



Desert Sky Observer

Volume 37

Antelope Valley Astronomy Club Newsletter

August 2017

Up-Coming Events

August 11: Club Meeting*

August 12: [Prime Desert Woodland Moon Walk](#)

August 21: [Total Solar Eclipse 2017](#)

* Monthly meetings are held at the S.A.G.E. Planetarium in Palmdale, the second Friday of each month. 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*



President

Frank Moore

It was a dark and stormy night....

Well, actually, it was a clear and stunningly beautiful night for the star party following our annual “Star-B-Cue”, on Saturday July 22, at the Brite Lake Recreational Center just outside of Tehachapi. Early on we shared views of the Jupiter and Saturn with members and the public and, as the night progressed and it grew dark, we were able to share views of many nebulae, galaxies, clusters, and even distant planets like Neptune and Uranus.

With the lights in the parking lot turned off the by the Campground Hosts for the Tehachapi Valley Recreation and Parks District, and Tom Neisler, General Manager for the Tehachapi Cummings County Water District once again having his staff turn off the lights at their nearby office and plant, we had truly dark skies. My fears of smoke and haze from the many wildfires that are (or were) burning throughout the state never materialized and as the night progressed the Milky Way began to twinkle brilliantly overhead. I honestly think it was the best sky conditions we’ve had in seven years of holding this event at Brite Lake.

In light of the sky conditions, Darrell Bennett ventured out with his 12” Meade LX-90, put on his Oxygen III filter, and shared stunning views of the usually elusive Veil Nebula with the public in addition to showing them wonderful views of the Lagoon Nebula (M17) and the Swan or Omega Nebula (M8) in Oxygen III. The Veil is particularly hard to share with the public, since it usually has so little contrast under anything but the best sky conditions, and Darrell was able to get a “Wow!” from anyone who took a look.

Matt Leone also shared views of the Veil, in Oxygen III and also with a Narrowband filter, on his 24” dobsonian reflector. He let the public manually move the big dob to follow the river of nebulosity through space as they gleefully expressed their delight. Later, he showed the public the Dumbbell Nebula which was impressive unfiltered but looked even more exceptional with a hydrogen beta filter. The most stunning view Matt offered to the public, however, was of M13, the Great Globular Cluster in Hercules, at 300X. He would position the cluster just outside of the field of view and viewers would experience the “spacewalk effect” as it came into view. The effect was almost as if you were flying among the 300,000 stars that make up the cluster.

The Whirlpool Galaxy, M51, was readily visible but, because of its position in the western sky, and above the sky glow from Bakersfield, it was difficult (though not impossible) to see the dust lanes through an eyepiece. Rod Girard solved that problem by presenting it to the public on an LCD screen, as captured by his Revolution Imager, and he was also able to milk some colors out of the Ring Nebula, M57, for presentation to the public.

As has been our custom, Dale Hawkins, NASA Solar System Ambassador, gave a talk about the Milky Way and our position within it to the public. He had a bigger crowd for his presentation this year than he had in any past year.

My recollection of those who had telescopes setup for sharing views with the public is as follows. Matt Leone-24" dobsonian, Robert Lynch Jr.-12" dobsonian, Tom Hames-14" dobsonian, Duane Lewis and Chris Cardon with the AVAC 13.1" dobsonian, Jim Pendleton-10" dobsonian, Ellen Mahler-6" dobsonian, Bob Wood (visitor from Hesperia who works at CCI) 16"-dobsonian, Dale Hawkins-8" SCT, Darrell Bennett-12" SCT, Rod Girard-9.25" SCT with Revolution Imager, Frank & Rose Moore-11" SCT and 60mm h-alpha. If I missed anyone in the chaos, my apologies and please let Rose or I know so she can log it in her records.

In addition to sharing the views of the cosmos with the public, we distributed at least several hundred eclipse shades to the public in attendance along with some pinhole projector viewers and information on the August 21 Eclipse from NASA's Night Sky Network. Of course, and as has been her custom for years at big outreach events, Rose gave red glow sticks and glow bracelets to the kids in attendance.

Thank you to Matt Leone's guest Jesse Martinez who was gracious enough to cook the burgers and dogs while I was attending to other business. I want to thank everyone who donated items for the Silent Auction and raffle and especially Darrell Bennett for the donation of the Meade DS-80 refractor which was our grand prize. We tuned it up a little by upgrading it to a 1.25" visual back, 1.25" diagonal, and two 1.25" eyepieces and I sweetened the pot with a glass solar filter for it from Orion. Now, all we have to do is teach the winner, Judy Jones, how to use it.

Nick Smirnoff, photographer for the Tehachapi News and Bakersfield Californian, attended our Brite Lake event and the paper published a little photo gallery of the event. It can be found here: <https://goo.gl/Hov32q>

On the weekend after the picnic, on Saturday July 29, we had our second Lunar Observing event of the season at Judy Fuentes' house in Antelope Acres. This event was as well attended as our last and, in addition to having a wonderful night of observing features of the moon in detail, led by Matt Leone and Rose Moore with maps printed from Rose's iPad apps "Moon Maps" and "Moon Charts", we enjoyed the friendship and fellowship of our fellow "Loonies" and feasted on pies, cookies, soft pretzels, vegetable and fruit plates, and other delights brought by our generous members. Despite haze on the horizons, we were all pleasantly surprised by the great viewing conditions and even the vestiges of the Milky Way visible in the rural/urban interface sky and under an almost first quarter moon. Even under those conditions, some of us still ventured off to view a few deep sky objects and I think all of us swung over to Jupiter and Saturn at some point during the night. These events are held relatively close to the Antelope Valley urban area, don't require much of a drive and only take a few hours, and I encourage more of you to come on out.

At our next meeting, at 7:00 pm on Friday August 11 at the SAGE Planetarium, I will be presenting a PowerPoint from NASA's Night Sky Network titled, "An Eclipse to Remember". I'll be adding a little content about the local view of the partial eclipse, as it will be visible in the Antelope Valley, so those who aren't traveling to the path of totality will know what to expect. As we have done at our last few meetings and events, we will also be handing out eclipse shades for members, visitors, friends and family.

The following night, we have a Prime Desert Woodland Moonwalk at 8:00 pm. This will be Jeremy Amaran's first use of the little handheld/portable PA the AVAC bought for his use at PDW and I'm anxious to hear it in action. We gave it a bit of test at the picnic and it worked great. Since this is the last Moonwalk before the eclipse, we will be making a concerted effort to get eclipse shades and literature out to the public so make sure to tell your friends and neighbors to come on out.

The week after the meeting, for many of us the adventure and trip to the path of totality for the August 21 Total Solar Eclipse begins. I wish all of you a safe journey, and clear skies for the event.

Space Place

Twenty Years Ago on Mars...

By Linda Hermans-Killiam

On July 4, 1997, NASA's Mars Pathfinder landed on the surface of Mars. It landed in an ancient flood plain that is now dry and covered with rocks. Pathfinder's mission was to study the Martian climate, atmosphere and geology. At the same time, the mission was also testing lots of new technologies.

For example, the Pathfinder mission tried a brand-new way of landing on Mars. After speeding into the Martian atmosphere, Pathfinder used a parachute to slow down and drift toward the surface of the Red Planet. Before landing, Pathfinder inflated huge airbags around itself. The spacecraft released its parachute and dropped to the ground, bouncing on its airbags about 15 times. After Pathfinder came to a stop, the airbags deflated.

Before Pathfinder, spacecraft had to use lots of fuel to slow down for a safe landing on another planet. Pathfinder's airbags allowed engineers to use and store less fuel for the landing. This made the mission less expensive. After seeing the successful Pathfinder landing, future missions used this airbag technique, too!

Pathfinder had two parts: a lander that stayed in one place, and a wheeled rover that could move around. The Pathfinder lander had special instruments to study Martian weather. These instruments measured air temperature, pressure and winds. The measurements helped us better understand the climate of Mars.

The lander also had a camera for taking images of the Martian landscape. The lander sent back more than 16,000 pictures of Mars. Its last signal was sent to Earth on Sept. 27, 1997. The Pathfinder lander was renamed the Carl Sagan Memorial Station. Carl Sagan was a well-known astronomer and science educator.

Pathfinder also carried the very first rover to Mars. This remotely-controlled rover was about the size of a microwave oven and was called Sojourner. It was named to honor Sojourner Truth, who fought for African-American and women's rights. Two days after Pathfinder landed, Sojourner rolled onto the surface of Mars. Sojourner gathered data on Martian rocks and soil. The rover also carried cameras. In the three months that Sojourner operated on Mars, the rover took more than 550 photos!

Pathfinder helped us learn how to better design missions to Mars. It gave us valuable new information on the Martian climate and surface. Together, these things helped lay the groundwork for future missions to Mars.

Learn more about the Sojourner rover at the NASA Space Place: <https://spaceplace.nasa.gov/mars-sojourner>

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit <https://spaceplace.nasa.gov/> to explore space and Earth science!

News Headlines

"Alien megastructure" star may be a sign of a dying world

In 2015, reports of an unusual signal observed around a distant star spurred suggestions of the presence of an alien megastructure. But new research suggests that the bizarre discovery could instead be the sign of a destroyed world.

<http://www.astronomy.com/news/2017/07/disintegrating-worlds>

NASA's Voyager Spacecraft Still Reaching for the Stars After 40 Years

Humanity's farthest and longest-lived spacecraft, Voyager 1 and 2, achieve 40 years of operation and exploration this August and September. Despite their vast distance, they continue to communicate with NASA daily, still probing the final frontier.

<https://goo.gl/Q7UV5H>

Reputable Vendors of Solar Filters & Viewers

Here you'll find lists of reputable manufacturers and authorized dealers of solar filters and viewers; these include companies with which members of the AAS Solar Eclipse Task Force have had prior (and positive!) experience as well as companies whose products have been certified safe by authorities we recognize and whose certification we have confirmed to be genuine. Your eyes are precious!

<https://eclipse.aas.org/resources/solar-filters>

How to watch the total solar eclipse online

It's the greatest 2 minutes and 40 seconds in astronomy and August 21st, you have a chance to see it. At 10:15 am Pacific Daylight Time, the Great American Eclipse will begin. The first total solar eclipse in history unique to the United States, it enters the country near Depoe Bay, Oregon, and, at 2:49 pm Eastern Daylight Time, exits outside McClellanville, South Carolina. For those who don't live in — or can't get to — one of the 12 states the eclipse crosses, there's always the internet or NASA TV.

<http://www.astronomy.com/news/2017/08/where-to-watch-the-eclipse-online>

Science Channel To Go Live For Great American Eclipse

If you don't have NASA TV, the Science Channel will be on the ground to capture the excitement with live coverage of the eclipse as it happens on Monday, August 21. In primetime, the network will premiere a one-hour special, THE GREAT AMERICAN ECLIPSE with same-day footage of the eclipse, on the 21st at 9 PM ET/PT. The Science Channel has also launched an eclipse micro-site complete with blog posts, photo galleries and an original eclipse companion guide video series. On August 21, the network will Facebook Live the eclipse from Madras, capturing crowd reactions of the remarkable spectacle, and will offer live eclipse updates throughout the day.

<https://www.sciencechannel.com/tv-shows/great-american-eclipse/>

August Sky Data

Full Aug 7 Last Qtr Aug 14 New Aug 21 First Qtr Aug 29



**Best time for deep sky observing this month:
August 15 through August 24**

Given a very low western horizon, **Mercury**, showing an 8 arc second disk and shining at magnitude +0.4 might just be seen after sunset at the beginning of August. Binoculars may well be needed but please do not use them until after the Sun has set. It passes between the Earth and the Sun (inferior conjunction) on August 26th.

Venus is visible in the east before dawn this month, rising around 3 hours before sunrise. Its magnitude remains constant the month as its angular diameter shrinks from 14.5 to 12.5 arc seconds. However, at the same time, its illuminated phase increases from 74 to 83%.

Mars passed behind the Sun in July, but will be hidden in the Sun's glare all month so cannot be observed.

Jupiter can be seen low in the southwestern sky after nightfall. It sets at about 2330 as August begins. As the month progresses its brightness falls from -1.9 to -1.8 magnitudes as its angular size falls from 34 to 32 arc seconds. It lies in Virgo, initially some 8 degrees to the west of Spica, reducing to 4 degrees as the month progresses and will pass Spica on September 11th on its journey towards the lower parts of the ecliptic.

Saturn came into opposition on June 11th and so will be at its highest elevation due south as darkness falls. It shines initially at magnitude +0.3 falling to +0.4 during the month and has an angular size of ~17 arc seconds. With an angle of 26.8 degrees inclination to the line of sight, the rings are virtually as open as they ever can be.

The Perseid **meteor shower** will probably produce the greatest number of meteors on the mornings of August 11, 12 and 13. In a dark, moonless sky, this shower often produces 50 or more meteors per hour. But, in 2017, we'll have to contend with the light of a bright waning gibbous moon, which rises at mid-evening and washes the sky during the peak hours of the shower, between midnight and dawn. A good number of Perseid meteors will be bright, so you should be able to see some Perseids, despite the moonlit glare.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
8/1/2017	16:11	02:17	07:02	20:53
8/5/2017	19:30	05:11	07:05	20:50
8/10/2017	22:45	09:56	07:08	20:45
8/15/2017	01:16	15:11	07:12	20:39
8/20/2017	06:01	20:00	07:16	20:33
8/25/2017	11:14	23:05	07:19	20:27
8/31/2017	16:38	02:16	07:24	20:19

Planet Data

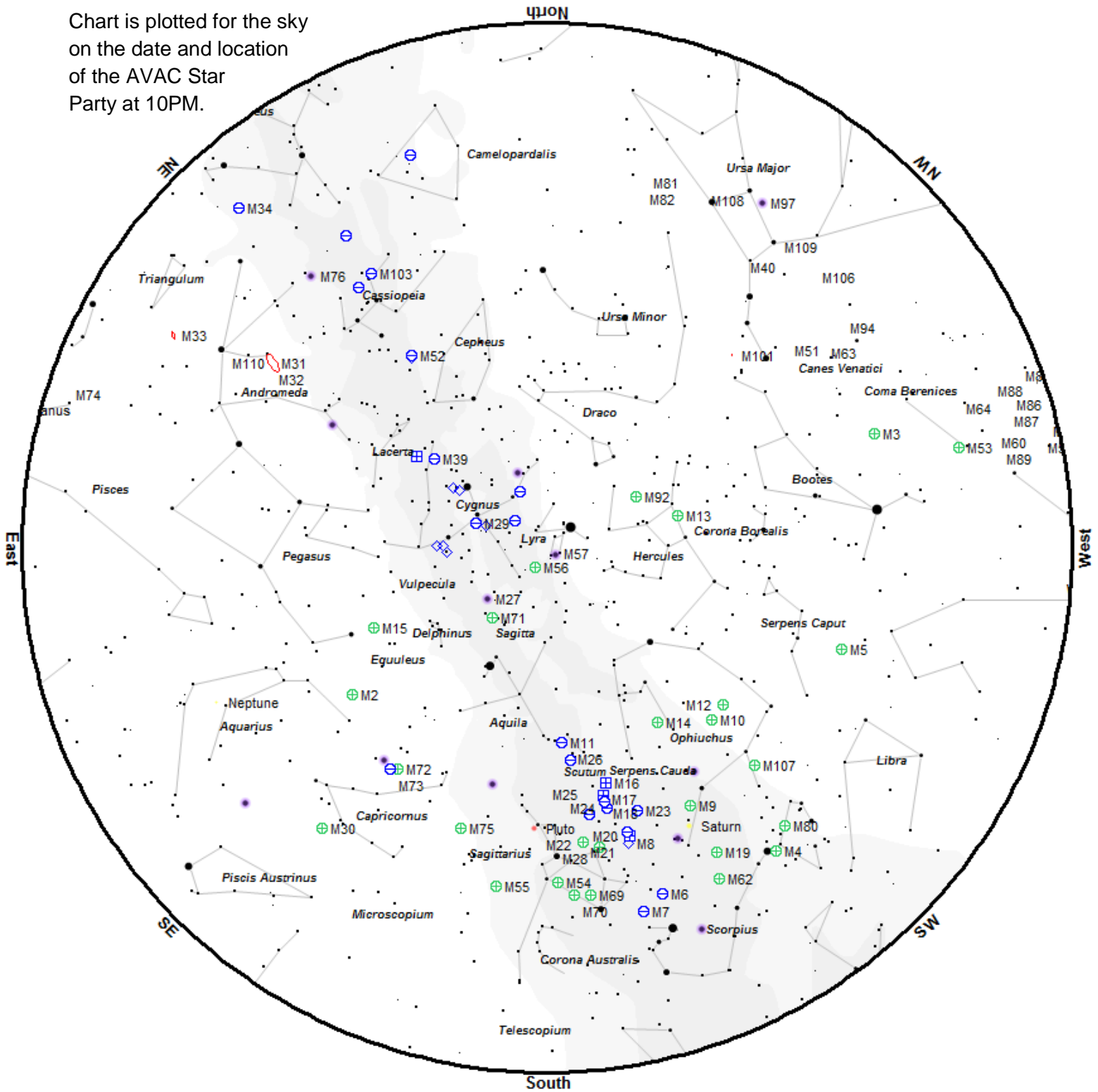
	Aug 1			
	Rise	Transit	Set	Mag
Mercury	08:11	14:40	21:08	0.6
Venus	03:02	10:16	17:29	-4.0
Mars	05:46	12:51	19:56	1.7
Jupiter	11:18	17:13	23:05	-1.9
Saturn	16:28	21:31	02:35	0.3

	Aug 15			
	Rise	Transit	Set	Mag
Mercury	07:37	13:58	20:14	1.8
Venus	03:19	10:31	17:42	-4.0
Mars	05:35	12:33	19:29	1.8
Jupiter	10:33	16:26	22:15	-1.8
Saturn	15:31	20:35	01:38	0.4

	Aug 31			
	Rise	Transit	Set	Mag
Mercury	05:37	12:14	18:45	2.9
Venus	03:46	10:48	17:50	-4.0
Mars	05:22	12:09	18:56	1.8
Jupiter	09:44	15:33	21:19	-1.8
Saturn	14:28	19:32	00:35	0.4

Planet, Sun, and Moon data calculated for local time at Lancaster, CA

Chart is plotted for the sky on the date and location of the AVAC Star Party at 10PM.



<p>Star Magnitudes</p> <p>● ● ● ● ● ●</p> <p>0 1 2 3 4 5</p>	<p>○ Galaxy</p> <p>⊕ Open Cluster</p> <p>⊕ Globular Cluster</p> <p>⊕ Cluster+Nebosity</p>	<p>◇ Nebula</p> <p>◇ Bright Nebula</p> <p>◇ Planetary Nebula</p>
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To use the chart, go outside within an hour or so of the time listed and hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge.

Suggested Observing List

The list below contains objects that will be visible on the night of August 19, 2017. The list is sorted by the best time to observe the object. The difficulty column describes how difficult it is to observe the object from the current location on a perfect night in a 6 inch Newtonian telescope.

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 83	Gal	Hya	13h37m00.8s	-29°51'56"	7.8	21:12	21:19	21:27	detectable
NGC 6167	Open	Nor	16h34m34.0s	-49°46'18"	6.6	21:04	21:23	22:02	challenging
NGC 6193	Open	Ara	16h41m20.0s	-48°45'48"	5.4	21:13	21:27	21:52	difficult
NGC 5986	Glob	Lup	15h46m03.0s	-37°47'12"	7.6	21:17	21:29	21:53	difficult
NGC 6178	Open	Sco	16h35m47.0s	-45°38'36"	7.2	21:10	21:30	22:10	detectable
NGC 6124	Open	Sco	16h25m20.0s	-40°39'12"	6.3	21:08	21:32	22:40	challenging
NGC 5897	Glob	Lib	15h17m24.0s	-21°00'36"	8.4	21:20	21:34	22:01	challenging
NGC 4565	Gal	Com	12h36m20.8s	+25°59'15"	10.1	21:23	21:35	21:45	difficult
M 64	Gal	Com	12h56m43.8s	+21°41'00"	9.3	21:18	21:36	21:55	detectable
M 106	Gal	CVn	12h18m57.6s	+47°18'13"	9.1	21:21	21:38	22:13	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	21:19	21:39	23:36	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	21:19	21:39	23:23	detectable
M 94	Gal	CVn	12h50m53.1s	+41°07'12"	8.7	21:17	21:39	22:32	detectable
M 3	Glob	CVn	13h42m11.0s	+28°22'42"	6.3	21:17	21:39	22:57	easy
M 80	Glob	Sco	16h17m02.0s	-22°58'30"	7.3	21:15	21:39	21:57	detectable
M 5	Glob	Ser	15h18m34.0s	+02°05'00"	5.7	21:15	21:40	23:24	easy
NGC 5195	Gal	CVn	13h29m59.6s	+47°15'58"	10.5	21:21	21:41	23:19	detectable
M 51	Gal	CVn	13h29m52.3s	+47°11'40"	8.7	21:17	21:41	23:25	easy
M 101	Gal	UMa	14h03m12.4s	+54°20'53"	8.4	21:21	21:42	23:49	detectable
M 62	Glob	Oph	17h01m13.0s	-30°06'48"	6.4	21:15	21:44	23:41	detectable
M 19	Glob	Oph	17h02m38.0s	-26°16'06"	6.8	21:17	21:44	23:45	detectable
NGC 6322	Open	Sco	17h18m25.0s	-42°56'00"	6.5	21:11	21:47	23:22	easy
NGC 6388	Glob	Sco	17h36m17.0s	-44°44'06"	6.8	21:26	22:02	22:48	challenging
NGC 6543	PNe	Dra	17h58m33.4s	+66°37'59"	8.3	21:06	23:06	04:42	obvious
M 92	Glob	Her	17h17m07.0s	+43°08'12"	6.5	21:16	23:06	02:27	easy
NGC 6633	Open	Oph	18h27m15.0s	+06°30'30"	5.6	21:14	23:05	02:46	easy
IC 4665	Open	Oph	17h46m18.0s	+05°43'00"	5.3	21:22	23:06	01:12	detectable
M 16	Open	Ser	18h18m48.0s	-13°48'24"	6.5	21:10	23:05	01:16	obvious
M 18	Open	Sgr	18h19m58.0s	-17°06'06"	7.5	21:14	23:06	00:57	easy
M 9	Glob	Oph	17h19m12.0s	-18°31'00"	7.8	21:20	23:05	23:46	difficult
M 23	Open	Sgr	17h57m04.0s	-18°59'06"	5.9	21:18	23:06	00:20	detectable
M 8	Neb	Sgr	18h04m02.0s	-24°23'14"	5.0	21:44	23:06	23:20	easy
M 28	Glob	Sgr	18h24m33.0s	-24°52'12"	6.9	22:18	23:06	23:29	detectable
M 6	Open	Sco	17h40m20.0s	-32°15'12"	4.6	21:12	23:06	00:35	easy
NGC 6383	Open	Sco	17h34m48.0s	-32°34'00"	5.4	21:14	23:06	00:18	easy
M 7	Open	Sco	17h53m51.0s	-34°47'36"	3.3	21:14	23:06	00:23	detectable
NGC 6541	Glob	CrA	18h08m02.0s	-43°42'54"	6.3	21:57	23:06	23:35	challenging
M 13	Glob	Her	16h41m41.0s	+36°27'36"	5.8	21:15	23:06	01:50	easy

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
NGC 6572	PNe	Oph	18h12m06.4s	+06°51'12"	8.0	21:01	23:06	02:31	obvious
M 12	Glob	Oph	16h47m14.0s	-01°56'48"	6.1	21:15	23:06	00:39	easy
M 14	Glob	Oph	17h37m36.0s	-03°14'48"	7.6	21:19	23:07	01:00	detectable
M 10	Glob	Oph	16h57m09.0s	-04°06'00"	6.6	21:17	23:06	00:34	detectable
M 17	Open	Sgr	18h20m47.0s	-16°10'18"	7.3	21:32	23:06	00:54	difficult
M 25	Open	Sgr	18h31m47.0s	-19°07'00"	6.2	21:24	23:06	00:52	detectable
M 21	Open	Sgr	18h04m13.0s	-22°29'24"	7.2	21:18	23:06	23:50	detectable
M 20	Open	Sgr	18h02m42.0s	-22°58'18"	5.2	21:19	23:06	23:43	easy
M 22	Glob	Sgr	18h36m24.0s	-23°54'12"	5.2	22:07	23:06	00:02	detectable
IC 4756	Open	Ser	18h39m00.0s	+05°27'00"	5.4	21:19	23:07	02:27	easy
M 70	Glob	Sgr	18h43m13.0s	-32°17'30"	7.8	21:53	23:11	00:51	detectable
M 11	Open	Sct	18h51m05.0s	-06°16'12"	6.1	21:22	23:19	02:13	detectable
M 57	PNe	Lyr	18h53m35.1s	+33°01'45"	9.4	21:15	23:21	04:02	easy
NGC 6716	Open	Sgr	18h54m34.0s	-19°54'06"	7.5	21:37	23:23	01:08	detectable
M 54	Glob	Sgr	18h55m03.0s	-30°28'42"	7.7	22:26	23:23	00:54	difficult
NGC 6723	Glob	Sgr	18h59m33.0s	-36°37'54"	6.8	22:21	23:27	00:54	detectable
M 56	Glob	Lyr	19h16m36.0s	+30°11'06"	8.4	21:28	23:44	03:09	detectable
M 55	Glob	Sgr	19h40m00.0s	-30°57'42"	6.3	22:44	00:08	01:58	detectable
NGC 6818	PNe	Sgr	19h43m57.8s	-14°09'12"	10.0	21:44	00:12	02:39	easy
M 71	Glob	Sge	19h53m46.0s	+18°46'42"	8.4	21:22	00:21	04:15	easy
M 27	PNe	Vul	19h59m36.3s	+22°43'16"	7.3	21:23	00:27	04:23	easy
NGC 6871	Open	Cyg	20h05m59.0s	+35°46'36"	5.8	21:23	00:33	04:30	easy
NGC 6910	Open	Cyg	20h23m12.0s	+40°46'42"	7.3	21:23	00:50	04:35	easy
M 29	Open	Cyg	20h23m57.0s	+38°30'30"	7.5	21:24	00:51	04:34	easy
NGC 7009	PNe	Aqr	21h04m10.9s	-11°21'48"	8.3	22:48	01:32	04:16	obvious
M 15	Glob	Peg	21h29m58.0s	+12°10'00"	6.3	22:51	01:58	04:36	easy
M 39	Open	Cyg	21h31m48.0s	+48°26'00"	5.3	21:32	01:59	04:39	easy
M 2	Glob	Aqr	21h33m27.0s	-00°49'24"	6.6	23:05	02:01	04:35	detectable
IC 1396	Neb	Cep	21h39m06.0s	+57°30'00"		21:46	02:06	04:36	challenging
NGC 7160	Open	Cep	21h53m40.0s	+62°36'12"	6.4	21:18	02:21	04:44	obvious
IC 5146	Neb	Cyg	21h53m24.0s	+47°16'00"	10.0	21:57	02:21	04:39	challenging
NGC 7243	Open	Lac	22h15m08.0s	+49°53'54"	6.7	23:06	02:42	04:36	detectable
M 52	Open	Cas	23h24m48.0s	+61°35'36"	8.2	23:50	03:46	04:33	detectable
NGC 7790	Open	Cas	23h58m24.0s	+61°12'30"	7.2	22:32	03:58	04:44	easy
NGC 7789	Open	Cas	23h57m24.0s	+56°42'30"	7.5	00:31	03:58	04:35	detectable

A.V.A.C. Information

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...

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

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P.O. BOX 8545,
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Visit the Antelope Valley Astronomy Club website at www.avastronomyclub.org/

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The A.V.A.C. is a Sustaining Member of The Astronomical League and the International Dark-Sky Association.

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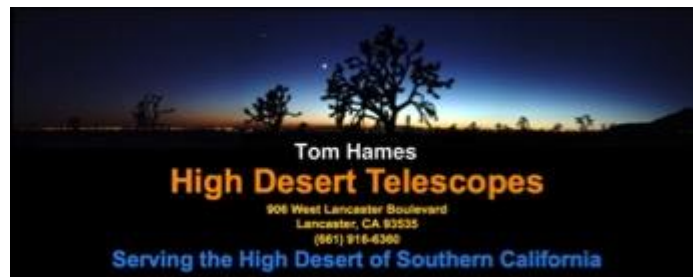


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