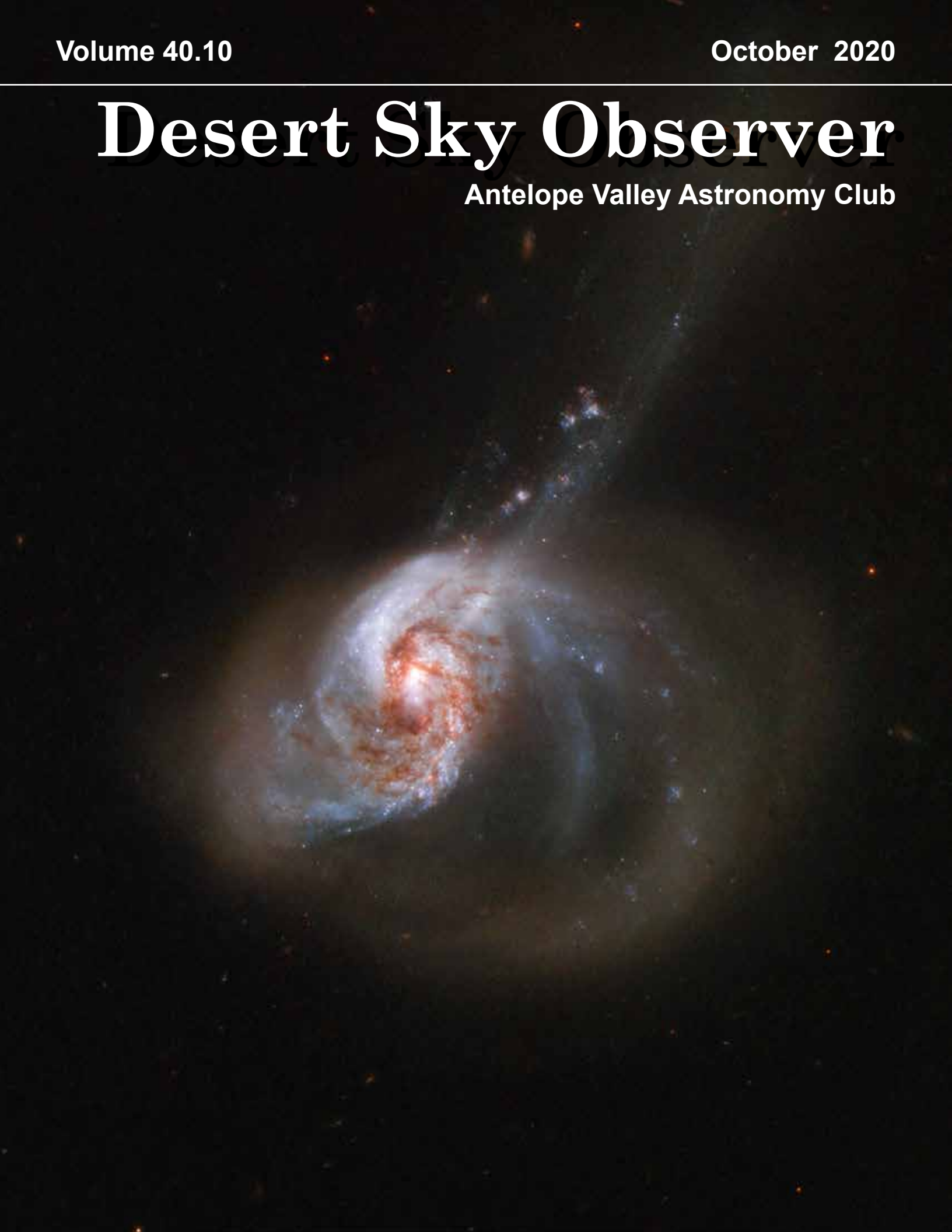


Volume 40.10

October 2020

# Desert Sky Observer

Antelope Valley Astronomy Club



# Desert Sky Observer

[www.avastronomyclub.org](http://www.avastronomyclub.org)

October 2020

## Upcoming Events

October 9: Business Meeting -- canceled  
October 17: DSSP ...Red Cliffs

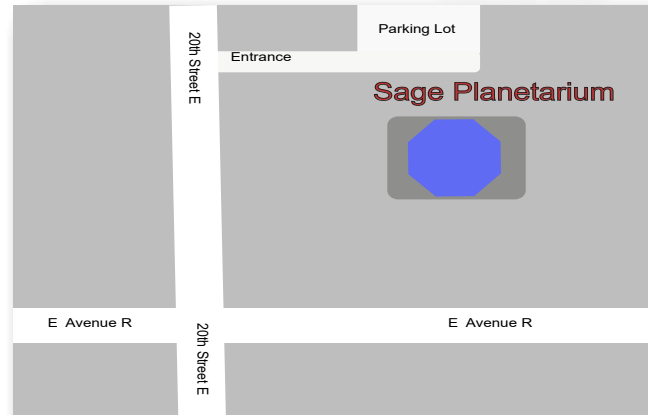
November 13: Club Meeting - maybe not  
November 14: DSSP .... TBA

December 11: Club Meeting  
December 12: Xmas Party-- Canceled

Any clear night: Personal Star Party



AVAC Calendar



## Board Members

**President:** Darrel Bennet (661) 220-0122  
[president@avastronomyclub.org](mailto:president@avastronomyclub.org)

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

**Secretary:** Rose Moore (661) 972-1953  
[secretary@avastronomyclub.org](mailto:secretary@avastronomyclub.org)

**Treasurer:** Rod Girard (661) 803-7838  
[treasurer@avastronomyclub.org](mailto:treasurer@avastronomyclub.org)

## Appointed Positions

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

**Equipment & Library:**  
John Van Evera 661-754-1819  
[library@avastronomyclub.org](mailto:library@avastronomyclub.org)

**Club Historian:** vacant  
[history@avastronomyclub.org](mailto:history@avastronomyclub.org)

**Webmaster:** Steve Trotta (661) 269-5428  
[webmaster@avastronomyclub.org](mailto:webmaster@avastronomyclub.org)

**Astronomical League Coordinator:**  
Frank Moore (661) 972-4775  
[al@avastronomyclub.org](mailto: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 20<sup>th</sup> 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/](http://www.avastronomyclub.org/).



[www.avastronomyclub.org](http://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,

As we are going into our seventh month of quarantine, I hope you and your families are doing great. I am still off work and trying to keep myself busy.

Last month we had scheduled two sky parties. One at Chuchupate and a lunar the other at Judy's house. Both were canceled due to the fires and smoke.

On September 27th we had an Executive Board Meeting at my house. We first discussed the Board Election for October. Since we cannot have meetings at the Sage Planetarium, the Board decided to hold the election on the first meeting when we are allowed to have our meetings at the Sage Planetarium again. Jeremy will let us know when it is safe to go back.

Next we discussed having to cancel the Christmas Party. Our next star party will be on October 17th at Red Cliff. I hope to see you there, Mars will be bright and closest to us.

Until then, stay healthy, safe and keep looking up.

## On The Cover

NGC 1614, captured here by the NASA/ESA Hubble Space Telescope, is an eccentrically-shaped galaxy ablaze with activity. The galaxy resides about 200 million light-years from Earth and is nestled in the southern constellation of Eridanus (The River).

NGC 1614 is the result of a past galactic merger which created its peculiar appearance. The cosmic collision also drove a turbulent flow of interstellar gas from the smaller of the two galaxies involved into the nucleus of the larger one, resulting in a burst of star formation which started in the core and slowly spread outwards through the galaxy.

Owing to its turbulent past and its current appearance, astronomers classify NGC 1614 as a peculiar galaxy, a starburst galaxy, and a luminous infrared galaxy. Luminous infrared galaxies are among the most luminous objects in the local Universe — and NGC 1614 is, in fact, the second most luminous galaxy within 250 million light-years.

Credit: ESA/Hubble & NASA, A. Adamo

## From the Secretary

By Rose Moore

Members:

October is here and you all know what that means! The club Business Meeting and elections!! Well, we are not having a business meeting this month. The Board is meeting the last Sunday in September, and will let you know what is decided about the club elections.

Our September dark sky star party was canceled due to the fires. Los Padres National Forest is still closed. Mt. Pinos and Chuchupate are part of this area. We will keep you informed as to a possible star party in October, and November, and where it might be held. Unfortunately, the skies in many areas have not been very clear to have a DSSP, as well as the air quality being poor.

Due to the continuing issues with the Covid virus, we will not be having a Christmas Party this year. I know that many club members look forward to this event, and it is our most attended event each year.

There are several meteor showers this month. Check your astronomy apps or websites to see when they peak. Maybe the sky will clear up to be able to observe a few of them.

Has anyone been able to get to a dark sky sight and do some observing? If so, let us know so that we can post some anecdotes in the DSO!

Clear skies, be safe!

### 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...

### 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: gurbal826@gmail.com -- or contact Rose by email: rmorion@bak.rr.com

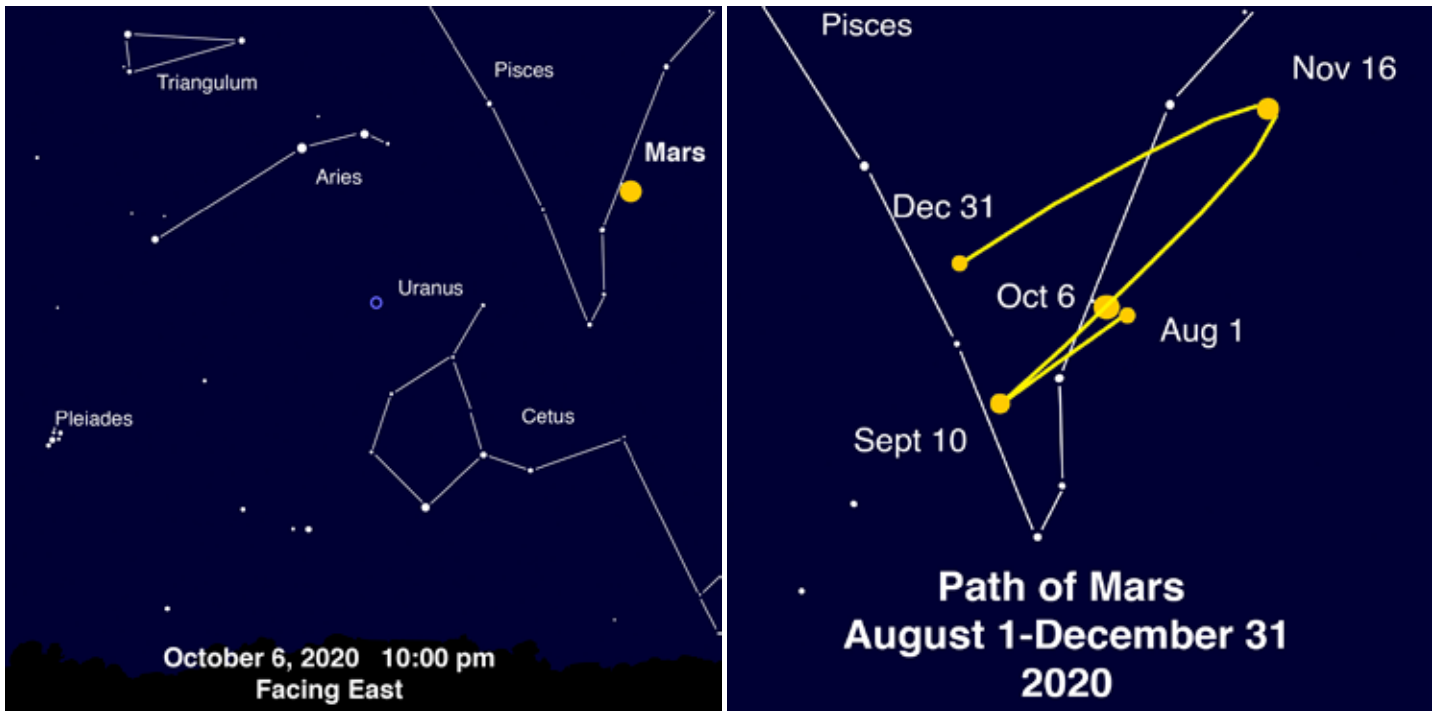
## Observe the Skies Near Mars

David Prosper, NASA Night Sky Network

October is a banner month for Mars observers! October 6 marks the day Mars and Earth are at closest approach, a once-every-26-months event. A week later, on October 13, Mars is at opposition and up all night. Mars is very bright this month, and astronomers are eager to image and directly observe details on its disc; however, don't forget to look at the space around the planet, too! By doing so, you can observe the remarkable retrograde motion of Mars and find a few nearby objects that you may otherwise overlook.

Since ancient times, Mars stood out to observers for its dramatic behavior. Usually a noticeable but not overly bright object, its wandering path along the stars showed it to be a planet instead of a fixed star. Every couple of years, this red planet would considerably flare up in brightness, for brief times becoming the brightest planet in the sky before dimming back down. At these times, Mars would also appear to slow down its eastward motion, stop, then reverse and head westward against the stars for a few weeks, before again stopping and resuming its normal eastward movement. This change in the planet's movement is called "apparent retrograde motion." While all of the planets will appear to undergo retrograde motion when observed from Earth, Mars's retrograde appearances may be most dramatic. Mars retrograde motion in 2020 begins on September 10, and ends on November 16. You can observe its motion with your eyes, and it makes for a fun observing project! You can sketch the background stars and plot Mars as you observe it night after night, or set up a photographic series to track this motion. Does the planet move at the same rate night after night, or is it variable? As you observe its motion, note how Mars's brightness changes over time. When does Mars appear at its most brilliant?

NASA has tons of great Mars-related resources! Want to know more about apparent retrograde motion? NASA has an explainer at: [bit.ly/marsretromotion](https://bit.ly/marsretromotion). Find great observing tips in JPL's "What's Up?" videos: [bit.ly/jplwhatsup](https://bit.ly/jplwhatsup). Check out detailed views with NASA's HiRISE satellite, returning stunning closeups of the Martian surface since 2006: [hirise.lpl.arizona.edu](https://hirise.lpl.arizona.edu). NASA's Curiosity Rover will be joined in a few months by the Perseverance Rover, launched in late July to take advantage of the close approach of Mars and Earth, a launch window that opens two years: [nasa.gov/perseverance](https://nasa.gov/perseverance). Calculate the ideal launch window yourself with this handy guide: [bit.ly/marslaunchwindow](https://bit.ly/marslaunchwindow). The Night Sky Network's Exploring Our Solar System handout invites you to chart the positions of the planets in the Solar System, and NSN coordinator Jerelyn Ramirez recently contributed an update featuring Mars opposition! You can download both versions at [bit.ly/exploresolarsystem](https://bit.ly/exploresolarsystem). Young astronomers can find many Mars resources and activities on NASA's Space Place: [bit.ly/spaceplacemars](https://bit.ly/spaceplacemars). Here's to clear skies and good seeing for Mars's best appearance until 2033!



(left) If you are paying this much attention to Mars, you're likely curious about the skies surrounding it! Find Mars in the constellation Pisces, with constellations Aries, Triangulum, and Cetus nearby. Aries may be the only one of these dimmer patterns readily visible from light-polluted areas. The Pleiades rises shortly after Mars. Dim Uranus is found close by, in Aries. If you are observing Mars up close, use the same eyepiece to check out Uranus's tiny blue-green disc. If you are uncertain whether you spotted Uranus, you didn't see it! Unlike stars, Uranus doesn't resolve to a point at high magnifications.

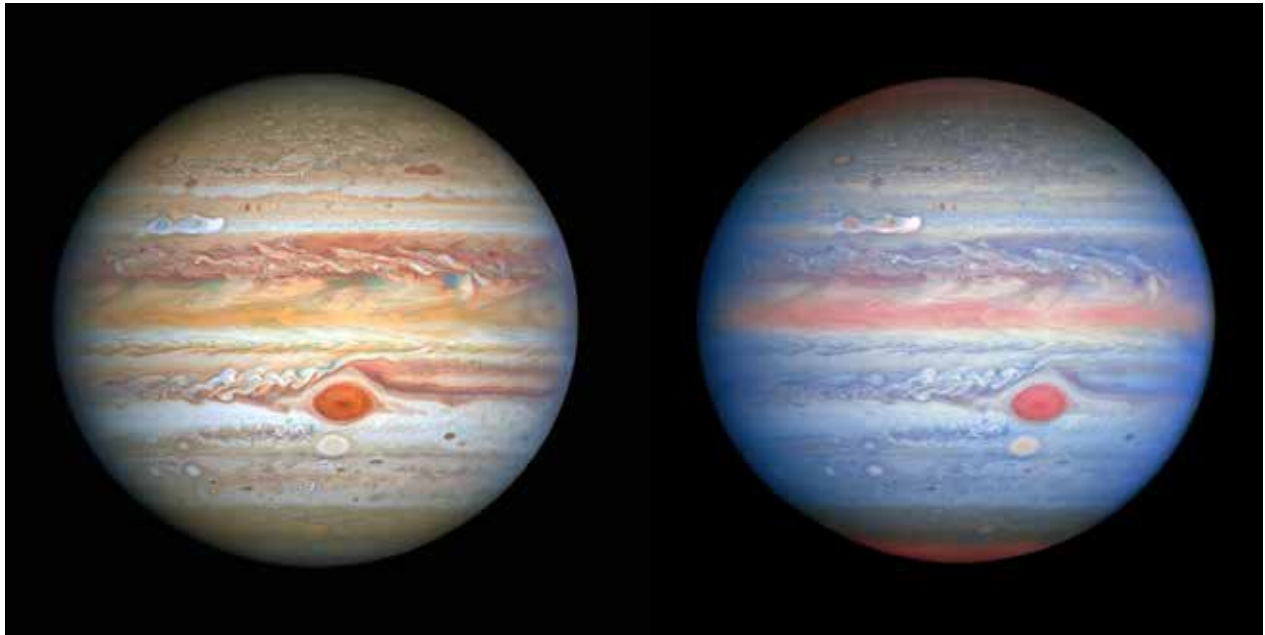
(right) The path of Mars during the last five months of 2020. Notice the retrograde motion from September 10 to November 16, with prime Mars observing time found in between. October 6 is the day of closest approach of Earth and Mars, "just" 38.6 million miles apart. Images created with help from Stellarium: [stellarium.org](https://stellarium.org)

**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](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!



## Hubble's New Views of Jupiter



[Left] This latest visible-light image of Jupiter was taken by the Hubble Space Telescope on 25 August 2020 and was captured when the planet was 653 million kilometres from Earth. Hubble's sharp view is giving researchers an updated weather report on the monster planet's turbulent atmosphere, including a remarkable new storm brewing, and a cousin of the Great Red Spot changing colour — again. The new image also features Jupiter's icy moon Europa.

[Right] This multiwavelength observation in ultraviolet/visible/near-infrared light of Jupiter was obtained by the Hubble Space Telescope on 25 August 2020 and is giving researchers an entirely new view of the giant planet. Hubble's near-infrared imaging, combined with ultraviolet views, provides a unique panchromatic look that offers insights into the altitude and distribution of the planet's haze and particles. This complements Hubble's visible-light pictures that show the ever-changing cloud patterns.

Credit: <https://www.spacetelescope.org/images/heic2017c/>

NASA, ESA, A. Simon (Goddard Space Flight Center), and M. H. Wong (University of California, Berkeley) and the OPAL team

## Space News

News from around the Net

### **Astronomers discover an earth-sized “pi planet” with a 3.14-Day orbit**

The rocky world, with its baking-hot surface, is likely not habitable. In a delightful alignment of astronomy and mathematics, scientists at MIT and elsewhere have discovered a “pi Earth” — an Earth-sized planet that zips around its star every 3.14 days, in an orbit reminiscent of the universal mathematics constant. The researchers discovered signals of the planet in data taken in 2017 by the NASA Kepler Space Telescope’s K2 mission. . . . (continued at <https://news.mit.edu/2020/earth-sized-pi-planet-0921> )



### **Scientists claim to find first-ever planet in another galaxy**

A team of scientists says it’s spotted what might be the first-known exoplanet in an entirely different galaxy. There could be billions of exoplanets within our own galaxy, but finding new worlds in even the next galaxies over is vastly more difficult. Now, with evidence that a planet-sized object is orbiting a binary system in the Whirlpool galaxy, New Scientist reports that a team of Harvard-Smithsonian scientists may have finally broken that barrier. ... (continued at <https://futurism.com/the-byte/first-planet-another-galaxy> )



### **Hubble captures a galaxy that’s chock-full of dark matter**

The newest image from the Hubble Space Telescope shows a galaxy that’s more than it appears. While NGC 5585 may look on the surface like a normal spiral galaxy, it’s thought to be chock full of dark matter. Located in the constellation of Ursa Major, sitting of the tail of the great bear, this galaxy is in many ways a typical spiral galaxy. . . . (continued at <https://www.digitaltrends.com/news/hubble-ngc-5585-dark-matter/> )



### **Infinity & Beyond — Episode 8: Black holes 101**

This week, Abigail Bollenbach and Astronomy magazine present you with a crash course on some of the weirdest objects in the universe: black holes. Black holes have long served as fodder for science fiction — and for good reason. These unimaginably dense objects contain so much matter trapped in such a small volume that their gravity is strong enough to prevent even light from escaping their surfaces. (continued at <https://astronomy.com/news/videos/2020/09/infinity--beyond--episode-8-black-holes-101> )



### **Nasa’s New \$23 Million Space Toilet Is Ready For Launch**

The upgraded toilet could be used on moon flights one day. NASA is launching a new space toilet to the International Space Station next week for astronauts to test out before it’s used on future missions to the moon or Mars. The \$23 million toilet system, known as the Universal Waste Management System (UWMS), is 65% smaller and 40% lighter than the toilet currently in use . . . (continued at <https://www.space.com/nasa-space-toilet-ready-for-launch> )





## Space News

News from around the Net. . .continued

### Explore Caroline Herschel's Celestial Showpieces

More than 200 years ago Caroline Herschel pointed her telescope at the heavens and discovered some of the finest deep-sky objects. Follow in her footsteps and see them for yourself. Because of COVID-19 restrictions many of us have found ourselves doing a lot of solo observing this year. Virtual star parties and online Zoom meetings have helped to connect us, but they only go so far. I needed a friend. Maybe that's why I was drawn to Caroline Herschel and her lovely catalog of deep-sky objects. . . . (continued at <https://skyandtelescope.org/astronomy-news/explore-caroline-herschels-celestial-showpieces/> )



### Possible Marker of Life Spotted on Venus

An international team of astronomers today announced the discovery of a rare molecule — phosphine — in the clouds of Venus. On Earth, this gas is only made industrially or by microbes that thrive in oxygen-free environments. Astronomers have speculated for decades that high clouds on Venus could offer a home for microbes — floating free of the scorching surface but needing to tolerate very high acidity. The detection of phosphine could point to such extra-terrestrial “aerial” life. . . (continued at <https://www.eso.org/public/news/eso2015/> )



### Astrophysicist probes cosmic ‘dark matter detector’

A University of Colorado Boulder astrophysicist is searching the light coming from a distant, and extremely powerful celestial object, for what may be the most elusive substance in the universe: dark matter. In two recent studies, Jeremy Darling, a professor in the Department of Astrophysical and Planetary Sciences, has taken a deep look at PSR J1745-2900. This body is a magnetar, or a type of collapsed star that generates an incredibly strong magnetic field. . . . (continued at <https://www.sciencedaily.com/releases/2020/09/200929123412.htm> )



### Venus might be habitable today, if not for Jupiter

Venus might not be a sweltering, waterless hellscape today, if Jupiter hadn't altered its orbit around the sun, according to new UC Riverside research. Jupiter has a mass that is two-and-a-half times that of all other planets in our solar system—combined. Because it is comparatively gigantic, it has the ability to disturb other planets' orbits. Early in Jupiter's formation as a planet, it moved closer to and then away from the sun due to interactions with the disc from which planets form as well as the other giant planets. This movement in turn affected Venus. . . . (continued at <https://phys.org/news/2020-09-venus-habitable-today-jupiter.html> )



### SpaceX's next astronaut flight for NASA to include heat shield tweak and more

SpaceX and NASA are preparing for the first full-fledged crew flight to the International Space Station, which will look similar — but not identical — to the crewed test flight the pair ran this summer. That test flight, dubbed Demo-2, saw veteran NASA astronauts Doug Hurley and Bob Behnken spend two months living and working in the orbiting laboratory while SpaceX and NASA confirmed that SpaceX's brand new Crew Dragon vehicle, the first new spacecraft to carry humans in decades, was functioning safely and as expected . . . (continued at <https://www.space.com/spacex-crew-1-heat-shield-update-from-demo-2> )



## 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.

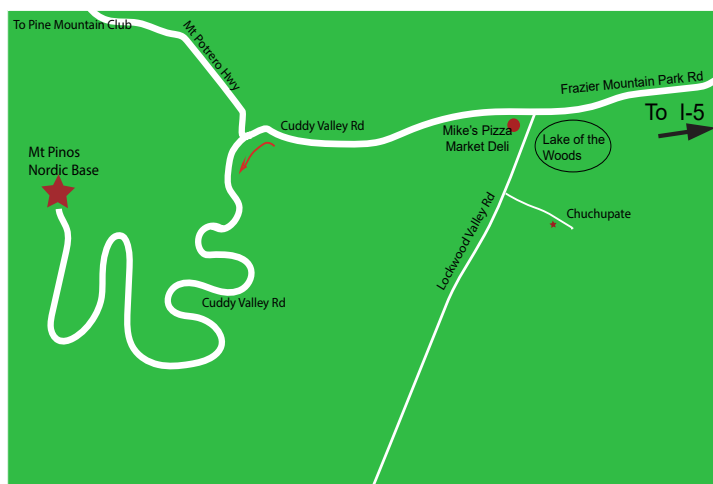
To get there: Take the CA-14 north 25 miles past Mojave. You will see giant red cliffs on the right side and a small sign that says "Red Cliffs Natural Area" and a dirt road. (If you see the large sign for the Ricardo campground, you drove a mile too far). Follow the road to the large parking lot (that 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



# Desert Sky Observer

www.avastronomyclub.org      October 2020

## Planet Summary

The **Sun** starts October in Virgo and crosses into Libra at the end of the month.

**Mercury** begins the month at its greatest eastern elongation(GEE) on October 1 some  $26^\circ$  east of the Sun at mag 0.0. By the 15th it will fade by a full magnitude. It reaches inferior conjunction on the 25th.

**Venus** begins the month close very close to Regulus. Venus will appear about half a degree on each side of the star in the morning twilight on the 2nd and 3rd. The waning crescent Moon passes  $4^\circ$  to the north on the 13th-14th.

**Mars** as October begins, outshines Jupiter. It reaches it closest approach to Earth, until 2035 on the 6th, at 3.5 light-minutes, with a magnitude of -2.6. Opposition doesn't occur until the 13th. Mars is in retrograde through the month among the stars of Pisces. There are two conjunctions with a nearly full Moon, on the 2nd and the 29th.

**Jupiter** returning to prograde motion . The waxing gibbous Moon passes  $2^\circ$  to the south on the 22th. Jupiter and Saturn continue to move closer until December 21 when they are less than  $7'$  apart.

**Saturn** continues its prograde motion in eastern Sagittarius. Jupiter is slowly approaching from the west. The waxing gibbous Moon passes  $2^\circ$  to its south on the 23th.

**Uranus** will spend 2020 in southern Aries at magnitude 5+. The 94% waning Moon will pass  $3^\circ$  south on the early evening of the 4th.

**Neptune** will spend the month stationary in northeast Aquarius at mag 7.8. The Moon will pass  $4^\circ$  south on the 26th.

**Pluto** spends the month in Sagittarius at mag 14 between Jupiter and Saturn.

## Sun and Moon Rise and Set



First Qtr  
Oct 23

Full  
Oct 1 & Oct 31

Third Qtr  
Oct 9

New  
Oct 16

## Sun and Moon Rise and Set\*

Date	Moonrise	Moonsset	Sunrise	Sunset
10/1/2020	18:31	05:34	06:47	18:37
10/5/2020	04:19	17:28	06:50	18:32
10/10/2020	23:54	13:57	06:54	18:25
10/15/2020	04:19	17:28	06:58	18:19
10/20/2020	10:23	20:42	07:02	18:12
10/25/2020	15:02	00:32	07:07	18:07
10/30/2020	17:28	05:20	07:11	18:01

## Planet Data\*

Oct 1					
	Rise	Transit	Set	Mag	Phase%
Mercury	08:56	14:15	19:34	0.06	60.66
Venus	03:34	10:12	16:50	-4.08	71.70
Mars	19:30	01:53	08:12	-2.49	98.93
Jupiter	14:34	19:30	00:25	-2.41	99.06
Saturn	15:01	20:01	01:04	0.47	99.77

Oct 15					
	Rise	Transit	Set	Mag	Phase%
Mercury	08:41	13:50	18:59	0.90	25.63
Venus	03:57	10:20	16:43	-4.05	76.42
Mars	18:20	00:36	06:58	-2.60	99.96
Jupiter	13:44	18:39	23:35	-2.32	99.05
Saturn	14:07	19:07	00:06	0.53	99.75

Oct 30					
	Rise	Transit	Set	Mag	Phase%
Mercury	06:32	12:04	17:36	2.42	7.74
Venus	04:24	10:29	16:33	-4.02	80.93
Mars	17:06	23:21	05:41	-2.20	98.47
Jupiter	12:51	17:48	22:44	-2.22	98.13
Saturn	13:10	18:10	23:10	0.59	99.76

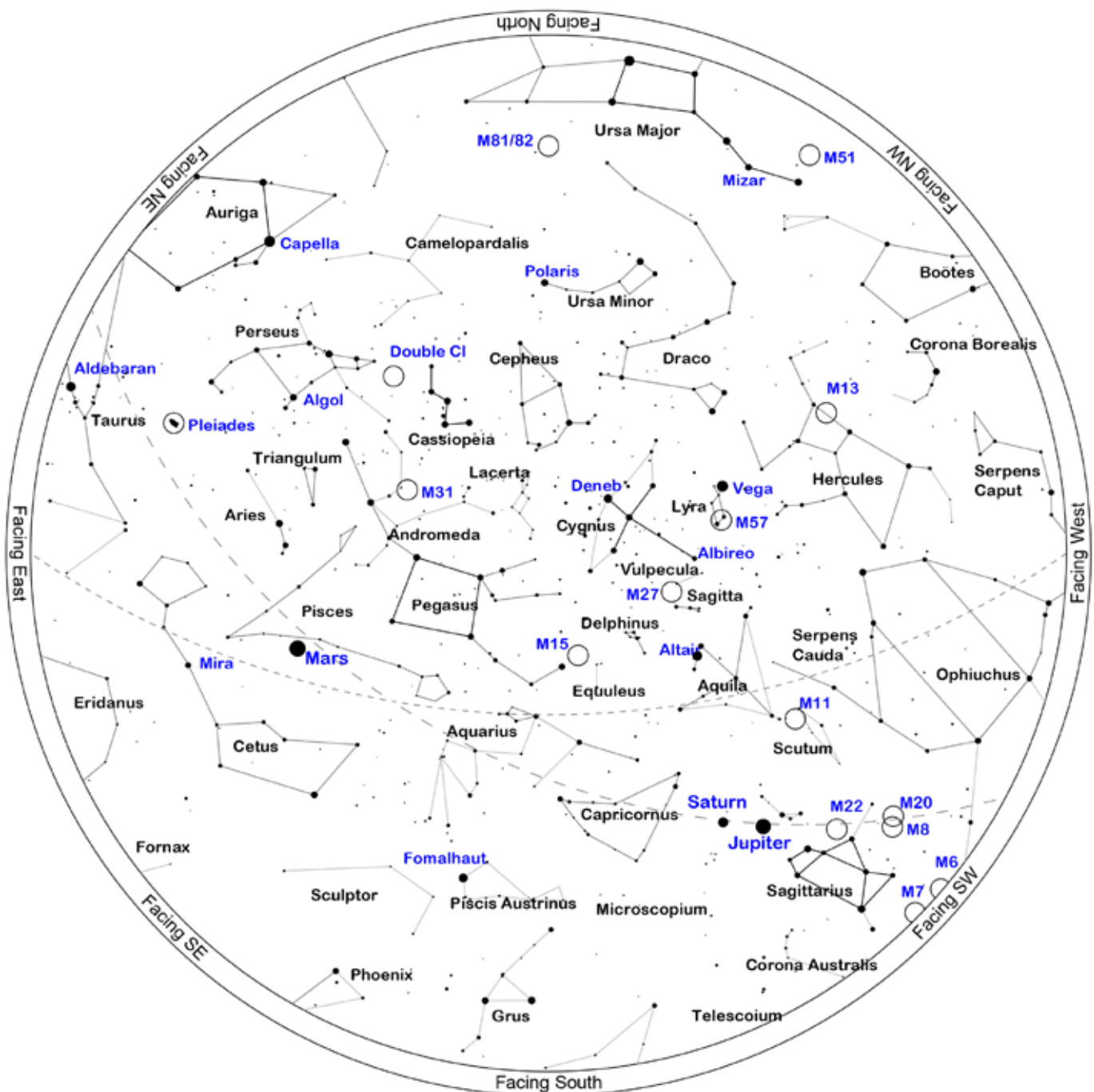
\*Sun, Moon and Planetary date based on Quartz Hill, CA

# Desert Sky Observer

[www.avastronomyclub.org](http://www.avastronomyclub.org)

October 2020

## Sky Chart



Location: Palmdale, CA 93551

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

Time: 2020 October 17, 21:00 (UTC -07:00)

Powered by: [Heavens-Above.com](http://Heavens-Above.com)

# Desert Sky Observer

www.avastronomyclub.org

October 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 October 17, 2020. The list is sorted by the transit time of the object.

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M14	Globular	Oph	17h 37m 36s	-03° 14.7'	9.5	10:53	16:47	22:40
Barnard276	DkNeb	Oph	17h 39m 39s	-19° 49.0'		11:43	16:49	21:54
M6	Open	Sco	17h 40m 20s	-32° 15.2'	4.5	12:29	16:49	21:10
NGC6397	Globular	Ara	17h 40m 42s	-53° 40.0'	5.6	15:17	16:50	18:22
NGC6426	Globular	Oph	17h 44m 55s	+03° 10.1'	11.2	10:42	16:54	23:05
Barnard83a	DkNeb	Sgr	17h 45m 18s	-20° 00.0'		11:50	16:54	21:59
IC4665	Open	Oph	17h 46m 30s	+05° 39.0'	4.2	10:37	16:56	23:14
NGC6445	P Neb	Sgr	17h 49m 15s	-20° 00.6'	13.0	11:54	16:58	22:03
NGC6503	Galaxy	Dra	17h 49m 27s	+70° 08.6'	10.2	Circum	16:58	Circum
NGC6441	Globular	Sco	17h 50m 13s	-37° 03.0'	7.4	13:01	16:59	20:57
Barnard283	DkNeb	Sco	17h 51m 00s	-33° 52.0'		12:47	17:00	21:13
Barnard285	DkNeb	Ser	17h 51m 32s	-12° 52.0'		11:34	17:01	22:27
M7	Open	Sco	17h 53m 51s	-34° 47.6'	3.5	12:54	17:03	21:12
IC4670	Neb	Sgr	17h 55m 07s	-21° 44.6'		12:05	17:04	22:03
NGC6501	Galaxy	Her	17h 56m 04s	+18° 22.3'	12.3	10:09	17:05	00:01
M23	Open	Sgr	17h 57m 04s	-18° 59.1'	6.0	11:58	17:06	22:14
NGC6543	P Neb	Dra	17h 58m 36s	+66° 38.0'	8.1	Circum	17:08	Circum
NGC6496	Globular	Sco	17h 59m 04s	-44° 16.0'	9.2	13:52	17:08	20:24
Barnard291	DkNeb	Sgr	17h 59m 43s	-33° 53.0'		12:56	17:09	21:22
Barnard292	DkNeb	Sgr	18h 00m 34s	-33° 20.0'		12:54	17:10	21:25
Barnard293	DkNeb	Sgr	18h 01m 12s	-35° 20.0'		13:04	17:10	21:17
M20	Open+D Neb	Sgr	18h 02m 42s	-22° 58.2'	5.0	12:17	17:12	22:07
M8	Open+D Neb	Sgr	18h 03m 41s	-24° 22.7'	5.0	12:23	17:13	22:03
Barnard295	DkNeb	Sgr	18h 04m 05s	-31° 09.0'		12:48	17:13	21:38
M21	Open	Sgr	18h 04m 13s	-22° 29.3'	7.0	12:17	17:13	22:10
NGC6530	Open	Sgr	18h 04m 31s	-24° 21.5'	4.6	12:23	17:14	22:04
NGC6528	Globular	Sgr	18h 04m 50s	-30° 03.3'	9.5	12:45	17:14	21:43
IC4684	Neb	Sgr	18h 09m 08s	-23° 26.1'		12:25	17:18	22:12
IC4685	Neb	Sgr	18h 09m 18s	-23° 59.2'		12:27	17:18	22:10
Barnard303	DkNeb	Sgr	18h 09m 28s	-23° 59.0'		12:27	17:18	22:10
IC1274	Neb	Sgr	18h 09m 51s	-23° 38.8'		12:26	17:19	22:12
IC1275	Neb	Sgr	18h 10m 07s	-23° 45.7'		12:27	17:19	22:11
NGC6572	P Neb	Oph	18h 12m 06s	+06° 51.2'	9.0	10:59	17:21	23:43
NGC6567	P Neb	Sgr	18h 13m 45s	-19° 04.5'	12.0	12:15	17:23	22:30
IC4701	Neb	Sgr	18h 16m 36s	-16° 38.0'		12:10	17:26	22:41
Barnard93	DkNeb	Sgr	18h 16m 53s	-18° 03.0'		12:15	17:26	22:37



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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC1284	Neb	Sgr	18h 17m 39s	-19° 40.3'		12:21	17:27	22:32
M24	Open	Sgr	18h 18m 26s	-18° 24.3'	4.5	12:18	17:27	22:37
M16	Open+D Neb	Ser	18h 18m 48s	-13° 48.3'	6.5	12:04	17:28	22:52
Barnard308	DkNeb	Sgr	18h 19m 08s	-22° 14.0'		12:31	17:28	22:26
M18	Open	Sgr	18h 19m 58s	-17° 06.1'	8.0	12:15	17:29	22:43
M17	Open+D Neb	Sgr	18h 20m 47s	-16° 10.3'	7.0	12:13	17:30	22:46
HR6923	Mult	Dra	18h 23m 54s	+58° 48.0'	5.0	Circum	17:33	Circum
M28	Globular	Sgr	18h 24m 33s	-24° 52.1'	8.5	12:45	17:34	22:22
Barnard95	DkNeb	Sct	18h 25m 35s	-11° 44.0'		12:05	17:35	23:04
Barnard97	DkNeb	Sct	18h 29m 05s	-09° 55.0'		12:03	17:38	23:13
Abell44	P Neb	Sgr	18h 30m 11s	-16° 45.4'	12.6	12:24	17:39	22:54
NGC6637	Globular	Sgr	18h 31m 23s	-32° 20.8'	7.7	13:21	17:40	22:00
IC1287	Neb	Sct	18h 31m 26s	-10° 47.7'		12:08	17:40	23:13
M25	Open	Sgr	18h 31m 42s	-19° 07.0'	6.5	12:33	17:41	22:48
IC4725	Open	Sgr	18h 31m 48s	-19° 06.7'	4.6	12:33	17:41	22:48
NGC6642	Globular	Sgr	18h 31m 54s	-23° 28.5'	8.8	12:48	17:41	22:34
NGC6644	P Neb	Sgr	18h 32m 35s	-25° 07.7'	12.0	12:54	17:42	22:29
NGC6647	Open	Sgr	18h 32m 49s	-17° 13.6'	8.0	12:28	17:42	22:55
IC4732	P Neb	Sgr	18h 33m 55s	-22° 38.6'	13.0	12:47	17:43	22:39
NGC6656	Globular	Sgr	18h 36m 24s	-23° 54.2'	5.1	12:54	17:45	22:37
IC4756	Open	Ser	18h 38m 54s	+05° 27.0'	5.0	11:30	17:48	00:06
NGC6681	Globular	Sgr	18h 43m 12s	-32° 17.4'	8.1	13:32	17:52	22:12
NGC6694	Open	Sct	18h 45m 18s	-09° 23.0'	8.0	12:18	17:54	23:31
IC4776	P Neb	Sgr	18h 45m 51s	-33° 20.5'	12.0	13:39	17:55	22:10
Barnard318	DkNeb	Sct	18h 49m 42s	-06° 23.0'		12:14	17:59	23:44
M11	Open	Sct	18h 51m 05s	-06° 16.1'	7.0	12:15	18:00	23:45
M57	P Neb	Lyr	18h 53m 35s	+33° 01.7'	9.5	10:12	18:03	01:53
Barnard117	DkNeb	Sct	18h 53m 43s	-07° 24.0'		12:21	18:03	23:45
NGC6715	Globular	Sgr	18h 55m 03s	-30° 28.7'	7.7	13:37	18:04	22:32
NGC6717	Globular	Sgr	18h 55m 06s	-22° 42.0'	9.2	13:08	18:04	23:00
Barnard122	DkNeb	Sct	18h 56m 48s	-04° 45.0'		12:16	18:06	23:55
Barnard123	DkNeb	Sct	18h 57m 39s	-04° 43.0'		12:17	18:07	23:56
NGC6723	Globular	Sgr	18h 59m 33s	-36° 37.9'	7.3	14:08	18:09	22:09
Barnard128	DkNeb	Aql	19h 01m 40s	-04° 34.0'		12:21	18:11	00:01
NGC6729	BrNeb	CrA	19h 01m 54s	-36° 57.0'		14:12	18:11	22:10
Barnard326	DkNeb	Aql	19h 03m 00s	-00° 23.0'		12:10	18:12	00:14
NGC6749	Globular	Aql	19h 05m 15s	+01° 54.0'	11.1	12:06	18:14	00:22
Barnard329	DkNeb	Aql	19h 06m 59s	+03° 11.0'		12:04	18:16	00:28
NGC6760	Globular	Aql	19h 11m 12s	+01° 01.8'	9.1	12:15	18:20	00:26
Abell56	P Neb	Aql	19h 13m 07s	+02° 52.8'	12.4	12:11	18:22	00:33
NGC6772	P Neb	Aql	19h 14m 36s	-02° 42.4'	14.0	12:28	18:24	00:19



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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
Barnard138	DkNeb	Aql	19h 16m 00s	+00° 13.0'		12:22	18:25	00:28
M56	Globular	Lyr	19h 16m 36s	+30° 11.0'	9.5	10:47	18:26	02:04
NGC6778	P Neb	Aql	19h 18m 25s	-01° 35.7'	13.0	12:29	18:27	00:26
Abell61	P Neb	Cyg	19h 19m 10s	+46° 14.5'	13.0	09:18	18:28	03:39
Barnard140	DkNeb	Aql	19h 19m 49s	+05° 13.0'		12:12	18:29	00:46
NGC6790	P Neb	Aql	19h 22m 57s	+01° 30.8'	10.0	12:25	18:32	00:39
NGC6803	P Neb	Aql	19h 31m 16s	+10° 03.3'	11.0	12:09	18:40	01:11
NGC6804	P Neb	Aql	19h 31m 35s	+09° 13.5'	12.0	12:12	18:41	01:09
Abell62	P Neb	Aql	19h 33m 18s	+10° 37.0'	13.0	12:10	18:42	01:15
NGC6807	P Neb	Aql	19h 34m 34s	+05° 41.0'	14.0	12:25	18:44	01:02
M55	Globular	Sgr	19h 40m 00s	-30° 57.7'	7.0	14:23	18:49	23:15
NGC6813	Neb	Vul	19h 40m 22s	+27° 18.5'		11:22	18:49	02:16
NGC6820	Neb	Vul	19h 42m 28s	+23° 05.2'		11:40	18:51	02:03
Barnard338	DkNeb	Aql	19h 43m 02s	+07° 27.0'		12:29	18:52	01:16
NGC6818	P Neb	Sgr	19h 43m 58s	-14° 09.1'	10.0	13:30	18:53	00:16
NGC6826	P Neb	Cyg	19h 44m 48s	+50° 31.0'	8.8	08:58	18:54	04:50
Abell65	P Neb	Sgr	19h 46m 34s	-23° 08.2'	13.1	14:01	18:56	23:50
NGC6838	Globular	Sge	19h 53m 46s	+18° 46.6'	8.3	12:05	19:03	02:00
NGC6842	P Neb	Vul	19h 55m 02s	+29° 17.3'	14.0	11:29	19:04	02:39
HR7619	Mult	Cyg	19h 55m 38s	+52° 26.3'	4.9	08:38	19:05	05:31
Abell66	P Neb	Sgr	19h 57m 32s	-21° 36.6'	14.1	14:07	19:07	00:06
Barnard144	DkNeb	Cyg	19h 58m 00s	+35° 20.0'		11:06	19:07	03:08
NGC6853	P Neb	Vul	19h 59m 36s	+22° 43.2'	8.1	11:58	19:09	02:19
NGC6857	Neb	Cyg	20h 02m 48s	+33° 31.4'	11.4	11:19	19:12	03:05
IC4954	Neb	Vul	20h 04m 45s	+29° 15.1'		11:39	19:14	02:48
M75	Globular	Sgr	20h 06m 05s	-21° 55.3'	9.5	14:17	19:15	00:14
Barnard342	DkNeb	Cyg	20h 09m 30s	+41° 12.0'		10:45	19:19	03:52
NGC6885	Open	Vul	20h 12m 00s	+26° 29.0'	5.9	11:57	19:21	02:45
NGC6891	P Neb	Del	20h 15m 09s	+12° 42.2'	12.0	12:45	19:24	02:03
NGC6894	P Neb	Cyg	20h 16m 24s	+30° 33.9'	14.0	11:46	19:25	03:05
IC4997	P Neb	Sge	20h 20m 09s	+16° 43.9'	12.0	12:38	19:29	02:20
Barnard345	DkNeb	Cyg	20h 21m 00s	+46° 33.0'		10:17	19:30	04:43
NGC6913	Open	Cyg	20h 23m 57s	+38° 30.5'	6.6	11:15	19:33	03:51
Abell70	P Neb	Aql	20h 31m 33s	-07° 05.3'	14.3	13:58	19:41	01:24
Barnard348	DkNeb	Cyg	20h 34m 00s	+42° 05.0'		11:04	19:43	04:22
NGC6940	Open	Vul	20h 34m 26s	+28° 17.0'	6.3	12:13	19:43	03:14
NGC6960	Neb	Cyg	20h 45m 58s	+30° 35.6'		12:15	19:55	03:35
IC5068	Neb	Cyg	20h 50m 29s	+42° 28.6'		11:18	20:00	04:41
NGC6979	Neb	Cyg	20h 51m 00s	+32° 09.0'	11.0	12:13	20:00	03:47
IC5070	Neb	Cyg	20h 51m 00s	+44° 24.1'		11:04	20:00	04:56
NGC6981	Globular	Aqr	20h 53m 28s	-12° 32.2'	9.4	14:35	20:02	01:30

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC5076	Neb	Cyg	20h 55m 33s	+47° 23.7'		10:43	20:05	05:26
IC1340	Neb	Cyg	20h 56m 08s	+31° 02.8'		12:23	20:05	03:47
NGC6992	Neb	Cyg	20h 56m 19s	+31° 44.6'		12:20	20:05	03:50
NGC6996	Open	Cyg	20h 56m 30s	+44° 38.0'	10.0	11:08	20:06	05:03
NGC6997	Open	Cyg	20h 56m 39s	+44° 37.9'	10.0	11:08	20:06	05:03
Barnard352	DkNeb	Cyg	20h 57m 10s	+45° 53.0'		10:59	20:06	05:14
Barnard354	DkNeb	Cep	20h 58m 00s	+58° 09.0'		Circum	20:07	Circum
NGC7000	BrNeb	Cyg	20h 58m 48s	+44° 20.0'		11:13	20:08	05:03
M73	Open+Asterism	Aqr	20h 58m 56s	-12° 38.1'	9.0	14:41	20:08	01:35
NGC7006	Globular	Del	21h 01m 30s	+16° 11.0'	10.6	13:21	20:11	03:00
NGC7009	P Neb	Aqr	21h 04m 12s	-11° 22.0'	8.0	14:42	20:13	01:44
NGC7027	P Neb	Cyg	21h 07m 02s	+42° 14.1'	10.0	11:36	20:16	04:56
Barnard151	DkNeb	Cep	21h 08m 13s	+56° 19.0'		Circum	20:17	Circum
IC1369	Open	Cyg	21h 12m 09s	+47° 46.1'	6.8	10:56	20:21	05:46
Barnard153	DkNeb	Cep	21h 21m 03s	+56° 26.0'		Circum	20:30	Circum
NGC7076	Neb	Cep	21h 26m 24s	+62° 53.5'		Circum	20:35	Circum
NGC7078	Globular	Peg	21h 29m 58s	+12° 10.0'	6.4	14:02	20:39	03:16
M39	Open	Cyg	21h 31m 42s	+48° 25.0'	5.5	11:09	20:41	06:12
M2	Globular	Aqr	21h 33m 27s	-00° 49.3'	7.5	14:42	20:42	02:43
NGC7090	Galaxy	Ind	21h 36m 28s	-54° 33.4'	11.0	19:33	20:46	21:58
IC1396	Open	Cep	21h 38m 58s	+57° 29.3'	3.5	Circum	20:48	Circum
NGC7099	Globular	Cap	21h 40m 22s	-23° 10.7'	7.5	15:55	20:49	01:44
NGC7128	Open	Cyg	21h 43m 57s	+53° 42.9'	9.7	09:57	20:53	07:49
NGC7142	Open	Cep	21h 45m 09s	+65° 46.5'	9.3	Circum	20:54	Circum
NGC7139	P Neb	Cep	21h 46m 08s	+63° 47.5'	13.3	Circum	20:55	Circum
Barnard166	DkNeb	Cep	21h 51m 05s	+60° 05.0'		Circum	21:00	Circum
Barnard168	DkNeb	Cyg	21h 53m 20s	+47° 16.0'		11:42	21:02	06:22
IC5146	Open	Cyg	21h 53m 29s	+47° 16.0'	7.2	11:43	21:03	06:22
IC1434	Open	Lac	22h 10m 42s	+52° 51.0'	9.0	10:45	21:20	07:55
NGC7245	Open	Lac	22h 15m 11s	+54° 20.6'	9.2	10:05	21:24	08:43
NGC7232	Galaxy	Gru	22h 15m 38s	-45° 51.0'	13.0	18:21	21:25	00:29
NGC7261	Open	Cep	22h 20m 06s	+58° 03.0'	8.4	Circum	21:29	Circum
NGC7293	P Neb	Aqr	22h 29m 36s	-20° 48.0'	7.3	16:36	21:39	02:41
NGC7380	Open	Cep	22h 47m 21s	+58° 07.9'	7.2	Circum	21:56	Circum
C9	BrNeb	Cep	22h 56m 48s	+62° 37.0'		Circum	22:06	Circum
IC1470	Neb	Cep	23h 05m 10s	+60° 14.6'		Circum	22:14	Circum
NGC7492	Globular	Aqr	23h 08m 27s	-15° 36.6'	11.5	16:59	22:17	03:36
HR8872	Triple	Cep	23h 18m 38s	+68° 06.6'	4.8	Circum	22:28	Circum
IC5308	Galaxy	Gru	23h 19m 21s	-42° 15.4'	12.0	18:59	22:28	01:58
M52	Open	Cas	23h 24m 48s	+61° 35.6'	8.0	Circum	22:34	Circum

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