ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 30 *Antelope Valley Astronomy Club Newsletter* **May 2010**

Up-Coming Events

May 7: Club Meeting* **Note: This month's meeting is a week early due to RTMC.**
May 8: Moon Walk @ Prime Desert Woodlands
May 10: Executive Board Meeting
May 12-16: RTMC

* Monthly meetings are held at the S.A.G.E. Planetarium on the Cactus School campus in Palmdale, the second Friday of each month. The meeting location is at the northeast corner of Avenue R and 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

Don Bryden

After a very cloudy day, Saturday night at Red Cliffs turned out to be excellent: no wind and clear, steady skies. It was nice to see some new faces out at a star party, too. Earlier in April a few of us went to Joshua Tree to offer a star party for a YMCA group. With four scopes set up there seemed to be endless lines at each of them for quite some time. It was a really nice time despite the fact that I had to leave my RV down at the ranger station as it was too large for the campsite parking. <inside joke>We all squeezed into Frank's RV for the night as his smallish motorhome was able to easily fit into one of the compact parking spots </inside joke>

In the coming months we will be offering some great observing opportunities. First we will be heading to Big Bear for RTMC. There will be four nights of dark skies for observing plus numerous vendors, raffles and swap-meet'ers . In June we hope to start our summer observing up at Mt. Pinos (if the snow is gone by then!). Also be sure to come out for our annual Star-be-que in July and in August we'll be heading up to Mt. Wilson for a night of observing on the 60" Hale telescope plus a tour of the 100" Hooker telescope.

There will also be a few other trips to Mt. Pinos as well so I'm definitely looking forward to summertime observing and I hope you all are too!

Vice President

Doug Drake

Hi all, I'm sorry I wasn't at the last meeting, but as most of you know I flew my airplane up to Spokane and Seattle for a vacation. My vacation was really great except for the lightening strike on the nose of my airplane when I was making my instrument approach (I was flying in clouds with a trace of ice) into the Seattle area for landing. Both the airplane and I made it

through OK. So, I'll be with you at our next meeting which will be the 7th of May, note that this meeting shall be the first Friday of the month. Nagin Cox will once again give a presentation on NASA JPL activities. She has been faithful in providing talks to us throughout the yeas. She is a Scientist at JPL and her talks have always been the best ever. I look forward to seeing all of you and to hear Nagin give a talk for us. Keep look up, the stars are beautiful, Doug

Director of Community Development

Rose Moore

Many thanks to those who came out to the Joshua Tree event arranged by Don! We had a large group of YMCA Princesses and their dads. They observed several objects through the telescopes, and were given handouts and planispheres to take home. We all had a good time, and hope to return to Joshua Tree for a club star party!

Coming up in May, don't forget our monthly club meeting is on Friday, May 7th for this month only, because of RTMC. We have a Prime Desert Woodlands Moon Walk with Jeremy on Saturday, May 8th at 8:30 pm. Please come out and enjoy this event, bring your telescope or just come out to enjoy the walk with Jeremy and the public. Also in May, don't forget Jeremy's class at the SAGE, SAGE Observations. This month is 'Stars, Clusters, and Galaxies'. Please check the website for the date and time.

June starts off with a PDW Moon Walk with Jeremy on Saturday June 5th, time to be announced.

In the future we have some events coming up including the day star party at Highland High School in Palmdale for Lockheed Martin employee's kids. More info to follow as it approaches. Look for upcoming emails soon regarding attending Mt. Wilson on August 7th, for those who signed up.

Come on out and support your club!

Rose

The Eye and How It Works when Viewing Faint Astronomical Objects

The eye has an amazing ability to see detail and perceive contrast in both very bright and very dim objects.

Dark Adaptation

The physiology of dark adaptation is complex. The phenomenon of adaptation is highly dependent upon the individual viewer. So, as with all biological effects, only average behavior can be specified. In its simplest form, it is a fact that a viewer's ability to perceive light changes and gets better if the eye is allowed to remain in the dark for some time. This is a chemical effect in the retina of the eye. (Too complex to describe here) Never-the-less everyone experiences this effect. Typically the change in sensitivity is from 2 to 6 magnitudes after 20 to 30 minutes of darkness. It may vary greatly from person to person for reasons related to physical condition of the eye. Typical variations for persons with otherwise normal sight are about 2 magnitudes.

These numbers mean that the sensitivity of the eye may increase after 30 minutes in the dark by as much as 250 times (6 magnitudes). That is a large change and improvement in perceiving dim objects. Brief

exposure to bright lights wipes out this improvement almost immediately. Thus viewers should shield their eyes from any light while viewing and especially from very actinic light. Dim red light is the least damaging but even that causes considerable decrease in acuity. Adaptation also depends on the size of a spot of light shown on the retina in a complex way. The best advice is to severely limit exposure of the retina to any light at all so as to retain maximum brightness acuity. An eye patch over the viewing eye is not inappropriate.

These numbers and variations from person to person show why some viewers claim to see Mag 8 stars regularly while other have trouble seeing Mag 4 stars under similar conditions. People's brightness acuity simply varies by a great deal and may depend significantly on the use of tobacco, alcohol and other chemicals. On a broad average, most persons can see Mag 6 stars on a clear dark night.

The Structure of the Retina of the Eye

The structure of eye is complex, here are outlined only a few factors that directly affect astronomical viewing. The very center of viewing, that is, the point in space that attracts our direct attention when we “look at” an object is focused on a region of the eye called the fovea centralis. This portion of the eye, only a few degrees in angular size, is crammed with visual cones. The cones have the ability to see color but are not highly sensitive to brightness. Immediately surrounding the fovea centralis is a large ring of receptors called rods. The rods have little sensitivity to color but are quite sensitive to brightness. They see in black and white (actually gray). There are, of course, some cones mixed in with the rods so color is perceived everywhere on the retina; but only when the excitation is sufficiently bright. The rods are about 4 magnitudes more sensitive to light than the cones.

There is a spot about 15 to 18 degrees to the nasal side of the retina where the optic nerve enters the eye and is attached to the retina. This spot is blind and may be a couple of degrees in diameter. Notice that since the spot is to the nasal side, the blind region on the surface being observed is in the temporal direction because the lens of the eye turns the image upside down and left to right. But it is important to recognize that when viewing objects they should not be viewed is such a way as to place them on the blind spot.

On the other hand, to the temporal side of the retina, especially at 15 to 20 degrees distance, there are an abundance of cones. This makes the region 15to 20 degrees to the temporal side of the retina very sensitive to brightness. Thus astronomers use what is called “averted” vision. By forcing the eye to concentrate attention just a bit in the temporal direction, the object is moved onto the region of the eye with the greatest brightness sensitivity. As one eye moves the object into the region of greater sensitivity the other eye moves the object into the blind spot. But viewing is generally done with one eye and whichever eye is used, moving the center of attention toward the temporal side does the desired function.

It is also necessary, when using averted vision to hold the object on the sensitive spot for some time to get the full effect of averted vision. A period of 4 to 7 seconds is usually optimal.

Thus, it requires concentration and practice to use averted vision techniques successfully. However, it is worthwhile to practice this technique since the increase in brightness sensitivity is considerable. Dim extended objects will pop into view that are totally invisible when looking directly at them. It is definitely worth applying the viewing tactics described above since viewers need all the help possible to see faint extended objects with some reasonable detail. Viewing the “faint fuzzies” takes practice but is well worth the effort.

Space Place

A Rock Hound is Born

It's tough to be a geologist when you can't tell one rock from another. Is that a meteorite or a chunk of lava? A river rock or an impact fragment? Houston, we have a problem!

It's a problem Spirit and Opportunity have been dealing with for the past six years. The two rovers are on a mission to explore the geology of the Red Planet, yet for the longest time they couldn't recognize interesting rocks without help from humans back on Earth.

Fortunately, it is possible to teach old rovers new tricks. All you have to do is change their programming—and that's just what NASA has done.

"During the winter, we uploaded new software to Opportunity," says Tara Estlin, a rover driver, senior member of JPL's Artificial Intelligence Group, and the lead developer of AEGIS, short for Autonomous Exploration for Gathering Increased Science. "AEGIS allows the rover to make some decisions on its own."

Estlin and her team have been working for several years to develop and upload increasingly sophisticated software to the rovers. As a result, the twins have learned to avoid obstacles, identify dust devils, and calculate the distance to reach their arms to a rock.

With the latest upgrade, a rock hound is born.

Now, Opportunity's computer can examine images that the rover takes using its wide-angle navigation camera (NavCam) and pick out rocks with interesting colors or shapes. It can then center its narrower-angle panoramic camera (PanCam) on targets of interest for close-up shots through various color filters. All this happens without human intervention.

The system was recently put to the test; Opportunity performed splendidly.

At the end of a drive on March 4th, the rover settled in for a bit of rock hunting. Opportunity surveyed the landscape and decided that one particular rock, out of more than 50 in the NavCam photo, best met criteria that researchers had set for a target of interest: large and dark.

"It found exactly the target we would want it to find," Estlin says. "It appears to be one of the rocks tossed outward onto the surface when an impact dug a nearby crater."

The new software doesn't make humans obsolete. On the contrary, humans are very much "in the loop," setting criteria for what's interesting and evaluating Opportunity's discoveries. The main effect of the new software is to strengthen the rover-human partnership and boost their combined exploring prowess.

Mindful that Opportunity was only supposed to last about six months after it landed in 2004, Estlin says "it is amazing to see Opportunity performing a brand new autonomous activity six years later."

What will the rock hounds of Mars be up to six years from now? Stay tuned for future uploads!

Learn more about how the AEGIS software works at http://scienceandtechnology.jpl.nasa.gov/newsandevents/newsdetails/?NewsID=677.

News Headlines

M81's "Halo" Sheds Light on Galaxy Formation
Observations with Subaru Telescope's Prime Focus Camera (Suprime-Cam) have revealed an extended structure of the spiral galaxy Messier 81 (M81) that may hold a key to understanding the formation of galaxies. This structure could be M81's halo. Until now, ground-based telescopes have only observed individual stars in the haloes around the Milky Way and Andromeda Galaxies. Differences in M81's extended structure from the Milky Way's halo may point to variations in the formation histories of spiral galaxies.
http://www.naoj.org/Pressrelease/2010/03/18/index.html

Einstein's Theory Fights Off Challengers
Two new and independent studies have put Einstein's General Theory of Relativity to the test like never before. These results, made using NASA's Chandra X-ray Observatory, show Einstein's theory is still the best game in town. Each team of scientists took advantage of extensive Chandra observations of galaxy clusters, the largest objects in the Universe bound together by gravity.
http://www.nasa.gov/mission_pages/chandra/news/10-032.html

Frosty Asteroid May Give Clues About Earth's Oceans
Out in the asteroid belt between Mars and Jupiter, at least one giant space rock seems to be covered in a fine layer of frost. The finding, by two separate teams using an infrared telescope in Hawaii, marks the first time that frozen water has been found on an asteroid. Scientists believe that early in Earth's history, impacts from water-bearing asteroids and comets may have created our planet's oceans.
http://www.npr.org/templates/story/story.php?storyId=126307849&ft=1&f=1026

Small, Ground-Based Telescope Images Three Exoplanets
Astronomers have snapped a picture of three planets orbiting a star beyond our own using a modest-sized telescope on the ground. The surprising feat was accomplished by a team at NASA's Jet Propulsion Laboratory in Pasadena, Calif., using a small portion of the Palomar Observatory's
Hale Telescope, north of San Diego.
http://www.spaceref.com/news/viewpr.html?pid=30596

Research Illuminates the Shape of Dark Matter's Distribution
The nature of dark matter is still unknown and is currently a central problem in modern astronomy and physics. Dark matter is dark in a couple of ways. It is undetectable to visible light and has escaped detection at all electromagnetic wavelengths. Because it is invisible, its existence has to be inferred from its gravitational effect on other celestial objects as well as from theoretical models. Indirect evidence has established its relative abundance in our universe-probably five times greater than visible matter-in addition to its significance for understanding galaxy formation.
http://www.naoj.org/Pressrelease/2010/04/26/index.html

Galaxy Merger Dilemma Solved
Scientists at the Naval Research Laboratory have solved a long-standing dilemma about the mass of infrared bright merging galaxies. Because galaxies are the largest directly observable objects in the universe, learning more about their formation is key to understanding how the universe works.
http://www.sciencedaily.com/releases/2010/04/100419173010.htm

Extraterrestrial Tidbits (ET) by Jeff Riechmann

The month of May in 2010, marks the one-hundredth anniversary of one of Halley's Comet's being visible to the inhabitants of Planet Earth. But this was not an ordinary visit, this was a visit thought by many to bring an end to the world!

Over the years, many people have believed that the sighting of a comet was the signal of impending disaster, thus many people suffered from *Cometophobia*, the fear of comets. In 1066, with the apparition of Halley's Comet, it wasn't long before William the Duke of Normandy crossed the English Channel and defeated King Harold at the Battle of Hastings. Other events blamed on the Curse of Halley's Comet include the Great Flood as told in the bible (2349 B.C.); the Turks conquering Egypt in 1066; the Black Plague of 1665; War between England and France in 1759 and the Indian War in Florida; the fall of the Alamo; and a fire that destroyed 530 buildings in New York City in 1835.

Two discoveries were soon to send the world's cometophobics into a panic. First, scientists in 1910 discovered that the tail of Halley's Comet was made of a gas called cyanogens gas. This gas was extremely poisonous. The discovery didn't excite the public too much. They continued to read about the comets approach in the daily newspapers. The excitement was starting to build. People were rushing out to buy binoculars and telescopes in preparation for the event. All sorts of toys and comet memorabilia were being sold.

It wasn't until sometime later that astronomers made the second discovery. This discovery would cause panic throughout the world. Earth was going to pass through the tail of Halley's Comet during the night of May 18 – 19, the poisonous tail of Halley's Comet! Astronomers told the public that the poisonous gas in the 24-million mile long tail of the comet was so spread out that it wasn't a hazard.

Nonetheless, it was calculated that the world as we know it would end between 10:20 PM and midnight on Wednesday, 18 May 1910.

Suddenly the sale of bottles of oxygen increased as people began to stockpile items. Con artists started selling *Comet Pills* on street corners, which were said to counter the effects of the poison. The pills were very popular! Storm shelters and basements were filled with survival supplies. Public health officials urged everyone to wear helmets. And as the dreaded date approached, the suicide rate dramatically increased.

Paul Hammertone was a miner in the San Bernardino Mountains. Described as a melancholy sort of individual, Hammertone soon learned of the approach of the Comet. He believed that the world was doomed. However, he believed that the world could be saved by one special act. But what that act was escaped him.

After several days of thinking over how to save the world, Hammertone hit upon an idea. He was certain he could save the world. A few days before the dreaded comet was scheduled to destroy all life on earth, Hammertone headed to the mountains. He built a cross. He then took his hammer and several long nails and nailed his feet to the cross. Then he nailed his left hand to the cross. With no means to nail his right hand, Hammertone hung from the cross.

No one is certain how long Hammertone hung on his cross before his friends found him. As they tried to take him down off of the cross he pleaded with them to let him hang, after all, it was for their own good that he was going to save the world! His friends ignored his pleading and removed him from the cross. They took him to a hospital in San Bernardino where his injuries were treated and then he was declared insane.

After earth had passed through the tail of Halley's Comet, many of Hammertone's cometophobic friends declared that the world had been saved by Hammertone's unselfish act of sacrifice.

Hammertone was not the only person to be declared insane as a result of his Cometophobia. Newspaper reports of the day contain numerous stories of people fearing that the end of the world was coming as a result of Halley's Comet. They acted upon this fear, only to be declared insane. There is even a report of a religious cult in Oklahoma planning to sacrifice a virgin in an attempt to appease Halley's Comet, only to have the virgin rescued at the last minute by a local sheriff's posse.

Some did not fear Halley's Comet as others had. These individuals reserved rooms that were offered at many of the more elite hotels around the country. These hotels offered special packages that included viewing areas on their roofs.

The day that the earth would pass through the tail arrived. Thousands of workers would call in sick to spend their last hours with their families. Churches would be crowded with people praying for salvation from the cursed comet. And everyone found a seat outside to watch the comet and await the end of the world.

As earth passed through the tail, it was reported that meteors fell to earth starting forest fires in California and Mexico. A gigantic earthquake shook Costa Rico. Chicken farmers around the world started reporting the hatching of two-headed chickens and 12 of polar explorer Robert Peary's 14 sled dogs dropped dead. Many Englishmen claimed that the comet's passing lead to the death of their King, King Edward VII. Meanwhile Frenchman said it foretold of the flooding of their capital.

Two days later in Bermuda, the soldiers at Fort Hamilton would fire a 101 gun salute to their dead King. As the 101st shot was fired, Halley's Comet flared up and turned the entire sky a blood red. This surely was the signal that with the death of King Edward the world was destined for a world war during the reign of King George.

No discussion of the 1910 visit by Halley's Comet would be complete without the famous connection with author Samuel Clemons, also known as Mark Twain. Clemons was born in 1835 as Halley's Comet passed overhead. He knew that the comet would soon be making another pass; he predicted he would die when it did. Observatories first picked up the comet on April 9. On April 20 the comet would reach perihelion with the Sun. Clemons died the next day.

Not all things associated with Halley's Comet are doom and gloom. In 1976 in London, Brian Harpur founded the Halley's Comet Society. What exactly the goals of the club are were best described in 1983 by Dr. Patrick Moore during the Club's annual meeting, "The Halley's Comet Society has no object, no purpose, no goal, no aim, no raison d'etre, and as such, is rather like the United Nations!" His remarks were answered with cheers and of course, the toasting of champagne!

And so the comet returned again in 1986. The Space Shuttle Challenger blew up during liftoff. The governments of Ferdinand Marcos of the Philippines and Jean-Claude Duvalier were overthrown and they were driven from their countries. And the New York Mets won the World Series.

Many people believe that the comet is cursed. The comet is due to return during the month of July in 2061. If the comet is indeed cursed, what tragedies are we in store for? Will the world once again suffer from an outbreak of Cometophobia?

May Sky Data

Best time for deep sky observing this month:
May 5 through May 15

Mercury is at its greatest distance west of the Sun in late May. But it rises only minutes before the Sun; we're unlikely to see this elusive little planet all month.

Venus is visible in the western sky as soon as it starts to get dark, and doesn't set in the north-west until late in the evening. The "Evening Star" is so brilliant, it can be seen even against a bright twilight sky. Relative to the stars, Venus is moving rapidly eastwards. It leaves Taurus and crosses into Gemini on May 19th, heading a little below the "Twin" stars of Gemini. But Venus far outshines any of the stars.

Mars is high in the south-western sky at dusk, and it doesn't set in the north-west until the sky starts to brighten towards dawn. Relative to the stars, Mars is moving steadily south-eastwards out of the constellation of Cancer into Leo, heading directly towards Regulus (the brightest star in Leo). The "Red Planet" actually shines with a steady orange glow, and it appears brighter than most of the nearby stars.

Jupiter is rising at dawn, and we may glimpse it very low in the south-east just before the Sun rises. The giant planet is less brilliant than Venus, but can still be seen even against a brightening sky. Relative to the stars, Jupiter is moving slowly north-eastwards out of Aquarius and into Pisces.

Saturn is well up in the southern sky at dusk, and doesn't set until just before sunrise. At dusk, it's about the same height above the horizon as Mars, and about the same brightness; but Saturn is some 40 degrees further left, and shines with a whiter light. Saturn is almost stationary this month, at the western end of Virgo, midway between the stars Regulus and Spica, and slightly brighter than either of them.

There are no significant **meteor-showers** for northern-hemisphere observers in May.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
5/1/2009	23:12	08:10	05:57	19:32
5/5/2009	01:14	12:00	05:54	19:35
5/10/2009	03:32	16:41	05:49	19:39
5/15/2009	06:50	21:52	05:45	19:42
5/20/2009	12:22	00:55	05:42	19:46
5/25/2009	17:56	03:42	05:39	19:50
5/31/2009	23:11	08:51	05:37	19:53

Planet Data

May 1

	Rise	Transit	Set	Mag
Mercury	05:40	12:30	19:15	4.8
Venus	07:24	14:39	21:55	-3.9
Mars	12:15	19:18	02:20	0.7
Jupiter	03:54	09:51	15:52	-2.2
Saturn	15:57	22:12	04:26	0.8

May 15

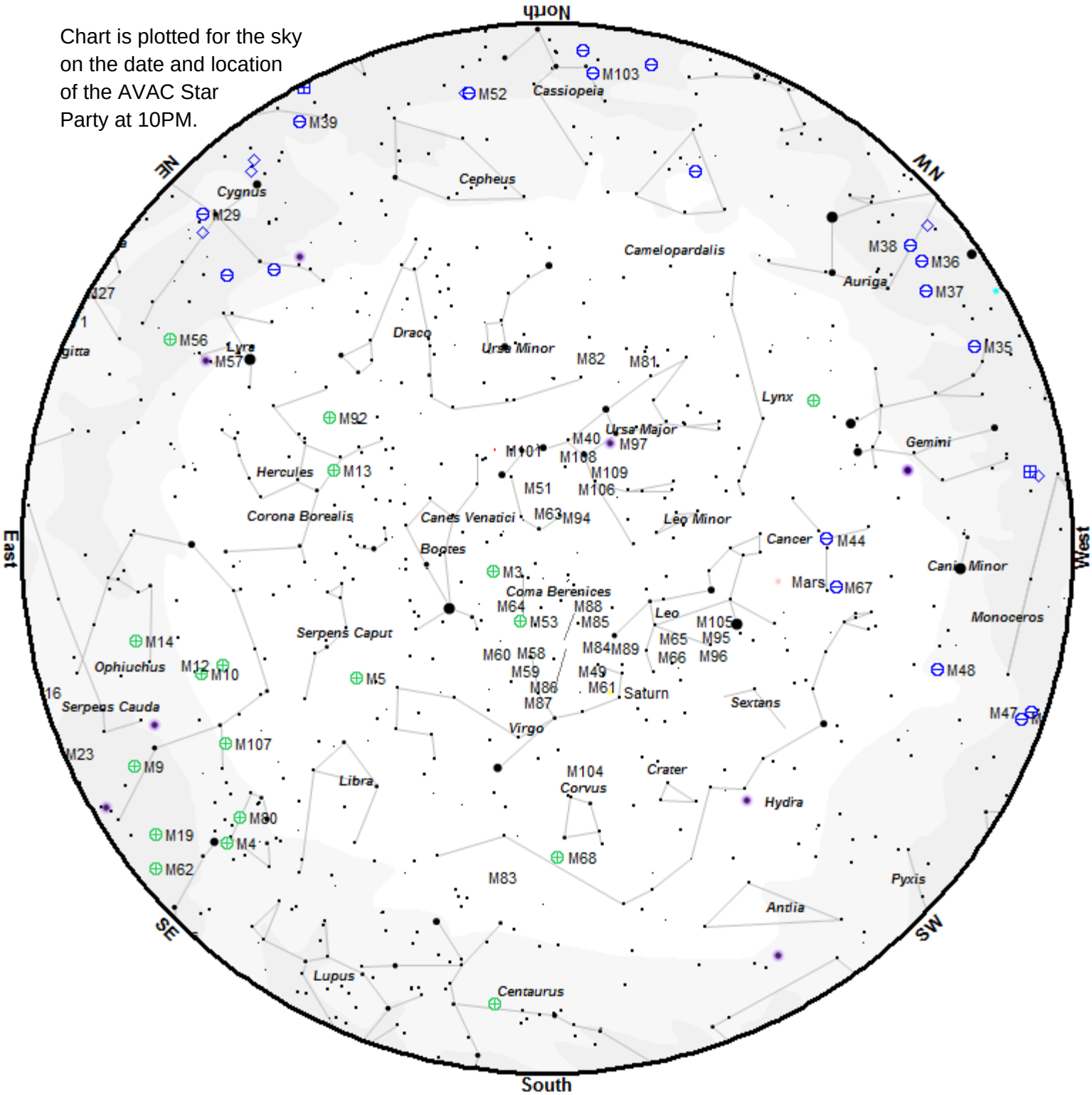
	Rise	Transit	Set	Mag
Mercury	04:51	11:25	18:02	1.4
Venus	07:34	14:57	22:21	-4.0
Mars	11:49	18:47	01:42	0.9
Jupiter	03:06	09:06	15:09	-2.2
Saturn	15:00	21:15	03:30	0.9

May 31

	Rise	Transit	Set	Mag
Mercury	04:28	11:16	18:02	0.1
Venus	07:57	15:18	22:41	-4.0
Mars	11:25	18:14	01:00	1.1
Jupiter	02:10	08:13	14:19	-2.3
Saturn	13:56	20:11	02:26	1.0

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	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
NGC 3132	PNe	8.2	Vel	10h07m01.8s	-40°26'11"	20:45	21:03	21:58	easy
NGC 2392	PNe	8.6	Gem	07h29m10.8s	+20°54'42"	20:48	21:13	22:27	obvious
M 67	Open	7.4	Cnc	08h51m18.0s	+11°48'00"	20:58	21:16	22:07	detectable
NGC 3242	PNe	8.6	Hya	10h24m46.1s	-18°38'32"	20:46	21:15	21:36	obvious
M 44	Open	3.9	Cnc	08h40m24.0s	+19°40'00"	20:55	21:17	22:19	easy
NGC 3227	Gal	11.5	Leo	10h23m30.6s	+19°51'54"	20:57	21:20	23:04	difficult
M 65	Gal	10.1	Leo	11h18m55.7s	+13°05'32"	20:53	21:24	00:06	detectable
M 66	Gal	9.7	Leo	11h20m14.9s	+12°59'30"	20:52	21:23	00:09	detectable
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	20:54	21:27	01:29	easy
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	20:56	21:27	01:28	detectable
M 97	PNe	11.0	UMa	11h14m47.7s	+55°01'09"	21:03	21:28	23:29	challenging
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	20:55	21:51	01:44	detectable
NGC 4565	Gal	10.1	Com	12h36m20.8s	+25°59'15"	20:56	21:51	01:07	difficult
M 86	Gal	9.8	Vir	12h26m12.2s	+12°56'44"	20:56	21:52	00:47	detectable
M 84	Gal	10.1	Vir	12h25m03.9s	+12°53'12"	20:53	21:51	01:01	detectable
M 87	Gal	9.6	Vir	12h30m49.2s	+12°23'29"	20:54	21:51	01:09	detectable
M 49	Gal	9.3	Vir	12h29m46.8s	+08°00'01"	20:54	21:51	01:05	detectable
M 104	Gal	9.1	Vir	12h39m59.3s	-11°37'22"	20:54	21:53	00:35	detectable
M 68	Glob	7.3	Hya	12h39m28.0s	-26°44'36"	20:55	21:53	00:07	detectable
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	20:53	22:03	02:38	easy
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	20:53	22:09	01:59	detectable
NGC 5128	Gal	7.8	Cen	13h25m27.7s	-43°01'07"	21:46	22:38	23:31	difficult
NGC 5139	Glob	3.9	Cen	13h26m46.0s	-47°28'36"	21:25	22:39	23:53	detectable
NGC 5195	Gal	10.5	CVn	13h29m59.6s	+47°15'58"	20:56	22:42	02:50	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	20:53	22:42	03:32	easy
M 83	Gal	7.8	Hya	13h37m00.8s	-29°51'56"	20:57	22:49	01:05	detectable
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	20:53	22:54	03:05	easy
M 101	Gal	8.4	UMa	14h03m12.4s	+54°20'53"	21:00	23:16	03:24	detectable
NGC 5897	Glob	8.4	Lib	15h17m24.0s	-21°00'36"	22:51	00:29	02:08	difficult
M 5	Glob	5.7	Ser	15h18m34.0s	+02°05'00"	21:07	00:31	04:02	easy
NGC 5986	Glob	7.6	Lup	15h46m03.0s	-37°47'12"	23:27	00:58	02:29	detectable
M 80	Glob	7.3	Sco	16h17m02.0s	-22°58'30"	00:13	01:29	02:45	detectable
NGC 6124	Open	6.3	Sco	16h25m20.0s	-40°39'12"	00:40	01:37	02:33	difficult
NGC 6193	Open	5.4	Ara	16h41m20.0s	-48°45'48"	00:28	01:53	03:19	easy
M 13	Glob	5.8	Her	16h41m41.0s	+36°27'36"	21:21	01:54	04:32	easy
M 12	Glob	6.1	Oph	16h47m14.0s	-01°56'48"	22:35	01:59	04:32	easy
M 10	Glob	6.6	Oph	16h57m09.0s	-04°06'00"	23:08	02:09	04:27	detectable
M 62	Glob	6.4	Oph	17h01m13.0s	-30°06'48"	00:01	02:13	04:20	detectable
M 19	Glob	6.8	Oph	17h02m38.0s	-26°16'06"	00:06	02:14	04:17	detectable

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 92	Glob	6.5	Her	17h17m07.0s	+43°08'12"	21:44	02:28	04:33	easy
NGC 6322	Open	6.5	Sco	17h18m25.0s	-42°56'00"	00:26	02:30	04:27	easy
M 9	Glob	7.8	Oph	17h19m12.0s	-18°31'00"	00:32	02:31	04:24	detectable
NGC 6383	Open	5.4	Sco	17h34m48.0s	-32°34'00"	00:23	02:46	04:32	easy
M 14	Glob	7.6	Oph	17h37m36.0s	-03°14'48"	23:48	02:49	04:31	detectable
NGC 6388	Glob	6.8	Sco	17h36m17.0s	-44°44'06"	01:27	02:48	04:08	detectable
M 6	Open	4.6	Sco	17h40m20.0s	-32°15'12"	00:15	02:52	04:36	easy
M 7	Open	3.3	Sco	17h53m51.0s	-34°47'36"	00:55	03:05	04:33	easy
M 23	Open	5.9	Sgr	17h57m04.0s	-18°59'06"	01:13	03:09	04:32	detectable
NGC 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	21:00	03:10	04:45	obvious
M 20	Open	5.2	Sgr	18h02m42.0s	-22°58'18"	01:58	03:14	04:30	easy
M 21	Open	7.2	Sgr	18h04m13.0s	-22°29'24"	01:54	03:16	04:32	detectable
M 8	Neb	5.0	Sgr	18h04m02.0s	-24°23'14"	02:23	03:16	04:09	easy
NGC 6541	Glob	6.3	CrA	18h08m02.0s	-43°42'54"	02:05	03:19	04:24	detectable
NGC 6572	PNe	8.0	Oph	18h12m06.4s	+06°51'12"	23:32	03:24	04:49	obvious
M 16	Open	6.5	Ser	18h18m48.0s	-13°48'24"	00:59	03:30	04:38	obvious
M 17	Open	7.3	Sgr	18h20m47.0s	-16°10'18"	01:18	03:32	04:29	detectable
M 18	Open	7.5	Sgr	18h19m58.0s	-17°06'06"	01:21	03:31	04:38	easy
M 28	Glob	6.9	Sgr	18h24m33.0s	-24°52'12"	02:52	03:36	04:20	detectable
NGC 6633	Open	5.6	Oph	18h27m15.0s	+06°30'30"	23:48	03:38	04:37	easy
M 25	Open	6.2	Sgr	18h31m47.0s	-19°07'00"	01:49	03:42	04:32	detectable
M 22	Glob	5.2	Sgr	18h36m24.0s	-23°54'12"	02:45	03:46	04:31	detectable
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	23:12	03:52	04:38	easy
M 11	Open	6.1	Sct	18h51m05.0s	-06°16'12"	01:00	03:53	04:33	detectable
M 70	Glob	7.8	Sgr	18h43m13.0s	-32°17'30"	01:59	03:52	04:33	detectable
NGC 6716	Open	7.5	Sgr	18h54m34.0s	-19°54'06"	02:17	03:55	04:34	detectable
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	00:49	03:58	04:32	detectable
M 54	Glob	7.7	Sgr	18h55m03.0s	-30°28'42"	02:20	03:58	04:29	detectable
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	00:40	04:02	04:35	easy
NGC 6723	Glob	6.8	Sgr	18h59m33.0s	-36°37'54"	02:27	04:01	04:32	detectable
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	01:06	04:03	04:38	obvious
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	00:37	04:02	04:35	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	00:49	04:03	04:34	easy
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	00:53	04:03	04:36	easy
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	00:53	04:03	04:36	easy
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	02:44	04:06	04:25	detectable
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	02:17	04:05	04:29	detectable
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	01:17	04:05	04:34	easy
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	03:23	04:07	04:25	detectable
NGC 6818	PNe	10.0	Sgr	19h43m57.8s	-14°09'12"	02:25	04:08	04:42	easy
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	02:34	04:09	04:33	easy
M 55	Glob	6.3	Sgr	19h40m00.0s	-30°57'42"	02:43	04:09	04:32	detectable
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	03:17	04:11	04:32	detectable
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	03:31	04:13	04:44	obvious
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	03:36	04:16	04:34	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.

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