Current Astronomy

RIVER BEND ASTRONOMY CLUB NEWSLETTER

JULY/AUGUST 2013

A mosaic of the Full Moon taken on May 24, 2013 with an Orion 10" Newtonian Astrograph and a Celestron Neximage 5 camera. Each of the 24 images used to create the image are 200 frames stacked with RegiStax 6 and combined in Photoshop. Photo by Dan Brandon.

INSIDE THIS ISSUE

River Bend Astronomy Club is a member of the Astronomical League.

River Bend Astronomy club serves astronomy enthusiasts of the American Bottom region, the Mississippi River bluffs and beyond, fostering observation, education, and a spirit of camaraderie.

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River Bend Astronomy Club is a member of the Astronomical League, dedicated to fostering astronomical education, providing incentives for astronomical observation and research, and assisting communication among amateur astronomical societies. *www.astroleague.org*

River Bend Astronomy Club is a member of the NASA Night Sky Network, a nationwide coalition of amateur astronomy clubs bringing the science, technology and inspiration of NASA's missions to the general public. See our **online calendar** on the NASA Night Sky Network at *http://nightsky.jpl.nasa.gov/*

Monthly Meetings

Saturday, July 6, 2013 • 7:00 PM
Saturday, August 3, 2013 • 7:00 PM
Saturday, September 7, 2013 • 7:00 PM
For meeting locations, please see our calendar at www.riverbendastro.org.

Looked Up Lately?

Join River Bend Astronomy Club

Want to learn more about astronomy? The members of River Bend Astronomy Club invite you to join. You won't need expensive tools or special skills – just a passion for observing the natural world.

- Meetings offer learning, peeks through great telescopes, and fun under the stars.
- You will receive the club newsletter, *Current Astronomy*, packed with news and photos.
- Get connected with our member-only online discussion group.
- Borrow from the club's multimedia library.
- Borrow from the club's selection of solar telescopes.
- And that's not all! Through club membership you also join the Astronomical League, with its special programs and colorful quarterly newsletter *The Reflector* to enrich your hobby.
- We meet monthly, observe regularly, email news and quips constantly, and generally have a good time. Won't you join us?

Name_____
Address_____
City_____State_____Zip_____
Phone_____
Email address_____
Where did you hear of our club?_____
_____
How long have you been interested in astronomy?_____
Do you have optical equipment?_____
Are you afraid of the dark? ___Yes ___No (just kidding)
I am submitted my application for:
_____Adult Membership(s) $20/year each (18 yrs. and up)
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I enclose a check for $_____ made out to:
Mike Veith, Treasurer, RBAC
Signature_____
Date_____

Mail to: **River Bend Astronomy Club**
c/o Mike Veith, 1121 St. Louis St., Edwardsville, IL 62025.

Questions? Contact us by email at rbac@riverbendastro.org.

Danville Observing Report, Saturday, May 11, 2013

By Bill Breeden

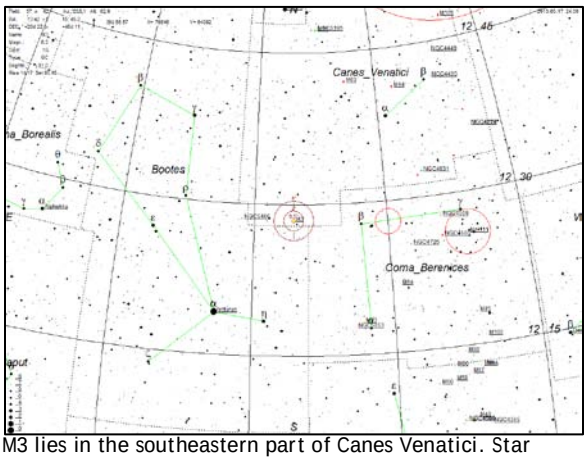
DANVILLE, MO – Saturday night, May 11, 2013. About 14 amateur astronomers, many of them members of the St. Louis Astronomical Society, gathered at Danville Conservation Area near New Florence, Missouri, to take in the dark skies and enjoy some much-needed stargazing. The weather forecast had been iffy during the days leading up to this event, and record-low temperatures were originally predicted overnight. Much to our favor, the weather cooperated, and we were treated to temperatures in the low fifties for most of the evening, and totally clear skies without a trace of clouds moving through. It was wonderful!

It seems like it has been forever since I have been under a clear, dark sky. I believe my last trip to a dark sky site was last October, and it was here at Danville. It has truly been too long. It still amazes me how difficult it can be to simply observe the stars under a clear, dark sky. As we all know too well, many factors come into play and mainly seem to work against the amateur astronomer. We need good weather, clear skies (not just dry weather), a weekend night (because of work commitments), and finally, a dark-of-the-moon night. And it helps to have mild temperatures: Even the hardiest of astronomers do not enjoy shivering all night, no matter what they tell you! Given all these factors that must line up to permit a night under a dark sky, I only seem to manage about six of these nights each year. There has to be a better way, without having to pack up and move to Tucson, Arizona!

Without a doubt, May is Galaxy Season. The many galaxies of the Virgo-Coma region are prominently displayed during this time of year, along with the galaxies near the Big Dipper in Ursa Major. To make preparing for any given observing session a little easier, I have prepared observing lists for each of the 12 months of the calendar ahead of time, and I keep them in my observing kit. For each month, my observing list contains deep-sky objects that culminate near 10:00pm. In May, these objects have a right ascension of 12 hours and 13 hours. By listing objects in groups of 2 hours of right ascension, I end up with 12 lists, one for each month. Brilliant, eh?

The 12 hour and 13 hour lines of right ascension include the galaxy-rich constellations of Virgo, Coma Berenices, Canes Venatici, Ursa Major, and then on down south through Corvus, part of Hydra, and what we can see of Centaurus. So, this was going to be a Galaxy Night, beginning with a visit to a few globular clusters in our own galaxy. I can't wait to get started on my journey out of this galaxy!

Before leaving our galaxy, I decided to start my journey with my 8-inch LX90 Schmidt-Cassegrain telescope at Messier 3 (M3), a globular cluster in the constellation Canes Venatici. It shines at magnitude 6.3. I inserted my 19mm TeleVue Panoptic eyepiece, which gives me a wonderful 68° apparent field of view, and an actual field of view of 0.6°, or 36 arcminutes (36'). With my telescope focal length of 2000mm, this eyepiece provides a magnification of 105x, a sweet spot for deep-sky observing. M3 subtends an angle of 18 arcminutes, which is about half of the apparent field of this eyepiece. This combination (object and eyepiece) makes for an extraordinary view! If you have an eyepiece that provides about 100x, take a look at M3 and enjoy the view!



M3 lies in the southeastern part of Canes Venatici. Star chart courtesy Hallo Northern Sky, by Han Kleijn.

I wanted to visit another globular cluster before leaving our Milky Way galaxy altogether, and M53 in Coma Berenices was my next stop. M53 is somewhat smaller than M3, subtending an angle of 13', compared to 18' for M3. The reason for this is that M53 is simply farther away, at a distance of 58,000 light-years from

Earth. M3 was only about 34,000 light-years away. I enjoy pondering the vast distances I am 'traveling' when observing these objects – it really puts the depth of the sky into perspective. By traveling from M3 to M53, I have traveled an additional 24,000 light-years into space, which is quite amazing. It also puts the relative brightness of the globular cluster M53 into perspective. M53 shines at magnitude 7.6, fully 1.3 magnitudes fainter than M3. But taking into account the additional 24,000 light-years of distance, the depth of the sky becomes an obvious observation in addition to the objects themselves. Amazing.

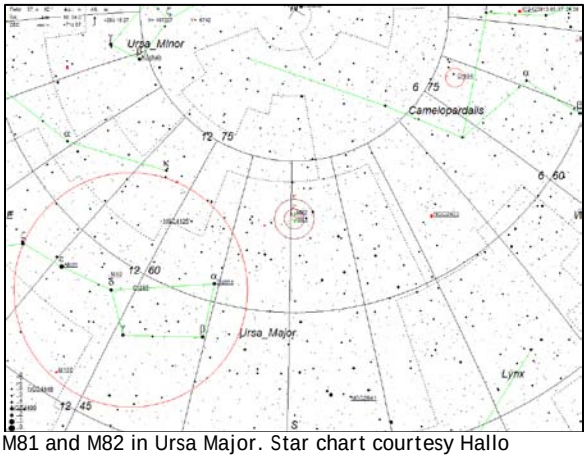
It is time to head south a bit and venture into the constellation Hydra, for a visit to another globular cluster. Messier 68 (M68), shining at a fainter magnitude of 8.0, lies just 33,000 light-years away from Earth, slightly closer than M3. But at nearly 2 magnitudes fainter, this tells me that I am actually visiting a smaller cluster than both M3 and M53. M68's angular size of 11' confirms that I am indeed visiting a smaller globular cluster. But don't let that stop you from visiting this wonder in space. It is quite a sight in my 19mm TeleVue Panoptic, and from a dark site, an 8th magnitude globular cluster presents a beautiful view in the eyepiece. Don't miss it!

I have one more stop to make within our galaxy, and that is the magnificent globular cluster Omega Centauri (NGC5139). With a right ascension of 13 hours, 26.48 minutes, Omega Centauri culminates around 10:00pm during May. Now is the time to see it, as it skirts above our southern horizon for a short time each night during this time of year. Omega Centauri is listed at an incredible magnitude of 3.6, making it an easy naked-eye target, if only it rose higher in our sky. But alas, it's low declination of -47° 29 minutes keeps it very low in the sky here at Danville. When centered in my 19mm Panoptic eyepiece, it's smudgy glow fills the field of view! I would estimate it's angular size as that of the full moon, about 30'. Let me look it up – it's actual angular size subtends 36.3', which is why my eyepiece is overwhelmed by it! Too bad it sits so low on our horizon: This must be an incredible sight from points farther south. One reason for it's incredible apparent size is its shorter distance from Earth – just 15,800 light-years. This is less than half the distance to M3, but Omega spans nearly three times M3's apparent size, which tells me that Omega is inherently huge!

The time has come to depart our home galaxy, the Milky Way, and head out toward the Virgo-Coma Cluster of Galaxies. This will be a very long journey, more than 60 million light years. Put another way, I will be traveling nearly 1,000 times farther out than the farthest globular cluster – M53 – that I have visited so far tonight. So, here I go. Zoom! As I head toward Canes Venatici, I realize that when I reach the Whirlpool Galaxy (M51), I will have traveled an incredible distance of 33 million light years, already over half the distance to the Virgo-Coma Cluster. My LX90 whirrs and slowly slews into Canes Venatici, and it finally places M51 in my eyepiece. I take a look – Wow! I have arrived! Here I am, 33 million light years from home, looking straight at a beautiful spiral galaxy. M51 subtends an angle of 11' by 7' as seen from Earth, which is incredible when you stop to think about it. I am looking at an entire galaxy, perhaps the size of our own home galaxy the Milky Way, from 33,000,000 light years away, and it still appears one third the size of the full Moon, even from this incredible distance. M51 is located about 1,000 times farther away from Earth than the globular cluster M3 that I visited earlier tonight. What a journey! From here at Danville, I could easily see the two cores of the main galaxy and the satellite galaxy, as well as some spiral structure. Incredible!

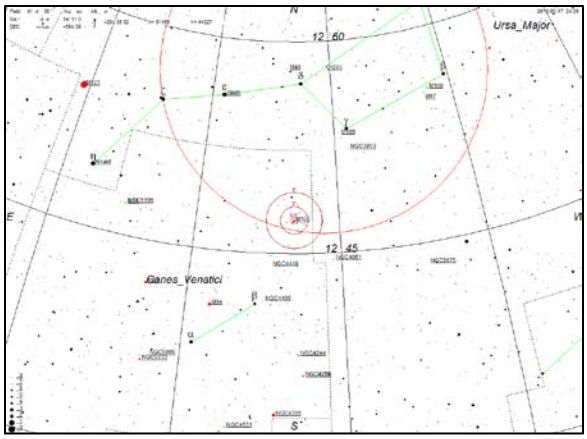
The galaxies M81 and M82 in Ursa Major sit between the 9 hour and 10 hour lines of right ascension, putting them on my March observing list. They do not appear on my May list, but their very northerly declination of +69° makes them easily viewable most nights, with the possible exception of mid-Autumn. So, I entered "Messier 81" into my LX90's hand controller, and the telescope began its 12 million light year journey to the distant galaxies. This pair of galaxies lies closer to home than M51 – and they subtend angles of 21' x 10' (M81) and 9' x 4' (M82) from our point of view. Judging from this known data, M81 must be close to the same actual size as M51, and M82 must be about half the size of M51. I made this conclusion simply by observing M82 – it is three times closer than M51 but still appears about the same size. Again, this

mental exercise provides cues to the three-dimensionality of the universe.



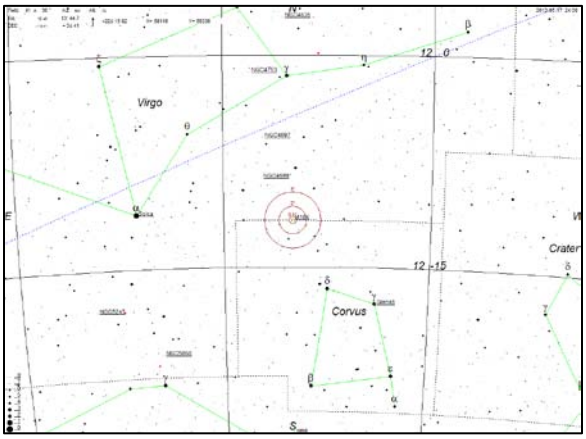
M81 and M82 in Ursa Major. Star chart courtesy Hallo Northern Sky, by Han Kleijn.

Canes Venatici is also home to Messier 106, a not-to-often visited galaxy on my May observing list. This may be because I am normally so preoccupied with the Virgo-Coma Cluster of Galaxies that I simply do not get to it. So I am going there tonight. At 25 million light-years from Earth, M106 glows at magnitude 8.4, making it about the same brightness as the galaxies I have visited so far tonight. When I arrived, I was surprised to see how nice M106 appears through the eyepiece. It is larger than I expected, with an angular size of 19' by 8'. Along it's longer axis, it is about 2/3 the size of the full Moon. It also appears brighter than its listed magnitude of 8.4, perhaps due to the dense core of the galaxy. If you have not visited M106 for a while, now is the time. It is magnificent.



M106 appears in the northwest region of the constellation Canes Venatici. Star chart courtesy Hallo Northern Sky, by Han Kleijn.

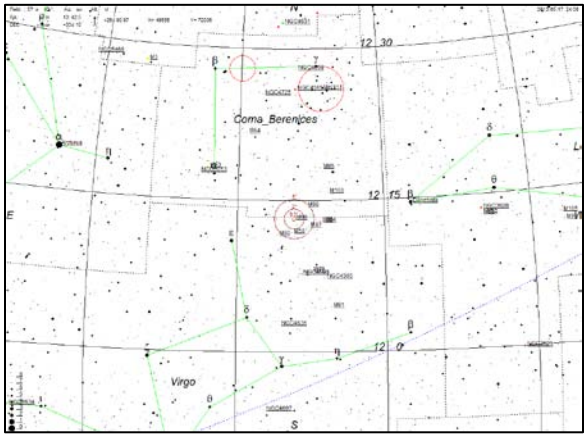
Before heading out to the distant Virgo-Coma Cluster of Galaxies, I decided to stop by the Sombrero Galaxy (M104) in the constellation Virgo. M104 lies so close to the border between Virgo and Corvus, many people mistakenly believe it lies within Corvus. But it doesn't – it is actually about 4' north of the Corvus border, just within Virgo's real estate. M104 is actually closer to the Corvus border than its own diameter – it subtends an angle of 9' by 4'. It also easy to understand why people think it is within the constellation Corvus – Corvus is easy to spot with its 'square' -- the stars Beta, Gamma, Delta, and Epsilon Corvi. M104 is magnificent in my 19mm TeleVue Panoptic eyepiece. It occupies about ¼ of the field of view's diameter, which frames it within a black, inky view of outer space. It truly is a remarkable sight. The dust lane was visible, and I felt as if I was actually 50 million light years from home as I gazed at this distant universe visible in my eyepiece.



M104 sits almost on the Virgo-Corvus border, lying just 4' north of the border in Virgo. Star chart courtesy Hallo Northern Sky, by Han Kleijn.

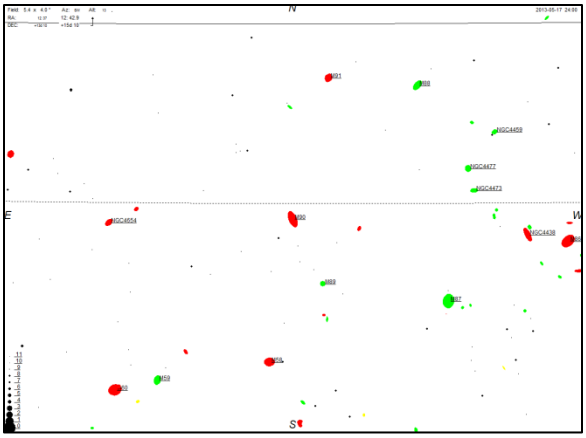
The time has come to launch my telescope in the direction of the distant Virgo-Coma Cluster of Galaxies, some 60 million light years away. I have been here before but it has been awhile, so I was certainly ready to go! So, I eagerly punched in Messier 90, and away I went! Zzzzoooom, my telescope was taking me an incredible 60 million light years from home. Put another way, I was heading toward objects whose light began their journey around the time of the demise of the dinosaurs on Earth. The telescope stopped, then beeped. The display read "Messier 90." I put eye to eyepiece, thus completing my journey to this

distant island universe. There it is – an eerie faint 10th magnitude glow. From Earth, M90 subtends an angle of just 9' by 5', but given its incredible distance, it must be a huge galaxy indeed. M90 lies in Virgo, just 9 minutes of arc south of the Coma Berenices border. Staring into the eyepiece at M90, it appears lonely – the only other prominent object in the field of view is a star to the galaxy's 10 o'clock position. This star is, in fact, one way that I know that I am looking at M90. It is sort of unique in the Virgo-Coma Cluster of Galaxies. M90 is tilted nicely from our point of view, giving it some depth in its appearance. Gee -- I really feel far away from home. This is one of the many reasons I love this hobby so much – I cannot think of any other pastime that can make me feel the way I do right now; sitting here at the eyepiece, quietly looking at something 60 million light years away, and listening to the sounds of wildlife (animals, not people!) in the dark at Danville Conservation Area. Yes, this is life at its zenith!



M90 appears in the center of this finder chart, which shows the area of the sky between Coma Berenices and Virgo. Star Chart courtesy Hallo Northern Sky, by Han Kleijn.

Update – The July 6, 2013 RBAC meeting will be held at Menz Observatory.



A closer view of the area around M90 in Virgo. M90 lies in Virgo, just 9 arcminutes away from the Coma Berenices border. M91 can be seen just above it in Coma Berenices. Star chart courtesy Hallo Northern Sky, by Han Kleijn.

Just north, across the border into Coma Berenices, lies another galaxy, M91. It is smaller and fainter than M90, glowing at magnitude 10.2 and presenting an angular size of 5' by 4'. It lies approximately the same distance from Earth as M90 (60 million light years), placing it among the galaxies of the Virgo-Coma Cluster of Galaxies. I made the journey across the border and put M91 into view. M91 appears nearly face-on from our point of view on Earth, which accounts for its lower brightness level. Face-on galaxies can excite newcomers in the hobby, until they see one in the eyepiece. Low surface brightness combined with (sometimes) larger angular sizes can spell disappointment for new observers. Edge-on and tilted galaxies are usually most pleasing to new observers, simply because they have higher surface brightness and stand out against the black background of space. M91 appears face-on, which looks awesome in photographs but can be disappointing though the eyepiece of a small or medium sized telescope. The view from a dark site such as Danville, can be much more pleasing.

After viewing M91, I spent most of the night enjoying my time, 60 million light years away among the galaxies of the Virgo-Coma Cluster of Galaxies. Here are the others I visited: M49, M58, M59, M60, M61, M64, M84, M85, M86, M87, M88, M89, M98, M99, M100. NGC4889, NGC4559, NGC4565, and NGC4697.

The author at Danville on Saturday night, May 11, 2013, with the Winter Hexagon setting in the background. Image by Jim Small.

Saturday night was one of those nights where I truly remembered why I love amateur astronomy so much. It can get frustrating waiting for clear skies, milder weather, dark-of-the-moon, or even just waiting for a weekend. My telescope can sit for literally months, its JMI case slowly gathering dust. "Why do I even bother with this?", I sometimes find myself asking. A night like Saturday provides the answer. And it is always worth the wait. Of course, I would love to have more nights like this, but we take what we can get. Somehow, the waiting game makes the payoff that much sweeter.

Happy viewing. RBAC

Gary Kronk's Messier Objects: A Journey Through Deep Space – The DVD

By Bill Breeden

The long-awaited DVD slide show of *Gary Kronk's Messier Objects: A Journey Through Deep Space* has been completed. It took two years of compiling the best of Gary's images, and seven years of actual imaging to complete the movie.

The movie is 54 minutes long and is set to the space-age awe-inspiring music of Jim Pietkivitch, who has received national recognition and has been aired on NPR and public radio. Jim's record label, Electrofine, kindly gave us permission to use songs from his album *Spiral Journey* as the soundtrack to *Gary's Messier Objects*. The result is a wonderful journey through Charles Messier's catalog of deep-space objects, as seen through the telescopes and cameras of Gary Kronk. All the images were captured at Kronk Observatory in St. Jacob, Illinois.

As some of you may know, Gary has since moved and sold the home and observatory where these images were taken, so the movie also serves as a testimony to all the nights of patience and hard work required to capture all 110 Messier Objects. I compiled a similar movie in 2007 featuring NASA images and images from other large observatories, but this one features only images by River Bend's very own Gary Kronk.

The movie can be played on any standard DVD or Blu-ray player, either in a home entertainment center or on a PC or Mac. You can certainly enjoy it on one of those cloudy nights when you would like to be outside observing!

It has been a while since I have been available to attend a River Bend Astronomy Club meeting or event. But next time you see me, I will be sure to bring copies of the DVD with me to distribute to members of RBAC. You will enjoy this movie! RBAC

The new DVD of Gary Kronk's Messier Objects has been completed. Image by Bill Breeden.

High-energy Spy

By Dr. Martin C. Weisskopf

The idea for the Chandra X-Ray Observatory was born only one year after Riccardo Giacconi discovered the first celestial X-ray source other than the Sun. In 1962, he used a sounding rocket to place the experiment above the atmosphere for a few minutes. The sounding rocket was necessary because the atmosphere blocks X-rays. If you want to look at X-ray emissions from objects like stars, galaxies, and clusters of galaxies, your instrument must get above the atmosphere.

Giacconi's idea was to launch a large diameter (about 1 meter) telescope to bring X-rays to a focus. He wanted to investigate the hazy glow of X-rays that could be seen from all directions throughout the sounding rocket flight. He wanted to find out whether this glow was, in fact, made up of many point-like objects. That is, was the glow actually from millions of X-ray sources in the Universe. Except for the brightest sources from nearby neighbors, the rocket instrument could not distinguish objects within the glow.

Giacconi's vision and the promise and importance of X-ray astronomy was borne out by many sounding rocket flights and, later satellite experiments, all of which provided years-, as opposed to minutes-, worth of data.

By 1980, we knew that X-ray sources exist within all classes of astronomical objects. In many cases, this discovery was completely unexpected. For example, that first source turned out to be a very small star in a binary system with a more normal star. The vast amount of energy needed to produce the X-rays was provided by gravity, which, because of the small star's mass (about equal to the Sun's) and compactness (about 10 km in diameter) would accelerate particles transferred from the normal star to X-ray emitting energies. In 1962, who knew such compact stars (in this case a neutron star) even existed, much less this energy transfer mechanism?

X-ray astronomy grew in importance to the fields of astronomy and astrophysics. The National Academy of Sciences, as part of its "Decadal Survey" released in 1981, recommended as its number one priority for large missions an X-ray observatory along the lines that Giacconi outlined in 1963. This observatory was eventually realized as the Chandra X-Ray Observatory, which launched in 1999.

The Chandra Project is built around a high-resolution X-ray telescope capable of sharply focusing X-rays onto two different X-ray-sensitive cameras. The focusing ability is of the caliber such that one could resolve an X-ray emitting dime at a distance of about 5 kilometers!
The building of this major scientific observatory has many stories.

Learn more about Chandra at www.science.nasa.gov/missions/chandra . Take kids on a "Trip to the Land of the Magic Windows" and see the universe in X-rays and other invisible wavelengths of light at spaceplace.nasa.gov/magic-windows.

Dr. Weisskopf is project scientist for NASA's Chandra X-ray Observatory. This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Composite image of DEM L50, a so-called superbubble found in the Large Magellanic Cloud. X-ray data from Chandra is pink, while optical data is red, green, and blue. Superbubbles are created by winds from massive stars and the shock waves produced when the stars explode as supernovas.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

RBAC's Monthly Observing Lists

These lists include brighter deep-sky objects that transit near 10:00 PM each month.

July Observing List

Prepared by Bill Breeden

Double Stars (Astronomical League's Double Star List)

_____ 61. Xi Scorpii SAO 159665 - Const. SCO Type DS RA 16 04.4 Decl. -11° 22' Mag. 4.8 7.3
_____ 62. Struve 1999 SAO 159670 - Const. Type DS RA 16 04.4 Decl. -11° 27' Mag. 7.4 8.1
_____ 63. Beta Scorpii SAO 159682 Graffias Const. SCO Type DS RA 16 05.4 Decl. -19° 48' Mag. 2.6 4.9
_____ 64. Kappa Herculis SAO 101951 Const. HER Type DS RA 16 08.1 Decl. +17° 03' Mag. 5.3 6.5
_____ 65. Nu Scorpii SAO 159763 Const. SCO Type DS RA 16 12.0 Decl. -19° 28' Mag. 4.3 6.4
_____ 66. Sigma Coronae Borealis SAO 65165 Const. COB Type DS RA 16 14.7 Decl. +33° 52' Mag. 5.6 6.6
_____ 67. 16 / 17 Draconis SAO 30012 Const. DRA Type DS RA 16 36.2 Decl. +52° 55' Mag. 5.4 6.4 5.5
_____ 68. Mu Draconis SAO 30239 - Const. DRA Type DS RA 17 05.3 Decl. +54° 28' Mag. 5.7 5.7
_____ 69. Alpha Herculis SAO 102680 Rasalgethi Const. HER Type DS RA 17 14.6 Decl. +14° 23' Mag. 3.5 5.4
_____ 70. Delta Herculis SAO 84951 Sarin Const. HER Type DS RA 17 15.0 Decl. +24° 50' Mag. 3.1 8.2
_____ 71. 36 Ophiuchi SAO 185199 - Const. OPH Type DS RA 17 15.3 Decl. -26° 36' Mag. 5.1 5.1
_____ 72. Omicron Ophiuchi SAO 122387 - Const. OPH Type DS RA 17 18.0 Decl. -24° 17' Mag. 5.4 6.9
_____ 73. Rho Herculis SAO 66000 Const. HER Type DS RA 17 23.7 Decl. +37° 09' Mag. 4.6 5.6
_____ 74. Nu Draconis SAO 30447 Kuma Const. DRA Type DS RA 17 32.2 Decl. +55° 11' Mag. 4.9 4.9
_____ 75. Psi Draconis SAO 8890 - Const. DRA Type DS RA 17 41.9 Decl. +72° 09' Mag. 4.9 6.1

Carbon Stars (Astronomical League's Carbon Star List)

_____ 59. RR Herculis SAO 29781 RA 16 04 13 Decl. +50 29 56 Mag. 7.8 – 12.5 Per. 240 Class C5 – C8 (N0e)
_____ 60. V Ophiuchi SAO 159916 RA 16 26 43 Decl. -12 25 35 Mag. 7.3 – 11.6 Per. 297 Class C5 – C7 (N3e)
_____ 61. SAO 46574 (Hercules) GSC 3081:810 RA 17 13 31 Decl. +42 06 22 Mag. 7.3 – 7.7 Per. ? Class C3 (R0)
810
_____ 62. TW Ophiuchi GSC 6243:462 RA 17 29 43 Decl. -19 28 22 Mag. 7.0 – 9.0 Per. 185 Class C5 (Nb)
_____ 63. SZ Sagittarii SAO 160795 RA 17 44 56 Decl. -18 39 26 Mag. 8.2 – 9.2 Per. 73 Class C7 (Nb)
_____ 64. T Draconis GSC 3914:546 RA 17 56 23 Decl. +58 13 06 Mag. 7.2–13.5 Per. 422 Class C6 – C8 (N0e)

Messier Objects

_____ M4 NGC6121 Const. SCO Type GC RA 16 23.6 Decl. -26 32 Mag. 6.4
_____ M6 NGC6405 Const. SCO Type OC RA 17 40.1 Decl. -32 13 Mag. 5.3
_____ M7 NGC6475 Const. SCO Type OC RA 17 53.9 Decl. -34 49 Mag. 4.1
_____ M9 NGC6333 Const. OPH Type GC RA 17 19.2 Decl. -18 31 Mag. 7.3
_____ M10 NGC6254 Const. OPH Type GC RA 16 57.1 Decl. -04 06 Mag. 6.7
_____ M12 NGC6218 Const. OPH Type GC RA 16 47.2 Decl. -01 57 Mag. 6.6
_____ M13 NGC6205 Great Hercules Cluster Const. HER Type GC RA 16 41.7 Decl. +36 28 Mag. 5.7
_____ M14 NGC6402 Const. OPH Type GC RA 17 37.6 Decl. -03 15 Mag. 7.7
_____ M19 NGC6273 Const. OPH Type GC RA 17 02.6 Decl. -26 16 Mag. 6.6
_____ M23 NGC6494 Const. SGR Type OC RA 17 56.8 Decl. -19 01 Mag. 6.9
_____ M62 NGC6266 Const. OPH Type GC RA 17 01.2 Decl. -30 07 Mag. 6.6
_____ M80 NGC6093 Const. SCO Type GC RA 16 17.0 Decl. -22 59 Mag. 7.7
_____ M92 NGC6341 Const. HER Type GC RA 17 17.1 Decl. +43 08 Mag. 6.5
_____ M107 NGC6171 Const. OPH Type GC RA 16 32.5 Decl. -13 03 Mag. 9.2

Caldwell Objects

_____ C6 NGC6543 Cat's Eye Nebula Const. DRA Type PN RA 17 58 36.00 Decl. +66 38 00.0 Mag. 8.8
_____ C69 NGC6302 Bug Nebula Const. SCO Type PN RA 17 13 42.00 Decl. -37 06 00.0 Mag. 12.8
_____ C75 NGC6124 Const. SCO Type OC RA 16 25 36.00 Decl. -40 40 00.0 Mag. 5.8
_____ C76 NGC6231 Const. SCO Type OC RA 16 54 00.00 Decl. -41 48 00.0 Mag. 2.6
_____ C81 NGC6352 Const. ARA Type GC RA 17 25 30.00 Decl. -48 25 00.0 Mag. 8.1

_____ C82 NGC6193 Const. ARA Type OC RA 16 41 18.00 Decl. -48 46 00.0 Mag. 5.2
_____ C86 NGC6397 Const. ARA Type GC RA 17 40 42.00 Decl. -53 40 00.0 Mag. 5.6
_____ C89 NGC6067 S Norma Cluster Const. NOR Type OC RA 16 18 54.00 Decl. -57 54 00.0 Mag. 5.4
_____ C95 NGC6025 Const. TRA Type OC RA 16 03 42.00 Decl. -60 30 00.0 Mag. 5.1
_____ C107 NGC6101 Const. APS Type GC RA 16 25 48.00 Decl. -72 12 00.0 Mag. 9.3

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_____ 88. NGC6503 Const. DRA Type G-Sb RA 17 49.4 Decl. +70 09 Mag. 10.2
_____ 89. NGC6543 Cat's Eye Nebula Const. DRA Type PN RA 17 58.6 Decl. +66 38 Mag. 8.8
_____ 90. NGC6210 Const. HER Type PN RA 16 44.5 Decl. +23 49 Mag. 9.3
_____ 91. NGC6369 Const. OPH Type PN RA 17 29.3 Decl. -23 46 Mag. 10.4
_____ 102. NGC6445 Const. SGR Type PN RA 17 49.2 Decl. -20 01 Mag. 11.8

August Observing List

Prepared by Bill Breeden

Double Stars (Astronomical League's Double Star List)

_____ 76. 40 / 41 Draconis SAO 8994 Const. DRA Type DS RA 18 00.2 Decl. +80° 00' Mag. 5.7 6.1
_____ 77. 95 Herculis SAO 85647 Const. HER Type DS RA 18 01.5 Decl. +21° 36' Mag. 5.0 5.1
_____ 78. 70 Ophiuchi SAO 123107 Const. OPH Type DS RA 18 05.5 Decl. +02° 30' Mag. 4.2 6.0
_____ 79. Epsilon Lyrae SAO 67310 Double Double Const. LYR Type DS RA 18 44.3 Decl. +39° 40' Mag. 5.0 6.1 5.2 5.5
_____ 80. Zeta Lyrae SAO 67321 Const. LYR Type DS RA 18 44.8 Decl. +37° 36' Mag. 4.3 5.9
_____ 81. Beta Lyrae SAO 67451 Sheliak Const. LYR Type DS RA 18 50.1 Decl. +33° 22' Mag. 3.4 8.6
_____ 82. Struve 2404 SAO 104170 - Const. Type DS RA 18 50.8 Decl. +10° 59' Mag. 6.9 8.1
_____ 83. Otto Struve 525 SAO 67566 Const. Type DS RA 18 54.9 Decl. +33° 58' Mag. 6.0 7.7
_____ 84. Theta Serpentis SAO 124068 Alya Const. SER Type DS RA 18 56.2 Decl. +04° 12' Mag. 4.5 5.4
_____ 85. Beta Cygni SAO 87301 Albireo Const. CYG Type DS RA 19 30.7 Decl. +27° 58' Mag. 3.1 5.1
_____ 86. 57 Aquilae SAO 143898 - Const. AQL Type DS RA 19 54.6 Decl. -08° 14' Mag. 5.8 6.5

Carbon Stars (Astronomical League's Carbon Star List)

_____ 65. FO Serpentis SAO 161327 RA 18 19 21 Decl. -15 36 46 Mag. 8.5 – 8.7 Per. Irr. Class C4 (R6)
_____ 66. AC Herculis SAO 86134 RA 18 30 16 Decl. +21 52 00 Mag. 6.9 – 9.0 Per. 75 Class C0 (F2pIb – K4e)
_____ 67. T Lyrae SAO 67087 RA 18 32 20 Decl. +36 59 55 Mag. 7.5 – 9.3 Per. Irr. Class C6 (R6)
_____ 68. HK Lyrae GSC 2649:507 RA 18 42 50 Decl. +36 57 30 Mag. 7.8 – 9.6 Per. Irr. Class C6 (N4)
_____ 69. S Scuti SAO 142674 RA 18 50 20 Decl. -07 54 27 Mag. 6.3 – 9.0 Per. 148 Class C6 (N3)
_____ 70. UV Aquilae GSC 1051:51 RA 18 58 32 Decl. +14 21 49 Mag. 8.0 – 9.6 Per. 386 Class C5 (N4)
_____ 71. V Aquilae SAO 142985 RA 19 04 24 Decl. -05 41 05 Mag. 6.6 – 8.4 Per. 353 Class C5 – C6 (N6)
_____ 72. V1942 Sagittarii SAO 162465 RA 19 19 09 Decl. -15 54 30 Mag. 6.7 – 7.0 Per. Irr. Class C6 (N2/R8)
_____ 73. U Lyrae GSC 3134:1708 RA 19 20 09 Decl. +37 52 36 Mag. 8.3 – 13.5 Per. 452 Class C4 (N0e)
_____ 74. UX Draconis SAO 9404 RA 19 21 35 Decl. +76 33 34 Mag. 5.9 – 7.1 Per. 168 Class C7 (N0)
_____ 75. NSV 11960 (Aquila) SAO 162551 RA 19 23 10 Decl. -10 42 11 Mag. 7.0 – 7.1 Per. ? Class C2 (R0)
_____ 76. AW Cygni GSC 3543:2275 RA 19 28 47 Decl. +46 02 38 Mag. 7.1 – 8.5 Per. 340 Class C4 (N3)
_____ 77. AQ Sagittarii SAO 162777 RA 19 34 18 Decl. -16 22 27 Mag. 6.6 – 8.5 Per. 200 Class C7 (N3)
_____ 78. TT Cygni SAO 68688 RA 19 40 57 Decl. +32 37 05 Mag. 7.0 – 9.1 Per. 118 Class C5 (N3e)
_____ 79. AX Cygni GSC 3149:942 RA 19 57 12 Decl. +44 15 40 Mag. 7.9 – 8.8 Per. Irr. Class C4 (N6)

Messier Objects

_____ M8 NGC6523 Lagoon Nebula Const. SGR Type EN RA 18 03.8 Decl. -24 23 Mag. 6
_____ M11 NGC6705 Wild Duck Cluster Const. SCT Type OC RA 18 51.1 Decl. -06 16 Mag. 6.3
_____ M16 NGC6611 Eagle Nebula Const. SER Type OC RA 18 18.8 Decl. -13 47 Mag. 6.4
_____ M17 NGC6618 Swan Nebula Const. SGR Type EN RA 18 20.8 Decl. -16 11 Mag. 7.5
_____ M18 NGC6613 Const. SGR Type OC RA 18 19.9 Decl. -17 08 Mag. 7.5
_____ M20 NGC6514 Trifid Nebula Const. SGR Type EN RA 18 02.6 Decl. -23 02 Mag. 9
_____ M21 NGC6531 Const. SGR Type OC RA 18 04.6 Decl. -22 30 Mag. 6.5
_____ M22 NGC6656 Const. SGR Type GC RA 18 36.4 Decl. -23 54 Mag. 5.9
_____ M24 NGC>6603 Sagittarius Star Cloud Const. SGR Type RA 18 16.9 Decl. -18 29 Mag. 4.6
_____ M25 IC4725 Const. SGR Type OC RA 18 31.6 Decl. -19 15 Mag. 6.5
_____ M26 NGC6694 Const. SCT Type OC RA 18 45.2 Decl. -09 24 Mag. 9.3
_____ M27 NGC6853 Dumbbell Nebula Const. VUL Type PN RA 19 59.6 Decl. +22 43 Mag. 7.4
_____ M28 NGC6626 Const. SGR Type GC RA 18 24.5 Decl. -24 52 Mag. 7.3
_____ M54 NGC6715 Const. SGR Type GC RA 18 55.1 Decl. -30 29 Mag. 8
_____ M55 NGC6809 Const. SGR Type GC RA 19 40.0 Decl. -30 58 Mag. 5
_____ M56 NGC6779 Const. LYR Type GC RA 19 16.6 Decl. +30 11 Mag. 8.2
_____ M57 NGC6720 Ring Nebula Const. LYR Type PN RA 18 53.6 Decl. +33 02 Mag. 8.8
_____ M69 NGC6637 Const. SGR Type GC RA 18 31.4 Decl. -32 21 Mag. 8.9
_____ M70 NGC6681 Const. SGR Type GC RA 18 43.2 Decl. -32 18 Mag. 9.6

_____ M71 NGC6838 Const. SGE Type GC RA 19 53.8 Decl. +18 47 Mag. 9

Caldwell Objects

_____ C15 NGC6826 Blinking Planetary Const. CYG Type PN RA 19 44 48.00 Decl. +50 31 00.0 Mag. 9.8
_____ C57 NGC6822 Barnard's Galaxy Const. SGR Type IG RA 19 44 54.00 Decl. -14 48 00.0 Mag. 9.3
_____ C68 NGC6729 R CrA Nebula Const. CRA Type BN RA 19 01 54.00 Decl. -36 57 00.0 Mag. 9.7
_____ C78 NGC6541 Const. CRA Type GC RA 18 08 00.00 Decl. -43 42 00.0 Mag. 6.6
_____ C93 NGC6752 Const. PAV Type GC RA 19 10 54.00 Decl. -59 59 00.0 Mag. 5.4
_____ C101 NGC6744 Const. PAV Type SG RA 19 09 48.00 Decl. -63 51 00.0 Mag. 9

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_____ 92. NGC6572 Const. OPH Type PN RA 18 12.1 Decl. +06 51 Mag. 9
_____ 93. NGC6633 Const. OPH Type OC RA 18 27.7 Decl. +06 34 Mag. 4.6
_____ 94. NGC6712 Const. SCT Type GC RA 18 53.1 Decl. -08 42 Mag. 8.2
_____ 95. NGC6781 Const. AQL Type PN RA 19 18.4 Decl. +06 33 Mag. 11.8
_____ 96. NGC6819 Const. CYG Type OC RA 19 41.3 Decl. +40 11 Mag. 7.3
_____ 97. NGC6826 Const. CYG Type PN RA 19 44.8 Decl. +50 31 Mag. 9.8
_____ 103. NGC6520 Const. SGR Type OC RA 18 03.4 Decl. -27 54 Mag. 8.1
_____ 104. NGC6818 Const. SGR Type PN RA 19 44.0 Decl. -14 09 Mag. 9.9
_____ 105. NGC6802 Const. VUL Type OC RA 19 30.6 Decl. +20 16 Mag. 8.8

Have you checked off all of the objects from these 12 monthly observing lists yet? Or perhaps you have checked off all of a certain category of objects from these lists, such as Double Stars? If so, we would like to know about it! Send your story to us at rbac@riverbendastro.org.