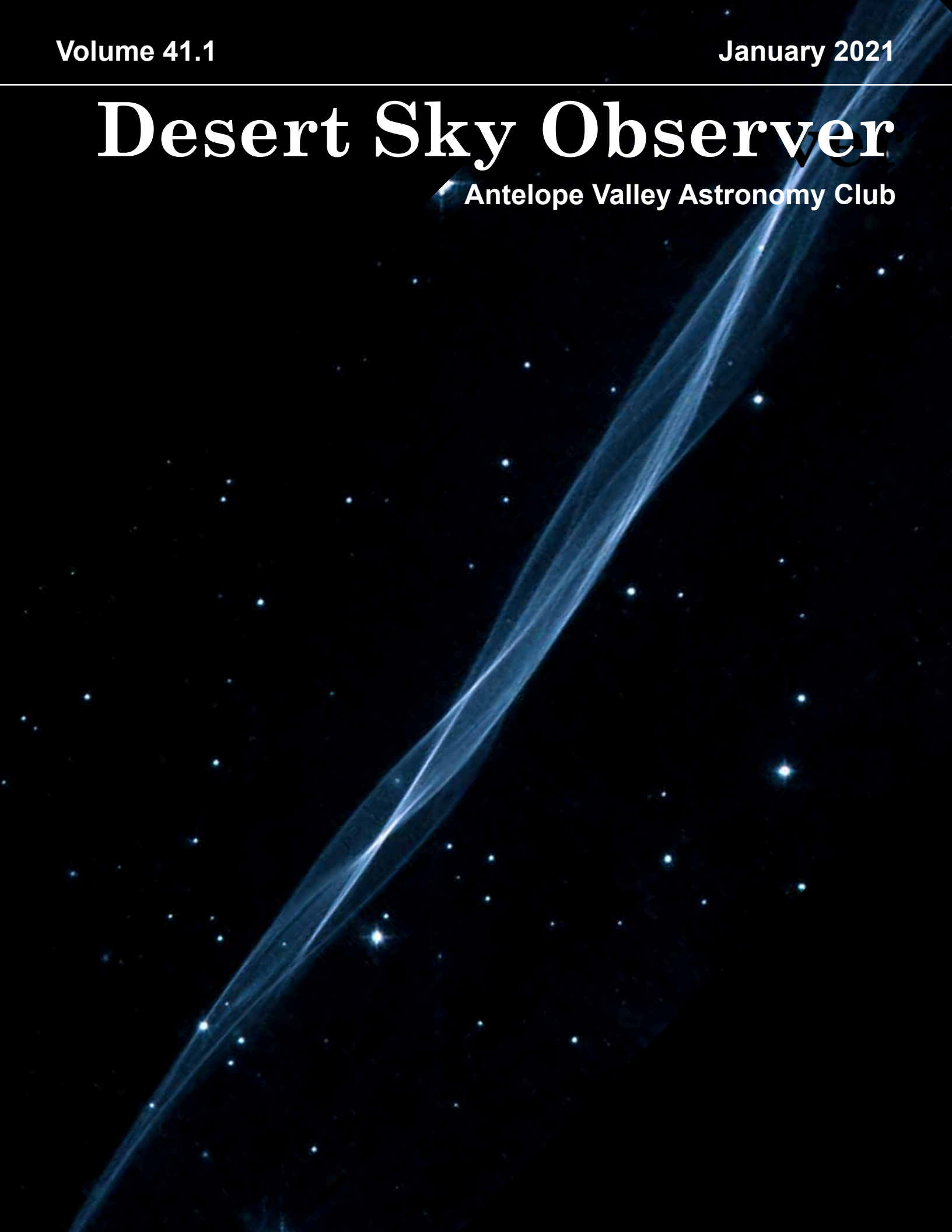


Volume 41.1

January 2021

Desert Sky Observer

Antelope Valley Astronomy Club



Desert Sky Observer

www.avastronomyclub.org January 2021

Upcoming Events

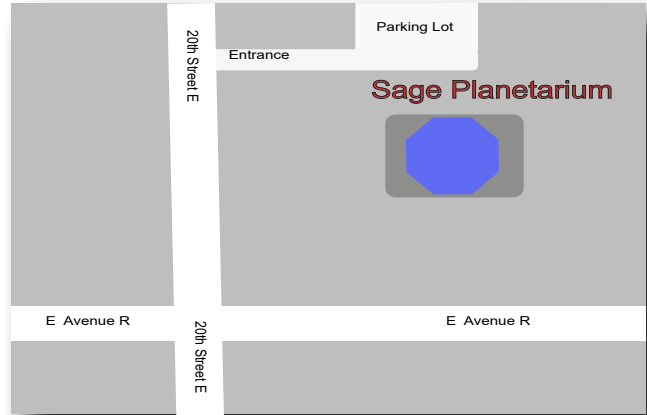
January 8: Club Meeting . . Ahhhh, no

Any clear night: Personal Star Party

February 12: Club Meeting. . . Probably Not



AVAC Calendar



Board Members

President: Darrel Bennet (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/.



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

President's Message

By Darrel Bennet

Hello Everyone,

It is with a heavy heart that I am reporting the passing of a long time club member and friend, Tom Hames, last month. Tom was not only a great astronomer and knew everything about telescopes from fixing them to grinding mirrors and building them too. Tom was also my go to guy on telescopes. Whenever I needed help on a telescope he was always there with the answer. Tom was also a great painter with some of his paintings on display in the Sage Planetarium. I know we will truly miss him, rest in peace my brother, your memory will live on.

I hope you all had a wonderful holiday and looking forward to a better year. We will be having an Executive Board meeting this month at my house to discuss this coming calendar year. If anyone would like to see the club do something special this year, please let one of the board members know.

Until then keep looking up.

Darrel

On The Cover

This image shows a small portion of a nebula called the Cygnus Loop. Covering a region on the sky six times the diameter of the full Moon, the Cygnus Loop is actually the expanding blastwave from a stellar cataclysm - a supernova explosion - which occurred about 15,000 years ago.

This delicate Hubble Space Telescope image shows a tiny portion of the Cygnus loop, a supernova remnant in the constellation of Cygnus, the Swan. Measurements on this super-detailed image of a cosmic veil shows that the original supernova explosion took place only 5, 000 years ago.

Credit:

ESA & Digitized Sky Survey (Caltech)

From the Secretary

By Rose Moore

Welcome to the first edition of the DSO for 2021!

January is here, and of course due to the Covid guidelines, there will be no meetings or gatherings. There will be no dark sky star parties probably until March, due to the weather. The AVAC Board will be meeting sometime in January.

Some of you many not be aware, but we lost member Bill Grove just before Thanksgiving. And we lost member Tom Hames a few weeks ago. See Darrell's post above. These are sad events for the club as both were long time members, and Tom was one of the founding members of the club. Our thoughts and prayers are with both families.

We're hoping that by March we will be able to hold our Messier Marathon. This is an annual event for us in the early spring. We'll send out any news as the time gets closer.

Whenever we will be able to hold our first meeting for 2021, we will be electing, or re-electing, members of the AVAC Board. Please consider helping out in some of these positions.

Is anyone doing any observing at home? January 13th is the New Moon for observing deep sky objects. Venus is still a morning planet. Mars will be up till late evening during the middle of the month, but Jupiter and Saturn will be rising in the morning and will be below the horizon by approximately 6pm. Check your astronomy calendars! Please let Phil know if you are doing any observing and what objects you were able to view.

As always, be safe, and stay healthy! Keep looking up!

Rose

Club's Trailer For Sale

The Executive Board has decided that the Club's trailer is no longer needed. The last active use for the trailer was to store members scopes overnight at the Poppy Festival, and lately has been storing a few boxes of club records. It's believed to be a 6x10 single axle cargo van. Contact Darrel for more info...

Check Your Sky's Quality with Orion!

David Prosper NASA Night Sky Network

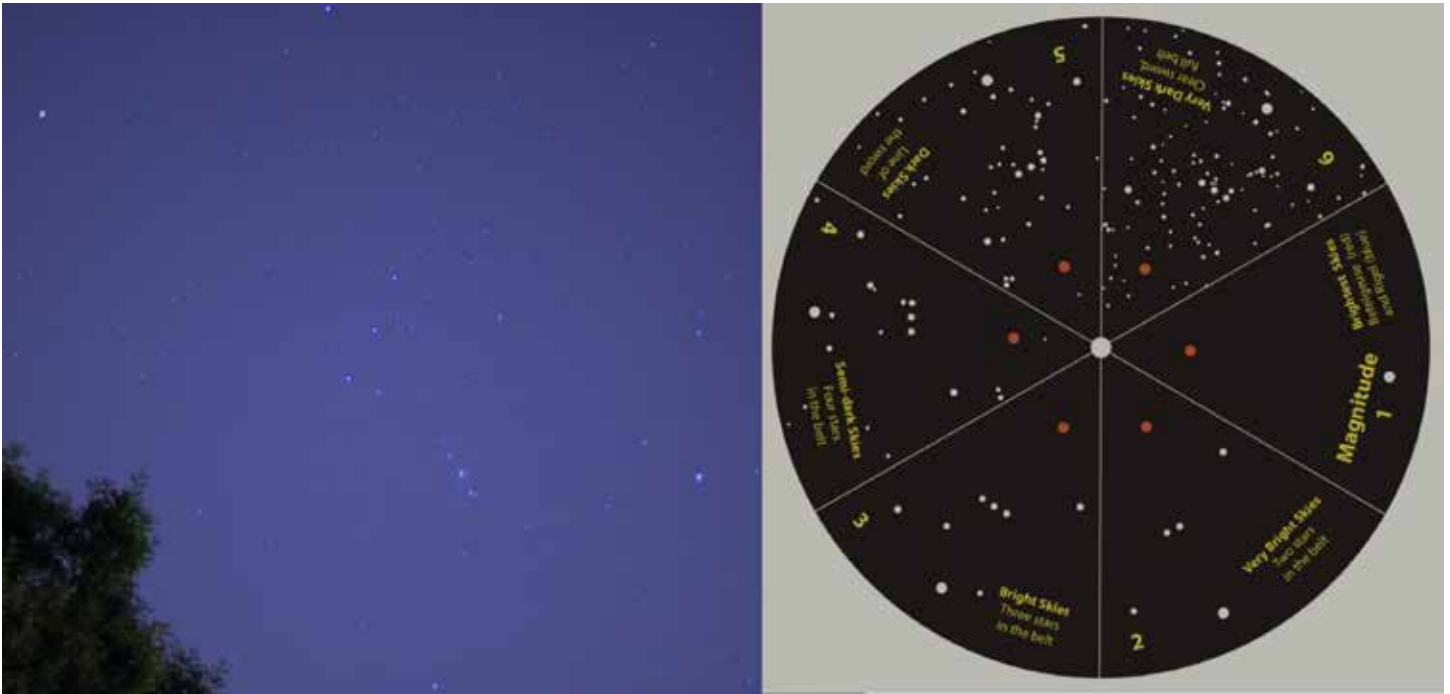
Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies – and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of **apparent magnitude**, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6. A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution. Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

Your sky's **limiting magnitude** is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5, then your limiting magnitude is 5. Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you have a bright sky and your limiting magnitude is at 3, watching a meteor shower or looking for dimmer stars and objects may be a wasted effort. But if your sky is dark and the limit is 5, you should be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, here: bit.ly/darkskywheel. Each wheel contains six "wedges" showing the stars of the constellation, limited from 1-6 magnitude. Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.

Did you have fun? Contribute to science with monthly observing programs from Globe at Night's website (globeatnight.org), and check out the latest NASA's science on the stars you can - and can't - see, at nasa.gov.



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!

Member Scope For Sale

Member Duane Lewis is selling his 9.25 inch Celestron CGEM OTA with the tripod, CGE mount, counterweights, one 1.25" 20mm Plossl eyepiece, a 1.25" diagonal and a 2" diagonal, telrad mount, and a Denkmeir (unknown model) binocular viewer. The OTA was tuned up by member Don Bryden before he moved. It has not been used since. Price is \$1200. Duane is unable to have this set up for viewing because of lack of space. So arrangements will have to be made for viewing the scope and accessories. For more info please contact Duane by email only: gurba1826@gmail.com -- or contact Rose by email: rmorion@bak.rr.com

Space News

News from around the Net

Citizen astronomers map near-Earth asteroid

In the battle to defend the planet from hazardous asteroids, amateur astronomers have taken on a new role — for the first time, helping to map a near-Earth asteroid (NEA), revealing its shape. The effort came as a collaboration between researchers at the SETI Institute and 26 citizen observers from seven countries who observed the 1.2-mile-wide (2 kilometers) asteroid 1999 AP10. . (continued at <https://astronomy.com/news/2020/12/citizen-astronomers-map-near-earth-asteroid>)



Here's what we know about the signal from Proxima Centauri

An enigmatic radio signal from the direction of Proxima Centauri, the Sun's nearest stellar neighbor, has set the internet ablaze with rumor and speculation. It could turn out to be the real deal — a calling card from another civilization. More likely, it's much ado about nothing. The discovery was leaked to the British newspaper The Guardian, which reported the story December 18. . . .(continued at <https://astronomy.com/news/2020/12/heres-what-we-know-about-the-signal-from-proxima-centauri>)



Water on Mars not as widespread as previously thought

Water on Mars, in the form of brines, may not be as widespread as previously thought, according to a new study by researchers at the Arkansas Center for Space and Planetary Sciences. Researchers combined data on brine evaporation rates, collected through experiments at the center's Mars simulation chamber, with a global weather circulation model of the planet to create planetwide maps of where brines are most likely to be found. . . .(continued at <https://www.sciencedaily.com/releases/2020/12/201211083044.htm>)



Dark coating can reduce satellite reflectivity

Today's growing demand for space-based services has spawned a wave of satellite constellation projects which operate numerous artificial satellites in orbit. Since these satellites can shine by reflecting sunlight, the astronomy community has raised concerns about their potential impact on astronomical observations. . . .(continued at <https://www.sciencedaily.com/releases/2020/12/201208090000.htm>)



The 10 biggest space discoveries and stories of 2020

For many reasons, 2020 may be a watershed year for society and science. Astronomers and space agencies spent the year managing the repercussions of the coronavirus pandemic. They also made breakthroughs in new technologies and bid farewell to several important projects. This year saw a new age of sample-retrieval missions, protests against a telescope, an incredible visit from a dazzling comet and the "great conjunction" of Saturn and Jupiter. ... (continued at <https://www.space.com/biggest-space-discoveries-stories-2020>)



Space News

News from around the Net. . .continued

If a planet has a lot of methane in its atmosphere, life is the most likely cause

The ultra-powerful James Webb Space Telescope will launch soon. Once it's deployed and in position at the Earth-Sun Lagrange Point 2, it'll begin work. One of its jobs is to examine the atmospheres of exoplanets and look for biosignatures. It should be simple, right? Just scan the atmosphere until you find oxygen, then close your laptop and head to the pub: Fanfare, confetti, Nobel prize. . . (continued at <https://phys.org/news/2020-12-planet-lot-methane-atmosphere-life.html>)



Why radio astronomers need things quiet in the middle of a Western Australia desert

A remote outback station about 800km north of Perth in Western Australia is one of the best places in the world to operate telescopes that listen for radio signals from space. It's the site of CSIRO's Murchison Radio-astronomy Observatory (MRO) and is home to three telescopes (and soon a fourth when half of the Square Kilometre Array, the world's largest radio telescope, is built there). But it's important these telescopes don't pick up any other radio signals generated here on Earth that could interfere with their observations. . . . (continued at <https://phys.org/news/2020-12-radio-astronomers-quiet-middle-western.html>)



January: The Hyades & Pleiades

December was a great month for stargazing, culminating with a super-close pairing of Jupiter and Saturn. As January opens, you can still see these planets nestled together, very low in the southwest. Start looking for them 30 to 45 minutes after sunset. Jupiter is the brighter one, and dimmer Saturn is to its lower right. They remain within 2° of each other until the 8th. Before they sink too low into evening twilight, on January 9th Jupiter and Saturn will be joined by fast-moving Mercury. . . . (continued at <https://skyandtelescope.org/observing/sky-tour-podcast-january-2021/>)



Top Astronomy News Stories Of 2020

This has been a year rocked by a global pandemic that has left its mark on nearly every aspect of society. Wildfires, social unrest, and loss have only added to our sense of struggle. Yet it has also been a year of celestial wonders, astronomical discoveries, and space successes. We look back at 13 of the biggest stories this year. . . . (continued at <https://skyandtelescope.org/uncategorized/top-astronomy-news-stories-of-2020/>)



The Best Meteor Showers In 2021

Every day, Earth is bombarded by roughly 25 million bits of interplanetary debris, totaling more than 100 tons of dust and sand-sized particles. These fragments of space rock strike Earth's upper atmosphere at speeds of 20 to 45 miles (30 to 70 km) per second, creating momentary streaks of light called meteors or "shooting stars." And although some meteors look bright enough that it seems you can almost touch them, actually they occur very high up, at altitudes of 50 to 75 miles (80 to 120 km). . . . (continued at <https://skyandtelescope.org/observing/best-meteor-showers-in-2021/>)



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.



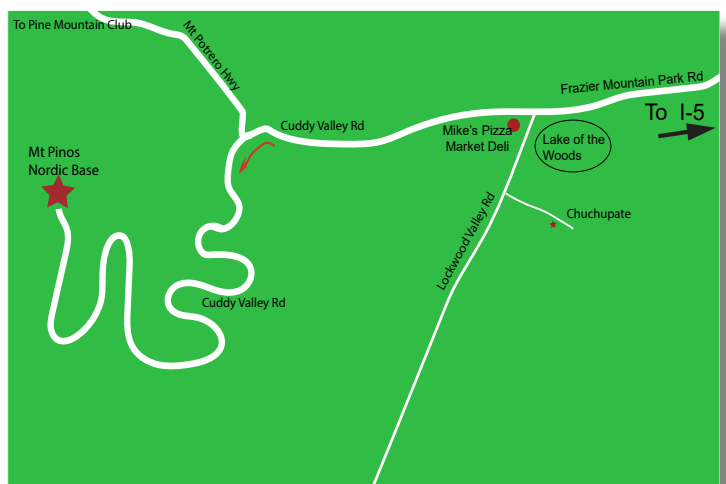
The Red Cliffs Natural Area is part of **Red Rock Canyon State Park** is a day use area and is not for use by the public after dark. The Club gets a special permit for a star party and pays a fee.

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 is uphill



Planet Summary

The **Sun** starts December in Sagittarius and crosses into Capricorn by the end of the month.

Mercury emerges from its superior conjunction early in the month and will be observable in the evening twilight with difficulty as early as the 10th when it will be in conjunction with Jupiter, 1.5° south of the giant, at just 13° elongation from the Sun. Mercury achieves greatest elongation on the 23rd just 5 days before perihelion.

Venus starts the month in Ophiuchus falling toward the Sun, ending the month in eastern Sagittarius at a mag of -3.91. Say good-bye till early May when it reemerges in the evening twilight.

Mars starts the month visible at zenith at sunset in Pieces. After a week Mars moves into Aries and continues to loose angular size and magnitude. The first quarter Moon passes 5° to its south on Jan 20-21.

Jupiter after the Great Conjunction will still be visible for a few days before, like Saturn, until it just gets too close to the Sun. In conjunction with the Sun on the 28th.

Saturn after the conjunction with Jupiter is still visible in the early evening for a few days. By now Saturn is just 10% the brightness of Jupiter. It fades quickly into the sunset reaching solar conjunction on the 24th.

Uranus will spend 2020 in southern Aries at magnitude 5.7. Mars slides past 1.5° to the north on the 20th.

Neptune will spend the month stationary in northeast Aquarius at mag 7.8. The Moon will pass 5.5° south on the 17th.

Pluto spends the month in Sagittarius at mag 14. The Sun is in front of Pluto almost the entire month. By the 28th slides past Venus by 0°44'.

Sun and Moon Rise and Set



First Qtr Jan 20 Full Jan 28 Third Qtr Jan 6 New Jan 12

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
1/1/2021	19:35	09:11	06:59	16:53
1/5/2021	23:57	11:36	07:00	16:56
1/10/2021	04:33	14:41	07:00	17:00
1/15/2021	09:04	19:53	06:59	17:05
1/20/2021	11:27	00:38	06:57	17:10
1/25/2021	14:23	04:29	06:55	17:15
1/30/2021	19:36	08:26	06:51	17:20

Planet Data*

Jan 1					
	Rise	Transit	Set	Mag	Phase%
Mercury	07:39	12:30	17:22	-0.95	97.4
Venus	05:32	10:29	15:26	-3.93	94.2
Mars	12:12	18:47	01:24	-0.21	89.0
Jupiter	08:23	13:28	18:32	-1.97	99.8
Saturn	08:19	13:26	18:26	0.62	99.9

Jan 15					
	Rise	Transit	Set	Mag	Phase%
Mercury	08:01	13:10	18:20	-0.86	81.4
Venus	05:55	10:50	15:45	-3.92	95.9
Mars	11:35	18:17	01:00	0.12	88.5
Jupiter	07:39	12:46	17:52	-1.95	99.9
Saturn	07:29	12:34	17:38	0.60	100.

Jan 30					
	Rise	Transit	Set	Mag	Phase%
Mercury	07:33	13:04	18:35	0.80	22.3
Venus	06:11	11:12	16:13	-3.91	97.5
Mars	10:58	17:48	00:39	0.43	88.5
Jupiter	06:52	12:01	17:11	-1.95	100.
Saturn	06:36	11:42	16:48	0.61	100.

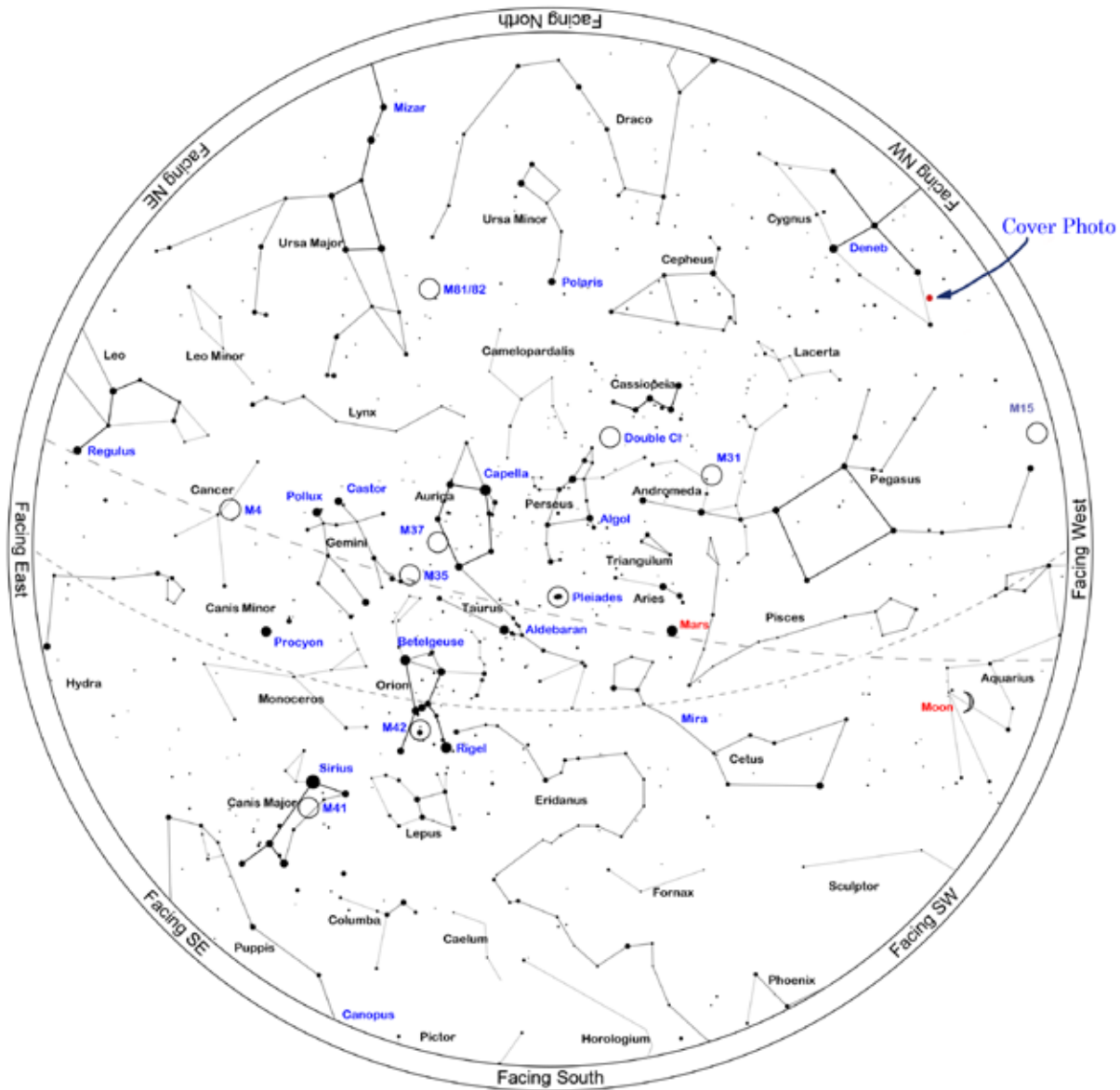
*Sun, Moon and Planetary date based on Quartz Hill, CA

Desert Sky Observer

www.avastronomyclub.org

January 2021

Sky Chart



Location: Palmdale, CA 93551

Latitude: 34° 36' N, longitude: 118° 11' W

Time: 2021 January 16, 20:00 (UTC -08:00)

Powered by: Heavens-Above.com

Desert Sky Observer

www.avastronomyclub.org

January 2021

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 January 16, 2021. The list is sorted by the transit time (this month in inverse order) of the object.

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
C9	BrNeb	Cep	22h 56m 48s	+62° 37.0'		Circum	15:07	Circum
IC1470	Neb	Cep	23h 05m 10s	+60° 14.6'		Circum	15:15	Circum
NGC7492	Globular	Aqr	23h 08m 27s	-15° 36.6'	11.5	10:00	15:19	20:37
HR8872	Triple	Cep	23h 18m 38s	+68° 06.6'	4.8	Circum	15:29	Circum
IC5308	Galaxy	Gru	23h 19m 21s	-42° 15.4'	12.0	12:00	15:30	18:59
M52	Open	Cas	23h 24m 48s	+61° 35.6'	8.0	Circum	15:35	Circum
NGC7662	P Neb	And	23h 25m 54s	+42° 33.0'	8.3	06:54	15:36	00:19
NGC7686	Open	And	23h 30m 07s	+49° 08.0'	5.6	06:01	15:40	01:20
IC5332	Galaxy	Scl	23h 34m 27s	-36° 06.0'	10.6	11:42	15:45	19:48
NGC7785	Galaxy	Psc	23h 55m 19s	+05° 54.9'	11.6	09:46	16:06	22:25
HR9071	Triple	Cas	23h 59m 01s	+55° 45.3'	4.9	Circum	16:09	Circum
NGC7822	Neb	Cep	00h 03m 36s	+67° 09.0'		Circum	16:14	Circum
NGC55	S Gal	Scl	00h 14m 54s	-39° 11.0'	7.9	12:38	16:25	20:12
NGC129	Open	Cas	00h 30m 00s	+60° 13.1'	6.5	Circum	16:40	Circum
NGC133	Open	Cas	00h 31m 19s	+63° 21.0'	9.0	Circum	16:42	Circum
NGC146	Open	Cas	00h 33m 03s	+63° 18.0'	9.1	Circum	16:43	Circum
NGC147	E Gal	Cas	00h 33m 12s	+48° 30.0'	9.3	07:11	16:43	02:16
NGC190	Galaxy	Psc	00h 38m 55s	+07° 03.7'	14.0	10:27	16:49	23:12
M110	Galaxy	And	00h 40m 22s	+41° 41.1'	8.9	08:14	16:51	01:27
NGC210	Galaxy	Cet	00h 40m 35s	-13° 52.3'	10.9	11:27	16:51	22:14
NGC206	Neb	And	00h 40m 36s	+40° 44.0'		08:20	16:51	01:22
Arp168	Galaxy	And	00h 42m 41s	+40° 51.0'	9.0	08:22	16:53	01:24
M32	Galaxy	And	00h 42m 42s	+40° 51.9'	9.1	08:21	16:53	01:24
M31	Galaxy	And	00h 42m 44s	+41° 16.1'	4.3	08:19	16:53	01:27
NGC246	P Neb	Cet	00h 47m 00s	-11° 53.0'	10.9	11:28	16:57	22:27
NGC254	Galaxy	Scl	00h 47m 28s	-31° 25.2'	11.8	12:34	16:58	21:21
NGC288	Globular	Scl	00h 52m 45s	-26° 35.0'	8.1	12:21	17:03	21:45
NGC281	Open	Cas	00h 52m 54s	+56° 37.4'	7.0	Circum	17:03	Circum
IC59	Neb	Cas	00h 57m 29s	+61° 08.6'		Circum	17:08	Circum
IC63	Neb	Cas	00h 59m 29s	+60° 54.7'		Circum	17:10	Circum
C51	IrrGal	Cet	01h 04m 48s	+02° 07.0'	9.3	11:06	17:15	23:24
NGC474	Galaxy	Psc	01h 20m 07s	+03° 24.9'	11.1	11:18	17:30	23:43
NGC485	Galaxy	Psc	01h 21m 28s	+07° 01.0'	14.0	11:09	17:32	23:54
M103	Open	Cas	01h 33m 23s	+60° 39.0'	7.0	Circum	17:44	Circum
NGC598	Galaxy	Tri	01h 33m 51s	+30° 39.6'	5.7	10:04	17:44	01:24
NGC604	Neb	Tri	01h 34m 33s	+30° 47.0'		10:04	17:45	01:26

Desert Sky Observer

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January 2021

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M74	Galaxy	Psc	01h 36m 42s	+15° 47.0'	9.8	10:59	17:47	00:35
M76	P Neb	Per	01h 42m 18s	+51° 34.2'	12.0	07:41	17:53	04:04
NGC651	P Neb	Per	01h 42m 21s	+51° 34.1'	12.2	07:41	17:53	04:04
NGC637	Open	Cas	01h 43m 04s	+64° 02.4'	8.2	Circum	17:53	Circum
NGC654	Open	Cas	01h 44m 00s	+61° 53.0'	6.5	Circum	17:54	Circum
NGC720	Galaxy	Cet	01h 53m 00s	-13° 44.3'	10.2	12:39	18:03	23:27
NGC780	Galaxy	Tri	02h 00m 35s	+28° 13.5'	14.0	10:40	18:11	01:41
NGC784	Galaxy	Tri	02h 01m 17s	+28° 50.2'	11.8	10:39	18:12	01:44
NGC821	Galaxy	Ari	02h 08m 21s	+10° 59.6'	10.8	11:45	18:19	00:52
Baily191	Open	Per	02h 22m 18s	+57° 08.1'	4.0	Circum	18:33	Circum
IC1795	Neb	Cas	02h 26m 32s	+62° 02.4'		Circum	18:37	Circum
NGC936	Galaxy	Cet	02h 27m 37s	-01° 09.3'	10.1	12:38	18:38	00:37
NGC943	Galaxy	Cet	02h 29m 09s	-10° 49.0'	11.4	13:07	18:39	00:12
NGC956	Open	And	02h 32m 30s	+44° 35.6'	9.0	09:46	18:43	03:40
IC1805	Open	Cas	02h 32m 47s	+61° 27.6'	6.5	Circum	18:43	Circum
NGC1052	Galaxy	Cet	02h 41m 05s	-08° 15.3'	10.6	13:12	18:51	00:31
M34	Open	Per	02h 42m 05s	+42° 45.6'	6.0	10:08	18:52	03:36
M77	Galaxy	Cet	02h 42m 41s	-00° 00.8'	9.7	12:50	18:53	00:56
NGC1084	Galaxy	Eri	02h 46m 00s	-07° 34.6'	10.6	13:15	18:56	00:38
IC1848	Open	Cas	02h 51m 18s	+60° 24.4'	6.5	Circum	19:02	Circum
NGC1156	Galaxy	Ari	02h 59m 42s	+25° 14.2'	11.7	11:51	19:10	02:29
NGC1201	Galaxy	For	03h 04m 08s	-26° 04.1'	10.6	14:30	19:14	23:59
NGC1175	Galaxy	Per	03h 04m 32s	+42° 20.3'	12.8	10:34	19:15	03:56
HR963	Dbl	For	03h 12m 04s	-28° 59.2'	3.9	14:49	19:22	23:56
NGC1316	Galaxy	For	03h 22m 42s	-37° 12.4'	8.9	15:36	19:33	23:30
Barnard202	DkNeb	Ari	03h 25m 38s	+30° 16.0'		11:57	19:36	03:15
Barnard204	DkNeb	Ari	03h 28m 29s	+30° 11.0'		12:00	19:39	03:17
NGC1350	Galaxy	For	03h 31m 08s	-33° 37.7'	10.5	15:27	19:41	23:56
Barnard1	DkNeb	Per	03h 32m 57s	+31° 09.0'		12:01	19:43	03:26
Barnard2	DkNeb	Per	03h 33m 31s	+32° 19.0'		11:56	19:44	03:31
Barnard3	DkNeb	Per	03h 40m 01s	+31° 58.0'		12:04	19:50	03:36
NGC1407	Galaxy	Eri	03h 40m 12s	-18° 34.8'	9.8	14:41	19:50	01:00
IC347	Galaxy	Eri	03h 42m 32s	-04° 17.9'	13.0	14:02	19:53	01:44
NGC1448	Galaxy	Hor	03h 44m 32s	-44° 38.6'	11.0	16:42	19:55	23:08
IC348	Open	Per	03h 44m 34s	+32° 09.7'	7.3	12:08	19:55	03:41
M45	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	12:42	19:58	03:13
Barnard5	DkNeb	Per	03h 47m 53s	+32° 53.0'		12:08	19:58	03:48
NGC1461	Galaxy	Eri	03h 48m 27s	-16° 23.5'	11.7	14:43	19:59	01:15
IC353	Neb	Tau	03h 53m 00s	+25° 48.0'		12:42	20:03	03:25
IC2003	P Neb	Per	03h 56m 22s	+33° 52.5'	13.0	12:12	20:07	04:01
NGC1499	Neb	Per	04h 03m 14s	+36° 22.0'		12:07	20:13	04:20

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC1515	Galaxy	Dor	04h 04m 03s	-54° 06.0'	11.0	18:51	20:14	21:38
NGC1496	Open	Per	04h 04m 32s	+52° 39.7'	10.0	09:44	20:15	06:46
NGC1502	Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circum	20:18	Circum
IC360	Neb	Tau	04h 09m 00s	+26° 06.0'		12:57	20:19	03:42
NGC1514	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	12:39	20:20	04:00
NGC1513	Open	Per	04h 09m 57s	+49° 30.8'	8.4	10:37	20:20	06:04
IC359	Neb	Tau	04h 12m 28s	+27° 42.1'		12:54	20:23	03:51
NGC1535	P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	14:58	20:25	01:51
Barnard10	DkNeb	Tau	04h 18m 41s	+28° 16.0'		12:58	20:29	04:00
NGC1545	Open	Per	04h 20m 57s	+50° 15.2'	6.2	10:38	20:31	06:24
NGC1569	Galaxy	Cam	04h 30m 49s	+64° 50.8'	11.2	Circum	20:41	Circum
Barnard18	DkNeb	Tau	04h 31m 13s	+24° 21.0'		13:25	20:41	03:58
NGC1582	Open	Per	04h 31m 53s	+43° 49.0'	7.0	11:51	20:42	05:33
NGC1560	Galaxy	Cam	04h 32m 48s	+71° 52.7'	11.5	Circum	20:43	Circum
Barnard19	DkNeb	Tau	04h 33m 00s	+26° 16.0'		13:20	20:43	04:06
Barnard20	DkNeb	Per	04h 37m 04s	+50° 58.0'		10:45	20:47	06:50
Barnard22	DkNeb	Tau	04h 38m 00s	+26° 03.0'		13:26	20:48	04:11
Barnard14	DkNeb	Tau	04h 39m 59s	+25° 44.0'		13:29	20:50	04:11
IC2087	Neb	Tau	04h 40m 00s	+25° 44.5'		13:29	20:50	04:11
Barnard23	DkNeb	Tau	04h 40m 33s	+29° 52.0'		13:14	20:51	04:28
NGC1624	Open	Per	04h 40m 36s	+50° 27.6'	10.4	10:55	20:51	06:46
NGC1640	Galaxy	Eri	04h 42m 14s	-20° 26.0'	11.7	15:49	20:52	01:56
NGC1647	Open	Tau	04h 45m 55s	+19° 06.8'	6.4	13:58	20:56	03:55
IC2118	Neb	Eri	05h 04m 54s	-07° 15.0'		15:33	21:15	02:58
NGC1851	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	17:42	21:24	01:07
IC405	Neb	Aur	05h 16m 29s	+34° 21.3'		13:30	21:27	05:23
M79	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	16:45	21:34	02:24
M38	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	13:35	21:39	05:43
M1	SNR	Tau	05h 34m 32s	+22° 00.8'	8.4	14:37	21:45	04:53
M42	Open+D Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	15:58	21:46	03:33
M43	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	15:58	21:46	03:34
M36	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	13:51	21:47	05:42
M78	D Neb	Ori	05h 46m 45s	+00° 04.8'	8.0	15:54	21:57	04:00
M37	Open	Aur	05h 52m 18s	+32° 33.2'	6.0	14:14	22:03	05:51
M35	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	15:03	22:19	05:35
M41	Open	CMa	06h 46m 01s	-20° 45.3'	5.0	17:54	22:56	03:59
M50	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	17:34	23:13	04:52
M47	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	18:25	23:47	05:09
M46	Open	Pup	07h 41m 46s	-14° 48.6'	6.5	18:31	23:52	05:13
M93	Open	Pup	07h 44m 30s	-23° 51.4'	6.5	19:03	23:55	04:47

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M48	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	18:37	00:24	06:11
M44	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	17:50	00:51	07:51
M67	Open	Cnc	08h 51m 18s	+11° 48.0'	7.5	18:25	01:02	07:38
M81	Galaxy	UMa	09h 55m 33s	+69° 03.9'	7.8	Circum	02:06	Circum
M82	Galaxy	UMa	09h 55m 53s	+69° 40.8'	9.2	Circum	02:06	Circum
M95	Galaxy	Leo	10h 43m 58s	+11° 42.2'	10.6	20:18	02:54	09:30
M96	Galaxy	Leo	10h 46m 46s	+11° 49.2'	10.1	20:21	02:57	09:33
M105	Galaxy	Leo	10h 47m 50s	+12° 34.9'	10.5	20:20	02:58	09:36
M108	Galaxy	UMa	11h 11m 31s	+55° 40.4'	10.6	Circum	03:22	Circum
M97	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	Circum	03:25	Circum
M65	Galaxy	Leo	11h 18m 56s	+13° 05.5'	10.1	20:49	03:29	10:09
M66	Galaxy	Leo	11h 20m 15s	+12° 59.4'	9.7	20:51	03:31	10:10
M109	Galaxy	UMa	11h 57m 36s	+53° 22.4'	10.6	17:21	04:08	14:55
M98	Galaxy	Com	12h 13m 48s	+14° 54.0'	10.9	21:39	04:24	11:09
M99	Galaxy	Com	12h 18m 50s	+14° 25.0'	10.4	21:45	04:29	11:13
M106	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	19:09	04:29	13:49
M61	Galaxy	Vir	12h 21m 55s	+04° 28.3'	10.1	22:17	04:32	10:47
M40	Dbt+Asterism	UMa	12h 22m 12s	+58° 05.0'	8.7	Circum	04:32	Circum
M100	Galaxy	Com	12h 22m 55s	+15° 49.3'	10.1	21:45	04:33	11:21
M84	Galaxy	Vir	12h 25m 04s	+12° 53.2'	10.2	21:56	04:35	11:15
M85	Galaxy	Com	12h 25m 24s	+18° 11.4'	10.0	21:40	04:36	11:31
M86	Galaxy	Vir	12h 26m 12s	+12° 56.7'	9.9	21:57	04:36	11:16
M49	Galaxy	Vir	12h 29m 47s	+08° 00.0'	9.3	22:15	04:40	11:05
M87	Galaxy	Vir	12h 30m 49s	+12° 23.4'	9.6	22:03	04:41	11:19
M88	Galaxy	Com	12h 31m 59s	+14° 25.2'	10.2	21:58	04:42	11:26
M91	Galaxy	Com	12h 35m 27s	+14° 29.7'	10.9	22:02	04:46	11:30
M89	Galaxy	Vir	12h 35m 40s	+12° 33.3'	10.9	22:08	04:46	11:24
M90	Galaxy	Vir	12h 36m 50s	+13° 09.7'	10.2	22:07	04:47	11:27
M58	Galaxy	Vir	12h 37m 44s	+11° 49.1'	10.4	22:12	04:48	11:24
M68	Globular	Hya	12h 39m 28s	-26° 44.5'	9.0	00:08	04:50	09:31
M104	Galaxy	Vir	12h 39m 59s	-11° 37.3'	9.2	23:20	04:50	10:20
M59	Galaxy	Vir	12h 42m 02s	+11° 38.7'	10.7	22:17	04:52	11:28
M60	Galaxy	Vir	12h 43m 40s	+11° 33.1'	9.8	22:19	04:54	11:29
M94	Galaxy	CVn	12h 50m 53s	+41° 07.1'	8.9	20:28	05:01	13:34
M64	Galaxy	Com	12h 56m 44s	+21° 41.0'	9.3	22:00	05:07	12:14
M53	Globular	Com	13h 12m 55s	+18° 10.1'	8.5	22:28	05:23	12:19
M63	Galaxy	CVn	13h 15m 49s	+42° 01.7'	9.3	20:47	05:26	14:05
NGC5139	Globular	Cen	13h 26m 48s	-47° 29.0'	3.6	02:47	05:37	08:27

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