



Desert Sky Observer

Volume 35

Antelope Valley Astronomy Club Newsletter

December 2015

Up-Coming Events

December 5: [AVAC Club Christmas Party](#)

December 9: [Board Meeting](#)

December 12: [Prime Desert MoonWalk](#)

* 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

With a shout out to Irving Berlin. Sing along if you're old enough to know the tune.

Happy Holidays, Happy Holidays
While the merry bells keep ringing
May your every wish come true.

Happy Holiday, Happy Holiday
May the calendar keep bringing
Happy Holidays (and AVAC events) to you.

As the new year approaches, and the cold weather moves in, we slow down a bit as far outdoor events and star parties go, but rest assured your Executive Board is busy working on events for the coming year.

As is our custom, we don't have a meeting planned for the SAGE Planetarium, or a star party, scheduled in December since we will be having our annual Christmas Party and dinner instead. By now, you all should have received several notices in regard to our change of venue and arrangements for reserving your spot. Reiterating, our Christmas event will be held at the Embassy Suites – Palmdale, on Saturday December 5, since the previously reserved venue has gone out of business. There's still a few days remaining to make your reservations as Rose has noted later in this newsletter.

For those who missed it, on Saturday November 7 there was a Trident III missile launch from the submarine USS Kentucky, positioned off Point Mugu, that was visible from Southern California and much of the western United States. Those of us who were at our November 7 Dark Sky Star Party at Red Cliffs (Red Rock Canyon State Park) had the rare treat of observing this from truly dark skies. The luminous cloud left in the missile's wake was gorgeous from our dark sky site and we were also able to track the vehicle itself through binoculars. It made an already beautiful night of observing even more special. Come on out to the star parties....you never know what you might see.

The last Prime Desert Woodland Moonwalk of 2015 will be held on Saturday December 12 at 5:30 PM. Put on your heavy coat and stocking cap (Santa hat if you've got one) and come on out and show the public

the stars in the crisp and hopefully clear December air. The first Moonwalk of 2016 is scheduled for January 30 at 6:00 PM.

Weather permitting, we will be having our first Dark Sky Star Party of 2016 on Saturday January 9. A site is yet to be determined but, also in keeping with past tradition, we will try to have it somewhere a little closer to town, lower in elevation, and WARMER.

Events for 2016 already on the calendar include the Antelope Valley/Los Angeles Regional Science Olympiad at Antelope Valley College on Saturday February 13 and our annual Messier Marathon on Saturday April 2. Though it's still in planning, we are considering having the Messier Marathon at the Chuchupate observing site for the darker skies and wide open horizons. It's a little farther, but the much darker skies will be more conducive to finding those elusive Messier objects.

One last item. As I'm sure some of you are aware, AVAC member Matt Leone was seriously injured when he crashed his motorcycle at the El Mirage Dry Lake Off-Highway Vehicle Recreation Area on Thanksgiving Day. At the time that I'm writing, he is still in Antelope Valley Hospital Medical Center. Matt will probably be out of the hospital by the time of the DSO's publication but you can call Sue Leone or Rose and I for updates on his condition.

Have a Happy Holiday, Merry Christmas, and a Happy New Year.



Vice President

Don Bryden

Winter is nearly upon us! Nice and dark, nice and early but, of course, nice and cold, too. Still, when the skies are clear and steady, the views are superb! This month we'll have a couple of viewing opportunities, too. First, on Saturday the 12th, join Jeremy and the gang for a nice Prime Desert Moonwalk just a day past new moon. That young, crescent moon will play nice the following night during the peak of the Geminids meteor shower. Although the club won't be having an official event, it will be prime viewing conditions for the shower. The best time for northern hemisphere observers will be just after sunset, rather than after midnight, due to the position of our orbit. Unlike most other meteor showers, the Geminids are associated not with a comet but with an asteroid - the 3200 Phaethon. The asteroid takes about 1.4 years to orbit around the Sun.

Here's a seasonal poem of mine dedicated to the astro-imagers among us. With apologies to Clement Clarke Moore:

A Visit from Astro-Nick

'Twas the night before Christmas, when all through the dome,
 Not a creature was stirring, I was observing alone;
 The cables were hung by the camera with care,
 In hopes that the Horsehead soon would be there;
 The eyepieces were nestled all snug in their case,
 While images from CCD's glowed in their place;
 And I in my cap at the computer control station,
 Had just settled down for a long integration;

When out on the lawn there arose such a clatter,
 I sprang from the mount to see what was the matter.
 Away to the dome slit I flew like a flash,
 Tore open the shutters and threw up the sash.

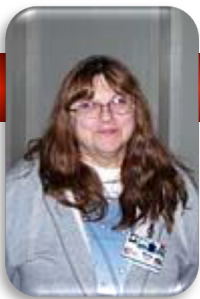
The red L.E.D. of my brand-new flashlight,
 Gave the luster of mid-day to objects in sight,
 When, what to my dark-adapted eyes should appear,
 But a miniature sleigh, and eight tiny reindeer,

With red nose a blazing, they hadn't a clue,
 I knew in a moment that my session was through.
 More rapid than Geminids his coursers they came,
 And he whistled, and shouted, and called them by name:

"Now, Dasher! now, Dancer! now Prancer and Vixen!
 We'll load it in Photoshop and there do some fixin'!
 A click of the mouse and a tweak of the stack
 Soon gave me to know I was but an imaging hack;

He spoke not a word, but went straight to his work,
 And aligned all the images with a magical jerk,
 And laying his finger aside of his head,
 He added H-alpha to beef up the red;

He sprang to his sleigh, to his team gave a whistle,
 And away they all flew like a Vandenberg missile.
 But I heard him exclaim, as he drove out of sight—
 "Happy imaging to all, and to all a dark night!"



Secretary

Rose Moore

For those that have not checked their emails lately, this is a reminder that our Christmas Party is coming up! We will be presenting our yearly AVAC certificates for outreach participation, as well as the Keith Lawson and Holland Fountain Awards.

Our location will be at the Embassy Suites, 39375 - 5th St West, Palmdale, CA 93551. This is the same venue where we've had our party a few years back. The time is from 6 pm to 10 pm. We will be having a silent auction and raffle. We have ordered a buffet meal and the cost is \$25 per member and each guest. Buffet will begin approximately 6:30, to allow us ample time to eat, hand out awards, and handle the auction and silent raffle. The menu is listed in the last club email from Frank on 11/24. Contact me if you haven't received the email!

The Embassy Suites wants to know the head count by Wednesday, Dec. 2nd. So we need to know if you will be attending by the night of Tuesday, Dec. 1st. If you can not pay by then, or have questions, please let Frank or myself know you would like to attend, and you can pay us at the party. But please contact us so that we have your name on the list for the final head count. Our phone number is 661-822-4580. The PayPal link for those that would still like to pay via PayPal is: <http://avastronomyclub.org/christmas.html>

Space Place

Our Solar System Is *Almost* Normal, But Not Quite

by Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.
- All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.
- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!

News Headlines

Mysterious Dark Matter May Not Always Have Been Dark

Dark matter particles may have interacted extensively with normal matter long ago, when the universe was very hot, a new study suggests. The nature of dark matter is currently one of the greatest mysteries in science. The invisible substance — which is detectable via its gravitational influence on "normal" matter — is thought to make up five-sixths of all matter in the universe.

<http://www.space.com/31013-stealth-dark-matter-universe-missing-mass.html>

Loss of Carbon in Martian Atmosphere Explained

Mars is blanketed by a thin, mostly carbon dioxide atmosphere -- one that is far too thin to keep water from freezing or quickly evaporating. However, geological evidence has led scientists to conclude that ancient Mars was once a warmer, wetter place than it is today. To produce a more temperate climate, several researchers have suggested that the planet was once shrouded in a much thicker carbon dioxide atmosphere. For decades that left the question, "Where did all the carbon go?"

<http://www.jpl.nasa.gov/news/news.php?feature=4778>

The BIG NEWS: Strange Star Likely Swarmed by Comets

A star called KIC 8462852 has been in the news recently for unexplained and bizarre behavior. NASA's Kepler mission had monitored the star for four years, observing two unusual incidents, in 2011 and 2013, when the star's light dimmed in dramatic, never-before-seen ways. Something had passed in front of the star and blocked its light, but what?"

<http://www.jpl.nasa.gov/news/news.php?feature=4777>

Scientists get first glimpse of black hole eating star, ejecting high-speed flare

An international team of astrophysicists led by a Johns Hopkins University scientist has for the first time witnessed a star being swallowed by a black hole and ejecting a flare of matter moving at nearly the speed of light. The finding reported Thursday in the journal *Science* tracks the star—about the size of our sun—as it shifts from its customary path, slips into the gravitational pull of a supermassive black hole and is sucked in, said Sjoert van Velzen, a Hubble fellow at Johns Hopkins.

<http://phys.org/news/2015-11-scientists-glimpse-black-hole-star.html#jCp>

Stars: Crash Course Astronomy #26 with Phil Plait

In this video, "The Bad Astronomer" Phil Plait explains the stars and how they can be categorized using their spectra. Together with their distance, this provides a wealth of information about them including their luminosity, size, and temperature. The HR diagram plots stars' luminosity versus temperature, and most stars fall along the main sequence, where they live most of their lives.

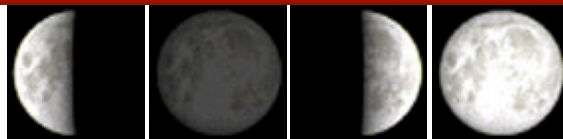
<https://www.youtube.com/watch?v=ld75W1dz-h0>

ASTEROID DAY: A global awareness movement to protect Earth from asteroid impacts

Asteroid Day is a global awareness movement where people from around the world come together to learn about asteroids and what we can do to protect our planet, our families, communities, and future generations. Asteroid Day will be held on the anniversary of the 1908 Siberian Tunguska event, the largest asteroid impact on Earth in recent history.

<http://www.asteroidday.org/>

December Sky Data

Last Qtr
Dec 2New
Dec 11First Qtr
Dec 18Full
Dec 25

Best time for deep sky observing this month:
December 1 through December 14

Mercury may be seen at the end of the month low in the south-western sky as it reaches greatest elongation on the 29th of December when it lies 20 degrees from the Sun. It will be only a few degrees above the horizon at twilight.

Venus is now moving back towards the Sun but, by month's end still rises almost three hours before sunrise. A telescope will show that its angular size reduces from 17.5 to 14.5 arc seconds during December but at the same time the illuminated percentage of the surface increases from ~66% to ~75% which is why the magnitude only drops from -4.2 to -4.1.

Mars rises in the east about 2 hours before the Sun at the start of December and about half an hour earlier as we move towards the new year. It brightens from +1.5 to +1.3 when it be nearly as bright as Spica, in Virgo, when it passes about 4 degrees up and to its left on the mornings of the 23rd and 24th of the month. Mars' angular diameter will have reached just 5 arc seconds by the 10th of the month so it will be hard to spot any details

Jupiter rises at around 00:17 at the beginning of the month lying low down in Leo close to the boundary with Virgo. By month's end it rises about 22:30 and shines at magnitude -2.2. During the month, its angular size increases from 35.6 to 38.9 arc seconds.

Saturn, having passed behind the Sun on the 20th of November, may be seen again around mid December rising an hour before sunrise. It will be shining at magnitude +0.5 and, by the end of the month, be high enough in the south-east before dawn to make out the beautiful ring system which has now opened out to ~25 degrees.

The Geminid **meteor shower** is one of the finest meteor showers. In 2015, the slender waxing crescent moon will set soon after the sun, providing a wonderful cover of darkness for the Geminid meteor shower. Your best bet is to watch on December 13-14 and 14-15, from mid-evening (9 to 10 p.m.) until dawn.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
12/1/2015	22:39	11:16	06:40	16:40
12/5/2015	01:21	13:27	06:43	16:40
12/10/2015	05:53	16:34	06:47	16:40
12/15/2015	10:04	21:18	06:51	16:42
12/20/2015	13:21	01:36	06:54	16:44
12/25/2015	17:31	06:51	06:56	16:46
12/31/2015	23:11	10:56	06:58	16:50

Planet Data

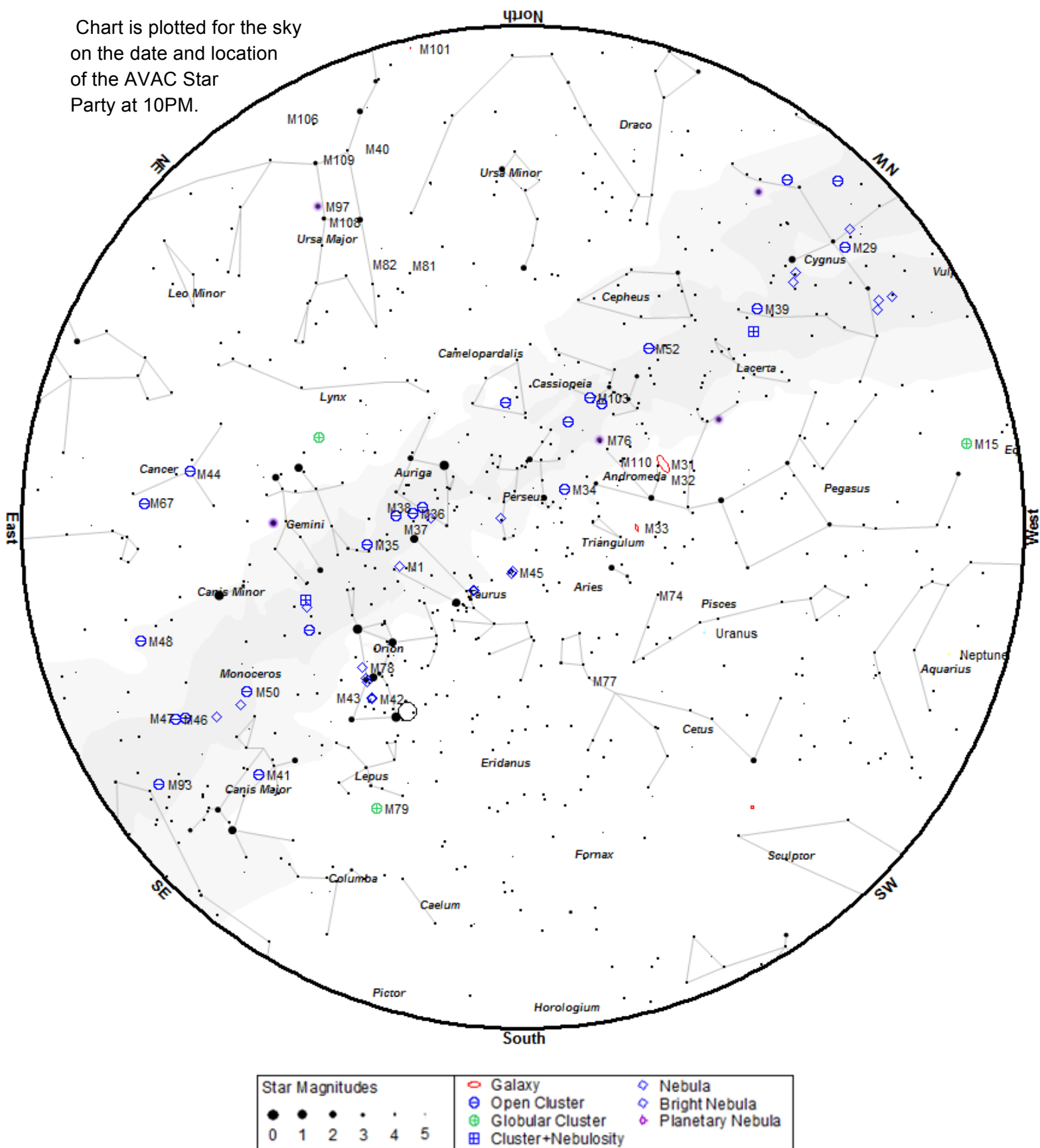
	Dec 1			
	Rise	Transit	Set	Mag
Mercury	07:21	12:14	17:10	-0.8
Venus	03:05	08:50	14:35	-4.2
Mars	01:54	07:52	13:53	1.5
Jupiter	00:17	06:36	12:59	-2.0
Saturn	06:21	11:31	16:44	0.4

	Dec 15			
	Rise	Transit	Set	Mag
Mercury	08:03	12:54	17:47	-0.6
Venus	03:29	08:59	14:28	-4.1
Mars	01:37	07:27	13:19	1.4
Jupiter	23:27	05:46	12:08	-2.1
Saturn	05:34	10:43	15:55	0.5

	Dec 31			
	Rise	Transit	Set	Mag
Mercury	08:09	13:17	18:24	-0.3
Venus	03:59	09:13	14:27	-4.1
Mars	01:17	06:58	12:41	1.3
Jupiter	22:28	04:46	11:03	-2.2
Saturn	04:40	09:48	14:59	0.5

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.



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. 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 57	PNe	Lyr	18h53m35.1s	+33°01'45"	9.4	17:54	18:12	18:17	easy
NGC 6543	PNe	Dra	17h58m33.4s	+66°37'59"	8.3	17:44	18:13	18:41	obvious
M 56	Glob	Lyr	19h16m36.0s	+30°11'06"	8.4	17:59	18:13	18:33	detectable
NGC 7009	PNe	Aqr	21h04m10.9s	-11°21'48"	8.3	17:48	18:13	18:14	obvious
M 30	Glob	Cap	21h40m22.0s	-23°10'42"	6.9	17:56	18:13	19:05	detectable
M 71	Glob	Sge	19h53m46.0s	+18°46'42"	8.4	17:56	18:14	18:45	easy
M 27	PNe	Vul	19h59m36.3s	+22°43'16"	7.3	17:55	18:15	18:59	easy
NGC 6871	Open	Cyg	20h05m59.0s	+35°46'36"	5.8	17:56	18:16	19:35	easy
NGC 6910	Open	Cyg	20h23m12.0s	+40°46'42"	7.3	17:53	18:17	20:03	easy
M 29	Open	Cyg	20h23m57.0s	+38°30'30"	7.5	17:55	18:17	19:59	easy
M 2	Glob	Aqr	21h33m27.0s	-00°49'24"	6.6	17:57	18:17	19:27	detectable
NGC 7293	PNe	Aqr	22h29m38.5s	-20°50'14"	6.3	17:57	18:17	18:34	detectable
M 15	Glob	Peg	21h29m58.0s	+12°10'00"	6.3	17:56	18:17	20:03	easy
NGC 7160	Open	Cep	21h53m40.0s	+62°36'12"	6.4	17:48	18:22	22:23	obvious
NGC 7243	Open	Lac	22h15m08.0s	+49°53'54"	6.7	17:55	18:22	21:16	detectable
M 39	Open	Cyg	21h31m48.0s	+48°26'00"	5.3	17:53	18:22	21:27	easy
IC 5146	Neb	Cyg	21h53m24.0s	+47°16'00"	10.0	17:53	18:22	21:42	challenging
M 52	Open	Cas	23h24m48.0s	+61°35'36"	8.2	17:58	18:27	22:05	detectable
NGC 7789	Open	Cas	23h57m24.0s	+56°42'30"	7.5	17:57	18:33	22:25	detectable
NGC 7790	Open	Cas	23h58m24.0s	+61°12'30"	7.2	17:50	18:34	00:24	easy
NGC 55	Gal	Scl	00h15m08.4s	-39°13'13"	8.5	18:01	18:42	19:50	challenging
M 110	Gal	And	00h40m22.3s	+41°41'09"	8.9	17:56	19:07	22:58	detectable
M 31	Gal	And	00h42m44.3s	+41°16'07"	4.3	17:53	19:09	23:47	easy
M 32	Gal	And	00h42m41.8s	+40°51'58"	8.9	17:53	19:09	23:51	easy
NGC 253	Gal	Scl	00h47m33.1s	-25°17'20"	7.9	18:50	19:13	19:37	detectable
NGC 288	Glob	Scl	00h52m45.0s	-26°35'00"	8.1	18:07	19:19	20:50	challenging
NGC 457	Open	Cas	01h19m35.0s	+58°17'12"	5.1	17:50	19:46	01:37	obvious
NGC 559	Open	Cas	01h29m31.0s	+63°18'24"	7.4	17:51	19:56	02:02	easy
M 103	Open	Cas	01h33m23.0s	+60°39'00"	6.9	17:50	20:00	01:57	obvious
M 33	Gal	Tri	01h33m50.9s	+30°39'36"	6.4	17:56	20:00	23:52	detectable
NGC 637	Open	Cas	01h43m04.0s	+64°02'24"	7.3	17:47	20:09	02:17	obvious
M 76	PNe	Per	01h42m19.9s	+51°34'31"	10.1	17:57	20:09	00:30	detectable
NGC 663	Open	Cas	01h46m09.0s	+61°14'06"	6.4	17:53	20:12	02:11	easy
NGC 752	Open	And	01h57m41.0s	+37°47'06"	6.6	18:14	20:24	22:47	challenging
NGC 869	Open	Per	02h19m00.0s	+57°07'42"	4.3	17:48	20:46	02:33	obvious
NGC 884	Open	Per	02h22m18.0s	+57°08'12"	4.4	17:50	20:49	02:37	obvious
Heart Neb	Neb	Cas	02h33m52.0s	+61°26'50"	6.5	18:14	21:00	23:59	challenging
NGC 957	Open	Per	02h33m21.0s	+57°33'36"	7.2	17:53	21:00	02:37	easy

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 34	Open	Per	02h42m05.0s	+42°45'42"	5.8	17:57	21:08	01:35	easy
M 77	Gal	Cet	02h42m40.8s	-00°00'48"	9.7	18:07	21:08	00:18	detectable
NGC 1027	Open	Cas	02h42m40.0s	+61°35'42"	7.4	17:59	21:09	01:51	detectable
NGC 1245	Open	Per	03h14m42.0s	+47°14'12"	7.7	19:21	21:41	00:01	challenging
NGC 1342	Open	Per	03h31m38.0s	+37°22'36"	7.2	18:03	21:58	02:18	detectable
M 45	Open	Tau	03h47m00.0s	+24°07'00"	1.5	17:56	22:12	02:49	obvious
NGC 1444	Open	Per	03h49m25.0s	+52°39'30"	6.4	17:50	22:16	03:54	obvious
NGC 1502	Open	Cam	04h07m50.0s	+62°19'54"	4.1	17:48	22:34	04:37	obvious
NGC 1528	Open	Per	04h15m23.0s	+51°12'54"	6.4	17:59	22:42	03:57	easy
Hyades	Open	Tau	04h26m54.0s	+15°52'00"	0.8	18:37	22:53	03:07	obvious
NGC 1647	Open	Tau	04h45m55.0s	+19°06'54"	6.2	19:48	23:12	02:33	detectable
NGC 1664	Open	Aur	04h51m06.0s	+43°40'30"	7.2	18:16	23:17	04:21	easy
NGC 1746	Open	Tau	05h03m50.0s	+23°46'12"	6.1	19:58	23:29	03:00	detectable
NGC 1851	Glob	Col	05h14m06.0s	-40°02'48"	7.1	22:24	23:39	00:55	difficult
M 38	Open	Aur	05h28m40.0s	+35°50'54"	6.8	19:36	23:54	04:14	detectable
M 36	Open	Aur	05h36m18.0s	+34°08'24"	6.5	19:04	23:59	05:00	easy
M 43	Neb	Ori	05h35m30.0s	-05°16'00"	9.0	21:50	00:01	02:11	difficult
M 1	Neb	Tau	05h34m30.0s	+22°01'00"	8.4	21:16	00:01	02:43	difficult
M 42	Neb	Ori	05h35m18.0s	-05°23'00"	4.0	20:50	00:01	03:11	easy
IC 434	Neb	Ori	05h41m00.0s	-02°27'00"	11.0	20:45	00:06	03:28	challenging
M 78	Neb	Ori	05h46m48.0s	+00°05'00"	8.0	22:01	00:12	02:24	difficult
M 37	Open	Aur	05h52m18.0s	+32°33'12"	6.2	19:30	00:18	05:06	easy
NGC 2129	Open	Gem	06h01m07.0s	+23°19'20"	7.0	19:52	00:27	05:01	obvious
NGC 2169	Open	Ori	06h08m24.0s	+13°57'54"	7.0	20:21	00:34	04:46	obvious
M 35	Open	Gem	06h09m00.0s	+24°21'00"	5.6	20:09	00:34	05:00	easy
NGC 2175	Open	Ori	06h09m39.0s	+20°29'12"	6.8	20:47	00:35	04:23	detectable
NGC 2237	Neb	Mon	06h32m02.0s	+04°59'10"	5.5	22:58	00:57	02:56	challenging
NGC 2264	Open	Mon	06h40m58.0s	+09°53'42"	4.1	21:05	01:06	05:07	easy
M 41	Open	CMa	06h46m01.0s	-20°45'24"	5.0	23:34	01:11	02:49	easy
NGC 2301	Open	Mon	06h51m45.0s	+00°27'36"	6.3	21:46	01:17	04:50	easy
M 50	Open	Mon	07h02m42.0s	-08°23'00"	7.2	22:30	01:27	04:25	detectable
NGC 2353	Open	Mon	07h14m30.0s	-10°16'00"	5.2	22:52	01:40	04:27	easy
NGC 2360	Open	CMa	07h17m43.0s	-15°38'30"	9.1	00:13	01:42	03:13	challenging
NGC 2355	Open	Gem	07h16m59.0s	+13°45'00"	9.7	22:57	01:43	04:29	difficult
NGC 2392	PNe	Gem	07h29m10.8s	+20°54'42"	8.6	21:25	01:54	05:40	obvious
NGC 2393	Gal	Gem	07h30m04.6s	+34°01'40"	14.6	20:56	01:55	05:38	not visible
NGC 2423	Open	Pup	07h37m06.0s	-13°52'18"	7.0	23:33	02:02	04:31	easy
M 47	Open	Pup	07h36m35.0s	-14°29'00"	4.3	23:37	02:02	04:27	obvious
M 46	Open	Pup	07h41m46.0s	-14°48'36"	6.6	23:44	02:07	04:31	detectable
NGC 2440	PNe	Pup	07h41m55.4s	-18°12'31"	11.5	00:08	02:07	04:06	difficult
NGC 2506	Open	Mon	08h00m01.0s	-10°46'12"	8.9	00:24	02:25	04:26	difficult
M 44	Open	Cnc	08h40m24.0s	+19°40'00"	3.9	22:55	03:05	05:36	easy
M 67	Open	Cnc	08h51m18.0s	+11°48'00"	7.4	00:15	03:16	05:30	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	22:23	04:21	05:37	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	22:05	04:21	05:37	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.

AVAC

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Visit the Antelope Valley Astronomy Club website at www.avastronomyclub.org/

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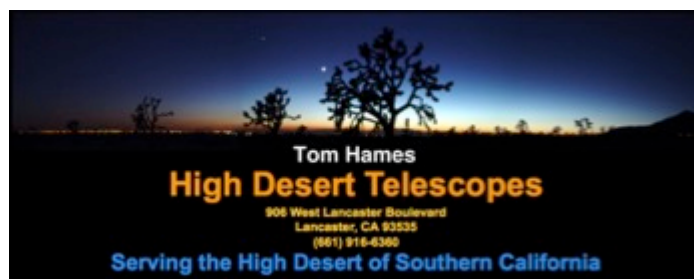
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