Spring 2013
Issue 101

Quarterly

www.bpastro.org Bainbridge Island, WA

Events Calendar

(unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

MARCH

March 10 Daylight "Saving" Time begins. Comet C/2011 L4 Pan-STARRS at perihelion

March 11 ●

March 20 Vernal Equinox (4:02 a.m. PDT)

March 24 Comet C/2012 F6 at perihelion

March 27 ○ (2:27 a.m. PDT)

APRIL

April 10 ●

April 13 7:30 p.m. Planetarium Show and Stargazing (open to the public)

April 22 Lyrid meteors peak

April 25 ○ (11:57 a.m. PDT) Partial Lunar Eclipse (Eastern Hemisphere)

April 28 Saturn at opposition

MAY

May 9 ● Annular Solar Eclipse (Solomon Islands)

May 11 8:00 p.m. Planetarium Show and Stargazing (open to the public)

May 24 ○ (8:25 p.m. PDT) Penumbral Lunar Eclipse (barely)

May 25-27 Conjunction of Venus, Jupiter, and Mercury

JUNE

June 8 ● 8:30 p.m. Planetarium Show and Stargazing (open to the public)

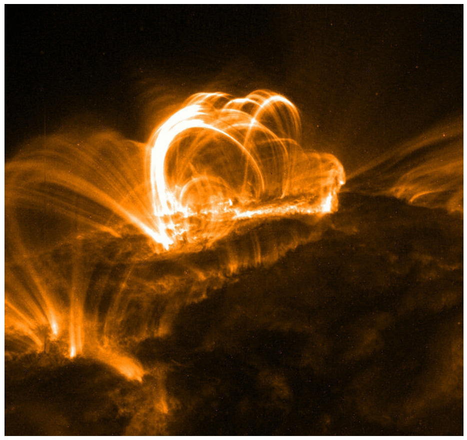
June 16 50th anniversary, first woman in space (Valentina Tereshkova)

June 18 30th anniversary first US woman in space (Sally Ride)

June 20 Summer Solstice (10:04 p.m. PDT)

June 23 ○ (3:32 a.m. PDT) Largest tidal swing of the year

June 30 105th anniversary Tunguska (meteor) explosion



Solar flare. Image credit: NASA

Hope for Stormy Weather

CALENDAR NOTES: Subtle astronomical events grace 2013's springtime skies. We've an invisible Lunar Eclipse, a pair of dimming comets, a triple planetary conjunction obscured by twilight, the often-missed Zodiacal Light, weakening chances for Aurora Borealis, and, as happens every spring, the ascendancy of the Coma-Virgo cluster of galaxies, a glorious concentration of "bright" extragalactic lights, that hopefully won't leave too many of its telescopic observers lost in disappointed aperture lust. With determination, imagination, and cooperating weather you can enjoy these events. But note that cooperating weather doesn't simply mean calm.

There is the oft-observed consolation prize that stunning skies frequently emerge after a seemingly interminable storm finally sweeps the air clean. But let's think larger. Weather is not simply an Earth phenomenon. The Sun storms too. Although debate continues, and no one will know for certain until after it has come and gone, it seems likely that we are now at the absolute peak of Solar Cycle 24. If so, and if the observed trends continue, this spring's Solar Maximum may be the best chance any of us will have for catching naked-eye sun spots and the Aurora Borealis for a great many years. Yes, Solar Cycles wind down gradually. Next year may still be relatively strong. But, as it appears we are at the height of the weakest Solar Cycle of the past one hundred years, and several forecasts suggest the next eleven year cycle may be even weaker, prudence suggests maximizing every opportunity now. The telescope pads on the berm outside our Ritchie Observatory offer a surprisingly good vantage, due to their long northern horizon. I saw one faint, but exhilarating, midnight display from there last summer. To gauge when you should look, try SpaceWeather.com for the latest "information about the Sun-Earth environment."

In addition to clear Earth skies and stormy Sun, a far-reaching interpretation of "cooperating weather" might also encompass turbulent outer space events, such as cometary flybys and meteoric rains-from-the-sky. Two naked-eye comets are currently wowing Southern Hemisphere viewers and about to reach perihelion and cross into our northern skies, Comet C/2011 L4 Pan-STARRS, and Comet C/2012 F6 Lemmon. Just after perihelion, a word which literally means "near Sun," comets are often at their brightest, but are also uncomfortably close to the horizon and too frequently drowned in twilight and atmospheric haze. Lemmon will arrive in morning twilight, arguably the less desirable choice for Bainbridge Island observers. Although our island has easily reachable eastern shores with long unobstructed horizons, morning apparitions face two serious strikes. The first, getting up long

Calendar Notes *con't on page 2*

before dawn, is not generally considered a legitimate complaint for an amateur astronomer (although I've certainly complained, and, occasionally, gone back to sleep). The second, and more serious drawback, is that directly east, where Lemmon will rise, lies Seattle—a damnable source of comet-killing light pollution.

Fortunately Pan-STARRS will emerge west, in the evening. Although initial expectations for a magnitude zero comet have recently been downgraded to magnitude 3, it should still be a fine binocular sight. The trick is finding the right vantage. Much of our island's long western shore is too near the Kitsap Peninsula to give an acceptably low horizon. A good metric is whether or not the Olympic Mountains are viewable. By this measure Crystal Springs, and pretty much the entire south half of the island, fails. Fortunately, north of Fletcher Bay the channel widens. Another local difficulty is trees, most easily avoidable by taking to the beach. Two reasonably good observation beaches are at the Skinner Street and Beach Street road ends. Conveniently, both are within walking distance of the Observatory—especially helpful since neither allows parking.

Whether or not you snag Pan-STARRS, any effort toward finding a suitable western horizon will be good preparation for late May's triple-triple conjunctions of Venus, Jupiter, and Mercury. No, triple-triple is not an official term; but these three will be especially close for three days in succession. They will be stunning.

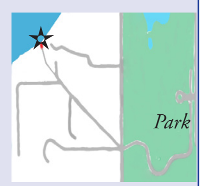
As Chelyabinsk reminds us, meteoric weather is less predictable. While lunar illumination interference can be precisely quantified, and the moment of most shower's peaks is well predicted, individual meteors appear according to their own schedule. All one can do is watch (or, for those with suitable equipment, listen) and wait. Humans have recorded this spring's first major shower, the Lyrids, longer than any other, for over 2600 years. Lyrid rates are generally low, and this year the moon will interfere until just before dawn; but considering that in 1803 observers reported seeing 700 meteors per hour, and the amazingly long history the Lyrids possess, this is always a shower to watch.

Watching won't enable viewing of May 24th's Penumbral Lunar Eclipse; Earth's shadow will be too far off-center to be visually seen on the moon. Yet, looking at its full moon, one may ponder the geeky significance that this invisible eclipse marks the beginning of a sesquicent moment, the first eclipse of saros cycle 150. A saros is a period of just over 18 years when the eclipse-producing alignment of Earth, Sun, and Moon (nearly) repeats. This repetition makes saros cycles the primary tool of eclipse prediction. Since each saros cycle lasts for over 1000 years as it crosses from one end of the Earth to the other, and since saros cycle 1 was arbitrarily assigned to the long-ago year 2000 BCE, this is a rather momentous, if wonky, event. (For those who just ran the division and wonder why this isn't a much smaller number, perhaps saros cycle 5, note that there are always many saros cycles running simultaneously.)

Fortunately, in spite of the many difficulties, unpredictabilities, and sometimes downright impossibilities of observing this spring's celestial highlights, the unquestioned telescopic showpiece of the night sky finally achieves opposition. Saturn never disappoints. A telescopic view of the faint galactic nits adorning Berenice's Hair can certainly inspire great awe and wonderment. But one must bring a great deal of fore-knowledge to the observation to appreciate that those murky smudges each teem with billions of (potentially) life-giving Suns; without that knowledge the objects themselves can be rather unimpressive. Not so with Saturn. I'm not entirely sure why. NASA photos are always more impressive than what one sees visually. Yet Saturn is the one object that always causes the, "Oh my God, I can see the rings!" reaction, regardless the telescope. I shall never forget my first 60mm sight of those amazing rings. Nor shall I ever tire of them.

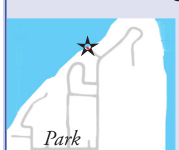
To see Saturn for yourself, and learn more about our amazing universe, join us at any of our always open-to-the-public Planetarium Show and Stargazing events. They're every second Saturday (but check the calendar for times), regardless the weather.—*Cheth Rowe*

Walking Directions to Skinner and Beach St. Road Ends



Skinner Street Road End

The Skinner St. Road End is a short, level, one-tenth mile walk from the foot of Skinner St. to its magnificent Olympic view beach. As at Beach St., the trail is announced by both a "Parking Prohibited" sign and the more welcoming "Shore Access." Skinner St. itself is conveniently located directly across Battle Point Dr. from the turn-off to the Ritchie Observatory. The turn-off is a five-way intersection; Skinner St. is the one that slants down toward the Sound. Figure a five minute walk (maybe slightly longer on the way back up).



Beach Street Road End

To reach the Beach St. Road End, travel 0.3 miles beyond Frey, the north end of the park, along Arrow Point Drive. On your right you may notice a low, moss covered, carved sign proclaiming "Arrow Point." Beach St. is about 100 feet further, on your left. Beach St. is short, a scant 200 feet long. Its Road End trail is even shorter—a nine-rung stairs. The beach itself is easy to denigrate. There's a washed up tire, a decaying green-plastic rowboat, a scrub alder that always seems to be in the way, all in a rather uncomfortably narrow space squashed between neighboring beachfront estates. There are annoying motion sensor lights on the property to the north. Yet this beach has actual sand, unlike its rock walled neighbors. And it has views.

Road End aficionados will note that between these two lies a third Road End, harder to reach at nighttime, but deserving of its name, "Fairy Dell."

Arduinos for Total Newbies class, San Francisco Maker Space Noisebridge

Making It on Bainbridge Island

MARCH 2013: It's spring, and maker spaces are in the air, or at least, under development on Bainbridge Island. Maker spaces, sometimes called hacker spaces, are workshops where makers gather to build, invent, or take things apart. There are about 200 in the United States: Seattle spaces include Metrix Create: Space *http://metrixcreatespace.com/*, Jigsaw Renaissance, *http://www.jigsawrenaissance.org/*, and Hackerbot Labs, *http://www.hackerbotlabs.com*. (Comprehensive list at *http://hackerspaces.org/wiki/Seattle*)

The essence of maker spaces is creative play with technology, collaboration, and self-directed, hands-on learning. They attract budding technologists and teach crucial STEM (science, technology, engineering, mathematics) concepts. DARPA, the President, educators, libraries, and museums have taken notice of this grass-roots movement. The American Library Association devoted a convention day to maker spaces *http://americanlibrariesmagazine.org/inside-scoop/midwinter-s-maker-monday-builds-new-bridges-between-libraries-and-communities*. The Exploratorium, The New York Hall of Science, and the Oregon Museum of Science and Industry are all building them.

Ideally, maker spaces provide tools, mentors, and community. It's easier to make things than ever before—amazing things, things only you can imagine—if you have the right tools, and can learn to use them. Computer-controlled devices, such as CNC routers and 3-D printers, can manufacture objects directly from design software. Cheap micro-controllers and single-board computers like Arduinos and Raspberry Pis require only rudimentary programming skills, allowing clever makers to computerize almost anything, creating light-up clothes, *http://www.lizbaumann.com/tag/arduino/*, clockwork sundials *http://www.youtube.com/watch?v=WXNLULFqoTM*, and even automated panhandlers, *http://www.chriseckert.com/Sculpture/037_gimme/gallery.shtml*, for those essential donations.

These tools are constantly improving and becoming cheaper. But the best thing about maker spaces is serendipitous learning from other makers, the same kind of learning that inspires Google and inspired Bell Labs.

Here on Bainbridge, the school district has agreed to rent four Commodore classrooms to BARN (Bainbridge Artisan Resource Network). The group is reserving one room for an electrical/technical maker space. BARN is also working on fundraising, designing, and building a much larger, permanent center on New Brooklyn Road. They are still refining their ideas on the maker space; if you are interested, email Angela Williams at BARNMakerSpace@gmail.com or contact BARN at info@bainbridgebarn.org.—*Vicki Saunders*

More Fixes for the 16" Telescope

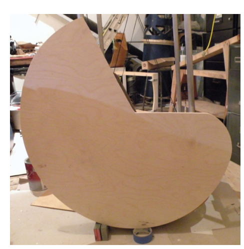
New discoveries happen all the time! We discovered that the new secondary cage + new finder scope + new secondary mirror holder + heavier oculars make the existing altitude friction bearings fail at lower elevations.

In order for the telescope to balance at all elevations it looked as if it would be necessary to rebuild the entire bottom half (mirror box and rocker box), thus enabling the raising of the telescope bearing on the mirror box—but the mirror box is not tall enough to allow that, and if we made it taller, it would also require a taller rocker box to accommodate it.

A lot of work to do that, so we thought we'd try something else, such as springs, lines and weights, or using felt pads for the bearing surface (tried the pads, didn't work), brake shoes, clamps, what else can we think of?

$f(x)= 7.25\sin x+15$. What? The what else is a new curve for a bearing.

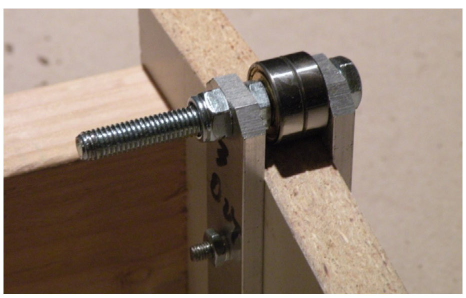
The altitude bearing's old curve.



The new curve.

Dave Janich and I found the new balance point was 7.25 inches above the top of the mirror box. We took into account the placement of the existing bearing and where the balancing point was for the vertical and where it needed to be for the horizontal. With that information we used the formula $7.25(\sin x) + 15$ to arrive at our net curve. (x from 90 to 0 degrees, 15 the radius of the old circle bearing, and 7.25 being the new balance point. Toward the bottom of the bearing when the telescope is toward the horizontal positions, the new curve crashes into the old curve. In order to prevent this we elongated the sine curve, joining it to the old circle at the 45 degree mark with a tangent line. The new curve looks like a Pac Man, what can I say? We made a mockup and attached it to the telescope and it works great!

But alas, another problem developed. The increased movement of the rocker box (it actually moves horizontally 7.25 inches) requires roller bearings to move the telescope. Skate board bearings are the answer. The telescope balances fantastically throughout its range and *without friction*. But the wind will blow it around and changing eyepieces will unbalance the scope, so we will come up with some friction pads and a sliding weight system to allow for those conditions. We'll cover the wearing edge of the plywood bearings with a 1/16 inch thick aluminum bar.



Skateboard bearing

This curve solves our problem of balancing the 16 inch and I'd like to say it was my idea, but I saw this curve on a scope at the Oregon Star Party about 10 years ago. This curve is not needed in a new telescope that is designed with a taller rocker and mirror box.

So keep looking up!—*Nels Johansen*

Steve Ruhl President's Message: Coursera

Coursera allows universities to offer courses online to anyone who wishes to take them for FREE. The universities are top line schools such as Stanford, Duke, Brown, and the University of Washington. The courses offered include a multitude of disciplines: Physical and Biological Sciences, Math, Computer Science, Finance, Economics, Physiology, Engineering, Social Science, Music, Agriculture, Ecology, English, etc. Currently they list 325 courses. Some are equivalent to University courses, and coordinate with school calendars, some are shorter and more informational. For the most part, courses consist of lectures with Powerpoint presentations. Depending on the course, they may include readings, quizzes, homework, tests and finals. You are taking a college course and doing the work. You are just not getting the college credits. I signed up for Galaxies and Cosmology (G&C), offered by the California Institute of Technology, and taught by S. George Djorgovski, *http://tinyurl.com/G-Ccaltech*

I took G&C as an undergraduate and felt ripped off. The professor, Greg Benford, was trained as a Plasma Physicist but his great passion is writing science fiction. I believe he finagled his way into teaching G&C as a way of teaching himself something about cosmology to improve his science fiction. Anyway, the class was an easy A, but a huge disappointment on content.

The Coursera class is the class I would have wished for at that time. Of course, Cosmology has progressed. In 1977, Cosmology was a pseudo-science where getting an answer within an order or two of magnitude was considered a success. With the precision of the Cosmic Microwave Background, the digital sky surveys, and a multitude of other sources, Cosmology has become a much more precise science.

I loved the course. The biggest disappointment was that the professor got the flu in the middle and was unable to do lectures for about ten days. (He looked really pale the first lecture after he came back.) The course covered the basics of relativistic cosmology, distance, age of universe, early universe, large scale structure, and the nature of galaxies. The course claimed to require two or so years of calculus, but the deepest it went was a little Fourier analysis and the resulting power functions. It did not require you to do the math and the professor did a good job of explaining what the math meant. Not knowing all the math would have had little impact on a student's general understanding.

The study of Cosmology does look at general relativity, which sounds terrifying to many, what with all of its tensor fields. But the first thing you do is assume the Cosmological Principle; at a given time, the universe is the same everywhere and in all directions. That assumption greatly simplifies general relativity.

If you are interested in something that Coursera offers, I would recommend signing up for it. There is great upside potential and virtually no down side. One of the great things about Coursera is that if you get in over your head, you can always un-enroll. Coursera, *https://www.coursera.org/*, is now one of my favorite sites. You can be sure that I will be taking a variety of courses in the future.

Any member who is planning to observe can invite others to join in by sending an email to *bpaa@yahoogroups.com*. To join our email group, send an email with your name to *bpaa-owner@yahoogroups.com* and we can enroll you. If you want to have web access to the messages and files, you can join the Yahoogroups by clicking the register link for new users on *http://groups.yahoo.com/*. Request to join at *http://groups.yahoo.com/group/bpaa/*. The system will send us a message, and we'll approve your request after we verify your membership.

Seeing Stars

Hubble's Photos

Astronomy .001

They're not pictures of our families; they're not pictures of strangers in dramatic situations. In fact, they're totally impersonal. So why are Hubble Space Telescope photographs so compelling?

Hubble weighs two tons and circles above the Earth about 350 miles up, going 17,500 miles an hour while the Earth itself is traveling 67,000 miles an hour around the Sun. The data arrive at the speed of ten billion bytes a day. The telescope is held steady to seven thousandths of an arcsecond by six gyroscopes. (Two arcseconds would be about the angle created by a dime seen from the distance of a mile.)

Hubble's equipment includes specialized cameras, spectrographs, a photometer, and guidance sensors. Its major camera, the Wide Field Camera 3, is fitted with multiple CCDs, two for covering wave lengths from 200 nm to 1,000 nm; two for infrared, along with broad and narrow band filters, and prisms and grisms (a prism with a grating) which produce wide field and low resolution and spectrographs; and two for visible light, plus a separate detector for the ultraviolet spectrum. The data all carry a time signal. The information goes first to the ground station in White Sands, NM, then to the Goddard Space Flight Center in Greenbelt, MD where controllers check Hubble's health and its operations. From there it goes to the Space Telescope Science Institute in Baltimore, MD where the raw data is translated into wavelengths and brightness. (For a more detailed description of the raw data see *http://tinyurl.com/nasasatdata*)

The information is cleaned of its random dust—cosmic rays, background noise, etc. Specialists manipulate it to bring out details in the variations of brightness. Only then is color added. Three separate filters, red, green, and blue, are superimposed. The information may show evidence of a particular element—hydrogen, for instance—so the specialists may use the color red in that part of the field. If there are two elements present that give off a similar color, they use their discretion in choosing the colors to keep them distinct, and they are not always the same. Sometimes the picture is turned upside down (that is, north is not always at the top) to give the best view or balance. Because the pictures are enlarged and can show light that would be outside our visual range, they go way beyond what we would see if we were sitting in the Hubble looking through the telescope.

A committee reviews the 2,000 projects submitted each year, chooses 200 of them, and schedules the time allowed, down to the second. Some of Hubble's pictures have been of objects in our Solar System, but many are of distant objects many light years away.

The Hubble Space Telescope is the longest operating observatory in space: Launched on April 25, 1990 from NASA's space shuttle Discovery, it has been rescued several times just when it

Stellar breeding ground in 30 Doradus, located in the heart of the Tarantula Nebula. Early astronomers nicknamed the nebula because its glowing filaments resemble spider legs.

30 Doradus is the brightest star-forming region visible in a neighboring galaxy and home to the most massive stars ever seen. The nebula resides 170,000 light-years away in the Large Magellanic Cloud, a small, satellite galaxy of our Milky Way. No known star-forming region in our galaxy is as large or as prolific as 30 Doradus.

The composite image comprises one of the largest mosaics ever assembled from Hubble photos and includes observations taken by Hubble's Wide Field Camera 3 and Advanced Camera for Surveys. The Hubble image is combined with ground-based data of the Tarantula Nebula, taken with the European Southern Observatory's 2.2-meter telescope in La Silla, Chile. NASA and the Space Telescope Science Institute released the image to celebrate Hubble's 22nd anniversary.

The colors represent the hot gas that dominates regions of the image. Red signifies hydrogen gas and blue, oxygen.

Hubble imaged 30 separate fields, 15 with each camera. Both cameras were making observations at the same time. Hubble made the observations in October 2011.

Credit: NASA, ESA, D. Lennon and E. Sabbi (ESA/STScI), J. Anderson, S. E. de Mink, R. van der Marel, T. Sohn, and N. Walborn (STScI), N. Bastian (Excellence Cluster, Munich), L. Bedin (INAF, Padua), E. Bressert (ESO), P. Crowther (University of Sheffield), A. de Koter (University of Amsterdam), C. Evans (UKATC/STFC, Edinburgh), A. Herrero (IAC, Tenerife), N. Langer (AifA, Bonn), I. Platais (JHU), and H. Sana (University of Amsterdam)

"The Mice" (NGC 4676): Colliding Galaxies Stream Stars and Gas Credit: NASA, H. Ford (JHU), G. Illingworth (UCSC/LO), M.Clampin (STScI), G. Hartig (STScI), the ACS Science Team, and ESA

seemed about to be terminated. Only weeks after it began sending pictures back to Earth scientists knew its large primary mirror was flawed. Thanks to the fact that Hubble had been built to be repaired, NASA could create the replacements to correct and upgrade the machine. With its continuing maintenance, Hubble is a hundred times more powerful today than it was in 1990.

Hubble has found more than was even expected of it. Perhaps its most lasting gift—and most unexpected—has been the public's growing appreciation of the beauty found in outer space.

The first pictures were black and white; it took several years for the scientific community to realize the impact they could make by adding colors. In 1994, less than a year after it was performing correctly, it showed us the impacts of Shoemaker-Levy 9 comet fragments on Jupiter. Those splatters raised the troubling question of "What if?" Hubble now sends pictures of the lasting scars.

The first full color pictures came in 2002; they were of the Mice Nebula in Coma Berenices, the Cone Nebula in Monocerous, the Tadpole Galaxy in Draco and the Swan Nebula in Sagittarius. They and the later pictures of the Eagle Nebula in Serpens gave the public a vision of cosmic wonders and sparked greater appreciation of astronomy.

For all the importance of that, Hubble's images have been far, far more than mere publicity for a scientific discipline. Its contributions have ranged from providing detailed information on Mars landing sites for the Pathfinder robot to, more recently, finding evidence of dark energy, critical information for understanding the evolution of the universe.

To list only a few of its major contributions, the Hubble Space Telescope

- has challenged astronomers and Congress to think creatively beyond our conventional world;
- has taken pictures of stars being formed, helping us realize that even the stars billions of light years away are similar to local stars;
- has identified black holes and showed gas and stars whirling around to be engulfed in them at almost the speed of light;
- has photographed a supernova, 1997ff, that exploded 10 million years ago, and revealed that the universe slowed down after the initial explosion;
- has shown the evolution of galaxies;
- by focusing on a point for ten days, has created a "Deep Field" picture of stars more than 12 billion years away, revealing irregularly shaped galaxies, unlike more recent structures;
- with both its Deep Field pictures and those of white dwarfs in the Milky Way, has given astronomers the information both to estimate the age of the universe at 13.75 billon years and to judge that recently the universe has been expanding more rapidly;
- has examined the chemical composition of the atmosphere of planets outside our Solar System and determined whether they have had the elements necessary for life.

Starting out as an Ugly Duckling with its telescope's primary mirror suffering from spherical aberration, Hubble has become a Magic Swan gliding around the Earth every 97 minutes. It has charmed the public with its visions of cosmic wonders and surprised the astronomers with public appreciation.

Why do we find the Hubble discoveries and the photographs so compelling? Is it the creative turbulence in the Eagle Nebula? The violence in the supernova explosions? The graceful ballet in the arms of the Whirling Galaxy? The mind-boggling distances? The magnificence of the billions and billions of celestial objects? Hubble's continuing ability to reveal something new? Or the terrifying possibility that the next space object may not be as relatively kind to us as the one that blew up near Chelyabinsk on February 15?

Or is our compulsion to look because we see ourselves mirrored in each of these events? —*Anna G. Edmonds*

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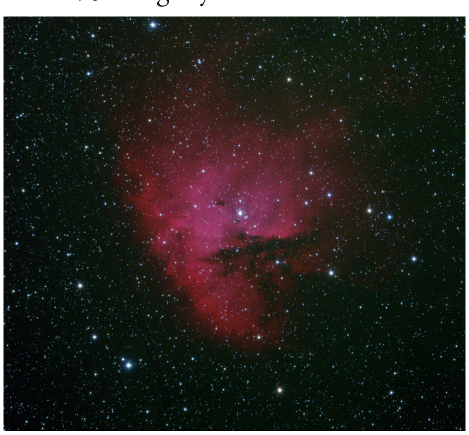
The Long Grey Gap

The end of last year saw a lapse in my astrophotographic efforts. The hiatus was one of those hazards of living in the Pacific Northwest. The clouds rolled in in October and I was unable to get another piece of clear sky for three months.

I have been experimenting with various combinations of filters to obtain colors. When I am photographing an emission nebula, the Hydrogen Alpha (Ha) emission can capture a lot of detail and structure. Ha is red so I have been using it to represent the red portion of the spectrum. This is the case with the picture of IC5146, the Cocoon Nebula. IC 5146 is in Cygnus and spans about 15 light years across. The dark molecular cloud nebula B168 trails behind it.

IC 5146, the Cocoon Nebula 8/5/2012 Ha(as Red) 10 300s exposures, Green & Blue 8 300s exposures (Total exposure time: 90 minutes)

NGC 281, the Pacman Nebula, is also an emission nebula and shot in a similar manner. It is located in Cassiopeia and is about 9500 light years distant.

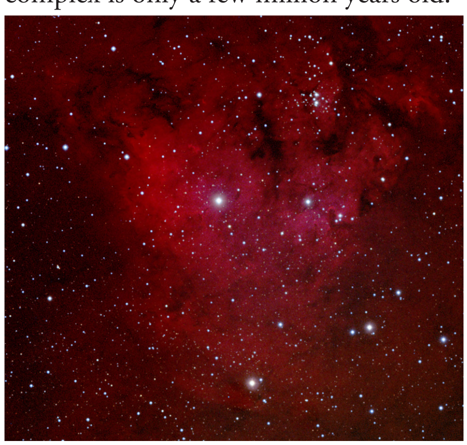


NGC 281, the Pacman Nebula 9/11/2012 Ha(as Red) 8 600s exposures binned 1x1, Green & Blue 9 300s exposures binned 2x2 (Total exposure time: 170 minutes)

NGC 7023 the Iris Nebula, is a reflection nebula, a different beast. The radiation emitted by the central young hot star is scattered by the surrounding gas, in the same way our atmosphere scatters sunlight and turns the sky blue. The shorter wave length of blue light scatters more easily than longer wavelengths, so this nebula glows more predominately in blue. As a result, a Ha filter would not be of value. This photo is constructed with the more conventional LRGB filters. NGC 7023 is in Cepheus and is about 1,300 light years distant.

NGC 7023, the Iris Nebula 10/7/2012 Luminosity 10 300s exposures, Red, Green & Blue 14 300s exposures, all binned 1x1 (Total exposure time: 260 minutes)

Fast forward to January and the Long Grey Gap has a brief respite. NGC 7822 (also known as Sharpless 171) is a star forming region in Cepheus with significant Ha emission. The whole complex is only a few million years old.



NGC 7822 1/15/2013 5 300s exposures in Red, Green & Blue binned 2x2 & 5 600s exposures in Ha (Total exposure time : 135 minutes)

IC 1848 (or Sharpless2 -199) is the Soul Nebula in Cassiopeia. It is a star forming emission nebula that is about 7,500 light years distant and lies just to the east of the Heart Nebula (i.e., the Heart and Soul Nebula)

IC 1848, the Soul Nebula 1/16/2013 5 300s exposures in Red, Green & Blue binned 1x1 and 8 600s exposures in Ha binned 1x1 (Total exposure time: 155 minutes)

Different areas of NGC 2264 are known by different names. Near the bottom is a structure known as the Cone Nebula for obvious reasons. The area near the mixed reflection and emission nebula (the white area) is known as the Fox Fur Nebula for its striations. NGC 2264 is in the constellation of Monoceros and is about 2,600 light years distant.

NGC 2264, Cone and Fox Fur Nebula 1/16/2013 5 300s exposures in Red, Green & Blue binned 2x2 and 5 600s exposures in Ha binned 1x1 (Total exposure time: 125 minutes)

All pictures were taken on Bainbridge Island with an AT 106 LE with an SBIG ST 8300 with Filter wheel.

—Steve Ruhl

In this Issue

Articles

BPAA Quarterly is a publication of the Battle Point Astronomical Association.
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