



# Desert Sky Observer

Volume 34

Antelope Valley Astronomy Club Newsletter

May 2014

## Up-Coming Events

- May 2: [Public Night at the SAGE](#)
- May 3: [Devil's Punchbowl Telescope Night](#)
- May 7: [Board Meeting](#)
- May 9: Club Meeting\*
- May 24-26: RTMC
- May 30: Chuchupate Star Party

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



## President Frank Moore

Greetings AVAC members.

As I write, Rose and I have just gotten home, and are trying to wind down, after our biggest public outreach event of the year, the California Poppy Festival. Throughout the two day event, our hardy crew shared views of the Sun, Venus, the Moon, and Jupiter with the crowds at Lancaster City Park.

It was raining hard on Friday when we were loading the cars for the event. Yes, that was cars "plural" as it took both the Flex and the Expedition to haul all of the astronomy equipment, displays, brochures, and other supplies we needed for a two day public outreach event. On my last trip out to the cars at 11:30 Friday night, it started to snow. It snowed throughout the night here in Tehachapi, we had to use the ice scrapers to clear the cars before we could leave, and baave road closures on our way to the Poppy Festival.

We had scattered clouds and high winds throughout event on Saturday but still got to share our passion for astronomy with thousands of people. By 5:00 PM, however, the wind and blowing dust got so intense that we had to give up, take the telescopes down, and store them in the club's trailer.

The weather was markedly improved on Sunday though we still have to contend with some scattered clouds, gusty winds, and blowing dust. For the most part, the clouds were thin enough that we could still share views of the sun through white light filters as well as show the public detailed sun features like prominences through the club's Coronado hydrogen-alpha scope. By late afternoon it cleared off entirely and Jupiter looked great in the East with some banding visible even in the daylight hours.

We had a wonderful prize for our Telescope Drawing, an Orion StarBlast 6i, as donated by our generous sponsor Farah Payan at Woodland Hills Camera and Telescope. Please patronize them for your astronomy needs and make sure to thank them for their generous, and long standing, support of the Antelope Valley Astronomy Club. They have a very extensive online shopping store at <http://www.telescopes.net>.

I want to thank AVAC members Don Bryden, Darrell Bennett, Bob Kemp, Pam and Bill Grove, Judy Fuentes, Bill Schebeck, Bob Ayres, Ann Coleal, and Robert Lynch for their help with the booth and telescopes throughout the Poppy Festival. We couldn't have done it without you.

I'll just make a brief mention of a few upcoming events. We have the College of Canyons Star Party on Friday May 2nd, an outreach event at Discovery School and STEM Academy in Lancaster, a Prime Desert Woodland moonwalk on May 17th, and of course there's the Riverside Telescope Makers Conference (RTMC) and the Starlight Festival at Big Bear throughout Memorial Day weekend. Check the club calendar on the website or facebook for details on these events. A late addition is a Telescope Clinic and Star Party at Tehachapi High School the night of Friday May 23. Though this is not an official AVAC event, Rose and I will be participating and we would certainly appreciate help from any AVAC members who might be able to come out with telescopes. Contact us directly for details.

Remember, "Lights down, means stars up."



## Vice President

### Rose Moore

For those not aware, our Summer Picnic will be held at Brite Lake, Tehachapi, again this year on Saturday August 23rd, from about 4pm to 8am the following morning. We will be starting a list for the potluck come June's meeting. We have our usual site reserved. So plan on attending, and plan on some nice stargazing after the Star-b-que!

Also, our Christmas Party venue is also booked for Saturday, December 6th at 6pm at Julianni's in Lancaster. This will be a buffet, along with the rest of our activities for the party! Signups begin in the fall, so stay tuned!

Coming up for our speaker this month is Chris Estrada, from the Telescope Alt-Az Initiative. He will be speaking on double star research he has done at the 60 inch at Mt. Wilson. He and his father, Reed Estrada, do outreach with student research on double star astrometry. This meeting is for Friday, May 9th. Come out to the meeting and enjoy the presentation! As always, any speaker donations will be taken by our club Treasurer, Virginia, before the meeting or after the presentation.

Our June meeting will have Jeff LaGrange from Goldstone speaking on Radio Astronomy and Radar Imaging. And July's meeting will have Diana Darus from JPL!

We need your participation! Please come on out to a meeting, or public outreach, and support your club! We promise you'll enjoy your time with fellow members and the public!



## Director of Community Development

### Don Bryden

May is upon us and you all know what that means: Playoff Hockey! No, wait I meant to say, the warmer weather will mean more folks out and about at our star parties and moon walks. And we have quite a few options this May for public outreach. First, we'll be out at the Canyon Country campus of College of the Canyons on May 2nd for their

telescope night. There will be a nice light buffet available and a guest speaker while we set up on the lawn for a nice evening of stargazing. If you can't make it down there then come out to the SAGE and join Jeremy for another "First Friday" public night planetarium show and star party.

On Saturday, May 17th we have our next Moonwalk at Prime Desert Woodlands. The warmer weather should bring out a big crowd so come out and set up your scope! The days leading up to Memorial Day, many of us will be heading up to Big Bear for RTMC and the First Annual Starlight Festival. It'll be a few days and nights of star parties, guest speakers, raffles and cool deals from lots of vendors and manufacturers from May 21st through the 25th.

If you don't want to travel during Memorial weekend then come out to Chuchupate in Lockwood Valley for a nice dark sky star party with the Local Group and other astronomy clubs. We'll be there Friday, the 30th of May so come on up and check it out!

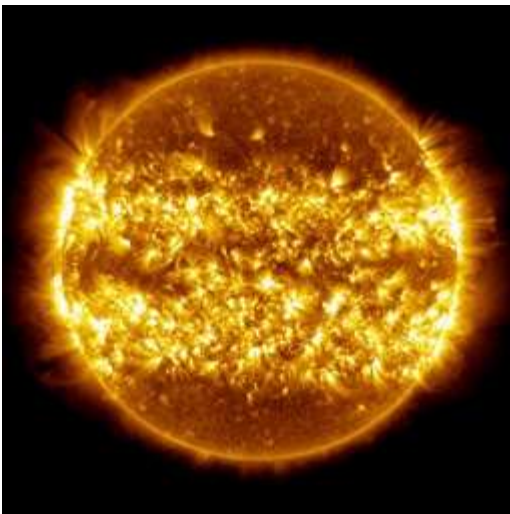
A few things to look for this month: Jupiter will be lower in the west but still shining brightly. High overhead you can find Mars lingering in Virgo just trailing Leo the Lion and Saturn will be up by 9:30pm for a nice triple treat. The approaching summer also means a welcome back to Scorpius, Ophiuchus and Sagittarius and all those nice globular clusters!

On more treat, in the early hours of Saturday, May 24th, there may be a very nice meteor storm or shower – not a yearly, well-known shower like Perseids or Geminids but a new one that may occur thanks to debris left over from comet P/209 LINEAR. We won't even pass through this debris stream for years after this but due to the type and size of debris that is being associated with the comet, there could be a very high rate and/or several large fireballs to see.

## Space Place

### The Power of the Sun's Engines

By Dr. Ethan Siegel



*Composite of 25 images of the sun, showing solar outburst/activity over a 365 day period; NASA/Solar Dynamics Observatory/Atmospheric Imaging Assembly / S. Wiessinger; post-processing by E. Siegel.*

Here on Earth, the sun provides us with the vast majority of our energy, striking the top of the atmosphere with up to 1,000 Watts of power per square meter, albeit highly dependent on the sunlight's angle-of-incidence. But remember that the sun is a whopping 150 million kilometers away, and sends an equal amount of radiation in all directions; the Earth-facing direction is nothing special. Even considering sunspots, solar flares, and long-and-short term variations in solar irradiance, the sun's energy output is always constant to about one-part-in-1,000. All told, our parent star consistently outputs an estimated  $4 \times 10^{26}$  Watts of power; one second of the sun's emissions could power all the world's energy needs for over 700,000 years.

That's a literally astronomical amount of energy, and it comes about thanks to the hugeness of the sun. With a radius of 700,000 kilometers, it would take 109 Earths, lined up from end-to-end, just to go across the diameter of the sun once. Unlike our Earth, however, the sun is made up of around 70% hydrogen by mass, and it's the individual protons — or the nuclei of hydrogen atoms — that fuse together, eventually becoming helium-4 and

releasing a tremendous amount of energy. All told, for every four protons that wind up becoming helium-4, a tiny bit of mass — just 0.7% of the original amount — gets converted into energy by  $E=mc^2$ , and that's where the sun's power originates.

You'd be correct in thinking that fusing  $\sim 4 \times 10^{38}$  protons-per-second gives off a tremendous amount of energy, but remember that nuclear fusion occurs in a huge region of the sun: about the innermost quarter (in radius) is where 99% of it is actively taking place. So there might be  $4 \times 10^{26}$  Watts of power put out, but that's spread out over  $2.2 \times 10^{25}$  cubic meters, meaning the sun's energy output per-unit-volume is just 18 W / m<sup>3</sup>. Compare this to the average human being, whose basal metabolic rate is equivalent to around 100 Watts, yet takes up just 0.06 cubic meters of space. In other words, you emit 100 times as much energy-per-unit-volume as the sun! It's only because the sun is so large and massive that its power is so great.

It's this slow process, releasing huge amounts of energy per reaction over an incredibly large volume, that has powered life on our world throughout its entire history. It may not appear so impressive if you look at just a tiny region, but — at least for our sun — that huge size really adds up!

Check out these “10 Need-to-Know Things About the Sun”:  
<http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun>.

Kids can learn more about an intriguing solar mystery at NASA's Space Place:  
<http://spaceplace.nasa.gov/sun-corona>.

## Astrophoto of The Month



A composite from the April 15<sup>th</sup>, 2014 lunar eclipse from end of totality to end of umbral contact, using a Nikon D300 through a Stellarvue f/6.3 refractor at prime focus. By Don Bryden

## News Headlines

### **First discovery of an Earth-sized planet in the habitable zone**

For the first time, an Earth-sized planet has been found in the habitable zone of its star. This discovery not only proves the existence of worlds that might be similar to our own, but also will undoubtedly shape future investigations of exoplanets that could have terrestrial surface environments. The new-found body, orbiting the red dwarf star Kepler-186 and designated Kepler-186f, is the fifth — and outermost — world to be discovered in this system.

<http://www.astronomy.com/news/2014/04/first-discovery-of-an-earth-sized-planet-in-the-habitable-zone>

### **NASA's Spitzer and WISE Telescopes Find Close, Cold Neighbor of Sun**

NASA's Wide-field Infrared Survey Explorer (WISE) and Spitzer Space Telescope have discovered what appears to be the coldest "brown dwarf" known -- a dim, star-like body that surprisingly is as frosty as Earth's North Pole. Images from the space telescopes also pinpointed the object's distance to 7.2 light-years away, earning it the title for fourth closest system to our sun. The closest system, a trio of stars, is Alpha Centauri, at about 4 light-years away.

<http://www.nasa.gov/jpl/wise/spitzer-coldest-brown-dwarf-20140425>

### **NASA's Hubble extends stellar tape measure 10 times farther into space**

Astronomers now can precisely measure the distance of stars up to 10,000 light-years away -- 10 times farther than previously possible. Astronomers have developed yet another novel way to use the 24-year-old space telescope by employing a technique called spatial scanning, which dramatically improves Hubble's accuracy for making angular measurements. The technique, when applied to the age-old method for gauging distances called astronomical parallax, extends Hubble's tape measure 10 times farther into space.

<http://www.sciencedaily.com/releases/2014/04/140411091943.htm>

### **Asteroids as Seen From Mars; A Curiosity Rover First**

A new image from NASA's Curiosity Mars rover is the first ever from the surface of Mars to show an asteroid, and it shows two: Ceres and Vesta. These two -- the largest and third-largest bodies in the asteroid belt between Mars and Jupiter -- are the destinations of NASA's Dawn mission. Dawn orbited Vesta in 2011 and 2012, and is on its way to begin orbiting Ceres next year. Ceres is a dwarf planet, as well as an asteroid.

<http://www.nasa.gov/jpl/msl/mars-20140424/>

### **Mystery Solved! Super-Bright Supernova Was Magnified by Cosmic Lens**

An incredibly bright supernova spotted in 2010 has been the subject of a stellar mystery until now. A new study shows that the superluminous supernova, called PS1-10afx, was not a new kind of super-radiant stellar explosion, as some scientists thought. Rather, it was the light from a well-studied type of star explosion that just happened to be magnified 30 times by a well-placed cosmic lens.

<http://www.space.com/25617-bright-supernova-mystery-cosmic-lens.html>

### **Solved: Mysteries of a Nearby Planetary System's Dynamics**

Mysteries of one of the most fascinating nearby planetary systems now have been solved, report authors of a scientific paper to be published by the journal Monthly Notices of the Royal Astronomical Society in its early online edition on 22 April 2014.

[http://www.spacedaily.com/reports/Solved\\_Mysteries\\_of\\_a\\_Nearby\\_Planetary\\_Systems\\_Dynamics\\_999.html](http://www.spacedaily.com/reports/Solved_Mysteries_of_a_Nearby_Planetary_Systems_Dynamics_999.html)

## May Sky Data

**Best time for deep sky observing this month:  
May 17 through May 31**

**Mercury**, has its highest apparition in the evening sky this year. As May begins it is very low above the horizon in the western sky in the twilight but, each evening that follows, will appear a little higher in the sky. May the 16th to 28th is the best time to observe it when it will be ~15 degrees above the north-western horizon at sunset.

**Venus**, shining at magnitude ~-4.0 during the month, lies in the southern part of Pisces and will be seen ~12 degrees above the eastern horizon half an hour before sunrise.

Following its opposition last month, **Mars** is now receding rapidly and so will dim from magnitude -1.2 to -0.5 during the month. As it does so, its angular size will shrink from 14.5 down to 11.8 arc seconds so its best to observe it early in the month if the weather allows.

As May begins, **Jupiter** is still at an elevation of 45 degrees in the western sky an hour after sunset and sets about 1 am. It is, however, now past its best and fading from -2.0 to -1.9 during the month while its angular diameter shrinks from 35 to 33 arc seconds. By month's end it will be only ~20 degrees above the horizon after sunset and sets around 11 pm.

**Saturn** comes to opposition on May 10th when it rises just before sunset and sets just after sunrise. Lying in Libra, it is shining with a magnitude of +0.1. The rings have now opened to around 22 degrees from the line of sight so presenting a magnificent view.

The Eta Aquarids **meteor shower** is expected to peak on May 6. The waxing crescent Moon will create ideal conditions for viewing the shower. The best time to view the Eta Aquarids is in the early mornings, right before dawn.

First Qtr May 6      Full May 14      Last Qtr May 21      New May 28



## Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
5/1/2014	08:51	23:05	06:57	20:32
5/5/2014	12:16	01:22	06:54	20:35
5/10/2014	16:49	04:13	06:49	20:39
5/15/2014	21:54	07:35	06:45	20:42
5/20/2014	01:25	12:46	06:42	20:46
5/25/2014	04:38	18:02	06:39	20:50
5/31/2014	09:14	23:18	06:37	20:53

## Planet Data

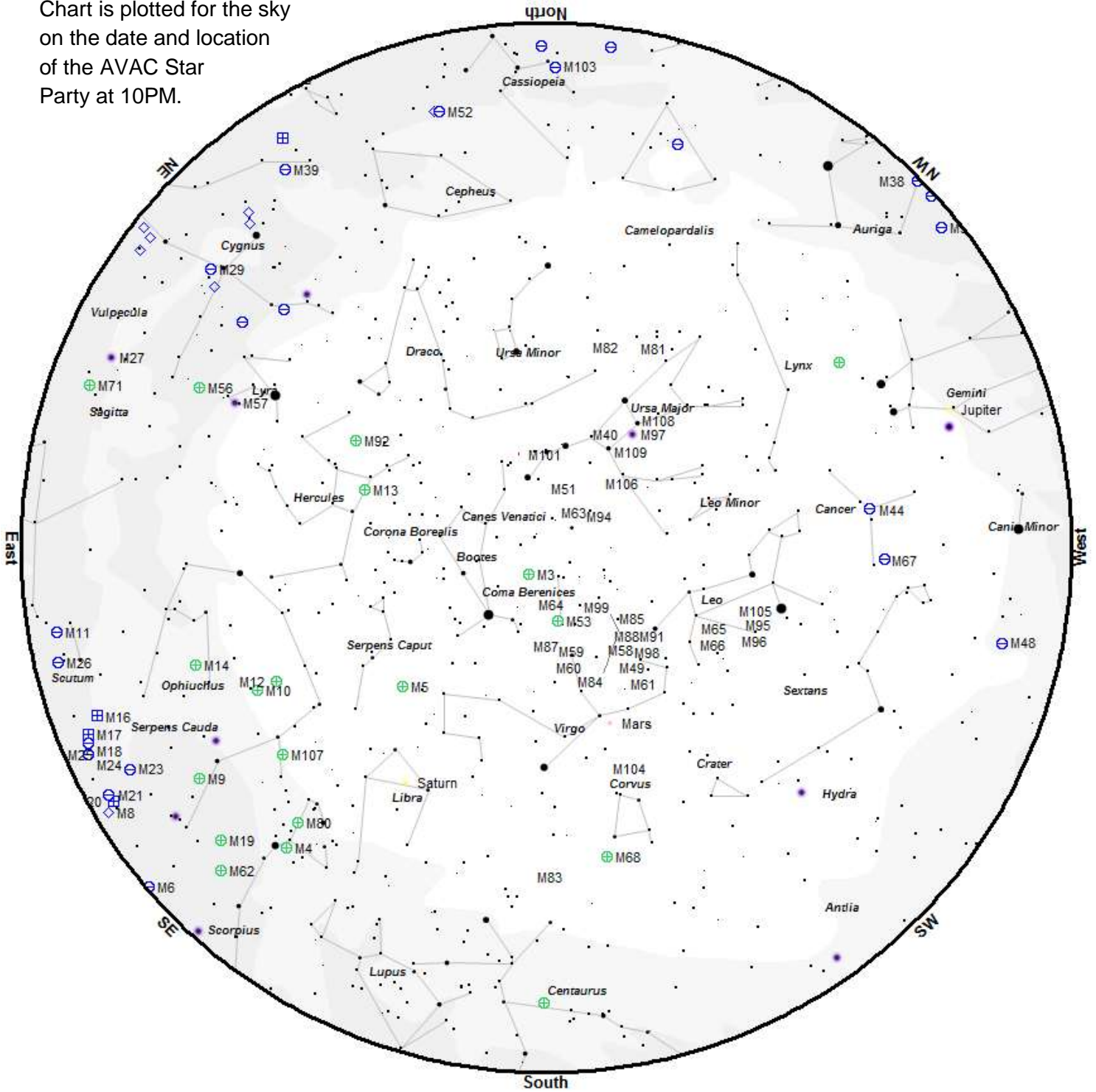
	May 1			
	Rise	Transit	Set	Mag
<b>Mercury</b>	06:16	13:14	20:16	-1.7
<b>Venus</b>	04:06	10:10	16:13	-4.1
<b>Mars</b>	16:56	22:54	04:53	-1.1
<b>Jupiter</b>	09:58	17:18	00:34	-2.1
<b>Saturn</b>	20:03	01:26	06:49	0.1

	May 15			
	Rise	Transit	Set	Mag
<b>Mercury</b>	06:47	14:10	21:35	-0.4
<b>Venus</b>	03:54	10:14	16:34	-4.0
<b>Mars</b>	15:52	21:51	03:50	-0.8
<b>Jupiter</b>	09:14	16:32	23:48	-2.0
<b>Saturn</b>	19:03	00:27	05:51	0.1

	May 31			
	Rise	Transit	Set	Mag
<b>Mercury</b>	06:57	14:21	21:43	1.3
<b>Venus</b>	03:43	10:22	17:00	-4.0
<b>Mars</b>	14:53	20:50	02:47	-0.5
<b>Jupiter</b>	08:25	15:42	22:56	-1.9
<b>Saturn</b>	17:55	23:19	04:44	0.2

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.



Star Magnitudes						Galaxy	Nebula
●	●	●	●	●	●	⊕ Open Cluster	◇ Bright Nebula
0	1	2	3	4	5	⊕ Globular Cluster	◇ Planetary Nebula
						⊕ Cluster+Nebulosity	

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 the AVAC Star Party, this month that's RTMC. 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
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	20:59	21:14	21:31	easy
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	20:59	21:14	21:31	easy
NGC 3242	PNe	Hya	10h24m46.1s	-18°38'32"	8.6	21:01	21:28	22:57	obvious
M 67	Open	Cnc	08h51m18.0s	+11°48'00"	7.4	21:18	21:32	21:35	detectable
M 44	Open	Cnc	08h40m24.0s	+19°40'00"	3.9	21:11	21:32	21:44	easy
NGC 3227	Gal	Leo	10h23m30.6s	+19°51'54"	11.5	21:15	21:37	22:54	detectable
M 65	Gal	Leo	11h18m55.7s	+13°05'32"	10.1	21:12	21:39	23:45	detectable
M 66	Gal	Leo	11h20m14.9s	+12°59'30"	9.7	21:12	21:39	23:47	detectable
M 68	Glob	Hya	12h39m28.0s	-26°44'36"	7.3	21:11	21:42	23:35	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	21:12	21:43	00:56	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	21:13	21:44	00:54	detectable
M 97	PNe	UMa	11h14m47.7s	+55°01'09"	9.7	21:13	21:44	00:47	detectable
M 86	Gal	Vir	12h26m12.2s	+12°56'44"	9.8	21:12	21:45	00:18	detectable
M 84	Gal	Vir	12h25m03.9s	+12°53'12"	10.1	21:12	21:45	00:33	detectable
M 104	Gal	Vir	12h39m59.3s	-11°37'22"	9.1	21:10	21:45	00:01	detectable
M 49	Gal	Vir	12h29m46.8s	+08°00'01"	9.3	21:11	21:45	00:35	detectable
M 87	Gal	Vir	12h30m49.2s	+12°23'29"	9.6	21:11	21:46	00:39	detectable
Col. 256	Open	Com	12h25m06.0s	+26°06'00"	2.9	21:08	21:46	01:36	easy
NGC 4565	Gal	Com	12h36m20.8s	+25°59'15"	10.1	21:12	21:47	00:42	detectable
M 106	Gal	CVn	12h18m57.6s	+47°18'13"	9.1	21:13	21:48	01:15	detectable
M 64	Gal	Com	12h56m43.8s	+21°41'00"	9.3	21:09	21:52	01:30	detectable
M 94	Gal	CVn	12h50m53.1s	+41°07'12"	8.7	21:08	21:52	02:08	easy
NGC 5128	Gal	Cen	13h25m27.7s	-43°01'07"	7.8	21:24	22:03	22:54	challenging
NGC 5139	Glob	Cen	13h26m46.0s	-47°28'36"	3.9	21:20	22:04	22:57	difficult
M 51	Gal	CVn	13h29m52.3s	+47°11'40"	8.7	21:10	22:09	03:03	easy
NGC 5195	Gal	CVn	13h29m59.6s	+47°15'58"	10.5	21:13	22:10	02:22	detectable
M 83	Gal	Hya	13h37m00.8s	-29°51'56"	7.8	21:10	22:14	00:32	detectable
M 3	Glob	CVn	13h42m11.0s	+28°22'42"	6.3	21:10	22:20	02:38	easy
M 101	Gal	UMa	14h03m12.4s	+54°20'53"	8.4	21:15	22:40	02:58	detectable
NGC 5460	Open	Cen	14h07m27.0s	-48°20'36"	6.1	21:31	22:45	23:59	challenging
NGC 5822	Open	Lup	15h04m21.0s	-54°23'48"	6.5	23:03	23:41	00:18	not visible
NGC 5897	Glob	Lib	15h17m24.0s	-21°00'36"	8.4	22:15	23:54	01:34	difficult
M 5	Glob	Ser	15h18m34.0s	+02°05'00"	5.7	21:13	23:55	03:30	easy
NGC 5986	Glob	Lup	15h46m03.0s	-37°47'12"	7.6	22:50	00:23	01:55	difficult
NGC 6067	Open	Nor	16h13m11.0s	-54°13'06"	6.5	00:11	00:50	01:28	not visible
M 80	Glob	Sco	16h17m02.0s	-22°58'30"	7.3	23:36	00:53	02:11	detectable
NGC 6124	Open	Sco	16h25m20.0s	-40°39'12"	6.3	23:59	01:02	02:05	challenging



ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
NGC 6167	Open	Nor	16h34m34.0s	-49°46'18"	6.6	00:22	01:12	02:01	detectable
NGC 6178	Open	Sco	16h35m47.0s	-45°38'36"	7.2	23:51	01:12	02:36	detectable
NGC 6193	Open	Ara	16h41m20.0s	-48°45'48"	5.4	00:19	01:18	02:17	detectable
M 13	Glob	Her	16h41m41.0s	+36°27'36"	5.8	21:17	01:18	04:16	easy
M 12	Glob	Oph	16h47m14.0s	-01°56'48"	6.1	22:00	01:24	04:13	easy
M 10	Glob	Oph	16h57m09.0s	-04°06'00"	6.6	22:27	01:34	04:09	detectable
M 62	Glob	Oph	17h01m13.0s	-30°06'48"	6.4	23:24	01:38	03:48	detectable
M 19	Glob	Oph	17h02m38.0s	-26°16'06"	6.8	23:25	01:39	03:48	detectable
NGC 6302	PNe	Sco	17h13m44.2s	-37°06'16"	12.8	23:36	01:50	04:00	not visible
M 92	Glob	Her	17h17m07.0s	+43°08'12"	6.5	21:22	01:53	04:16	easy
NGC 6322	Open	Sco	17h18m25.0s	-42°56'00"	6.5	00:05	01:55	03:45	easy
M 9	Glob	Oph	17h19m12.0s	-18°31'00"	7.8	23:55	01:56	03:57	detectable
NGC 6383	Open	Sco	17h34m48.0s	-32°34'00"	5.4	23:48	02:11	04:12	easy
NGC 6388	Glob	Sco	17h36m17.0s	-44°44'06"	6.8	01:03	02:13	03:22	difficult
M 14	Glob	Oph	17h37m36.0s	-03°14'48"	7.6	23:09	02:14	04:13	detectable
M 6	Open	Sco	17h40m20.0s	-32°15'12"	4.6	23:40	02:17	04:18	easy
IC 4665	Open	Oph	17h46m18.0s	+05°43'00"	5.3	23:14	02:23	04:12	detectable
M 7	Open	Sco	17h53m51.0s	-34°47'36"	3.3	00:14	02:30	04:16	easy
M 23	Open	Sgr	17h57m04.0s	-18°59'06"	5.9	00:36	02:33	04:16	detectable
NGC 6543	PNe	Dra	17h58m33.4s	+66°37'59"	8.3	21:05	02:34	04:27	obvious
M 20	Open	Sgr	18h02m42.0s	-22°58'18"	5.2	01:21	02:39	03:57	easy
M 21	Open	Sgr	18h04m13.0s	-22°29'24"	7.2	01:17	02:40	04:04	detectable
M 8	Neb	Sgr	18h04m02.0s	-24°23'14"	5.0	01:44	02:41	03:36	easy
NGC 6541	Glob	CrA	18h08m02.0s	-43°42'54"	6.3	01:34	02:44	03:52	detectable
NGC 6572	PNe	Oph	18h12m06.4s	+06°51'12"	8.0	22:55	02:48	04:33	obvious
M 16	Open	Ser	18h18m48.0s	-13°48'24"	6.5	00:23	02:55	04:23	obvious
M 24	Open	Sgr	18h18m26.0s	-18°24'24"	11.1	00:52	02:55	04:20	not visible
M 18	Open	Sgr	18h19m58.0s	-17°06'06"	7.5	00:44	02:56	04:21	easy
M 17	Open	Sgr	18h20m47.0s	-16°10'18"	7.3	00:39	02:57	04:11	difficult
M 28	Glob	Sgr	18h24m33.0s	-24°52'12"	6.9	02:13	03:01	03:49	detectable
NGC 6633	Open	Oph	18h27m15.0s	+06°30'30"	5.6	23:11	03:03	04:21	easy
M 25	Open	Sgr	18h31m47.0s	-19°07'00"	6.2	01:12	03:07	04:16	detectable
M 22	Glob	Sgr	18h36m24.0s	-23°54'12"	5.2	02:08	03:12	04:17	detectable
IC 4756	Open	Ser	18h39m00.0s	+05°27'00"	5.4	23:37	03:14	04:18	easy
M 70	Glob	Sgr	18h43m13.0s	-32°17'30"	7.8	01:22	03:19	04:14	detectable
M 57	PNe	Lyr	18h53m35.1s	+33°01'45"	9.4	22:35	03:22	04:22	easy
M 11	Open	Sct	18h51m05.0s	-06°16'12"	6.1	00:20	03:24	04:16	detectable
NGC 6716	Open	Sgr	18h54m34.0s	-19°54'06"	7.5	01:40	03:28	04:18	detectable
NGC 7160	Open	Cep	21h53m40.0s	+62°36'12"	6.4	00:29	03:30	04:22	obvious
NGC 6871	Open	Cyg	20h05m59.0s	+35°46'36"	5.8	23:59	03:30	04:19	easy
NGC 6910	Open	Cyg	20h23m12.0s	+40°46'42"	7.3	23:57	03:30	04:20	easy
M 56	Glob	Lyr	19h16m36.0s	+30°11'06"	8.4	00:12	03:30	04:16	detectable
M 29	Open	Cyg	20h23m57.0s	+38°30'30"	7.5	00:09	03:30	04:18	easy

## 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.

### AVAC

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Visit the Antelope Valley Astronomy Club website at [www.avastronomyclub.org/](http://www.avastronomyclub.org/)

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