



Desert Sky Observer

Volume 35

Antelope Valley Astronomy Club Newsletter

November 2015

Up-Coming Events

November 7: Dark Sky Star Party Check website for details

November 13: Club Meeting*

November 14: [Prime Desert Moon Walk](#)

* 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

Hello friends and AVAC members.

Well, a lot of water has gone under the bridge since our last newsletter, as well as over, around, and through it. For some of us that water carried a lot of mud, debris, and disruption to our lives.

Of course I'm referring to the recent thunderstorms that caused flooding and mudslide damage in the Leona Valley, Lake Elizabeth, Quartz Hill and other areas of the Antelope Valley as well as wreaking havoc on the roadways to and from Tehachapi. Some of our members were directly affected with damage to property while others of us were unable to travel due to damage to roadways. Highway 58 was closed to both the East and West in and out of Tehachapi, as was Tehachapi Willow Springs Road (90th St W), and I was unable to travel to several AVAC events because of it. I again want to thank all of the members who stepped up and covered the events at The College of the Canyons and Prime Desert Woodland for those of us who were stranded by the storms.

Those who made the trip had a truly enjoyable night of observing on the 100" Hooker Telescope at the Mt. Wilson Observatory. The weather cooperated to give us clear and stable skies for an extremely rewarding experience. We split some double stars, observed some clusters, and saw some items that are normally overlooked when observing with telescopes of smaller apertures. Some of the items that are familiar to us also took on a whole new look, at a whole new resolution, when observing through a telescope with a 100" aperture and almost 19,000 mm of focal length. It was wonderful time of friendship, fellowship, and scientific discovery.

At the time of writing this, I have an application for a Special Use Permit pending with California State Parks to hold our November 7 Dark Sky Star Party at the Red Cliffs Natural area at Red Rock Canyon State Park. I was holding off on my DSO submission till I heard from them but could finally hold out no more. As soon I know something, one way or another, I'll let the membership know via email. If we are unable to hold the event at Red Cliffs we'll make our last trip of the year to Chuchupate. Current weather forecasts call for nighttime lows at both locations to be within a few degrees of each other and in the mid 40's.

Other upcoming events include our monthly meeting at the SAGE Planetarium on Friday November 13. I think Don will address that in his DSO submission but I wanted to mention that Mark Brewer, from the Apple Valley Double Star Workshop, will be making a brief presentation requesting Schmidt Cassegrain Telescope operators, with GoTo mounts, for their upcoming workshops. We would be running the telescopes while the student researchers collect the data. I intend to participate, as I think it would be a rewarding experience, and some of you may want to participate as well. On Saturday November 14 there will be a Moon Walk at Prime Desert Woodland Preserve at 5:30 PM. If you can, make it out to support Jeremy and Lancaster City Parks.

I think Rose will have addressed this in detail, but make sure you get signed up for the December 5 Christmas Party well in advance. We need a head count in time to finalize the menu with the venue. Once again it will be at Julianni's Italian Ristorante in the Lancaster Marketplace. They treated us great last year, with good food, good service, and a wonderful facility and I'm looking forward to it.

Finally, for those who missed our Annual Business Meeting, by accident or by design, your Executive Board for 2016 is as follows.

President – Frank Moore

Vice President – Bill Schebeck

Treasurer – Virginia Reed

Secretary – Rose Moore

Director of Community Development – Robert Lynch Jr.

Please do all you can to support the AVAC and your board in our Education, Public Outreach, and club events in the coming year. We hope to make it rewarding year for everyone.



Vice President

Don Bryden

Our speaker for this month is Geo Somoza. Some of you may have met him at the Mt Wilson trip last month, as he was our session director. Geo is also an outreach director for the Planetary Society and plans to speak on the Lightsail project. LightSail is a citizen-funded project by The Planetary Society, the world's largest non-profit space advocacy group. The project's goal is to demonstrate solar sailing, an innovative method of propulsion using the sun's energy, as a viable propulsion for CubeSats. You can find out more information about Lightsail at sail.planetary.org

Finally, start planning for the Christmas party at Julianni's on Saturday, December 5th! We need donations as well so sign up online, send an email to the board or sign up at the next meeting and I'll see you all out there under the stars!



Secretary Rose Moore

Our Christmas Party is scheduled for Saturday Dec. 5th from 6pm to 9pm, at Julianni's Ristorante in Lancaster. Dinner will be a buffet, similar to last year. This is open to members and their guest(s). The cost is \$25 per person, and is due by November 20th. Steve has placed a brief message on the home page that will take you to the AVAC page with information and the link to pay with Paypal. This is the direct link:
<http://avastronomyclub.org/christmas.html>

If you can't pay with PayPal, then please submit your payment to our Treasurer Virginia at our next meeting, or you may pay by mailing a check to our post office box. Our mailing address is: AVAC, P.O. Box 8545, Lancaster, CA 93539

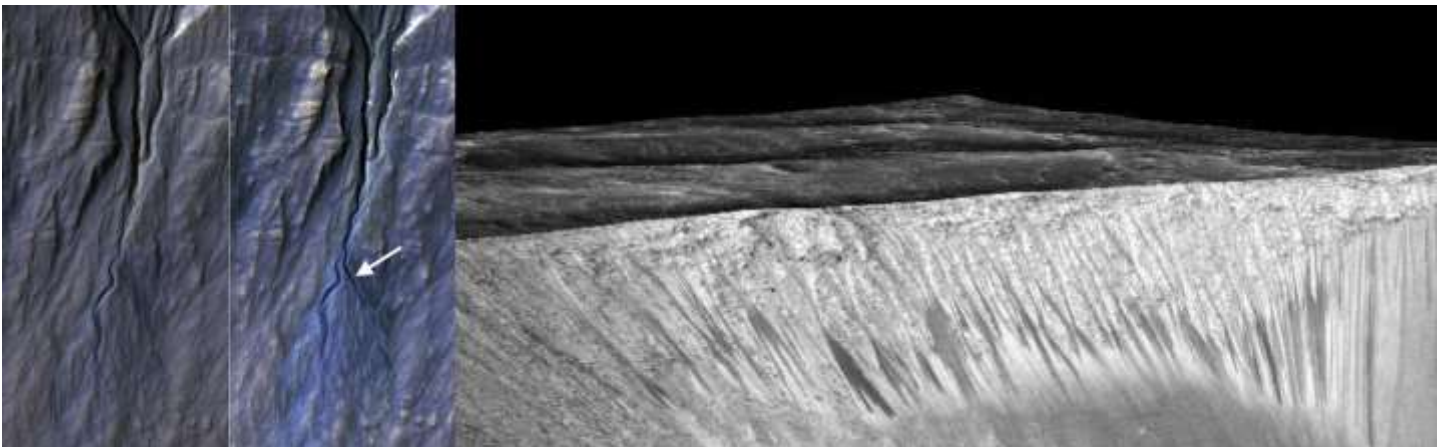
We will be having a silent auction and raffle. If you have any items you would like to donate, you may bring them directly to the party. The items do not have to be astronomy related.

Space Place

How we know Mars has liquid water on its surface

by Ethan Siegel

Of all the planets in the solar system other than our own, Mars is the one place with the most Earth-like past. Geological features on the surface such as dried up riverbeds, sedimentary patterns, mineral spherules nicknamed "blueberries," and evidence of liquid-based erosion all tell the same story: that of a wet, watery past. But although we've found plenty of evidence for molecular water on Mars in the solid (ice) and gaseous (vapor) states, including in icecaps, clouds and subsurface ices exposed (and sublimated) by digging, that in no way meant there'd be water in its liquid phase today.



Images credit: NASA/JPL-Caltech/Univ. of Arizona, of a newly-formed gully on the Martian surface (L) and of the series of gullies where the salt deposits were found (R).

Sure, water flowed on the surface of Mars during the first billion years of the solar system, perhaps producing an ocean a mile deep, though the ocean presence is still much debated. Given that life on Earth took hold well within that time, it's conceivable that Mars was once a rich, living planet as well. But unlike Earth, Mars is small: small enough that its interior cooled and lost its protective magnetic field, enabling the sun's solar wind to strip its atmosphere away. Without a significant atmosphere, the liquid phase of water became a virtual impossibility, and Mars became the arid world we know it to be today.

But certain ions—potassium, calcium, sodium, magnesium, chloride and fluoride, among others—get left behind when the liquid water disappears, leaving a “salt” residue of mineral salts (that may include table salt, sodium chloride) on the surface. While pure liquid water may not persist at standard Martian pressures and temperatures, extremely salty, briny water can indeed stay in a liquid state for extended periods under the conditions on the Red Planet. It's more of a "sandy crust" like you'd experience on the shore when the tide goes out than the flowing waters we're used to in rivers on Earth, but it means that under the right temperature conditions, liquid water does exist on Mars today, at least in small amounts.

The measured presence and concentration of these salts, found in the dark streaks that come and go on steep crater walls, combined with our knowledge of how water behaves under certain physical and chemical conditions and the observations of changing features on the Martian surface supports the idea that this is the action of liquid water. Short of taking a sample and analyzing it in situ on Mars, this is the best current evidence we have for liquid water on our red neighbor. Next up? Finding out if there are any single-celled organisms hardy enough to survive and thrive under those conditions, possibly even native to Mars itself!

News Headlines

Saturn's Geyser Moon Shines in Close Flyby Views

NASA's Cassini spacecraft has begun transmitting its latest images of Saturn's icy, geologically active moon Enceladus, acquired during the dramatic Oct. 28 flyby in which the probe passed about 30 miles (49 kilometers) above the moon's south polar region. The spacecraft will continue transmitting its data from the encounter for the next several days. "Cassini's stunning images are providing us a quick look at Enceladus from this ultra-close flyby, but some of the most exciting science is yet to come," said Linda Spilker, the mission's project scientist at NASA's Jet Propulsion Laboratory in Pasadena, California.

<http://www.jpl.nasa.gov/news/news.php?feature=4759>

On Track: New Horizons Carries Out Third KBO Targeting Maneuver

NASA's New Horizons spacecraft has successfully completed the third in a series of four maneuvers propelling it toward an encounter with the ancient Kuiper Belt object 2014 MU69, a billion miles farther from the sun than Pluto. The targeting maneuver, performed with the spacecraft's hydrazine-fueled thrusters, started at approximately 1:15 p.m. EDT on Wednesday, Oct. 28, and lasted about 30 minutes – surpassing the Oct. 25 propulsive maneuver as the largest ever conducted by New Horizons.

<http://pluto.jhuapl.edu/News-Center/News-Article.php?page=20151029>

Spooky Nebula is Coldest Known Object in Universe

A ghostly nebula shining about 5,000 light-years from Earth is also the coldest known object in the universe. The dead star creating the Boomerang Nebula is sloughing off gas from its shell, which is producing the strangely shaped cosmic object, astronomers have discovered. The gas is cooling as it flows away from the white dwarf star in a process similar to how refrigerators stay cold by using expanding gas.

<http://www.space.com/23367-spooky-nebula-coldest-object-universe-photo.html>

Rosetta finds molecular oxygen on comet 67P

Stunned scientists announced Wednesday the unexpected discovery of large quantities of oxygen on a comet which streaked past the Sun in August with a European spacecraft in tow. The find came as a "big surprise", and challenges mainstream theories on the formation of our Solar System, said scientist Andre Bieler of the University of Michigan. Measurements made by the Rosetta probe suggested that oxygen molecules in the 67P comet's gassy halo must have existed "before or at" its formation, he told journalists.

<http://phys.org/news/2015-10-rosetta-molecular-oxygen-comet-67p.html#jCp>

Most Earth-like worlds have yet to be born

Earth came early to the party in the evolving universe. According to a new theoretical study, when our solar system was born 4.6 billion years ago only eight percent of the potentially habitable planets that will ever form in the universe existed. And, the party won't be over when the sun burns out in another 6 billion years. The bulk of those planets -- 92 percent -- have yet to be born. This conclusion is based on an assessment of data collected by NASA's Hubble Space Telescope and the prolific planet-hunting Kepler space observatory.

<http://www.sciencedaily.com/releases/2015/10/151020104849.htm>

November Sky Data

Last Qtr Nov 3 New Nov 11 First Qtr Nov 18 Full Nov 25



**Best time for deep sky observing this month:
November 1 through November 16**

Mercury reaches superior conjunction on November 17th and will not be seen for much of the month.

Venus starts the month dominating the eastern sky before dawn in a close grouping with both Jupiter and Mars. Its magnitude drops only slightly from -4.4 to -4.2 during the month while its angular diameter drops from 22.7 to 17.6 arc seconds, but the illuminated disk increases from 54 to 63% at the same time.

Mars rises about 2:30 am as the month begins, shining at magnitude +1.7. This increases to magnitude +1.5 as the month progresses with its angular diameter increasing from 4.2 to 4.7 arc seconds. This is still too small for any details to be seen. As Novembers start it will lie close to both Jupiter and Venus making a wonderful grouping in the sky.

Jupiter is now a wonderful morning object, rising soon after midnight by the last week of November. Jupiter starts the month shining at magnitude -1.8 with an angular diameter of 33 arc seconds. During the month, these increase to -2.0 and 35.5 respectively.

Saturn passes behind the Sun on the 29th of November. It might just be seen using binoculars at the very beginning of the month just a few degrees above the southwestern horizon 45 minutes after sunset but, really, we will have to wait for a while yet to see it in the pre-dawn sky.

November's wonderful Leonid **meteor shower** happens every year at this time. In 2015, the peak night of the shower is expected from midnight to dawn on November 18. The waxing moon will set in the evening hours, so moonlight will not obstruct this year's Leonid shower. Also, it'll be fun to look for the planet Jupiter, which shines in front of the constellation Leo this year. Watch for the Leonids on the mornings of November 17 and 18! The mornings before and after the peak might feature meteors as well, as we pass through the Leonid meteor stream in space.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
11/1/2015	22:03	11:17	06:12	16:58
11/5/2015	00:49	13:51	06:15	16:54
11/10/2015	05:17	16:34	06:20	16:50
11/15/2015	09:46	20:23	06:25	16:46
11/20/2015	13:23	00:28	06:30	16:44
11/25/2015	17:00	06:05	06:34	16:42
11/30/2015	21:44	10:37	06:39	16:40

Planet Data

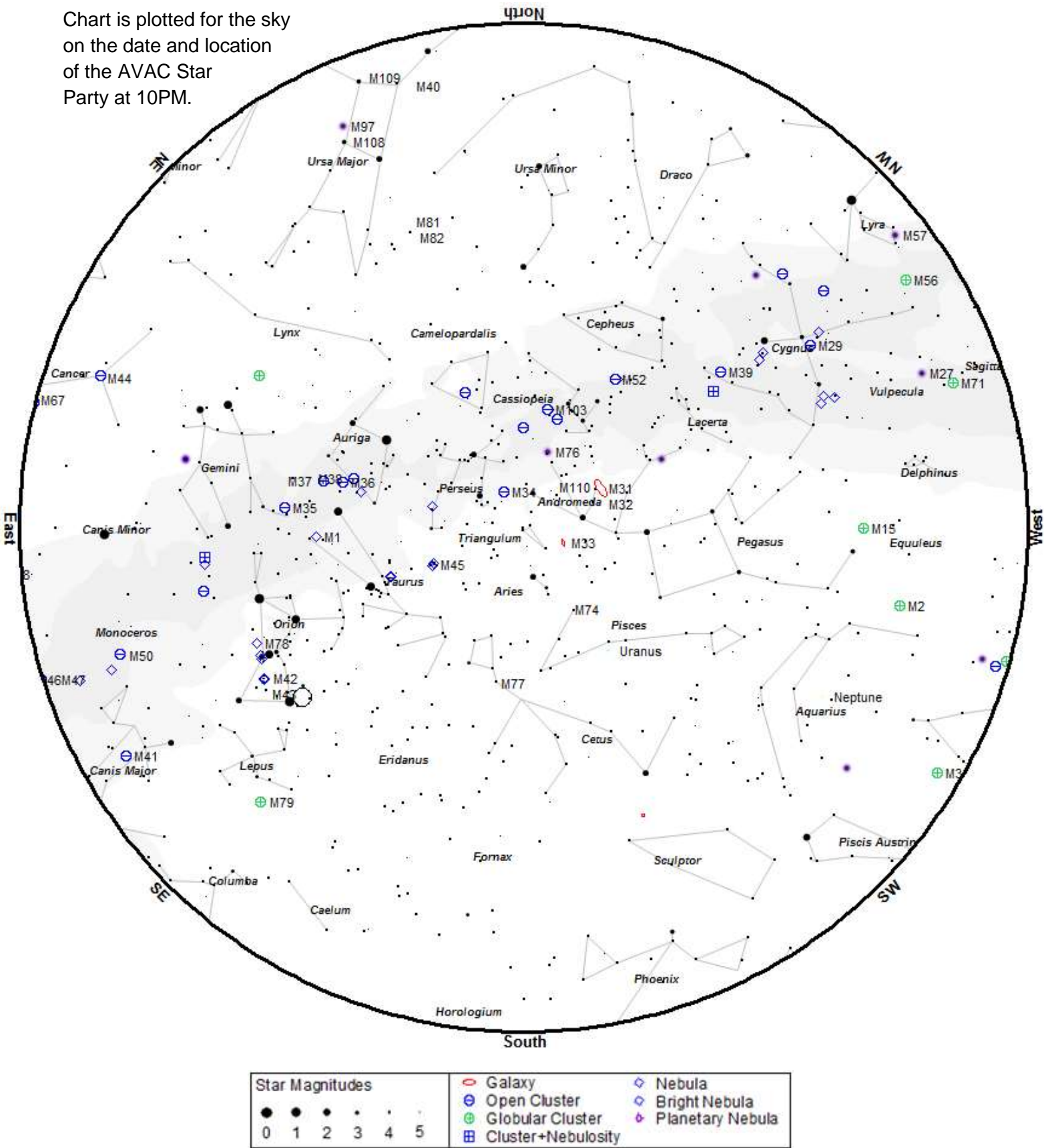
	Nov 1			
	Rise	Transit	Set	Mag
Mercury	05:21	11:01	16:40	-1.0
Venus	02:26	08:43	15:00	-4.3
Mars	02:26	08:44	15:04	1.7
Jupiter	01:55	08:19	14:46	-1.9
Saturn	08:03	13:18	18:30	0.5

	Nov 15			
	Rise	Transit	Set	Mag
Mercury	06:19	11:34	16:47	-1.3
Venus	02:42	08:45	14:48	-4.3
Mars	02:11	08:20	14:31	1.6
Jupiter	01:10	07:32	13:57	-1.9
Saturn	07:15	12:30	17:40	0.5

	Nov 31			
	Rise	Transit	Set	Mag
Mercury	07:17	12:11	17:08	-0.8
Venus	03:04	08:50	14:36	-4.2
Mars	01:55	07:54	13:55	1.5
Jupiter	00:20	06:40	13:03	-2.0
Saturn	06:25	11:35	16:48	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.



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 70	Glob	Sgr	18h43m13.0s	-32°17'30"	7.8	18:04	18:12	18:24	detectable
NGC 6723	Glob	Sgr	18h59m33.0s	-36°37'54"	6.8	18:04	18:12	18:24	detectable
M 8	Neb	Sgr	18h04m02.0s	-24°23'14"	5.0	18:03	18:13	18:31	detectable
M 21	Open	Sgr	18h04m13.0s	-22°29'24"	7.2	18:04	18:14	18:30	detectable
M 20	Open	Sgr	18h02m42.0s	-22°58'18"	5.2	18:04	18:14	18:34	easy
M 54	Glob	Sgr	18h55m03.0s	-30°28'42"	7.7	18:06	18:15	18:27	difficult
M 23	Open	Sgr	17h57m04.0s	-18°59'06"	5.9	18:05	18:16	18:33	detectable
M 28	Glob	Sgr	18h24m33.0s	-24°52'12"	6.9	18:05	18:16	18:33	detectable
M 24	Open	Sgr	18h18m26.0s	-18°24'24"	11.1	18:01	18:17	18:59	not visible
M 22	Glob	Sgr	18h36m24.0s	-23°54'12"	5.2	18:04	18:17	18:44	detectable
M 18	Open	Sgr	18h19m58.0s	-17°06'06"	7.5	18:01	18:17	19:00	easy
M 14	Glob	Oph	17h37m36.0s	-03°14'48"	7.6	18:06	18:18	18:41	detectable
M 16	Open	Ser	18h18m48.0s	-13°48'24"	6.5	18:00	18:18	19:11	obvious
M 17	Open	Sgr	18h20m47.0s	-16°10'18"	7.3	18:10	18:18	18:36	difficult
M 25	Open	Sgr	18h31m47.0s	-19°07'00"	6.2	18:07	18:19	18:46	detectable
NGC 6716	Open	Sgr	18h54m34.0s	-19°54'06"	7.5	18:03	18:19	19:01	detectable
M 55	Glob	Sgr	19h40m00.0s	-30°57'42"	6.3	18:05	18:19	18:54	detectable
M 13	Glob	Her	16h41m41.0s	+36°27'36"	5.8	18:04	18:20	18:30	easy
NGC 6572	PNe	Oph	18h12m06.4s	+06°51'12"	8.0	17:53	18:20	18:49	obvious
IC 4665	Open	Oph	17h46m18.0s	+05°43'00"	5.3	18:08	18:20	18:55	detectable
NGC 6818	PNe	Sgr	19h43m57.8s	-14°09'12"	10.0	17:58	18:22	18:56	easy
M 92	Glob	Her	17h17m07.0s	+43°08'12"	6.5	18:03	18:22	19:19	easy
NGC 6633	Open	Oph	18h27m15.0s	+06°30'30"	5.6	18:03	18:22	19:03	easy
IC 4756	Open	Ser	18h39m00.0s	+05°27'00"	5.4	18:04	18:22	19:12	easy
M 11	Open	Sct	18h51m05.0s	-06°16'12"	6.1	18:06	18:22	18:42	detectable
NGC 6543	PNe	Dra	17h58m33.4s	+66°37'59"	8.3	17:53	18:24	20:59	obvious
M 57	PNe	Lyr	18h53m35.1s	+33°01'45"	9.4	18:01	18:24	20:35	easy
M 56	Glob	Lyr	19h16m36.0s	+30°11'06"	8.4	18:06	18:26	20:04	detectable
M 71	Glob	Sge	19h53m46.0s	+18°46'42"	8.4	18:02	18:26	20:56	easy
M 27	PNe	Vul	19h59m36.3s	+22°43'16"	7.3	18:01	18:27	21:05	easy
NGC 6871	Open	Cyg	20h05m59.0s	+35°46'36"	5.8	18:02	18:27	21:32	easy
M 29	Open	Cyg	20h23m57.0s	+38°30'30"	7.5	18:01	18:28	21:51	easy
NGC 7009	PNe	Aqr	21h04m10.9s	-11°21'48"	8.3	17:55	18:28	20:33	obvious
NGC 6910	Open	Cyg	20h23m12.0s	+40°46'42"	7.3	17:59	18:28	22:01	easy
M 15	Glob	Peg	21h29m58.0s	+12°10'00"	6.3	18:02	18:33	21:59	easy
M 2	Glob	Aqr	21h33m27.0s	-00°49'24"	6.6	18:03	18:34	21:35	detectable
M 30	Glob	Cap	21h40m22.0s	-23°10'42"	6.9	18:03	18:34	19:35	detectable
M 39	Open	Cyg	21h31m48.0s	+48°26'00"	5.3	17:59	18:36	23:33	easy

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
IC 1396	Neb	Cep	21h39m06.0s	+57°30'00"		18:00	18:39	23:47	challenging
IC 5146	Neb	Cyg	21h53m24.0s	+47°16'00"	10.0	18:00	18:42	23:43	challenging
NGC 7160	Open	Cep	21h53m40.0s	+62°36'12"	6.4	17:56	18:43	00:41	obvious
NGC 7243	Open	Lac	22h15m08.0s	+49°53'54"	6.7	18:04	18:59	23:20	detectable
NGC 7293	PNe	Aqr	22h29m38.5s	-20°50'14"	6.3	18:03	19:13	20:52	detectable
M 52	Open	Cas	23h24m48.0s	+61°35'36"	8.2	18:06	20:09	00:19	detectable
NGC 7789	Open	Cas	23h57m24.0s	+56°42'30"	7.5	18:07	20:41	00:42	detectable
NGC 7790	Open	Cas	23h58m24.0s	+61°12'30"	7.2	17:58	20:42	02:41	easy
NGC 55	Gal	Scl	00h15m08.4s	-39°13'13"	8.5	19:52	20:59	22:07	challenging
M 110	Gal	And	00h40m22.3s	+41°41'09"	8.9	18:09	21:25	01:16	detectable
M 31	Gal	And	00h42m44.3s	+41°16'07"	4.3	18:05	21:26	02:05	easy
M 32	Gal	And	00h42m41.8s	+40°51'58"	8.9	18:03	21:27	02:07	easy
NGC 253	Gal	Scl	00h47m33.1s	-25°17'20"	7.9	21:08	21:31	21:55	detectable
NGC 288	Glob	Scl	00h52m45.0s	-26°35'00"	8.1	20:06	21:37	23:08	challenging
NGC 457	Open	Cas	01h19m35.0s	+58°17'12"	5.1	18:01	22:03	03:55	obvious
NGC 559	Open	Cas	01h29m31.0s	+63°18'24"	7.4	18:01	22:13	04:20	easy
M 103	Open	Cas	01h33m23.0s	+60°39'00"	6.9	18:00	22:17	04:15	obvious
M 33	Gal	Tri	01h33m50.9s	+30°39'36"	6.4	18:28	22:18	02:08	detectable
NGC 637	Open	Cas	01h43m04.0s	+64°02'24"	7.3	17:58	22:27	04:35	obvious
M 76	PNe	Per	01h42m19.9s	+51°34'31"	10.1	18:16	22:27	02:48	detectable
NGC 663	Open	Cas	01h46m09.0s	+61°14'06"	6.4	18:03	22:30	04:27	easy
NGC 752	Open	And	01h57m41.0s	+37°47'06"	6.6	20:18	22:41	01:05	challenging
NGC 869	Open	Per	02h19m00.0s	+57°07'42"	4.3	18:01	23:03	04:51	obvious
NGC 884	Open	Per	02h22m18.0s	+57°08'12"	4.4	18:00	23:07	04:54	obvious
NGC 957	Open	Per	02h33m21.0s	+57°33'36"	7.2	18:10	23:17	04:48	easy
Heart Neb	Neb	Cas	02h33m52.0s	+61°26'50"	6.5	20:19	23:18	02:17	challenging
M 34	Open	Per	02h42m05.0s	+42°45'42"	5.8	19:00	23:25	03:49	easy
M 77	Gal	Cet	02h42m40.8s	-00°00'48"	9.7	20:17	23:26	02:36	detectable
NGC 1027	Open	Cas	02h42m40.0s	+61°35'42"	7.4	18:44	23:27	04:03	detectable
NGC 1245	Open	Per	03h14m42.0s	+47°14'12"	7.7	21:39	23:59	02:18	challenging
NGC 1342	Open	Per	03h31m38.0s	+37°22'36"	7.2	19:56	00:16	04:31	detectable
M 45	Open	Tau	03h47m00.0s	+24°07'00"	1.5	19:53	00:30	05:05	obvious
NGC 1444	Open	Per	03h49m25.0s	+52°39'30"	6.4	18:55	00:33	05:12	obvious
NGC 1502	Open	Cam	04h07m50.0s	+62°19'54"	4.1	18:49	00:52	05:16	obvious
NGC 1528	Open	Per	04h15m23.0s	+51°12'54"	6.4	19:43	00:59	05:06	easy
Hyades	Open	Tau	04h26m54.0s	+15°52'00"	0.8	20:55	01:11	05:02	obvious
NGC 1647	Open	Tau	04h45m55.0s	+19°06'54"	6.2	22:08	01:29	04:47	detectable
NGC 1664	Open	Aur	04h51m06.0s	+43°40'30"	7.2	20:31	01:34	05:09	easy
NGC 1746	Open	Tau	05h03m50.0s	+23°46'12"	6.1	22:18	01:47	04:57	detectable
NGC 1851	Glob	Col	05h14m06.0s	-40°02'48"	7.1	00:41	01:57	03:11	difficult
M 38	Open	Aur	05h28m40.0s	+35°50'54"	6.8	21:54	02:12	05:07	detectable
M 36	Open	Aur	05h36m18.0s	+34°08'24"	6.5	21:21	02:17	05:10	easy
M 43	Neb	Ori	05h35m30.0s	-05°16'00"	9.0	00:10	02:18	04:25	difficult
M 1	Neb	Tau	05h34m30.0s	+22°01'00"	8.4	23:34	02:18	04:51	difficult
M 42	Neb	Ori	05h35m18.0s	-05°23'00"	4.0	23:08	02:18	05:04	easy

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
IC 434	Neb	Ori	05h41m00.0s	-02°27'00"	11.0	23:02	02:24	05:08	challenging
M 78	Neb	Ori	05h46m48.0s	+00°05'00"	8.0	00:19	02:29	04:36	difficult
M 37	Open	Aur	05h52m18.0s	+32°33'12"	6.2	21:48	02:36	05:10	easy
NGC 2129	Open	Gem	06h01m07.0s	+23°19'20"	7.0	22:09	02:44	05:13	obvious
NGC 2169	Open	Ori	06h08m24.0s	+13°57'54"	7.0	22:39	02:51	05:13	obvious
M 35	Open	Gem	06h09m00.0s	+24°21'00"	5.6	22:27	02:52	05:10	easy
NGC 2175	Open	Ori	06h09m39.0s	+20°29'12"	6.8	23:07	02:53	05:07	detectable
NGC 2237	Neb	Mon	06h32m02.0s	+04°59'10"	5.5	01:16	03:15	04:53	challenging
NGC 2264	Open	Mon	06h40m58.0s	+09°53'42"	4.1	23:23	03:24	05:12	easy
M 50	Open	Mon	07h02m42.0s	-08°23'00"	7.2	00:47	03:24	05:08	detectable
M 41	Open	CMa	06h46m01.0s	-20°45'24"	5.0	01:51	03:24	05:06	easy
NGC 2355	Open	Gem	07h16m59.0s	+13°45'00"	9.7	01:12	03:25	05:03	difficult
NGC 2301	Open	Mon	06h51m45.0s	+00°27'36"	6.3	00:03	03:25	05:11	easy
NGC 2392	PNe	Gem	07h29m10.8s	+20°54'42"	8.6	23:43	04:14	05:15	obvious
NGC 2393	Gal	Gem	07h30m04.6s	+34°01'40"	14.6	23:15	04:18	05:13	not visible
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	00:24	04:41	05:09	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	00:11	04:42	05:09	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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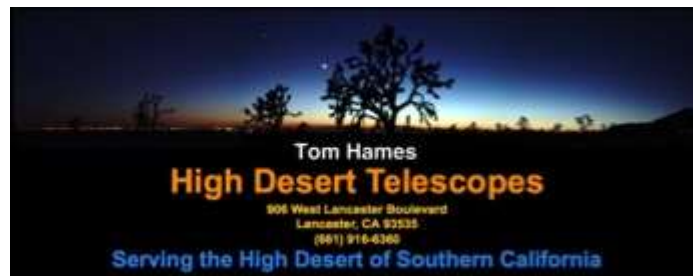
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