



SVAS

Vol.70 No.3* May/June, 2013

★★★★★★★★

OBSERVER

Sacramento Valley Astronomical Society

Founded in 1945

2013 Elections



It's been a great year for SVAS, and one more election is in the history books. We are fortunate to have such quality volunteers taking care of club business! Our returning President Ross Gorman, rear right of center, is just raising his hand to be sworn in. To his right is our Vice President Walt Heiges. In the front row from left to right; Rich Sandler (Board member), Kirk Alexander (Treasurer), Nerissa Adams (Secretary), (Board members) Tim Tingey, Bill Marquardt, and Lonnie Robinson. Perry P. Porter (Observatory Director) is the photographer, and Liam McDaid (past President) is directing the oath. Special thanks to everyone for your support in 2012, and anticipating a great 2013!

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SVAS Event Calendar

May 4th & 5th (Sat & sun) 12-4:00pm,

Solar Viewing at the

Discovery Museum

Please volunteer for this public viewing, bring your solar scope if you have one or just come to help out! We will be setting up in front of the sun dial near the main entrance, directly across from the rocket engine.

Challenger Learning Center
3615 Auburn Blvd.
12-4pm

DISCOVERY MUSEUM
Science & Space Center
Growing into the Powerhouse Science Center

May 9 New Moon



May 10-11, Messier Marathon training at our Blue Canyon star party. Contact Tim Tingey or Perry Preston Porter.



May 17th, General Meeting, Friday at 8:00pm

Glenn Reagan will speak on his asteroid search campaign. He also directed the programs at Cordova High School and Folsom Lake College for the zooniverse.org project for citizen astronomers.

Sacramento City College, Mohr Hall Room 3, 3835 Freeport Boulevard, Sacramento, CA.

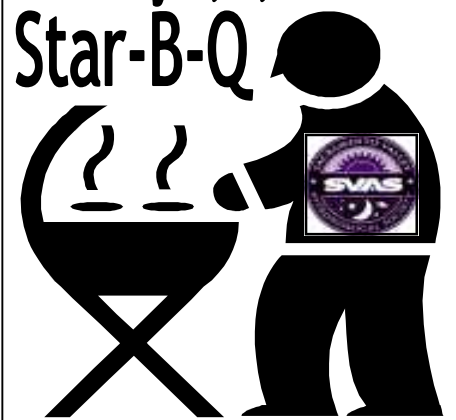
June 8 New Moon



June 7-8 Blue Canyon

More Messier Marathon training. We should be getting much better finding stuff by now?

July 5, 6, & 7th
Star-B-Q



June 21 General Meeting
Friday at 8:00pm



Tim Unruh will be the scheduled speaker?

Sacramento City College, Mohr Hall Room 3, 3835 Freeport Boulevard, Sacramento, CA.

Yosemite Star Party
Labor Day Weekend
Aug 30- Sept 1
New Moon Sept 5th



SVAS News

As you all probably know by now, Scope City is closed. Sam Sweiss has supported the SVAS for many years!

Ray Brown wrote about the closing of Scope City and Sam in the SVAS-members

Yahoo groups: "The closing of Scope City is a sad, sad moment for me , and I suspect many members of SVAS as well. I hope the club has sent Sam a message of thanks for the many years of service he has given us and best wishes ongoing. I also hope we will keep in contact with him, and that we will continue to see him at events such as the SVAS Star B Q."

Sam answered in the Yahoo groups: "Scope City closed due to a bad economy, and mostly to web competition. Maria and I are in Simi Valley as Director of Operations for Lumicon International, and once the economy gets better, I'll consider opening again. Give our regards to everyone, and hope to see you soon. If anyone from the club needs anything, I can be reached at 805-813-3135 and at samsweiss@gmail.com."

Thank you Sam! We will be watching for your re-opening!



Walt Heiges wrote in the SVAS-members Yahoo group: "Farah Payan, from Woodland Hills Telescopes (<http://www.telescopes.net/>) is willing to take up the responsibility of being our astronomical equipment supplier. Although they are in southern California, Farah has reached out to us and issued gift certificates to all members. In order to receive your certificate, you must be a new or renewing member and pick it up at a SVAS general meeting."

Student Member—\$20.00

General Member—\$35.00

Observatory Member - \$75.00

Thank you Farah, we will do our best to support Telescopes.net!

Telescopes.net is owned and operated by Woodland Hills Camera and Telescopes.

For over 50 years Woodland Hills Camera and Telescopes, has offered the best prices & service on digital cameras, digital accessories, telescopes and telescope accessories.

They are located at:

5348 Topanga Canyon Blvd, Woodland Hills, CA. 91364

Toll-Free 888-427-8766

1-818-347-2270

Nightwatch Observatory Update

Bud Bafia



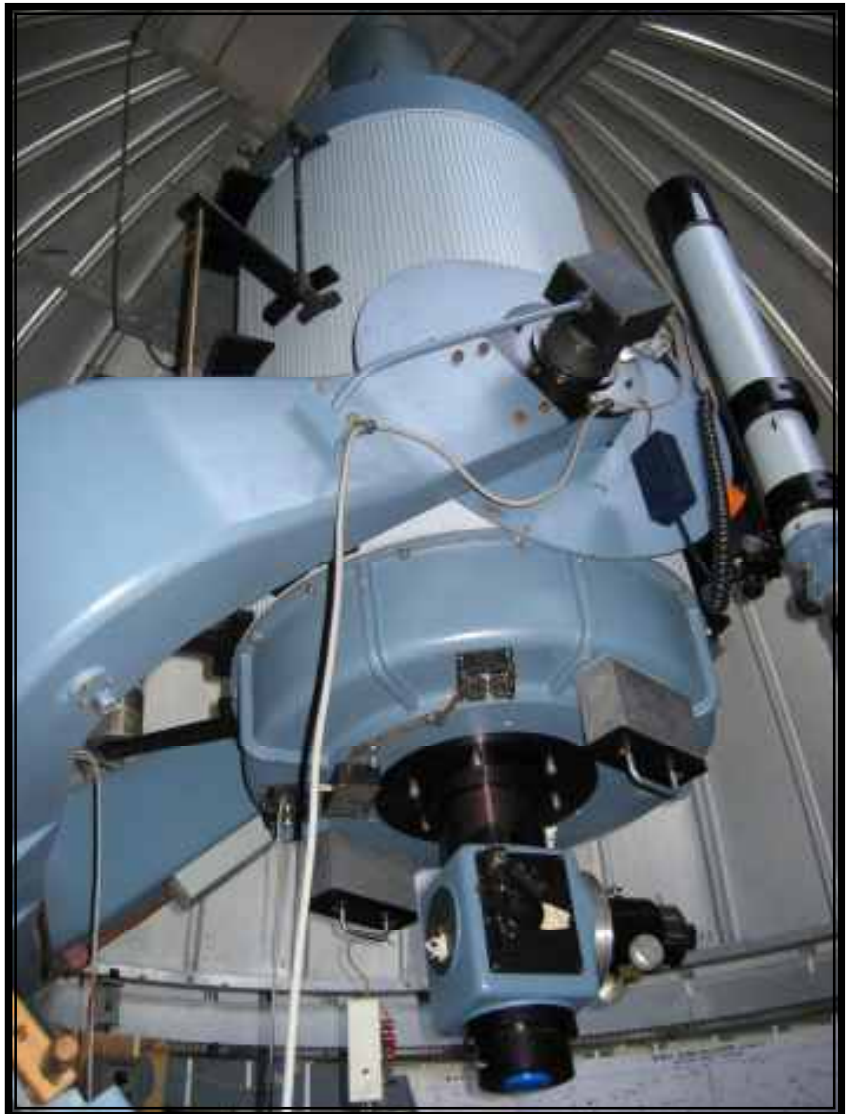
It was really great to see Blue Canyon without snow for the April

13th Star Party! I arrived about 5:30, without my telescope, to attend a walk through at the Nightwatch observatory. Bud Bafia, Walt Heiges, and Perry Porter, were already there gathered in the open dome around the 22" Ritchey Chretien. It wasn't long before other board members arrived. The list included Tim Tingey, Ramona Glasgow, Richard Sandler, and a special



guest Bill Goff and his friend Jim Colt. Bill operates a backyard observatory in Sutter Creek, and was a SVAS member back in the day. It was refreshing to get his expert input on the 22" optics and drive mechanism, his extensive observing experience really showed through. The scope and fork mount was originally made by Celestron, and produced as a Schmidt-Cassegrain. Phil Mattingly had the full thickness main mirror and secondary refigured as a Ritchey Chretien to better suit astrophotography.

By the time this newsletter arrives, Bill will have already presented his most informative talk, at the SVAS April meeting, about Cepheid variable stars. We viewed many slides of the actual observational logs handwritten by Edwin Hubble. It was most interesting to contemplate the enormous time and attention to detail these hand written records portrayed. The original Cepheid variable discovery in the Andromeda Galaxy completely changed the early 20th century cosmology, and beyond, concerning the size of the universe. They proved once and for all the Andromeda Galaxy was not in the Milky Way, but located an unbelievable distance away. As promised, Bill offered some great insight on how the Nightwatch could be used for this kind of research which is ongoing today and performed by



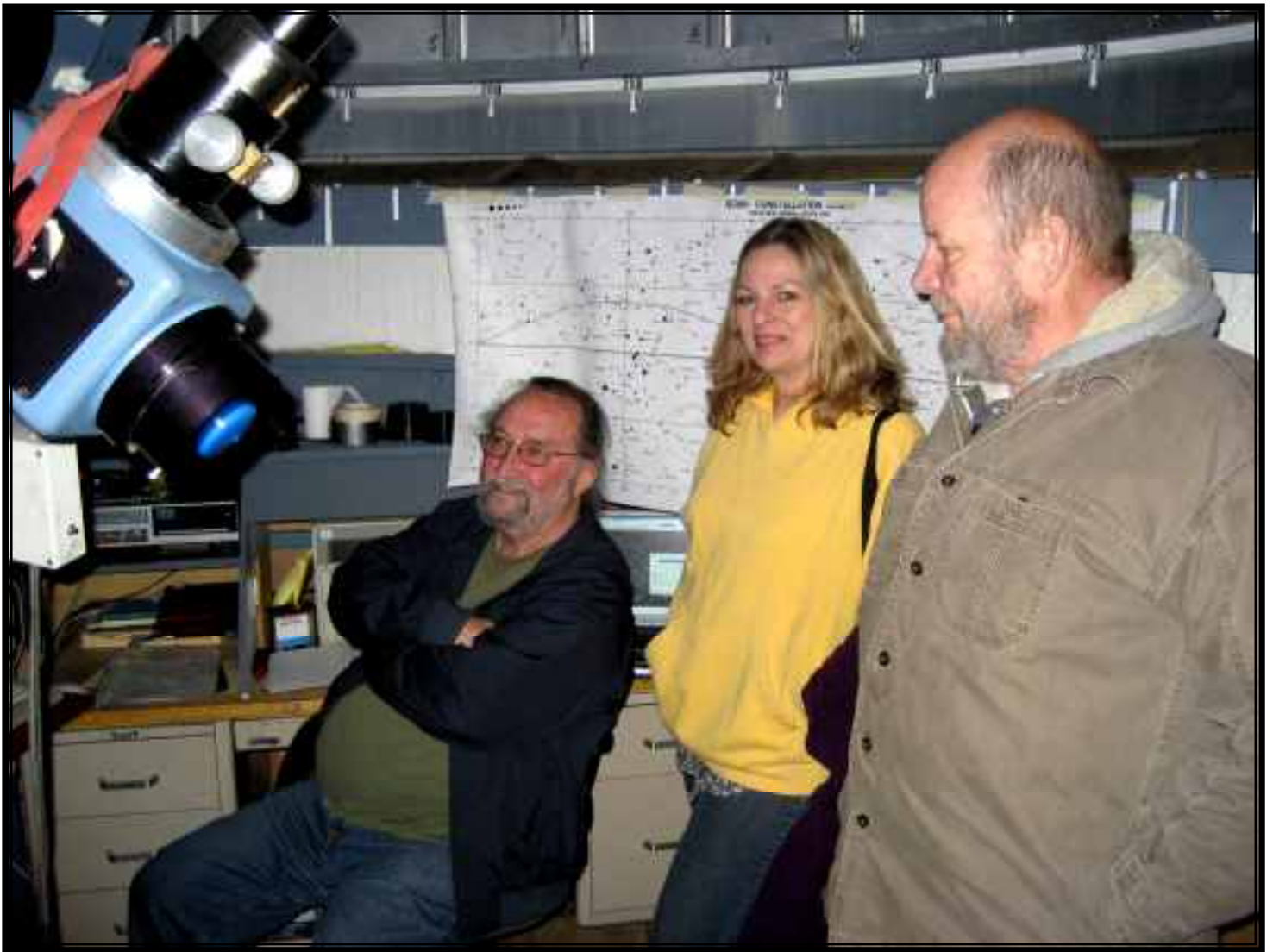
amateurs around the world.

Our SVAS Board discussions often include how much we would like to hear from you, the membership, about your thoughts and desires regarding the possible purchase and use of the Nightwatch observatory. We are hoping a member will step forward with a research project like AAVSO's variable star observers. A program like that could involve many of our members, sharing the workload of many evenings taking photos of Cepheid variable stars and recording their brightness changes.

There are no decisions made yet on the purchase so please call or write the project leader Walt Heiges, and let him know what you would like us to do! Copy all the board members for extra ears, we are listening. It's your club, the SVAS Board would really appreciate your comments and support!

SVAS Newsletter Editor

Walt, Ramona, & Perry



SVAS Loaner Scope Program

Tim Tingey



We are cleaning and aligning several telescopes that belong to the SVAS, making them available for loan to our members. This is your chance to try different optical designs and sizes before you decide to buy. We are working out the loan details, so please contact Tim Tingey for further information. A small \$2,000 donation is all we ask! Just Kidding!

Don't forget the SVAS owns a 16" Dobsonian you can use at HGO star parties. We just added wheel barrel handles so it can be rolled down the ramp and on the tarmac, and will have the mirror cleaned and collimated in the next few weeks.

Contact Perry P. Porter for more info.

New Membership Renewal Date?

There has been a lot of talk lately about making the SVAS membership renewal the same date for everyone. It's so easy for members to forget the random dates, so the SVAS Board has been making a case for everyone to renew each June. This is a good month because all the elections are behind us, and we keep finding memberships accidentally expired for those interested in running for office. It's easy to remember, just before Star-B-Q, and we can hand out membership cards at the June SVAS meeting. Last but not least, our Treasurer will know more about how to budget for the coming year, making it easier paying bills, and planning for current and future projects. It seems like a win-win.

Now for the negative stuff. If your membership expires in November, we will need to adjust the dollar amount for the new date. When new members sign up, they will also pay an adjusted dues amount. Overall you won't be charged more or less, just prorated to the new date.

It will give us the opportunity to shout at everyone this time of year; "The SVAS dues are due"! No more trips to Star B Q only to find your membership has expired! Again, let us know what you think! We are listening....

SVAS Board of Directors



For Sale

Celestron 8i orange OCR telescope. Comes with very stable tripod. extra filters and eyepieces. Cataracts have caught up with me.

Asking \$400

Phone 916-985-3712 leave message

avhartwell@comcast.net

Arthur Hartwell

HGO Has a New Porch!

The HGO elves are still working hard. Almost overnight a new front porch magically appeared, roughed out minus the ramp. This was after extensive replacement of the floor structures around the front door, damaged by years of moisture leaking underneath. We are making sure the new wood beams will be protected this time! HGO is looking good!

New



Old



Prairie City Star Party Report

We had a great turnout March 9, for the first SVAS Messier Marathon training session for 2013. The weather was just right, actually perfect for a mild, slightly breezy, winter day in Sacramento. We just don't realize how good we have it here! Prairie City offers a great horizon from east to west, very few lights, and creature comforts. We knew going forward that the lights from Sacramento would be a problem, and hoped for hopes sake that we could see the first Messier objects rotating ever so slowly into the evening sky glow.

Paul Redmon and I arrived early, but it's hard to beat Perry P. Porter and he was already there to greet us. Since no one else had arrived yet, we decided to take a few minutes to check out the area a bit. The three of us piled into Paul's van and toured the various parking areas that support the different motor sport race tracks. Perry had talked with the rangers about their possible SVAS use, and had permission for us to set up there if we desired. The second area had a grocery store which is open till 5:00pm. We were specifically looking for ice, which they have, and found they had a good selection of snacks as well as all sorts of parts and accessories for motocross. Each lot had it's Astro advantages, but mostly either had trees that would block our views or a light in the wrong place. We returned to the 4x4 pit area confident we had chosen the best area for the marathon.



Tim Tingey



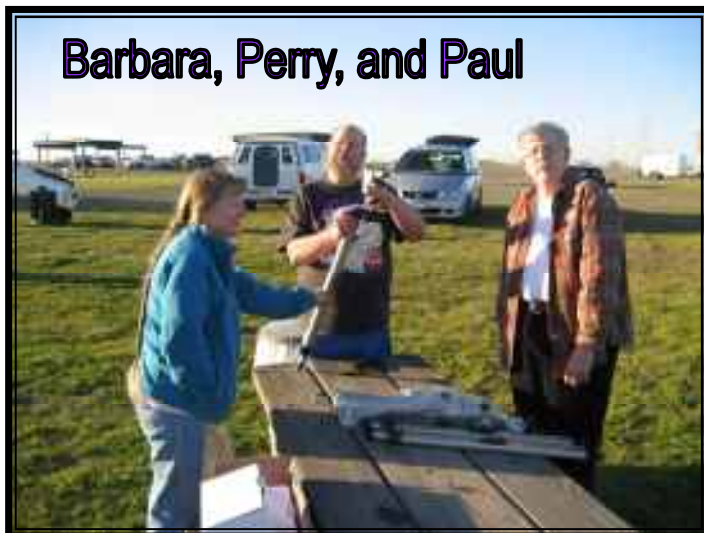
A very low, flat horizon!



As we pulled in, we noticed Tim was setting his equipment up on the south west corner and we joined him there. He had his 16" Dob already set up with a solar filter installed. The area is well maintained, and looked almost like mowed grass with picnic tables scattered about. Perry did his thing by covering up the restroom light with a black garbage bag before nightfall. I began setting up my scope and retold the story about how it only takes me ten minutes to set up, but twenty if I have help. It was one of those nights when Murphy's Law caught up with me. When packing up I didn't notice four of my lower truss mounting bolts were missing. I had taken them out a month or so before while

mirror testing, and didn't get them installed again. Contemplating the problem and only finding one spare bolt in my toolbox, I spread out the five bolts to the eight truss poles where I thought the support was most needed. It worked OK with just a bit of movement here and there! However, I definitely don't recommend it.

A new member, Barbara, called me last year, asking for help putting together her new telescope. Somehow we never touched base, and after talking again we agreed to meet at this star party. The park bench proved handy to start assembly, and Paul and Perry were a great help. After finishing the last connection, without reading the instructions, the scope looked great. Very cool first scope with a rotating eyepiece holder and built in turn knob for a 2x Barlow! It's amazing what

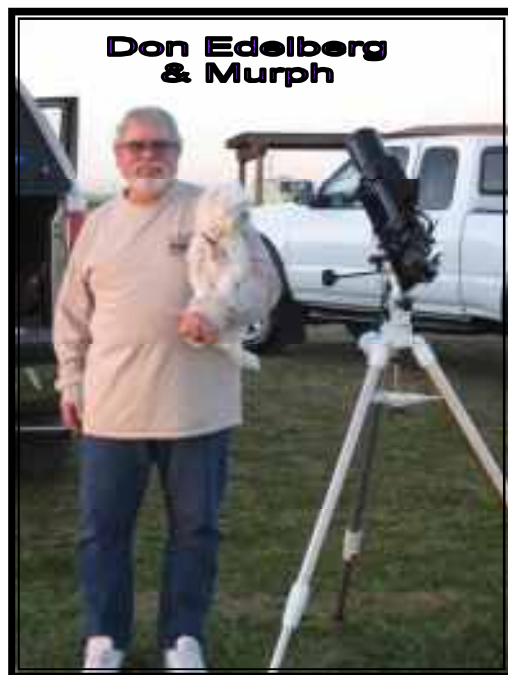


Barbara, Perry, and Paul

can be done with plastic engineering these days! After setting up Barbara's scope and getting it roughly polar aligned, she enjoyed first light on Jupiter with the Orion Nebula up next.

We were so involved setting up scopes, I almost didn't notice how many members were showing up.

We astronomers can only endure so much photon starvation over the winter, and the break in the weather was just in time. Good to see Don Edel-



Don Edelberg & Murph



Bill Hagbery & friend

berg with his dog Murph, Kevin Heider, and Bill Hagbery and friend. While I was taking pictures, a ranger pulled up at the fence and asked what we were doing. Apparently he didn't get the word we had a scheduled star party, and

thought we were squatters setting up camp for the night! All was good and he joined us for some telescope talk before returning to his rounds. It's rather reassuring we have security interested in our safety.



Davin Enigl & friend

Davin Enigl joined us, we are so fortunate to have such observing talent in the SVAS! He was first to notice that we would be heavily challenged finding the first Messier Objects because of a moisture laden sky. He is also the go-to guy for helping new observers get started, from equipment setup to observing skills. Don't tell anyone I mentioned this, he would like to remain low key.



My Messier evening, scratch that for Murphy evening, was underway. Tim was looking for the first object M77 in the sky glow, and after it was enveloped in enough darkness he finally found it. Try as I might, I couldn't see it! Later Tim told me he was using a sky glow filter, now he tells me! I'm a real rookie when it comes to finding stuff with a Telrad, and not my computer, so I decided to connect my computer and it wouldn't connect. Murphy again I concluded! We continued

manually looking for other Messier objects, and I constantly bothered Tim for guidance. It's a wonder he had time to find anything on his own. As the evening progressed, I manually found Messier;

52,103,41,44,35,67,65,66,81,82,94,63,51,53,64,3,84, and 86, but Tim logged over 40 objects by 1am Sunday putting my 18 to shame.



That's why I joined this group, to get much better at finding stuff on my own. We had great views of Jupiter and the Orion Nebula. Canes Venatici, Coma Bernices, Leo, and Virgo (the realm of the galaxies) gave up several great views of Messier Objects including the Sombrero Galaxy.

Perry P. Porter didn't set up his scope, but helped others instead. The evening started to get very cool so we put on some more layers, and Perry lit his great little propane heater. It wasn't long till everyone was huddled around for a little extra warmth. It's a great way to go because besides the heat, the red glow emitted from the front was friendly to dark adapted eyes! It will run several hours on two small cans of propane, and who knows how long on a large tank? A whole new winter sky may be waiting, but one of these heaters is in my very near future.

We all had a great evening, but most everyone had left for home by midnight. I had to work Sunday so I left early too. It would have been great to stay all night and add to my Messier Collection. We left Tim there by himself, but he packed up around 1:00am. Come join the Messier group at future star parties this year. Let's get really good at manually finding stuff getting ready for the real marathon test next March. We are planning on a Messier awards ceremony next year at the 2014 Star-B-Q.



Kevin & Paul



Jack & Meredith

School Star Party Report

Twin Bridges Middle School Star Night

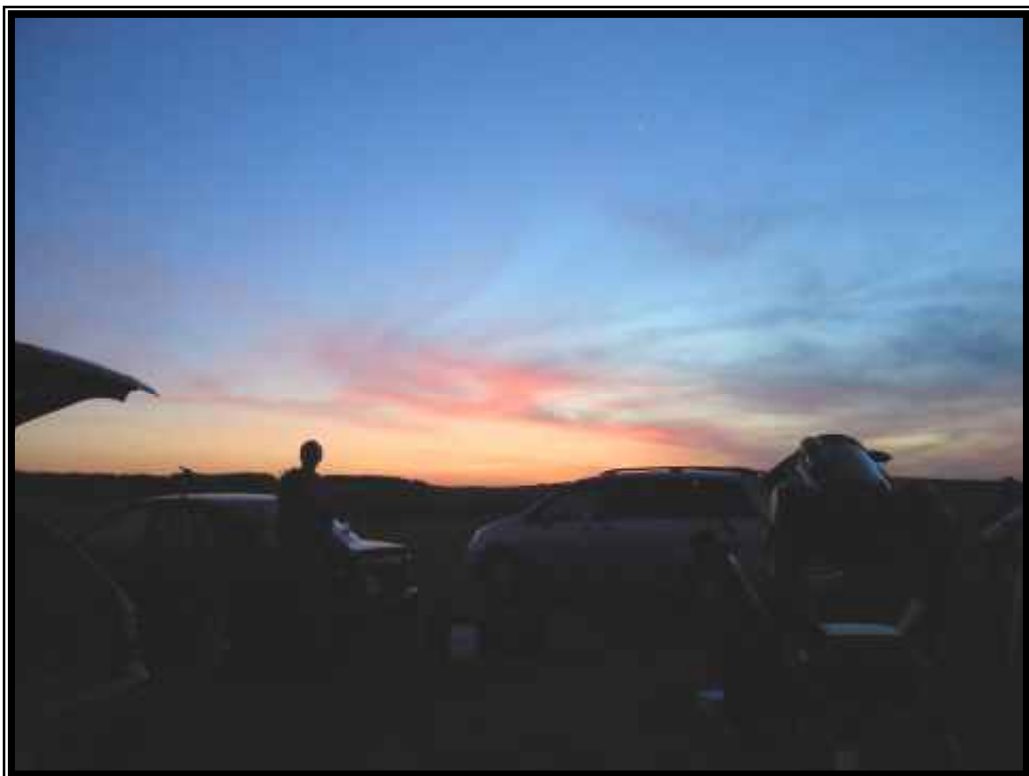


by Wayne Lord



Hi everyone. I went to this event with some trepidation since we still had high stratus clouds when I left Citrus Heights and they were still around when I arrived at the location which, unlike most school events, was not held at the school. Instead they had a nice elevated "platform" that you had to take a long dirt road to reach. No lights, virtually no obstructions such as

trees, buildings, etc., but also no sanitary facilities. At about the same time I arrived a parafoil ultralight came up from behind a low hill and flew past. He had fun flying around for a while, occasionally dipping down into ravines and skimming up over the low hills, so I got a few pictures with him in them. Perry promised that the clouds would go away around sundown, but that's one promise he couldn't keep as clouds of varying density plagued us the whole evening, leaving those of us trying to show these middle school kids and their parents the wonders that lurk out there beyond visual sight



with limited targets to aim for. So, we pretty much stuck by the bright objects such as the 3-4 day old moon and Jupiter. I tried to find M42 once, but couldn't find it in the murk. Oh, and I would NOT recommend this spot for a dark



sky site since the glow of Sacramento/Roseville to the southeast against the clouds was pretty bright.

They did have a large turnout of students and families and, unlike many school events of this nature, the teachers provided each student a checklist of information to find out from

us astronomers that, if correct, earned them extra credit. Since Laura, the coordinator, also provided us with the same checklist, we were prepared for the questions we would be asked, or at least some of them. Unfortunately, they left out some important instructions for the drivers of the many cars transporting people to this remote site



and the majority of them parked with their headlights aimed right at where we were set up, so we battled the glare of headlights off and on most of the post-twilight period.

So, kind of mixed bag type of night, with a few high points. BTW, several people mentioned that the view through my old 10-inch Dob (Big Red or the Cannon) of the moon was better than that through some of the other scopes. I had just collimated it earlier, and the SVAS ATM Connection efforts to rebuild the collimation adjusters have certainly paid off.

Please contact Perry Porter if you would like to join in the fun...





Observing Guide

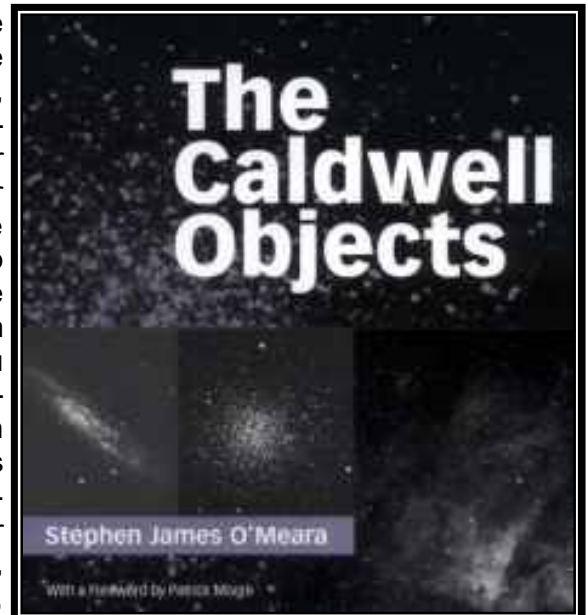
for
**May
&
June
2013**

by **Davin Enigl**



This column is devoted to looking at the night sky on the darkest nights of the month: May 10, 11, 12 and June 7, 8, 9, from 10 p.m. to 4 a.m. This month we are exploring many of the Caldwell objects. All Caldwells have NGC numbers so they can be found on most sky charts. The 109 Caldwell objects were chosen by the famous British astronomer Sir Patrick Alfred Caldwell-Moore (Patrick Moore) to find other "splendid objects" that Messier did not include. The best sky chart for these months is Stephen James O'Meara's (2002) *The Caldwell Objects*. A planisphere rotating circular sky chart is also recommended. Remember to set the planisphere to one hour earlier in Summer's Daylight savings time, so 10 p.m. on your watch is set to 9 p.m. on the planisphere. Also, Stellarium is a free planetarium program for Windows, Apple Mac or Linux computers, where the Caldwell NGC numbers can be searched and their location displayed.

Caldwells are an extension of the Messier list. Caldwell's are the next logical step for amateur astronomers beyond the Messiers. Once you can find the Caldwell's, you have found some of the best NGCs. So, it's natural to look at other NGC that are next to the Caldwell's. I recommend an eight-inch diameter mirror telescope. A ten-inch is only better than an eight if the sky is dark enough. In a light polluted area, bigger telescopes magnify the light pollution too much. So it is possible to see more with a smaller telescope. After exploring the NGCs it's natural to want to see the dimmer ICs. You will need a larger diameter telescope mirror and darker skies to see the IC objects. I recommend a minimum of a 16-inch mirror. After that, to see the even dimmer UGC objects you will probably need a 22-inch mirror or larger. For instance, the Nightwatch observatory next to the SVAS's HGO observatory has a 22-inch research-grade telescope that can see much dimmer objects, such as those on the IC list and probably even some UGC galaxies. At that dimness almost all the objects are either planetary nebulae, galaxies or globular clusters around galaxies outside the Milky Way. In summary, it is best to find a darker sky first, and explore the Messiers, Caldwell's, and NGCs, before investing in a larger mirror for the ICs and UGCs.



Of the total 109 Caldwell Objects, we will concentrate on only a few for May 11-12 and June 8-9 (10 p.m. - 4 a.m.):

Look for this first in May:

C25 NGC2419 "Intergalactic Tramp", "Intergalactic Wanderer", a small remote globular cluster next to two bright stars, neatly in a row *** something like this.

In Leo and South of Leo in May:

C40 NGC3626 Lenticular galaxy, dimmer than most, look for nearby galaxies NGC 3605, 3607 and 3608 (best).

C45 NGC5248 Mixed spiral galaxy. Dim. Best when high in sky.

C48 NGC2775 Spiral galaxy. Very dim. Very difficult to find.

C52 NGC4697 Elliptical and lenticular galaxy. Very good, easy to see.


C53 NGC3115 "Spindle Galaxy", a beautiful lenticular. Best galaxy of the night? Probably, very good.

C54 NGC2506 Open cluster. Weakly seen.

C59 NGC3242 "Ghost of Jupiter", the "CBS-Eye" or "Rival of Uranus" nebula. very bright. Add as much magnification as possible, 170x, 365x or more. Best planetary nebula of the night!

C60 & C61 NGC4038 "The Antennae", two very famous galaxies, colliding. C60 also known as the "Ringtail Galaxy". Seen between two stars.

The Virgo galactic supercluster area is also best in May:

C21 NGC4449 "Box Galaxy" - the only known rectangular shaped galaxy. Use high magnification, 170x 185x+. Very unusual, like this: 

C26 NGC4244 "Silver Needle Galaxy" - one of the thinnest flat galaxies with virtually no central bulge seen from Earth. Compare this to NGC4565 (C38). High magnification filled the 6mm eye piece on an f/4 telescope.

C29 NGC5005 Mixed spiral galaxy. Very bright, large center. Very good concentric rings around center.

C32 NGC4631 Barred spiral galaxy. Thin flat. Near NGC4656-7. Nice an big with one fore ground star near core.

C35 NGC4889 Elliptical galaxy. Duet of two nice galaxies. See also NGC4921.

C36 NGC4559 Mixed spiral galaxy. At 73x, top is framed by three stars then it looks like a rectangle similar to the Box Galaxy (C21), but with an elongated central core.

C38 NGC4565 The most famous thin-flat with central bulge, galaxy. (see also C26).

Look for these at 11 p.m. May 11th, directly South of Spica, 4 and 8 degrees above the horizon:

C77 NGC5128 "Peculiar Galaxy", Centaurus-A once the loudest radio source known, plus x-ray and gamma. One of the most interesting galaxies, usually only seen from the Southern Hemisphere. Only 8 degrees above the horizon 11 p.m. on May 11th from Blue Canyon. Also see at the Friday, April 12th Blue Canyon pre-star party night. Much dimmer than C80, with a central black zone cutting the top and bottom apart, looks like the side view of a hamburger, white buns on top and bottom. Two stars tend to frame the galaxy.

C80 NGC5139 "Omega Centauri", the biggest and brightest globular cluster seen from Earth. Usually only seen from the Southern hemisphere. See it at the same time as C80 at only 4 degrees above the horizon. By the way, at Blue Canyon, we can see down (South) to a celestial coordinate of about -51.5 degrees. Minus 51, means 51 degrees below the celestial equator. From a practical standpoint, fog, wind, light pollution and dust prevents us from seeing that low. So normally, we try to look at least 20 degrees up from the horizon. But C77 and C80 are so spectacular, it is worthwhile trying to see them even if they are very low, "impossibly low" on our horizon. This is the only time of the year we have any chance of seeing them. Also seen at the Friday, April 12th Blue Canyon pre-star party night. Low contrast made no difference, the density of the globular cluster shined through anyway. Very large, much larger than the also famous M13 Hercules cluster.

Look for these next after Midnight and into early morning, mostly in June:

C66 NGC5694 Globular cluster, the last object in the "Hydra Hysteria" list of Walter Scott Houston. Best at Midnight - highest, in the South. Very small.

C69 NGC6302 "The Bug Nebula", planetary nebula. Best May 12 at 3 a.m.

C68 NGC6729 "the R Coronae Australis Nebula". Best June 8 at 2-3 a.m.

C75 NGC6124 Open cluster. Best June 8 at 12:30 a.m.

C76 NGC6231 "False Comet Cluster". Best June 9 at 1 a.m.

C78 NGC6541 Globular cluster. Best June 9 at 2 a.m.

C55 NGC7009 One of the most spectacular planetary nebulae, "The Saturn (aka Venus) Nebula". Best June 9, at 3-4 a.m.

C57 NGC6822 "Barnard's Galaxy". Best June 9, at 3-4 a.m.

C15 NGC6826 "The Blinking Planetary". Best May 12 at 1 a.m. and almost any time Vega is high.

C27 NGC6888 "Crescent Nebula". Best May 12 at 1 a.m. and almost any time Vega is high.

C33 & C34 NGC6992 & 6995 "Network or Bridal Veil Nebula". Usually just called "The Veil". Best June 8 at 2-3 a.m.

C42 NGC7006 Globular cluster. Best June 8 at 2-3 a.m.

C47 NGC6934 Globular cluster. Best June 8 at 2-3 a.m.

Tip: How to find objects by compass direction. Newtonian reflector telescopes such as Dobsonians, show the image upside-down in the eyepiece. The Polaris (North)-to-South line is reversed. It's important to keep in mind where the eyepiece's top is relative to the North Star position, because that changes with telescope rotation. Also, it's the North Star (Polaris) we need, not the magnetic North of the earth. We see the sky as the inside of a dome. All compass directions are oriented relative to Polaris at Blue Canyon. Polaris is about 38 degrees up from the horizon. The sky is circular around that point and "radiates" around Polaris.

The view from both Cassegrain and refractor telescopes (with diagonals) looks exactly the same, a mirror-image. The eyepiece image is reversed but "up" is still right side up. So if the sky chart's N is "up", it's still "up" in the eyepiece. Reversal means that the sky chart's E (left), is actually on the right side in the eyepiece. That's called "mirror-image" or reversed. Real sky SW viewing means S is still down, but W is left and not right. Split the eyepiece view into two sides and look on the opposite side of the mirror directly across from where the sky chart shows the object. It's important the diagonal is oriented in-line with the telescope's top to know where "up", also known as "top", is located. Once you find the object you can rotate the diagonal to a more comfortable position, so you do not hit your head on, say, the finder scope.

If these directions are too difficult, there is an alternative. Newtonians and straight-through spotter scopes with no diagonals, turn the image upside down. Newtonians can not be corrected further than this. However, with refractors, an "erector" 45-degree prism can be used instead of a 90-degree diagonal. Erectors keep the image looking exactly like the sky chart - no correction needed. The problem is that the image is dimmer, so it's usually used only for terrestrial viewing, not dim nighttime objects. An erector can also be used on a Schmidt-Cassegrain for more comfortable viewing.

Charts for selected Caldwell Objects:

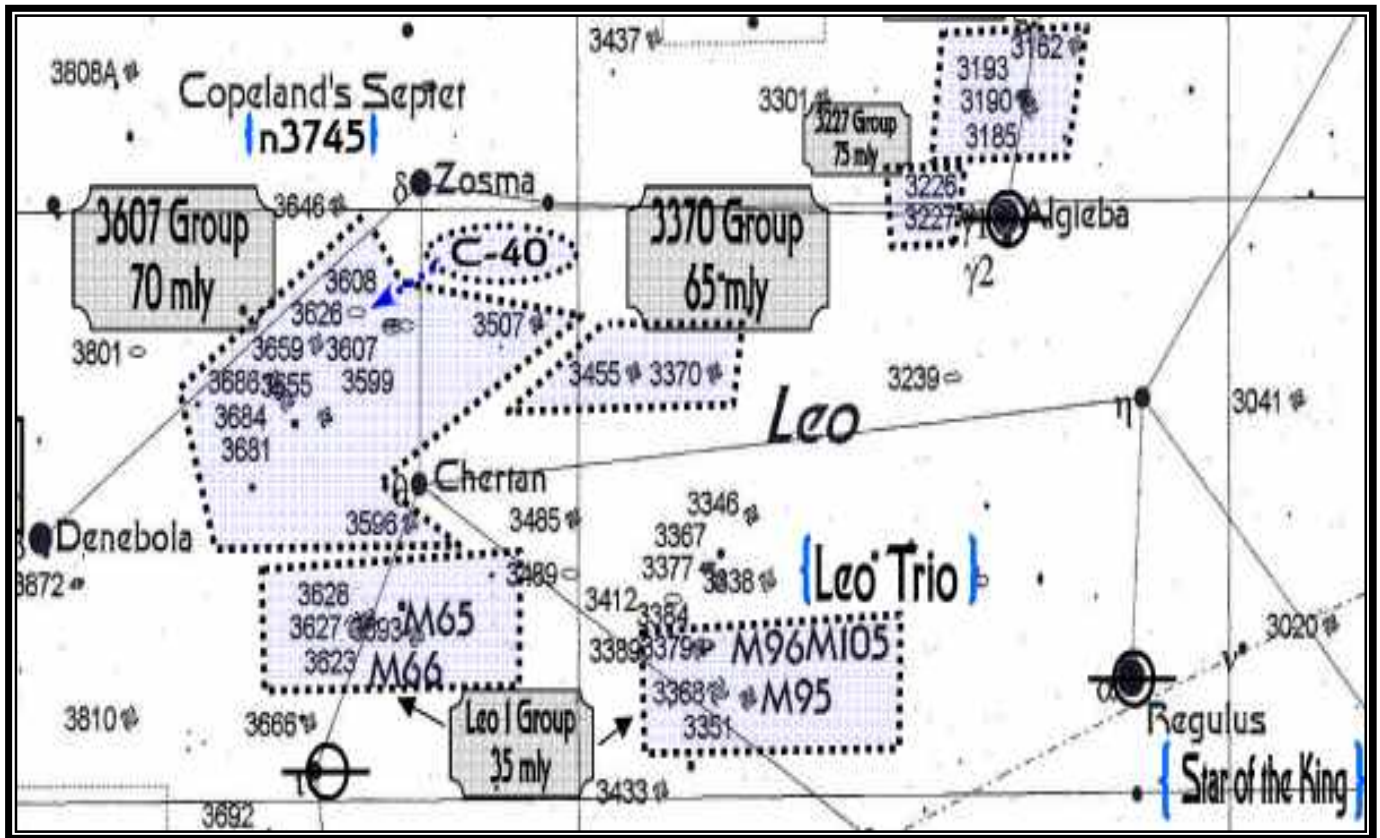


Chart #1: C40 is near a large cluster of galaxies. Look for the other NGCs next to C40.

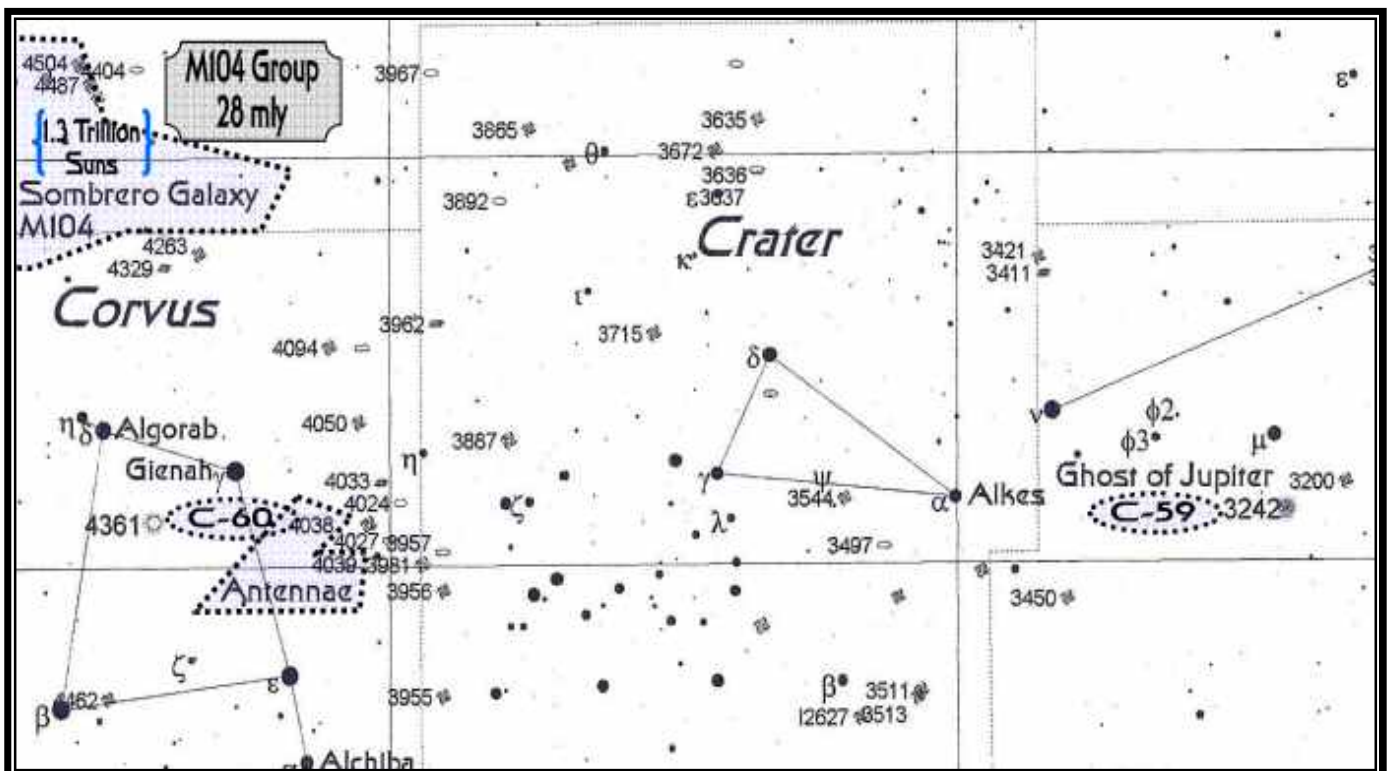


Chart #2: C59 is the "Ghost of Jupiter", "The Antennae" are two galaxies C60 & C61.

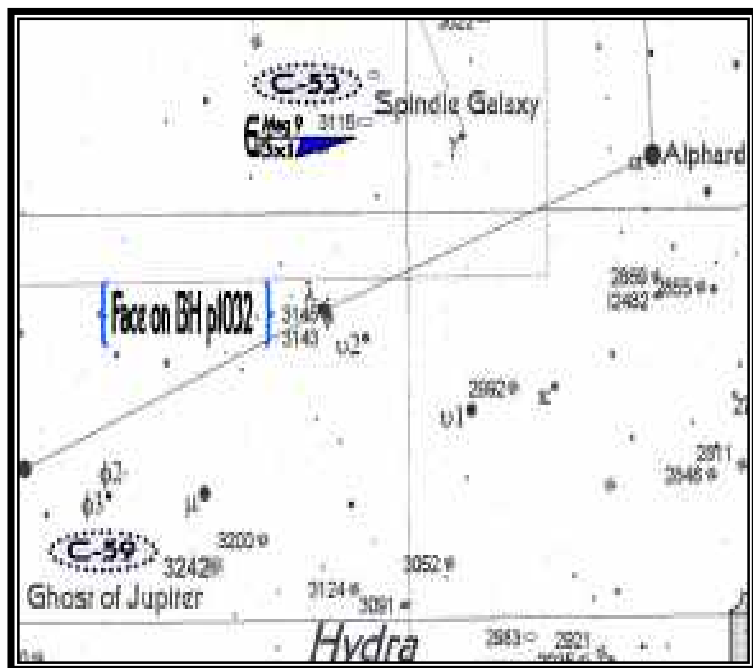


Chart #3: Look northeast of C59 to find C53, Spindle Galaxy.

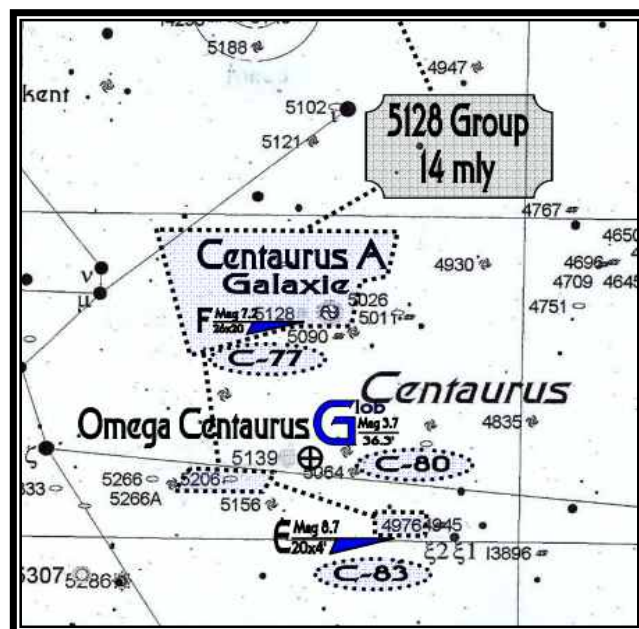


Chart #4: Omega Centauri C80, is directly South of Centaurus-A C77 C83 is not visible from Blue Canyon because it's too far South.

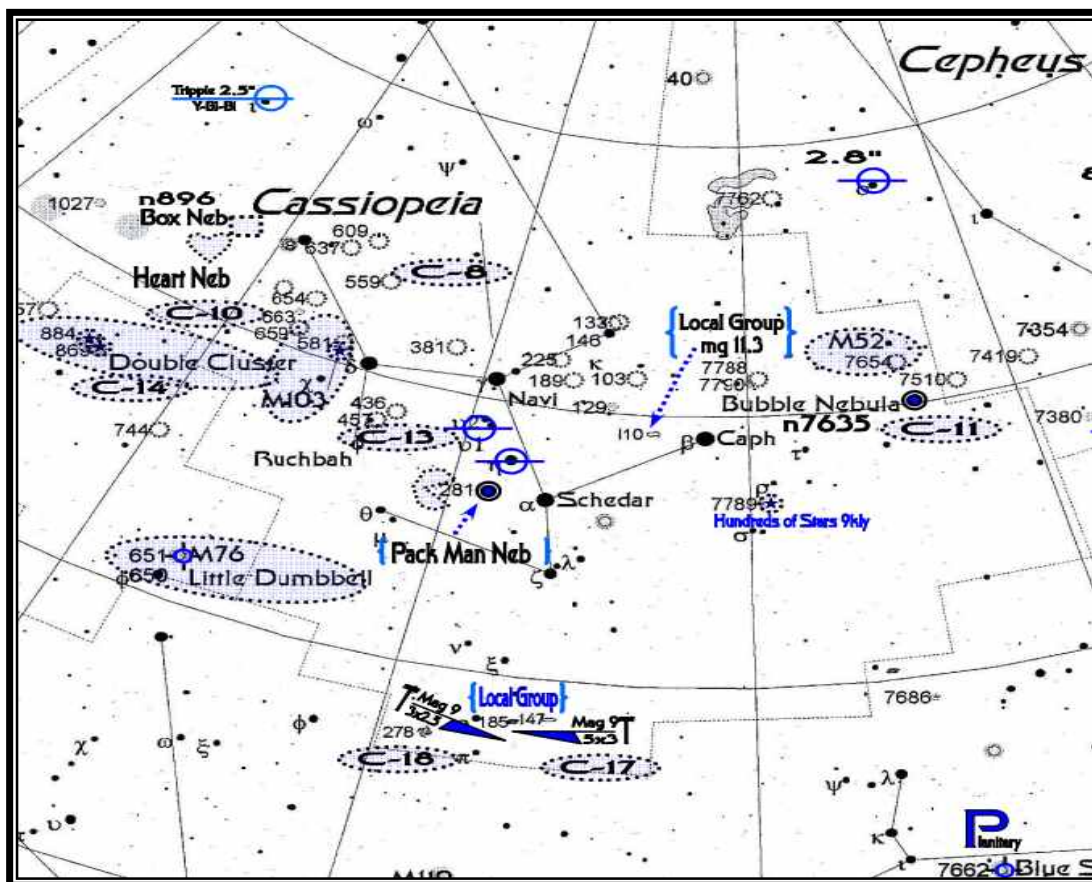


Chart #5: Several Caldwell objects can be found on this chart: C8, C10, C14, C17, C18, C11.

Galactic Distance Yardsticks



When someone asks to view the heavens through my telescope, the first thing I ask is what type of object is your favorite? The basic categories are planets, nebulae, globular clusters, star clusters, and galaxies. I usually recommend galaxies, my personal hands down favorite, and after a novice stargazer sees one for the first time the usual response is “what’s the big deal, it’s just a faint smudge of blurry light?” The big deal turns out to be very big indeed, and in order to fully appreciate what we are looking at we must have some idea of a galaxy’s vast size and distance!

Try as I might, I can’t get my head around just how far away these island universes are! It’s even more difficult to describe or explain it to someone else. The solution is to compare the huge distance with a familiar yardstick, something we judge distance with every day. Here’s one of my favorite yardsticks.

Using a scale of 1 mile = 1 Ly, the Earth would be 1 inch from the Sun, Pluto about 3.5 feet away, Alpha Centauri 4.2 miles away, and Andromeda 2.5 million miles away!

This really helps put things in perspective. If the Earth and Sun were one inch apart and Alpha Centauri, our sun’s closest neighbor, is 4.2 miles away, it’s still well within our frame of common reference. However, the Andromeda Galaxy at 2.5 million miles distant begins to stretch reality! Let’s make it still easier and describe the 2.5 million miles as about 100 trips around the earth’s circumference. Not too bad, until we remember we’re still talking about 1 mile equaling the distance light travels in one year!

The speed of light is truly amazing, it travels most distances we can comprehend fairly instantly. Here are a few factoids you have probably seen many times that help understand it’s amazing speed. Fast is putting it mildly, instant seems much closer to reality. With this info we can begin to understand why astronomers from the early 19th century were having such a difficult time accepting galaxies being more distant than the canopy of stars in our Milky Way Galaxy that we see from earth! Even Andromeda, our nearest galactic neighbor that can easily be seen with unaided vision, is at an incomprehensible distance. Looking at it from Earth gives us the impression it must be quite small. That would be the wrong conclusion, because it’s physical size is equally compelling, and if we stacked it end

on end only about 17.7 times it would span the 2.5 million light year distance to the Milky Way! It must be quite a view if we could observe both Galaxies while safely suspended from a central location between the two.

Sorry for dumping a lot of numbers, but there is a final yardstick chart I’d like to share on the following pages. It really helps me comprehend the distances to the Andromeda Galaxy and beyond out to 50 million light years, and puts it in a context that can easily be shared with others. The reference scale could be anything, but I liked 3.3” equals a million light years so it would fit on a regular sheet of paper, with the Milky Way and Andromeda approximately scaled as to size and distance. Then for the more distant galaxies, converting to inch or a foot per 5 million light years also fits the paper and enabled me to pace off the distance on the tarmac of HGO, putting markers on the

Light Travels :

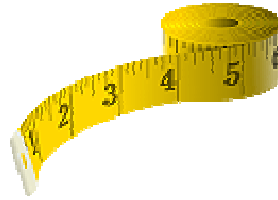
186,282 miles per second
671 million miles per hour
5.88 trillion miles per year.
Around the Earth 7.5 times in one second.
1.3 seconds to the Moon.
8.3 minutes to the Sun.
5.5 hours to Pluto.
4.37 years to Alpha Centauri, or 25.69 trillion miles.
1,000 Centuries to cross the Milky Way, or 100,000 Ly.
1,400 Centuries to cross Andromeda, or 140,000 Ly.
2.5 million years from Andromeda to the Milky Way.

ground as I go. Convenient that my size 13 shoe is close to a foot long, and ten feet equals 50 million light years out to the Virgo cluster. This scale locates the Andromeda Galaxy at about 1/2" or 6" from the Milky Way, really close by don't you think?

The reason I built a large Dobsonian Telescope wasn't to find the faintest galaxies, but to see our nearest neighbors a little better. Everyone can find the Andromeda Galaxy, even with the unaided eye, so it seems to get ignored for more challenging objects. NGC 253, the Silver Dollar Galaxy in Sculptor, is another very near neighbor, and because it's viewed so far south we tend to ignore it too. They both have so much detail to offer, so spend some time taking in the details at various magnifications. I enjoy visiting these galaxies often, and really appreciate the great views that a big mirror provides.

These galaxies are just a walk on the tarmac away using this distance scale. When viewing these distant island universes, don't forget to contemplate how many probable intelligent life forms and civilizations, are most certainly present in that small fuzzy blob. We simply can't be the only life forms in the universe! Armed with this knowledge, that tiny fuzzy blob becomes an extremely interesting object that you may never tire of observing!

Our galactic neighbors are now only several inches away...



Andromeda Galaxy, 2.5 Mly away, and 141Kly across



Pinwheel Galaxy
 ⑥ *M33 (SC)*

Andromeda Galaxy

141,000 Ly across (SB)

M31



M32 (E2)
Andromeda

M110 (E6)
Andromeda

NGC 185 (E4)
Cassiopeia

NGC 147 (E4)
Cassiopeia

2.5 Mly

Virgo Cluster

50 Mly ^{Feet or Inches} 10

Scale
 1"=5 Million
 Light Years

47.5

45 Mly 9

42.5

NGC 4565 Coma Berenices

NGC 7331 Pegasus

40 Mly 8

37.5

M65 Leo

35 Mly 7

NGC 45 Cetus

32.5

M104 Sombrero

30 Mly 6

NGC 891 Andromeda

27.5

M51 Whirlpool

25 Mly 5

22.5

M101 Pinwheel

20 Mly 4

17.5

M83 Hydra

15 Mly 3

12.5

M81 Ursa Major

NGC 253 Sculptor

10 Mly 2

(Distance Source-Wikipedia)

7.5

Scale
 3.3"=1 Million
 Light Years

5 Mly 1

M31 Andromeda

2.5

Milky Way Galaxy

100,000 Ly across SBbc



Milky Way

Feet or Inches

SVAS Observer

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Galactic Distance Scale

Andromeda, Pinwheel, and the Milky Way are approximately proportional in size and distance on this page.

Milky Way Galaxy with a diameter of 100Kly, contains 200-400 billion stars. The Sun is about 27Kly from our galaxies center.

M31 Andromeda Galaxy is 2.5 Mly away, about 17.7 diameters of 141Kly, and is one of the most distant naked eye objects. It contains over one trillion stars, with a blue shift of -301 km/s moving towards us.

M33 Pinwheel Galaxy is 2.7 Mly away, and visually larger than the full Moon. It is 50Kly across and about 570Kly from Andromeda. It contains 30-40 billion stars.

Astronomical Unit (AU) = 93 million miles. Earth to the Sun distance.

Light Year = 63,239 AU = 5.88 trillion miles = 0.307 parsecs

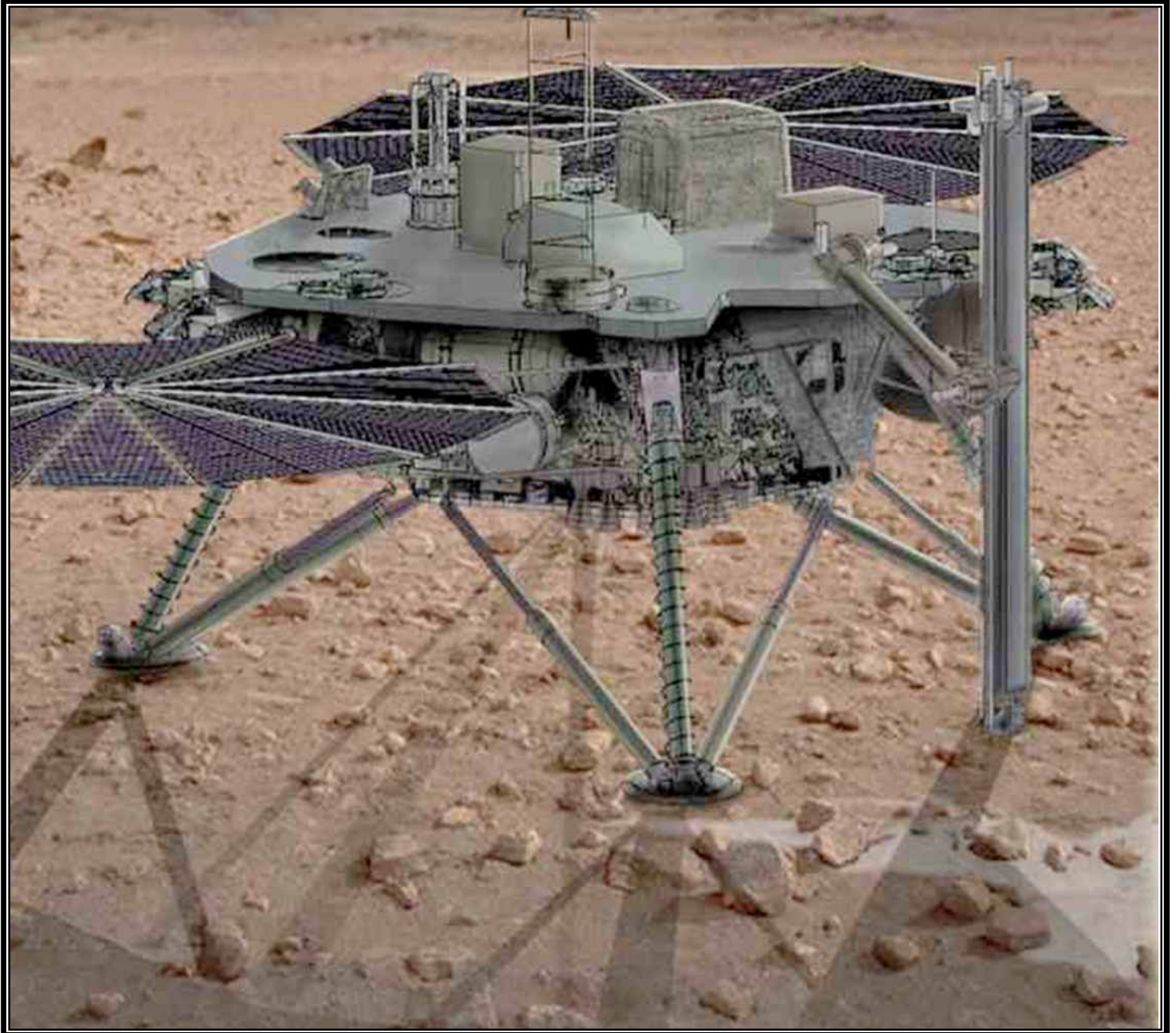
Parsec = 3.26 Ly = 19.2 trillion miles = 206,260 AU = 1 deg of parallax arc from AU base.

Kiloparsec = 3,260 Ly = 1 thousand parsecs

Megaparsec = 3,260,000 Ly = 1 thousand Kiloparsecs = 1 million parsecs

Mars

by John Jaksich



Artist's concept of the Icebreaker drill and sample transfer system, mounted on a Phoenix-derived Mars lander platform. http://blogs.nasa.gov/cm/blog/mission-ames/posts/post_1357389710291.html

Martian soil is an intriguing subject for various reasons—perhaps a primary reason is whether life resides beneath the Martian soil. Prior missions are indicative of the possibility of life and have teased the public into practically “wanting” to see life, itself. The most recent rover, Curiosity, has found “strong” evidence for past, flowing water (it seems almost indicative—that life may be next? . . .). However, no rover has yet to find any evidence of life—so NASA’s astrobiology investigations continue.

In upcoming missions, NASA scientists propose (a partial list)

- Search for bio-molecules indicative of present life,
- Search for organic molecules,
- Understand ground ice dynamics,
- Assess habitability conditions of (recent & past) life.

In one upcoming mission termed **Icebreaker**, a lander is to drill through the solid ice-like surface near the northern pole (approximately 1 meter). Icebreaker is to survey Martian ice, attempt to understand soil dynamics, and further assess for the presence of Martian life. The predecessor mission, Phoenix, was an astounding success (uncovering physical evidence of ice). Some stumbling blocks of the former mission were the “poor handling” conditions of the Martian soil near the pole. The Martian soil-ice at the north-pole was extremely “sticky” and a majority of the previous experiments (in the Phoenix mission) nearly failed. Similar experiments of the Viking era nearly “failed” due to similar soil conditions, as well.

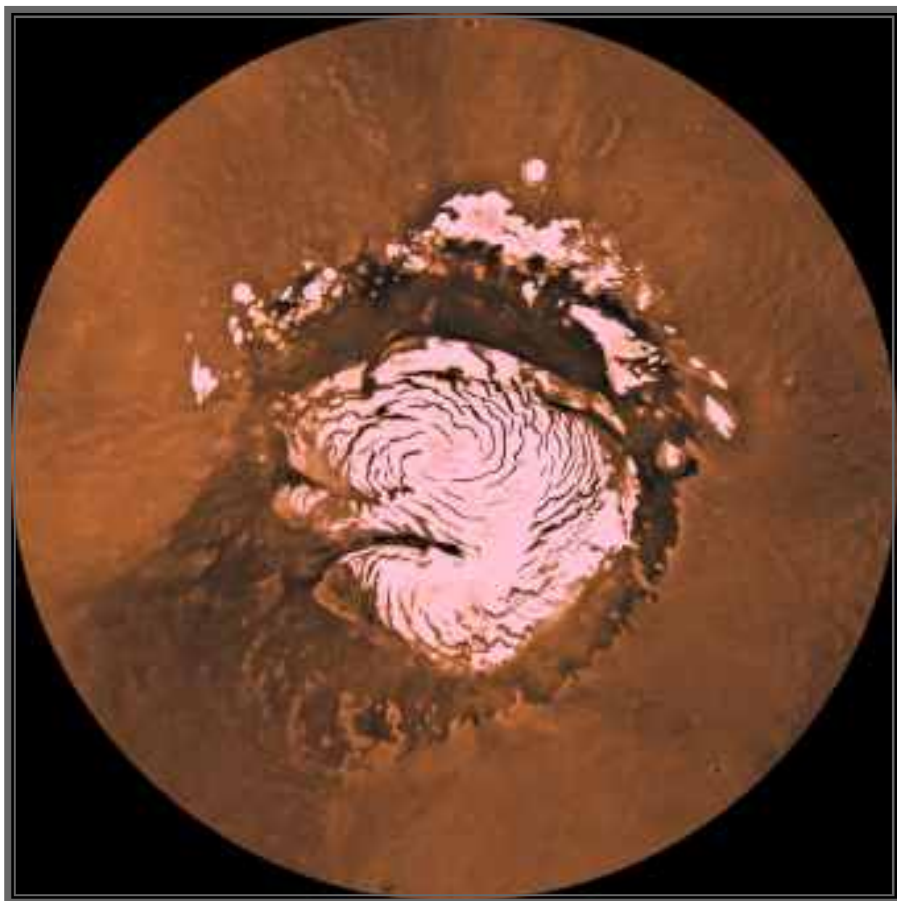
Because knowledge of Martian soil is limited, sampling of future soils will prove difficult and treacherous as well. To briefly recap on the soil, current working knowledge indicates that Martian soil is extremely tacky (or in common parlance—sticky). The difficulties are multifaceted: (1) salt-like conditions increase the polarity (electro-static like) of the soil, (2) the soil is ferromagnetic—it will adhere to permanent magnetic components in rovers and landers, (3) a lack of organic-like (peat ?) conditions (in certain areas of the Martian surface) produce a “concrete-like” shell, (4) solid water (ice) / dry ice (carbon dioxide solid) mixed with Martian salts produce “dune-like” shifts on the Martian surface, and (5) Martian dust devils deposit copious amounts of soil salts and ferromagnetic materials upon rovers/landers. As one may perceive—surveying, conducting experiments, and eventual human landings/colonization may not be for the faint of heart.

REFERENCES and LINKS

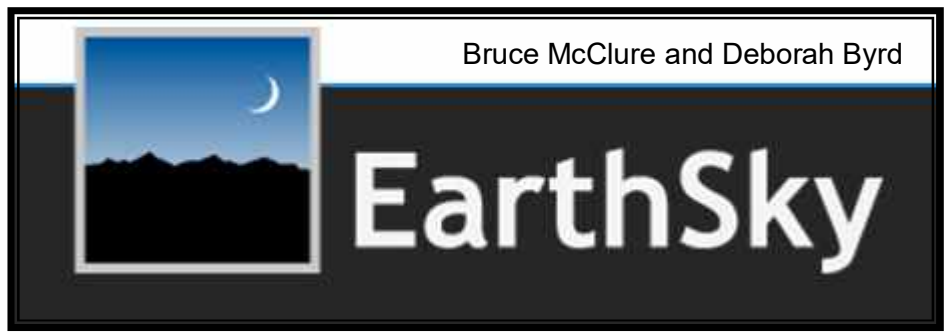
Link from Lunar Planetary Institute—Icebreaker

Mission: [pdf file from meeting 2012](#)

NASA blog about Icebreaker Mission : [NASA blog](#)



Zodiacal Light



The zodiacal light – or *false dusk* – is an eerie light extending up from the western horizon in springtime. You might also see it in the east before dawn begins to light the sky, in autumn, in which case it's called the *false dawn*.

Maybe you've seen the zodiacal light in the sky and not realized it. Maybe you glimpsed it while driving on a highway or country road at this time of year. This strange light is a seasonal phenomenon. Springtime and autumn are best for seeing the zodiacal light. Suppose you're driving toward the west in springtime the hour after dusk. You catch sight of what you think is the lingering evening twilight, or the light of a nearby town, just over the horizon. Instead, what you're seeing is the zodiacal light. It looks like a hazy pyramid of light extending up from the western horizon, after evening twilight ends.

Springtime? Autumn? Is there a difference between Earth's two hemispheres. Yes and no. For both hemisphere, springtime is the best time to see the zodiacal light in the evening. Autumn is the best time to see it before dawn. But, of course, spring and autumn fall in different months for Earth's Northern and Southern Hemisphere.

What is zodiacal light?

People used to think zodiacal light originated somehow from phenomena in Earth's up-

per atmosphere, but today we understand it as sunlight reflecting off dust grains that circle the sun in the inner solar system. These grains are thought to be left over from the process that created our Earth and the other planets of our solar system 4.5 billion years ago.

These dust grains in space spread out from the sun in the same flat disc of space inhabited by Mercury, Venus,



Photo credit: Robert Snache

Earth, Mars and the other planets in our sun's family. This flat space around the sun – the *plane* of our solar system – translates on our sky to a narrow pathway called the ecliptic. This is the same pathway traveled by the sun and moon as they journey across our sky.

The pathway of the sun and moon was called the Zodiac Pathway of Animals by our ancestors in honor of the constellations seen beyond it. The word *zodiacal* stems from the word *Zodiac*.

In other words, the zodiacal light is a solar system phenomenon. The grains of dust that create it are like tiny worlds – ranging from meter-sized to micron-sized – densest around the immediate vicinity of the sun and extending outward beyond the orbit of Mars. Sunlight shines on these grains of dust to create the light we see. Since they lie in the flat sheet of space around the sun, we could, in theory, see them as a band of dust across our entire sky, marking the same path that the sun follows during the day. And indeed there are sky phenomena associated with this band of dust, such as the gegenschein. But seeing such elusive sky phenomena as the gegenschein is difficult. Most of us see only the more obvious part of this dust band – the zodiacal light – in either spring or fall.

How you can see the zodiacal light

The zodiacal light can be extremely bright and easy to see from latitudes like those in the southern U.S., sometimes leading to the above situation where drivers mistake the lights for a town just over the horizon.

Meanwhile, skywatchers in the northern U.S. or Canada sometimes say, wistfully, that they've never seen it.

You'll need a dark sky location to see the zodiacal light, someplace where city lights aren't obscuring the natural lights in the sky. The zodiacal light is even milkier in appearance than the summer Milky Way. It's most visible after dusk in spring because, as seen from the northern hemisphere, the ecliptic – or path of the sun and moon – stands nearly straight up in autumn with respect to the western horizon after dusk. Likewise, the zodiacal light is easiest to see before dawn in autumn, because then the ecliptic is most perpendicular to the eastern horizon in the morning.

In spring, the zodiacal light can be seen for up to an hour after dusk ends. Or, in autumn, it can be seen for up to an hour before dawn. Unlike true dusk, though, there's no rosy color to the zodiacal light. The reddish skies at dawn and



Zodiacal Light over the Faulkes Telescope, Haleakala, Maui. Photo credit: Wikimedia Commons



dusk are caused by Earth's atmosphere, while the zodiacal light originates far *outside* our atmosphere, as explained above.

Look for the zodiacal light in the west after sunset in late winter and early spring, around the time of the spring equinox. Look for it in the east before sunrise in late summer and early autumn, around the time of the autumn equinox. The darker your sky, the better your chances of seeing it. Your best bet is to pick a night when the moon is out

The zodiacal light is easier to see as you get closer to Earth's equator. But it can be glimpsed from northerly latitudes, too. Here's the zodiacal light seen by EarthSky, Facebook friend Jim Peacock on the evening of February 5, 2013, over Lake Superior in northern Wisconsin. Thank you, Jim!

of the sky, although it's definitely possible, and very lovely, to see a slim crescent moon in the midst of this strange milky pyramid of light.

If you see it, let us know!

Bottom line: The zodiacal light is a hazy pyramid of light extending up from the western horizon, beginning about an hour after sunset, in springtime. It extends up from the eastern horizon, a couple of hours before dawn. It's sunlight reflecting on dust grains that move in the plane of the solar system.

Credit; Article Reprint Courtesy of EarthSky

<http://earthsky.org/astronomy-essentials/everything-you-need-to-know-zodiacal-light-or-false-dusk>

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