



# Desert Sky Observer

Volume 37

Antelope Valley Astronomy Club Newsletter

June 2017

## Up-Coming Events

June 9: Club Meeting\*

June 24: [Dark Sky Star Party](#)

June 30: [Lunar Club for Members](#)

\* 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

The night is filled with desert stars,  
stars cast across the sky.

The sky as deep as the canyons,  
canyons filled with desert cries.  
from Cowboy Poetry, The Gathering  
By Michael Whitaker

On Friday and Saturday nights, May 26 and 27, the sky was truly filled with desert stars at our star party and public outreach event at the Ricardo Campground at Red Rock Canyon State Park. Unfortunately, on Friday the night was also filled with desert wind, which prevented us from doing any serious observing.

Fortunately the wind calmed down on Saturday the 27th and we were able to share daytime views through our solar telescopes with at least 60 campers and hikers who stopped by throughout the day. Before they left we gave most of them eclipse glasses for the August 21 solar eclipse and literature about the event. We also shared solar viewing with dozens of campers on Friday the 26th but the numbers were decreased somewhat as people largely stayed sheltered from the desert wind.

Our display board, with information about the weekend's night sky, the coming solar eclipse, and the Antelope Valley Astronomy Club and our activities, was displayed in the theater at the Red Rock Canyon State Park Visitor's Center and Museum alongside a looping video of "California's Gold" with Huell Howser as he visited the park. Many people who later visited our telescopes did so after seeing the display.

At sunset on Saturday, I gave a PowerPoint presentation, which was attended by 25 people, in the park's outdoor amphitheater about dark sky preservation and the effect of light pollution on human health, animal health, and our enjoyment of the night sky. Meanwhile, back at camp, Rose, Darrell Bennett, Jim Pendleton and Kennedy, Rod Girard, Ann C were already sharing the night with the public on a variety of telescopes. After the amphitheater presentation I joined them as we shared views of Jupiter, Saturn, and a selection of galaxies, nebulae and open and globular clusters. As is her usual custom, Rose had Rose glow sticks for our visitors and we distributed more eclipse shades and literature.

Though we tried to tell them that the “best stuff doesn’t come out till later”, most of the public had left by 11:00 pm though we had a few lucky souls who wandered in and out of our camp after midnight and thus got to see the good stuff. The Milky Way was gorgeous throughout the night though not quite as good as it had been at Red Cliffs during our April Dark Sky Star Party.

I went to extend my heartfelt thanks to all of our members who came out to help at this event. Between us I think we had three Schmidt-Cassegrain telescopes, three dobsonian reflectors and one refractor so we had a variety of technologies to tell people about as well. The Tehachapi District of California State Parks is good to us, in allowing us to use their facilities for our star parties, and I am pleased that we were able to return the favor in such a meaningful way.

As I’ve noted previously, I will be watching weather and wildfire trends to assist in selecting a location for our June 24 Dark Sky Star Party. Many people have expressed a desire to return to Red Cliffs but if the heat is stifling we’ll opt for a mountain location like Chuchupate or Mount Pinos.

Our speaker for the June 9 meeting at the SAGE Planetarium is Dr. Eric Becklin from the SOFIA airborne observatory. Rose makes further mention of this in her DSO article and this is a meeting you won’t want to miss. Also, remember to keep your calendars clear for the July 22 “Star-B-Que” and public star party at the Brite Lake Recreational Area near Tehachapi. This is always a great event with good food, good fellowship, and beautiful skies. Don’t miss it!



## **Secretary**

### **Rose Moore**

We will be having a speaker at our meeting on Friday, June 9th! Our speaker will be Dr. Eric Becklin, from the SOFIA program, the Stratospheric Observatory for Infrared Astronomy. He will be speaking on SOFIA: Overview and First Science Results. Dr. Becklin is currently the Chief Science Advisor on SOFIA, and is one of the pioneers of Infrared Astronomy. He has over 50 years experience, and is a graduate of the California Institute of Technology. He was involved in the design and construction of the NASA Infrared Telescope Facility, a 3 meter telescope, located at the summit of Mauna Kea, Hawaii, and served as it's first director. He was also was a principal investigator for two experiments on NASA's Kuiper Airborne Observatory between 1981 and 1988. Dr. Becklin is an emeritus professor in the Department of Physics and Astronomy at UCLA.

Our summer picnic, Star-B-Que, is coming up on Saturday July 22nd. This will start Saturday afternoon, followed by a public star party that evening. We will have the facility until early Sunday morning. If anyone would like to bring a potluck dish, it would be appreciated, but not necessary. The club will be supplying the meat, buns, drinks, etc as in the past. We will have a sign up sheet at our meeting, or you can notify me via email, so that we will have an approximate number of those attending. More info to follow.

We have a Prime Desert Moon Walk on Saturday June 3rd, and also on Saturday July 15th, both at 8:30pm. Please come out and support Jeremy and our club at these events. Weather permitting.

On Friday June 28th, we will be having our first Lunar Club meeting/viewing at 7pm, headed by Matt Leone. This will be at member Judy Fuentes home in Antelope Acres. More info to follow.

## Space Place

### The Fizzy Seas of Titan

By Marcus Woo

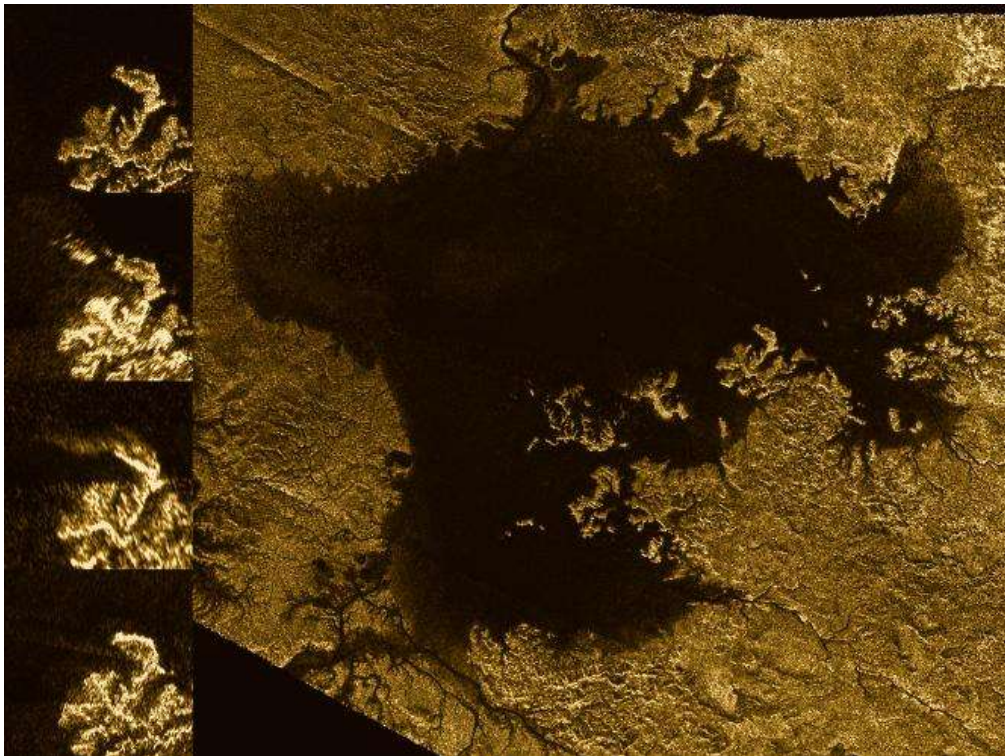
With clouds, rain, seas, lakes and a nitrogen-filled atmosphere, Saturn's moon Titan appears to be one of the worlds most similar to Earth in the solar system. But it's still alien; its seas and lakes are full not of water but liquid methane and ethane.

At the temperatures and pressures found on Titan's surface, methane can evaporate and fall back down as rain, just like water on Earth. The methane rain flows into rivers and channels, filling lakes and seas.

Nitrogen makes up a larger portion of the atmosphere on Titan than on Earth. The gas also dissolves in methane, just like carbon dioxide in soda. And similar to when you shake an open soda bottle, disturbing a Titan lake can make the nitrogen bubble out.

But now it turns out the seas and lakes might be fizzier than previously thought. Researchers at NASA's Jet Propulsion Laboratory recently experimented with dissolved nitrogen in mixtures of liquid methane and ethane under a variety of temperatures and pressures that would exist on Titan. They measured how different conditions would trigger nitrogen bubbles. A fizzy lake, they found, would be a common sight.

On Titan, the liquid methane always contains dissolved nitrogen. So when it rains, a methane-nitrogen solution pours into the seas and lakes, either directly from rain or via stream runoff. But if the lake also contains some ethane—which doesn't dissolve nitrogen as well as methane does—mixing the liquids will force some of the nitrogen out of solution, and the lake will effervesce.



*Radar images from Cassini showed a strange island-like feature in one of Titan's hydrocarbon seas that appeared to change over time. One possible explanation for this "magic island" is bubbles.  
Image credits: NASA/JPL-Caltech/ASI/Cornell*

"It will be a big frothy mess," says Michael Malaska of JPL. "It's neat because it makes Earth look really boring by comparison."

Bubbles could also arise from a lake that contains more ethane than methane. The two will normally mix, but a less-dense layer of methane with dissolved nitrogen—from a gentle rain, for example—could settle on top of an ethane layer.

In this case, any disturbance—even a breeze—could mix the methane with dissolved nitrogen and the ethane below. The nitrogen would become less soluble and bubbles of gas would fizz out.

Heat, the researchers found, can also cause nitrogen to bubble out of solution while cold will coax more nitrogen to dissolve. As the seasons and climate change on Titan, the seas and lakes will inhale and exhale nitrogen.

But such warmth-induced bubbles could pose a challenge for future sea-faring spacecraft, which will have an energy source, and thus heat. "You may have this spacecraft sitting there, and it's just going to be fizzing the whole time," Malaska says. "That may actually be a problem for stability control or sampling."

Bubbles might also explain the so-called magic islands discovered by NASA's Cassini spacecraft in the last few years. Radar images revealed island-like features that appear and disappear over time. Scientists still aren't sure what the islands are, but nitrogen bubbles seem increasingly likely.

To know for sure, though, there will have to be a new mission. Cassini is entering its final phase, having finished its last flyby of Titan on April 21. Scientists are already sketching out potential spacecraft—maybe a buoy or even a submarine—to explore Titan's seas, bubbles and all.

To teach kids about the extreme conditions on Titan and other planets and moons, visit the NASA Space Place: <https://spaceplace.nasa.gov/planet-weather/>

## News Headlines

### **Cassini Finds Saturn Moon May Have Tipped Over**

Saturn's icy, ocean-bearing moon Enceladus may have tipped over in the distant past, according to recent research from NASA's Cassini mission. Researchers with the mission found evidence that the moon's spin axis -- the line through the north and south poles -- has reoriented, possibly due to a collision with a smaller body, such as an asteroid.

<https://goo.gl/rbl6gN>

### **High-Silica 'Halos' Shed Light on Wet Ancient Mars**

Pale "halos" around fractures in bedrock analyzed by NASA's Curiosity Mars rover contain copious silica, indicating that ancient Mars had liquid water for a long time. "The concentration of silica is very high at the centerlines of these halos," said Jens Frydenvang, a rover-team scientist at Los Alamos National Laboratory in New Mexico, and the University of Copenhagen in Denmark. "What we're seeing is that silica appears to have migrated between very old sedimentary bedrock and into younger overlying rocks."

<https://www.jpl.nasa.gov/news/news.php?feature=6859>

### **NASA's Parker Solar Probe mission will revolutionize understanding of the sun..**

Parker Solar Probe will swoop to within 4 million miles of the sun's surface, facing heat and radiation like no spacecraft before it. Launching in 2018, Parker Solar Probe will provide new data on solar activity and make critical contributions to our ability to forecast major space-weather events that impact life on Earth. Parker Solar Probe is an extraordinary and historic mission exploring arguably the last and most important region of the solar system to be visited by a spacecraft to finally answer top-priority science goals for over five decades.

<http://solarprobe.jhuapl.edu/>

### **NASA to Launch First-Ever Neutron-Star Mission**

Nearly 50 years after British astrophysicist Jocelyn Bell discovered the existence of rapidly spinning neutron stars, NASA will launch the world's first mission devoted to studying these unusual objects. The agency also will use the same platform to carry out the world's first demonstration of X-ray navigation in space. The agency plans to launch the two-in-one Neutron Star Interior Composition Explorer, or NICER, aboard SpaceX CRS-11, a cargo resupply mission to the International Space Station to be launched aboard a Falcon 9 rocket.

<https://goo.gl/jWwfCb>

## June Sky Data

**Best time for deep sky observing this month:  
June 16 through June 25**

**Mercury** is lost in the glare of the Sun for most of the month before it makes a modest evening apparition in July. It might just be spotted with binoculars very low in the west after sunset at the very end of the month.

**Venus** is visible in the east before dawn this month, reaching its greatest elongation on the 3rd of June. It's magnitude dims slightly during the month from -4.3 to -4.1 as its angular diameter shrinks from ~24 to 18 arc seconds. However, at the same time, its illuminated phase increases from 48 to 62%, which explains why the magnitude does not drop too much.

Following a two year long apparition, **Mars** finally slips into the Sun's glare in the first week of June when its salmon-pink disk might just be picked out in the west-northwest.

Now two months after opposition, **Jupiter** still dominates the late evening sky shining in the south to southwest after nightfall. It sets at about 3 am as June begins and by about 1 am at its end. As the month progresses its brightness falls from -2.3 to -2.0 magnitudes as its angular size falls from 41 to 37 arc seconds.

**Saturn** comes into opposition on June 11th and will be visible throughout the short night. It shines at around magnitude 0.1 all month and has an angular size of 18.3 arc seconds. With an angle of 26.5 degrees inclination to the line of sight the rings are virtually as open as they ever can be.

There are no significant **meteor-showers** in June.

First Qtr Jun 1      Full Jun 9      Last Qtr Jun 17      New Jun 23



## Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
6/1/2017	13:57	02:20	06:40	20:59
6/5/2017	17:42	04:32	06:39	21:02
6/10/2017	22:04	07:42	06:38	21:04
6/15/2017	-----	12:09	06:38	21:06
6/20/2017	03:57	17:24	06:39	21:07
6/25/2017	08:30	22:46	06:40	21:08
6/30/2017	13:44	01:29	06:42	21:08

## Planet Data

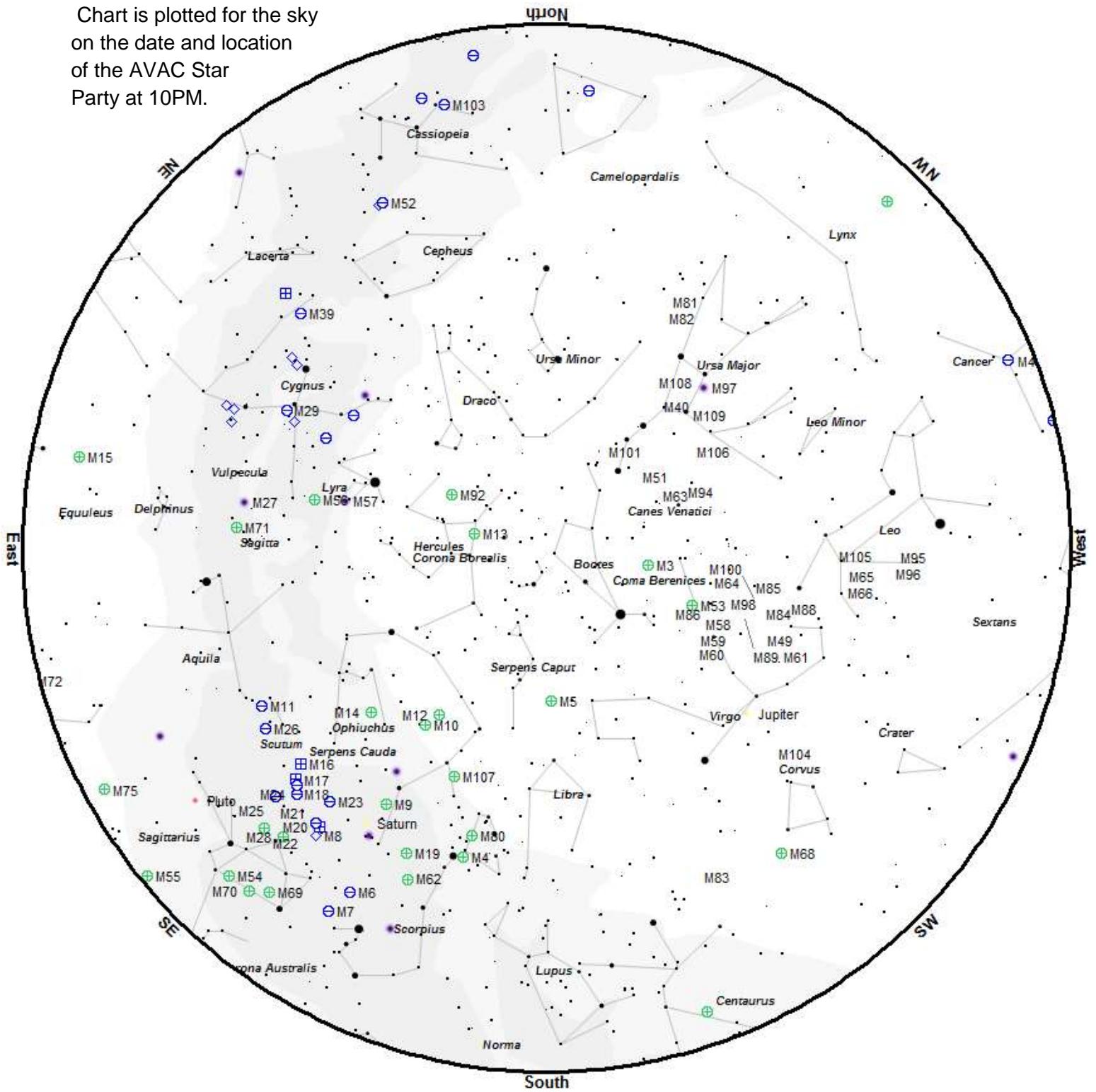
	Jun 1			
	Rise	Transit	Set	Mag
<b>Mercury</b>	04:33	11:29	18:21	-0.4
<b>Venus</b>	03:17	09:48	16:18	-4.3
<b>Mars</b>	06:38	14:01	21:23	1.7
<b>Jupiter</b>	15:03	20:59	02:55	-2.3
<b>Saturn</b>	20:45	01:48	06:51	0.1

	Jun 15			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:06	12:21	19:41	-1.6
<b>Venus</b>	03:03	09:46	16:29	-4.2
<b>Mars</b>	06:24	13:47	21:08	1.7
<b>Jupiter</b>	14:08	20:04	02:00	-2.2
<b>Saturn</b>	19:45	00:48	05:51	0.0

	Jun 31			
	Rise	Transit	Set	Mag
<b>Mercury</b>	06:27	13:43	21:04	-1.1
<b>Venus</b>	02:54	09:50	16:46	-4.1
<b>Mars</b>	06:11	13:30	20:48	1.7
<b>Jupiter</b>	13:12	19:07	01:02	-2.1
<b>Saturn</b>	18:41	23:45	04:48	0.1

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. 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.

Cls	ID	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
Gal	NGC 5128	Cen	13h25m27.7s	-43°01'07"	7.8	21:21	21:39	22:08	challenging
Gal	M 83	Hya	13h37m00.8s	-29°51'56"	7.8	21:31	21:50	22:40	detectable
QSO	3C 273.0	Vir	12h29m06.7s	+02°03'08"	12.8	21:27	21:51	22:44	difficult
QSO	3C 273.0	Vir	12h29m06.7s	+02°03'08"	12.8	21:27	21:51	22:44	difficult
Gal	M 65	Leo	11h18m55.7s	+13°05'32"	10.1	21:34	21:52	22:06	detectable
Gal	M 104	Vir	12h39m59.3s	-11°37'22"	9.1	21:32	21:52	22:00	detectable
Gal	M 66	Leo	11h20m14.9s	+12°59'30"	9.7	21:36	21:53	22:07	detectable
Gal	M 49	Vir	12h29m46.8s	+08°00'01"	9.3	21:34	21:56	23:01	detectable
Gal	M 86	Vir	12h26m12.2s	+12°56'44"	9.8	21:37	21:57	22:52	detectable
Gal	M 84	Vir	12h25m03.9s	+12°53'12"	10.1	21:35	21:57	23:02	detectable
Gal	M 87	Vir	12h30m49.2s	+12°23'29"	9.6	21:36	21:57	23:06	detectable
Gal	NGC 4565	Com	12h36m20.8s	+25°59'15"	10.1	21:37	21:59	23:09	difficult
Open	Col 256	Com	12h25m06.0s	+26°06'00"	2.9	21:33	22:00	23:44	easy
Gal	M 64	Com	12h56m43.8s	+21°41'00"	9.3	21:33	22:00	23:43	detectable
PNe	M 97	UMa	11h14m47.7s	+55°01'09"	9.7	21:38	22:01	23:24	detectable
Gal	M 82	UMa	09h55m52.4s	+69°40'47"	9.0	21:37	22:02	23:03	detectable
Gal	M 81	UMa	09h55m33.1s	+69°03'56"	7.8	21:37	22:02	22:59	detectable
Gal	M 106	CVn	12h18m57.6s	+47°18'13"	9.1	21:37	22:02	23:41	detectable
Gal	M 94	CVn	12h50m53.1s	+41°07'12"	8.7	21:34	22:03	00:16	detectable
Glob	M 3	CVn	13h42m11.0s	+28°22'42"	6.3	21:32	22:04	00:35	easy
Gal	NGC 5195	CVn	13h29m59.6s	+47°15'58"	10.5	21:36	22:06	00:23	detectable
Gal	M 51	CVn	13h29m52.3s	+47°11'40"	8.7	21:33	22:06	00:59	easy
Gal	M 101	UMa	14h03m12.4s	+54°20'53"	8.4	21:38	22:09	00:53	detectable
Glob	NGC 5897	Lib	15h17m24.0s	-21°00'36"	8.4	21:39	22:09	23:31	challenging
Glob	M 5	Ser	15h18m34.0s	+02°05'00"	5.7	21:32	22:14	01:19	easy
Glob	NGC 5986	Lup	15h46m03.0s	-37°47'12"	7.6	21:38	22:25	23:36	difficult
Glob	M 80	Sco	16h17m02.0s	-22°58'30"	7.3	21:43	22:55	00:06	detectable
Open	NGC 6124	Sco	16h25m20.0s	-40°39'12"	6.3	21:35	23:04	00:44	challenging
Open	NGC 6167	Nor	16h34m34.0s	-49°46'18"	6.6	22:50	23:13	23:36	challenging
Open	NGC 6178	Sco	16h35m47.0s	-45°38'36"	7.2	22:13	23:14	00:15	detectable
Glob	M 13	Her	16h41m41.0s	+36°27'36"	5.8	21:32	23:19	03:45	easy
Open	NGC 6193	Ara	16h41m20.0s	-48°45'48"	5.4	22:44	23:20	23:57	difficult
Glob	M 12	Oph	16h47m14.0s	-01°56'48"	6.1	21:32	23:25	02:43	easy
Glob	M 10	Oph	16h57m09.0s	-04°06'00"	6.6	21:38	23:35	02:25	detectable
Glob	M 62	Oph	17h01m13.0s	-30°06'48"	6.4	21:48	23:39	01:36	detectable
Glob	M 19	Oph	17h02m38.0s	-26°16'06"	6.8	21:49	23:41	01:36	detectable
Glob	M 92	Her	17h17m07.0s	+43°08'12"	6.5	21:35	23:54	04:03	easy
Glob	M 9	Oph	17h19m12.0s	-18°31'00"	7.8	22:00	23:57	01:54	difficult



Cls	ID	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
Open	NGC 6322	Sco	17h18m25.0s	-42°56'00"	6.5	22:28	23:57	01:26	easy
Open	NGC 6383	Sco	17h34m48.0s	-32°34'00"	5.4	22:06	00:13	02:19	easy
Glob	NGC 6388	Sco	17h36m17.0s	-44°44'06"	6.8	23:27	00:15	01:02	challenging
Glob	M 14	Oph	17h37m36.0s	-03°14'48"	7.6	21:44	00:15	03:01	detectable
Open	M 6	Sco	17h40m20.0s	-32°15'12"	4.6	22:00	00:18	02:37	easy
Open	IC 4665	Oph	17h46m18.0s	+05°43'00"	5.3	21:48	00:24	03:16	detectable
Open	M 7	Sco	17h53m51.0s	-34°47'36"	3.3	22:37	00:32	02:27	detectable
Open	M 23	Sgr	17h57m04.0s	-18°59'06"	5.9	22:41	00:34	02:30	detectable
PNe	NGC 6543	Dra	17h58m33.4s	+66°37'59"	8.3	21:23	00:36	04:23	obvious
Open	M 20	Sgr	18h02m42.0s	-22°58'18"	5.2	23:28	00:41	01:53	easy
Open	M 21	Sgr	18h04m13.0s	-22°29'24"	7.2	23:24	00:42	02:00	detectable
Neb	M 8	Sgr	18h04m02.0s	-24°23'14"	5.0	23:54	00:42	01:30	easy
Glob	NGC 6541	CrA	18h08m02.0s	-43°42'54"	6.3	23:56	00:46	01:36	challenging
PNe	NGC 6572	Oph	18h12m06.4s	+06°51'12"	8.0	21:20	00:49	04:26	obvious
Open	M 16	Ser	18h18m48.0s	-13°48'24"	6.5	22:28	00:57	03:26	obvious
Open	M 18	Sgr	18h19m58.0s	-17°06'06"	7.5	22:50	00:58	03:07	easy
Open	M 17	Sgr	18h20m47.0s	-16°10'18"	7.3	22:56	00:59	03:01	difficult
Glob	M 28	Sgr	18h24m33.0s	-24°52'12"	6.9	00:27	01:02	01:39	detectable
Open	NGC 6633	Oph	18h27m15.0s	+06°30'30"	5.6	21:40	01:05	04:12	easy
Open	M 25	Sgr	18h31m47.0s	-19°07'00"	6.2	23:16	01:09	03:03	detectable
Glob	M 22	Sgr	18h36m24.0s	-23°54'12"	5.2	00:17	01:14	02:11	detectable
Open	IC 4756	Ser	18h39m00.0s	+05°27'00"	5.4	21:59	01:17	04:06	easy
Glob	M 70	Sgr	18h43m13.0s	-32°17'30"	7.8	23:42	01:21	03:01	detectable
Open	M 11	Sct	18h51m05.0s	-06°16'12"	6.1	22:36	01:29	04:04	detectable
PNe	M 57	Lyr	18h53m35.1s	+33°01'45"	9.4	21:38	01:31	04:17	easy
Open	NGC 6716	Sgr	18h54m34.0s	-19°54'06"	7.5	23:46	01:32	03:18	detectable
Glob	M 54	Sgr	18h55m03.0s	-30°28'42"	7.7	00:04	01:33	03:02	difficult
Glob	NGC 6723	Sgr	18h59m33.0s	-36°37'54"	6.8	00:12	01:37	03:04	detectable
Glob	M 56	Lyr	19h16m36.0s	+30°11'06"	8.4	22:30	01:54	04:08	detectable
Glob	M 71	Sge	19h53m46.0s	+18°46'42"	8.4	22:36	02:31	04:17	easy
PNe	M 27	Vul	19h59m36.3s	+22°43'16"	7.3	22:38	02:37	04:15	easy
Open	NGC 6871	Cyg	20h05m59.0s	+35°46'36"	5.8	22:21	02:43	04:16	easy
Open	NGC 6910	Cyg	20h23m12.0s	+40°46'42"	7.3	22:25	03:00	04:16	easy
Open	M 29	Cyg	20h23m57.0s	+38°30'30"	7.5	22:37	03:00	04:16	easy
Neb	IC 1396	Cep	21h39m06.0s	+57°30'00"		23:11	03:32	04:14	challenging
Open	M 39	Cyg	21h31m48.0s	+48°26'00"	5.3	23:04	03:33	04:17	easy
Open	NGC 7160	Cep	21h53m40.0s	+62°36'12"	6.4	22:27	03:34	04:20	obvious
Neb	IC 5146	Cyg	21h53m24.0s	+47°16'00"	10.0	23:34	03:36	04:17	challenging
Open	NGC 7243	Lac	22h15m08.0s	+49°53'54"	6.7	00:33	03:38	04:13	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

**P.O. BOX 8545,  
LANCASTER, CA 93539-8545**

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

The Antelope Valley Astronomy Club, Inc. is a 501(c)(3) Non-Profit Corporation.

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

## Board Members

### President:

Frank Moore (661) 972-4775  
[president@avastronomyclub.org](mailto:president@avastronomyclub.org)

### Vice-President:

Vacant  
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### Secretary:

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