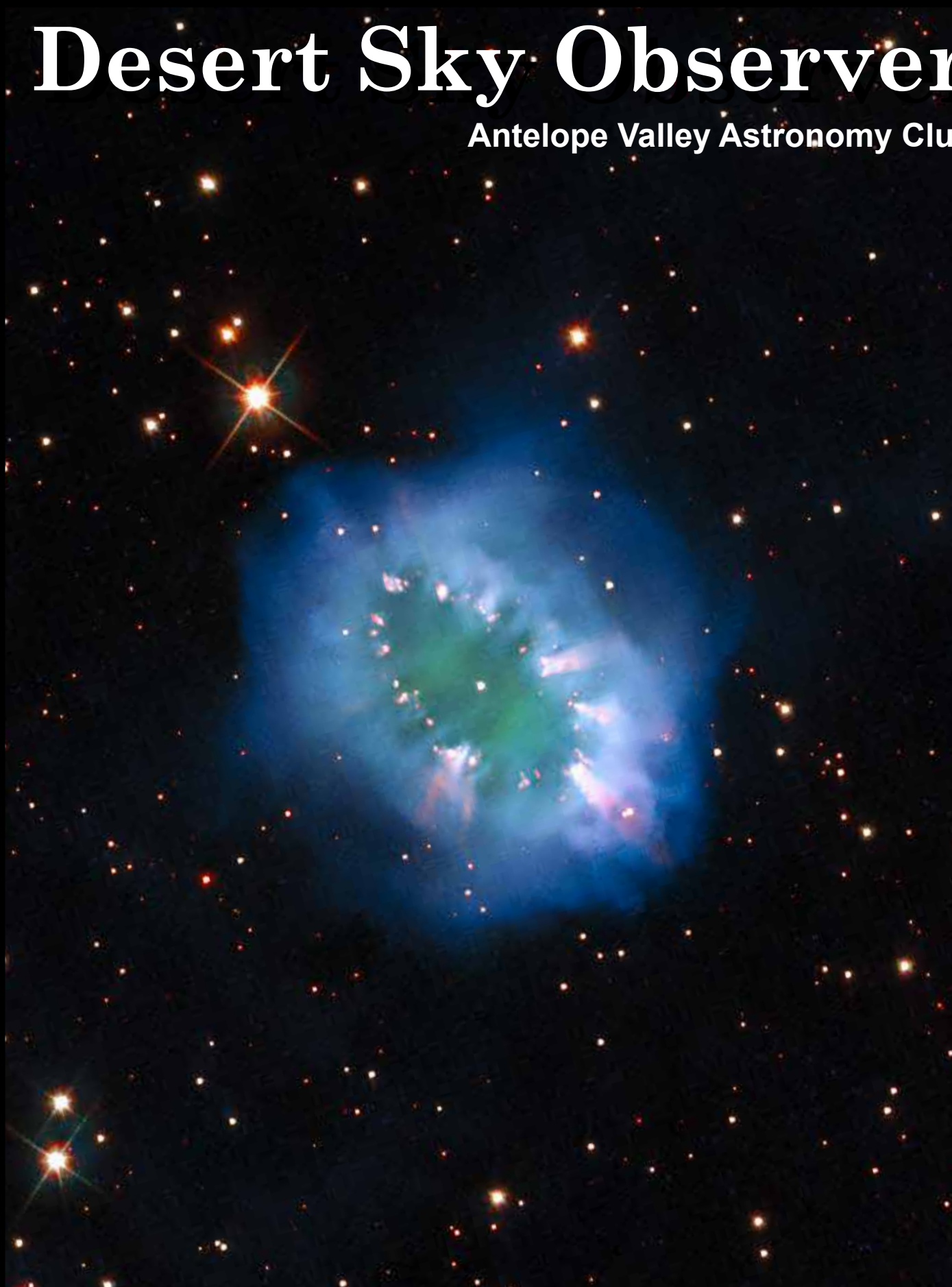


Volume 41.7

July 2021

Desert Sky Observer

Antelope Valley Astronomy Club



Desert Sky Observer

www.avastronomyclub.org

July 2021

Upcoming Events

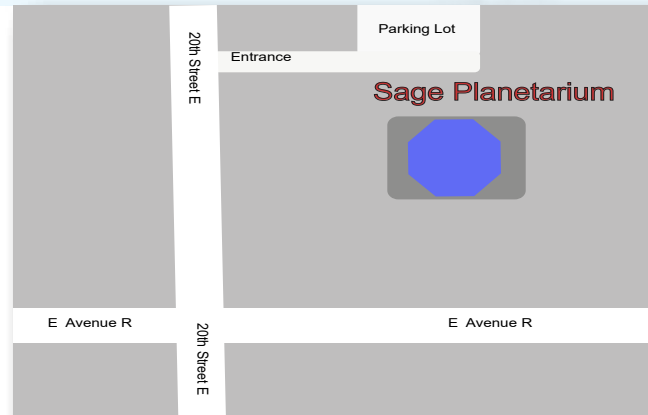
July 9: Club Meeting -- Zoom
July 10: Deep Sky Star Party -- Mt Pinos ? TBA
July 24: Moon Walk -- Prime Desert Woodland

Every clear night: Personal Star Party

August 7: DSSP -- Mt Pinos? TBA
August 7: Moon Walk @ PDW
August 13: Club Meeting
September 4: DSSP- Chuchupate
September 10: Club Meeting
September 11: Lunar Club @ Judy's
September 25: Moon Walk @ PDW



AVAC Calendar



Board Members

President: Darrell Bennett (661) 220-0122
president@avastronomyclub.org

Vice-President: Matt Leone (661) 713-1894
vice-president@avastronomyclub.org

Secretary: Rose Moore (661) 972-1953
secretary@avastronomyclub.org

Treasurer: Rod Girard (661) 803-7838
treasurer@avastronomyclub.org

Appointed Positions

Newsletter Editor: Phil Wriedt (661) 917-4874
dso@avastronomyclub.org

Equipment & Library:
John Van Evera 661-754-1819
library@avastronomyclub.org

Club Historian: vacant
history@avastronomyclub.org

Webmaster: Steve Trotta (661) 269-5428
webmaster@avastronomyclub.org

Astronomical League Coordinator:
Frank Moore (661) 972-4775
al@avastronomyclub.org



Monthly Meetings

Monthly meetings are held at the **S.A.G.E. Planetarium** in Palmdale, the second Friday of each month except December. The meeting location is at the northeast corner of Avenue R and 20th Street East. Meetings start at 7 p.m. and are open to the public. *Please note that food and drink are not allowed in the planetarium.*

Membership

Membership in the Antelope Valley Astronomy Club is open to any individual or family.

The Club has three categories of membership.

- Family membership at \$30.00 per year.
- Individual membership at \$25.00 per year.
- Junior membership at \$15.00 per year.

Membership entitles you to ...

- The Desert Sky Observer -- monthly newsletter
- The Reflector -- the publication of the Astronomical League.
- The AVAC Membership Manual.
- To borrow club equipment, books, videos, and other items.

AVAC

PO Box 8545

Lancaster, CA 93539-8545

Visit the Antelope Valley Astronomy Club website at www.avastronomyclub.org/.

The Antelope Valley Astronomy Club, Inc. is a §503(c)(3) Non-Profit Corporation.

The AVAC is a Sustaining Member of The Astronomical League and the International Dark-Sky Association



www.avastronomyclub.org

President's Message

By Darrell Bennett

Well Hello Everyone,

It's July already, half the year is gone and it's been hot. The state is opening up more places to go and the end of this virus is almost here.

Last month we had our Dark Sky Party at Chuchupate again. I loaded up my truck and left my home around 3pm. I got on the 138 heading west until I got to 110th St West where I found the road was closed and had to take a detour around it to 160th St West. Once I got to Gorman I then ran into traffic on the I-5 North, there was a big accident on the downhill side. When I finally got to the parking lot at Chuchupate it was full of RV's, trailers, trucks and pop up canopies. There were no astronomers, just dirt bike riders. I drove through the parking lot but could only find one parking spot. I decided to just go back home. I hope that we will have better luck at the Dark Sky Party this month at Mt. Pinos on July 10th.

Shortly after I turned in my message for the June DSO, Jeremy sent me the schedule for Prime Desert Woodlands Moon Walk, this is one of the events I truly missed. The first Walk is on July 24th at 8:30pm. Come on out and support Jeremy and the club.

We had an Executive Board Meeting at my house to plan the rest of the year for speakers on Zoom, plan a Star BBQ at Saddleback Butte in November and a Christmas Party in December. We will send out the dates as soon as we can confirm them.

Prime Desert Woodlands Moon Walk Schedule:

July 24th @ 8:30pm
August 7th @ 8:00pm
September 25th @ 7:30pm
October 23rd: Scary Science @ 3:00pm
Moon Walk @ 6:30pm
November 13th @ 5:30pm
December 11th @ 5:30pm

Until then keep looking up.

On The Cover

The interaction of two doomed stars has created this spectacular ring adorned with bright clumps of gas — a diamond necklace of cosmic proportions. Fittingly known as the Necklace Nebula, this planetary nebula is located 15 000 light-years away from Earth in the small, dim constellation of Sagitta (The Arrow).

The Necklace Nebula — which also goes by the less glamorous name of PN G054.2-03.4 — was produced by a pair of tightly orbiting Sun-like stars. Roughly 10,000 years ago, one of the aging stars expanded and engulfed its smaller companion, creating something astronomers call a “common envelope”. The smaller star continued to orbit inside its larger companion, increasing the bloated giant's rotation rate until large parts of it spun outwards into space. This escaping ring of debris formed the Necklace Nebula, with particularly dense clumps of gas forming the bright “diamonds” around the ring.

Continued On Next Page

From the Secretary

By Rose Moore

Members:

The month of July brings us the first PDW since February of 2020! Our Prime Desert Moon Walk is scheduled for Saturday July 24th at 8:30pm. We need members with telescopes, and you may arrive about an hour before to set up. Or you may come and just do the astronomy walk with Jeremy. There will be viewing through the scopes before and after the Moon Walk, weather permitting. It's free and open to the public. The Sun will set at 8:03pm. Venus and Mars will be up till approximately 9:43pm and 9:23pm, respectively. Jupiter rises at 9:25pm, and Saturn at 8:26pm. The waning gibbous Moon will rise at 9:06pm.

We had Tiffany Stone Wolbrecht speak at our Zoom club meeting for June. Tiffany is a Planetarium Lecturer at the Ward Beecher Planetarium, Youngstown State University, Youngstown, OH. She spoke about the telescopes and observatories in Chile from a recent trip to the area.

We will have a Zoom astronomy club meeting on Friday July 9th at 7:00pm. We have messages out to set up some speakers for the upcoming months. Unfortunately, we do not know when we will be resuming meetings at the SAGE Planetarium. Please try to attend the Zoom meeting and support your club! We will have a short business meeting usually after the speaker's presentation, and invite your participation. Further info to follow.

There will be a dark sky star party up at large parking lot at Mt. Pinos on Saturday July 10th. You may arrive anytime on Saturday, or even Friday, weather permitting. Check weather and road conditions before heading out to the star party!

Rose

On The Cover ... continued

The pair of stars which created the Necklace Nebula remain so close together — separated by only a few million kilometres — that they appear as a single bright dot in the centre of this image. Despite their close encounter the stars are still furiously whirling around each other, completing an orbit in just over a day.

The Necklace Nebula was featured in a previously released Hubble image, but now this new image has been created by applying advanced processing techniques, making for a new and improved view of this intriguing object. The composite image includes several exposures from Hubble's Wide Field Camera 3.

Credit:

ESA/Hubble & NASA, K. Noll

Observe the Milky Way and Great Rift

by David Prosper, NASA Night Sky Network

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!

To observe the Milky Way, you need clear, dark skies, and enough time to adapt your eyes to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that’s the beauty and quietly deceptive nature of long exposure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn’t easily visible until it rises a bit above the horizon and the thick, turbulent air which obscures the view. The Milky Way is huge, but is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Try not to check your phone while you wait, as its light will reset your night vision. It’s best to attempt to view the Milky Way when the Moon is at a new or crescent phase; you don’t want the Moon’s brilliant light washing out any potential views, especially since a full Moon is up all night.

Keeping your eyes dark adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way. Other “dark nebulae” of cosmic clouds pepper the Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their traditional stories along with the constellations and Milky Way.

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The “Our Place in Our Galaxy” activity can help you do just that, with only birdseed, a coin, and your imagination: bit.ly/galaxyplace. You can also discover the amazing science NASA is doing to understand our galaxy – and our place in it - at nasa.gov.



The Great Rift is shown in more detail in this photo of a portion of the Milky Way along with the bright stars of the Summer Triangle. You can see why it is also called the “Dark Rift.” Credit: NASA / A.Fujii



If the Milky Way was shrunk down to the size of North America, our entire Solar System would be about the size of a quarter. At that scale, the North Star, Polaris - which is about 433 light years distant from us - would be 11 miles away! Find more ways to visualize these immense sizes with the Our Place in Our Galaxy activity: bit.ly/galaxyplace

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Space News

News from around the Net

The Curious Cloud Above Mars's Arsia Mons Volcano

A 1,800km-long cloud over a Martian mountain holds clues about the Red Planet's atmosphere, and provides a key lesson for planetary science. Many planets in the Solar System have atmospheres, and their clouds bring much joy to the scientists studying them, including Mars. One Martian cloud in particular has caught the attention of astronomer Jorge Hernández-Bernal and his team: . . . (continued at <https://www.skyatnightmagazine.com/space-science/mars-arsia-mons-elongated-cloud/>)



Tests Of General Relativity With Gravitational Waves Can Go Awry

Just six years ago, scientists with the Laser Interferometer Gravitational-Wave Observatory, or LIGO, in Louisiana and Washington measured a unique undulating signal when the distance between the detector mirrors was nudged by just one part in a billion trillion -- just a fraction of the width of a proton. It revealed the existence of gravitational waves emanating from an ancient collision of black holes. . . (continued at <https://astronomy.com/news/2021/06/tests-of-general-relativity-with-gravitational-waves-can-go-awry>)



20 Of The Best Places To View The 2024 Great North American Eclipse

The total solar eclipse set to occur April 8, 2024, will dazzle everyone who views it. However, potential observers might have some questions. Where exactly in Mexico and the U.S. will totality be visible? That's easy to answer with a detailed map, such as the one below. But which locations are the best spots to view the event? That answer is less straightforward . . . (continued at <https://astronomy.com/news/2021/06/20-of-the-best-places-to-view-the-2024-great-north-american-eclipse>)



Astronomers Find A Blinking Star Near The Center Of The Milky Way

In this week's edition of new unexplained astronomical phenomena, a team of astronomers led by Dr. Leigh Smith from Cambridge found a star 100 times larger than our sun that nearly disappears from the sky every few decades. They also have no idea why it does so. The star, called VVV-WIT-08, is located 25,000 light years away, and decreases in brightness by a factor of 30 rather than disappearing altogether. . . . (continued at <https://www.universetoday.com/151579/astronomers-find-a-blinking-star-near-the-center-of-the-milky-way/>)



Twisters In The Cosmic Web

Astronomers have found that the largest structures in the universe spin, making twister-like strings of galaxies and dark matter in the cosmic web. Like giant cosmic twisters, filaments of the cosmic web slowly spin around their own axis while funneling matter into galaxy clusters. These humongous structures are made of galaxies, gas, and dark matter and can measure up to hundreds of millions of light-years . . . (continued at <https://skyandtelescope.org/astronomy-news/twisters-in-the-cosmic-web/>)



A New Nasa Space Telescope, SPHEREX, Is Moving Ahead

The observatory will map the entire sky to study the rapid expansion of the universe after the big bang, the composition of young planetary systems, and the history of galaxies. NASA's upcoming space telescope, the Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer, or SPHEREx, is one step closer to launch. . . . (continued at <https://www.jpl.nasa.gov/news/a-new-nasa-space-telescope-spherex-is-moving-ahead>)



Space News

News from around the Net

Earth's Atmosphere Could Be A Truly Rare Thing, Thanks To One Chemical Process

Life currently has a sample size of just one. Without an alien or two to expand the boundaries of biology, Earth's evolutionary history sets the limits on whether we can expect other planets to spawn complex critters like, well, us. Given many life forms owe a great debt to the oxygen in our atmosphere, it's natural to look to other planets surrounded by a similar mix of gases in our search for aliens . . . (continued at <https://www.sciencealert.com/photosynthesis-made-our-atmosphere-what-it-is-and-it-could-be-an-extremely-rare-thing>)



A Structure In Deep Space Is So Giant It's Challenging Standard Physics

The Giant Arc is a newly-discovered structure spanning 3.3 billion light years, and it's challenging our understanding of the universe. Scientists have discovered a structure in the distant universe so immense that it is actually challenging our understanding of the universe. Known as the Giant Arc, this crescent-shaped stream of galaxies stretches across 3.3 billion light years. . . .(continued at <https://www.vice.com/en/article/g5gjzm/a-structure-in-deep-space-is-so-giant-its-challenging-standard-physics>)



Giant Comet Found In Outer Solar System By Dark Energy Survey

A giant comet from the outskirts of our Solar System has been discovered in 6 years of data from the Dark Energy Survey. Comet Bernardinelli-Bernstein is estimated to be about 1000 times more massive than a typical comet, making it arguably the largest comet discovered in modern times. It has an extremely elongated orbit, journeying inward from the distant Oort Cloud over millions of years. It is the most distant comet to be discovered on its incoming path, giving us years to watch it evolve as it approaches the Sun, though it's not predicted to become a naked-eye spectacle. . . . (continued at <https://noirlab.edu/public/news/noirlab2119/?lang>)



Could Life Exist In The Atmosphere Of A Sub-Neptune Planet?

Earth is perfectly suited for organic life. It stands to reason then that similar worlds orbiting distant stars might also be rich with life. But proving it will be a challenge. One of the better ways to discover extraterrestrial life will be to study the atmospheres of inhabited exoplanets, but Earth is fairly small for a planet and has a thin atmosphere compared to larger worlds. It will be much easier to study . . . (continued at <https://www.universetoday.com/151626/could-life-exist-in-the-atmosphere-of-a-sub-neptune-planet/>)



NASA's Webb Telescope Will Use Quasars To Unlock The Secrets Of The Early Universe

Quasars are very bright, distant and active supermassive black holes that are millions to billions of times the mass of the Sun. Typically located at the centers of galaxies, they feed on infalling matter and unleash fantastic torrents of radiation. Among the brightest objects in the universe, a quasar's light outshines that of all the stars. . . . (continued at <https://phys.org/news/2021-06-nasa-webb-telescope-quasars-secrets.html>)



After A 30-Year Hiatus, NASA Is Returning To Venus With Two New Probes

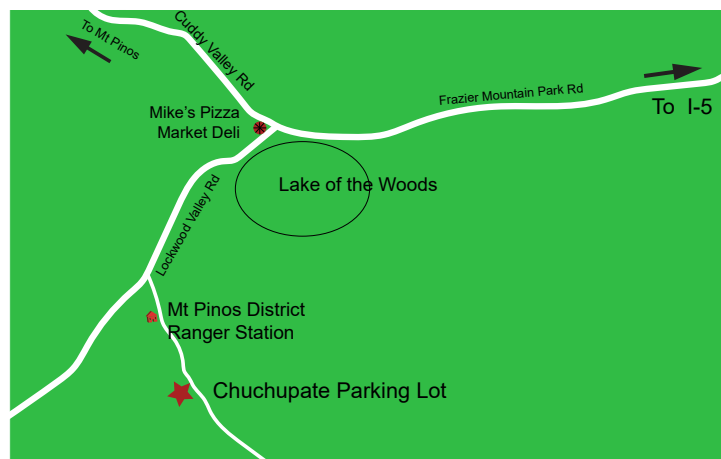
Three decades after NASA's Magellan mission came to an end, the U.S. space agency is returning to cloud-shrouded Venus with two cost-capped Discovery-class missions, one to map the world with a cloud-penetrating radar and another that will plunge into the atmosphere for a dramatic hourlong descent to study its chemical composition. . . . (continued at <https://astronomynow.com/2021/06/04/after-a-30-year-hiatus-nasa-is-returning-to-venus-with-two-new-probes/>)



Dark Sky Observing Sites

The Chuchupate parking lot is a half a mile beyond the Mt Pinos ranger station (on some maps The Chuchupate Ranger Sta., the parking lot is also called Frazier Mountain trailhead).

To get there, take the Frazier Mountain Park RD east about 7 miles from I-5, to Lake Of The Woods, Turn left on Lockwood Valley Rd. (If you see Mike's Pizza on your left you missed the turn) In less than a mile there is a road to the left, go past the ranger station, the parking lot is on the right. The Club gathers in the upper end of the lot. The Elevation is 5430 feet. There is a vault toilet.



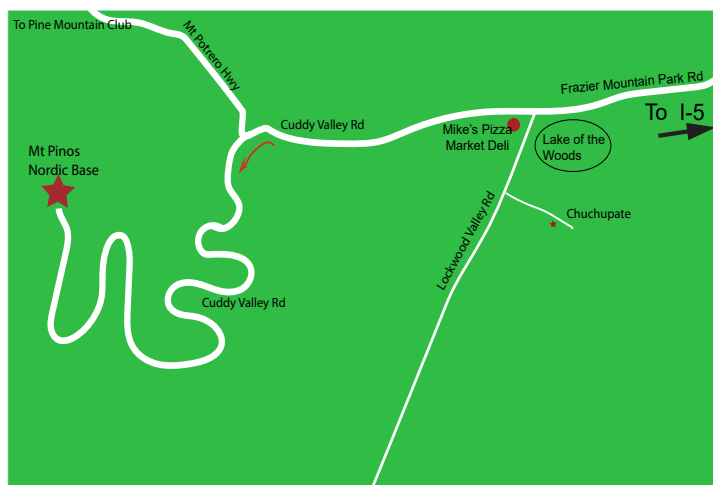
The Red Cliffs Natural Area is part of **Red Rock Canyon State Park** is a day use area and is not for use by the public after dark. The Club gets a special permit for a star party and pays a fee.

To get there: Take the CA-14 north 25 miles past Mojave. You will see giant red cliffs on the right side and a small sign that says “Red Cliffs Natural Area” and a dirt road. (If you see the large sign for the Ricardo campground, you drove a mile too far). Follow the road to the large parking lot (that hasn't been graded in a long time). Elevation is 2410 feet. There is a vault toilet.

Mt Pinos is a parking lot at 8350 feet for the “Mt Pinos Nordic Base.” There is a vault toilet 300 yds to the east in the Chula Vista campground.

To get there: From I-5, get off at Frazier Mountain Park Rd and drive west about 7 miles to Mike's Pizza/Market Deli at Lockwood Valley Rd. Keep on the main roadway (don't turn left to go to Chuchupate). Continue past Mike's Pizza on Cuddy Valley Rd (the road's new name) about 5 miles. Continue straight (do not turn right on to Mil Potrero Hwy) for another 8 1/2 miles to the parking area.

Note: The entire drive from I-5 is uphill.



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Planet Summary

The **Sun** starts July in Gemini and crosses into Cancer by the middle of the month.

Mercury achieves greatest western elongation on the 4th, when it is 22° separated from the Sun at mag +0.4. Mercury continues to brighten as its phase increases, reaching mag 0.0 when the Moon passes 4° to the north on the 8th and mag -1.0 and on the 18th when it is still just 15° from the Sun; after that it gets lost in the morning twilight as it approaches superior conjunction on August 1.

Venus's elongation from the Sun increases from 25° to 33° during July. On the 13th it passes just 0.5° from Mars, with Venus outshining Mars by a factor of 200. The waxing crescent Moon passes 3° north of the pair on the 11th. Venus passes just 1° north of Regulus on the 21st.

Mars is near its minimum brightness at mag +1.8 as it heads toward its October conjunction with the Sun.

Jupiter continues its westward motion among the stars of western Aquarius. The waning gibbous Moon passes to the south in the late night of the 25th.

Saturn spends the month moving retrograde among the stars of Capricorn becoming larger and more apparent in the morning sky. On the 23th the full Moon passes less than 8° to the southwest.

Uranus continues moving east in central Aries for the next several months. The waning Moon zips by in the morning of the 4th.

Neptune will spend the month almost stationary in northeast Aquarius. The 83% waning Moon will pass 4° south the afternoon of the 27th.

Pluto spends the month slowing moving west in Sagittarius at mag 14.3.

Sun and Moon Rise and Set



First Qtr July 17 Full July 23 Third Qtr July 14 & 31 New July 9

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
7/1/2021	00:43	12:52	05:43	20:09
7/5/2021	02:31	16:38	05:46	20:09
7/10/2021	06:11	21:06	05:48	20:07
7/15/2021	11:23	23:57	05:51	20:05
7/20/2021	17:04	02:18	05:34	20:03
7/25/2021	21:40	07:30	05:58	20:00
7/30/2021	23:03	12:35	06:01	19:56

Planet Data*

July 1

	Rise	Transit	Set	Mag	Phase%
Mercury	04:29	11:27	18:26	0.79	30.2
Venus	07:43	14:46	21:49	-3.92	89.6
Mars	08:18	15:14	22:09	1.82	97.3
Jupiter	22:58	04:27	10:00	-2.70	99.4
Saturn	21:59	03:10	08:25	0.37	99.9

July 15

	Rise	Transit	Set	Mag	Phase%
Mercury	04:33	11:44	18:55	-0.74	69.9
Venus	08:11	14:59	21:46	-3.93	86.3
Mars	08:06	14:53	21:40	1.84	97.9
Jupiter	22:01	03:29	09:01	-2.78	99.6
Saturn	21:01	02:11	07:25	0.28	99.9

July 30

	Rise	Transit	Set	Mag	Phase%
Mercury	05:48	12:53	19:56	-1.99	99.6
Venus	08:40	15:08	21:36	-3.95	82.4
Mars	07:53	14:30	21:07	1.84	98.6
Jupiter	20:58	02:25	07:55	-2.84	99.8
Saturn	19:59	01:08	06:21	0.19	99.9

*All time mentioned are local

*Sun, Moon and Planetary date based on Quartz Hill, CA

July 2021

This circular star chart displays the Northern Hemisphere of the sky. The outer ring is labeled with cardinal directions: Facing North (top), Facing South (bottom), Facing East (left), and Facing West (right). The chart is divided into four quadrants by dashed lines. Constellations are labeled with their names, and stars are labeled with their names or designations. Key objects include the Moon, Venus, Mars, Saturn, and various Messier objects (M15, M27, M11, M22, M20, M8, M6, M7, M4, M13, M51, M57, M81/82, M44). The chart also shows the ecliptic and the zodiac signs.

Powered by: Heavens-Above.com

Time: 2021 July 10, 21:00 (UTC -07:00)

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Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Deep Sky Star Party or the Saturday nearest the New Moon, in this case July 10, 2021. The list is sorted by the transit time of the object.

ID	Type		RA	Dec	Mag	Rise	Transit	Set
M51	Galaxy	CVn	13h 29m 52s	+47° 11.7'	8.9	09:53	19:13	04:34
Arp85	Galaxy	CVn	13h 29m 58s	+47° 16.0'	9.6	09:52	19:13	04:35
NGC5182	Galaxy	Hya	13h 30m 41s	-28° 09.0'	13.0	14:38	19:14	23:50
NGC5214	Galaxy	CVn	13h 32m 49s	+41° 52.3'	14.0	10:37	19:16	03:55
M83	Galaxy	Hya	13h 37m 00s	-29° 51.8'	8.0	14:51	19:20	23:50
HR5144	Triple	Boo	13h 40m 40s	+19° 57.3'	5.8	12:23	19:24	02:26
NGC5283	Galaxy	Dra	13h 41m 06s	+67° 40.3'	14.0	Circum	19:25	Circum
M3	Globular	CVn	13h 42m 11s	+28° 22.5'	7.0	11:54	19:26	02:57
NGC5286	Globular	Cen	13h 46m 24s	-51° 22.0'	7.6	17:23	19:30	21:37
NGC5292	Galaxy	Cen	13h 47m 40s	-30° 56.4'	14.0	15:06	19:31	23:56
NGC5356	Galaxy	Vir	13h 54m 59s	+05° 20.0'	14.0	13:21	19:38	01:56
NGC5363	Galaxy	Vir	13h 56m 07s	+05° 15.2'	10.2	13:22	19:40	01:57
NGC5447	Neb	UMa	14h 02m 29s	+54° 16.3'		08:23	19:46	07:09
M101	Galaxy	UMa	14h 03m 13s	+54° 20.9'	8.2	08:20	19:47	07:14
NGC5461	Neb	UMa	14h 03m 42s	+54° 19.0'		08:22	19:47	07:13
NGC5485	Galaxy	UMa	14h 07m 11s	+55° 00.0'	11.5	Circum	19:51	Circum
NGC5460	Open	Cen	14h 07m 27s	-48° 20.6'	5.6	17:10	19:51	22:32
NGC5500	Galaxy	Boo	14h 10m 15s	+48° 32.7'	14.0	10:19	19:54	05:28
IC991	Galaxy	Vir	14h 17m 48s	-13° 52.3'	13.0	14:38	20:01	01:25
HR5362	DbI	Lup	14h 20m 10s	-43° 03.5'	5.6	16:41	20:04	23:27
IC4406	P Neb	Lup	14h 22m 26s	-44° 09.0'	11.0	16:50	20:06	23:21
HR5409	Triple	Vir	14h 28m 12s	-02° 13.6'	4.8	14:15	20:12	02:08
NGC5669	Galaxy	Boo	14h 32m 44s	+09° 53.4'	12.0	13:46	20:16	02:47
NGC5689	Galaxy	Boo	14h 35m 30s	+48° 44.5'	11.9	10:42	20:19	05:56
M102	Galaxy	Dra	15h 06m 30s	+55° 45.7'	10.8	Circum	20:50	Circum
NGC5875	Galaxy	Boo	15h 09m 13s	+52° 31.6'	13.0	10:21	20:53	07:24
NGC5907	Galaxy	Dra	15h 15m 54s	+56° 19.7'	11.4	Circum	20:59	Circum
NGC5882	P Neb	Lup	15h 16m 50s	-45° 38.9'	11.0	17:56	21:00	00:05
NGC5897	Globular	Lib	15h 17m 24s	-21° 00.6'	8.6	16:00	21:01	02:02
M5	Globular	Ser	15h 18m 33s	+02° 04.9'	7.0	14:53	21:02	03:11
Barnard228	DkNeb	Lup	15h 44m 00s	-34° 30.0'		17:18	21:27	01:37
IC4593	P Neb	Her	16h 11m 44s	+12° 04.3'	11.0	15:18	21:55	04:32
IC4592	Neb	Sco	16h 11m 59s	-19° 27.4'		16:49	21:55	03:02
M80	Globular	Sco	16h 17m 03s	-22° 58.5'	8.5	17:06	22:01	02:55
C4601	Neb	Sco	16h 20m 18s	-20° 04.9'		17:00	22:04	03:08
Abell38	P Neb	Sco	16h 23m 17s	-31° 44.9'	11.7	17:45	22:07	02:28

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC4601	Neb	Sco	16h 20m 18s	-20° 04.9'		17:00	22:04	03:08
Abell38	P Neb	Sco	16h 23m 17s	-31° 44.9'	11.7	17:45	22:07	02:28
M4	Globular	Sco	16h 23m 35s	-26° 31.5'	7.5	17:25	22:07	02:49
IC4603	Neb	Oph	16h 25m 24s	-24° 28.0'		17:19	22:09	02:58
IC4604	Neb	Oph	16h 25m 33s	-23° 26.5'		17:16	22:09	03:02
NGC6124	Open	Sco	16h 25m 36s	-40° 40.0'	5.8	18:31	22:09	01:47
Abell39	P Neb	Her	16h 27m 33s	+27° 54.5'	12.9	14:41	22:11	05:41
IC4605	Neb	Sco	16h 30m 12s	-25° 06.8'		17:27	22:14	03:01
NGC6153	P Neb	Sco	16h 31m 31s	-40° 15.2'	12.0	18:35	22:15	01:55
NGC6181	Galaxy	Her	16h 32m 21s	+19° 49.5'	11.9	15:15	22:16	05:17
NGC6171	Globular	Oph	16h 32m 32s	-13° 03.1'	8.1	16:50	22:16	03:42
NGC6178	Open	Sco	16h 35m 47s	-45° 38.6'	7.2	19:15	22:19	01:24
NGC6193	Open	Ara	16h 41m 18s	-48° 46.0'	5.2	19:48	22:25	01:02
M13	Globular	Her	16h 41m 41s	+36° 27.5'	7.0	14:18	22:25	06:33
NGC6210	P Neb	Her	16h 44m 30s	+23° 48.0'	9.0	15:13	22:28	05:43
Barnard44a	DkNeb	Sco	16h 44m 45s	-40° 20.0'		18:48	22:28	02:08
NGC6204	Open	Ara	16h 46m 09s	-47° 01.0'	8.2	19:37	22:30	01:23
M12	Globular	Oph	16h 47m 14s	-01° 56.8'	8.0	16:33	22:31	04:28
NGC6231	Open	Sco	16h 54m 00s	-41° 48.0'	2.6	19:06	22:37	02:08
IC4628	Neb	Sco	16h 56m 58s	-40° 27.3'		19:01	22:40	02:19
NGC6254	Globular	Oph	16h 57m 09s	-04° 05.9'	6.6	16:49	22:41	04:32
Barnard47	DkNeb	Oph	16h 59m 42s	-22° 38.0'		17:47	22:43	03:39
M62	Globular	Oph	17h 01m 13s	-30° 06.7'	8.0	18:16	22:45	03:13
M19	Globular	Oph	17h 02m 38s	-26° 16.0'	8.5	18:03	22:46	03:29
Barnard51	DkNeb	Oph	17h 04m 44s	-22° 15.0'		17:51	22:48	03:45
IC4637	P Neb	Sco	17h 05m 10s	-40° 53.1'	14.0	19:12	22:49	02:25
Barnard56	DkNeb	Sco	17h 08m 48s	-32° 05.0'		18:32	22:52	03:13
Barnard59	DkNeb	Oph	17h 11m 23s	-27° 29.0'		18:16	22:55	03:33
NGC6302	P Neb	Sco	17h 13m 42s	-37° 06.0'	9.6	19:00	22:57	02:54
Barnard251	DkNeb	Oph	17h 13m 48s	-20° 09.0'		17:53	22:57	04:01
Barnard63	DkNeb	Oph	17h 16m 00s	-21° 28.0'		18:00	22:59	03:59
M92	Globular	Her	17h 17m 07s	+43° 08.1'	7.5	14:13	23:01	07:48
M9	Globular	Oph	17h 19m 12s	-18° 31.0'	9.0	17:54	23:03	04:12
NGC6326	P Neb	Ara	17h 20m 46s	-51° 45.2'	12.0	21:03	23:04	01:06
Barnard256	DkNeb	Oph	17h 22m 12s	-28° 49.0'		18:32	23:06	03:39
Barnard67a	DkNeb	Oph	17h 22m 30s	-21° 53.0'		18:08	23:06	04:04
Barnard71	DkNeb	Oph	17h 23m 02s	-24° 00.0'		18:15	23:07	03:58
NGC6357	Neb	Sco	17h 24m 43s	-34° 12.1'		18:57	23:08	03:19
IC4651	Open	Ara	17h 24m 52s	-49° 56.5'	6.9	20:44	23:08	01:33
Abell41	P Neb	Ser	17h 29m 04s	-15° 13.3'	13.9	17:53	23:13	04:32

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
Abell42	P Neb	Oph	17h 31m 31s	-08° 19.1'	14.6	17:36	23:15	04:54
Barnard78	DkNeb	Oph	17h 32m 00s	-25° 35.0'		18:30	23:15	04:01
NGC6388	Globular	Sco	17h 36m 17s	-44° 44.1'	6.9	20:09	23:20	02:31
M14	Globular	Oph	17h 37m 36s	-03° 14.7'	9.5	17:27	23:21	05:15
Barnard276	DkNeb	Oph	17h 39m 39s	-19° 49.0'		18:18	23:23	04:28
M6	Open	Sco	17h 40m 20s	-32° 15.2'	4.5	19:04	23:24	03:43
NGC6397	Globular	Ara	17h 40m 42s	-53° 40.0'	5.6	21:55	23:24	00:54
NGC6426	Globular	Oph	17h 44m 55s	+03° 10.1'	11.2	17:17	23:28	05:40
Barnard83a	DkNeb	Sgr	17h 45m 18s	-20° 00.0'		18:24	23:29	04:33
IC4665	Open	Oph	17h 46m 30s	+05° 39.0'	4.2	17:11	23:30	05:49
NGC6445	P Neb	Sgr	17h 49m 15s	-20° 00.6'	13.0	18:28	23:33	04:37
NGC6503	Galaxy	Dra	17h 49m 27s	+70° 08.6'	10.2	Circum	23:33	Circum
NGC6441	Globular	Sco	17h 50m 13s	-37° 03.0'	7.4	19:36	23:34	03:31
Barnard283	DkNeb	Sco	17h 51m 00s	-33° 52.0'		19:22	23:34	03:47
Barnard285	DkNeb	Ser	17h 51m 32s	-12° 52.0'		18:09	23:35	05:01
M7	Open	Sco	17h 53m 51s	-34° 47.6'	3.5	19:29	23:37	03:46
IC4670	Neb	Sgr	17h 55m 07s	-21° 44.6'		18:40	23:39	04:37
NGC6501	Galaxy	Her	17h 56m 04s	+18° 22.3'	12.3	16:43	23:40	06:36
M23	Open	Sgr	17h 57m 04s	-18° 59.1'	6.0	18:33	23:41	04:48
NGC6543	P Neb	Dra	17h 58m 36s	+66° 38.0'	8.1	Circum	23:42	Circum
NGC6496	Globular	Sco	17h 59m 04s	-44° 16.0'	9.2	20:28	23:43	02:57
Barnard291	DkNeb	Sgr	17h 59m 43s	-33° 53.0'		19:31	23:43	03:56
Barnard292	DkNeb	Sgr	18h 00m 34s	-33° 20.0'		19:29	23:44	03:59
Barnard293	DkNeb	Sgr	18h 01m 12s	-35° 20.0'		19:39	23:45	03:50
M20	Open+D Neb	Sgr	18h 02m 42s	-22° 58.2'	5.0	18:52	23:46	04:41
M8	Open+D Neb	Sgr	18h 03m 41s	-24° 22.7'	5.0	18:57	23:47	04:37
Barnard295	DkNeb	Sgr	18h 04m 05s	-31° 09.0'		19:23	23:48	04:12
M21	Open	Sgr	18h 04m 13s	-22° 29.3'	7.0	18:51	23:48	04:44
NGC6530	Open	Sgr	18h 04m 31s	-24° 21.5'	4.6	18:58	23:48	04:38
NGC6528	Globular	Sgr	18h 04m 50s	-30° 03.3'	9.5	19:20	23:48	04:17
IC4684	Neb	Sgr	18h 09m 08s	-23° 26.1'		19:00	23:53	04:46
IC4685	Neb	Sgr	18h 09m 18s	-23° 59.2'		19:02	23:53	04:44
Barnard303	DkNeb	Sgr	18h 09m 28s	-23° 59.0'		19:02	23:53	04:44
IC1274	Neb	Sgr	18h 09m 51s	-23° 38.8'		19:01	23:53	04:46
IC1275	Neb	Sgr	18h 10m 07s	-23° 45.7'		19:02	23:54	04:45
NGC6572	P Neb	Oph	18h 12m 06s	+06° 51.2'	9.0	17:34	23:56	06:18
NGC6567	P Neb	Sgr	18h 13m 45s	-19° 04.5'	12.0	18:50	23:57	05:05
IC4701	Neb	Sgr	18h 16m 36s	-16° 38.0'		18:45	00:00	05:15
Barnard93	DkNeb	Sgr	18h 16m 53s	-18° 03.0'		18:50	00:00	05:11

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC1284	Neb	Sgr	18h 17m 39s	-19° 40.3'		18:56	00:01	05:07
M24	Open	Sgr	18h 18m 26s	-18° 24.3'	4.5	18:52	00:02	05:11
M16	Open+D Neb	Ser	18h 18m 48s	-13° 48.3'	6.5	18:39	00:02	05:26
Barnard308	DkNeb	Sgr	18h 19m 08s	-22° 14.0'		19:06	00:03	05:00
M18	Open	Sgr	18h 19m 58s	-17° 06.1'	8.0	18:50	00:03	05:17
M17	Open+D Neb	Sgr	18h 20m 47s	-16° 10.3'	7.0	18:48	00:04	05:21
HR6923	Mult	Dra	18h 23m 54s	+58° 48.0'	5.0	Circum	00:07	Circum
M28	Globular	Sgr	18h 24m 33s	-24° 52.1'	8.5	19:20	00:08	04:56
Barnard95	DkNeb	Sct	18h 25m 35s	-11° 44.0'		18:39	00:09	05:39
Barnard97	DkNeb	Sct	18h 29m 05s	-09° 55.0'		18:38	00:13	05:47
Abell44	P Neb	Sgr	18h 30m 11s	-16° 45.4'	12.6	18:59	00:14	05:28
NGC6637	Globular	Sgr	18h 31m 23s	-32° 20.8'	7.7	19:56	00:15	04:34
IC1287	Neb	Sct	18h 31m 26s	-10° 47.7'		18:43	00:15	05:47
M25	Open	Sgr	18h 31m 42s	-19° 07.0'	6.5	19:08	00:15	05:22
IC4725	Open	Sgr	18h 31m 48s	-19° 06.7'	4.6	19:08	00:15	05:23
NGC6642	Globular	Sgr	18h 31m 54s	-23° 28.5'	8.8	19:23	00:15	05:08
NGC6644	P Neb	Sgr	18h 32m 35s	-25° 07.7'	12.0	19:29	00:16	05:03
NGC6647	Open	Sgr	18h 32m 49s	-17° 13.6'	8.0	19:03	00:16	05:29
IC4732	P Neb	Sgr	18h 33m 55s	-22° 38.6'	13.0	19:22	00:17	05:13
NGC6656	Globular	Sgr	18h 36m 24s	-23° 54.2'	5.1	19:28	00:20	05:11
IC4756	Open	Ser	18h 38m 54s	+05° 27.0'	5.0	18:04	00:22	06:40
NGC6681	Globular	Sgr	18h 43m 12s	-32° 17.4'	8.1	20:07	00:27	04:46
NGC6694	Open	Sct	18h 45m 18s	-09° 23.0'	8.0	18:52	00:29	06:05
IC4776	P Neb	Sgr	18h 45m 51s	-33° 20.5'	12.0	20:14	00:29	04:44
Barnard318	DkNeb	Sct	18h 49m 42s	-06° 23.0'		18:48	00:33	06:18
M11	Open	Sct	18h 51m 05s	-06° 16.1'	7.0	18:49	00:35	06:20
M57	P Neb	Lyr	18h 53m 35s	+33° 01.7'	9.5	16:46	00:37	08:28
Barnard117	DkNeb	Sct	18h 53m 43s	-07° 24.0'		18:55	00:37	06:19
NGC6715	Globular	Sgr	18h 55m 03s	-30° 28.7'	7.7	20:12	00:39	05:05
NGC6717	Globular	Sgr	18h 55m 06s	-22° 42.0'	9.2	19:43	00:39	05:34
Barnard122	DkNeb	Sct	18h 56m 48s	-04° 45.0'		18:51	00:40	06:30
Barnard123	DkNeb	Sct	18h 57m 39s	-04° 43.0'		18:51	00:41	06:31
NGC6723	Globular	Sgr	18h 59m 33s	-36° 37.9'	7.3	20:44	00:43	04:43
Barnard128	DkNeb	Aql	19h 01m 40s	-04° 34.0'		18:55	00:45	06:35
NGC6729	BrNeb	CrA	19h 01m 54s	-36° 57.0'		20:47	00:45	04:43
Barnard326	DkNeb	Aql	19h 03m 00s	-00° 23.0'		18:45	00:46	06:48
NGC6749	Globular	Aql	19h 05m 15s	+01° 54.0'	11.1	18:41	00:49	06:57
Barnard329	DkNeb	Aql	19h 06m 59s	+03° 11.0'		18:39	00:50	07:02
NGC6760	Globular	Aql	19h 11m 12s	+01° 01.8'	9.1	18:49	00:55	07:00

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