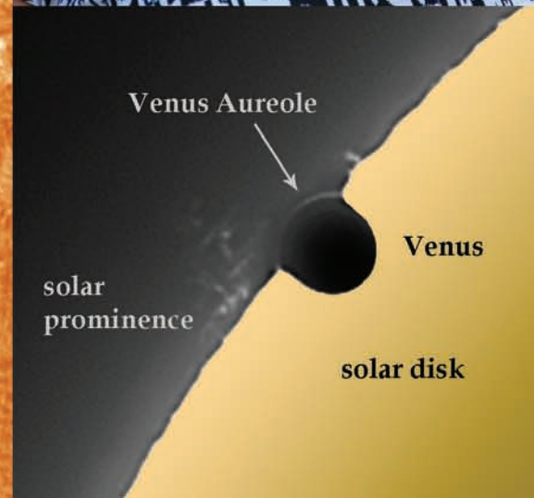
The Transit of Venus

June 5, 2012



2014 JUNE

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	**2**	**3**	**4**	**5**	**6**	**7** *Saturnday II*
8 *Mars 1.6° N. of Moon*	**9**	**10** *Saturn 0.6° N. of Moon*	**11**	**12**	**13**	**14** *Flag Day*
15 *Father's Day*	**16**	**17**	**18**	**19** *Mercury in inferior conjunction*	**20**	**21** *Solstice* *Stargaze at Stonelick State Park** *Uranus 1.6° S. of Moon*
22	**23**	**24** *Venus 1.3° N. of Moon*	**25**	**26**	**27**	**28** *Stargaze at Stonelick State Park** *Ramadan (start)*
29	**30**					

May 2014

S	M	T	W	T	F	S
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18	19	20	21	22	23	24
25	26	27	28	29	30	31

July 2014

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

The Transit of Venus

Sue and Steve Rismiller

June 5, 2012 was a partly cloudy day in Cincinnati. However, an event happened in the afternoon that will not occur again anywhere on earth until 2117! Venus transited or passed between the Earth and the Sun. Venus, nearly the same diameter as the Earth, was seen in silhouette against the Sun.

The large image, in H-alpha light, shows Venus as a black disk. Sunspots, dark thread-like filaments, and small white flares are seen below the planet. The top image shows Venus as it looked to most of the Earth's population through small filtered telescopes. Sue obtained this white light image an hour before sunset using an 80mm refractor. The bottom image shows a magnified view of Venus as it first contacted the Sun. In the overexposed frame, Venus appears as a dark notch on the Sun's yellow edge. The Aureole, or atmosphere of Venus, is seen as an arc just above the dark notch. The atmosphere of Venus has only been imaged by a few observers this way.

Warning: Observing the Sun with a telescope can be dangerous. Permanent eye damage and blindness will result from an improperly filtered telescope.

Presented By:

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2014 JULY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
June 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	August 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**1**	**2**	**3**	**4** *Independence Day* *Earth at aphelion*	**5**
6 *Mars 0.2° S. of Moon*	**7**	**8** *Saturn 0.4° N. of Moon*	**9**	**10**	**11**	**12** *Mercury greatest elongation W.* *Mars 1.4° N. of Spica*
13 *Sunday Sun-day Sundae*	**14**	**15**	**16**	**17**	**18** *Uranus 1.4° S. of Moon*	**19** *Stargaze at Stonelick State Park**
20	**21**	**22**	**23**	**24** *Laylat al-Qadr*	**25**	**26** *Stargaze at Stonelick State Park**
27	**28** *Delta Aquarids Meteor Shower* *Eid al Fitr*	**29** *Delta Aquarids Meteor Shower*	**30**	**31**	*All events are Universal Time unless otherwise specified.* ** Stonelick events are weather dependent*	

M16 The Eagle Nebula

Fred Calvert, Cold Spring Observatory

The Eagle Nebula (Messier 16) is a dazzling stellar nursery located 7000 light-years away near the constellation of Serpens - the Snake. The center section of this image is well known to the public as the "Pillars of Creation" image taken by Hubble Space Telescope. This wide field image shows that M16 is both an Emission Nebula and Open Star Cluster which spans some 315 light years across.

The cluster of young stars formed from the nebula and located above and to the right of the "Pillars of Creation" is known as NGC 6611. The "Pillars of Creation" light-year long columns of gas and dust are being simultaneously sculpted, illuminated and destroyed by the intense ultraviolet light from massive stars in NGC 6611. M16 is one of eight nebulas discovered by Swiss astronomer Jean-Philippe de Cheseaux. (1718-1751).

The image was taken using narrowband filters which are used to highlight areas of the nebula that are of scientific interest.

This image was taken at Cold Spring Observatory with a Astrotech 66 telescope piggy-backed on a Meade LX200ACF using an SBIG ST2000XM CCD Camera, CFW-8 color filter wheel with Sulfur II, Hydrogen Alpha and Oxygen III Filters. Total exposure time was 4 hours.

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2014 AUGUST

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			July 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 September 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**1**	**2**
3 *Mars 2° S. of Moon*	**4** *Saturn 0.07° N. of Moon*	**5**	**6**	**7**	**8**	**9** *Supermoon 2014*
10 *Moon at perigee*	**11**	**12** *Perseids Meteor Shower*	**13** *Perseids Meteor Shower*	**14** *Uranus 1.2° S. of Moon*	**15**	**16**
17	**18** *Venus 0.2° N. of Jupiter*	**19**	**20**	**21**	**22**	**23** *Stargaze at Stonelick State Park**
24 *Saturn 0.4°S. of Moon* **31**	**25**	**26**	**27**	**28**	**29** *Neptune at opposition*	**30** *Stargaze at Stonelick State Park**

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

M17 The Omega Nebula

Fred Calvert, Cold Spring Observatory

The Omega Nebula, also known as NGC 6618 is an H II region in the constellation Sagittarius. It was discovered by Philippe Loys de Chéseaux in 1745. Charles Messier catalogued it in 1764. It is located in the rich starfields of the Sagittarius area of the Milky Way.

The Omega Nebula is between 5,000 and 6,000 light-years from Earth and it spans some 15 light-years in diameter. The cloud of interstellar matter of which this nebula is a part is roughly 40 light-years in diameter and has a mass of 30,000 solar masses. The total mass of the Omega Nebula is an estimated 800 solar masses. It is considered one of the brightest and most massive star-forming regions of our galaxy.

An open cluster of 35 stars lies embedded in the nebulosity and cause the gases of the nebula to shine due to radiation from these hot, young stars; however the actual number of stars in the nebula is much higher, up to 800. It's also one of the youngest clusters known, with an age of just 1 million years.

This image was taken at Cold Spring Observatory using a Planewave 17" Corrected Dall-Kirkham Astrograph Telescope and a Finger Lake Instrumentation ProLine PL4710 CCD Camera located in Coonabarabran NSW, Australia.

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2014 SEPTEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
All events are Universal Time unless otherwise specified. ** Stonelick events are weather dependent*	**1** *Labor Day*	**2** ◐	**3**	**4**	**5** *Venus 0.8° N. of Regulus*	**6**
7	**8**	**9** ○	**10**	**11** *Uranus 1.1° S. of Moon*	**12**	**13** *ScopeOut*
14	**15**	**16** ◑	**17**	**18**	**19**	**20** *Stargaze at Stonelick State Park**
21 *Mercury 0.6° S. of Spica* *Mercury greatest elongation E.*	**22**	**23** *Equinox*	**24** ● *Rosh Hashanah (start)*	**25**	**26**	**27** *Stargaze at Stonelick State Park**
28 *Ceres 0.1° N. of Moon* *Vesta 0.5° S. of Moon* *Saturn 0.7° S. of Moon*	**29**	**30**				

August 2014

S	M	T	W	T	F	S
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17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

October 2014

S	M	T	W	T	F	S
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

NGC 281
The PacMan Nebula

Eric Africa

NGC 281 is a beautiful emission nebula in Cassiopeia. It is nicknamed the PacMan Nebula for its resemblance to the video game hero of the 1980's. Compared with other emission nebulae, NGC 281 is relatively small, about 35 arc-minutes across (slightly larger than the Full Moon).

This "Hubble Palette" image was imaged and processed in a manner similar to popular images from the Hubble space telescope: SII data mapped to Red, H-alpha data to Green, and OIII to Blue. The stars were given a natural color from RGB data.

Like many emission nebulae, NGC 281 is a busy star-forming region. Open cluster IC 1590 is associated with the nebula and is composed of stars born within it. The dark region forming the nebula's "mouth" is actually a foreground dark nebula blocking light from the nebula and stars behind it.

This image was shot from a remote observatory in New Mexico with a 5" telescope (Takahashi TOA-130F) and astronomy CCD camera (SBIG STL-6303) for a total imaging time of 37 hours.

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2014 OCTOBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	September 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	November 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**1**	**2**	**3** *Yom Kippur begins at sunset*	**4** *Astronomy Day Part II*
5 *Eid al-Adha*	**6**	**7** *Uranus at opposition*	**8** *Total Lunar Eclipse* *Draconids Meteor Shower*	**9** *Draconids Meteor Shower*	**10**	**11**
12	**13** *Columbus Day*	**14**	**15** *Last day of Sukkot* *Saturn 1.0° S. of Moon*	**16**	**17**	**18** *Stargaze at Stonelick State Park**
19	**20**	**21**	**22** *Orionids Meteor Shower*	**23** *Orionids Meteor Shower* *Partial Solar Eclipse*	**24**	**25** *Stargaze at Stonelick State Park** *Muharram / Islamic New Year*
26	**27**	**28**	**29**	**30**	**31** *Halloween*	*All events are Universal Time unless otherwise specified.* ** Stonelick events are weather dependent*

vdB 141
The Ghost Nebula

Eric Africa

Boo! In commemoration of Hallow's Eve 2014, I bring you not one, not two, but THREE GHOSTS!

Actually, vdB 141 is a reflection nebula in the constellation Cepheus. The "vdB" in the catalog number stands for "van den Bergh", named after Sidney van den Bergh who catalogued a list of nebulae in 1966. It earned the nickname "The Ghost Nebula" from the spooky appearance of what look like at least three human-like figures with arms raised, rising up from the top of the cloud structure.

No matter how we perceive them, these shapes are actually clouds of dust faintly reflecting the light from nearby stars. The dark region to the right of the "ghosts" is a dust cloud collapsing and likely forming a star, possibly even a binary star.

This image was shot from a remote observatory in New Mexico with a 5" telescope (Takahashi TOA-130F) and astronomy CCD camera (SBIG STL-6303) for a total imaging time of more than 13 hours.

Happy Halloween!

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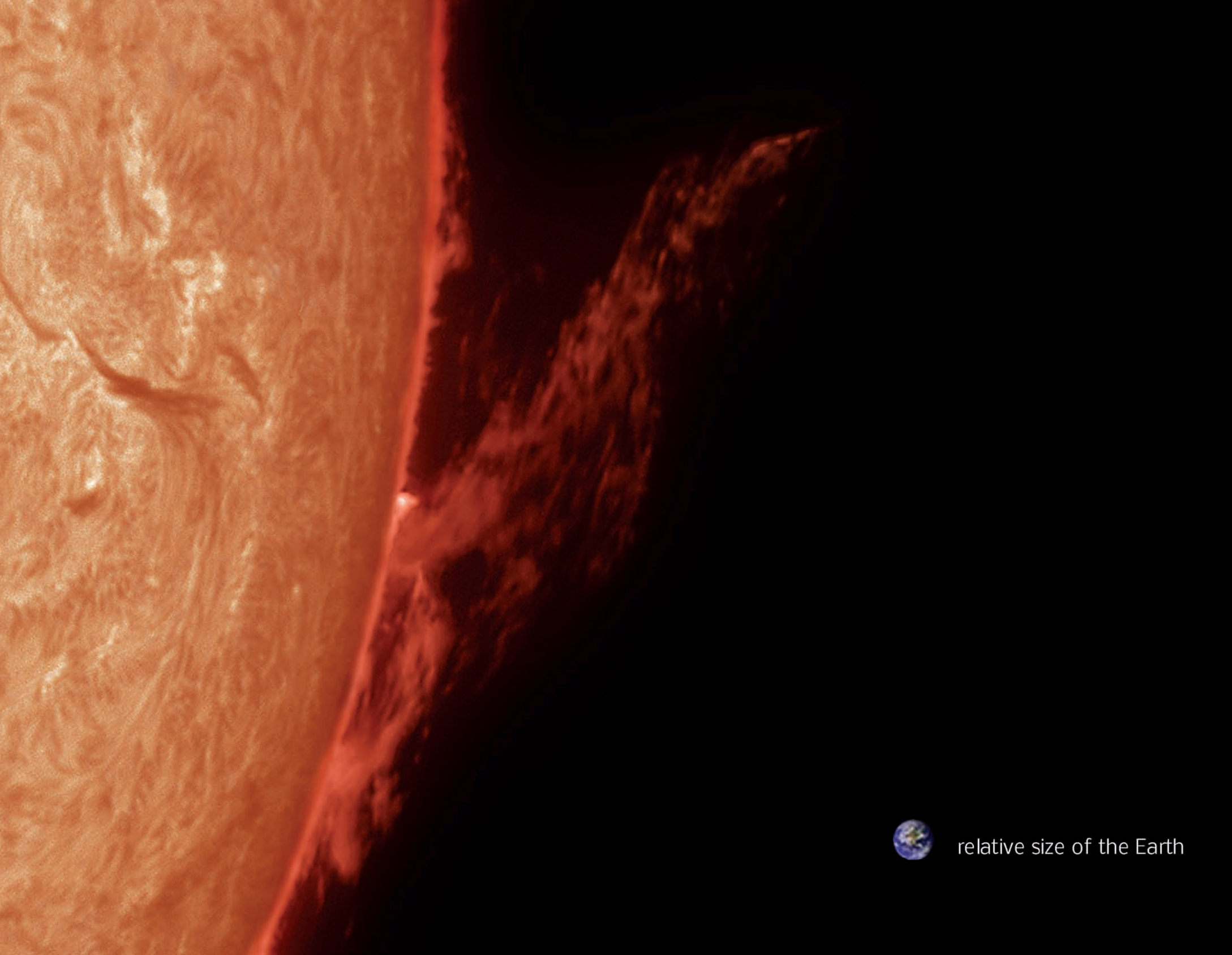
relative size of the Earth

2014 NOVEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				October 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	December 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**1** *Mercury greatest elongation W.*
2 *Daylight Savings Time Ends*	**3**	**4** *Uranus 1.3° S. of Moon* *Election Day*	**5** *Taurids Meteor Shower*	**6** *Taurids Meteor Shower*	**7**	**8**
9	**10**	**11** *Veterans Day*	**12**	**13**	**14**	**15** *Stargaze at Stonelick State Park**
16	**17** *Leonids Meteor Shower*	**18** *Leonids Meteor Shower*	**19**	**20**	**21**	**22** *Stargaze at Stonelick State Park**
23 / **30**	**24**	**25**	**26**	**27** *Thanksgiving Day*	**28**	**29**

All events are Universal Time unless otherwise specified.
** Stonelick events are weather dependent*

A Large Solar Prominence

Steve Rismiller

Prominences were first seen by people watching a total solar eclipse. They looked like red tongues of fire projecting from the blackened Sun. These prominences could only be seen for a few minutes during the total eclipse. Now, we can look at the Sun with a hydrogen-alpha filter and see these spectacular events nearly every day. These large clouds of gas, seen in profile, are suspended above the pink chromosphere. The Sun's magnetic field causes them to appear in many shapes looking like hedgerows, trees, loops, and fountains. Typically they have temperatures of 10,000 K. They may last for a few hours to many days and are almost always larger than our Earth. Some prominences explode in a violent surge moving 8,000 miles or more in less than a minute.

Warning: Observing the Sun with a telescope can be dangerous. Permanent eye damage and blindness will result from an improperly filtered telescope.

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2014 DECEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
All events are Universal Time unless otherwise specified. ** Stonelick events are weather dependent*	**1**	**2** *Uranus 1.2° S. of Moon*	**3**	**4**	**5**	**6** ○
7	**8**	**9**	**10**	**11**	**12**	**13** *Geminids Meteor Shower* *Stargaze at Stonelick State Park**
14 ◑ *Geminids Meteor Shower*	**15**	**16** *First day of Hanukkah*	**17**	**18**	**19** *Saturn 1.5° S. of Moon*	**20** *Stargaze at Stonelick State Park**
21 *Solstice*	**22** ● *Ursids Meteor Shower*	**23**	**24** *Christmas Eve* *Last Day of Hanukkah*	**25** *Christmas Day*	**26**	**27**
28 ◐	**29** *Uranus 1.0° S. of Moon*	**30**	**31** *New Year's Eve*			

November 2014

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

January 2015

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

The Horsehead Nebula

Eric Africa

Pictures of the Horsehead Nebula are among the standards of astronomy textbooks. This object is so familiar-looking and relatively easy to point a telescope to: it is near the most southeastern of the three belt stars of Orion (the "leftmost" star of Orion's belt from the perspective of a Northern Hemisphere-based observer). Unfortunately, it is one of the toughest objects to spot visually, as very dark skies and very large telescopes are needed to see it. Photographically though, it is a beauty.

The Horsehead Nebula is part of an immense cloud of emission, reflection and dark nebulae collectively known as the Orion Molecular Cloud Complex, which lies about 1,500 light-years away and is hundreds of light-years across. In addition to the Horsehead and Flame Nebulae pictured here, the complex also includes the spectacular Orion Nebula.

This image was shot from a remote observatory in New Mexico with a 5" telescope (Takahashi TOA-130F) and astronomy CCD camera (SBIG STL-6303) for a total imaging time of 12 hours.

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2015 JANUARY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		December 2014 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 February 2015 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	**1** *New Year's Day*	**2**	**3** *Quadrantids Meteor Shower*
4 *Quadrantids Meteor Shower*	**5**	**6**	**7**	**8**	**9**	**10**
11	**12**	**13**	**14**	**15**	**16**	**17** *Stargaze at Stonelick State Park**
18	**19** *Martin Luther King Day*	**20**	**21**	**22**	**23**	**24** *Stargaze at Stonelick State Park**
25	**26**	**27**	**28**	**29**	**30**	**31**

All events are Universal Time unless otherwise specified.

** Stonelick events are weather dependent*

2012 Annular Solar Eclipse

Eric Africa

Solar eclipses occur when the Moon crosses the face of the Sun as seen from the Earth's surface. The most spectacular of these are the total eclipses, when the Sun is completely blocked by the Moon. When the Moon is farther from the Earth during an eclipse, however, it will be unable to cover the entire disk of the Sun. The outer edges of the Sun will appear as a Ring of Fire around the Moon, giving us an Annular Eclipse.

Such an event happened on May 20, 2012, over a section of the Earth that included portions of North America. Because the Moon's shadow is smaller than the Earth's surface, solar eclipses are only visible over small sections of the Earth's surface, and totality (or annularity in this case) over an even narrower stretch. I travelled to the Magdalena Ridge Observatory in New Mexico to observe and photograph this event with a solar filtered telescope. This image represents part of the sequence that I was able to capture during the eclipse.

Equipment used was a Borg 76ED equipped with a Lunt 50mm solar filter on a Celestron CG-5 ASGT mount. Camera was an Imaging Source DMK 41AU02.

Warning: Observing the Sun with a telescope can be dangerous. Permanent eye damage and blindness will result from an improperly filtered telescope.

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The Andromeda Galaxy
E. Africa

Comet Machholz
F.Calvert

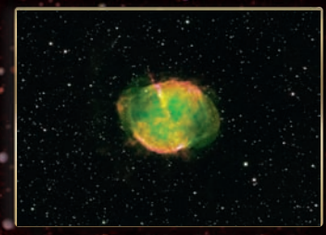
The Cone Nebula
E. Africa

Orion Trapezium Cluster
F.Calvert & S.Gainey

The Seagull Nebula
E. Africa

The Pinwheel Galaxy
F.Calvert

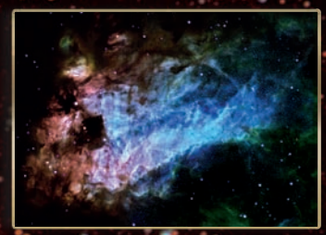
The Hercules Cluster
F.Calvert



The Dumbbell Nebula
F.Calvert

The Transit of Venus
S.Rismiller & S.Rismiller

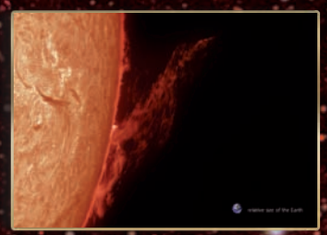
The Eagle Nebula
F.Calvert



The Omega Nebula
F.Calvert

Pacman Nebula
E. Africa

The Ghost Nebula
E. Africa



Solar Prominence
S.Rismiller

The Horsehead Nebula
E. Africa

Annular Solar Eclipse
E. Africa

Inspired by the fantastic astrophotography used in this calendar and the desire to share these cosmic wonders, the following individuals and organizations have come together to publish this calendar. The Cincinnati Observatory Center; Xavier University Center for Excellence in Education; Eric Africa, imager; Fred Calvert, imager; Graham Davis, production consultant, Scott Gainey, imager/project team leader; Trevor Griffith, composition/graphics; Michelle Lierl, proofer/editor; Craig Niemi, project team; Steve and Sue Rismiller, imagers; John Ventre, project team; Ket-Moy Printing Inc.

Covers: Erica Africa, Sh2-183.

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