

# Sky WAA tch



## Cerro Tololo

The Cerro Tololo Inter-American Observatory in the Coquimbo Region of Chile, 225 miles north of Santiago, is a complex of telescopes and other instruments at 2200 meters (7200 feet) elevation. It is operated by the Association of Universities for Research in Astronomy (AURA), which also operates the Space Telescope Science Institute and the Gemini Observatory (8.1 meter telescopes in Hawaii and Chile) with funding from the National Science Foundation. The largest instrument at Cerro Tololo is the 4-meter Victor Blanco telescope, very similar to the 4-meter Mayall telescope at Kitt Peak. It saw first light in 1976. The photograph (converted to black-and-white) was taken from the Gemini South site on Cerro Pachón, some 6.5 miles to the southeast, on March 22, 2017 by Larry Faltz.

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## Events for May

### WAA May Lecture

“Cassini, A 20 Year Voyage”

Friday May 5<sup>th</sup>, 7:30pm

Leinhard Lecture Hall,  
Pace University, Pleasantville, NY

Due to the amount of fuel that NASA’s Cassini spacecraft has in reserve, the Cassini mission will end on September 15<sup>th</sup>. The spacecraft will plunge into Saturn’s atmosphere and eventually succumb to the planet’s intense atmospheric pressure. Meanwhile, Cassini will send back to Earth invaluable data. Using breathtaking images taken by the Cassini Spacecraft, Andy Poniros—NASA/JPL Solar System Ambassador, Amateur Astronomer and radio show host—will discuss Cassini’s amazing discoveries of Saturn, the planet’s moons and its rings as well as the spacecraft’s Grand Finale orbits. Free and open to the public. [Directions](#) and [Map](#).

### Upcoming Lectures

Pace University, Pleasantville, NY

On June 2<sup>nd</sup>, our presenter will be Gary Johnson.

### Starway to Heaven

Saturday May 20<sup>th</sup>, Dusk.

Ward Pound Ridge Reservation,  
Cross River, NY

This is our scheduled Starway to Heaven observing date for May, weather permitting. Free and open to the public. The rain/cloud date is May 27<sup>th</sup>. **Important Note:** By attending our star parties you are subject to our rules and expectations as described [here](#). [Directions](#) and [Map](#).

### New Members. . .

Kevin Lillis - Yorktown Heights  
Rukhama Halim - Eastchester  
Louis H. Liotti - Garrison  
Chris Samios - Scarsdale

### Renewing Members. . .

Everett Dickson - White Plains  
Anthony Sarro - Scarsdale  
John & Maryann Fusco - Yonkers  
Jimmy Gondek and Jennifer Jukich - Jefferson Valley  
Robert Danehy - White Plains  
Jeffrey Jacobs - Rye



David Parmet took this image of the Northern Lights on a recent trip to Iceland. He used a Nikon D7000 - 10-20 mm zoom - set to 10mm, f4.5, 1250 ASA, 15 seconds.



John Paladini took this image of Jupiter with an Orion Maktusov (cropped by editor).

### Wanted Assistant Editor

The WAA newsletter (the *SkyWaatch*) is seeking an Assistant Editor. If you can help, please let us know. Your participation in editing, compositing and proofreading tasks or submitting articles or images, will be much appreciated. Email Tom at [waa-newsletter@westchesterastronomers.org](mailto:waa-newsletter@westchesterastronomers.org).

**Call: 1-877-456-5778 (toll free)** for announcements, weather cancellations, or questions. Also, don't forget to visit the [WAA website](#).

## ALMANAC

For May 2017 by Bob Kelly



May 3



May 10



May 19



May 25

Jupiter is the star of the evening show this month into next month. Get out there and see if the Great Red Spot is really red; it rotates into view every 10 hours. The Spot is best seen during the couple of hours bracketing the time it crosses the center of the planet's disk. How much detail can you see in the cloud bands? Check on the 11<sup>th</sup>, 18<sup>th</sup>, or 25<sup>th</sup> to see up to two moon shadows on Jupiter at once this month.

Saturn shines steadily, moderately high in the south, peaking in the early morning sky. By the end of month, Saturn is peeking into the late evening sky, rising by 9:30pm by the end of May. All month, Saturn rises just when Jupiter is highest in the southern sky. Count all the moons you can see – Titan can be easy. Iapetus passes just north of the planet by the end of the month, brightening as it goes eastward.

A moon of Saturn you can't see, but can follow along as well, is the Cassini spacecraft making weekly dives between Saturn's cloud-tops and its rings. No other spacecraft has done this. There was a discussion about sending Pioneer 11 through the Cassini Gap. Turns out there are lots of small but spacecraft-killing particles in the Gap. (Check photos taken from behind Saturn toward the Sun to see the scattered light from the fine particles in the gap that looks empty from Earth.)

Mercury makes a low pass through the morning sky, well below soaring Venus. Mercury achieves maximum separation from the Sun on the 17<sup>th</sup> and 18<sup>th</sup>. Venus is a beacon in the morning sky now through December.

An old, thin Moon posts up between Mercury and Venus on the 17<sup>th</sup>. Mercury will return to visit Venus in September and December. The December apparition will put Mercury on top since Venus will be exiting the morning show. Venus is brightest at the start of the month at magnitude minus 4.7. It shrinks in size, but waxes past half full by the end of the month. Our Moon is closest to the Earth for 2017 on May 26, the same day as the New Moon, so it's an invisible Supermoon! Be alert for higher than normal ocean tides on the 26<sup>th</sup> and a few days following.

Mars fades into the twilight after a long run. The reddish planet sets by the end of twilight by mid-month.

But it poses nicely with the Pleiades and Hyades star clusters on the way out.

What's overhead? Use Jupiter to find Virgo stretching across the southern sky. Not a lot of bright stars, but it's a good time to see how many galaxies you can find in Virgo and the nearby Coma Berenices.

Comets? I was surprised last month, hearing about 41P/Tuttle-Giacobini-Kresak making a nice show in binoculars. It fades to 8<sup>th</sup> magnitude as it edges past Hercules. Stay tuned in case other marginally bright comets brighten up over the next few months.

The overrated (for us) Eta Aquariids max out around May 7<sup>th</sup>. I've read it's the best shower of the year for the south side of the planet, but not so much for us in the northern mid-latitudes.

The International Space Station overflies our skies in the morning twilight starting on the 5<sup>th</sup>. By the last week of the month, we'll have five visible passes each night every 97 minutes.

Ramadan starts later this month, once the new, young Moon is sighted, most likely on the 26<sup>th</sup>. Make your own sighting, low in the west-northwest 30 minutes or so after sunset, with Mars nearby. The next night, look in the west to find the Twins standing tall, with the crescent Moon at their feet.

Some sky experiences can't be captured on camera. I was lucky enough in late March to share watching Jupiter settle down in the Californian pre-dawn skies with an early-rising jet-lagged almost-three-year-old granddaughter. Evenings brought the Moon setting in the evening sky. One night, we saw Orion descending over the hi-rises of Old-Town San Diego, just like a Japanese monster movie.

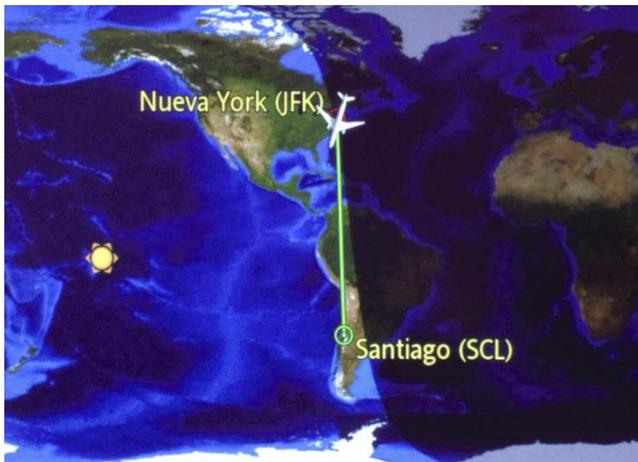


## An Astronomy Trip to Chile: Part 1

### Larry Faltz

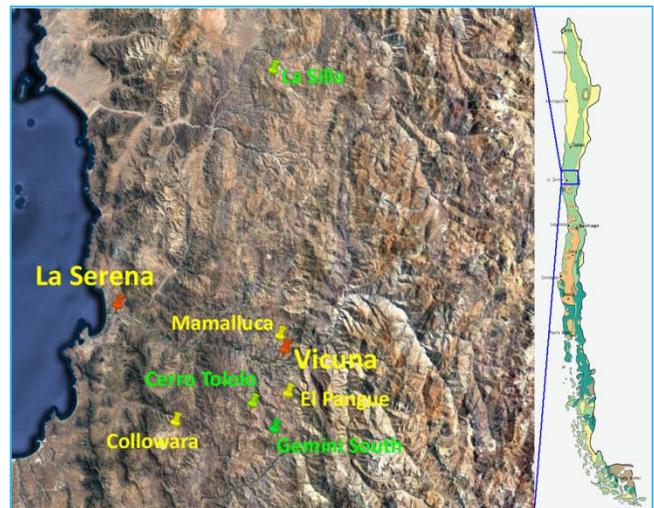
They're on every northern amateur astronomer's bucket list: the Large and Small Magellanic Clouds. The Southern Cross. Alpha and Beta Centauri. The Coal Sack. The Tarantula Nebula. Eta Carina. The problem is that to get a good look you have to travel well south of the equator, a trip that can be lengthy and expensive. But last summer at the [Medomak Astronomy Retreat](#) we met Sky & Telescope Senior Editor J. Kelly Beatty, who told us about a trip he was organizing to several of the large research observatories in Chile in March 2017, with opportunities to observe the southern sky with large amateur scopes under very dark skies. So Elyse and I signed on even before S&T announced the tour.

The excursion was to last 8 days, arriving on a Saturday morning in Santiago and leaving Sunday a week later. We were scheduled to visit four important research observatories: La Silla, Cerro Tololo and Gemini South in the mountains a couple of hundred miles north of Santiago, and another 500 miles north the headquarters of ALMA, the Atacama Large Millimeter Array, outside of San Pedro de Atacama in the high desert that's reputedly the driest place in the world. We would have four nights of dark-sky observing in private "tourist" observatories with some large telescopes, including one that gave us the opportunity to spend the entire night using large (24-28") telescopes under the guidance of an astronomer. We would also tour the famous Geysers de Tatio at 14,000 feet elevation near San Pedro and the bizarre Valley of the Moon. There would be ample time to experience some of the local color, food and drink, and to make new friends among the group.



New York to Santiago, a straight shot (from the airplane TV)

Santiago is essentially at the same longitude as New York, so there's no jet lag if you can catch some z's on the plane. But spending 10 hours in an economy-class seat trying to sleep sitting up, which I usually fail to do, was too daunting a way to start a once-in-a-lifetime experience. So, using a combination of miles and offers from American Express, we booked round trip in business class. This was the first time I had ever indulged myself like this, and let me tell you it's going to be hard not to do it again on a long flight, in spite of the rather insane cost. You get a comfortable, spacious seat with infinite leg room that turns into a flat bed at the push of a button, a clean pillow and warm blanket, as well as free wine, a decent dinner and breakfast and a staff seemingly catering to your every need.



Observing in Coquimbo region: Green=research observatories, Yellow=tourist observatories, Orange markers=cities

We landed in Santiago at about 7:30 am, after a totally restful flight, and met some of the other members of our group, who hailed from all over the US. Our hotel for the first two nights was the undistinguished Gallerias, situated near the pedestrian areas in the central part of the city. The construction of central Santiago is mostly bland early 20<sup>th</sup> century, with stores and eateries lining the streets. Several thoroughfares were reserved as pedestrian malls and were teeming with people on a warm and beautiful Saturday. There were innumerable street vendors selling all sorts of trinkets and supplies, apparently illegally since every once and a while they would pick up their blankets by the corners and rush away, having somehow been informed that policemen were heading their way. When the

coast was clear, they spread their blankets back down on the pavement and reopened for business. We quickly noticed that there were dogs everywhere, not pet dogs but feral animals that lived in the streets. They were generally tame although essentially indifferent to humans, but their presence gave the impression that the whole city is one gigantic animal shelter. We also remarked on innumerable graffiti splashed on every wall.

The city's main square, Plaza de Armas, with a central fountain set among palm trees and the Santiago Cathedral on the north side, was also full of energy. A block away we found the Precolumbian Art Museum, said to be one of South America's best archeological museums. Entry was free that day, and we spent a couple of hours looking at a truly superb collection of treasures from early Chilean cultures as well as objects from other ancient South and Central American civilizations as far north as central Mexico. As we were leaving, a young woman with a microphone, accompanied by a video cameraman, stopped me and asked to interview me. She wanted to know if I came to the museum that day because it was free, part of an arts event throughout Santiago. My first reply was "no habla Español" and so she switched to excellent English and repeated the question. "No," I said, "we just arrived from New York this morning and wanted to see this museum before we started our tour of the country." This got her all excited, and I got a chance to give my impressions of the museum and explain what we were going to be doing in Chile. I imagine a few snippets of the interview, with Spanish subtitles, were on the local 5-o'clock news. I mean, think about it, I'm in Chile for 4 hours and I'm already a TV star!

That evening, our group assembled at the hotel for drinks, conversation and dinner. There were 26 people in the group, including Kelly Beatty and his wife Cheryl and Gary Spears, whose travel agency in Bartlesville, OK, made the ground arrangements. Almost everyone was our age or older. Although there were a few non-astronomers in the group, most of the people had observing or even astrophotography experience. Astro-themed T-shirts abounded: Texas Star Party, Saguaro Club (Phoenix) Messier Marathon, etc. I was careful to wear my WAA-logoed garb as often as possible, although I had one JPL shirt with me too.

The next day we had a walking tour of downtown Santiago and learned a lot about the history of the city and country from our guide Javier. He was enthusiastic and well-informed about everything, even the plant

species in the Plaza de Armas. At Constitution Square and the Moneda Palace (the President's residence) we learned about the political turmoil that characterized the rise and fall of the socialist Salvador Allende, now a revered figure, and the CIA-sponsored military coup of General Augusto Pinochet that overthrew the Allende regime in 1973. Democracy returned in 1990. Life in Chile during the 27-year Pinochet period was difficult, with night-time curfews and brutal secret police with relatively unchecked power. Since then, Chile has been a contentious democracy (what democracy in the world is not contentious these days?) and has grown economically, with copper, lithium, wine, fruit and fishing its primary industries. However, it was clear from what we observed in Santiago and elsewhere that there is still a lot of poverty in the country.



Our group at the Plaza De Armas, in front of the Cathedral

But for us, the most important thing is that Chile is effectively the capital of world astronomy. With 300 clear nights or more per year at the major observatories and laminar wind flows and low humidity across the mountains where the scopes are sited, the conditions are just about perfect. And their sky has those special objects that almost everyone in the group had never seen before.

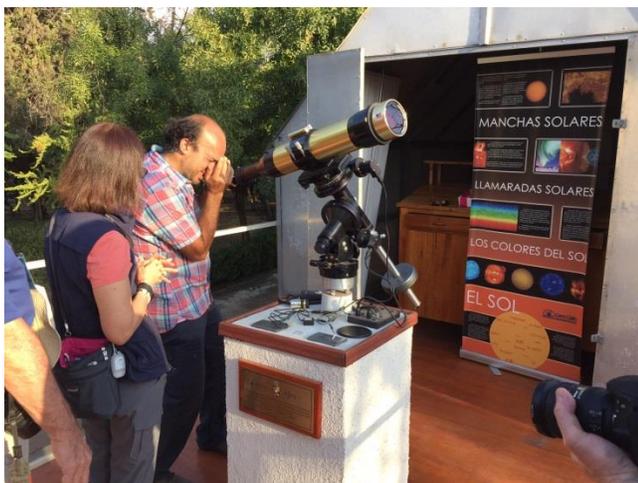


One of the domes on Cerro Calán

That evening, we drove over to the Chilean National Observatory (Observatorio Astronómico Nacional de Chile – OAN). The observatory is run by the University of Chile, which benefits from the infusion of research at the large telescopes to the north. For hosting these research observatories, Chile is allocated 10% of the observing time, and this has resulted in substantial growth of the astronomy faculty at major universities.

OAN was originally set up after an expedition by the US Naval Observatory in 1849 to observe Mars and Venus. After several moves in the Santiago area, it was finally sited on Cerro Calán, a hill on the eastern side of Santiago just 7.3 miles from the city center.

We arrived about 2½ hours before sunset. Our guide was Patricio Rojo, a professor of astronomy at the University of Chile. He walked us around the site, showing a number of domes housing now-archaic meridian telescopes. We had a look at the late afternoon sun through a 90mm Coronado hydrogen-alpha scope that was housed in a roll-off observatory (the entire building rolled off to reveal the telescope!). My status as an official WAA gearhead was called into play when Dr. Rojo couldn't achieve focus, and I figured out how to extend the back part of the telescope to the proper position. One of our group thought the polar axis of the mount was aligned in the wrong direction, until he realized that we are in the southern hemisphere and it was properly pointing to the *south* celestial pole.



Prof. Rojo at the Coronado H $\alpha$  scope

Two domes housed wonderful, century-old 11-inch refractors. One was built in Germany and installed in 1913 on a German equatorial mount, while the other, an astrograph, was of French manufacture. Originally installed in 1894 at an earlier location of the observa-

tory, the astrograph was on a yoke mount similar to the 100-inch Hooker telescope at Mt. Wilson (and thus unable to reach the pole). These instruments are now only used for outreach.



Refractor by Gustav Heyde of Dresden, Germany



Astrograph refractor by Gautier. It has a glass plate holder at the prime focus.

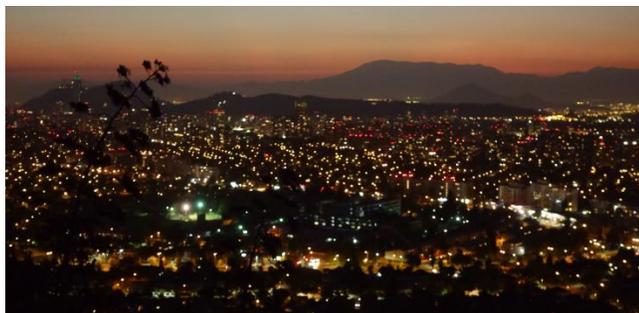
Dr. Rojo gave us an excellent introductory lecture on the search for life. It was up-to-date and included the Trappist-1 results that were just published a couple of weeks before our visit. We then enjoyed a rather wonderful cocktail party with excellent and plentiful hors d'oeuvres, fine Chilean wine and freely-flowing Pisco sours, a drink to which we had been introduced at lunch earlier that day. Pisco is a form of brandy made in Peru and Chile from Madeira grapes. After fermentation, the wine is distilled to about 35-45% alcohol and aged. The sour is made with lemon or lime juice, sugar and egg whites. Pisco sours became the drink of the trip for nearly all of us, and we had one almost every evening.

The main outreach telescope is a fairly new (2002) 18-inch computer-controlled Cassegrain that was donated by the Japanese government and the local Japanese community in Santiago. We observed a few of the

brighter southern objects with this telescope as well with as an 11-inch go-to Celestron.



Prof. Rojo and the 18" GOTO Cassegrain. It's massive.



Sunset over Santiago from Cerro Calán, looking towards downtown Santiago



The first star of the trip, Sirius, was high overhead, which it never is at our northern latitude.

By the time it got dark enough to observe, we all searched for the Magellanic clouds, but the urban sky was just too bright (Santiago also has a bit of a smog problem too) and they were completely washed out. We had to settle for bright, compact objects such as the Jewel Box, Orion Nebula (which was almost directly overhead) and Omega Centauri. Jupiter was low in the east showing 3 of its moons. These objects were nice to see, but we knew that later in the trip we would be observing them under very dark skies with even larger instruments, and so the blah skies did not diminish the pleasure of the evening. The freely-flowing Pisco sours also might have had something to do with it. We left for our hotel at 10:45 pm.

The next morning we flew from Santiago to La Serena, on the Chilean coast 250 miles to the north. La Serena's metropolitan area population is about 200,000. It is the site of the Chilean offices of the European Southern Observatory (operating La Silla Observatory), AURA (Association of Universities for Research in Astronomy, running Cerro Tololo and Gemini South) and the Carnegie Institution for Science (Las Campanas Observatory). We were to visit La Silla on the following day and both Cerro Tololo and Gemini South the day after. La Serena has a large university, and like most places in Chile, a large soccer stadium. Over the centuries the city has undergone substantial reconstruction and its avenues are lined with pleasant, European-style buildings. It's beaches are famous.

La Serena is the second oldest city in Chile after Santiago. It was founded in 1544 by Francisco De Aguirre. Its colorful history includes an attack by Francis Drake in 1578. Bullet holes from 17<sup>th</sup> century pirate raids are still seen on the façade of the Iglesia Santo Domingo, right across the street from our hotel.



A street in downtown La Serena

Our guide in La Serena, Alan, took us on a walking tour in the afternoon. The central part of the city was bustling. A large number of high school students appeared in their school uniforms. In the large central market there were many stalls with vast amounts of cheap garments, trinkets and souvenirs, but also food-stuffs, spices, oils and utensils. All was not lost when one of the young female students sat down at a rickety upright piano in the middle of the maze of hallways and interior plazas and played a Chopin nocturne with great sensitivity and touch. We found a stall selling rocks and minerals manned by an elderly gentleman, and some stones with veins of blue copper salts were snapped up inexpensively by a couple of geologically-inclined members of the group.

After dinner at the hotel, we boarded the bus for a trip to a private observatory, Collowara, near the mining town of Andacollo, population 10,000. As the crow-flies, the distance from La Serena is only 25 miles, but half of the trip was on a steep and twisty road that climbed from sea level to over 3,300 feet, and so it took over 1½ hours to get there. The trip was slightly prolonged when a wild burro appeared in the middle of the road. The animal stared blankly at us for a short time, making the bus wait until he ambled into the bushes. Andacollo is famed for having an annual festival for the Virgin every December, in which the miners do a dance in her honor.



Collowara Observatory

Just outside of town, a bit higher on the surrounding mountains, is a modern and architecturally interesting public observatory, Collowara. It was built by the government of the region of Coquimbo to encourage astro-tourism (it's one of 5 "tourist" observatories in the Coquimbo region) and staffed by a group of young astronomy enthusiasts. Visitors usually come as part of a pre-arranged commercial tour. The curriculum for the tour is an introductory PowerPoint lecture in their modern 50-seat auditorium, followed by a naked eye survey of the southern sky with descriptions of the constellations as seen by native peoples and by modern astronomers, and then observations of deep sky objects with telescopes, the most potent being a 14-inch Meade SCT in the observatory's dome. The video presentation was good, but we were all chomping at the bit to observe, and when it was over we headed out to the south-facing observing deck, a series of walkways and patios lined with faint red lights. The Milky Way spread across the sky in a great arc from left to right, with the brightest area in the southeast containing Alpha and Beta Centauri, the Southern Cross, the Coal Sack and Eta Carina, and to the southwest the Large and Small Magellanic Clouds. For a first-time view of these objects under dark skies, it could barely have been better. There was a faint light dome from Andacollo off to the northwest, but nothing artificial in front of us. The sky was Bortle level 3, with limiting magnitude better than 6.6.

A 16" Meade Dobsonian was available on one of the patios for observing, but the Crayford focuser didn't work properly. Neither Kelly Beatty nor I could fix it, lacking hex wrenches of the proper size. We could offset the eyepiece to achieve reasonable (if unstable) focus, but most of us were content to use binoculars or just look with the naked eye. About half a dozen of us took non-guided wide-angle photographs.

The Jewel Box open cluster (NGC 4755), just below Becrux in the Southern Cross, was a somewhat meager sight in binoculars, but truly impressive in the 16" when we got the focusing right. John Herschel described it as "though neither a large nor a rich [cluster], is yet an extremely brilliant and beautiful object when viewed through an instrument of sufficient aperture to show distinctly the very different colour of its constituent stars, which give it the effect of a superb piece of fancy." It is one of the youngest open clusters known, just 14 million years old. The red supergiant DU Crucis shines like a ruby in the middle among bright bluish-white B stars.

The Large Magellanic Cloud appears to the naked eye as a large, featureless blob, almost better perceived with averted vision. In 10x50 binoculars, it shows considerable structure, with a concentration of stellar density linearly across it and extensions above and below. Along its upper edge, the Tarantula Nebula appears as the largest bright knot of glowing gas. The Small Magellanic Cloud is fainter and more homogeneous in the binoculars. It was closer to the horizon and set earlier in the evening.

I made a wide-angle image with my DSLR (lens effective focal length 22 mm, f/2.8, 20 seconds, ISO 6400). The dark Coal Sack sits just below the Southern Cross and above  $\alpha$  and  $\beta$  Centauri. The brightest nebula above the Coal Sack is the Eta Carinae nebula. The great globular cluster Omega Centauri can be seen on the left side of the image as a bright star just below center. The famous radio galaxy Centaurus A (NGC 5128) with its dust lane can even be picked out on an enlargement of that section. Both objects could easily be seen in the same binocular field.



My first image of the southern sky from Collowara (80°x60°)



Enlargement of the previous photo

The LMC, spanning 10 full moons in the sky, is the largest, but not the nearest, of the dwarf galaxies that are gravitationally bound to the Milky Way. At least a couple of dozen have been confirmed to be linked to the Milky Way. The LMC is in the constellation Dorado (Dolphin), some 163,000 light years from us by the most recent (2013) measurements. It's small, but not that small: at 1% of the mass of the Milky Way it's still the 4<sup>th</sup> largest galaxy in the Local Group (after M31, the Milky Way and M33) with a mass of 10 billion suns. Thought for years to be an irregular galaxy, it probably started as a barred spiral galaxy but it has been disrupted by gravitational and tidal forces from our galaxy. Its disk is offset from our line of sight by perhaps 35 degrees (0 degrees would be face-on). It undergoes rotation with a period of 250 million years. The LMC contains many very large, energetic stars, a large population of Cepheid variables (famously examined by Henrietta Swan Leavitt), lots of gas and numerous areas of active star formation, of which the Tarantula Nebula (also called 30 Doradus) is the most intense in the entire Local Group. Scanning the LMC with binoculars or a wide-field telescope yields a glut of astronomical fascination: many open clusters and nebulae scattered throughout the starry background.



The Large Magellanic Cloud (Eckhard Slawik, ESA/Hubble)

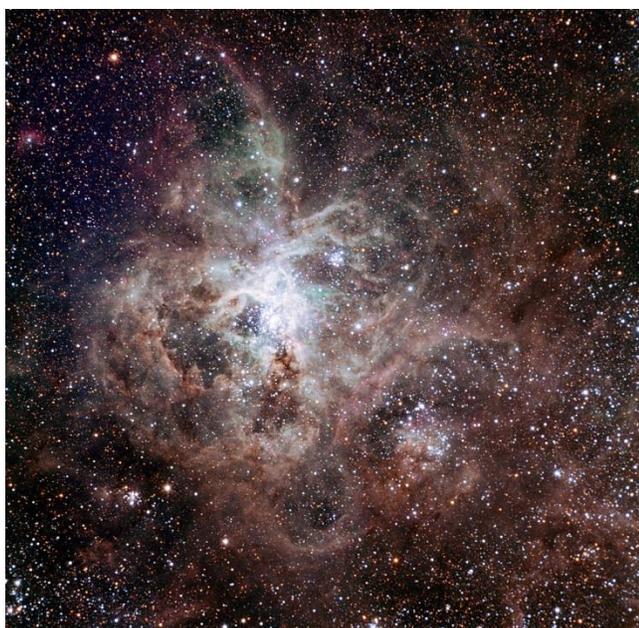
In the dome, the 14" go-to Meade SCT was aimed first at the Tarantula Nebula. We queued up to get a look, and what a sight it was! Complex eddies of bright gas filled the eyepiece, extending way beyond the field stop. It really does resemble a tarantula. Elyse pronounced it "swirly" and the group quickly developed an official "swirliness" scale, with the Tarantula way ahead of anything that we have in the Northern hemisphere. After we had all gotten our fill, the scope was slewed to 47 Tucanae, a globular clus-

ter just below the Small Magellanic Cloud. M13, eat your heart out: 47 Tucanae is second brightest globular in the sky, after the amazing Omega Centauri (which we also looked at each night, of course), and it has a more defined center than Omega.

We also looked at the Eta ( $\eta$ ) Carinae Nebula, also very high on Elyse's swirliness scale. A binary system of very massive, energetic stars, Eta underwent an outburst in 1837 called the "Great Eruption" that made it for some years the second brightest star in the sky. Now shining at magnitude 4.5 but on the increase again, Eta irradiates a vast amount of interacting gas and dust. Two nights later, at an even higher and darker observatory, we were able to see the "Homunculus", the actual gas ejected in the 1837 outburst, made famous by Hubble photographs, and the night after that we observed it through a 28" reflector. Eta Carina may go supernova soon ("soon" in astronomical terms means perhaps millions of years, but it could happen tomorrow, in which case I'm going to head back down to Chile to see it).

Among the other objects we viewed were the "Southern Pleiades," also called Theta Carinae Cluster because it contains the star  $\theta$  Carinae. Smaller and fainter than M45, it's young (30 million years) and among its 60 members there are ten stars brighter than 6<sup>th</sup> magnitude.

We reluctantly returned to our hotel about 1:30 am, with instructions to get up early for the long drive to La Silla. More about that in next month's article.



The Tarantula Nebula (Trappist, ESO)



47 Tucanae (NASA)

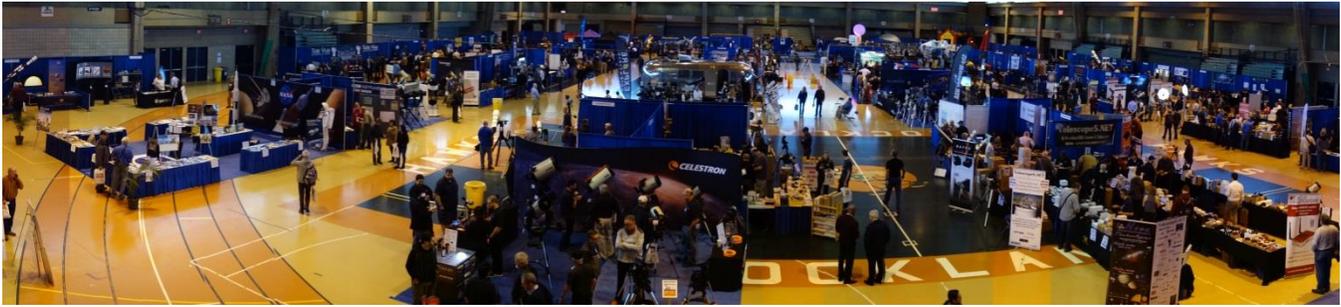


The Jewel Box (VLT)



Eta Carina Nebula (ESO)

## Two April Events

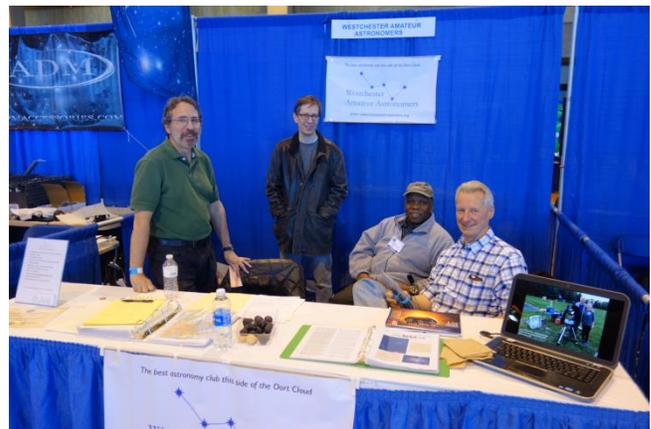


### Northeast Astronomy Forum

NEAF is the largest astronomy show in the US. Once again we took a booth and many club members gave an hour or two of their time to help staff it. It's an opportunity for members meet each other in an environment different from the lectures or star parties (where we can't always tell what we look like in the dark!). This year's show was larger than the past couple of years, with lots of new technology and some amazing large telescopes designed for imaging. On Saturday, the place was packed and it was nearly impossible to get into any of the lectures.

Assisting at the WAA booth were Paul Alimena, Owen and Brian Dugan, Katherine Hannan, Eva Andersen, Gene Lewis, DeDe Raver, Charlie Gibson, Darryl Ciucci, Mike Lomsky, Karen Seiter, Rick Bria, Oliver Prache, Frank Jones, Mauri Rosenthal, Harry Butcher, Bill Forsyth, Hans Minnich, Scott Nammacher, Bob Kelly, Pat Mahon, Larry Faltz, Dave Parmet, and Jinny Gerstle, and I think a few other members who dropped by and stayed for a while. Many other club members passed by for a brief spell, among them Eric and Katherine Baumgartner, Jimmy Gondek, Francis O'Reilly, Warren Lindholm, Mike and Angie Virsinger. We apologize if we left anyone out. Mike Virsinger again set up his marvelous 100mm Lunt double-stacked H $\alpha$  scope at the Solar Star Party, this time adding a Hinode solar tracker. Just 2 booths from us, WAA member Roman Tytla had an enlarged display for his [Big Bang Prints](#). John Higbee, our most distant member, came from Alexandria, Virginia with a range of orange tube Celestrons, including Bob Davidson's restored C14, to display at the wonderful Classic Telescopes booth, among the beautiful old Unitrons, Cave Astrolas and elegant small-aperture Japanese refractors of the post-war era.

If you haven't been to NEAF, make plans to come next year. It's a necessary astronomy pilgrimage.



### Scarsdale Outreach

Every year, WAA provides an outreach experience for the third-graders of the Scarsdale school system. The event is held at the Quaker Ridge School on Weaver Street in Scarsdale, near the Hutchinson River Parkway. We usually schedule the event to coincide with a quarter moon, since light pollution in southern Westchester makes deep sky objects difficult and the moon is astronomy object #1 anyway, except maybe for Saturn, which wasn't in the right place this spring. The event is correlated with the elementary school science curriculum, which introduces astronomy during the second semester of the 3<sup>rd</sup> grade.

Every 3<sup>rd</sup> grade student and their families from all 6 Scarsdale grammar schools are invited, divided more or less into two shifts starting around 7:45 in the evening. The number of attendees is excitingly massive, with at one point surely over 200 people in the school's parking lot where WAA members had set up 11 telescopes, ranging from a 3½ Questar to a 14" Meade Newtonian. The WAA participants this year were:

- Brian & Owen Dugan (11" Celestron SCT)
- Art Linker (brand-new 8" Celestron SCT)
- Jordan Weber (8" Newtonian)
- Mike Lomsky (14" Newtonian)
- Mauri Rosenthal (3½ Questar)
- Bill Newell (8" Dobsonian)
- Josh Knight (8" orange tube Celestron)
- Eva and Erik Andersen (101 mm Televue)
- Harry Butcher (5" Celestron SCT)
- Larry Faltz (8" Celestron SCT)
- Dave Butler (8" Meade SCT)

WAA officers Charlie Gibson and Paul Alimena also came to assist. We answered many questions about astronomy, the club, the moon and the equipment we had deployed. We gave out club business cards and bookmarks and stickers from SpacePlace, the educational outreach arm of NASA.

Quite a few of the students seemed genuinely interested in astronomy, and some had already learned some sophisticated details about space. It was a first look through a telescope for nearly all of them, and most of the parents also were observing for the first time, accompanied by various oohs! aahs! and wows!



Mike Lomsky and the 14" go-to Dobsonian



Jordan Webber and 8" f/6 reflector

Westchester  
Amateur Astronomers



Art Linker (L) and Dave Butler with 8" SCT's



Charlie Gibson, Erik Andersen and Eva Andersen a Televue 101 mm Petzval refractor



The front of the line to see the moon with Mike Lomsky's 14" scope. At times there were 30 people waiting to look through the big scope.

Although the sky was not optimal, the views of the moon excited children and their parents alike. A couple of days after the event, we received a lovely note from Jennifer Kiley, the Elementary Science Coordinator for the Scarsdale school system and our liaison for the event.

Dear Larry all the wonderful WAA club members,

On behalf of the Scarsdale Schools and especially our 3rd grade students, I'd like to thank you for another spectacular Telescope Night at the Quaker Ridge School.

The children and their families were thoroughly engaged and excited to try out each of your sophisticated telescopes. I'd like to note that it is not just your fancy equipment that adds to the enjoyment. It is the knowledge, expertise, and desire to share your passion for the night sky that makes the evening so special every year. Although we were all looking at the same moon, each and every one of you created a unique viewing experience for our students. We hope you will continue to join us for many years to come.

The Scarsdale outreach has become a WAA tradition, and we look forward to doing it again next year.

## NOAA's Joint Polar Satellite System (JPSS) to Monitor Earth as Never Before Ethan Siegel

Later this year, an ambitious new Earth-monitoring satellite will launch into a polar orbit around our planet. The new satellite—called JPSS-1—is a collaboration between NASA and NOAA. It is part of a mission called the Joint Polar Satellite System, or JPSS.

At a destination altitude of only 824 km, it will complete an orbit around Earth in just 101 minutes, collecting extraordinarily high-resolution imagery of our surface, oceans and atmosphere. It will obtain full-planet coverage every 12 hours using five separate, independent instruments. This approach enables near-continuous monitoring of a huge variety of weather and climate phenomena.

JPSS-1 will improve the prediction of severe weather events and will help advance early warning systems. It will also be indispensable for long-term climate monitoring, as it will track global rainfall, drought conditions and ocean properties.

The five independent instruments on board are the main assets of this mission:

- The Cross-track Infrared Sounder (CrIS) will detail the atmosphere's 3D structure, measuring water vapor and temperature in over 1,000 infrared spectral channels. It will enable accurate weather forecasting up to seven days in advance of any major weather events.
- The Advanced Technology Microwave Sounder (ATMS) adds 22 microwave channels to CrIS's measurements, improving temperature and moisture readings.
- Taking visible and infrared images of Earth's surface at 750 meter resolution, the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument will enable monitoring of weather patterns, fires, sea temperatures, light pollution, and ocean color observations at unprecedented resolutions.
- The Ozone Mapping and Profiler Suite (OMPS) will measure how ozone concentration varies with altitude and in time over every location on Earth's surface. This can help us understand how UV light penetrates the various layers of Earth's atmosphere.
- The Clouds and the Earth's Radiant System (CERES) instrument will quantify the effect of

clouds on Earth's energy balance, measuring solar reflectance and Earth's radiance. It will greatly reduce one of the largest sources of uncertainty in climate modeling.

The information from this satellite will be important for emergency responders, airline pilots, cargo ships, farmers and coastal residents, and many others. Long and short term weather monitoring will be greatly enhanced by JPSS-1 and the rest of the upcoming satellites in the JPSS system.

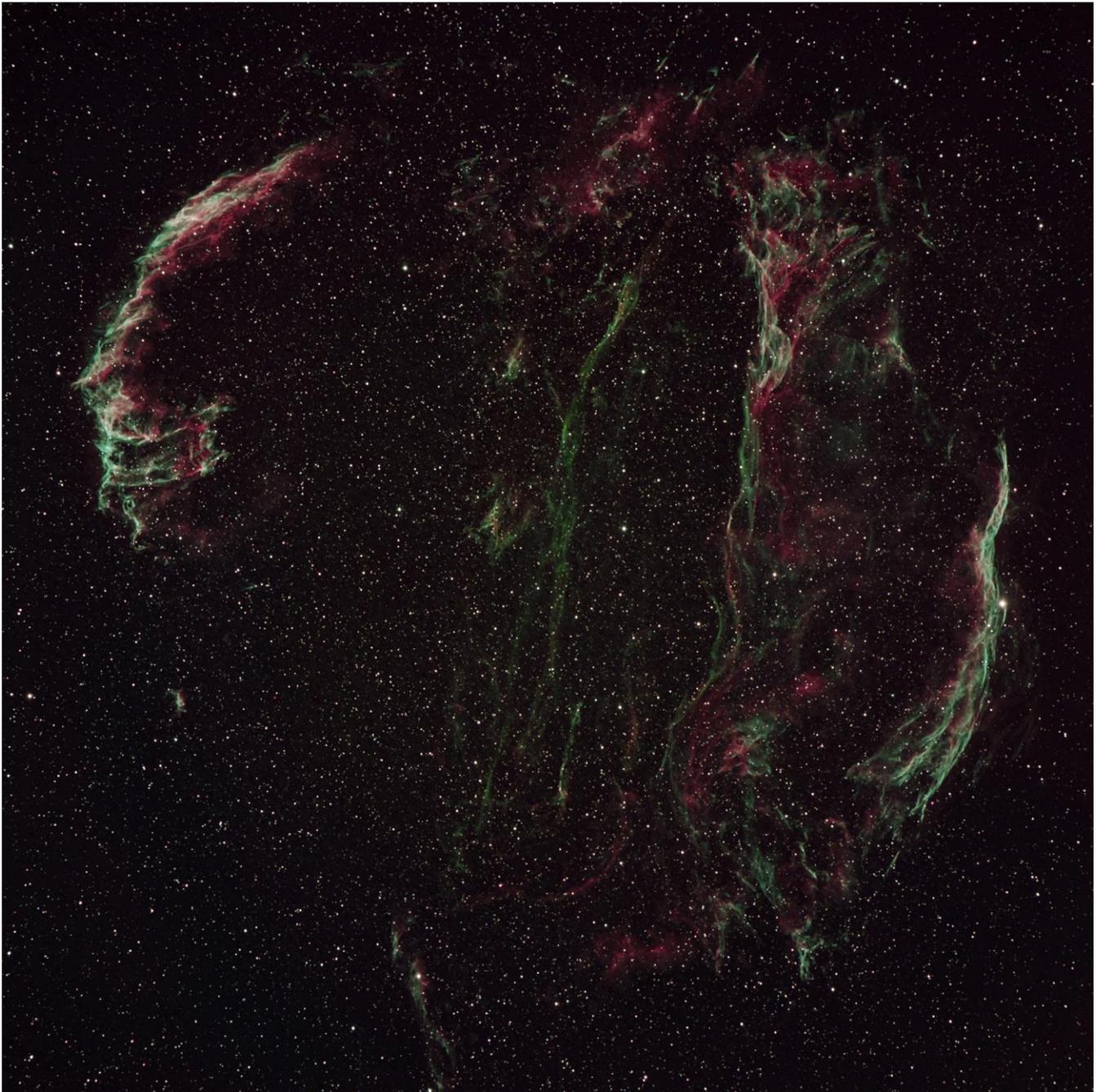
Want to teach kids about polar and geostationary orbits? Go to the NASA Space Place: <https://spaceplace.nasa.gov/geo-orbits/>. This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](https://spaceplace.nasa.gov) to explore space and Earth science!



Ball and Raytheon technicians integrate the VIIRS Optical and Electrical Modules onto the JPSS-1 spacecraft in 2015. The spacecraft will be ready for launch later this year. Image Credit: Ball Aerospace & Technologies Corp.



## Veil Nebula



Courtesy of Scott Nammacher is this photo of the entire veil nebula. The image was taken in  $H\alpha$ , OIII and Syn Green with a U16 Apogee Camera from Scott's upstate observatory in the fall. Scott used a Televue 127 (5 inch) refractor, MaximDL for stacking and Photoshop for the processing.

## Full Moon and Jupiter



The full moon and Jupiter were only  $2^{\circ} 44'$  apart in a partly cloudy sky at 9:30 pm on April 10<sup>th</sup>. The photo shows that the eye has more dynamic range than a camera: the camera has to overexpose the -12.64 magnitude moon in order to capture the -2.5 magnitude planet. The magnitude difference of 10.14 translates to an absolute brightness difference of  $1.1376 \times 10^4$ , or over 11,000! The human eye can easily compensate and allow us to see a sharp moon with surface features as well as a distinct planet, but a camera sensor is completely overwhelmed by the difference. An image exposed to show the lunar surface won't pick up the planet at all. Canon T3i, 135 mm lens (effective focal length 216 mm), 1/10 sec at f/5.6, ISO 800, no post-processing.

--Larry Faltz