

Volume 40.3

March 2020

Desert Sky Observer

Antelope Valley Astronomy Club



Desert Sky Observer

March 2020

Upcoming Events

March 3: Primary Election, Get Out and Vote
March 13: Club Meeting
March 21: Messier Marathon at Red Cliffs
March 28: PDW Moonwalk

April 10: Club Meeting
April 18: PDW Moonwalk
April 24: College of the Canyons
Star Party
April 25: DSSP at Red Cliffs



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 VanEvera 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

Well, once again we had another slow month for astronomy. Either it's been cloudy or windy or both, not very good for going out and doing some viewing.

I did go on a family camping trip up to Lone Pine. The night sky was great, but I didn't have room for my telescope because the car was already full of our camping stuff, plus it was really cold at night; it would be a great place for a star party although it's probably too far away for most people.

On February 29 we had our beginner's class at the SAGE Planetarium to show members how to use the club's telescopes and teach them how to use setting circles and later we were at Prime Desert Woodlands for our monthly star party. As you can guess it was cold and windy again, but Rod and I still set up our scopes. Rod was having a little trouble with his scope and had to operate it manually, but all together there were 47 people that showed up for the walk and viewing.

Our next club meeting will be on Friday the 13th at the SAGE. On March 21 we will be doing the Messier Marathon at Red Cliffs and we're hoping for great weather that night.

We are still working on a trip to Mt. Wilson but the 3 dates we asked for have been taken already. We'll let you know what we can get.

Until then keep looking up.

Darrel



On The Cover

This new image shows the dramatic shape and colour of the Ring Nebula, otherwise known as Messier 57.

From Earth's perspective, the nebula looks like a simple elliptical shape with a shaggy boundary. However, new observations combining existing ground-based data with new NASA/ESA Hubble Space Telescope data show that the nebula is shaped like a distorted doughnut. This doughnut has a rugby-ball-shaped region of lower-density material slotted into its central "gap", stretching towards and away from us.

Credit:

NASA, ESA, and C. Robert O'Dell (Vanderbilt University).

Desert Sky Observer

March 2020

From the Secretary

By Rose Moore

Welcome March! We start off March with a club meeting on Friday, March 13th, when Frank Moore will be giving a presentation on the Messier objects! This is the program Frank gave at Red Rock Canyon last year, and it was a very informative presentation!

We have the following speakers lined up so far: April/Tim Thompson; May/Dr. Eric Becklin; June/Tom Hames; July/speaker thru the NASA Speaker Bureau; August and September/open; November/Tom Hames. Potential speakers are Geo Somoza and member Rod Girard.

On Saturday March 21st, is our first star party of the year, and our Messier Marathon! This year we are having this event at Red Cliffs Natural Area off the CA-14. An email with directions and a link for a map will be sent before the event. The club will supply charcoal for grilling, but members are responsible for bringing their own food to grill. You may bring a snack or side dish to share with other members. The club will supply drinks. There are 2 or 3 tables and benches to sit on, but you may want to also bring a chair. There are vault toilets. There is no running water. Cell signal is poor and unreliable. Arrival time is approximately 4pm on Saturday. This site is reserved for us overnight via special permit, until Sunday at 8am.

We plan to have a Prime Desert Woodland Moon Walk on Saturday March 28th at 7:30pm; we need members with telescopes to help support this event. April's Moon Walk will be on Saturday, April 18th at 8pm, weather permitting.

Also coming up in April is a College of the Canyons Star Party! The date is Friday, April 24th from 7:30 to 10pm. Further information, directions and a map will be sent before the event!

We have the order form for Bee's Embroidery in Lancaster, so that we may order clothes items with the AVAC logo. Phil has placed a sample of the order sheet in the February DSO. Please look it over! We have several t-shirts, a kid t-shirt, hats, and a hoodie available with our club logo. Do not use the sample sheet in the DSO to order on your own!! We will be taking orders and it will be sent in all at once to Bee's. Money must be given at the time of ordering, either check or cash to our Treasurer Rod, at our next club meeting in March or upcoming events. You will need to add tax to your order. If you want your name added it will be \$5 additional. We will take orders for several weeks so that members ordering may be able to attend either a club meeting or outreach event to place their order. If any questions please email me!

Rose



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

A Messier Marathon?

The French astronomer Charles Messier was born in 1730 and began his career at the age of 21. He was one of the first people in France to observe the predicted return of Halley's Comet in 1759, and became obsessed with comets - so much so that King Louis XV called him the 'comet ferret'.

During his lifetime, Messier discovered 13 comets independently and shared credit for the discovery of six more. However, it is his catalogue of astronomical objects that has given him the lasting fame he sought as a comet hunter.

The catalogue started as a personal reference as he scanned the skies in his small telescope. The blurry objects he cataloged appeared identical to comets, but did not move in relation to the background stars the way a comet would. More than two centuries later, these 110 objects are still referred to as the 'Messier objects' and they include some of the most observed astronomical objects that lie outside of the solar system. Many Messier objects are observable with a pair of binoculars or through a small telescope. Others require a more powerful telescope to make out details in the object.

Types of Messier Objects

There are four main types of astronomical objects included in Messier's list - open clusters, globular clusters, galaxies and nebulae.

- An **open cluster** is simply a grouping of stars in the sky. These stars often form from an associated cloud of gas and dust and can be quite young in age.
- A **globular cluster** is a gravitationally-bound concentration of approximately 10,000 to one million stars, populating the halo or bulge of the Milky Way. Globular clusters are believed to be very old and formed from an earlier generation of stars.
- A **galaxy** is a huge mass of stars and dust with upwards of several million stars. They are further classified by appearance, resulting in spiral galaxies which have a spiral structure; elliptical galaxies which are of ellipsoidal shape; and irregular galaxies which have irregular shapes.
- A **nebula** is an interstellar cloud of gas and dust. There are two types in Messier's catalogue: diffuse nebulae, which are clouds of interstellar gas and dust; and planetary nebula, which are essentially shells of gas expelled by a star as it shrinks from a red giant to white dwarf.

The Messier Marathon

Once a year, in the spring, it's possible to observe all the Messier objects in one night. For more information on this fun and exciting night, visit our [Messier Marathon](#) page.



A star party that is devoted to observing as many of the Messier objects as possible in a single evening has come to be called a "Messier Marathon." These turn out to be some of the most memorable evenings of stargazing that you'll do - not only because of the quantity of objects that you can observe, but because you're 'forced' to interact with the breadth of the night sky in a short period of time.

How is it possible to see what amounts to an entire year's worth of deep sky objects in just one night? With a lot of planning and patience (See [Messier Marathon Tips](#)). After a review of your planisphere, you can determine that it's possible to see all of the Messier Objects if you try during the period near the Spring Equinox of March 17-24. Anything can happen at this time of year though; clouds, rain, high winds. Many roadblocks to success are possible/probable.

There is a suggested order to observing the Messier objects in one evening. This logical progression across the night sky has little to do with the order of Charles Messier's list! This [suggested order](#) has been established after many years of Messier Marathoning - give it a try and see what you think.



Desert Sky Observer

March 2020

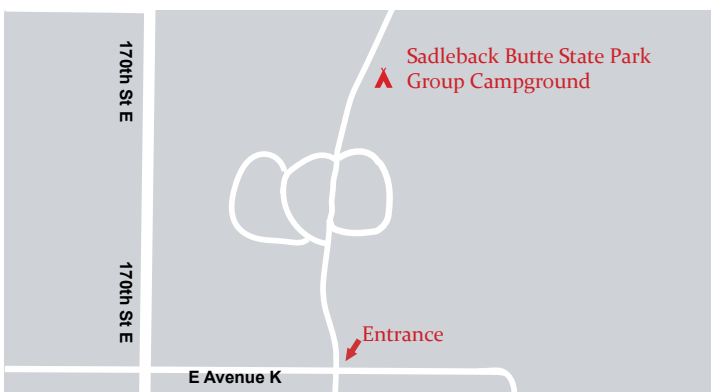
Dark Sky Observing Sites



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.

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.



Saddleback Butte State Park is east of 170th Street East between Avenue I and Avenue K. Elevation 3651 feet. Temperatures in summer average 95° with a high of 115,° winter average lows are 33° with occasional snow. There are 37 individual campsites and one group campsite. When the club has a star party there the group campsite is used. Individual campsites cost \$20 per night. Enter off Avenue K.



Saddleback Butte State Park



Dim Delights in Cancer

David Prosper, NASA Night Sky Network

Cancer the Crab is a dim constellation, yet it contains one of the most beautiful and easy-to-spot star clusters in our sky: the **Beehive Cluster**. Cancer also possesses one of the most studied exoplanets: the superhot super-Earth, **55 Cancri e**. Find Cancer's dim stars by looking in between the brighter neighboring constellations of Gemini and Leo. Don't get frustrated if you can't find it at first, since Cancer isn't easily visible from moderately light polluted areas. Once you find Cancer, look for its most famous deep-sky object: the **Beehive Cluster**! It's a large open cluster of young stars, three times larger than our Moon in the sky. The Beehive is visible to unaided eyes under good sky conditions as a faint cloudy patch, but is stunning when viewed through binoculars or a wide-field telescope. It was one of the earliest deep-sky objects noticed by ancient astronomers, and so the Beehive has many other names, including Praesepe, Nubilum, M44, the Ghost, and Jishi qi. Take a look at it on a clear night through binoculars. Do these stars look like a hive of buzzing bees? Or do you see something else? There's no wrong answer, since this large star cluster has intrigued imaginative observers for thousands of years.

55 Cancri is a nearby binary star system, about 41 light years from us and faintly visible under excellent dark sky conditions. The larger star is orbited by at least five planets including 55 Cancri e, (a.k.a. Janssen, named after one of the first telescope makers). Janssen is a "super-earth," a large rocky world 8 times the mass of our Earth, and orbits its star every 18 hours, giving it one of the shortest years of all known planets! Janssen was the first exoplanet to have its atmosphere successfully analyzed. Both the Hubble and recently-retired Spitzer space telescopes confirmed that the hot world is enveloped by an atmosphere of helium and hydrogen with traces of hydrogen cyanide: not a likely place to find life, especially since the surface is probably scorching hot rock. The NASA Exoplanet Catalog has more details about this and many other exoplanets at bit.ly/nasa55cancric.

How do astronomers find planets around other star systems? The Night Sky Network's "How We Find Planets" activity helps demonstrate both the transit and wobble methods of exoplanet detection: bit.ly/findplanets. Notably, 55 Cancri e was discovered via the wobble method in 2004, and then the transit method confirmed the planet's orbital period in 2011!

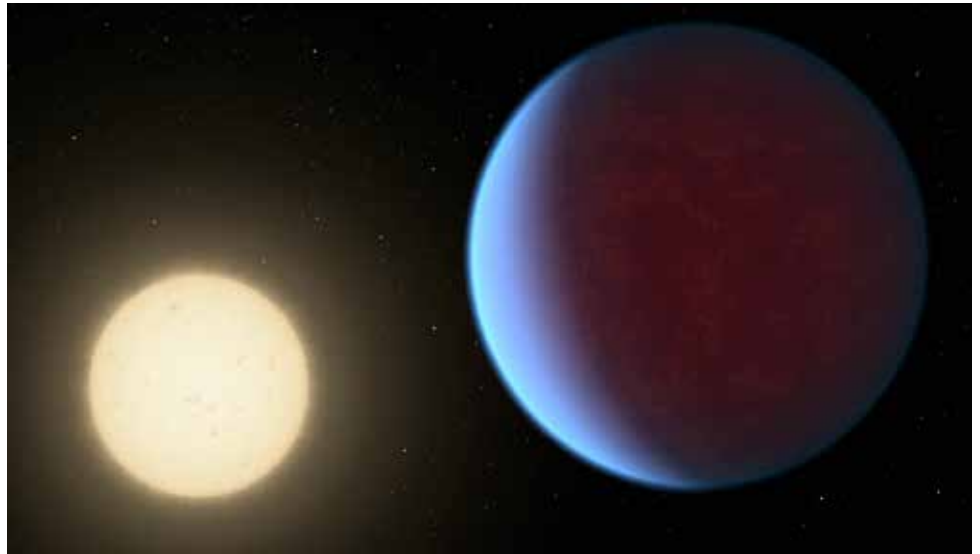
Want to learn more about exoplanets? Get the latest NASA news about worlds beyond our solar system at nightsky.jpl.nasa.gov. NASA Night Sky Notes March 2020

Continued on next page. . . .

Desert Sky Observer

March 2020

Artist concept of 55 Cancri e orbiting its nearby host star. Find details from the Spitzer Space Telescope's close study of its atmosphere at: bit.ly/spitzer55cancrie and the Hubble Space Telescope's observations at bit.ly/hubble55cancrie Credit: NASA/JPL-Caltech



Look for Cancer in between the “Sickle” or “Question Mark” of Leo and the bright twin stars of Gemini. You can’t see the planets around 55 Cancri, but if skies are dark enough you can see the star itself. Can you see the Beehive Cluster?

Space News

News from around the Net

How interferometry works, and why it's so powerful for astronomy

When astronomers talk about an optical telescope, they often mention the size of its mirror. That's because the larger your mirror, the sharper your view of the heavens can be. It's known as resolving power, and it is due to a property of light known as diffraction. . . . (continued at <https://phys.org/news/2020-02-interferometry-powerful-astronomy.html>)



NASA's Insight Detects Many Marsquakes on the Red Planet

Mars quivers regularly with barely discernable quakes, caused by fracturing in the brittle crust as the planet's interior cools. That's the takeaway from the first 10 months of observations by NASA's Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (Insight) lander, (continued at <https://www.skyandtelescope.com/astronomy-news/nasas-insight-detects-many-marsquakes-on-the-red-planet/>)



Stargazing with computers: What machine learning can teach us about the cosmos

Gazing up at the night sky in a rural area, you'll probably see the shining moon surrounded by stars. If you're lucky, you might spot the furthest thing visible with the naked eye—the Andromeda galaxy. It's the nearest neighbor to our galaxy, the Milky Way. But that's just the tiniest fraction of what's out there. (continued at <https://phys.org/news/2020-02-stargazing-machine-cosmos.html>)



Proxima Centauri: The closest exoplanet to Earth

Astronomers are finding new exoplanets nearly every day. But this particular answer probably won't change, because astronomers have already found two planets orbiting Proxima Centauri, the closest star to our Sun. One of them was discovered in 2016, and is just slightly larger than Earth. Even more exciting, it orbits in the habitable zone of its star, where temperatures allow liquid water – and therefore possibly life. (continued at <https://astronomy.com/news/2020/02/proxima-centauri-the-closest-exoplanet-to-earth>)



Could alien life hitchhike to Earth on space rocks from other stars?

The theory of panspermia — the idea that simple life can travel from world to world — is back in the limelight after several interstellar objects were discovered in our solar system. Did life on Earth come from Mars, or perhaps even another star system? For generations, some astronomers have speculated about whether our planet was pollinated with an alien seed. . . . continued at <https://astronomy.com/news/2020/02/could-alien-life-hitchhike-from-other-stars-on-asteroids-and-comets>)



Earth has a new mini-moon -- but it's only temporary

It's not the moon, but you can call it mini-moon. Earth has captured a tiny object and pulled it into orbit. The asteroid, known as 2020 CD3, is only the second asteroid known to orbit Earth. And while it won't last, this asteroid acts as a temporary mini-moon whirling around our planet. . . . (continued at <https://www.cnn.com/2020/02/26/world/earth-mini-moon-asteroid-scen-trnd/index.html>)



Astronomy student discovers 17 new planets, including Earth-sized world

University of British Columbia astronomy student Michelle Kunimoto has discovered 17 new planets, including a potentially habitable, Earth-sized world, by combing through data gathered by NASA's Kepler mission. . . . (continued at <https://phys.org/news/2020-02-astronomy-student-planets-earth-sized-world.html>)



Earth formed much faster than previously thought, new study shows

The precursor of our planet, the proto-Earth, formed within a time span of approximately five million years, shows a new study from the Centre for Star and Planet Formation (StarPlan) at the Globe Institute at the University of Copenhagen. . . . (continued at <https://www.sciencedaily.com/releases/2020/02/200220130509.htm>)



Newest solar telescope produces first images

Just released first images from the National Science Foundation's Daniel K. Inouye Solar Telescope reveal unprecedented detail of the sun's surface and preview the world-class products to come from this preeminent 4-meter solar telescope. NSF's Inouye Solar Telescope, on the summit of Haleakala, Maui, in Hawai'i, will enable a new era of solar science and a leap forward in understanding the sun and its impacts on our planet. . . . (continued at <https://www.science-daily.com/releases/2020/01/200129131449.htm>)



Hubble finds hints the Sombrero galaxy had a turbulent past

New data from the Hubble Space Telescope reveals the popular Sombrero galaxy may have had a more violent past than previously thought. Based on the number of metal-rich stars Hubble spotted in the galaxy's extended halo, astronomers think the seemingly serene Sombrero galaxy could have once went through a major merger with another galaxy. . . . (continued at <https://astronomy.com/news/2020/02/hubble-finds-hints-the-sombrero-galaxy-had-a-turbulent-past>)



Desert Sky Observer

March 2020

Planet Summary

The **Sun** starts the month in Aquarius and moves into Pisces by the end of the month

Mercury spends the early mornings this month gradually gaining separation from the Sun, achieving greatest elongation west of 28° on the 24th

Venus rules the western evening sky. Venus passes 2° north of Uranus on the 8th/9th. It achieves its greatest elongation west of 46° on the 24th. The Moon passes 7° to its south on the 27th-28th.

Mars spends the month in Sagittarius. It passes within 1° of Jupiter on the 20th and of Saturn on the 31st. The waning crescent Moon will be within 10° of all 3 bodies on the 18th

Jupiter remains part of a cluster of planets visible in the morning twilight. The waning crescent Moon passes 1.5° to its south on the 18th. In conjunction with Mars on the 20th.

Saturn starts the month in Sagittarius and slowly crosses into Capricorn by the middle of the month. On the 18th it's less than 6° from a waning crescent Moon. Mars passes within 1° of Saturn on the morning of the 31st.

Uranus will spend the month in southern Aries at magnitude 5.8.

Neptune will spend the month in northeast Aquarius at mag. 7.9.

Sun and Moon Rise and Set



Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
3/1/2020	10:16	00:23	06:21	17:49
3/5/2020	13:30	03:22	06:16	17:53
3/10/2020	20:24	08:06	07:09	18:57
3/15/2020	01:02	11:22	07:02	19:01
3/20/2020	05:19	15:54	06:56	19:05
3/25/2020	07:48	20:30	06:49	19:09
3/30/2020	10:33	00:17	06:42	19:13

Planet Data*

	March 1				
	Rise	Transit	Set	Mag	Phase%
Mercury	05:44	11:24	17:03	2.90	6.43
Venus	08:14	14:49	21:24	-4.23	62.17
Mars	03:03	07:56	12:49	1.16	90.81
Jupiter	03:41	08:39	13:36	-2.02	99.43
Saturn	04:12	09:14	14:17	0.67	99.88
	March 15				
	Rise	Transit	Set	Mag	Phase%
Mercury	05:54	11:24	16:55	0.54	38.70
Venus	08:57	15:50	22:44	-4.31	55.71
Mars	03:47	08:43	13:38	0.96	89.67
Jupiter	03:55	08:54	13:52	-2.09	99.26
Saturn	04:22	09:25	14:28	0.68	99.83
	March 30				
	Rise	Transit	Set	Mag	Phase%
Mercury	05:42	11:22	17:02	0.11	62.57
Venus	08:41	15:51	23:02	-4.40	47.58
Mars	03:27	08:28	13:29	0.79	88.48
Jupiter	03:04	08:04	13:03	-2.18	99.12
Saturn	03:26	08:30	13:34	0.67	99.78

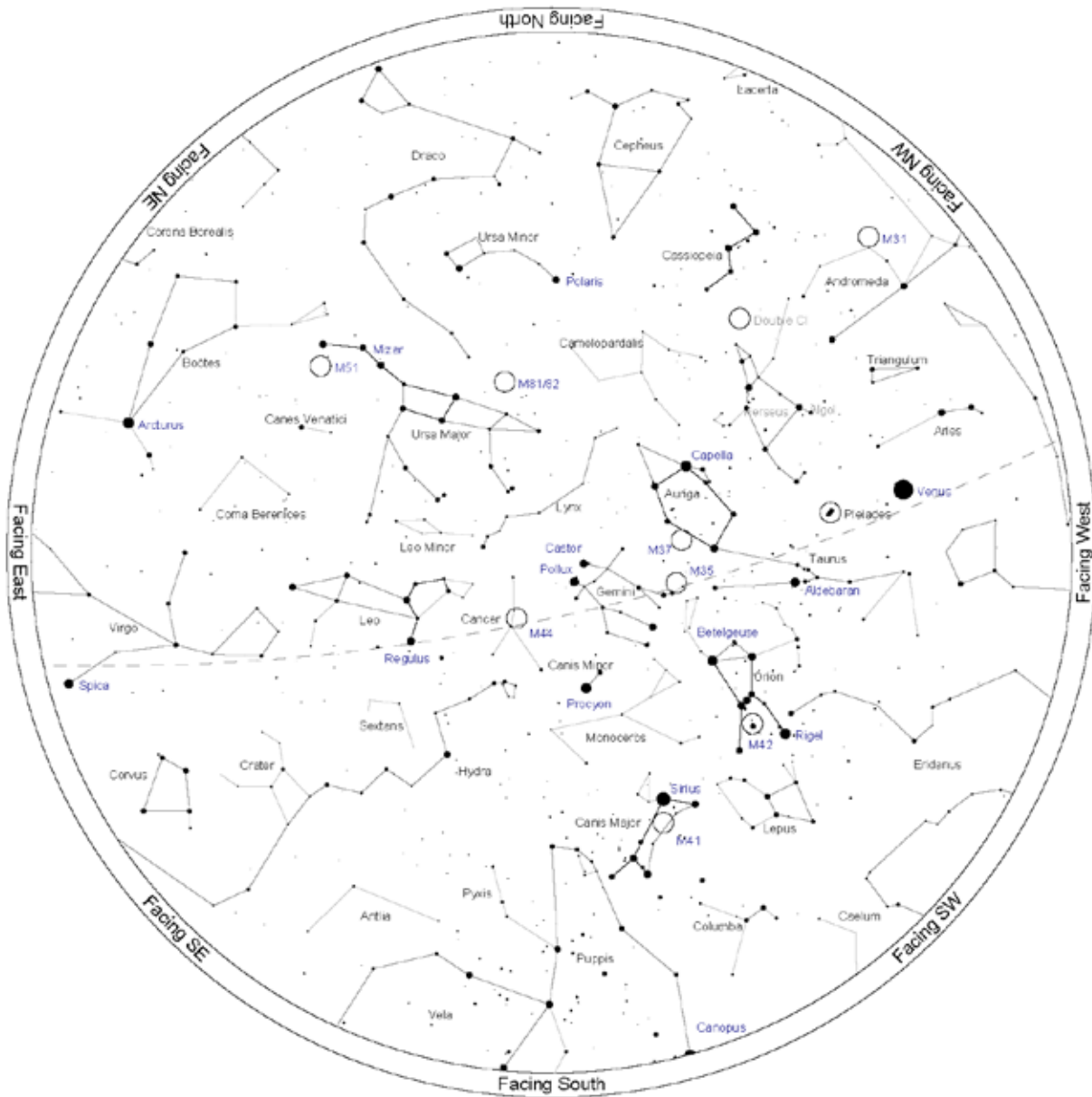
*Sun, Moon and Planetary date based on Quartz Hill, CA



Desert Sky Observer

March 2020

Sky Chart



Location: Palmdale, CA 93551
Latitude: 34° 36' N, longitude: 118° 11' W
Time: 2020 March 21, 21:00 (UTC -07:00)

Powered by: Heavens-Above.com

Desert Sky Observer

March 2020

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 March 21, 2020. The list is sorted by the transit time of the object.

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M31	Galaxy	And	00h 42m 44s	+41° 16.1'	4.3	05:06	13:40	22:14
NGC246	P Neb	Cet	00h 47m 00s	-11° 53.0'	10.9	08:15	13:44	19:13
NGC253	S Gal	Scl	00h 47m 36s	-25° 17.0'	7.1	08:58	13:45	18:32
NGC288	Globular	Scl	00h 52m 45s	-26° 35.0'	8.1	09:07	13:50	18:32
NGC584	Galaxy	Cet	01h 31m 21s	-06° 52.0'	10.4	08:45	14:28	20:12
M33	Galaxy	Tri	01h 33m 51s	+30° 39.6'	6.2	06:51	14:31	22:11
M76	P Neb	Per	01h 42m 18s	+51° 34.2'	12.0	04:28	14:39	00:51
NGC663	Open	Cas	01h 46m 00s	+61° 15.0'	7.1	Circum	14:43	Circum
NGC752	Open	And	01h 57m 48s	+37° 41.0'	5.7	06:42	14:55	23:08
NGC869	Open	Per	02h 20m 00s	+57° 08.0'	4.3	Circum	15:17	Circum
NGC884	Open	Per	02h 22m 18s	+57° 08.1'	4.0	Circum	15:19	Circum
NGC908	Galaxy	Cet	02h 23m 05s	-21° 14.0'	10.2	10:19	15:20	20:21
NGC896	Neb	Cas	02h 25m 28s	+62° 01.1'		Circum	15:22	Circum
NGC896	Neb	Cas	02h 25m 28s	+62° 01.1'		Circum	15:22	Circum
NGC1027	Open	Cas	02h 42m 40s	+61° 35.7'	6.7	Circum	15:40	Circum
NGC1097	S Gal	For	02h 46m 18s	-30° 17.0'	9.2	11:15	15:43	20:12
HR963	Dbl	For	03h 12m 04s	-28° 59.2'	3.9	11:36	16:09	20:42
HR963	Dbl	For	03h 12m 04s	-28° 59.2'	3.9	11:36	16:09	20:42
NGC1261	Globular	Hor	03h 12m 18s	-55° 13.0'	8.4	15:17	16:09	17:02
NGC1261	Globular	Hor	03h 12m 18s	-55° 13.0'	8.4	15:17	16:09	17:02
NGC1291	Galaxy	Eri	03h 17m 18s	-41° 06.4'	8.5	12:38	16:14	19:50
NGC1302	Galaxy	For	03h 19m 51s	-26° 03.6'	11.0	11:33	16:17	21:01
NGC1342	Open	Per	03h 31m 38s	+37° 22.6'	6.7	08:17	16:29	00:40
NGC1432	Neb	Tau	03h 45m 50s	+24° 22.1'		09:27	16:43	23:59
NGC1435	Neb	Tau	03h 46m 10s	+23° 45.8'		09:29	16:43	23:57
NGC1435	Neb	Tau	03h 46m 10s	+23° 45.8'		09:29	16:43	23:57
M45	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	09:29	16:44	00:00
NGC1499	Neb	Per	04h 03m 14s	+36° 22.0'		08:54	17:00	01:07
NGC1502	Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circum	17:05	Circum
NGC1502	Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circum	17:05	Circum
NGC1514	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	09:25	17:06	00:47
NGC1535	P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	11:44	17:11	22:38
NGC1528	Open	Per	04h 15m 23s	+51° 12.9'	6.4	07:06	17:12	03:19
NGC1579	Neb	Per	04h 30m 14s	+35° 16.7'		09:26	17:27	01:28
NGC1579	Neb	Per	04h 30m 14s	+35° 16.7'		09:26	17:27	01:28
NGC1600	Galaxy	Eri	04h 31m 40s	-05° 05.2'	11.1	11:40	17:29	23:17
NGC1662	Open	Ori	04h 48m 27s	+10° 56.1'	6.4	11:12	17:45	00:19
NGC1664	Open	Aur	04h 51m 06s	+43° 40.4'	7.6	08:58	17:48	02:38
NGC1784	Galaxy	Lep	05h 05m 27s	-11° 52.3'	11.8	12:33	18:02	23:32

Desert Sky Observer

March 2020

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC1778	Open	Aur	05h 08m 04s	+37° 01.4'	7.7	09:55	18:05	02:15
NGC1807	Open	Tau	05h 10m 43s	+16° 31.3'	7.0	11:17	18:08	00:58
NGC1851	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	14:29	18:11	21:53
C31	BrNeb	Aur	05h 16m 12s	+34° 16.0'		10:17	18:13	02:09
C31	BrNeb	Aur	05h 16m 12s	+34° 16.0'		10:17	18:13	02:09
NGC1893	Open	Aur	05h 22m 45s	+33° 24.7'	7.5	10:27	18:20	02:12
M79	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	13:31	18:21	23:11
M38	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	10:22	18:26	02:29
NGC1981	Open	Ori	05h 35m 09s	-04° 25.9'	4.6	12:42	18:32	00:23
NGC1977	Neb	Ori	05h 35m 16s	-04° 49.2'		12:43	18:32	00:22
NGC1977	Neb	Ori	05h 35m 16s	-04° 49.2'		12:43	18:32	00:22
M42	Open+D Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	12:44	18:32	00:20
NGC1976	Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	12:44	18:32	00:20
NGC1975	Neb	Ori	05h 35m 18s	-04° 41.0'		12:42	18:32	00:22
NGC1975	Neb	Ori	05h 35m 18s	-04° 41.0'		12:42	18:32	00:22
NGC1980	Neb	Ori	05h 35m 25s	-05° 54.9'		12:46	18:32	00:19
NGC1980	Neb	Ori	05h 35m 25s	-05° 54.9'		12:46	18:32	00:19
M43	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	12:44	18:32	00:21
NGC1990	Neb	Ori	05h 36m 13s	-01° 12.1'		12:34	18:33	00:33
M36	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	10:38	18:33	02:29
NGC1999	Neb	Ori	05h 36m 25s	-06° 43.0'		12:49	18:33	00:18
NGC2023	Neb	Ori	05h 41m 38s	-02° 15.5'		12:42	18:39	00:35
NGC2023	Neb	Ori	05h 41m 38s	-02° 15.5'		12:42	18:39	00:35
NGC2024	Neb	Ori	05h 41m 42s	-01° 51.4'		12:41	18:39	00:36
NGC2024	Neb	Ori	05h 41m 42s	-01° 51.4'		12:41	18:39	00:36
NGC2022	P Neb	Ori	05h 42m 06s	+09° 05.2'	12.0	12:11	18:39	01:07
NGC2064	Neb	Ori	05h 46m 18s	+00° 00.3'		12:41	18:43	00:46
M37	Open	Aur	05h 52m 18s	+32° 33.1'	6.0	11:01	18:49	02:38
NGC2169	Open	Ori	06h 08m 24s	+13° 57.9'	5.9	12:23	19:05	01:48
M35	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	11:50	19:06	02:22
NGC2174	Neb	Ori	06h 09m 24s	+20° 39.5'		12:03	19:06	02:10
NGC2174	Neb	Ori	06h 09m 24s	+20° 39.5'		12:03	19:06	02:10
NGC2175	Open	Ori	06h 09m 40s	+20° 29.2'	6.8	12:04	19:07	02:10
NGC2217	Galaxy	CMa	06h 21m 40s	-27° 14.0'	10.4	14:39	19:19	23:59
NGC2232	Open	Mon	06h 28m 01s	-04° 50.8'	3.9	13:36	19:25	01:14
NGC2237	BrNeb	Mon	06h 32m 18s	+05° 03.0'		13:12	19:29	01:46
NGC2244	Open	Mon	06h 32m 24s	+04° 52.0'	4.8	13:13	19:29	01:46
NGC2264	Open	Mon	06h 40m 58s	+09° 53.7'	3.9	13:07	19:38	02:08
M41	Open	CMa	06h 46m 01s	-20° 45.3'	5.0	14:41	19:43	00:45
NGC2281	Open	Aur	06h 48m 17s	+41° 04.7'	5.4	11:12	19:45	04:18
NGC2298	Globular	Pup	06h 48m 59s	-36° 00.2'	9.4	15:43	19:46	23:49

Desert Sky Observer

March 2020

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M50	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	14:20	20:00	01:39
NGC2343	Open	Mon	07h 08m 06s	-10° 37.0'	6.7	14:32	20:05	01:38
NGC2362	Open	CMa	07h 18m 48s	-24° 57.0'	4.1	15:28	20:16	01:04
NGC2384	Open	CMa	07h 25m 10s	-21° 01.3'	7.4	15:21	20:22	01:24
NGC2396	Open	Pup	07h 28m 00s	-11° 43.0'	7.0	14:55	20:25	01:55
NGC2392	P Neb	Gem	07h 29m 12s	+20° 55.0'	9.2	13:22	20:26	03:31
NGC2414	Open	Pup	07h 33m 12s	-15° 27.1'	7.9	15:11	20:30	01:49
M47	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	15:12	20:34	01:55
NGC2438	P Neb	Pup	07h 41m 50s	-14° 44.1'	10.0	15:18	20:39	02:00
NGC2440	P Neb	Pup	07h 41m 55s	-18° 12.5'	11.0	15:28	20:39	01:49
NGC2451	Open	Pup	07h 45m 15s	-37° 58.0'	2.8	16:49	20:42	00:36
NGC2477	Open	Pup	07h 52m 18s	-38° 33.0'	5.8	16:59	20:49	00:40
NGC2527	Open	Pup	08h 04m 58s	-28° 08.8'	6.5	16:25	21:02	01:38
NGC2547	Open	Vel	08h 10m 09s	-49° 12.9'	4.7	18:33	21:07	23:41
NGC2539	Open	Pup	08h 10m 37s	-12° 49.1'	6.5	15:41	21:08	02:34
NGC2546	Open	Pup	08h 12m 15s	-37° 35.7'	6.3	17:14	21:09	01:05
M48	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	15:24	21:11	02:58
NGC2541	Galaxy	Lyn	08h 14m 40s	+49° 03.7'	11.8	11:33	21:12	06:50
NGC2567	Open	Pup	08h 18m 32s	-30° 38.3'	7.4	16:49	21:16	01:42
C85	Open	Vel	08h 40m 12s	-53° 04.0'	2.5	19:53	21:37	23:21
M44	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	14:37	21:37	04:38
NGC2781	Galaxy	Hya	09h 11m 28s	-14° 49.0'	11.5	16:48	22:08	03:29
NGC2768	Galaxy	UMa	09h 11m 37s	+60° 02.2'	10.0	Circum	22:09	Circum
NGC2910	Open	Vel	09h 30m 30s	-52° 55.1'	7.2	20:41	22:27	00:14
NGC2968	Galaxy	Leo	09h 43m 12s	+31° 55.7'	11.8	14:55	22:40	06:26
NGC2986	Galaxy	Hya	09h 44m 16s	-21° 16.7'	10.9	17:41	22:41	03:42
NGC3132	P Neb	Vel	10h 07m 42s	-40° 26.0'	9.4	19:25	23:05	02:45
NGC3201	Globular	Vel	10h 17m 36s	-46° 25.0'	6.7	20:15	23:15	02:14
NGC3242	P Neb	Hya	10h 24m 48s	-18° 38.0'	7.8	18:13	23:22	04:31
NGC3277	Galaxy	LMi	10h 32m 55s	+28° 30.6'	11.7	15:58	23:30	07:01
NGC3330	Open	Vel	10h 38m 46s	-54° 07.3'	7.4	22:13	23:36	00:59
NGC3448	Galaxy	UMa	10h 54m 39s	+54° 18.3'	11.7	12:34	23:52	11:09
M97	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	Circum	00:12	Circum
NGC3599	Galaxy	Leo	11h 15m 27s	+18° 06.5'	11.9	17:17	00:12	07:08
NGC3607	Galaxy	Leo	11h 16m 55s	+18° 03.0'	10.0	17:19	00:14	07:09
NGC3610	Galaxy	UMa	11h 18m 25s	+58° 47.1'	10.8	Circum	00:15	Circum
NGC3672	Galaxy	Crt	11h 25m 02s	-09° 47.7'	11.0	18:47	00:22	05:57
NGC3705	Galaxy	Leo	11h 30m 07s	+09° 16.5'	11.0	17:58	00:27	06:56
NGC3953	Galaxy	UMa	11h 53m 49s	+52° 19.6'	10.1	14:26	00:51	11:15
NGC4036	Galaxy	UMa	12h 01m 27s	+61° 53.7'	10.6	Circum	00:58	Circum
NGC4147	Globular	Com	12h 10m 06s	+18° 32.5'	10.3	18:10	01:07	08:04
NGC4236	S Gal	Dra	12h 16m 42s	+69° 28.0'	9.7	Circum	01:14	Circum
NGC4233	Galaxy	Vir	12h 17m 08s	+07° 37.4'	11.9	18:50	01:14	07:38

Desert Sky Observer

March 2020

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M106	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	15:56	01:16	10:36
NGC4274	Galaxy	Com	12h 19m 51s	+29° 36.8'	10.4	17:41	01:17	08:53
M100	Galaxy	Com	12h 22m 55s	+15° 49.3'	10.1	18:32	01:20	08:08
NGC4340	Galaxy	Com	12h 23m 35s	+16° 43.3'	11.0	18:30	01:21	08:11
NGC4361	P Neb	Crv	12h 24m 31s	-18° 47.0'	10.0	20:13	01:21	06:30
M86	Galaxy	Vir	12h 26m 12s	+12° 56.7'	9.9	18:44	01:23	08:03
M87	Galaxy	Vir	12h 30m 49s	+12° 23.4'	9.6	18:50	01:28	08:06
NGC4528	Galaxy	Vir	12h 34m 06s	+11° 19.2'	11.7	18:56	01:31	08:06
M91	Galaxy	Com	12h 35m 27s	+14° 29.7'	10.9	18:48	01:32	08:16
NGC4546	Galaxy	Vir	12h 35m 29s	-03° 47.5'	10.3	19:40	01:32	07:25
M68	Globular	Hya	12h 39m 28s	-26° 44.5'	9.0	20:55	01:36	06:18
NGC4691	Galaxy	Vir	12h 48m 14s	-03° 20.0'	11.2	19:52	01:45	07:39
NGC4753	Galaxy	Vir	12h 52m 22s	-01° 12.0'	9.9	19:50	01:49	07:49
NGC4762	Galaxy	Vir	12h 52m 56s	+11° 13.8'	10.2	19:16	01:50	08:24
NGC4936	Galaxy	Cen	13h 04m 17s	-30° 31.5'	11.3	21:34	02:01	06:29
M53	Globular	Com	13h 12m 55s	+18° 10.1'	8.5	19:14	02:10	09:05
M53	Globular	Com	13h 12m 55s	+18° 10.1'	8.5	19:14	02:10	09:05
NGC5018	Galaxy	Vir	13h 13m 01s	-19° 31.1'	10.8	21:04	02:10	07:16
NGC5053	Globular	Com	13h 16m 27s	+17° 41.8'	9.8	19:19	02:13	09:07
NGC5053	Globular	Com	13h 16m 27s	+17° 41.8'	9.8	19:19	02:13	09:07
NGC5139	Globular	Cen	13h 26m 48s	-47° 29.0'	3.6	23:33	02:24	05:14
HR5144	Triple	Boo	13h 40m 40s	+19° 57.3'	5.8	19:36	02:38	09:39
HR5144	Triple	Boo	13h 40m 40s	+19° 57.3'	5.8	19:36	02:38	09:39
M3	Globular	CVn	13h 42m 11s	+28° 22.5'	7.0	19:08	02:39	10:10
NGC5286	Globular	Cen	13h 46m 24s	-51° 22.0'	7.6	00:34	02:43	04:52
NGC5307	P Neb	Cen	13h 51m 03s	-51° 12.3'	12.0	00:37	02:48	04:59
NGC5354	Galaxy	CVn	13h 53m 27s	+40° 18.1'	11.5	18:22	02:50	11:18
NGC5427	Galaxy	Vir	14h 03m 26s	-06° 01.8'	11.4	21:14	03:00	08:46
NGC5474	Galaxy	UMa	14h 05m 02s	+53° 39.7'	10.9	16:07	03:02	13:57
NGC5466	Globular	Boo	14h 05m 28s	+28° 31.9'	9.1	19:31	03:02	10:34
NGC5466	Globular	Boo	14h 05m 28s	+28° 31.9'	9.1	19:31	03:02	10:34
NGC5460	Open	Cen	14h 07m 27s	-48° 20.6'	5.6	00:22	03:04	05:47
HR5362	Dbl	Lup	14h 20m 10s	-43° 03.5'	5.6	23:53	03:17	06:41
HR5362	Dbl	Lup	14h 20m 10s	-43° 03.5'	5.6	23:53	03:17	06:41
HR5409	Triple	Vir	14h 28m 12s	-02° 13.6'	4.8	21:29	03:25	09:22
HR5409	Triple	Vir	14h 28m 12s	-02° 13.6'	4.8	21:29	03:25	09:22
NGC5634	Globular	Vir	14h 29m 37s	-05° 58.6'	9.6	21:40	03:27	09:13
NGC5660	Galaxy	Boo	14h 29m 50s	+49° 37.3'	11.8	17:42	03:27	13:12
NGC5668	Galaxy	Vir	14h 33m 24s	+04° 27.0'	11.5	21:15	03:30	09:45
NGC5694	Globular	Hya	14h 39m 36s	-26° 32.0'	10.2	22:54	03:37	08:19
NGC5713	Galaxy	Vir	14h 40m 11s	-00° 17.4'	11.4	21:35	03:37	09:39
NGC5806	Galaxy	Vir	15h 00m 00s	+01° 53.4'	11.6	21:49	03:57	10:05
NGC5812	Galaxy	Lib	15h 00m 56s	-07° 27.4'	11.2	22:16	03:58	09:40

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