Desert Sky Observer

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

Up-Coming Events

March 9: Club Meeting*
March 10: Moon Walk @ Prime Desert Woodlands
March 12: Board meeting @ Don's house
March 16: SCVi Student Stargaze @ Templin Hwy Dark Sky Site
March 24: Messier Marathon Star Party @ Saddle Back Butte
March 28: Acton Library Astronomy Lecture Series @ Acton Library
March 31: Vasquez Rocks Star Party @ 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

While you're out among the stars do you find yourself wondering about the nature of the universe? A topic for the theologians and philosophers for sure, but how about the quick and easy star party answer? Certainly someone has come up to you while you're looking at M42 and asked how far is it, Or how big is it, or how old is it? Some you can rattle off: M42 is roughly 1344 LY away, M13 is about 25000 LY distant with about 250000 – 300000 stars. Ellen was trying to locate M41 last Friday and wanted me to look where her Telrad was pointed. "How far am I from M41?", she asked. "About 2300 light years!" I replied. She chuckled and I smiled as we finally found the little cluster.

Other folks are not so easy going. I spoke at length with a fellow who was sure he could prove the universe expansion is slowing. I'm sure this would be shocking news to Hubble and his constant so I thought I should hear him out. "Scientist sclaim they have found the furthest object, a galaxy that is 13.7 billion light years away." (actually GRB 090429B is estimated to be 13.14 billion light years away). He continued, "…and if the age of the universe is also 13.7 billion years old, then this object, in order to be that old, must have been at the origin of the big bang and therefore could not be 13.7 billion light years away!"

There are a few flaws in this thinking. First is that his assumptions put us at the origin of the big bang. In fact the idea of a singularity is a mathematical description – there is no one point in space that the big bang originated from. Additionally, while the current age of the universe is accepted to be about 13.7 billion years, the observable universe is actually estimated to be 93 billion light years across. Or from our perspective, it is about 46.5 billion light years to the observable edge of the universe. The real mind bender is that it doesn't matter where you are – If we were orbiting out near that quasar (GRB 090429B) 13.14 billion light years away, the observable edge would still be 46.5 billion light years away!

The idea is not that the observable universe is any approximation of the size of the universe – it may very well be infinite in size – but that it consists of galaxies and other matter that humans can observe from Earth in the present day, because light from those objects has had time to reach us since the beginning of the cosmological expansion.

Enough of that! Let's get back to star parties and the sky at night. And we have some great opportunities to do just this upcoming. First, join me with an outreach event for the SCVi charter school out at Templin Hwy on Friday, March 16th. You can use it as a tune up for our annual Messier Marathon! You'll want to mark your calendar 'cause we have the group camp site out at Saddleback Butte from noon Saturday the 24th of March until the following day. Come out and hike then join us for a light cookout, all sponsored by your club! Then we'll get down to business. Brush up on your star hopping and see how many Messier objects you can bag from sundown until sun up. There will be coffee, hot chocolate and bacon for those who make it past midnight. Plus you can get a last look at Comet Garradd as well as some nice views of Saturn who returns to the night sky with its rings wide open!

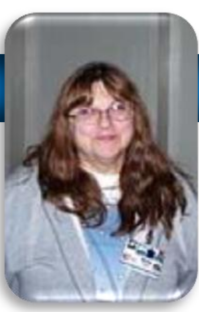
See you under the (observable) stars!

Vice President

Doug Drake

Our speaker this month will be Dr. David Reitzel and will speak about our Galaxy, the Milky Way. Dr. Reitzel is a PhD. from UC Santa Cruz/Lick Observatory. He is an observer with many telescopes and studies stars and galaxies. Dr. Reitzel gives presentations a Griffith Observatory and has talked on the Hubble Space Telescope and Apollo Moon landings. We look forward to his presentation.

We have three celestial bodies to look at after the sun sets this month. First is the planet Venus, just up from the western horizon after sunset. Venus becomes crescent throughout the month. Above Venus is Jupiter, shining ever so bright with its moons dancing abound it as if children playing ring around the rosy. Then looking to the eastern horizon see the angry red planet Mars appearing as a glowing orange blossom. Look now because Mars will not be close to us for another two years.



Director of Community Development

Rose Moore

We have lots of events for AVAC heading into spring! The Acton Library Lecture Series with Jeremy begins March 28, starting at approximately 6:30pm. The lecture will be on 'Telescopes'. Jeremy will be alternating a lecture and a star party every other month, so please check the calendar for what is planned. Also please check the calendar for the exact time for this first lecture! Email to follow.

On Saturday, March 10th at 6:30pm we have another Prime Desert Woodlands Moon Walk with Jeremy! Come on out with your telescopes, or just to take the walk through the desert preserve. We had approx. 65 people in February's walk! Dress warm, and weather permitting.

April is a busy month for our club! Please try to attend one of our events to help out! We start with a Lunar Club Star Party with Matt Leone, at 'Lee's Flat' in Rosamond, on Saturday, April 14th starting at 7:00

pm. This night we have a waning gibbous moon, so the moon will rise late. Tonight will be an overnight event (for those who would like to stay), and we can get some dark sky observing in before the moon comes up! Dress warm. Weather permitting.

Friday, April 20th will be Lockheed Martin Space Day. Time, place, and further details to be announced! We will need volunteers to man a booth at the event, pass out handouts, and talk to the public.

The weekend of April 21-22 brings us the Poppy Festival 2012! This is a big public outreach event for the club! Come on out with your telescope, or other astronomy items of interest to show the public!

Set up time is approximately 7am on Saturday. We will be having a larger tent this year, so more room inside to set up tables with items of interest. This is always a fun event for our club! Sign up for a couple of hours, or longer. Contact Rose via email or at the club (signup sheet).

Our last event for April will be another Lunar Club with Matt Leone at 'Lee's Flat' at approximately 7pm to 1am. The moon will be 6 days past new moon. Bring telescopes, dress warm! Weather permitting.

And coming up is RTMC on Memorial Day weekend, the Transit of Venus on June 5th, more Prime Desert Woodlands events, and Mt. Wilson in September!

Stay tuned!!

Stargazing Below the Equator by Paul Derrick

This column comes to you from beautiful New Zealand deep in the Southern Hemisphere where my wife and I, along with two other couples, have just begun a six-week adventure in what many, including myself, consider the most beautiful and fascinating country in the world. And upon crossing the Equator, we went from the middle of winter to the middle of summer.

New Zealand is situated nearly a thousand miles southeast of Australia and consists mainly of two long, narrow islands sitting end to end – the North Island and South Island – and extending nearly one thousand miles. The islands are separated by Cook Strait that took our inter-islander ferry three hours to cross. To the east is the dazzlingly aqua-blue Pacific Ocean and to the west the Tasman Sea. Christchurch, the South Island's largest city, is a major point of departure for flights to Antarctica.

New Zealand's total land space is about equal to that of Colorado. Most of its 4.4 million residents reside within its five major cities, so there's lots of sparsely populated areas – especially on the South Island. For stargazers that means many areas with dark skies free of light pollution.

Its highly varied land consists of miles (they use kilometres) of coasts, beaches, • sounds, mountains, pastures, farm land, lakes, rivers, waterfalls, forests, and even • glaciers. But the beauty comes with a price. Situated where two tectonic plates meet, it also • has earthquakes, as Christchurch has been painfully aware this past year, and volcanoes, of which most, but not all, are extinct. •

The native Maoris of • Polynesian origin settled the islands less than a thousand years ago while Europeans, mostly English, began settling in the 1800s. Today, Maoris • represent less than 20 percent of the population, yet their • culture – language, art, names of rivers, lakes, towns and the • like – is a highly visible part of the fabric of New Zealand society, • similar to native American culture in Oklahoma, New Mexico, and Arizona. English • is the primary language, but Maori is also still in use.

A thumbnail sketch of New Zealand would be incomplete without mentioning the friendliness of the people – Kiwis as they call themselves, nicknamed after the kiwi bird. Their friendliness is more proactive and helpful than mere politeness, and it is contagious. Although I'm generally friendly by nature, I found myself seeking opportunities to be even more friendly and helpful to others.

An example of Kiwi friendliness: As I was changing a flat tire in a parking lot at the Auckland StarDome Planetarium, an older fellow stopped and asked if I needed anything. When I told him I could change the tire, but I had no idea where to get it fixed, he pointed me in the right direction. Later, after the tire shop replaced the tire, I asked the owner-manager the best way to get back to the hostel in which we were staying which was several kilometers away. Rather than simply give me directions, he got on his computer, had MapQuest calculate the route, and printed a map for me.

Unfortunately, I still got lost, but it wasn't his fault. I blamed it on having to concentrate so intently on New Zealand's English-style driving – traveling on the left side of the roads while seated on the right side of the auto. And, of course, I also blamed the “backward” driving for my whacking a curb which damaged the tire in the first place.

So what about stargazing, my primary reason for returning to this wonderful place? Well, so far it's been frustratingly limited owing to cloudy nights and the light-polluted cities we've been in most nights. But I have had one good, if brief, night of viewing, and though I saw nothing I didn't see during our previous trip to New Zealand in 2001, I was still thrilled.

Facing north I saw many of the constellations we see from home when facing south in the early evening this time of year – what we call the winter sky. I saw the constellations of the Great Winter Arc like Orion, Canis Major, Taurus, and Gemini. But even though they are familiar, they don't look like what we're used to seeing since from here they appear up-side-down. There's just nothing like seeing the great hunter standing on his head or the big dog on his back with his feet up.

Facing south and peering into the part of the sky never visible from our mid-northern latitudes, I immediately spotted the four stars forming the Southern Cross, the signature constellation of the Southern Hemisphere. It is so small your fist held at arm's length will cover it, yet it is usually the first thing that comes to mind when we think of the deep southern night sky. Both the New Zealand and Australian flags feature this four-star pattern.

To its lower right were Alpha and Beta Centauri, the brightest stars in the constellation Centaurus, most of which is hidden from our northern view. Alpha Centauri is noteworthy for being our nearest stellar neighbor at a mere 4 light years away. It is actually a multiple star system consisting of Alpha Centauri and several other fainter stars bound together by gravity and orbiting each other.

High overhead I saw two stars that we can see from the southern U.S., but just barely – Canopus in the constellation Carina, and Achernar in Eridanus. Canopus, which rises a few degrees above our horizon, was a major guide stars for Polynesian sailors who long ago navigated the huge Pacific using the stars. They undoubtedly used Canopus when they discovered New Zealand. Achernar just barely rises above our horizon.

In seeing part of the Milky Way too far south to reveal itself to us in the U.S., two jewels came into view. The Eta Carina Nebula, a naked-eye area of nebulosity (cosmic cloudiness), is formed by the incredibly huge dying star Eta Carina. The star itself isn't visible, but the nebula is spectacular. The other is a naked-eye star cluster, formally designated IC 2602, but better known as the Southern Pleiades. As is often the case with naked-eye objects, both are even more dramatic through binoculars.

While I saw several other things that first night, I'll save them for another column when there will be even more observations and reflections to report.

Space Place

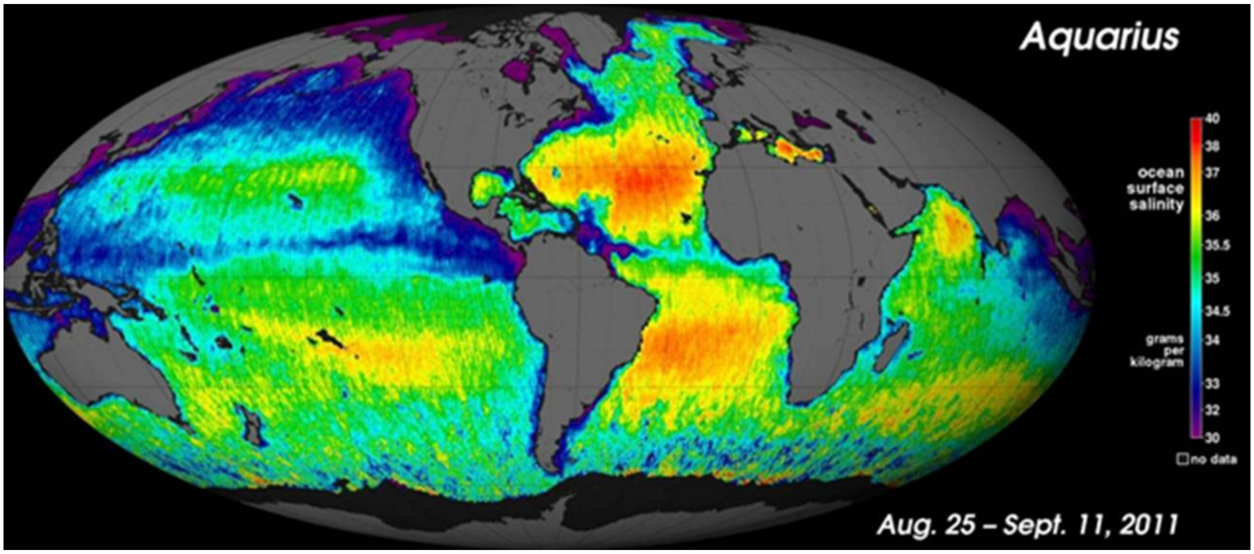
The Hidden Power of Sea Salt, Revealed

By Dauna Coulter

Last year, when NASA launched the Aquarius/SAC-D satellite carrying the first sensor for measuring sea salt from space, scientists expected the measurements to have unparalleled sensitivity. Yet the fine details it's revealing about ocean saltiness are surprising even the Aquarius team.

"We have just four months of data, but we're already seeing very rich detail in surface salinity patterns," says principal investigator Gary Lagerloef of Earth & Space Research in Seattle. "We're finding that Aquarius can monitor even small scale changes such as specific river outflow and its influence on the ocean."

Using one of the most sensitive microwave radiometers ever built, Aquarius can sense as little as 0.2 parts salt to 1,000 parts water. That's about like a dash of salt in a gallon jug of water.



Aquarius produced this map of global ocean salinity. It is a composite of the first two and a half weeks of data. Yellow and red represent areas of higher salinity, with blues and purples indicating areas of lower salinity.

"You wouldn't even taste it," says Lagerloef. "Yet Aquarius can detect that amount from 408 miles above the Earth. And it's working even better than expected."

Salinity is critical because it changes the density of surface seawater, and density controls the ocean currents that move heat around our planet. A good example is the Gulf Stream, which carries heat to higher latitudes and moderates the climate.

"When variations in density divert ocean currents, weather patterns like temperature and rainfall are affected. In turn, precipitation and evaporation, and fresh water from river outflow and melt ice determine salinity. It's an intricately connected cycle."

The atmosphere is the ocean's partner. The freshwater exchange between the atmosphere and the ocean dominates the global water cycle. Seventy-eight percent of global rainfall occurs over the ocean, and 85 percent of global evaporation is from the ocean. An accurate picture of the ocean's salinity will help scientists better understand the profound ocean/atmosphere coupling that determines climate variability.

"Ocean salinity has been changing," says Lagerloef. "Decades of data from ships and buoys tell us so. Some ocean regions are seeing an increase in salinity, which means more fresh water is being lost through evaporation. Other areas are getting more rainfall and therefore lower salinity. We don't know why. We just know something fundamental is going on in the water cycle."

With Aquarius's comprehensive look at global salinity, scientists will have more clues to put it all together. Aquarius has collected as many sea surface salinity measurements in the first few months as the entire 125-year historical record from ships and buoys.

"By this time next year, we'll have met two of our goals: a new global map of annual average salinity and a better understanding of the seasonal cycles that determine climate."

Stay tuned for the salty results. Read more about the Aquarius mission at aquarius.nasa.gov.

Other NASA oceanography missions are Jason-1 (studying ocean surface topography), Jason-2 (follow-on to Jason-1), Jason-3 (follow-on to Jason-2, planned for launch in 2014), and Seawinds on the QuikSCAT satellite (measures wind speeds over the entire ocean). The GRACE mission (Gravity Recovery and Climate Experiment), among its other gravitational field studies, monitors fresh water supplies underground. All these missions, including Aquarius, are sponsors of a fun and educational ocean game for kids called "Go with the Flow" at spaceplace.nasa.gov/ocean-currents.

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

Astrophoto of The Month

February's Full Moon is sometimes called the Snow Moon. But the Moon was not quite full in this mosaicked skyscape recorded on February 2 south of Budapest, Hungary, and there was no snow either. Still, thin clouds of ice crystals hung in the cold, wintry sky creating this gorgeous lunar halo. Refraction of moonlight by the six-sided crystals produce the slightly colored halo with its characteristic radius of 22 degrees. Just below the Moon is bright star Aldebaran. Also well within the halo at the right is the Pleiades star cluster. At the lower left, near the halo's edge lie the stars of Orion with bright Capella, alpha star of the constellation Auriga, just beyond the halo near the top of the frame.

Image Credit & Copyright: Rafael Schmall

News Headlines

Dwarf Galaxy Found Secretly Feasting on Smaller Dwarf

For the first time astronomers have captured highly detailed pictures of a dwarf galaxy consuming an even smaller companion—one so diminutive that at first it looked like nothing more than a smudge. "It wasn't clear what it was" originally, study co-author Aaron Romanowsky, an astronomer at the University of California, Santa Cruz, said of the mini galaxy. The small blob of stars was first spied in digitized photographic plates from the Digitized Sky Survey project.

http://news.nationalgeographic.com/news/2012/02/120210-dwarf-galaxy-stealth-merger-subaru-space-science/

New Evidence for Ancient Martian Ocean

Planetary scientists have known since the 1970s that a huge depression on Mars, centered on its north pole, dominates the planet's northern hemisphere. And they've mapped gigantic flood channels cut into the ruddy landscape, proof that water once gushed freely and drained into that vast lowland area.

http://www.skyandtelescope.com/community/skyblog/newsblog/New-Evidence-for-Ancient-Martian-Ocean-139085114.html

New alien planet is perfect for life, scientists say

A potentially habitable alien planet — one that scientists say is the best candidate yet to harbor water, and possibly even life, on its surface — has been found around a nearby star. The planet is located in the habitable zone of its host star, which is a narrow circumstellar region where temperatures are neither too hot nor too cold for liquid water to exist on the planet's surface.

http://www.foxnews.com/scitech/2012/02/02/new-alien-planet-is-perfect-for-life-scientists-say/

NASA's Spitzer Finds Solid Buckyballs in Space

Astronomers using data from NASA's Spitzer Space Telescope have, for the first time, discovered buckyballs in a solid form in space. Prior to this discovery, the microscopic carbon spheres had been found only in gas form in the cosmos. Formally named buckministerfullerene, buckyballs are named after their resemblance to the late architect Buckminster Fuller's geodesic domes.

http://www.jpl.nasa.gov/news/news.cfm?release=2012-047&cid=release_2012-047

NASA Spacecraft Reveals Recent Geological Activity on the Moon

New images from NASA's Lunar Reconnaissance Orbiter (LRO) spacecraft show the moon's crust is being stretched, forming minute valleys in a few small areas on the lunar surface. Scientists propose this geologic activity occurred less than 50 million years ago, which is considered recent compared to the moon's age of more than 4.5 billion years.

http://www.nasa.gov/mission_pages/LRO/news/lunar-graben.html

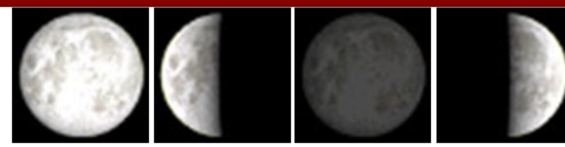
Galaxy May Swarm with 'Nomad Planets'

Our galaxy may be awash in homeless planets, wandering through space instead of orbiting a star. In fact, there may be 100,000 times more "nomad planets" in the Milky Way than stars, according to a new study by researchers at the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), a joint institute of Stanford University and the SLAC National Accelerator Laboratory.

http://www.spaceref.com/news/viewpr.html?pid=36195

March Sky Data

Full	Last Qtr	New	First Qtr
Mar 8	Mar 14	Mar 22	Mar 29



Best time for deep sky observing this month:
March 13 through March 24

Mercury is at its greatest distance east of the Sun on March 5th, so we have an unusually good chance to look for this elusive little planet just after sunset. Any evening in the first week of March, try looking for Mercury around 7 pm, low in the western sky. The planets Jupiter and Venus will be high in the sky; Mercury will be much further down and a little further right.

Venus continues to shine as a brilliant "Evening Star" this month. It can be seen in the south-western sky immediately after sunset, and remains visible late into the evening. Relative to the stars, it is moving rapidly north-eastwards: leaving Pisces on March 4th, hurrying right across Aries, and crossing into Taurus on the 30th.

Mars is at opposition (to the Sun) on March 3rd. So it rises in the east at sunset, it's high in the southern sky at midnight, and it doesn't set until sunrise. Relative to the stars, the "Red Planet" is moving steadily north-westwards in the constellation of Leo, approaching the bright star Regulus.

At the start of March, **Jupiter** is well up in the western sky at dusk, but every night it appears a little lower down, and sets a little earlier. Relative to the stars, it is moving slowly north-eastwards in Aries. When the month begins, Venus is to the lower right of Jupiter, but by the end of March the two have exchanged places, Venus climbing higher in the sky as Jupiter sinks lower.

Saturn is rising in the east in the late evening, so this month it is theoretically possible to see all five of the naked-eye planets in a single night. Relative to the stars, Saturn moving slowly north-westwards in the constellation of Virgo, close to the left of its brightest star Spica. Saturn is just a little brighter than Spica, and shines with a steadier light.

There are no major **meteor-showers** in March, but we may see a handful of meteors from the Virginid shower, which is usually active during March and April; they appear to radiate outwards from the constellation of Virgo.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
3/1/2012	11:23	01:12	06:20	17:48
3/5/2012	15:19	04:11	06:14	17:51
3/10/2012	21:02	07:16	06:08	17:56
3/15/2012	02:19	12:36	07:01	18:59
3/20/2012	05:36	17:38	06:54	19:04
3/25/2012	08:12	22:17	06:47	19:08
3/31/2012	13:00	02:23	06:39	19:12

Planet Data

Mar 1

	Rise	Transit	Set	Mag
Mercury	06:56	13:07	19:16	-0.
Venus	08:06	14:46	21:26	-4.2
Mars	17:43	00:18	06:52	-1.2
Jupiter	08:44	15:31	22:15	-2.2
Saturn	21:18	03:00	08:43	0.4

Mar 15

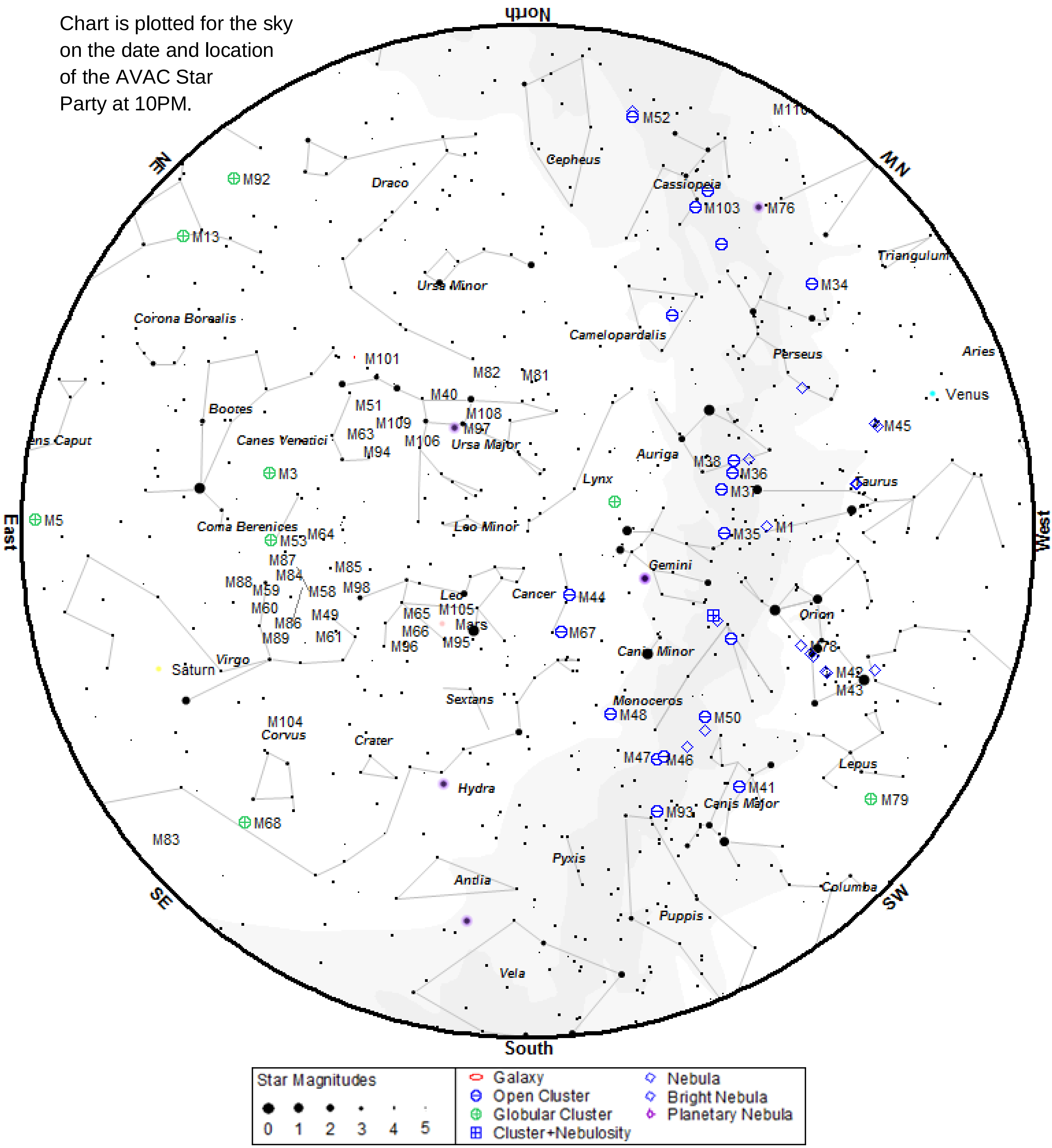
	Rise	Transit	Set	Mag
Mercury	07:05	13:32	19:54	2.7
Venus	08:49	15:48	22:47	-4.3
Mars	17:23	00:02	06:42	-1.1
Jupiter	08:57	15:47	22:33	-2.1
Saturn	21:19	03:03	08:46	0.4

Mar 31

	Rise	Transit	Set	Mag
Mercury	05:44	11:47	17:54	1.9
Venus	08:32	15:50	23:07	-4.4
Mars	16:00	22:43	05:26	-0.7
Jupiter	08:04	14:57	21:47	-2.1
Saturn	20:11	01:56	07:41	0.3

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. Since this month is our Messier Marathon the list is the observing order for the night. You can download the order in Excel format at http://www.avastronomyclub.org/docs/marathon_order.xls or Adobe PDF at http://www.avastronomyclub.org/docs/marathon_order.pdf

Order	Time	M #	NGC	Con	R.A.	Dec	Mag	Type	Comments
1		M 77	1068	CET	2h 43m	0° 1'	8.8	SG	
2		M 74	628	PSC	1h 37m	15° 47'	9.2	S	
3		M 33	598	TRI	1h 34m	30° 39'	5.7	SG	Pinwheel galaxy
4		M 31	224	AND	0h 43m	41° 16'	3.4	SG	Andromeda galaxy
5		M 32	221	AND	0h 43m	40° 52'	8.2	EG	
6		M 110	205	AND	0h 40m	41° 41'	8.0	EG	
7		M 52	7654	CAS	23h 24m	61° 35'	6.9	OC	
8		M 103	581	CAS	1h 33m	60° 42'	7.4	OC	
9		M 76	650	PER	1h 42m	51° 34'	11.5	PN	The Little Dumbell
11		M 34	1039	PER	2h 42m	42° 47'	5.2	OC	
11		M 45		TAU	3h 47m	24° 7'	1.2	OC	Pleiades
12		M 79	1904	LEP	5h 24m	-24° 33'	8.0	GC	
13		M 42	1976	ORI	5h 35m	-5° 27'	4.0	DN	Great Orion nebula
14		M 43	1982	ORI	5h 35m	-5° 16'	9.0	DN	
15		M 78	2068	ORI	5h 47m	0° 3'	8.0	DN	
16		M 1	1952	TAU	5h 34m	22° 1'	8.4	PN	Crab nebula
17		M 35	2168	GEM	6h 09m	24° 20'	5.1	OC	
18		M 37	2099	AUR	5h 52m	32° 33'	5.6	OC	
19		M 36	1960	AUR	5h 36m	34° 8'	6.0	OC	
20		M 38	1912	AUR	5h 29m	35° 50'	6.4	OC	
21		M 41	2287	CMA	6h 47m	-20° 44'	4.5	OC	
22		M 93	2447	PUP	7h 45m	-23° 52'	6.2	OC	
23		M 47	2422	PUP	7h 37m	-14° 30'	4.4	OC	
24		M 46	2437	PUP	7h 42m	-14° 49'	6.1	OC	
25		M 50	2323	MON	7h 03m	-8° 20'	5.9	OC	
26		M 48	2548	HYA	8h 14m	-5° 48'	5.8	OC	
27		M 44	2632	CNC	8h 40m	19° 59'	3.1	OC	Beehive Cluster
28		M 67	2682	CNC	8h 50m	11° 49'	6.9	OC	
29		M 95	3351	LEO	10h 44m	11° 42'	9.7	SG	
30		M 96	3368	LEO	10h 47m	11° 49'	9.2	SG	
31		M 105	3379	LEO	10h 48m	12° 35'	9.3	EG	
32		M 65	3623	LEO	11h 19m	13° 5'	9.3	SG	Leo's triplet
33		M 66	3627	LEO	11h 20m	12° 59'	9.0	SG	Leo's triplet
34		M 81	3031	UMA	9h 56m	69° 4'	6.8	SG	Bodes Galaxy
35		M 82	3034	UMA	9h 56m	69° 41'	8.4	IG	Cigar Galaxy
36		M 97	3587	UMA	11h 15m	55° 1'	11.2	PN	Owl Nebula
37		M 108	3556	UMA	11h 12m	55° 40'	10.0	SG	

Order	Time	M #	NGC	Con	R.A.	Dec	Mag	Type	Comments
38		M 109	3992	UMA	11h 58m	53° 23'	9.8	SG	
39		M 40		UMA	12h 22m	58° 5'	8.0	dbl	
40		M 106	4258	CVN	12h 19m	47° 18'	8.3	SG	
41		M 94	4736	CVN	12h 51m	41° 7'	8.1	SG	
42		M 63	5055	CVN	13h 16m	42° 2'	8.6	SG	Sunflower galaxy
43		M 51	5194	CVN	13h 30m	47° 12'	8.1	SG	Whirlpool galaxy
44		M 101	5457	UMA	14h 03m	54° 21'	7.7	SG	
45		M 102	5457	UMA	14h 03m	54° 21'	7.7	SG	Duplicate of M101
46		M 53	5024	COM	13h 13m	18° 10'	7.7	GC	
47		M 64	4826	COM	12h 57m	21° 41'	8.5	SG	Black eye galaxy
48		M 3	5272	CVN	13h 42m	28° 23'	6.4	GC	
49		M 98	4192	COM	12h 14m	14° 54'	10.1	SG	
50		M 85	4382	COM	12h 25m	18° 11'	9.2	EG	
51		M 99	4254	COM	12h 19m	14° 25'	9.8	SG	Pin Wheel nebula
52		M 100	4321	COM	12h 23m	15° 49'	9.4	SG	
53		M 84	4374	VIR	12h 25m	12° 53'	9.3	EG	
54		M 86	4406	VIR	12h 26m	12° 57'	9.2	EG	
55		M 87	4486	VIR	12h 31m	12° 24'	8.6	EG	
56		M 89	4552	VIR	12h 36m	12° 33'	9.8	EG	
57		M 90	4569	VIR	12h 37m	13° 10'	9.5	SG	
58		M 88	4501	COM	12h 32m	14° 25'	9.5	SG	
59		M 91	4548	COM	12h 35m	14° 30'	10.2	SG	
60		M 58	4579	VIR	12h 38m	11° 49'	9.8	SG	
61		M 59	4621	VIR	12h 42m	11° 39'	9.8	EG	
62		M 60	4649	VIR	12h 44m	11° 33'	8.8	EG	
63		M 49	4472	VIR	12h 30m	8° 0'	8.4	EG	
64		M 61	4303	VIR	12h 22m	4° 28'	9.7	SG	
65		M 104	4594	VIR	12h 40m	-11° 37'	8.3	SG	Sombrero galaxy
66		M 68	4590	HYA	12h 40m	-26° 45'	8.2	GC	
67		M 83	5236	HYA	13h 38m	-29° 52'	7.6	SG	Southern Pinwheel
68		M 5	5904	SER	15h 18m	2° 5'	5.8	GC	
69		M 13	6205	HER	16h 42m	36° 28'	5.9	GC	Hercules Cluster
70		M 92	6341	HER	17h 17m	43° 8'	6.5	GC	
71		M 57	6720	LYR	18h 54m	33° 2'	9.0	PN	Ring nebula
72		M 56	6779	LYR	19h 17m	30° 11'	8.2	GC	
73		M 29	6913	CYG	20h 23m	38° 32'	6.6	OC	
74		M 39	7092	CYG	21h 32m	48° 26'	4.6	OC	
75		M 27	6853	VUL	20h 00m	22° 43'	8.1	PN	Dumbbell nebula
76		M 71	6838	SGE	19h 54m	18° 47'	8.3	GC	
77		M 107	6171	OPH	16h 33m	-13° 3'	8.1	GC	
78		M 10	6254	OPH	16h 57m	-4° 6'	6.6	GC	
79		M 12	6218	OPH	16h 47m	-1° 57'	6.6	GC	
80		M 14	6402	OPH	17h 38m	-3° 15'	7.6	GC	
81		M 9	6333	OPH	17h 19m	-18° 31'	7.9	GC	
82		M 4	6121	SCO	16h 23m	-26° 32'	5.9	GC	

Order	Time	M #	NGC	Con	R.A.	Dec	Mag	Type	Comments
83		M 80	6093	SCO	16h 17m	-22° 59'	7.2	GC	
84		M 19	6273	OPH	17h 03m	-26° 16'	7.2	GC	
85		M 62	6266	OPH	17h 01m	-30° 7'	6.6	GC	
86		M 6	6405	SCO	17h 40m	-32° 13'	4.2	OC	Butterfly cluster
87		M 7	6475	SCO	17h 54m	-34° 49'	3.3	OC	Ptolemy's Cluster
88		M 11	6705	SCT	18h 51m	-6° 16'	5.8	OC	Wild Duck cluster
89		M 26	6694	SGR	18h 45m	-9° 24'	8.0	OC	
90		M 16	6611	SER	18h 19m	-13° 47'	6.0	DN	Eagle nebula
91		M 17	6618	SGR	18h 21m	-16° 11'	7.0	DN	Swan nebula
92		M 18	6613	SGR	18h 20m	-17° 8'	6.9	OC	
93		M 24	6603	SGR	18h 16m	-18° 29'	4.5	OC	
94		M 25		SGR	18h 32m	-19° 15'	4.6	OC	
95		M 23	6494	SGR	17h 57m	-19° 1'	5.5	OC	
96		M 21	6531	SGR	18h 05m	-22° 30'	5.9	OC	
97		M 20	6514	SGR	18h 02m	-23° 2'	8.5	DN	Trifid nebula
98		M 8	6523	SGR	18h 03m	-24° 23'	5.8	DN	Lagoon nebula
99		M 28	6626	SGR	18h 25m	-24° 52'	6.9	GC	
100		M 22	6656	SGR	18h 36m	-23° 54'	5.1	GC	
101		M 69	6637	SGR	18h 31m	-32° 21'	7.7	GC	
102		M 70	6681	SGR	18h 43m	-32° 18'	8.1	GC	
103		M 54	6715	SGR	18h 55m	-30° 29'	7.7	GC	
104		M 55	6809	SGR	19h 40m	-30° 58'	7.0	GC	
105		M 75	6864	SGR	20h 06m	-21° 55'	8.6	GC	
106		M 15	7078	PEG	21h 30m	12° 10'	6.4	GC	
107		M 2	7089	AQR	21h 33m	0° -49'	6.5	GC	
108		M 72	6981	AQR	20h 54m	-12° 32'	9.4	GC	
109		M 73	6994	AQR	20h 58m	-12° 38'		ast	
110		M 30	7099	CAP	21h 40m	-23° 11'	7.5	GC	

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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