ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 32 *Antelope Valley Astronomy Club Newsletter* **June 2012**

Up-Coming Events

June 5: Transit of Venus @ SAGE Planetarium
June 8: Club Meeting*
June 9: Prime Desert Woodlands Moon Walk @ Prime Desert Woodlands
June 16: Dark Sky Star Party @ Mt. Pinos
June 27: Acton Library Star Party @ Acton Library
June 30: Vasquez with the Local Group @ Vásquez Rocks State Park

* 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

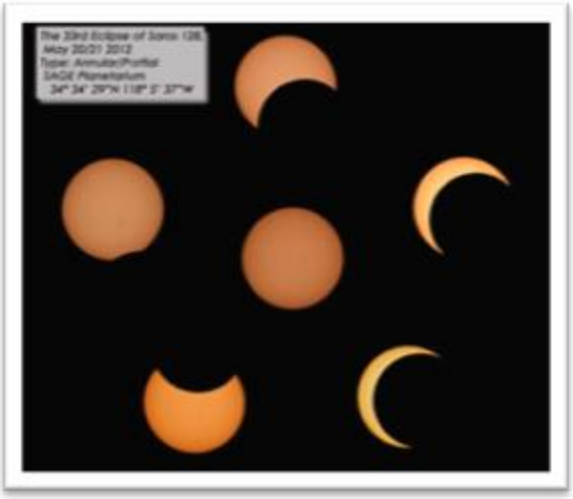
Don Bryden

News from RTMC, where the winds are strong, the scopes are good looking and the seeing's above average. The AVAC compound was in full force with Bob from Orange County, me with Sophie and Mimi, Frank with Rose and the dogs (Duane, Yogi and Duncan – of the three Yogi was the best behaved), Ann, Jim and Kennedy and Matt, Sue and Robert. Steve Trotta and the boys dropped in on Saturday as well and Darrell and Nick were in and out all week.

The 2012 edition had a bit of everything from warm sun (I think Sophie and Kennedy spent all of Saturday in the pool) to high winds and even snow. The waxing moon interfered a bit but each night after it set and the winds died the transparency and seeing were terrific. Frank had the Whirlpool in at around 100X and it looked great with a lot of structure and dust lanes visible. Jim picked up a nice 11mm ES eyepiece thanks to John and Farah at Woodland Hills Camera and had a great time star hopping to some nice Messier objects. And of course, Matt and Mr. Water Heater were showing us some great views of Saturn at around 280X.

Farah and John were there along with Kevin and the Woodland Hills Camera & Telescope crew. They were so good to us, too. John and Farah piled discount upon discount and they all were happy to take the time to talk with all of us about our prospective purchases. Frank and Rose gathered a few new eyepieces as did I and Jim and Ann. And after over a year of looking at the new Imaging Source video cameras, I finally picked one up after Kevin took the time to show me all the features as well as some of the

pictures he's taken with it. That afternoon I had it hooked up to the Coronado with nice solar images on the laptop. Later that night I had the moon and Saturn as well. I was especially impressed with how the camera performed on faint fuzzies. Now it won't outdo a CCD astro-camera like my ST10 or even a nice DSLR but there were great images in real-time right there on the monitor – a wonderful addition to a public outreach event like the upcoming Transit of Venus. Come see for yourself on the 5th of June at the SAGE Planetarium. We'll set up around 2pm to get ready for outer contact which will occur around 3:09pm. Come see it on my new camera!



The Saturday raffle was another high point with a number of our entourage getting prizes. Mimi pulled off the biggest win, though, by getting a Meade 6" Lightswitch SCT. By the way, she says it's for sale if there are any interested parties! You can all come see it at repair day, the 9th of June and then later we'll all head out to Prime Desert Woodlands. Later on the 16th we'll be out at Mt. Pinos for the first dark sky star party of the season. And then don't forget the 30th of June at Vasquez Rocks we'll meet up with the Local Group for a nice evening under the stars. Yes, RTMC is over and that means the Summer is upon us so I hope to see you all out under the stars as well!

Vice President

Doug Drake

This June we will have a special presentation about the aviation pioneers "Wilber and Orville Wright." The Wright brothers found "controlled motor flight" for our aeronautical history. Up until their great discovery man was unable to control their aircraft when trying to making a left or right turn. The Wright brothers found that the rudder did not make the aircraft turn left or right, as everyone assumed, but by banking (rolling) left or right did cause the aircraft to turn left or right. The rudder helps coordinate the turn when the aircraft is banked for a turn. This special presentation will show pictures that have not been seen on PBS or television presentation.

Director of Community Development

Rose Moore

Many thanks to all the members who have been coming out to support our events the last couple of months! We had a great turnout for the Eclipse on Sunday May 20th! Lots of kids took (or tried to) pictures using their smart phones thru the eyepiece. And there were some elderly people who got a kick out of looking through the eyepiece as well!

Well, we are all back from RTMC, and spent the 5 days and 4 nights in varying weather conditions, from sunny and about 80, to very windy, to waking up Saturday morning with a temp of 29 and some snow! There were much less vendors than previous years, but club members still made some awesome purchases from eyepieces to cameras to t-shirts. Many thanks to Woodland Hills Camera and Telescope for their friendship and help with our purchases!

Jeremy is having a lecture event at the Acton Library this coming Wednesday, May 30th. I don't have any info on it at this time, so if any members are interested, please contact Jeremy prior to the event!

There is also an Acton Library Star Party on Wednesday, June 27th at approximately 8pm. Come on out with your scope to help Jeremy show the public the night sky!

A big upcoming event for the club is the Transit of Venus on Tuesday, June 5th!! The event starts around 3pm, and is open to the public. We need members with telescopes, with solar filters, to help out with the event. This event is at the SAGE Planetarium, and we will be in the same area of the parking lot as for the eclipse.

On Saturday, June 9th at 8:30pm is a Prime Desert Moon Walk with Jeremy at the Prime Desert Woodlands. We need members with telescopes for this event, or any astronomy item of interest to show the public. Set up time is approximately an hour before the event.

Anothe upcoming event is the Star B Que for club members at Brite Lake in Tehachapi on Saturday, July 21st. This is our annual summer picnic! Picnic time, raffle and silent auction, is from approximately 4pm to 7pm. We will be having a Star Party to follow, to which the public is invited. Come on out and bring a potluck dish, or dessert, (or other) to supplement the BBQ! If you have any items to donate for the raffle or silent auction, please let Rose or Don know, and/or bring them to the BBQ.

Also, the Mt. Wilson trip is planned for Saturday, September 15th. We will be carpooling as before as there are limited parking spots. Our list is full, but if you want to be added to the standby list, let me know! Money will be due by the 2nd week of August, so that we will be able to get a check made to send to Mt. Wilson for payment in time. Further info on payment to follow.

PATS -Pacific Astronomy and Telescope Show- is in Pasadena on Saturday and Sunday September 22nd and 23rd. We have received tickets for the event, and they are available from me at $5 apiece. If attending both days, you will need a ticket for each day. Tickets will be $20 at the door if you do not purchase ahead. Come on out to help at the club's booth, and/or browse all the astronomy booths and vendors! There will be lectures throughout both days and a raffle on Sunday. Please contact me if interested. I'll have the tickets available at each club meeting up through September.

See you at the Transit!!

Space Place

Thank Goodness for Magnetism

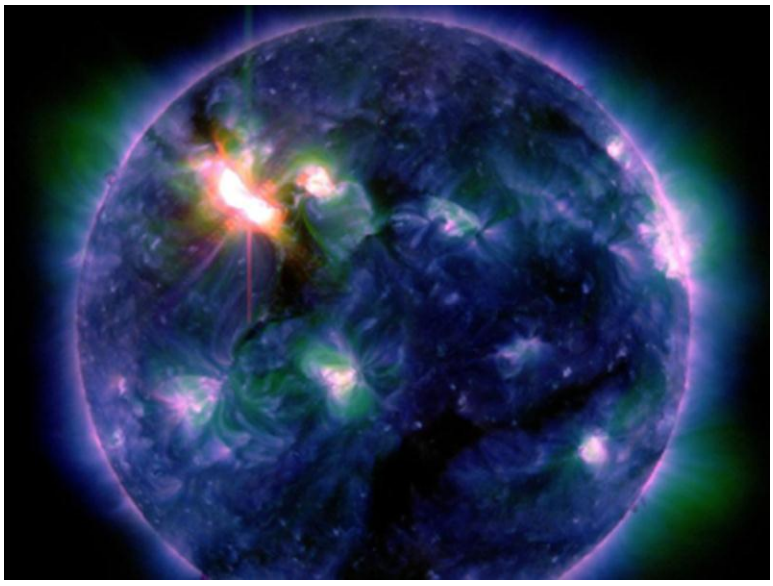
By Dr. Tony Phillips

Only 93 million miles from Earth, a certain G-type star is beginning to act up.

Every 11 years or so, the solar cycle brings a period of high solar activity. Giant islands of magnetism—"sunspots"—break through the stellar surface in increasing numbers. Sometimes they erupt like a billion atomic bombs going off at once, producing intense flares of X-rays and UV radiation, and hurling massive clouds of plasma toward Earth.

This is happening right now. Only a few years ago the Sun was in a state of deep quiet, but as 2012 unfolds, the pendulum is swinging. Strong flares are becoming commonplace as sunspots once again pepper the solar disk. Fortunately, Earth is defended from solar storms by a strong, global magnetic field.

In March 2012, those defenses were tested.



Multiple-wavelength view of X5.4 solar flare on March 6, captured by the Solar Dynamics Observatory (SDO) in multiple wavelengths (94, 193, 335 angstroms). Credit: NASA/SDO/AIA

At the very beginning of the month, a remarkable sunspot appeared on the Sun's eastern limb. AR1429, as experts called it, was an angry-looking region almost as wide as the planet Jupiter. Almost as soon as it appeared, it began to erupt. During the period March 2nd to 15th, it rotated across the solar disk and fired off more than 50 flares. Three of those eruptions were X-class flares, the most powerful kind.

As the eruptions continued almost non-stop, Earth's magnetic field was buffeted by coronal mass ejections or "CMEs." One of those clouds hit Earth's magnetosphere so hard, our planet's magnetic field was sharply compressed, leaving geosynchronous satellites on the outside looking in. For a while, the spacecraft were directly exposed to solar wind plasma.

Charged particles propelled by the blasts swirled around Earth, producing the strongest radiation storm in almost 10 years. When those particles rained down on the upper atmosphere, they dumped enough energy in three days alone (March 7-10) to power every residence in New York City for two years. Bright auroras circled both poles, and Northern Lights spilled across the Canadian border into the lower 48 states. Luminous sheets of red and green were sighted as far south as Nebraska.

When all was said and done, the defenses held—no harm done.

This wasn't the strongest solar storm in recorded history—not by a long shot. That distinction goes to the Carrington Event of September 1859 when geomagnetic activity set telegraph offices on fire and sparked auroras over Mexico, Florida, and Tahiti. Even with that in mind, however, March 2012 was remarkable

It makes you wonder, what if? What if Earth didn't have a magnetic field to fend off CMEs and deflect the most energetic particles from the Sun.

The answer might lie on Mars. The red planet has no global magnetic field and as a result its atmosphere has been stripped away over time by CMEs and other gusts of solar wind. At least that's what many researchers believe. Today, Mars is a desiccated and apparently lifeless wasteland.

Only 93 million miles from Earth, a G-type star is acting up. Thank goodness for magnetism.

With your inner and outer children, read, watch, and listen in to "Super Star Meets the Plucky Planet," a rhyming and animated conversation between the Sun and Earth, at http://spaceplace.nasa.gov/story-superstar.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Transit of Venus by Paul Derrick

Come May 20 we were treated to a relatively rare solar eclipse – a partial eclipse over much of the western half of the U.S. and an even more spectacular annular eclipse for the lucky ones in a 200-mile wide band stretching from the Texas panhandle to northern California.

On June 5 an even rarer event will be visible over the entire North American continent as millions of people – with safe and proper equipment – will be witness a transit of Venus. When the planet passes directly between the Sun and Earth, it appears as a tiny black dot creeping across the face of the Sun.

While the transit won't be as dramatic as the "ring of fire" of an annular eclipse, it is far rarer. Transits of Venus occur in 8-year-apart pairs with each pair occurring less than once each century. This 2012 transit is paired with the 2004 transit which didn't get as much notice since it was not positioned well for viewing in the U.S. The previous pair occurred in 1874 and 1882, and the next pair won't come around until 2117 and 2125 – long after we're gone, so it's now or never for us.

A transit and a solar eclipse are similar as both involve a solar system object passing between our planet and the Sun. Yet they are quite different in effect. With a solar eclipse, the Moon comes in between, and given its nearness to us, all or much of the Sun is dramatically eclipsed (covered) briefly. However, Venus, although larger than the Moon, is much further away and thus covers only a tiny percentage of the Sun, not even enough to be noticed by casual observers.

Venus Transits in History

Indeed, there is no known record of an observation of a transit of Venus until British astronomer Jeremiah Horrocks' accomplished the feat in 1639. In the early 1600s Johannes Kepler discovered that planetary (and other) orbits are elliptical rather than circular; he published his Rudolphine Tables of planetary motions in 1627 and predicted there would be a Venus transit in 1631. Unfortunately, he died in 1630, and the few others who knew about it were in the wrong part of the world to see it. Eight years later when the second of the paired transits occurred, Horrocks was one of only two – other being his friend, William Crabtree – who reported viewing the 1639 transit.

The next time around, in 1761 and 1769, astronomers were better prepared. And by then, thanks to British astronomer Edmond Halley (of Halley's Comet fame), they realized the potential scientific importance of Venus transits. Halley pointed out that if precisely measured from several different parts of the world, a far more accurate value for the mean distance between the Earth and Sun (a measure known as an "astronomical unit") could be calculated using basic geometry.

Capt. Cook in Tahiti

During our recent trip to New Zealand, we spent four days in Tahiti on the way home. While on a tour around the scenic island, we made a stop at a place named Point Venus where there was a beautiful 1800s lighthouse. Almost casually the tour guide mentioned that it was also the site from which Capt. James Cook observed a transit of Venus in June 1769.

In 1760, the world powers, notably Britain and France, set out to organize expeditions in both 1761 and 1769 to make observations, one expedition being that of Cook and Charles Green to the South Pacific.

They benefited from cooperative weather and did indeed observe the transit, yet their measurements – like those of other expeditions – were confounded by unforeseen problems. A major issue was the blurring effect of Earth's atmosphere which made it difficult to ascertain the exact moment of Venus' contact with the edge of the Sun – and precision was essential to success. So the results of all these efforts, while not complete failures, were disappointing to the astronomical world. (The astronomical unit has since been measured with great accuracy by far more sophisticated means.)

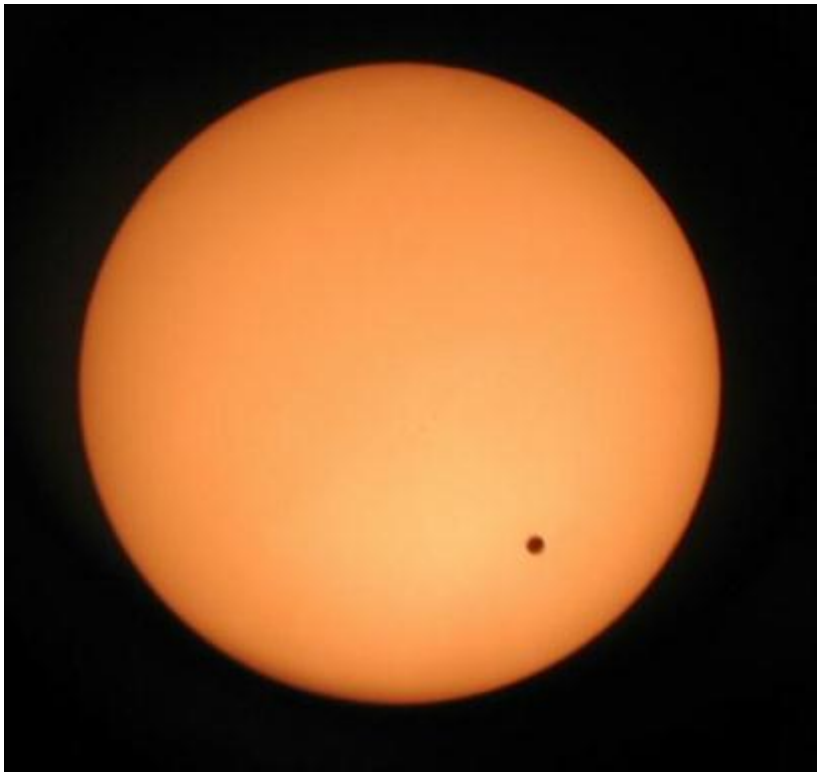
Engraving on this marker: "The people of Tahiti built this memorial to CAPT. JAMES COOK RN, who observed the Transit of Venus from near this site on 3 June 1769 during his first Pacific voyage, and gave the name Point Venus." (photo by the author)

Seeing the Transit of Venus

At least part of the nearly seven-hour June 5 transit of Venus will be visible from the entire U.S., and like with the May 20 solar eclipse, the further west one is, the longer it will be visible. Most of the middle U.S. will see the first half before the Sun sets, but this should be enough to enjoy the view.

Two things to note about the following contact times – they are geocentric, calculated for the center of Earth, thus actual times for specific locations can vary a few minutes, and they are given in Central Daylight Time.

Venus first touches the edge of the Sun (Contact 1) at 3:06 p.m. and is totally within the Sun's disc (completely surrounded by sunlight – Contact 2) at 3:23 p.m. It reaches mid-transit at 6:26 p.m. Although it will already be below the horizon for the continental U.S., Contact 3 and 4 occur at 9:29 p.m. and 9:47 p.m., respectively.



2004 Transit of Venus (from Wikimedia Commons)

The usual precautions about viewing the Sun apply to viewing transits as well as solar eclipses. In addition to visible light, the Sun emits invisible ultraviolet, infrared and other rays which, even if not painful at the moment, can still cause serious and permanent eye damage. As fascinating as transits and solar eclipses are, they not worth losing one's eyesight, so never view the Sun, even for a few seconds, without proper protection, such as approved solar glasses or #14 welder's glass.

The safest way to view the transit (and eclipse) is by using binoculars or a telescope – not to look through directly, but to project an image of the Sun on a piece of white cardboard. This is also a more fun method as a group can simultaneously watch the event. Venus' apparent diameter is only about 1/30 that of the Sun, so its silhouette will appear quite small, somewhat like a darker and perfectly round sunspot gradually easing across the Sun.

News Headlines

NASA Scientist Figures Way to Weigh Space Rock
A scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif., has accurately determined the mass of a nearby asteroid from millions of miles away. The celestial equivalent of "guess your weight" was achieved by Steve Chesley of JPL's Near-Earth Object Program Office by utilizing data from three NASA assets - the Goldstone Solar System Radar in the California desert, the orbiting Spitzer Space telescope, and the NASA-sponsored Arecibo Observatory in Puerto Rico.
http://www.jpl.nasa.gov/asteroidwatch/newsfeatures.cfm?release=2012-145

Private spacecraft connects to space station
A private spacecraft connected to the International Space Station on Friday, a milestone in a new era of commercial space flight. It happened just before 10 a.m. ET when the station's robotic arm captured the unmanned SpaceX Dragon spacecraft. The process of attaching the Dragon to the space station was completed at 12:02 p.m. ET.
http://www.cnn.com/2012/05/25/us/spacex/index.html?iref=storysearch

Monster Telescope Combo Spies Feeding Black Hole
Astronomers are finally getting a look at the extreme processes inside and around black holes. By combining the light from three powerful infrared telescopes, an international team has observed the active gas and dust accretion around a supermassive black hole in the center of a galaxy tens of millions of light-years away.
http://news.discovery.com/space/fuel-for-black-holes-120521.html

A Supernova Cocoon Breakthrough
Observations with NASA's Chandra X-ray Observatory have provided the first X-ray evidence of a supernova shock wave breaking through a cocoon of gas surrounding the star that exploded. This discovery may help astronomers understand why some supernovas are much more powerful than others.
http://www.nasa.gov/mission_pages/chandra/multimedia/sn2012jl.html

One Supernova Type, Two Different Sources
The exploding stars known as Type Ia supernovae serve an important role in measuring the universe, and were used to discover the existence of dark energy. They're bright enough to see across large distances, and similar enough to act as a "standard candle" -- an object of known luminosity.
http://spaceref.com/astronomy/one-supernova-type-two-different-sources.html

Signs of ancient flowing water on Mars
ESA’s Mars Express has returned images of a region on the Red Planet that appears to have been sculpted in part by flowing liquid. This again adds to the growing evidence that Mars had large volumes of water on its surface in the distant past.
http://www.esa.int/esaSC/SEM2RJQWJ1H_index_0.html

Astrophoto of The Month

While most people were looking up at the Sun during the eclipse on May 20th, those who looked down were sometimes treated to a surprise. As the Sun's light passes through a tree it can act like hundreds of pinhole cameras creating unique shadows on the ground.

While watching the eclipse with his family, Trevor Baer noticed the shadows on the side of his car and took this picture with his phone.

June Sky Data

Best time for deep sky observing this month:
June 12 through June 22

Mercury is at its greatest distance east of the Sun on July 1st. But it is close to the western horizon after sunset: we are unlikely to see this elusive little planet in the twilight sky this month.

Venus is in inferior conjunction on Wednesday June 6th. This normally means that it is passing almost directly in front of the Sun. But this time, most unusually, it will pass exactlyin front, and we will be able to observe a transit of Venus across the disc of the Sun. The last such transit took place in 2004, but there will not be another until 2117. Towards the end of June, we may start to see Venus low in the east-north-east just before sunrise, as a brilliant "Morning Star".

Mars is in the south-western sky at dusk, and sets in the west around midnight. Relative to the stars, the "Red Planet" is moving steadily south-eastwards out of the constellation of Leo, crossing into Virgo on June 21st. It ends the month very close to the star beta Virginis, about half-way between the bright stars Regulus (in Leo) and Spica (in Virgo).

The giant planet **Jupiter** was in conjunction with the Sun last month, and is now emerging into the morning sky. Look for it low in the east-north-east just before sunrise, towards the end of June.

Saturn is in the south-western sky at dusk, and doesn't set till after midnight. Relative to the stars, it is almost stationary in the constellation of Virgo, less than 5 degrees above the bright star Spica. Saturn is a little brighter than Spica, and it shines with a steadier light.

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

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
6/1/2012	17:11	03:12	05:39	20:00
6/5/2012	21:33	06:55	05:39	20:02
6/10/2012	00:12	12:15	05:38	20:04
6/15/2012	02:50	16:54	05:38	20:06
6/20/2012	06:40	21:00	05:39	20:07
6/25/2012	11:39	23:56	05:40	20:08
6/30/2012	17:12	02:37	05:42	20:08

Planet Data

June 1

	Rise	Transit	Set	Mag
Mercury	05:59	13:17	20:41	-1.7
Venus	05:53	13:17	20:36	-3.9
Mars	12:48	19:15	01:40	0.5
Jupiter	04:46	11:48	18:53	-2.0
Saturn	15:48	21:37	03:25	0.5

June 15

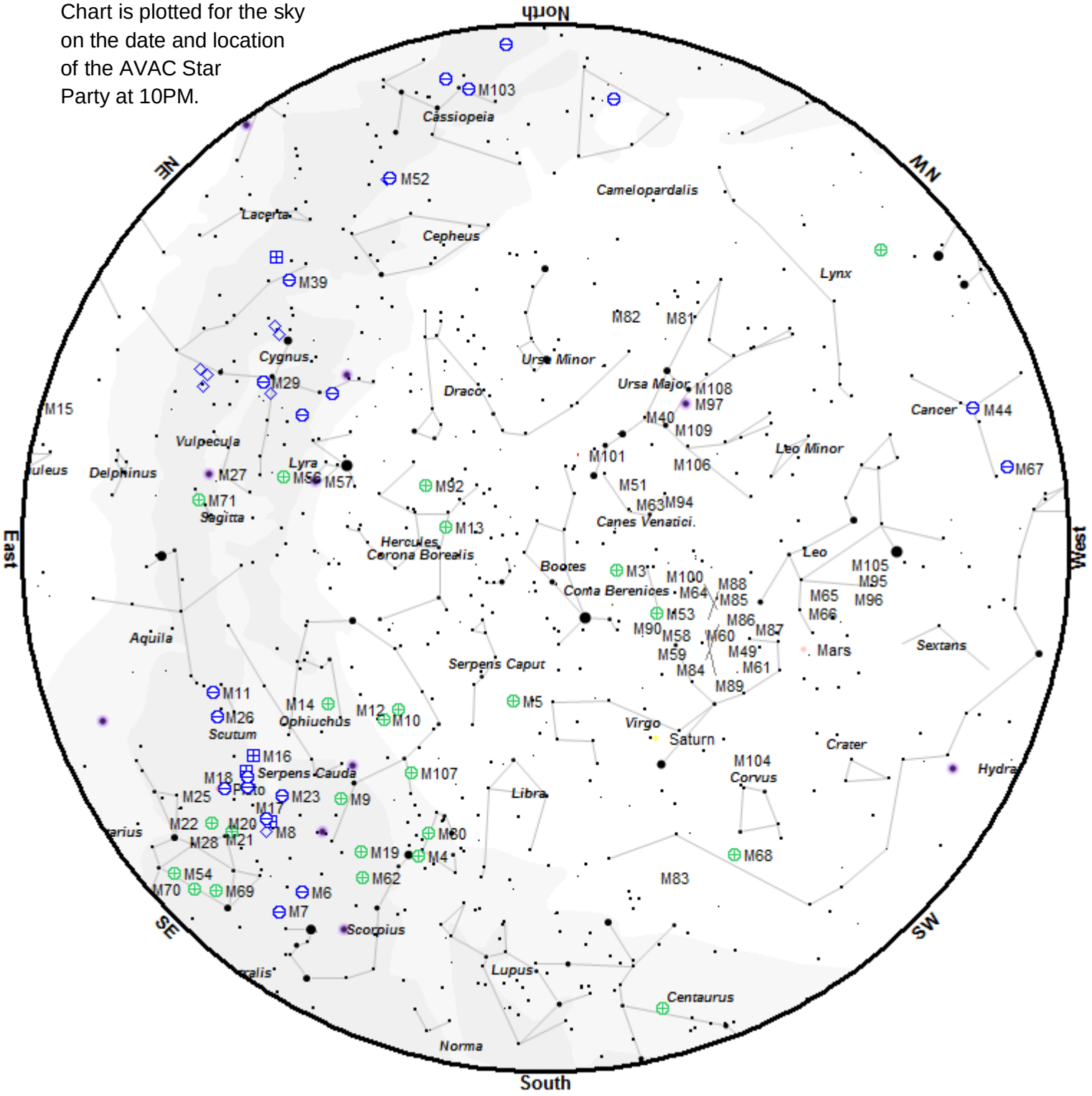
	Rise	Transit	Set	Mag
Mercury	07:01	14:21	21:44	-0.4
Venus	04:39	11:43	18:54	-4.1
Mars	12:23	18:42	01:00	0.7
Jupiter	04:02	11:06	18:14	-2.0
Saturn	14:52	20:40	02:29	0.6

June 30

	Rise	Transit	Set	Mag
Mercury	07:41	14:44	21:48	0.6
Venus	03:40	10:38	17:38	-4.4
Mars	11:58	18:09	00:19	0.9
Jupiter	03:14	10:21	17:31	-2.1
Saturn	13:53	19:41	01:30	0.7

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 5139	Glob	3.9	Cen	13h26m46.0s	-47°28'36"	21:25	21:37	21:59	difficult
NGC 5128	Gal	7.8	Cen	13h25m27.7s	-43°01'07"	21:30	21:43	22:02	challenging
NGC 5460	Open	6.1	Cen	14h07m27.0s	-48°20'36"	21:18	21:44	22:45	challenging
M 68	Glob	7.3	Hya	12h39m28.0s	-26°44'36"	21:28	21:48	22:39	detectable
NGC 3227	Gal	11.5	Leo	10h23m30.6s	+19°51'54"	21:36	21:50	22:04	difficult
M 65	Gal	10.1	Leo	11h18m55.7s	+13°05'32"	21:31	21:52	22:42	detectable
M 66	Gal	9.7	Leo	11h20m14.9s	+12°59'30"	21:31	21:52	22:44	detectable
M 104	Gal	9.1	Vir	12h39m59.3s	-11°37'22"	21:29	21:52	22:34	detectable
M 83	Gal	7.8	Hya	13h37m00.8s	-29°51'56"	21:27	21:52	23:19	detectable
M 49	Gal	9.3	Vir	12h29m46.8s	+08°00'01"	21:29	21:54	23:35	detectable
M 86	Gal	9.8	Vir	12h26m12.2s	+12°56'44"	21:32	21:55	23:22	detectable
M 84	Gal	10.1	Vir	12h25m03.9s	+12°53'12"	21:30	21:55	23:34	detectable
M 87	Gal	9.6	Vir	12h30m49.2s	+12°23'29"	21:31	21:56	23:38	detectable
Col. 256	Open	2.9	Com	12h25m06.0s	+26°06'00"	21:26	21:57	00:19	easy
NGC 4565	Gal	10.1	Com	12h36m20.8s	+25°59'15"	21:32	21:57	23:36	difficult
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	21:27	21:58	00:20	detectable
M 97	PNe	9.7	UMa	11h14m47.7s	+55°01'09"	21:34	21:59	23:58	detectable
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	21:31	22:00	23:38	detectable
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	21:33	22:00	23:35	detectable
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	21:31	22:00	00:18	detectable
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	21:27	22:00	00:59	easy
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	21:27	22:02	01:18	easy
NGC 5195	Gal	10.5	CVn	13h29m59.6s	+47°15'58"	21:31	22:03	01:06	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	21:27	22:03	01:47	easy
M 101	Gal	8.4	UMa	14h03m12.4s	+54°20'53"	21:33	22:08	01:35	detectable
NGC 5822	Open	6.5	Lup	15h04m21.0s	-54°23'48"	21:31	22:19	23:12	not visible
NGC 5897	Glob	8.4	Lib	15h17m24.0s	-21°00'36"	21:36	22:32	00:02	difficult
M 5	Glob	5.7	Ser	15h18m34.0s	+02°05'00"	21:26	22:33	02:07	easy
NGC 5986	Glob	7.6	Lup	15h46m03.0s	-37°47'12"	21:38	23:00	00:33	difficult
NGC 6067	Open	6.5	Nor	16h13m11.0s	-54°13'06"	22:32	23:28	00:21	not visible
M 80	Glob	7.3	Sco	16h17m02.0s	-22°58'30"	22:24	23:31	00:37	detectable
NGC 6124	Open	6.3	Sco	16h25m20.0s	-40°39'12"	22:44	23:39	00:35	challenging
NGC 6167	Open	6.6	Nor	16h34m34.0s	-49°46'18"	22:46	23:48	00:51	detectable
NGC 6178	Open	7.2	Sco	16h35m47.0s	-45°38'36"	22:22	23:49	01:17	detectable
NGC 6193	Open	5.4	Ara	16h41m20.0s	-48°45'48"	22:50	23:55	00:59	detectable
M 13	Glob	5.8	Her	16h41m41.0s	+36°27'36"	21:28	23:56	04:15	easy
M 12	Glob	6.1	Oph	16h47m14.0s	-01°56'48"	21:30	00:01	03:23	easy
M 10	Glob	6.6	Oph	16h57m09.0s	-04°06'00"	21:36	00:10	03:13	detectable

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 62	Glob	6.4	Oph	17h01m13.0s	-30°06'48"	22:01	00:15	02:29	detectable
M 19	Glob	6.8	Oph	17h02m38.0s	-26°16'06"	22:06	00:16	02:26	detectable
NGC 6302	PNe	12.8	Sco	17h13m44.2s	-37°06'16"	22:11	00:27	02:43	not visible
M 92	Glob	6.5	Her	17h17m07.0s	+43°08'12"	21:30	00:31	04:20	easy
NGC 6322	Open	6.5	Sco	17h18m25.0s	-42°56'00"	22:37	00:32	02:26	easy
M 9	Glob	7.8	Oph	17h19m12.0s	-18°31'00"	22:38	00:33	02:28	detectable
NGC 6383	Open	5.4	Sco	17h34m48.0s	-32°34'00"	22:23	00:49	03:14	easy
NGC 6388	Glob	6.8	Sco	17h36m17.0s	-44°44'06"	23:38	00:50	02:02	difficult
M 14	Glob	7.6	Oph	17h37m36.0s	-03°14'48"	21:52	00:51	03:54	detectable
M 6	Open	4.6	Sco	17h40m20.0s	-32°15'12"	22:14	00:54	03:34	easy
NGC 6397	Glob	5.3	Ara	17h40m42.0s	-53°40'24"	23:56	00:55	01:54	not visible
IC 4665	Open	5.3	Oph	17h46m18.0s	+05°43'00"	21:57	01:00	04:01	detectable
M 7	Open	3.3	Sco	17h53m51.0s	-34°47'36"	22:57	01:07	03:19	easy
M 23	Open	5.9	Sgr	17h57m04.0s	-18°59'06"	23:19	01:11	03:03	detectable
NGC 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	21:18	01:11	04:37	obvious
M 20	Open	5.2	Sgr	18h02m42.0s	-22°58'18"	00:09	01:16	02:24	easy
M 8	Neb	5.0	Sgr	18h04m02.0s	-24°23'14"	00:37	01:18	01:58	easy
M 21	Open	7.2	Sgr	18h04m13.0s	-22°29'24"	00:04	01:18	02:32	detectable
NGC 6541	Glob	6.3	CrA	18h08m02.0s	-43°42'54"	00:06	01:22	02:38	difficult
NGC 6572	PNe	8.0	Oph	18h12m06.4s	+06°51'12"	21:34	01:26	04:41	obvious
M 24	Open	11.1	Sgr	18h18m26.0s	-18°24'24"	23:35	01:32	03:29	not visible
M 16	Open	6.5	Ser	18h18m48.0s	-13°48'24"	23:04	01:33	04:00	obvious
M 18	Open	7.5	Sgr	18h19m58.0s	-17°06'06"	23:27	01:34	03:40	easy
M 17	Open	7.3	Sgr	18h20m47.0s	-16°10'18"	23:22	01:34	03:46	difficult
M 28	Glob	6.9	Sgr	18h24m33.0s	-24°52'12"	01:13	01:38	02:03	detectable
NGC 6633	Open	5.6	Oph	18h27m15.0s	+06°30'30"	21:51	01:41	04:28	easy
M 25	Open	6.2	Sgr	18h31m47.0s	-19°07'00"	23:55	01:45	03:36	detectable
M 22	Glob	5.2	Sgr	18h36m24.0s	-23°54'12"	00:58	01:50	02:41	detectable
IC 4756	Open	5.4	Ser	18h39m00.0s	+05°27'00"	22:19	01:52	04:23	easy
M 70	Glob	7.8	Sgr	18h43m13.0s	-32°17'30"	23:59	01:57	03:54	detectable
M 11	Open	6.1	Sct	18h51m05.0s	-06°16'12"	23:00	02:04	04:22	detectable
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	21:36	02:07	04:30	easy
NGC 6716	Open	7.5	Sgr	18h54m34.0s	-19°54'06"	00:24	02:08	03:52	detectable
M 54	Glob	7.7	Sgr	18h55m03.0s	-30°28'42"	00:22	02:08	03:54	difficult
NGC 6723	Glob	6.8	Sgr	18h59m33.0s	-36°37'54"	00:27	02:13	03:57	detectable
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	22:49	02:29	04:23	detectable
M 55	Glob	6.3	Sgr	19h40m00.0s	-30°57'42"	00:49	02:54	04:23	detectable
NGC 6818	PNe	10.0	Sgr	19h43m57.8s	-14°09'12"	00:32	02:57	04:35	easy
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	22:55	03:07	04:29	easy
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	22:55	03:13	04:29	easy
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	22:42	03:18	04:29	easy
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	22:40	03:31	04:30	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	22:53	03:32	04:29	easy
IC 1396	Neb		Cep	21h39m06.0s	+57°30'00"	23:02	03:48	04:28	challenging
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	23:02	03:48	04:32	obvious

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	23:18	03:49	04:29	easy
Cocoon Neb.	Neb	10.0	Cyg	21h53m24.0s	+47°16'00"	23:45	03:52	04:30	challenging
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	00:52	03:53	04:23	detectable
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	00:52	03:53	04:29	easy
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	01:35	03:53	04:41	obvious
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	01:36	03:53	04:21	detectable
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	01:11	03:55	04:29	obvious
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	01:22	03:54	04:27	detectable
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	02:13	03:56	04:19	detectable
NGC 637	Open	7.3	Cas	01h43m04.0s	+64°02'24"	02:48	03:57	04:29	obvious
NGC 559	Open	7.4	Cas	01h29m31.0s	+63°18'24"	02:37	03:57	04:28	easy
NGC 663	Open	6.4	Cas	01h46m09.0s	+61°14'06"	02:58	03:57	04:25	easy
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	02:47	03:57	04:28	obvious
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	02:40	03:57	04:26	obvious
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	03:54	03:59	04:19	detectable
Heart Nebula	Neb	6.5	Cas	02h33m52.0s	+61°26'50"	03:47	03:59	04:26	challenging
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	03:45	03:59	04:28	obvious
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	03:43	03:59	04:28	obvious
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	02:45	03:59	04:20	detectable
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	02:41	03:59	04:25	easy
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	02:44	03:59	04:25	easy
NGC 957	Open	7.2	Per	02h33m21.0s	+57°33'36"	03:55	04:00	04:23	easy
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	03:20	04:00	04:20	detectable
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	03:48	04:00	04:27	detectable
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	03:55	04:03	04:21	detectable
NGC 7293	PNe	6.3	Aqr	22h29m38.5s	-20°50'14"	02:42	04:04	04:27	detectable

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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.
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