# the Skyscraper

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AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND ⋆ 47 PEEPTOAD ROAD ⋆ NORTH SCITUATE, RHODE ISLAND 02857 ⋆ WWW.THESKYSCRAPERS.ORG


**In This Issue:**



## Saturday, January 7, 7:00pm
### at North Scituate Community Center

**Dye Hill Observatory – The Rubbermaid Wonder**

Conrad Cardano will talk about his decision and methods to take a Rubbermaid toolshed and turn it into a one-person observatory. We are all very familiar with the wooden observatories at Seagrave and the expensive ones advertised in Sky & Telescope. Much though had to go into this because it was never made to be an observatory. He will show how his modifications to the toolshed made it into a usable observatory, all for around $1200. There is nothing more convenient than having your telescope in a permanent place.

Conrad has been an amateur astronomer for almost 50 years and a Skyscrapers member for 30 years. As a boy growing up in Maryland, he had a roll-off roof observatory for his 6" reflector. He studied astronomy and physics at the University of Maryland in the 1970's, but became a computer programmer for the State of Rhode Island. Over the last ten years, he has gone way past the casual observing with his telescope and concentrated on areas like stellar spectroscopy with cameras and telescopes, solar observing with a Lunt Hydrogen-Alpha scope and CCD imaging.


## Skyscrapers Board Meetings
**Third Monday of the Month**
**All Members Welcome**

## Phases of the Moon

**First Quarter Moon**
January 5 19:47

**Full Wolf Moon**
January 12 11:34

**Last Quarter Moon**
January 19 22:13

**New Moon**
January 28 00:07

# President's Message

**by Steve Siok**

It is with a heavy heart that I must tell you that member Jeff Padell lost his son Sean this month to a sudden illness. Sean was a teacher and an EMT. He had recently joined Skyscrapers. Sean was an outdoorsman and enjoyed writing and drawing. Please join me in offering our deepest condolences.

For a couple of months the Board of Directors has been discussing the "Library Telescope Program". The idea was first introduced by Francine Jackson, who has been involved with a project at the Cumberland Library. There are also three loner telescopes at the Greenville Library. At the December Board meeting, Steve Hubbard invited John Root, from the Aldrich Astronomical Society in Worcester, to speak about the nearly 100 library telescope programs that he manages in Massachusetts. Aldrich is a sister society to Skyscrapers, having also been founded in 1932. John explained how the program, which was started by the New Hampshire Astronomical Society, is structured.

This program, that is being promoted by the Astronomical League, is currently in libraries around the United States. Local libraries that agree to be involved will be given one or more Orion StarBlast 4.5 inch Astro Reflectors. These off the shelf telescopes are purchased from Cornerstones in Science of Brunswick Maine as part of a bulk order. Minor adjustments are made to these telescopes by a local society to ensure that they are user-friendly to inexperienced observers. The current cost of this modified telescope is $375. Training is provided to the library staff and a video and instructions are available to those who check out the scope. The library takes care of everything relating to the lending and responsibility for the instrument. The astronomy group is called upon to make adjustments to the instruments from time to time and to be a resource.

I would like to issue a challenge to help get this program off the ground in Rhode Island. This is a new way for us to be involved in educational outreach, which is our prime goal. A program like this will start small and grow as the interest and support grows. However, this is still in the discussion phase. We need to find out if there is sufficient interest in the libraries in our state. I am asking you, as a Skyscraper member, to help out by approaching a library near your home to see if there is interest in participating to consider being an ambassador to that library if and when the program is started.


Individuals, companies and organizations provide the monies for each telescope and donor names are shown on each instrument. These donations are fully tax-deductible. Kathy & I are willing to donate to Skyscrapers the costs for two telescopes and will contact the North Kingstown and East Greenwich libraries to determine their interest.

I welcome your thoughts are comments about this new project. Please feel free to contact me at ssiok@cox.net.

I extend a Happy New Year to all and look forward to seeing each of you at our winter meetings at the Community Center.

Steve Siok - President, Skyscrapers

*Steve Siok is president of Skyscrapers, Inc. See more at http://www.theskyscrapers.org/steve-siok*

*The Skyscraper* is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

**Directions**
Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

**Submissions**
Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **January 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

**E-mail subscriptions**
To receive The Skyscraper by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

# Sean P. Padell

**1987-2016**

Sean P. Padell, age 29, passed away on Tuesday, December 13, 2016, surrounded by his loving family. Born in Norwood, Massachusetts on November 16, 1987, he was raised in East Walpole. As a young boy, Sean enjoyed traveling with his family to visit his grandparents in Tampa, Florida and loved visiting Disney World. Sean was active in the Cub Scouts and later the Boy Scouts of America and was always prepared for a camping trip to Sebago Lake with his family. He loved being outdoors and became a Youth Member of the Wrentham Sportsmans Club, where he enjoyed fishing and archery. While competing in a 3-D archery shoot at the club, he earned 1st Place in the Youth Division. Sean also enjoyed playing youth soccer in Walpole for many years as well as catching a round of golf with his Dad at the Foxboro Country Club.

Sean graduated from Walpole High School with the Class of 2005 and continued his studies at Massasoit Community College. Drawing on the archery skills that he learned as a young boy, Sean taught archery and was a range master at the Hale Reservation for many years. While working toward his undergraduate degree, Sean taught himself how to snowboard and spent a season working at the Blue Hills Ski Area. He later transferred to the University of Massachusetts at Boston, where in 2011 he earned his Bachelor's Degree, majoring in Biology. After graduating from UMass, he took an EMT Course in 2008, earning his Basic EMT License. Sean went to work for Fallon Ambulance in 2009, where he developed lifelong friendships. He achieved certification in Urban Search and Rescue.

Sean returned to UMass Boston, enrolling in a Master's Degree Program, to earn a degree in Education. He was a student teacher at Charlestown High School as a part of the program and was awarded his Masters this year. He loved teaching and served as a substitute teacher in the Boston Public Schools and as a STEM teacher at the Independent Institute in Brockton. Sean also served as a long term substitute at Walpole High School in the Spanish Department, teaching himself the language as he went.

Alongside his Dad, Sean began practicing target shooting and competitive cowboy shooting, under the alias Joe Cartwright, while his father was Ben Cartwright. He learned the guitar and keyboard (self-taught) and enjoyed writing and drawing as well as having an interest in Astronomy and was a recent member of the Rhode Island Astronomical Society.

Cherished son of Jeffrey M. and Susan C. (Carrigan) Padell.

Devoted brother of Joseph M. Padell and his wife Meg of Franklin and Daniel C. Padell of East Walpole.

Loving longtime boyfriend of Quadasha "Q" Petit of Walpole.

Also survived by many Aunts, Uncles, and Cousins.

## Friday, January 13: Dawn of the Space Age at the URI Planetarium


University of Rhode Island Planetarium
Kingston Campus
Upper College Road
Friday, January 13th, 2017, 6:00 P.M.

Contact: Francine Jackson 401-527-5558

In July, 1969, the first footprints on another world were made on our neighbor Moon. To honor this historic event, the University of Rhode Island Planetarium will show Dawn of the Space Age, taking us from the first successful Sputnik mission to the hoped-for expeditions to Mars. Often considered one of the greatest planetarium shows ever made, Dawn of the Space Age will follow both the successful and the failings in our attempts to leave the Earth for other worlds.

Also shown will be a short program on our increase in the use of lighting, plus a live presentation to the Skies over the URI campus.

Admission, to benefit the URI Planetarium Fund, is only $5.00.

The University of Rhode Island Planetarium is located on Upper College Road, on the Kingston campus, across from the Art Center.

The University of Rhode Island Planetarium is available for programming for schools and other organizations. For more information, please contact Francine Jackson at 401-527-5558.

# In Memory of Astronaut John Glenn

**by Francine Jackson**

As a baby boomer, one of the generation to be "a part of that time in history," it seems only fitting for me to write about one of the first, and last, of the original Mercury 7 astronauts, John Glenn.

Born in 1921, Glenn dropped out of college to serve his country during World War II and the Korean War, flying a total of 122 combat missions with the Army Air Corps. After the wars, he became one of the first seven designated astronauts, chosen to fly in totally uncharted territory, space.

Glenn was chosen to be the fourth astronaut in space, and the first American to circle the Earth. His orbits, it was learned, were not the stuff of just sitting there and enjoying the view: During the flight, the climate control mechanism stopped working properly, forcing Glenn to balance the temperature of his space suit against the interior craft's humidity; also, the automated steering failed. Glenn had to take control of Friendship 7, manually maneuvering the craft throughout his mission. In addition, it was said that as the Atlas rockets had a history of massive, catastrophic explosions, NASA was unsure it could bring Glenn to Earth safely, that it had reason to believe the capsule could disintegrate during reentry. However, he did make it back home, and it is said, once he stepped onto the USS Noa after touching down in the Atlantic Ocean, his first words were, "It was hot in there." His reward: a glass of iced tea, a call from then-President John F. Kennedy, and an eventual ticker-tape parade. (For those too young to know the meaning of a ticker-tape parade, ask one of us slightly older people.)


After his successful work at NASA, Glenn retired at age 42, realizing he was now too old to be chosen to travel to the Moon, but he continued to serve his country by representing his home state of Ohio for 24 years. However, apparently he could not forget his astronaut training, volunteering in 1998 at age 77 to become the oldest person ever to fly aboard the Space Shuttle, spending several days on the Discovery, to determine the effects of space on aging. That record still holds.

John Glenn was the last living member of the Mercury 7 astronauts, dying December 8th, 2016 at age 95. By then, it was assumed, like many heroes, that Glenn would live forever, but, it was not meant to be. However, the words spoken to him as he began his first trip into space will: "Godspeed, John Glenn." RIP.

*Francine Jackson is Skyscrapers Public Relations Spokesperson, writes the weekly newsletter for Ladd Observatory and serves as planetarian at the University of Rhode Island. See more at http://theskyscrapers.org/francine-jackson*

# The Sun, Moon & Planets in January

This table contains the ephemeris of the objects in the Solar System for each Saturday night in January. All times are in Eastern Standard (UTC -5) for Seagrave Observatory (41.845N, 71.590W).

| Object | Date | RA | Dec | Const | Mag | Size | Elong | Phase(%) | Dist(S) | Dist(E) | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sun** | **7** | 19 13.2 | -22 22.3 | Sgr | -26.8 | 1951.8 | - | - | - | 0.98 | 07:13 | 11:52 | 16:32 |
| | **14** | 19 43.5 | -21 18.3 | Sgr | -26.8 | 1951.3 | - | - | - | 0.98 | 07:11 | 11:55 | 16:40 |
| | **21** | 20 13.4 | -19 54.3 | Cap | -26.8 | 1950.2 | - | - | - | 0.98 | 07:07 | 11:57 | 16:48 |
| | **28** | 20 42.7 | -18 12.1 | Cap | -26.8 | 1948.7 | - | - | - | 0.98 | 07:02 | 11:59 | 16:57 |
| **Moon** | **7** | 2 05.9 | 7 35.6 | Psc | -12.2 | 1971.3 | 105° E | 63 | - | - | 12:43 | 19:38 | 02:42 |
| | **14** | 9 07.1 | 14 16.7 | Cnc | -12.7 | 1927.2 | 160° W | 97 | - | - | 19:25 | 02:22 | 09:10 |
| | **21** | 14 47.9 | -11 30.3 | Lib | -11.5 | 1751.9 | 78° W | 40 | - | - | 01:26 | 06:52 | 12:13 |
| | **28** | 20 37.2 | -16 35.7 | Cap | -4.1 | 1830.7 | 2° W | 0 | - | - | 07:16 | 12:32 | 17:52 |
| **Mercury** | **7** | 17 55.7 | -20 19.1 | Sgr | 1.0 | 8.8 | 18° W | 26 | 0.35 | 0.77 | 05:47 | 10:32 | 15:16 |
| | **14** | 18 03.5 | -21 12.5 | Sgr | 0.1 | 7.4 | 23° W | 50 | 0.39 | 0.91 | 05:33 | 10:14 | 14:56 |
| | **21** | 18 30.6 | -22 09.2 | Sgr | 0.0 | 6.5 | 24° W | 66 | 0.42 | 1.04 | 05:37 | 10:15 | 14:52 |
| | **28** | 19 07.2 | -22 30.3 | Sgr | -0.1 | 5.9 | 23° W | 77 | 0.45 | 1.15 | 05:48 | 10:24 | 15:01 |
| **Venus** | **7** | 22 24.7 | -11 00.7 | Aqr | -4.2 | 23.3 | 47° E | 54 | 0.72 | 0.73 | 09:40 | 15:04 | 20:28 |
| | **14** | 22 51.0 | -7 44.5 | Aqr | -4.3 | 25.1 | 47° E | 50 | 0.72 | 0.67 | 09:26 | 15:02 | 20:39 |
| | **21** | 23 15.3 | -4 24.5 | Aqr | -4.3 | 27.2 | 47° E | 46 | 0.72 | 0.62 | 09:10 | 14:58 | 20:47 |
| | **28** | 23 37.6 | -1 05.5 | Psc | -4.4 | 29.7 | 46° E | 42 | 0.72 | 0.57 | 08:53 | 14:53 | 20:54 |
| **Mars** | **7** | 23 02.4 | -6 59.4 | Aqr | 0.9 | 5.6 | 57° E | 91 | 1.41 | 1.68 | 10:02 | 15:40 | 21:19 |
| | **14** | 23 21.8 | -4 49.9 | Aqr | 1.0 | 5.4 | 55° E | 91 | 1.42 | 1.73 | 09:46 | 15:32 | 21:19 |
| | **21** | 23 41.0 | -2 39.1 | Psc | 1.1 | 5.3 | 53° E | 92 | 1.43 | 1.77 | 09:30 | 15:24 | 21:18 |
| | **28** | 0 00.0 | -0 28.2 | Psc | 1.1 | 5.1 | 52° E | 92 | 1.44 | 1.82 | 09:13 | 15:15 | 21:17 |
| **1 Ceres** | **7** | 1 37.6 | 2 32.3 | Cet | 8.7 | 0.5 | 97° E | 97 | 2.82 | 2.54 | 12:02 | 18:13 | 00:25 |
| | **14** | 1 41.6 | 3 26.9 | Psc | 8.7 | 0.5 | 91° E | 97 | 2.82 | 2.63 | 11:35 | 17:50 | 00:05 |
| | **21** | 1 46.3 | 4 24.3 | Psc | 8.8 | 0.5 | 85° E | 97 | 2.81 | 2.72 | 11:09 | 17:27 | 23:46 |
| | **28** | 1 51.9 | 5 23.9 | Psc | 8.9 | 0.4 | 80° E | 97 | 2.81 | 2.81 | 10:43 | 17:05 | 23:27 |
| **Jupiter** | **7** | 13 22.3 | -7 15.5 | Vir | -1.8 | 36.1 | 85° W | 99 | 5.46 | 5.45 | 00:24 | 06:00 | 11:35 |
| | **14** | 13 24.5 | -7 26.6 | Vir | -1.9 | 36.9 | 92° W | 99 | 5.46 | 5.34 | 23:59 | 05:34 | 11:09 |
| | **21** | 13 26.1 | -7 34.5 | Vir | -1.9 | 37.7 | 98° W | 99 | 5.46 | 5.22 | 23:33 | 05:08 | 10:43 |
| | **28** | 13 27.2 | -7 39.1 | Vir | -2.0 | 38.5 | 105° W | 99 | 5.46 | 5.11 | 23:07 | 04:42 | 10:16 |
| **Saturn** | **7** | 17 25.7 | -21 55.0 | Oph | 0.5 | 15.1 | 25° W | 100 | 10.05 | 10.93 | 05:24 | 10:02 | 14:41 |
| | **14** | 17 29.0 | -21 57.6 | Oph | 0.5 | 15.2 | 31° W | 100 | 10.05 | 10.88 | 05:00 | 09:38 | 14:16 |
| | **21** | 17 32.1 | -21 59.8 | Oph | 0.5 | 15.3 | 38° W | 100 | 10.05 | 10.81 | 04:36 | 09:14 | 13:52 |
| | **28** | 17 35.1 | -22 01.6 | Oph | 0.6 | 15.4 | 44° W | 100 | 10.05 | 10.73 | 04:11 | 08:49 | 13:27 |
| **Uranus** | **7** | 1 17.0 | 7 29.0 | Psc | 5.8 | 3.6 | 94° E | 100 | 19.94 | 19.85 | 11:23 | 17:52 | 00:21 |
| | **14** | 1 17.2 | 7 30.9 | Psc | 5.8 | 3.5 | 87° E | 100 | 19.94 | 19.97 | 10:56 | 17:25 | 23:54 |
| | **21** | 1 17.7 | 7 33.7 | Psc | 5.8 | 3.5 | 80° E | 100 | 19.94 | 20.09 | 10:28 | 16:58 | 23:27 |
| | **28** | 1 18.2 | 7 37.5 | Psc | 5.8 | 3.5 | 73° E | 100 | 19.94 | 20.21 | 10:01 | 16:31 | 23:00 |
| **Neptune** | **7** | 22 47.0 | -8 39.1 | Aqr | 7.9 | 2.2 | 53° E | 100 | 29.95 | 30.53 | 09:52 | 15:23 | 20:53 |
| | **14** | 22 47.7 | -8 34.8 | Aqr | 7.9 | 2.2 | 46° E | 100 | 29.95 | 30.63 | 09:25 | 14:56 | 20:27 |
| | **21** | 22 48.5 | -8 30.0 | Aqr | 8.0 | 2.2 | 39° E | 100 | 29.95 | 30.71 | 08:58 | 14:29 | 20:00 |
| | **28** | 22 49.3 | -8 24.8 | Aqr | 8.0 | 2.2 | 32° E | 100 | 29.95 | 30.78 | 08:31 | 14:02 | 19:34 |
| **Pluto** | **7** | 19 13.8 | -21 20.2 | Sgr | 14.3 | 0.2 | 1° E | 100 | 33.25 | 34.23 | 07:09 | 11:50 | 16:31 |
| | **14** | 19 14.8 | -21 19.0 | Sgr | 14.3 | 0.2 | 7° W | 100 | 33.25 | 34.23 | 06:43 | 11:23 | 16:04 |
| | **21** | 19 15.8 | -21 17.8 | Sgr | 14.3 | 0.2 | 14° W | 100 | 33.26 | 34.21 | 06:16 | 10:57 | 15:38 |
| | **28** | 19 16.8 | -21 16.6 | Sgr | 14.3 | 0.2 | 20° W | 100 | 33.26 | 34.18 | 05:49 | 10:30 | 15:11 |

# Astronomical Highlights of 2017 Including the Great American Total Solar Eclipse

by Dave Huestis

Ever since I became interested in astronomy in the early 1970s I was aware of a total solar eclipse that would cross the United States diagonally from Oregon to South Carolina. Well, as of January 1 that spectacular event will be a mere 233 days away on August 21. While totality will not be visible from southern New England, here in Rhode Island about 66% of the solar disk will be covered by the Moon.

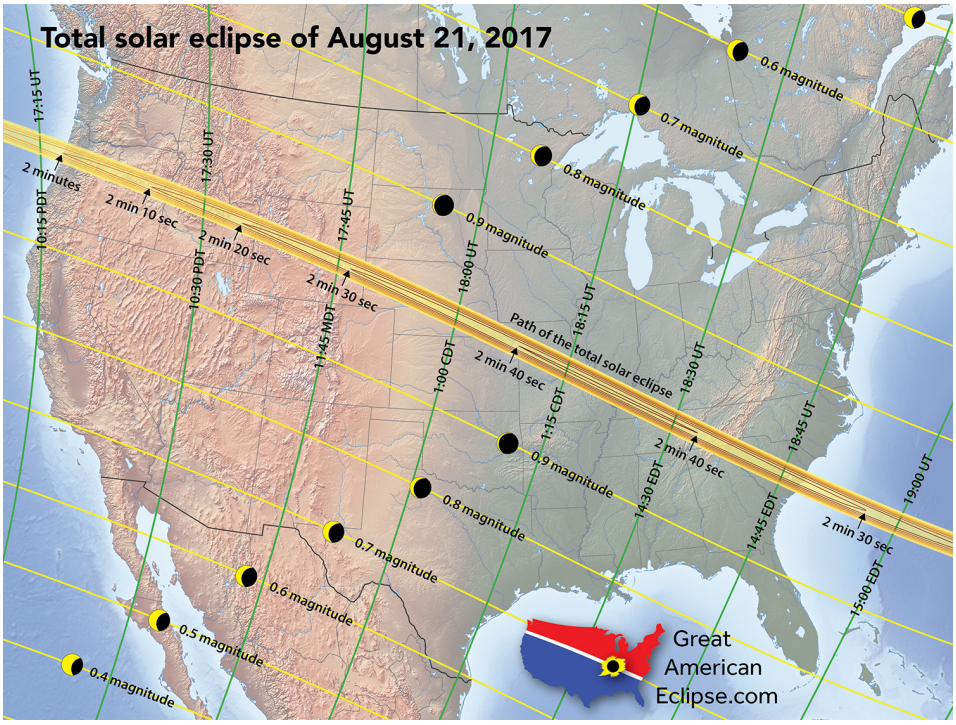
Fortunately, a day or two's drive will position you within the 65-mile wide path of totality. Flights to observing locations farther to the west and northwest could possibly be accomplished. However, regardless of what mode of transportation you choose, lodging anywhere near the path of totality could be non-existent or outrageously expensive. One hotel chain I contacted back in July 2015 was originally contemplating charging $1000 per night and requiring a three-night minimum!! They later settled for $899.

So if you haven't already booked lodging, you may not find anything within a 150 mile drive of the path of totality, or if you do find an establishment you may have to mortgage your house to finance it. Perhaps folks will not book lodging with such high rates and the prices may drop just prior to the event. I will write an extensive column about this Great American Total Solar Eclipse in my August column. Check out this interactive eclipse map that shows the entire path through the United States: http://eclipse.gsfc.nasa.gov/SEgoogle/SEgoogle2001/SE2017Aug21Tgoogle.html. You can zoom in on any location within the eclipse path to get an idea of how long totality will last, or determine how much of the solar disk will be covered by the Moon outside of the path of totality.

While the total solar eclipse is most definitely the highlight of 2017, there are many other astronomical happenings waiting to be observed. The following is a sampling of events to come.

On January 4 at 9:17 a.m. the Earth is at perihelion (closest to the Sun) for 2017 at 91,404,322 miles. This might seem counterintuitive, but the northern hemisphere is tilted away from the Sun at that time and we experience winter. On July 3 at 4:11 p.m. the Earth will be at aphelion (farthest from the Sun) at 94,505,901 miles. This three million mile plus difference in the Earth's elliptical orbit does not affect our global temperature.

The first major meteor shower of the year, called the Quadrantids, occurs during the early morning hours of January 3. No Moon will interfere. These blue shooting stars blaze across the sky at 25.5 miles per second. While 100 meteors per hour are possible, 60 or so is more realistic. Still, the Quadrantids are a very narrow stream of particles, yielding higher numbers for only about an hour or so. One year I called it quits because of the cold temperature and little meteor activity, learning a week later that soon after I retired for the morning the meteors poured out of the sky for a brief but impressive display. Since the peak is forecast during daylight hours for us on the east coast, I would suggest observing between 3:00 a.m. and dawn's early light.

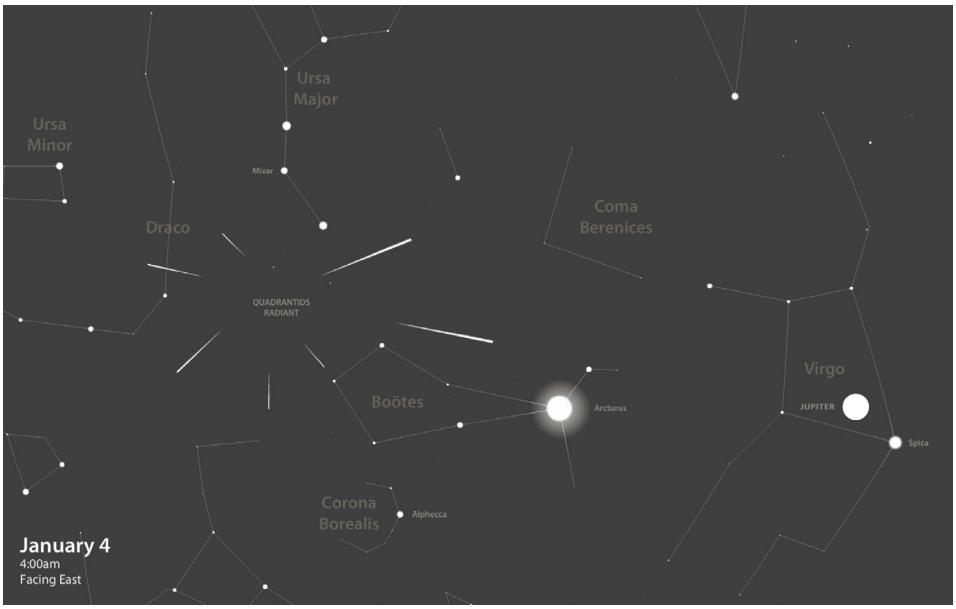



Venus will continue to be that bright beacon seen in the western sky after sunset as 2017 begins. On January 12, it will be at its highest position above the horizon. Telescopic observers should observe Venus as it runs through its phases. At the beginning of January Venus will be just more than half illuminated, looking like a waxing gibbous Moon. The phase will slowly decrease, eventually looking like a waxing crescent as the planet moves towards the horizon and its conjunction with the Sun.

During the early evening of February 11 there is an unremarkable penumbral eclipse

# Meteor Shower Prospects for 2017

| Month | Shower | Date | Moon Phase |
|---|---|---|---|
| January | Quadrantids | 3 | Waxing Crescent (First Qtr on 5th) |
| April | Lyrids | 22-23 | Waning Crescent |
| May | Eta Aquarids | 5-6 | Waxing Gibbous (First Qtr on 2nd) |
| July | Delta Aquarids | 27-29 | Waxing Crescent (First Qtr on 30th) |
| July | Capricornids | 29-30 | Waxing Crescent (First Qtr on 30th) |
| August | Perseids | 12-13 | Waning Gibbous (Last Qtr on 14th) |
| October | Orionids | 21-22 | Waxing Crescent |
| November | Leonids | 17-18 | New Moon |
| December | Geminids | 13-14 | Waning Crescent (Last Qtr on 10th) |




of the Moon. The Moon will slide deep into the Earth's lighter shadow, but will just miss the Earth's dark umbral shadow. The top portion of the Moon's disk will look slightly dusky.

Amateur astronomers will be observing Jupiter and Saturn between midnight and dawn during the first few months of the year. By mid March giant Jupiter will be visible high in the eastern sky around 10:00 p.m. On April 7 Jupiter will be at opposition, rising at sunset. Saturn will likewise be an early morning telescopic target at the beginning of 2017. Saturn will rise before midnight during May, and will reach opposition on June 15. Stargazers will be fortunate to have two bright planets to observe for a couple of months. Jupiter will be visible until late July or early August, depending upon one's horizon. Saturn will be visible through until mid to late October, again depending upon one's horizon. In October Saturn's rings will be at their maximum tilt towards the Earth—27 degrees. We've been looking at the north face of Saturn's rings since the Earth passed above the ring plane in 2009.

Another beautiful celestial sight will be a very slender waning crescent Moon to the lower right of Venus before sunrise on May 22. Notice the earthshine that illuminates the lunar surface not receiving sunlight. Why does this phenomenon occur? If you were on the Moon looking back at the Earth, the Earth would be in a waxing gibbous phase, just before Full Earth (the phase of the Earth is always the opposite phase of the Moon).

On June 9 we experience a Minimoon, the smallest Full Moon of 2017. This scenario is in contrast to a Supermoon! And like a Supermoon, this mini version would not even be recognized as such by the majority of folks without the media hype.

For a nice view of two planets, look towards the eastern sky before sunrise on November 13. Less than ten degrees above the horizon will be a conjunction of brilliant Venus and Jupiter. The pair will be separated by less than one full moon diameter. Get out your cameras and snap an image of this beautiful event.

Furthermore, like 2016, there are multiple occultations of Taurus' bright star Aldebaran. They occur on September 12, November 5, and December 30. I will bring the details of these events to your attention in their respective monthly columns.

And our solar system's closest planet to the Sun, Mercury, will become visible several times in the evening after sunset and also in the morning sky before sunrise throughout the year.

So as you see, 2017 has a lot to offer the amateur and casual stargazer alike. Let's hope the majority of these celestial events elicit the full cooperation of Mother Nature.

In conclusion, please remember, weather permitting, the local observatories remain open during the winter months to share beautiful views of the heavens. Snow or ice can force closures, so please check the respective websites for any cancellation notices and observing schedules before venturing out for a visit. Seagrave Memorial Observatory in North Scituate is open every clear Saturday night. Ladd Observatory (http://www.brown.edu/Departments/Physics/Ladd/) in Providence is open every Tuesday night. The Margaret M. Jacoby Observatory at the CCRI Knight Campus in Warwick (http://www.ccri.edu/physics/observatory.htm) is open every clear Wednesday night. Frosty Drew Observatory (http://www.frostydrew.org/) in Charlestown is open every clear Friday night.

Some of the topics highlighted in this column may be covered in depth as an event date approaches.

Please clip and save the chart showing the observing prospects for the 2017 meteor showers. These displays of shooting stars only require your eyes, dark skies, and patience to enjoy.

Keep your eyes to the skies for 2017 and always.

Happy New Year!

*Dave Huestis is Skyscrapers Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at http://theskyscrapers.org/dave-huestis*

# Big Science in Small Packages

By Marcus Woo

About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It's one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one, dubbed MinXSS ("minks") is NASA's first CubeSat with a bona fide science mission.

Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares – eruptions on the sun that produce dramatic bursts of energy and radiation.

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don't have the capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: "It's helping address this very long-term problem that's been around for 50 years: how is the corona heated to be so hot."

The $1 million original mission has been gathering observations since June.

The satellite will likely burn up in Earth's atmosphere in March. But the researchers have built a second one slated for launch in 2017. MinXSS-2 will watch long-term solar activity—related to the sun's 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.

If you'd like to teach kids about where the sun's energy comes from, please visit the NASA Space Place: http://spaceplace.nasa.gov/sun-heat/

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*This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!*

Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat, which observes soft X-rays from the sun—such X-rays can disturb the ionosphere and thereby hamper radio and GPS signals. (The second CubeSat is CADRE — short for CubeSat investigating Atmospheric Density Response to Extreme driving - built by the University of Michigan and funded by the National Science Foundation.) Credit: ESA/NASA

# December Reports

## Skyscraper Board of Directors meeting. December 19,2016

In attendance: Kathy and Steve Siok, Ian Dell'Antonio, Francine Jackson, Bob Horton, Jim Crawford, Tracy Prell, Jim Hendrickson, Steve Hubbard. (Guests John Root and Russ Chaplis to discuss the Library Telescope Project).

**Board of Trustees:** The trustees have about $1000 available in their budget. Jim Crawford suggested 3" dovetails and weights for balancing the 12" telescope. 2 donated camera adapters are working well. There is one for an iphone and one for a point and shoot type camera. These are good for visitors to have keepsakes of their visits.

Further suggestions were for camera adapters for DSLR and CCD cameras for the 16" and 12" scopes.

An additional suggestion concerned the purchase of a 10 camera security system. Bob Napier saw a system at B.J.'s for $399. This would be a hard wired system. Jim Crawford has a roll of about 1000 feet of CAT 6 wire that we will donate to this project.

Jim further mentioned that he would like to look at a couple of inexpensive laptops to run the telescopes during the next budget cycle.

**Upcoming Meeting Speaker:** Ian has been in contact with Dava Sobel who has just published a new book entitled "The Glass Universe." Dava will be in Cambridge for an upcoming history colloquium and we are trying to piggyback that onto one of our meetings. The Community Center would not be available for the time frame needed. An option could be at Ladd Observatory. This would be limited in terms of the number of attendees, perhaps 35 to 45. This would be a separate event from one of our regular meetings and would be a "treat" for our members.

**Library Telescope Project:** John Root presented an overview of this. He is the coordinator of the program for the Aldrich Astronomy Club in Worcester Mass. There was a separate handout with an overview of how this all works. Generally he works to have funding from outside sources for the telescopes which have been placed in a number of different libraries in Mass.

It was suggested that there be a specific person designated as a point of contact to coordinate the program. Each telescope is an Orion Starblast with specific modifications made to it to allow for the fact that there would be occasional rough handling by people not familiar with how telescopes work.

The telescopes all come from Cornerstones of Science in Brunswick Maine. It was suggested that we get in touch with the New Hampshire Astronomical Society as they originated the program in our area. With each telescope, John has a unique dedication plaque made up specifically describing how a telescope was funded.

Training and delivery receipts are vital documentation with each scope. There is


**Dick Parker & Al Hall receive recognition for their accomplishment of completing 3/4 scale replica Alvan Clark telescopes at the December 10 meeting.**

Cash Flow YTD 2016
4/1/2016 through 12/31/2016

| Category | 4/1/2016-12/31/2016 |
|---|---|
| **INFLOWS** | |
| AstroAssembly | |
| Banquet | 1,225.00 |
| Cash Bank | 460.00 |
| Doantions | 1,000.00 |
| Grill | 288.00 |
| Raffle | 529.00 |
| Registration | 1,215.00 |
| TOTAL AstroAssembly | 4,717.00 |
| Donation | |
| Donations Earmarked - In | 1,378.00 |
| Donations Earmarked - Out | -1,378.00 |
| Misc Donation | 1,178.90 |
| TOTAL Donation | 1,178.90 |
| Dues | |
| Family | 540.00 |
| Junior | 15.00 |
| Regular | 1,100.00 |
| Senior | 645.00 |
| TOTAL Dues | 2,300.00 |
| Misc Income | |
| Interest Inc | 3.05 |
| TOTAL Misc Income | 3.05 |
| Star Party Donations | 70.00 |
| **TOTAL INFLOWS** | **8,268.95** |
| **OUTFLOWS** | |
| Astro Assem Exp | |
| Banquet | |
| Caterer | 641.25 |
| Reception | 38.45 |
| TOTAL Banquet | 679.70 |
| Cash Bank | 460.00 |
| Grill | 167.05 |
| Misc | 20.27 |
| Refreshments | |
| Friday PM | 17.28 |
| TOTAL Refreshments | 17.28 |
| Speaker Fee | 533.40 |
| TOTAL Astro Assem Exp | 1,877.70 |
| Corporation, State Fee | 125.00 |
| Misc Expenses | 96.68 |
| PayPal Fee | 43.51 |
| Postage and Delivery | 87.84 |
| Property Insurance | 2,457.00 |
| Refreshment Expense | 61.45 |
| Trustee Expense | 64.19 |
| Capital Equipment | 706.50 |
| Donations Earmarked | -1,378.00 |
| Property Maintenance | 802.29 |
| TOTAL Trustee Expense | 194.98 |
| Utilities | |
| Electric | 130.32 |
| Internet | 629.91 |
| Porta-John | 792.00 |
| Propane | 80.25 |
| TOTAL Utilities | 1,632.48 |
| **TOTAL OUTFLOWS** | **6,576.64** |
| **OVERALL TOTAL** | **1,692.31** |

a 1 hour training power point presentation that is done.

A "Check In / Check Out" tool is provided with each scope as well as a spiral bound guide.

The cost per each fully modified telescope is currently $375.

Steve Siok will send a note out to the membership via a presidential announcement about the program and ask for any people interested in spearheading the program.

**Visitor Groups / on site and off:** There was further discussion about this. We need a policy and need to have it posted on our website for people to refer to.

There was more discussion about what, how much and if to charge for star parties done for groups. There is currently a form on our website to request a star party. We need to evaluate this to make possible changes.

The past Saturday, a group of scouts was supposedly scheduled to visit. No one knew of this. The scout leader was told that the only way to contact us was by email. We need a policy as regards cancellations. We need a person / contact that people can reach.

It was suggested that since we now have FIOS at the Observatory that we could have a phone there that could then link automatically with whoever is designated as the coordinator.

Further discussion all of this is still ongoing.

## Open Cluster in Perseus

# NGC 1545

**by Las Vegas Astronomical Society**

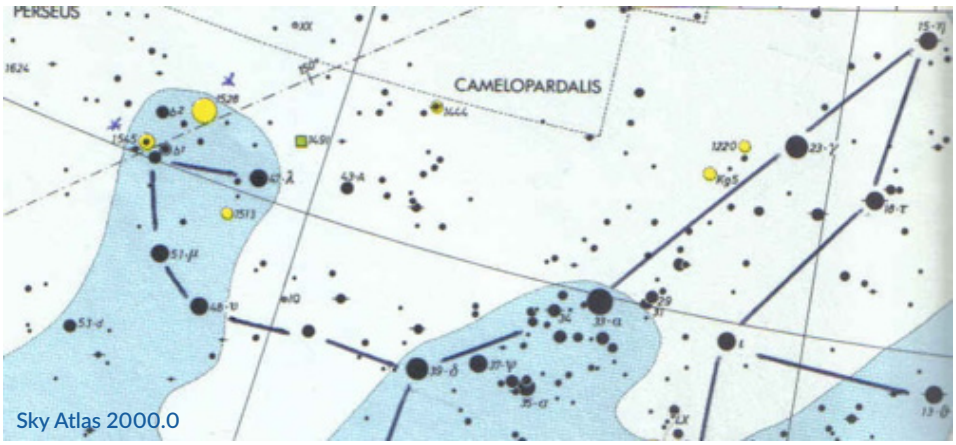
NGC 1528 (top right) and NGC 1545 (bottom left). www.alsonwongastro.com

In the northeast corner of Perseus is the beautiful open cluster NGC 1528. This is not the January, 2017, Observer's Challenge object, but it's worth starting here before moving 1.5 degrees southeastward to our real target, the open cluster NGC 1545 Both clusters shine at magnitude 6.2, with NGC 1528 being larger and richer.

NGC 1545 lies a few arcminutes east of the 5th magnitude star b Persei, and is dominated by the wide triple star South 445 (observed and catalogued by the British astronomer Sir James South in 1825). Its three members, of magnitudes 7.1, 8.1, and 9.3, form an isosceles triangle. The brightest is a yellow-orange K5 giant. About 7.5' north of S445 is the double star Struve 519 (magnitudes 7.9 and 9.4, separation 18.3") whose primary is also yellow-orange.

On March 18, 1979, I observed and sketched S445 and Struve 519 using a 3-inch f/10 reflector at 60X. I failed to notice the fainter stars that comprise the bulk of NGC 1545. My Observer's Challenge will be to re-observe the area with the 3-inch and see if I can pick out some of the dozen or so 10th to 11th magnitude members. Steven O'Meara, author of the Herschel 400 Observing Guide, reports adding 3 dozen more stars with a 4-inch scope at 101X.

Discovered by William Herschel in late December, 1790, NGC 1545 also bears the Herschel designation HVIII85 (H858) – the 85th entry in his 8th category of deep-space objects (coarsely scattered clusters of stars). It lies an estimated 2500 light years away.




Sky Atlas 2000.0

*The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either Roger Ivester (rogerivester@me.com) or Fred Rayworth (queex@embarqmail.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to lvastronomy.com/observing-challenge.*

NGC 457, the Owl Cluster in Cassiopeia, taken by Jeff Padell on December 3 using the ST80 that is the guidescope for the Meade 16" using a Canon 70D.

Bob Horton takes test images with a CCD camera connected with the 16-inch SCT equipped with the new Moonlight focuser on January 1. Note crescent Moon, Venus & Mars visible in the background. Photo by Jim Hendrickson.

The Pleiades Cluster by Tom Thibault, December 25 through Astro-Tech 65EDQ with a Celestron Nightscape 8300C. Exposures as follows: (20) 3 minute unguided frames, (4) 3 minute Dark frames, (5) Bias frames, processing with AstroFx, Digital Photo Professional, PhotoShop.

Tom Thibault took this image of M1, the Crab Nebula in Taurus on January 1 using a Celestron C11, Nightscape 8300C Non Guided; Exposures: (20) – 90 Second, (5) – 90 Second , Dark Frames (5) Bias Frames



December 11: North pole of the Moon. Shot with the LX200 16" SCT at prime focus with ASI174mm CCD.

# Directions to Seagrave Memorial Observatory

www.theSkyscrapers.org

**From the Providence area:**
Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

**From Coventry/West Warwick area:**
Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

**From Southern Rhode Island:**
Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

**From Northern Rhode Island:**
Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

**From Connecticut:**
• Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
• or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

**From Massachusetts:**
Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

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