



# Desert Sky Observer

**Volume 30**

**Antelope Valley Astronomy Club Newsletter**

**February 2010**

## Up-Coming Events

**February 10:** Sage Observations @ The SAGE Planetarium

**February 12:** Club Meeting\*

**February 13:** Star Party @ Devils Punchbowl

**February 15:** Board Meeting @ Don's house

\* 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 20<sup>th</sup> Street East. Meetings start at 7 p.m. and are open to the public. *Please note that food and drink are not allowed in the planetarium*



## **President**

### **Don Bryden**

I'm sitting in my living room watching the Australian open while taking dark and bias frames on my CCD camera. I'm trying to build up master bias, dark and flat frames for a wide range of temperatures and exposure integrations. The cool thing is that when I set up to take astrophotos I can just take pics of whatever faint fuzzy I'm trying to image and then worry about all the calibrating and image reduction at some other time (like when it's raining or sunny or the moon's out).

No, actually the cool thing is the fact that I'm taking all my calibration frames from the comfort of my couch next to a warm fire! I have a computer (my laptop "Astroboy") and camera hooked up to my telescope out in the observatory (my driveway). On the computer is MaxiM DL running the camera. I'm on another computer (Mimi's laptop "Pinky") and connected to Astroboy via WiFi and remote desktop.

I just checked Astroboy and it's on image 18 of 30 on my -30<sup>0</sup>, 60 second dark frames. I'll set up some 75 second runs next and eventually to about five minutes – all from the warm comfort of my living room! Now if I could just press a button and have the scope roll into the garage and close the door, maybe when I finally build a real observatory...

Our January star party was surprisingly well attended though by 8:30 we were clouded out. Allen, Ellen and Virginia joined me as well as new members Jim and his son Connor. Beside the footscope and my refractor the only other scope was Connor's 4" reflector. Connor also amazed us with his grasp of the universe – better than many adults – and he's a third grader! It's great to see that sort of enthusiasm and I hope they get to be regulars at our star parties.

Speaking of star parties, the 13th of February will be our next dark sky star party. Dave Numer and the rangers out at Devil's Punchbowl are starting their telescope nights back up and we'll be joining them. If you haven't been to the Punchbowl, it's a short distance east of Palmdale, up in the hills south of Littlerock. Come early and take a walk on one of the trails. Later the rangers will have cocoa to cut the chill. Check out the fabulous new website (thanks Steve!) for info and directions.

Well it's time for my 90 second integrations. I think I'll get a glass of milk and watch some more tennis while I'm at it.



## Vice President

### Doug Drake

Hi everyone, we have a surprise speaker for our next meeting, February 12. It was even a surprise for me too! Since it is a surprise, I'm not able to tell you who it is, so please come out and see.

Shane Barker and I found a possible new dark sky observing site. We flew my airplane up to Lake Isabella (Kern Valley) and found a camp ground just off the northwest side of the airport; the airport is not lighted at night. The camp ground has water, power, tables and a port-a-potty. The small Kern Valley airport is located on the northeast side of Lake Isabella and has a small café open during the day with outside and inside eating areas. My son and I flew up there in the early 1990s, tied our airplane down and stayed over night to see a good dark sky. If anyone is interested I will contact the people there and see what we/they can do.

I'm not able to carry much telescope equipment right now because on January 28th I had surgery, but this will only slow me down a bit until I'm in full recovery. I'm looking forward to seeing all of you at our next meeting. Remember, "Keep your attitude right and fly high."

Doug



## Director of Community Development

### Rose Moore

For the month of February, we do not have any public outreach events but do have our monthly club star party coming up at Devil's Punchbowl on Saturday, 2/13. Let's hope for some clear, dry, and less chilly weather!

March brings us the first Prime Desert Woodlands Moon Walk with Jeremy. This is scheduled for Saturday, March 6th. Moon will be last quarter. Our event starts at 6:30pm, and we need members with telescopes to sign up for this event to help out. Please come out with your telescopes and show the public some of the night sky!

Don has arranged for our club to have its annual Messier Marathon at the Poppy Reserve on Saturday, March 13th, starting at 4pm. We encourage members to come out for this event and enjoy the dark skies! Check our website for information.

On March 20th at Saddleback Butte we will be having a Lunar Club event along with a Star Party for a local Girl Scout Troop.

The event starts at 5pm. The scouts will be there before the sun goes down to look at the scopes, receive handouts, and talk to the members. I'll be providing a list of some of the things they hope to see, and learn, that evening. Please sign up for this event and come out and show the scouts some of the awesome objects of the night sky!

Also coming up in April is a PDW event with Jeremy and the Poppy Festival, and in May is RTMC-Riverside Telescope Makers Conference in Big Bear. Check our website for information, and RTMC website for information and registration: [www.rtmcastronomyexpo.org/](http://www.rtmcastronomyexpo.org/)

Also note that Jeremy has started informal astronomy classes at the SAGE Planetarium, followed by observing outside the SAGE, weather permitting. This is a great opportunity to learn astronomy from a member who is formally taught in the subject. Let's support Jeremy in this new outreach program!

Clear skies!

Extraterrestrial Tidbits by Jeff Riechmann

The N1 Moon Rocket

On 10 February 1965, the Soviet Chief Designer, Sergei Korolov, approved the development of the N1 Moon Rocket. This rocket was intended to compete with the Americans in the race for who would be first on the Moon. Their plan was for three N1 rockets and a Soyuz-A to be launched into orbit where they would build a 200-ton spacecraft to orbit earth. From this orbiting spacecraft, the Soviets would then shoot for the moon. The N1 was plagued with problems from the start. Politics between the various designers, specifically military designer Vladimir Chelomei who wanted to build a super booster, the UR-700, played a big part in their demise. On 14 January 1966, Korolov died during routine colon surgery. Four test flights for the N1 were planned. The first on 21 February 1969 ended when a fire caused the engines to shut down. The final test flight on 23 November 1976, ended with an explosion of the rocket. The Soviet manned lunar program was finally abandoned on 17 February 1976.

Aerospace Committee Report Jeff Riechmann and Roswell (co-chairbeings)

Vandenberg Launch Schedule: As of 2010 January 17

Date	Launch Time/Window (PST/PDT)	Vehicle	Pad/Silo
JAN-FEB	To be announced	GBI	---
Missile defense Ground-based Interceptor. Delayed from SEP 27. Mission Name: FTG-06			
JUN	To be announced	Minuteman III	---
Vehicle will probably send one or more unarmed warheads on a ballistic trajectory to the central Pacific. Delayed from NOV 18 to allow for the completion of pre-launch ground testing. A new launch date has not been announced.			
JUN	To be announced	Minuteman III	---
Vehicle will probably send one or more unarmed warheads on a ballistic trajectory to the central Pacific. Delayed from NOV 18 to allow for the completion of pre-launch ground testing. A new launch date has not been announced.			

## Space Place

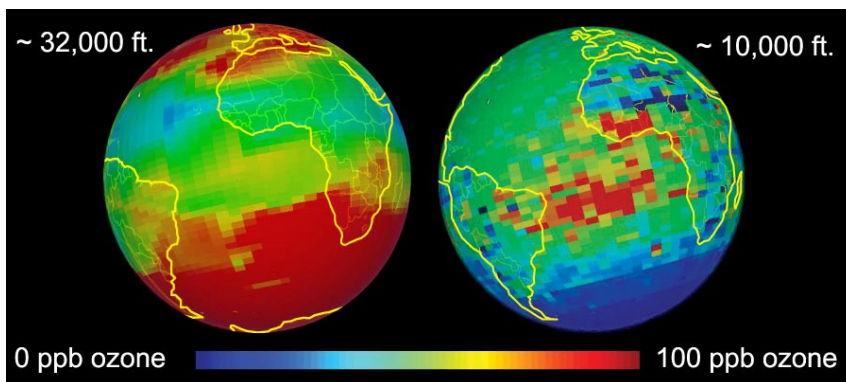
### Building a Case Against Ozone

by Patrick Barry

When it comes to notorious greenhouse gases, carbon dioxide is like Al Capone—always in the headlines. Meanwhile, ozone is more like Carlo Gambino—not as famous or as powerful, but still a big player.

After tracking this lesser-known climate culprit for years, NASA's Tropospheric Emission Spectrometer (TES) has found that ozone is indeed a shifty character. Data from TES show that the amount of ozone—and thus its contribution to the greenhouse effect—varies greatly from place to place and over time.

"Ozone tends to be localized near cities where ozone precursors, such as car exhaust and power plant exhaust, are emitted," says Kevin Bowman, a senior member of the TES technical staff at the Jet Propulsion Laboratory. But the ozone doesn't necessarily stay in one place. Winds can stretch the ozone into long plumes. "Looking out over the ocean we can see ozone being transported long distances over open water."



*These images are TES ozone plots viewed with Google Earth. Colors map to tropospheric ozone concentrations. The image on the left shows ozone concentrations at an altitude of approximately 32,000 feet, while the one on the right shows ozone at approximately 10,000 feet. The measurements are monthly averages over each grid segment for December 2004.*

Unlike CO<sub>2</sub>, ozone is highly reactive. It survives in the atmosphere for only a few hours or a few days before it degrades and effectively disappears. So ozone doesn't have time to spread out evenly in the atmosphere the way that CO<sub>2</sub> does. The amount of ozone in one place depends on where ozone-creating chemicals, such as the nitrogen oxides in car exhaust, are being released and which way the wind blows.

This short lifespan also means that ozone could be easier than CO<sub>2</sub> to knock off.

"If you reduce emissions of things that generate ozone, then you can have a quicker climate effect than you would with CO<sub>2</sub>," Bowman says. "From a policy standpoint, there's been a lot of conversation lately about regulating short-lived species like ozone."

To be clear, Bowman isn't talking about the famous "ozone layer." Ozone in this high-altitude layer shields us from harmful ultraviolet light, so protecting that layer is crucial. Bowman is talking about ozone closer to the ground, so-called tropospheric ozone. This "other" ozone at lower altitudes poses health risks for people and acts as a potent greenhouse gas.

TES is helping scientists track the creation and movement of low-altitude ozone over the whole planet each day. "We can see it clearly in our data," Bowman says. Countries will need this kind of data if they decide to go after the heat-trapping gas.

Ozone has been caught red-handed, and TES is giving authorities the hard evidence they need to prosecute the case.

## How to Make \$1000 with Your Telescope by Tom Koonce

So...You've observed the Moon and the planets in detail. You've awed your family with close-up views of craters, rings, and subtle hues of color. You've used your observational successes to justify "investment" in the purchase of a bigger, better telescope and sharper eyepieces with wider fields of view so that you can observe deep-sky objects like remote galaxies and faint nebulae. You know what a SCT is and know and understand cool down times, stellar magnitude, seeing, and why every serious amateur needs a Telrad. Perhaps you invested in imaging equipment and are starting to produce night sky pictures like those in the magazines. Does this fit you?

Now you're asking yourself, "How can I make some money with my telescope to recoup my investment? ...How can I make \$1000 with my telescope?"

The weather will be warming up soon, and the opportunity to feel that sense of sustained excitement you always get as you head back out under the stars. More importantly, you'll soon have opportunities to interact with others who don't have your knowledge of astronomy, and certainly don't have the kind of telescope equipment you've put together! Sharing nighttime views with others is the key to getting a big payoff from your telescope. No, not by charging people to view through your eyepiece, but instead by getting a charge out of someone's first spectacular view through your telescope!

How can you make \$1000 from your telescope? If you want fast cash, I suggest that you start out with a telescope worth \$2500 and offer it for sale on AstroMart.com. But by offering views of the night sky to people who have never had the opportunity, you'll easily get \$1000 of value for every adult who gasps in astonishment when seeing the Ring Nebula or a distant galaxy, comprehending their physical significance. You'll get a million dollars of satisfaction each child that sees the craters on the Moon and the rings of Saturn for the first time and cries out with joy.

How can you make money in amateur astronomy? The truth is, if you're involved in this hobby to make cash, you can either sell your amazing astrophotos, meteorites that you found, or maybe invent the next Telrad. But if you want the real payoff, then share your love of astronomy with others as the weather turns warmer. You will provide them inspiration and enrichment worth \$1000 and more.



### Outreach Resources:

For individuals:

<http://www.noao.edu/education/>

[http://astronomywebguide.com/links\\_amateurastronomers.html](http://astronomywebguide.com/links_amateurastronomers.html)

For Clubs:

<http://www.astrosociety.org/education/resources/AAISASurveyResults.pdf>

<http://kepler.nasa.gov/education/amateurAstronomersResourceKits/>



## News Headlines

### **Brown Dwarf Hunt Hits Record Low**

Brown dwarfs are curious objects. Although they can weigh up to 80 Jupiter masses, they are too small to be called stars yet too big to be called planets. Until the late 1980's they were purely theoretical objects.

<http://news.discovery.com/space/brown-dwarf-hunt-hits-record-low.html>

### **How Galaxies Form: New Research Resolves Conflict in Theory**

For more than two decades, the cold dark matter theory has been used by cosmologists to explain how the smooth universe born in the big bang more than 13 billion years ago evolved into the filamentary, galaxy-rich cosmic web that we see today.

<http://www.sciencedaily.com/releases/2010/01/100113131454.htm>

### **Long-anticipated eruption of U Scorpii has begun**

Today, two amateur astronomers from Florida detected a rare outburst of the recurrent nova U Scorpii, which set in motion satellite observations by the Hubble Space Telescope, Swift, and Spitzer. The last outburst of U Scorpii occurred February 1999.

<http://www.astronomy.com/asy/default.aspx?c=a&id=9020>

### **Black Hole Hunters Set New Distance Record**

Astronomers using ESO's Very Large Telescope have detected, in another galaxy, a stellar-mass black hole much farther away than any other previously known. With a mass above fifteen times that of the Sun, this is also the second most massive stellar-mass black hole ever found. It is entwined with a star that will soon become a black hole itself.

[http://www.spacedaily.com/reports/Black\\_Hole\\_Hunters\\_Set\\_New\\_Distance\\_Record\\_999.html](http://www.spacedaily.com/reports/Black_Hole_Hunters_Set_New_Distance_Record_999.html)

### **Endeavour to bring high-tech 'sunroom' to ISS**

The US space shuttle Endeavour will carry the last major component needed to complete the International Space Station and a high-tech "sunroom" called a cupola next week, officials said Friday.

[http://www.space-travel.com/reports/Endeavour\\_to\\_bring\\_high-tech\\_sunroom\\_to\\_ISS\\_999.html](http://www.space-travel.com/reports/Endeavour_to_bring_high-tech_sunroom_to_ISS_999.html)

### **Mars Rover Spirit Becomes a Stationary Research Platform**

After six years of unprecedented exploration of the Red Planet, NASA's Mars Exploration Rover Spirit no longer will be a fully mobile robot. NASA has designated the once-roving scientific explorer a stationary science platform after efforts during the past several months to free it from a sand trap have been unsuccessful.

<http://www.marstoday.com/news/viewsr.html?pid=33312>

### **Asteroids Pale After Close Encounters**

Late one night a couple of years ago I found myself in the Green building, the signature high rise that towers over the MIT campus in Cambridge, Massachusetts — where I was watching asteroids with Rick Binzel.

<http://www.skyandtelescope.com/news/82499022.html>

## Astrophoto of The Month



**The Moon** by Steve Trotta  
A stack of 26 exposures of .002 sec each  
Camera: Meade DSI-C  
Scope Stellarvue AT1010 80mm

## February Sky Data

**Best time for deep sky observing this month:**  
**February 4 through February 17**

At the start of February, **Mercury** is rising about an hour before the Sun, but it will be very hard to find this elusive little planet in the dawn sky. By the end of the month, it is disappearing behind the Sun.

**Venus** was behind the Sun last month, and it is now starting to emerge into the evening sky. By the end of February, try looking to the west immediately after sunset; Venus is so intensely bright, it may show up even when the sky is still quite light. We will get better views of the “Evening Star” later in the year.

**Mars** was at its closest to Earth last month, and it’s still very well placed for viewing. The “Red Planet” is already visible in the east at dusk, and it’s high in the southern sky in the late evening. Mars is moving quickly westwards in Cancer. But it’s brighter than any of the other stars in that part of the sky. On the evening of Thursday February 25th, the waxing gibbous Moon will be about 6 degrees to the lower right of Mars.

The giant planet **Jupiter** is hidden behind the Sun this month.

**Saturn** is rising in the middle of the evening, and it crosses the southern sky in the early hours of the morning. Relative to the stars, it’s moving very slowly north-westwards in Virgo. When the Moon rises late in the evening of Monday February 1st, Saturn will be about 15 degrees to its lower left. The following evening, the Moon will be about 8 degrees to the lower right of Saturn.

However, there are no significant **meteor-showers** in February, and it is generally a quiet time for sporadic meteors too.

Last Qtr  
Feb 5

New  
Feb 13

First Qtr  
Feb 21

Full  
Feb 28



## Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
2/1/2010	20:41	08:11	06:49	17:21
2/5/2010	00:03	10:27	06:46	17:25
2/10/2010	04:36	14:37	06:42	17:30
2/15/2010	07:10	19:20	06:37	17:35
2/20/2010	09:37	-----	06:31	17:40
2/25/2010	14:33	04:08	06:25	17:44
2/31/2010	18:14	06:05	06:21	17:47

## Planet Data

	Feb 1			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:21	10:26	15:30	-0.1
<b>Venus</b>	07:06	12:27	17:48	-3.9
<b>Mars</b>	16:37	23:50	07:04	-1.2
<b>Jupiter</b>	07:46	13:26	19:03	-2.0
<b>Saturn</b>	21:12	03:21	09:29	0.7

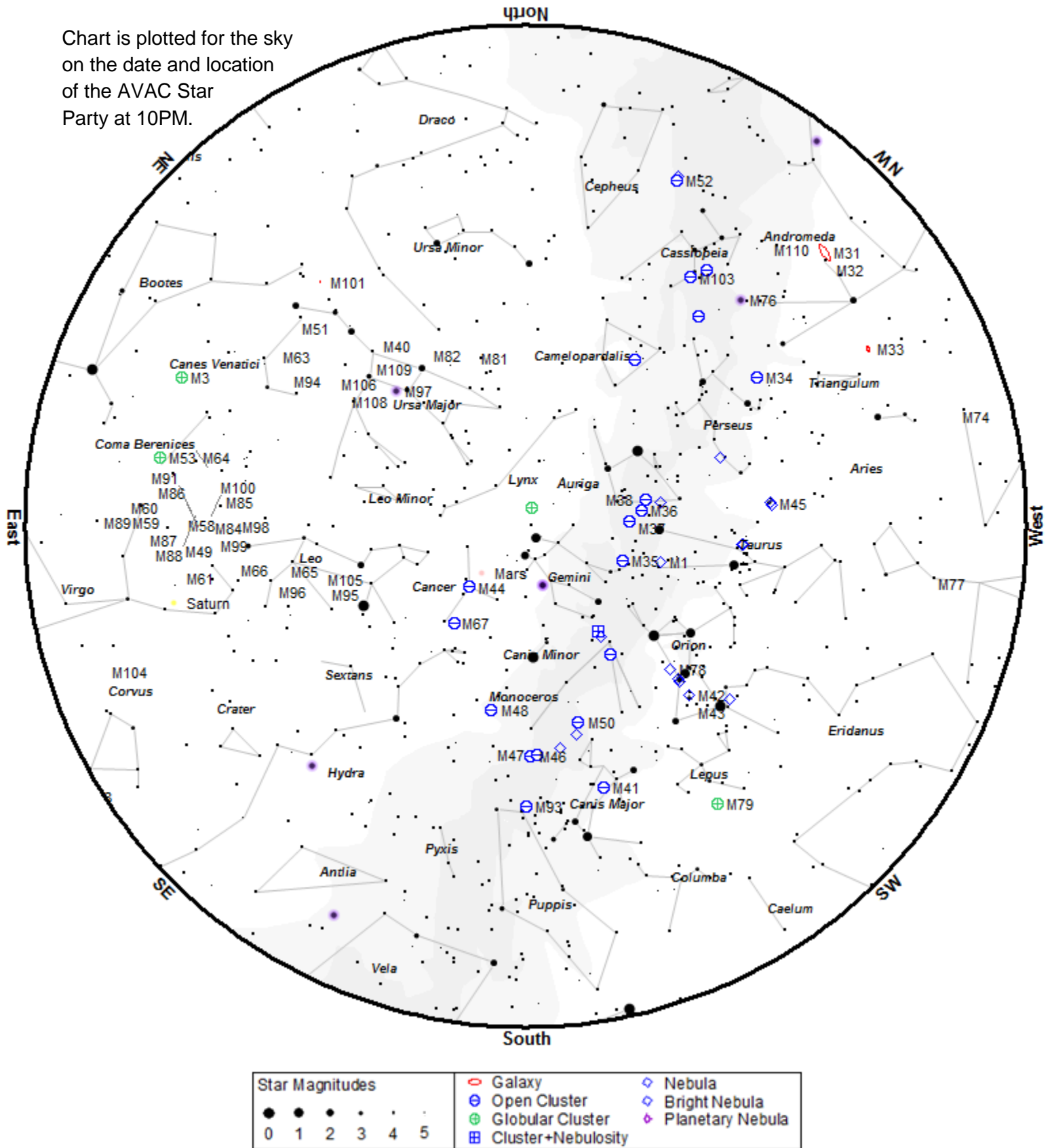
	Feb 15			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:41	10:54	16:04	-0.3
<b>Venus</b>	07:01	12:40	18:18	-3.9
<b>Mars</b>	15:17	22:35	05:52	-1.0
<b>Jupiter</b>	07:00	12:44	18:24	-2.0
<b>Saturn</b>	20:14	02:24	08:33	0.6

	Feb 31			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:55	11:27	16:54	-0.7
<b>Venus</b>	06:53	12:49	18:45	-3.9
<b>Mars</b>	14:13	21:32	04:50	-0.6
<b>Jupiter</b>	06:18	12:04	17:48	-2.0
<b>Saturn</b>	19:19	01:30	07:40	0.6

Planet, Sun, and Moon data calculated for  
 local time at Lancaster, CA



Chart is plotted for the sky  
on the date and location  
of the AVAC Star  
Party at 10PM.



To use the chart, go outside within an hour or so of the time listed and hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge.

## Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Star Party. The list is sorted by the best time to observe the object. The difficulty column describes how difficult it is to observe the object from the current location on a perfect night in a 6 inch Newtonian telescope.

Cls	ID	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
Open	NGC 457	5.1	Cas	01h19m35.0s	+58°17'12"	18:35	19:01	21:26	obvious
PNe	M 76	10.1	Per	01h42m19.9s	+51°34'31"	18:40	19:00	20:52	detectable
Open	NGC 559	7.4	Cas	01h29m31.0s	+63°18'24"	18:36	19:01	21:49	easy
Open	NGC 663	6.4	Cas	01h46m09.0s	+61°14'06"	18:36	19:02	21:59	easy
Open	M 103	6.9	Cas	01h33m23.0s	+60°39'00"	18:34	19:01	21:45	obvious
Open	NGC 957	7.2	Per	02h33m21.0s	+57°33'36"	18:37	19:02	22:33	easy
Open	NGC 884	4.4	Per	02h22m18.0s	+57°08'12"	18:33	19:02	22:26	obvious
Open	NGC 869	4.3	Per	02h19m00.0s	+57°07'42"	18:33	19:02	22:22	obvious
Open	M 34	5.8	Per	02h42m05.0s	+42°45'42"	18:38	19:01	21:40	easy
Open	NGC 1027	7.4	Cas	02h42m40.0s	+61°35'42"	18:40	19:03	21:51	detectable
Open	NGC 1342	7.2	Per	03h31m38.0s	+37°22'36"	18:38	19:03	22:10	easy
Open	M 45	1.5	Tau	03h47m00.0s	+24°07'00"	18:32	19:03	22:38	obvious
Open	NGC 1444	6.4	Per	03h49m25.0s	+52°39'30"	18:31	19:06	23:42	obvious
Open	NGC 1528	6.4	Per	04h15m23.0s	+51°12'54"	18:35	19:08	23:42	easy
Open	NGC 1502	4.1	Cam	04h07m50.0s	+62°19'54"	18:30	19:09	00:25	obvious
Open	NGC 1647	6.2	Tau	04h45m55.0s	+19°06'54"	18:39	19:12	22:26	detectable
Open	NGC 1664	7.2	Aur	04h51m06.0s	+43°40'30"	18:34	19:15	00:03	easy
Open	NGC 1746	6.1	Tau	05h03m50.0s	+23°46'12"	18:39	19:21	22:52	detectable
Open	M 38	6.8	Aur	05h28m40.0s	+35°50'54"	18:36	19:45	23:53	detectable
Neb	M 1	8.4	Tau	05h34m30.0s	+22°01'00"	18:47	19:50	21:55	challenging
Neb	M 42	4.0	Ori	05h35m18.0s	-05°23'00"	18:35	19:51	23:01	easy
Open	M 36	6.5	Aur	05h36m18.0s	+34°08'24"	18:34	19:52	00:44	easy
Open	M 37	6.2	Aur	05h52m18.0s	+32°33'12"	18:35	20:08	00:50	easy
Open	NGC 2129	7.0	Gem	06h01m07.0s	+23°19'20"	18:32	20:16	00:51	obvious
Open	M 35	5.6	Gem	06h09m00.0s	+24°21'00"	18:35	20:25	00:41	easy
Open	NGC 2169	7.0	Ori	06h08m24.0s	+13°57'54"	18:32	20:24	00:36	obvious
Open	NGC 2175	6.8	Ori	06h09m39.0s	+20°29'12"	18:39	20:25	00:04	detectable
Open	NGC 2264	4.1	Mon	06h40m58.0s	+09°53'42"	18:37	20:56	00:57	obvious
Open	M 41	5.0	CMa	06h46m01.0s	-20°45'24"	19:23	21:01	22:40	easy
Open	NGC 2301	6.3	Mon	06h51m45.0s	+00°27'36"	18:37	21:08	00:39	easy
Open	M 50	7.2	Mon	07h02m42.0s	-08°23'00"	18:43	21:18	00:15	detectable
Open	NGC 2353	5.2	Mon	07h14m30.0s	-10°16'00"	18:42	21:30	00:18	easy
Open	NGC 2355	9.7	Gem	07h16m59.0s	+13°45'00"	18:54	21:32	00:18	difficult
Open	NGC 2360	9.1	CMa	07h17m43.0s	-15°38'30"	20:04	21:33	23:02	challenging
PNe	NGC 2392	8.6	Gem	07h29m10.8s	+20°54'42"	18:33	21:45	02:12	obvious
Open	M 47	4.3	Pup	07h36m35.0s	-14°29'00"	19:27	21:52	00:17	obvious
Open	NGC 2423	7.0	Pup	07h37m06.0s	-13°52'18"	19:24	21:53	00:22	easy
Open	NGC 2439	7.1	Pup	07h40m45.0s	-31°41'36"	19:45	21:56	00:08	easy
Open	M 46	6.6	Pup	07h41m46.0s	-14°48'36"	19:33	21:57	00:20	detectable
PNe	NGC 2440	11.5	Pup	07h41m55.4s	-18°12'31"	19:56	21:57	23:58	detectable
Open	M 93	6.5	Pup	07h44m30.0s	-23°51'24"	21:01	22:00	22:59	easy
Open	NGC 2451	3.7	Pup	07h45m23.0s	-37°57'21"	20:08	22:01	23:53	easy

Cls	ID	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
Open	NGC 2477	5.7	Pup	07h52m10.0s	-38°31'48"	20:16	22:07	23:57	easy
Open	NGC 2506	8.9	Mon	08h00m01.0s	-10°46'12"	20:16	22:15	00:14	difficult
Open	NGC 2547	5.0	Vel	08h10m09.0s	-49°12'54"	21:30	22:25	23:20	detectable
Open	NGC 2546	5.2	Pup	08h12m15.0s	-37°35'42"	21:21	22:27	23:36	difficult
Open	NGC 2571	7.4	Pup	08h18m56.0s	-29°45'00"	20:18	22:34	00:50	easy
Open	M 44	3.9	Cnc	08h40m24.0s	+19°40'00"	18:53	22:56	03:01	easy
Open	M 67	7.4	Cnc	08h51m18.0s	+11°48'00"	20:13	23:06	02:00	detectable
Gal	M 82	9.0	UMa	09h55m52.4s	+69°40'47"	18:46	00:07	05:27	easy
Gal	M 81	7.8	UMa	09h55m33.1s	+69°03'56"	18:47	00:07	05:24	detectable
PNe	NGC 3132	8.2	Vel	10h07m01.8s	-40°26'11"	22:30	00:22	02:14	easy
Open	NGC 3228	6.4	Vel	10h21m22.0s	-51°43'42"	23:48	00:36	01:24	easy
Gal	NGC 3227	11.5	Leo	10h23m30.6s	+19°51'54"	21:38	00:39	03:40	difficult
PNe	NGC 3242	8.6	Hya	10h24m46.1s	-18°38'32"	22:43	00:40	02:37	obvious
PNe	M 97	11.0	UMa	11h14m47.7s	+55°01'09"	22:49	01:26	04:10	challenging
Gal	M 65	10.1	Leo	11h18m55.7s	+13°05'32"	22:12	01:34	04:55	detectable
Gal	M 66	9.7	Leo	11h20m14.9s	+12°59'30"	22:11	01:35	05:00	detectable
Gal	M 106	9.1	CVn	12h18m57.6s	+47°18'13"	22:30	02:33	05:29	detectable
Gal	M 86	9.8	Vir	12h26m12.2s	+12°56'44"	23:40	02:41	05:23	detectable
Gal	M 84	10.1	Vir	12h25m03.9s	+12°53'12"	23:24	02:40	05:27	detectable
Gal	M 49	9.3	Vir	12h29m46.8s	+08°00'01"	23:28	02:44	05:28	detectable
Gal	M 87	9.6	Vir	12h30m49.2s	+12°23'29"	23:26	02:46	05:28	detectable
Gal	NGC 4565	10.1	Com	12h36m20.8s	+25°59'15"	23:41	02:51	05:26	difficult
Gal	M 104	9.1	Vir	12h39m59.3s	-11°37'22"	00:14	02:54	05:25	detectable
Glob	M 68	7.3	Hya	12h39m28.0s	-26°44'36"	00:49	02:54	04:59	detectable
Gal	M 94	8.7	CVn	12h50m53.1s	+41°07'12"	22:40	03:05	05:34	easy
Gal	M 64	9.3	Com	12h56m43.8s	+21°41'00"	23:29	03:11	05:33	detectable
Glob	NGC 5139	3.9	Cen	13h26m46.0s	-47°28'36"	02:46	03:41	04:36	detectable
Gal	M 51	8.7	CVn	13h29m52.3s	+47°11'40"	23:02	03:44	05:34	easy
Gal	NGC 5195	10.5	CVn	13h29m59.6s	+47°15'58"	23:45	03:44	05:32	detectable
Gal	M 83	7.8	Hya	13h37m00.8s	-29°51'56"	01:45	03:52	05:30	detectable
Glob	M 3	6.3	CVn	13h42m11.0s	+28°22'42"	23:54	03:56	05:35	easy
Gal	M 101	8.4	UMa	14h03m12.4s	+54°20'53"	00:16	04:13	05:31	detectable
Glob	M 5	5.7	Ser	15h18m34.0s	+02°05'00"	02:07	05:05	05:34	easy
PNe	NGC 6543	8.3	Dra	17h58m33.4s	+66°37'59"	02:00	05:10	05:43	obvious
Glob	M 92	6.5	Her	17h17m07.0s	+43°08'12"	02:32	05:10	05:34	easy
Glob	M 13	5.8	Her	16h41m41.0s	+36°27'36"	02:14	05:10	05:35	easy
Glob	M 12	6.1	Oph	16h47m14.0s	-01°56'48"	03:39	05:12	05:33	easy
PNe	M 57	9.4	Lyr	18h53m35.1s	+33°01'45"	04:12	05:13	05:35	easy
Open	IC 4665	5.3	Oph	17h46m18.0s	+05°43'00"	04:15	05:13	05:29	detectable
Glob	M 10	6.6	Oph	16h57m09.0s	-04°06'00"	03:56	05:12	05:31	detectable
Glob	M 80	7.3	Sco	16h17m02.0s	-22°58'30"	03:57	05:13	05:32	detectable
Glob	M 56	8.4	Lyr	19h16m36.0s	+30°11'06"	04:42	05:15	05:29	detectable
Open	NGC 6633	5.6	Oph	18h27m15.0s	+06°30'30"	04:49	05:14	05:32	easy
Glob	M 14	7.6	Oph	17h37m36.0s	-03°14'48"	04:33	05:14	05:30	detectable
PNe	NGC 6572	8.0	Oph	18h12m06.4s	+06°51'12"	04:34	05:16	05:43	obvious
Glob	M 9	7.8	Oph	17h19m12.0s	-18°31'00"	04:39	05:16	05:30	detectable
Glob	NGC 5986	7.6	Lup	15h46m03.0s	-37°47'12"	04:29	05:15	05:31	detectable
Glob	M 19	6.8	Oph	17h02m38.0s	-26°16'06"	04:39	05:17	05:31	detectable
Glob	M 62	6.4	Oph	17h01m13.0s	-30°06'48"	04:38	05:18	05:32	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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- Desert Sky Observer—monthly newsletter.
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### AVAC

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