



# Desert Sky Observer

Volume 37

Antelope Valley Astronomy Club Newsletter

January 2017

## Up-Coming Events

January 7: [Prime Desert Woodland Moon Walk](#)

January 13: Club Meeting\*

January 28: Dark Sky Star Party @ TBA

\* 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 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

Hello AVAC members. Welcome to 2017.

I hope all of you had wonderful holidays with family and friends and wish all of you the best in the New Year.

As I noted in the last newsletter, and in no small part out of respect for the winter weather, our events usually slow down a little for the winter months and this winter has certainly shown the wisdom of that policy. Last night, as I was looking at on the 4 inches of snow in our yard near Tehachapi, I reflected on the fact that our planning calendar showed December 31 as a “new moon weekend” and possible date for a Dark Sky Star Party. We all know that wouldn’t have worked for us since it was raining or snowing across the region and the roads to many of observing sites were closed. I’m not commiserating though, since we all know that California needs ever precious drop of water that we can get.

We’ve been working on the tentative calendar of events for the coming year and are gradually putting them on the calendar on the club’s website. Rose has already entered some tentative dates and will be entering more once we them confirmed. In light of the fact that we still don’t have anyone in the position of Vice President we’re limping along a little slower than usual but we’ll get it all done and hope to be able to fill that position soon. (Hint, hint !!)

As some of you may be aware, AVAC member and multiple term past AVAC President Don Bryden has retired from the FAA and moved to South Carolina with his family. Don was a fantastic President, with impeccable planning and organizational skills, and was a great help to me even when he was no longer on the board. Don also has a wealth of astronomical knowledge, is a proficient and prolific astrophotographer and a skilled telescope maker. Don made numerous truss dobsonian telescopes for the club and for individual club members and his body of knowledge and skill will be greatly missed. On a very personal level, I will miss Don’s company at the many outreach events we worked together and the infectious enthusiasm and knowledge he imparted to young people. I hope that all of you will join me in wishing Don and his family the best in their new home and future endeavors.

In deference to the fact that we are supposed to in a La Niña ocean-atmosphere condition, so far we are having a wet weather pattern in Southern California and it seems that this pattern will continue to affect our events and activities for the near future.

With that in mind, and weather permitting, our next event is a Prime Desert Woodland Moonwalk on Saturday January 7 at 5:30 PM with the February PDW Moonwalk on February 4 at 6:30 PM. Please come out and support Jeremy Amarant in his generous public outreach activities. Bring a telescope for public viewing or just go on the Moon Walk and learn from Jeremy's tour of the night sky.

After taking December off, our next monthly meeting at the SAGE Planetarium will be on Friday January 13 at the 7:00 PM. I hope to see a lot of you there.

Remember, with the beginning of the new year membership renewals are due using the procedure outlined below.

Log in to the club website at <http://www.avastronomyclub.org/member/login.html>.

Your password is your last name if you haven't changed it. If you have forgotten your password, click on the link that says "Forgot login?" and follow the directions to recover your password.

Once you have logged in, go to the "Member Profile" page, listed under the Membership menu, click on the Membership tab in your profile and then click on the "Renew Now" button. You will be taken to a form where you can verify your information and choose your payment type, either PayPal or Offline (cash or check).

If you select PayPal, you will be directed to the PayPal site to complete your payment.

If you select Offline, you will be taken to a page to print out your application. Once you have printed your application, you may mail it to the club with your payment (check only) to:

AVAC  
P.O. Box 8545  
Lancaster, CA 93539-8545

You may also pay by **\*\*cash or check\*\*** at our Club meetings held at the SAGE Planetarium on the second Friday of every month. The SAGE Planetarium is located at the corner of 20th East and Avenue R in Palmdale, CA.



## **Secretary**

### **Rose Moore**

I hope everyone had a wonderful holiday season!

For those who are going on the SOFIA trip, I sent an email out on 12/26/16 with information I need to turn over to our coordinator. This is due before our next meeting on Jan. 13th! Besides needing your driver's license number/your full name (as it is on your license), whether or not you are a US citizen, I will now need the city/state/country of birth. **\*\*If you work at Edwards AFB, or are retired from there, your base ID will not get you into the facility at Palmdale. Our coordinator states that she needs this info from everyone! Please send me this information in a timely manner. Everyone will have to go through security clearance at the facility. Once the names are turned in to the coordinator, cancellations will be allowed, but there will not be any additions allowed.**

I am working on the club's calendar on the website. After the holidays, I will be sending out emails for speakers. If you have any suggestions for speakers or topics you want covered at the meetings, please let one of the board members know.

We have a Prime Desert Moon Walk scheduled for Saturday, January 7th at 5:30pm. We will need members with telescopes. Dress warm, weather permitting.

## Space Place

### Big Science in Small Packages

By Marcus Woo

About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It's one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one, dubbed MinXSS ("minks") is NASA's first CubeSat with a bona fide science mission.

Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares – eruptions on the sun that produce dramatic bursts of energy and radiation.

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don't have the capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: "It's helping address this very long-term problem that's been around for 50 years: how is the corona heated to be so hot."

The \$1 million original mission has been gathering observations since June.

The satellite will likely burn up in Earth's atmosphere in March. But the researchers have built a second one slated for launch in 2017. MinXSS-2 will watch long-term solar activity—related to the sun's 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.



*Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat, which observes soft X-rays from the sun—such X-rays can disturb the ionosphere and thereby hamper radio and GPS signals. (The second CubeSat is CADRE — short for CubeSat investigating Atmospheric Density Response to Extreme driving - built by the University of Michigan and funded by the National Science Foundation.) Credit: ESA/NASA*

## News Headlines

### **NASA's Biggest Space Feats of 2016**

It's been a busy year for NASA, which has been pushing frontiers in robotic space exploration, human missions, scientific research and more. Here are some of the projects that the space agency pursued in 2016.

<https://goo.gl/f3G015>

### **Sun setting on solar telescope at Kitt Peak, southwest of Tucson**

Sad. The most distinctive observatory skyline around my soon be forever changed.

The world's largest solar telescope, the iconic McMath–Pierce atop Kitt Peak has been eclipsed by newer technology and is headed toward eventual demolition if a last-ditch attempt to find a new operator for it is unsuccessful.

<https://goo.gl/Fho18k>

### **2016 took astrophysicist Vera Rubin who proved the existence of dark matter**

In the 1970s, Rubin and other astronomers found that invisible mass was responsible for the stars' movement, determining that each spiral galaxy has a halo of dark matter, or material that doesn't give off light and goes beyond what one can see in the galaxy, according to Carnegie. While there were indications going back to the 1930s that dark matter existed, her work confirmed it.

<https://goo.gl/wBnQuG>

### **NASA's NEOWISE Mission Spies One Comet, Maybe Two**

NASA's NEOWISE mission has recently discovered some celestial objects traveling through our neighborhood, including one on the blurry line between asteroid and comet. Another--definitely a comet--might be seen with binoculars through next week.

<https://goo.gl/GKkM83>

### **2016 Saturn Tour Highlights**

After a year of touring the Saturn system nearly in the equatorial plane, Cassini bid goodbye to its final close encounters with Saturn's smaller satellites in 2015, including three spectacular flybys of Enceladus. In 2016, 11 Titan flybys punctuated by a handful of large main engine burns will raise Cassini's inclination to almost 64 degrees. This will set up the 20 F-ring orbits and prepare for the spacecraft's Grand Finale mission phase beginning in April 2017.

<https://saturn.jpl.nasa.gov/news/2861/2016-saturn-tour-highlights/>

### **CERN scientists get the first glance of the innards of anti-matter**

Antimatter is more than a science fiction concept that allows engineers to power the Enterprise. It's an actual — albeit small — constituent of our universe. While antimatter is rare, it can exist under the right conditions. Information about the way antimatter behaves provides a powerful tool for testing the Standard Model of particle physics we currently use to understand the forces that govern the way particles behave.

<http://astronomy.com/news/2016/12/cern-scientists-get-the-first-glance-of-the-innards-of-antimatter>

## January Sky Data

First Qtr  
Jan 5Full  
Jan 12Last Qtr  
Jan 19New  
Jan 27

**Best time for deep sky observing this month:  
January 18 through January 31**



**Mercury** becomes visible in the pre-dawn sky by the second week of the month down to the left of Saturn. By the 6th it will have reached magnitude +0.9. Over the next week or so it begins to fall back towards the horizon, but its magnitude increases to a maximum of -0.2 on the 21st.

**Venus** reaches its greatest elongation from the Sun on the 12th - some 47 degrees to its east. Venus sets around three and a half hours after the Sun. As Venus moves northwards along the ecliptic its elevation at sunset increases from ~27 to 36 degrees. Its angular size increases from 21.7 to 30.4 arc seconds during the month.

**Mars** brightness reduces slightly during the month from magnitude +0.9 to +1.1 as the angular size of its disk reduces from 5.7 to 5.1 arc seconds. It will be easily found up to the left of Venus which is rapidly approaching it and will be just 5.5 degrees away by months end.

**Jupiter** rises at around midnight at the beginning of the month lying low in Virgo not far above Spica. It will be due south and so highest in the sky at an elevation of 35 degrees in the pre-dawn sky. Jupiter's disk increases from 35.5 to 38.9 arc seconds so one should be easily able to see the equatorial bands in the atmosphere, sometimes the Great Red Spot and up to four of the Galilean moons as they weave their way around it.

**Saturn** is now a morning object seen low in the southeast at dawn rising about one and a half hours before the Sun on New Year's Day and by three hours by month's end. Its beautiful ring system has now opened out to ~26.7 degrees - virtually as open as they can be.

While the Quadrantids are a little-known **meteor shower**, 2017 will be a great year to catch them during their Jan. 3-4 overnight peak. The nearly new moon's dim light will provide favorable viewing conditions for the shower, and average rates of 120 meteors per hour are expected.

## Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
1/1/2017	09:16	20:25	06:59	16:52
1/5/2017	11:44	-----	06:59	16:55
1/10/2017	15:37	04:57	06:59	16:59
1/15/2017	20:50	09:12	06:58	17:04
1/20/2017	00:35	11:59	06:56	17:09
1/25/2017	04:57	15:28	06:54	17:14
1/31/2017	09:10	21:23	06:50	17:20

## Planet Data

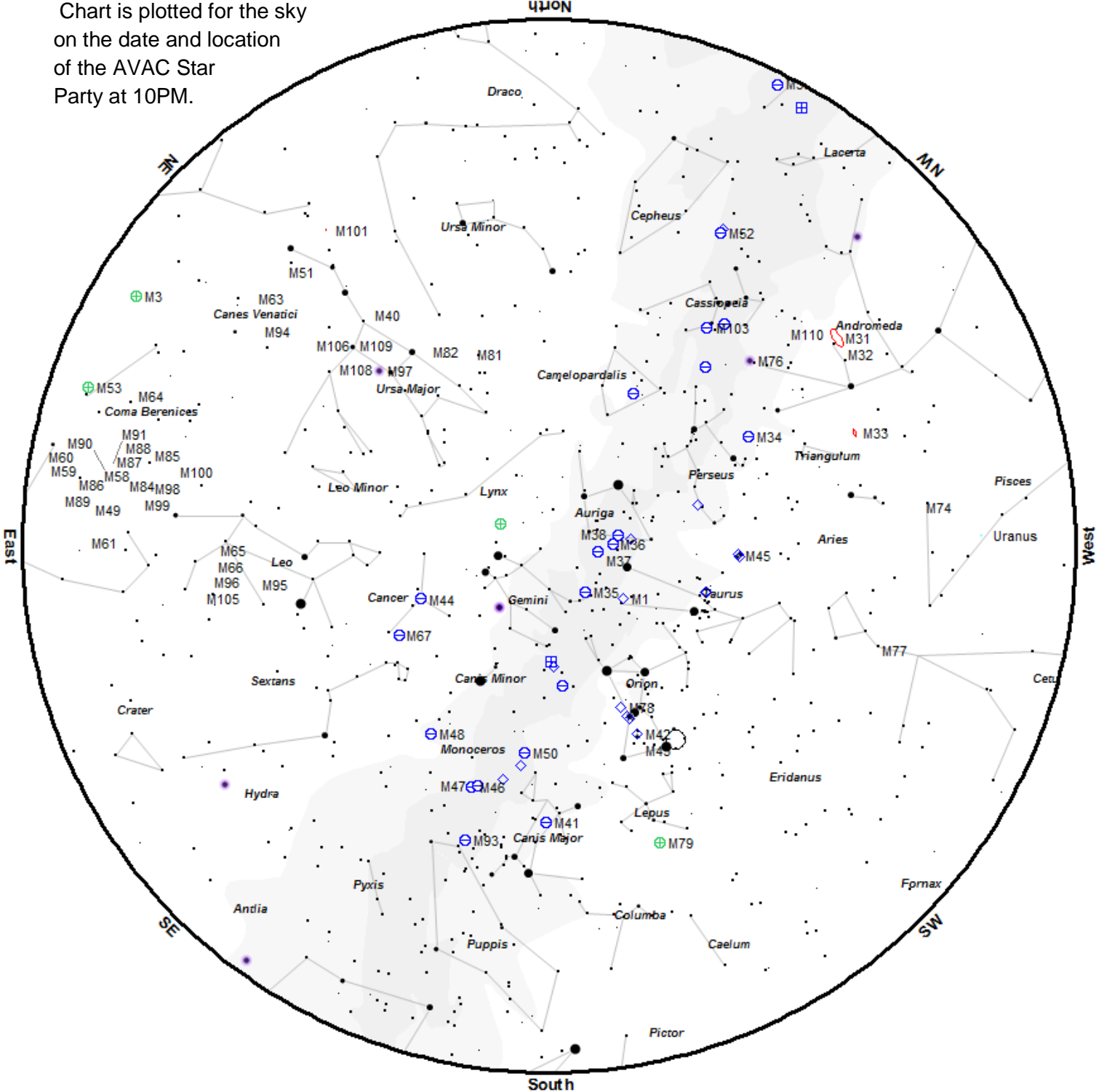
	Jan 1			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:59	11:07	16:23	2.3
<b>Venus</b>	09:37	15:09	20:40	-4.3
<b>Mars</b>	10:07	15:53	21:37	0.9
<b>Jupiter</b>	00:35	06:22	12:13	-2.0
<b>Saturn</b>	05:21	10:25	15:32	0.5

	Jan 15			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:13	10:18	15:24	-0.1
<b>Venus</b>	09:17	15:07	20:56	-4.5
<b>Mars</b>	09:38	15:36	21:32	1.0
<b>Jupiter</b>	23:45	05:32	11:18	-2.1
<b>Saturn</b>	04:33	09:36	14:43	0.5

	Jan 31			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:34	10:38	15:39	-0.2
<b>Venus</b>	08:43	14:55	21:05	-4.6
<b>Mars</b>	09:05	15:17	21:27	1.1
<b>Jupiter</b>	22:46	04:31	10:17	-2.2
<b>Saturn</b>	03:37	08:40	13:47	0.6

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+Nebosity	

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



ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 43	Neb	Ori	05h35m30.0s	-05°16'00"	9.0	18:46	20:53	23:03	difficult
M 1	Neb	Tau	05h34m30.0s	+22°01'00"	8.4	18:39	20:53	23:37	difficult
M 42	Neb	Ori	05h35m18.0s	-05°23'00"	4.0	18:30	20:53	00:03	easy
M 78	Neb	Ori	05h46m48.0s	+00°05'00"	8.0	18:54	21:04	23:18	difficult
M 37	Open	Aur	05h52m18.0s	+32°33'12"	6.2	18:26	21:10	01:54	easy
NGC 2129	Open	Gem	06h01m07.0s	+23°19'20"	7.0	18:24	21:19	01:54	obvious
NGC 2169	Open	Ori	06h08m24.0s	+13°57'54"	7.0	18:25	21:26	01:38	obvious
M 35	Open	Gem	06h09m00.0s	+24°21'00"	5.6	18:28	21:27	01:50	easy
NGC 2175	Open	Ori	06h09m39.0s	+20°29'12"	6.8	18:32	21:27	01:13	detectable
NGC 2237	Neb	Mon	06h32m02.0s	+04°59'10"	5.5	19:47	21:49	23:52	challenging
NGC 2264	Open	Mon	06h40m58.0s	+09°53'42"	4.1	18:29	21:58	01:59	easy
M 41	Open	CMa	06h46m01.0s	-20°45'24"	5.0	20:26	22:03	23:41	easy
NGC 2301	Open	Mon	06h51m45.0s	+00°27'36"	6.3	18:38	22:09	01:42	easy
M 50	Open	Mon	07h02m42.0s	-08°23'00"	7.2	19:23	22:20	01:17	detectable
NGC 2353	Open	Mon	07h14m30.0s	-10°16'00"	5.2	19:44	22:32	01:20	easy
NGC 2355	Open	Gem	07h16m59.0s	+13°45'00"	9.7	19:48	22:34	01:22	difficult
NGC 2360	Open	CMa	07h17m43.0s	-15°38'30"	9.1	21:05	22:34	00:05	challenging
NGC 2392	PNe	Gem	07h29m10.8s	+20°54'42"	8.6	18:27	22:47	03:16	obvious
NGC 2423	Open	Pup	07h37m06.0s	-13°52'18"	7.0	20:25	22:54	01:24	easy
M 47	Open	Pup	07h36m35.0s	-14°29'00"	4.3	20:29	22:54	01:20	obvious
NGC 2439	Open	Pup	07h40m45.0s	-31°41'36"	7.1	20:46	22:58	01:10	detectable
M 46	Open	Pup	07h41m46.0s	-14°48'36"	6.6	20:36	22:59	01:23	detectable
NGC 2440	PNe	Pup	07h41m55.4s	-18°12'31"	11.5	21:00	22:59	00:58	detectable
M 93	Open	Pup	07h44m30.0s	-23°51'24"	6.5	22:04	23:01	23:59	easy
NGC 2451	Open	Pup	07h45m23.0s	-37°57'21"	3.7	21:05	23:02	01:01	easy
NGC 2477	Open	Pup	07h52m10.0s	-38°31'48"	5.7	21:18	23:09	01:01	easy
NGC 2506	Open	Mon	08h00m01.0s	-10°46'12"	8.9	21:18	23:17	01:18	difficult
NGC 2547	Open	Vel	08h10m09.0s	-49°12'54"	5.0	22:53	23:28	00:00	challenging
NGC 2546	Open	Pup	08h12m15.0s	-37°35'42"	5.2	22:15	23:29	00:44	difficult
NGC 2571	Open	Pup	08h18m56.0s	-29°45'00"	7.4	21:18	23:36	01:54	detectable
M 44	Open	Cnc	08h40m24.0s	+19°40'00"	3.9	19:53	23:58	04:02	easy
IC 2395	Open	Vel	08h42m30.0s	-48°06'48"	4.6	23:04	00:00	00:55	detectable
M 67	Open	Cnc	08h51m18.0s	+11°48'00"	7.4	21:07	00:08	03:09	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	18:59	01:13	05:39	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	19:20	01:13	05:37	detectable
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	23:34	01:23	03:15	easy
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	23:34	01:23	03:15	easy
NGC 3227	Gal	Leo	10h23m30.6s	+19°51'54"	11.5	22:30	01:41	04:51	difficult
NGC 3242	PNe	Hya	10h24m46.1s	-18°38'32"	8.6	23:46	01:41	03:37	obvious
M 97	PNe	UMa	11h14m47.7s	+55°01'09"	9.7	22:01	02:32	05:36	detectable
M 65	Gal	Leo	11h18m55.7s	+13°05'32"	10.1	23:07	02:36	05:35	detectable
M 66	Gal	Leo	11h20m14.9s	+12°59'30"	9.7	23:08	02:37	05:34	detectable
M 106	Gal	CVn	12h18m57.6s	+47°18'13"	9.1	23:27	03:35	05:38	detectable
Col 256	Open	Com	12h25m06.0s	+26°06'00"	2.9	23:25	03:41	05:42	easy
M 84	Gal	Vir	12h25m03.9s	+12°53'12"	10.1	00:22	03:42	05:39	detectable

<b>ID</b>	<b>Cls</b>	<b>Con</b>	<b>RA 2000</b>	<b>Dec 2000</b>	<b>Mag</b>	<b>Begin</b>	<b>Best</b>	<b>End</b>	<b>Difficulty</b>
M 86	Gal	Vir	12h26m12.2s	+12°56'44"	9.8	00:38	03:43	05:36	detectable
M 87	Gal	Vir	12h30m49.2s	+12°23'29"	9.6	00:26	03:48	05:37	detectable
NGC 4565	Gal	Com	12h36m20.8s	+25°59'15"	10.1	00:33	03:53	05:37	difficult
M 94	Gal	CVn	12h50m53.1s	+41°07'12"	8.7	23:36	04:07	05:42	detectable
M 51	Gal	CVn	13h29m52.3s	+47°11'40"	8.7	00:00	04:46	05:43	easy
NGC 5195	Gal	CVn	13h29m59.6s	+47°15'58"	10.5	00:40	04:46	05:40	detectable
M 101	Gal	UMa	14h03m12.4s	+54°20'53"	8.4	01:08	05:05	05:39	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/](http://www.avastronomyclub.org/)

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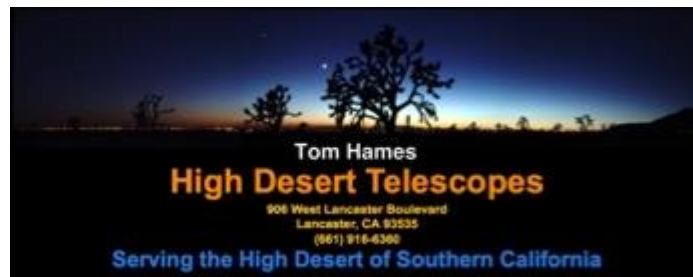


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