alpha

Astronomical League of the Philippines' *HerAld*

Vol. 14, Issue No. 3
March 2016

Visit our website at
www.astroleaguephils.org

Francisco Lao, Jr.
Editor-in-Chief
< appulse2000@yahoo.com >

FEATURE IMAGE THIS ISSUE

It's now time to observe Jupiter, as it is up in the evenings. This image of the giant planet was captured under the tutelage of master planetary imager, Christopher Go. © Val Abapo, Cebu

CLUB NEWS

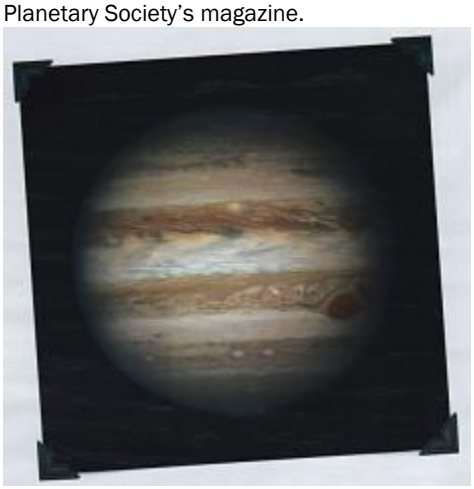
February Monthly Meeting

Last February 7th, the Astronomical League of the Philippines (ALP) held its monthly meeting at the Exploreum at SM Mall of Asia. Members who attended were ALP President James Kevin Ty, wife Charito and son KC; VP Jett Aguilar; Secretary Christopher Louie Lu; directors Iah Serna, Shubhashish Banerjee and Ronald Sison; and, Fung Yu, Joaquin Fajardo, and Joyce Gonsalves. The meeting started at around 3:30 p.m. with Christopher Louie (*below*) giving a rundown on the final plans for the 2016 ALP National Astronomy Week celebration, where public events will be held at Exploreum, SM Mall of Asia on February 14 and 20.

Afterwards, James Kevin (*bottom left*) then talked on the preparations for the upcoming March 9th Total Solar Eclipse in Indonesia. The meeting ended at around 5 p.m. and this was followed by a traditional AstroKapihan at Starbucks. - *James Kevin Ty*

ALPer in the News

ALPer Christopher Go's Jupiter image (*below*) was featured in the inside back cover of the December Solstice 2015 issue of the Planetary Society's magazine.



Separately, Chris' article on planetary imaging was featured in the April 2016 issue of Astronomy magazine. Chris will also be giving a presentation at the NorthEast Astronomy Imaging Conference (NEAIC) and NorthEast Astronomy Forum (NEAF) this April.

NAW 2016

I would like to thank everyone who participated in our NAW 2016 opening despite it being a Valentine's/family Sunday, especially those few who braved the heat of the afternoon sun and endured the early night without dinner, just to showcase to the general public what beauty lies beyond our planet.

After so many consecutive failed attempts at public solar observation due to bad weather, we were finally able to hold one. In one unprecedented swoop and largely due to the largely cloudless conditions, we held a public solar observation in conjunction with a normal public stargazing night event without breaks...

And with the very densely crowded area, we did not have the opportunity to eat anything other than water and some hotdogs.

Despite being undermanned, the night stargazing event alone probably set a new public viewing event record for our organization in terms of both crowd participation and crowd density. If we include the afternoon solar viewing session, I'm 100% sure that we have utterly shattered all previous ALP single free public viewing session records. – *NAW 2016 Chairman Andrew Ian Chan*

Feb 14 Free Telescope Viewing

In the great spirit of sharing the passion of astronomy, the Astronomical League of the Philippines gathered once again in celebration of National Astronomy Week 2016. Solar observation began at 4 p.m., focusing on the solitary sunspot AR2497. Just before 6 p.m., we set our sights on another celestial body, the Moon. As the night wore on, other celestial targets became available (⇨ *p. 36*).

The Pleiades, the bright star Sirius, and the crown jewel of the night, the planet Jupiter, were all targets.

It was a tiring night, yet lots of fun. The satisfied and awestruck looks on people's eyes was reward enough. – *Christopher Louie Lu*

February 18, 2016 - NAW Free Telescope Viewing

After closing the shop and a quick dinner, I set up my telescope on my neighborhood sidewalk and conducted a Free Telescope Viewing in celebration of National Astronomy Week, featuring the Pleiades, Moon and the planet Jupiter.

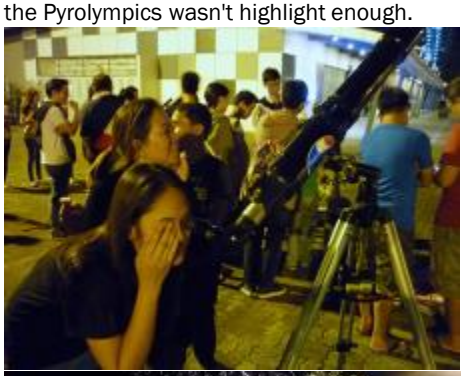
I was later joined by fellow astro-enthusiast Jayson Martinez, who answered questions from the curious public. Observations were from 8 till 11 p.m. – *Christopher Louie Lu*

Feb. 20 at Mall of Asia

About 1300 people were able to view the Moon up close and personal as well as planet Jupiter and the 4 Galilean Moons, the Orion Nebula and the brightest star, Sirius.

- *James Kevin Ty*

We were late in arriving for the Free Telescope Viewing at the Mall of Asia (MoA), and even though I only had 30 mins left to share my telescope with the public, I set up my scope anyway. In those 30 mins, I was not only sharing my telescope, but also answering questions from the viewing public about astronomy - the very same thing that my fellow ALPers were doing hours before we arrived. However, I'd like to share a few highlights during tonight's FTV, not that the Pyrolympics wasn't highlight enough.



First, there was this young boy who knew his basic astronomy. He asked me questions about Mercury and Venus, then followed up with questions that I didn't expect a young boy his age would ask. I should've shaken his hand. Second was, I believe a college student, wearing a La Salle t-shirt, who asked me about Albert Einstein's Theory of Relativity and the recent discovery of Gravitational Waves by LIGO.

My heart silently smiled as I realized that there were Filipinos curious about this subject. Finally, there was a family group who continuously asked me questions about Jupiter, but then changed the subject to "Why bother with astronomy?" I ended up promoting Agham Partylist to them and I gave them a broad understanding why Filipino science mattered, and why sScience can benefit our country in the long run, all in 30 mins. I consider that a job well done and Bravo to the Astronomical League of the Philippines, for an awesome week of Astronomy. – *Christopher Louie Lu*

Observing Reports

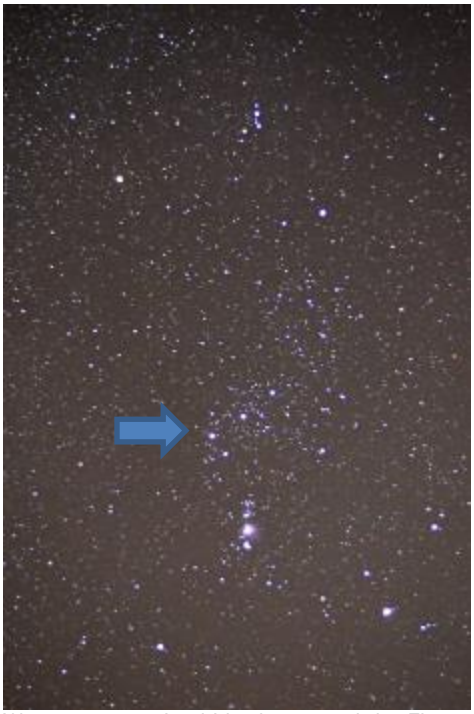
Wide Field

Feb. 6. Did some quick wide field astrophotography at Cowan Lake, but the skies were a little bright, which was strange for a winter night. I suspect humidity was causing the water vapor in the air to ice up and spread light around (temperature was just a degree or two below freezing), so my images of stars were not as pinpoint as they should be.

Wide field shot with Orion in the center. The Pleaides is prominent at the upper right corner, while Sirius can be seen at lower left. The winter Milky Way can be traced on the left side in this image *(⇨ p. 37)*.

As I got better dark-adapted, I finally saw the winter Milky Way visually spread across the sky.

When I processed my images, there were a number of open clusters that were quite apparent in the images - M35 at the foot of Gemini (*above*), and the three open clusters in Auriga (*below*).



Was most surprised I had captured the Flame nebula near Alnitak, aside from the Great Orion nebula. – Jun Lao, Mason, Ohio

Moon

Jan. 31. I always wanted to catch something like this. FINALLY, what luck!

22-day old 53.3% illuminated last quarter Moon. Imaged with a Canon 450d on Celestron Powerseeker 80EQ. 1/50 second at f/11 and ISO 200.

Feb. 10. Unprocessed images taken with Canon 450d with EFS 55mm-250mm lens on a Vixen Polarie tracking mount.

- Christopher Louie Lu

Feb. 5. 12% illuminated Moon during the early morning of Feb. 5. 800 mm f/8 Opteka mirror-lens with 2x teleplus.

No equilibration from indoor temperature to outdoor sub-freezing temperature.

Feb. 6. Clear skies early this morning were just right to reveal the 5% illuminated crescent Moon with earthshine hanging around in Sagittarius with Venus in below freezing temps.

It was a little bright, and a house was likely blocking Mercury. – Jun Lao, Mason, Ohio

Feb. 23. The sky was clear, so I used this opportunity to test my old reliable camera setup of Canon EOS 500D DSLR with Canon EF 100-400 mm f/4.5-5.6 IS L lens set at 400 mm f/8 to image the waning gibbous Moon and check my actual true field of view.

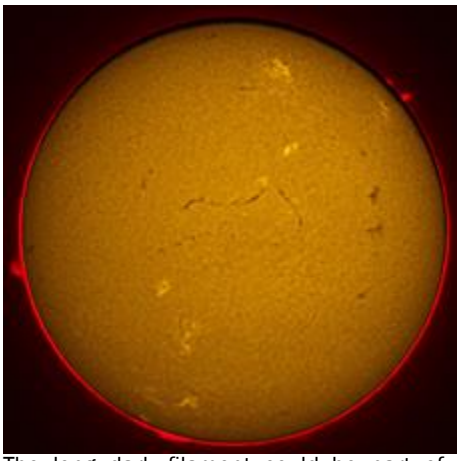
I plan to use this on the upcoming total solar eclipse on March 9, 2016.

Since the Moon and the Sun are almost of the same size of about half a degree, even the moon shot is a good appropriate test.

Manila and the rest of the Philippines will have a partial solar eclipse, while a total solar eclipse will happen near the middle portion of Indonesia, crossing Sumatra, Central Kalimantan, Sulawesi and South Molukku. - James Kevin Ty

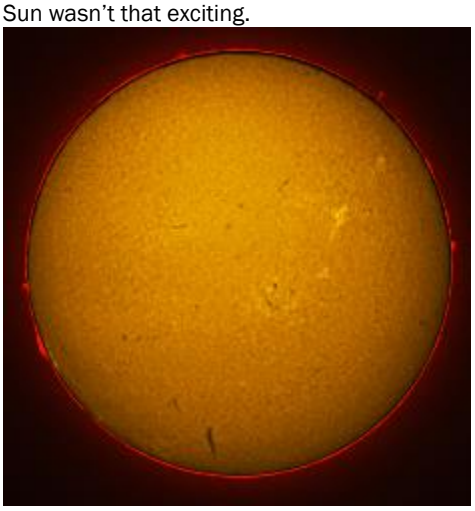
Sun

Feb. 3. The sky was clear before sunset, and I was able to capture the Sun, with two large prominences, a number of bright active regions, and a long dark filament, in addition to what looked like broken pieces of a 3-dimensional dark filament.

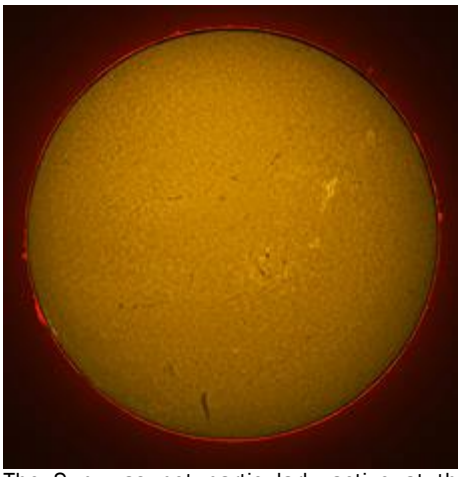


The long dark filament could be part of a complex that included another dark filament next to it. Bright areas indicated where the active regions were, where sunspots usually were located.

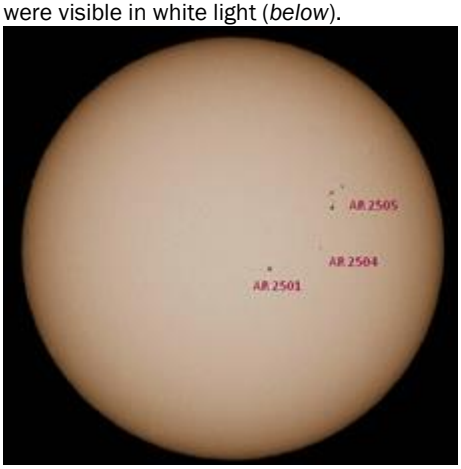
Feb. 20. Skies were clear, but activity in the Sun wasn't that exciting.



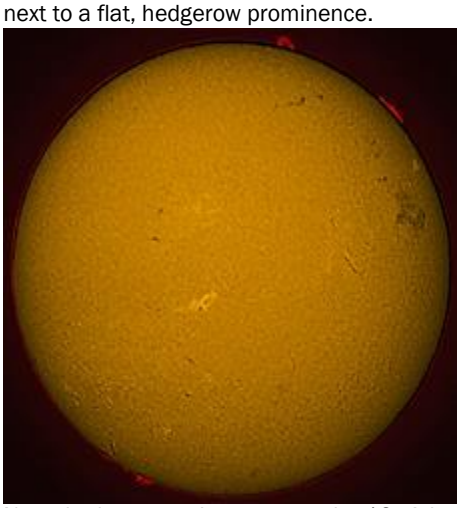
Feb. 21. Skies were clear, and seeing was great during the late afternoon.



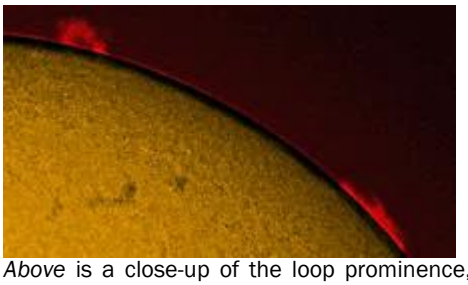
The Sun was not particularly active at the time, as seen in H-alpha (*above*), but there were three respectable sunspot groups that were visible in white light (*below*).



Feb. 27. There were three large prominences, with one of them being the attention-getter – a loop prominence on the Sun's western limb, next to a flat, hedgerow prominence.

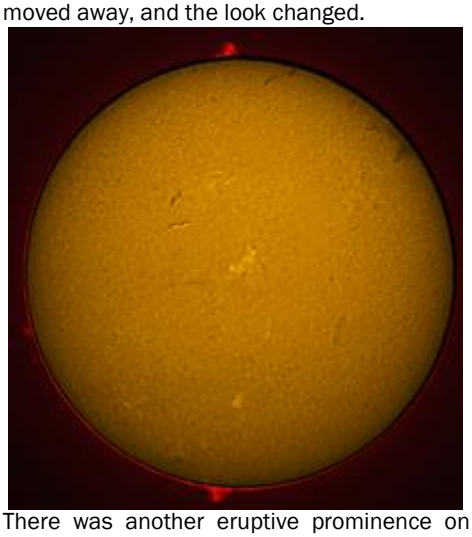


Note the loop prominence near the 12 o'clock position, and below that, were a number of dark filaments, including a large patch of dark filaments near the 3 o'clock position. A patchy appearance for dark filaments is not normally encountered.



Above is a close-up of the loop prominence, while *below* is a white light view showing the sunspot complex AR 2506.

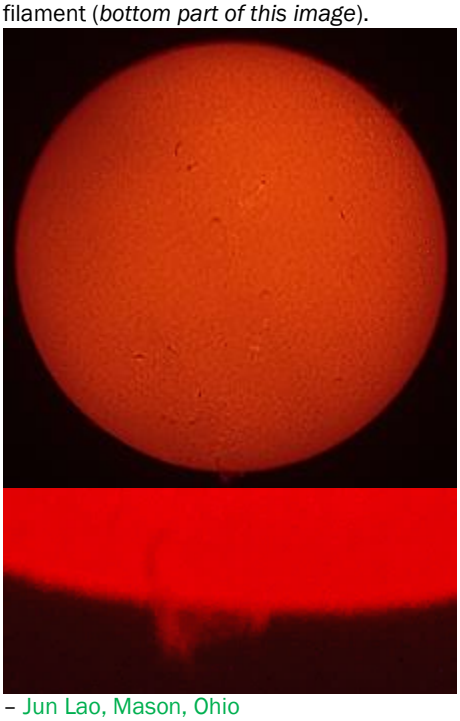
Feb. 28. The loop prominence was gone as it moved away, and the look changed.



There was another eruptive prominence on the opposite limb. Below is a white light view.

In white light, there was a sprinkling of small sunspots.

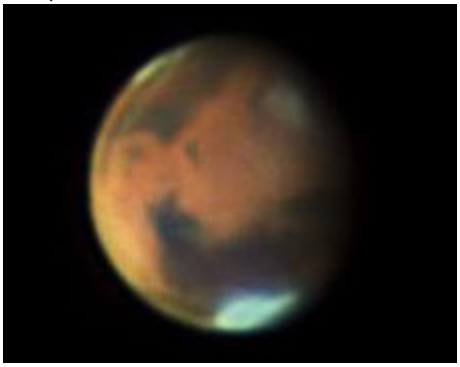
Feb. 29. A third consecutive day of late afternoon sunshine revealed a wonderful FilaProm – a prominence that was partly in the Sun's disk, changing over to a dark filament (*bottom part of this image*).



– Jun Lao, Mason, Ohio

Mars

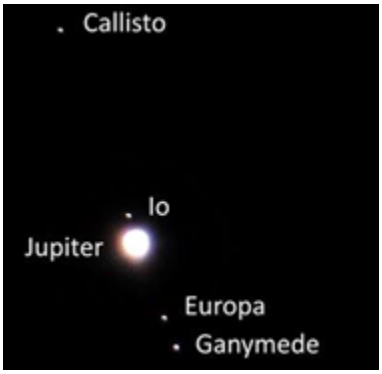
Feb. 20. Here's a preliminary color image. 30s per channel and no derotation.



- Christopher Go, Cebu

Jupiter

Feb. 2.



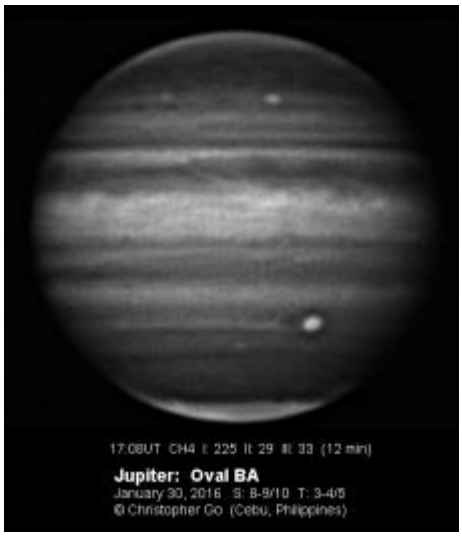
Imaged with a Canon SX50 on Vixen Polarie mount. ¼ second at f/5.6 and ISO 80. - Christopher Louie Lu

Feb. 27. Last night, fellow Cebu astronomer - Christopher Go, guided me on astrophotography and planetary imaging.

This image was taken using my Nexstar 4SE, using Chris' skyris 132C CCD camera, captured on firecapture 2.4, stacked in Autostakkert, processed in Registax5 and Photoshop. – Val Abapo

Jan. 30. After over a week of bad weather because of a cold front, I finally got a clearing.

Seeing was perfect today, but transparency was variable due to dew. Oval BA was well resolved. The orange ring was very prominent. Part of the South Equatorial Belt (SEBn) had light-colored features. The large red dark barge on the SEBs was still prominent on the left of the 2nd image.



Note the two dark red ovals on the North Equatorial Belt (NEB) looked very interesting as they seem to be interacting with each other. The North Temperate Belt (NTB) was rather quiet in this region. The CH_4 bright spot on the North North Temperate Belt (NNTB) seemed to be a low contrast white spot on the visible light image.

Feb. 2. It was raining all night but it cleared around midnight. Seeing was good but it was very windy. Humidity was high and I had to use my dew shield, which made imaging a challenge, because it made the wind-induced shaking worse.

The NTB was active in this region. Note the small ovals lining up. The NEB had a lot of rift activity (⇨ *p. 40).*

The NEB was narrow in this region. The South Temperate Belt (STB) ghost was prominent.

Feb. 6. Condition was variable this evening. Seeing started very bad, but improved as Jupiter got higher.

Oval BA could be seen in these images. The red ring was prominent. The NEB had a lot of rift activity. The SEBn looked very complex.

Feb. 8. Condition was a bit challenging this morning. The monsoon was still affecting seeing here.

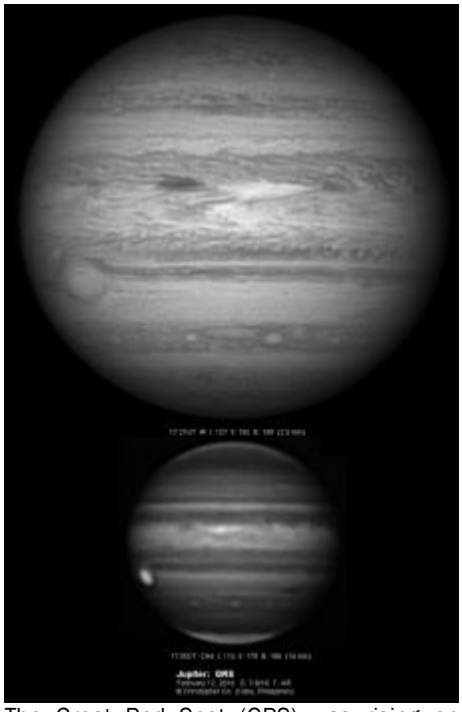
Oval BA was well resolved. Io could be seen on the NEB. Io's shadow was distorted due to effects of derotation.

Io was added to the image by using the best image of the batch. The original image had Io distorted due to derotation.

Feb. 11. Seeing was variable this evening due to northerly winds.

Note the dark red barge on the SEB at the central meridian (CM). This feature was still very prominent months after its merger. The NEB looked quiet in this region and it was very narrow here.

Feb. 12. Condition was still variable today.



The Great Red Spot (GRS) was rising on these images. The GRS still had a strong color. There was a lot of rift activity on the NEB. The NTB was active in this region. The bluish STB ghost was also very prominent.

Feb. 20. I had a very frustrating imaging session today.

(⇨ *p. 41*)

The sky was clear but we had some turbulence so I started taking methane band images. After taking the methane band image, the sky turned overcast. I had to wait for almost half an hour before I had a small break to capture some RGB. Then it was overcast again. I was about to give up after waiting for more than half an hour. I'm glad I waited.

The GRS was well resolved. It had a very strong red color. Note the dark features overflowing from the GRS. Note that there were no outbreaks in the wake following the GRS. The SEBn was losing color! Was a fade starting?

White Spot Z was very prominent on the NEBn. The region following this spot was wider than the region preceding it. The South Polar red spot could be seen below the GRS.

Now here was the reason I'm glad I was patient that evening. Note the small reddish (DS5) spot embedding on the STB Spectre - DS5 had faded a lot!

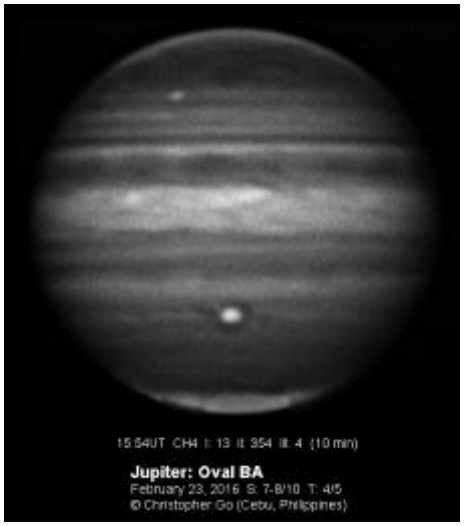
Feb. 23. 10 years ago on February 24, 2006 (Feb 25 Philippine Time), I was late in imaging Jupiter because I overslept. This was fortuitous because I was able to be the first to image red Oval BA rising on Jupiter's disk. 10 years later, my little red spot is still red!

Red Oval BA 10th Anniversary! Here is a high resolution image of Jupiter's Red Oval BA, aka Red Spot Jr. I used close to 40 minutes of data, which were derotated then deprojected using Winjupos.

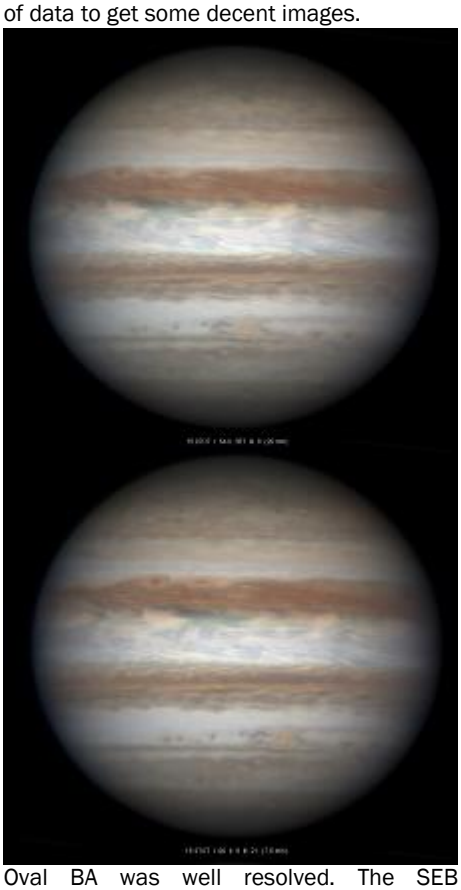
Seeing was excellent this morning except for 20 minutes when Oval BA was at the Central Meridian (CM), during which time seeing suddenly turned very bad.

Oval BA still had a dark red ring. Note the complex feature following Oval BA. The SEBs was very active due to the wake of the GRS.

The NEB had a very dark red color with a lot of rift activity.



Feb. 28. Seeing was very challenging today because of the cold front. I had to use a lot of data to get some decent images.



Oval BA was well resolved. The SEB continued to have complex activity on its edges. The NEB looked quiet in this region. - Christopher Go, Cebu

Deep Sky

Pleiades

Using my brother's Canon SX50, in combination with the Vixen Polarie, I was able to image the Pleiades and the planet Jupiter with its Galilean Moons (*page 39*). - Christopher Louie Lu

Orion.

Alnitak Region of Orion (Practice shots), replete with nebulosity that framed the Horsehead nebula (⇨ *p. 42*).

Imaged with a Canon 650d with 55-250 mm lens at 250 mm. 52 mins exposure (86 light frames, 10 dark frames, 10 flat frames, and 10 bias frames) at ISO 1600.

Canon 650d with 55-250mm lens at 250 mm. Frames: 20 light, 30 dark, 30 bias, stacked in DSS, and enhanced in CS3. – Val Abapo

Not my usual imaging target. Here is an image of M42 using an unmodified Nikon D5200 and a 180mm f/2.8 lens. ISO 1250 and 11 X 10s exposures.

- Christopher Go, Cebu

IC 2177

IC 2177 is a colorful star forming region in Monoceros. It is the "head" of the more wide spread Seagull Nebula. There is a small but distinct doughnut-shaped object in the center of the upper right quadrant that I have not been able to identify even though the SIMBAD Astronomical Database. Perhaps someone can help identify it? - John Nassr, Baguio

Owl Nebula

M97 is a nice example of a planetary nebula. It is well-sized, though smaller (about half the size) than the Dumbbell Nebula (M27). Specifically, according to the SEDS Messier database (http://messier.seds.org), the dimensions of M27 are 8.0 x 5.7 arc-minutes, while M97 is 3.4 x 3.3 arc-minutes in size.

M97 is well-placed in the northern sky, sitting "under" the bowl of the Big Dipper. This object is the gaseous outer envelope of a star similar in mass to our Sun that has completed its red-giant phase.

Undergoing a process that is still not well-understood, the outer layers of the red giant are being ejected by the object's central star. Ultraviolet and other radiation from the central star excite the atoms of the gas being ejected, causing it to glow and revealing the object to us.

Planetary nebulae don't glow for very long by cosmic standards. Estimates are that they glow for a few tens of thousands of years, which is a blink of an eye, given a star's typical lifetime of a few billion years.

The reason for the relatively short lifetime of planetary nebulae is that as the central star settles down to its white dwarf phase, the radiation that causes planetary nebulae to glow also fades and the gases stop glowing. Given M97's estimated age of 8,000 years, we better enjoy this object while it lasts!

M97 is nicknamed the Owl Nebula, thanks to an illustration by William Parsons, the 3rd Earl of Rosse. His observation and hand-drawn illustration resembled an owl's head, most likely from the two dark lobes visible even in my image.

Source: Wikipedia, Seds database

Constellation: Ursa Major
When Visible: January - July
Distance: 2,000 Light-years
Date: March 2014
Location: Rancho Hidalgo, New Mexico
Exposure Details:
Luminance: 17 x 10 Minutes Binned 1x1
H-Alpha: 22 x 30 Minutes Binned 1x1
R: 13 x 10 Minutes binned 1x1
G: 13 x 10 Minutes binned 1x1
B: 13 x 10 Minutes binned 1x1

Equipment used: 12.5" PlaneWave CDK on a Software Bisque Paramount ME mount. SBIG STL-6303 camera with 5-position filter wheel and Astrodon LRGB filters.

Acquisition Software: MaximDL, CCDAutopilot 5, TheSky6, FocusMax
Processing Software: Software: MaximDL, Adobe Photoshop CS5 Gradient Xterminator, Carboni Tools, IrFanView

IC 447 and the Cone Nebula Region

This widefield shot (*next page*) showcases a couple of my favorite and often-shot objects, namely the Cone Nebula/Fox Fur Nebula to the upper right, and the dark complex I've affectionately dubbed the Philippine Nebula towards the lower right. It also includes IC 447, the largish blue nebula left of center. The comet-like blue nebula standing out in the sea of red emission towards the upper right is NGC 2261, known as Hubble's Variable Nebula.

IC 447 is a reflection nebula, glowing blue from the light of stars reflecting off its gas and dust. IC 447 is also known as Dreyer's nebula, and is thought to be part of the same cloud of gas and dust that encompasses the Cone and Fox Fur nebulae.

Constellation: Monoceros
When Visible: December - April
Distance: 2,600 Light-years
Date: January 2014
Location: Rancho Hidalgo, Animas, NM
Exposure Details:
L :19 x 10 Minutes Binned 1 x 1
Red: 9 x 10 Minutes Binned 1x1
Green: 9 x 10 Minutes Binned 1x1
Blue: 9 x 10 Minutes Binned 1x1

Equipment Used: Takahashi FSQ-106N on an Astro-Physics AP1200GTO mount. SBIG STL-11000 camera with FW8-STL filter wheel and Astrodon LRGB and narrowband filters. Robofocus focuser and Astrodon Takometer rotator.

Acquisition Software : MaximDL, TheSky6, CCDAutopilot 5, FocusMax
Processing Software: MaximDL, Photoshop CS5, Carboni Actions, IrFanView
- Eric Africa

(⇨ *p. 43).*

See if you can identify the various features that Eric had mentioned.

- Philippine nebula (dark nebula)
- IC 1447 (emission nebula)
- NGC 2261 (Hubble's Variable Nebula)

Gravitational Wave Astronomy Will Be The Next Great Scientific Frontier

By Ethan Siegel

Imagine a world very different from our own: permanently shrouded in clouds, where the sky was never seen. Never had anyone seen the Sun, the Moon, the stars or planets, until one night, a single bright object shone through.

Imagine that you saw not only a bright point of light against a dark backdrop of sky, but that you could see a banded structure, a ringed system around it and perhaps even a bright satellite: a moon. That's the magnitude of what LIGO (Laser Interferometer Gravitational-wave Observatory) saw, when it directly detected gravitational waves. An unavoidable prediction of Einstein's General Relativity, gravitational waves emerge whenever a mass gets accelerated. For most systems -- like Earth orbiting the Sun -- the waves are so weak that it would take many times the age of the Universe to notice. But when very massive objects orbit at very short distances, the orbits decay noticeably and rapidly, producing potentially observable gravitational waves. Systems such as the binary pulsar PSR B1913+16 [the subtlety here is that binary pulsars may contain a single neutron star, so it's best to be specific], where two neutron stars orbit one another at very short distances, had previously shown this phenomenon of orbital decay, but gravitational waves had never been directly detected until now.

When a gravitational wave passes through an object, it simultaneously stretches and compresses space along mutually perpendicular directions: first horizontally, then vertically, in an oscillating fashion. The LIGO detectors work by splitting a laser beam into perpendicular "arms," letting the beams reflect back and forth in each arm hundreds of times (for an effective path lengths of hundreds of km), and then recombining them at a photodetector. The interference pattern seen there will shift, predictably, if gravitational waves pass through and change the effective path lengths of the arms.

Over a span of 20 milliseconds on September 14, 2015, both LIGO detectors (in Louisiana and Washington) saw identical stretching-and-compressing patterns. From that tiny amount of data, scientists were able to conclude that two black holes, of 36 and 29 solar masses apiece, merged together, emitting 5% of their total mass into gravitational wave energy, via Einstein's E = mc2 (⇨ *p. 44).*

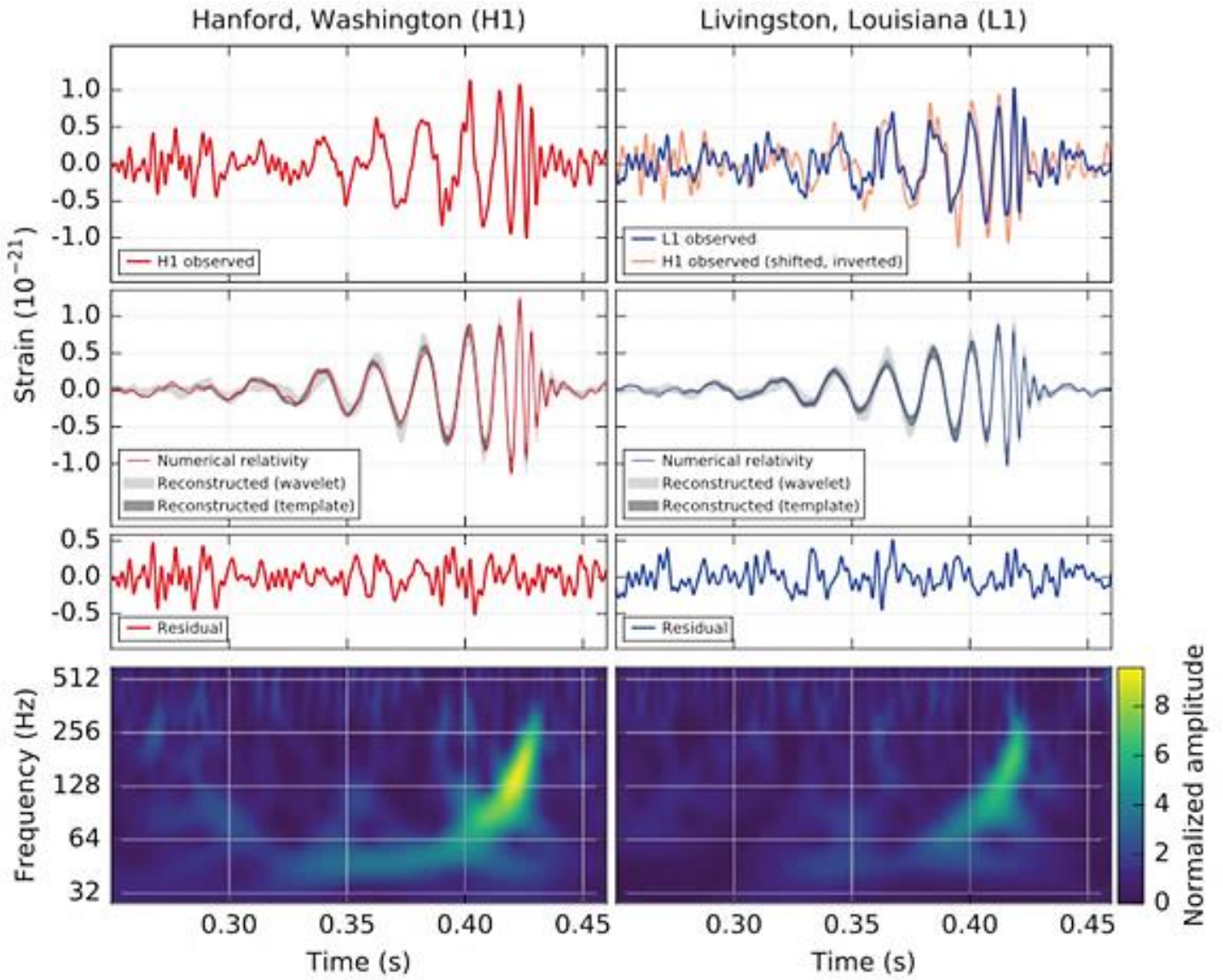


Image credit: Observation of Gravitational Waves from a Binary Black Hole Merger B. P. Abbott et al., (LIGO Scientific Collaboration and Virgo Collaboration), Physical Review Letters 116, 061102 (2016). This figure shows the data (top panels) at the Washington and Louisiana LIGO stations, the predicted signal from Einstein's theory (middle panels), and the inferred signals (bottom panels). The signals matched perfectly in both detectors.

During that event, more energy was emitted in gravitational waves than by all the stars in the observable Universe combined. The entire Earth was compressed by less than the width of a proton during this event, yet thanks to LIGO's incredible precision, we were able to detect it. At least a handful of these events are expected every year. In the future, different observatories, such as NANOGrav (which uses radiotelescopes to measure the delay caused by gravitational waves on pulsar radiation) and the space mission LISA will detect gravitational waves from supermassive black holes and many other sources. We've just seen our first event using a new type of astronomy, and can now test black holes and gravity like never before.

This article is provided by NASA Space Place. Visit http://spaceplace.nasa.gov *to explore space and Earth science.*

What's Up in April

April is typically a month where clear skies at night help to get a lot of observers out and about before the hot and humid month of May brings poor seeing and afternoon and late night thunderstorms (which can make for some very dramatic views, though).

Elusive Mercury pops out of the western horizon after sunset, offering an opportunity to see the fleetest of the planets, and one that is usually not observed by casual observers. You can use Aldebaran, to its upper left, as a marker, but make sure you don't confuse it for the Eye of the Bull.

Venus is lost in the glare of the Sun, and will reappear in the western sky after sunset, but not for a few more months – wait till August before it becomes evident.

Mars rises in the late evening and is high up over Antares, its rival (Anti-Ares, "Ares" being the Greek form of "Mars"), before dawn. Mars continues to brighten and become larger on its way to opposition on May 22.

Jupiter continues to blaze brightly almost all evening long, setting in the west before sunrise. On April 17-18, the waxing gibbous Moon pays Jupiter a visit.

Saturn joins Mars for an orange-red triumvirate with red Antares in the early mornings. The waning gibbous Moon joins the trio on the early mornings of April 25 and 26. Try to catch these luminaries.

On April 9, try to catch the thin crescent Moon and Mercury close to each other.