



Mars was captured above rising through the Arch Rock in Valley of Fire State Park, Nevada, USA. This month's cover photo is a creation of OCA Member Wally Pacholka of Astropics.com. This photo was featured as the nasa Astronomy Picture of the day (APOD) on July 15th see <http://antwrp.gsfc.nasa.gov/apod/ap030715.html>

## OCA CLUB MEETING

The free and open club meeting will be held Friday, August 8th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The featured speaker this month is not known as of the deadline for the newsletter. Please check the web site for updated information.

## STAR PARTIES

The Anza star party is on August 23rd. The Black Star Canyon site will be open this month on August 23rd also. As the new moon is on Wednesday August 27th members may choose to visit Anza on August 30th but there will be no official star party at that time due to the Labor day weekend. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

*If you have a "web capable" phone you can also check the weather conditions at our Anza site while you are travelling. Just use your phone to navigate to our web site at [www.OCAstronomers.org](http://www.OCAstronomers.org).*

## COMING UP

The beginners class will be held on Friday August 1st, at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

Astrophysics SIG: Aug 15th.  
Astro-Imagers' SIG: Aug 19th.  
The EOA SIG: Aug 20th.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

# President's Message

By Barbara Toy

The year is really moving along, as we head into prime time for Mars observing. Anza in August can be both a pleasure for observing and a challenge – the price of comfortable viewing temperatures at night is blazing hot days.

And, speaking of challenges – we have a few others that have come up in the last few weeks. These aren't necessarily in order of importance...

## What Happened With the July Sirius Astronomer?

This is one of those object lessons in why we shouldn't take it for granted that things are working the way we think they should. Without going into a complete blow-by-blow description of the entire sequence, the ultimate outcome was that the July issue got lost in transmission between Darren Thibodeau (our illustrious editor) and the printer. We didn't find this out until Charlie Oostdyk, who is the person who receives the printed copies, processes them, and gets them in the mail, called to find out when he was going to get them, and was told the printer didn't have the issue and couldn't find any trace of the transmission. This was in the late afternoon of July 3, when a lot of people were taking off early for the 4<sup>th</sup> of July weekend, so the earliest they could actually receive the resubmission was the following Monday morning. They weren't delivered to Charlie until Friday, the 11<sup>th</sup>, but he got them processed and in the mail in 24 hours, even though the general meeting was that night. And we profoundly hope that all of you have now received it ...

## The August issue should come much earlier in the month

The August issue should come much earlier in the month. Liam Kennedy graciously agreed to help out with that issue, as Darren has a major project going at work and won't be able to put the issue together. Unfortunately for those of us who have to meet the paper's deadline, this means that the deadline for material had to be moved up by several days. If you get this issue early, you can thank Liam, who had to put together before he left on a business trip.

## Changes at the Sirius Astronomer...

As many of you may know, Darren has

been working in Moorpark during the week and coming back to Orange County on the weekends. His work as editor of the Sirius Astronomer has mainly been done on weekends, as he hasn't had the facilities to do it in Moorpark. This was a tolerable situation for him while he thought the job was for a limited period, but it has now become a long-term commitment. While that is great for him professionally, he has reluctantly concluded that this means that he will not be able to continue in the position of editor of the SA.

Darren has been doing a great job as editor, and the issues he has produced show that he has indeed been a worthy successor to Chris McGill and John Sanford. We are very sorry that he will be stepping down from that position, and very grateful that he has been willing to continue as editor over the last few months even though the job has been made a lot more difficult for him because of his work situation. He has also assured me that, though he cannot continue with full responsibility for the SA, he will be helping out in any way he can, which should make the transition to his successor a lot easier.

Liam was instrumental in finding us our current printer and has worked with Darren on a lot of problems that have come up while Darren has been editor. Besides stepping in to put the August issue together, he has generously agreed to help out until we can find a new editor for the long term. He has some ideas, drawing on Darren's experience and his own background, for further streamlining the mechanics of putting each issue together, and we expect that this part of the editor's job will become easier and less time-consuming than it has been for Darren as a result.

As anyone who has had anything to do with the newsletter can tell you, what takes the most time and effort is obtaining enough material for each issue, and getting it in by the deadline. We really need a group of people helping with this aspect of the newsletter – the more people we have scouting for articles and contributing their own, the more original content each issue of the Sirius Astronomer will have, and the better it will be. In the time I've been on the board, I've received more comments and complaints about the SA than about any other single aspect of

or service provided by the club, so it's obviously very important to all of you – and well worth its own "special interest group" to support it.

If you have any background working with newsletters or journalism in general, or would like to gain some practical experience working in that area, we would love to have you get involved in working with the Sirius Astronomer. And, of course, if you are interested in taking on the job of editor, we are very interested in hearing from you! Please contact Liam Kennedy at SiriusAstronomer@ocastronomers.org or 949/552-6187, or me at btoy@cox.net or 714/606-1825.

## More Changes – at Anza House...

For the last couple years, Stephen Eubanks has been doing a really wonderful job in the very necessary position of Anza House Coordinator. That position is primarily intended to oversee Anza House, and to take care of such things as making sure there are adequate supplies, collecting the money left by people who stay there overnight, letting the board know of any significant problems, and generally seeing that the house is running smoothly. Steve has consistently gone beyond that, making repairs, taking care of cleaning and other maintenance himself, improving the arrangement of furniture and obtaining new items that make the house more functional, and generally doing everything he could to make Anza House as inviting a place to stay as possible.

Those of you who know him know that he has his own business and many calls on his time and talents, and we are very grateful that he has been willing to devote so much of his energy to Anza House while he's been the Coordinator. Unfortunately for us, he has reached a point where he can no longer do this, and he has now advised us that he will have to give up this position by the end of the year. We are all hoping that one of you will step forward to take on this position in his place while he is still handling the position, so he can work out an orderly transition to his successor.

Anza House is a wonderful facility that really makes our Anza site both unique and much more comfortable than most dark sites. The Anza House Coordinator is in a unique position to make the experience of members and visitors to our site memorable, and to continue the

process of improving the facilities at the site. If you have any experience with Anza House, please consider taking on the position of Coordinator. If you have questions about what is involved in the position, I'm sure Steve would be delighted to talk to you about his experience. He can generally be found around Anza House during part of each star party, or you can reach him at SSEubanks@earthlink.net. You can also contact me about this.

### **A Happier Change...**

One change for Anza House that we've been planning for a long time is finally going to take place – thanks to Trustee Gary Schones, the exterior of Anza House is finally going to be painted. This means that we won't be able to refer to the two halves of the building by color (for those who may not have noticed, currently they are two different colors), but I'm sure we can adapt. We've decided on a beige tone for the main color that is light enough that it should reflect most of the heat, helping to keep the house cooler, but with enough color that it shouldn't be too glaring to the eyes during the day. The trim will be white. If you have any interest in helping out with this job, please contact Gary via email at: gary378@pacbell.net.

For those who may not know him, I should mention that Gary is another of our "unsung heroes." His claims to fame include getting us Anza House, and continuing to make improvements to it over time. He's helped plan and then overseen the various grading projects on the Anza site, and is the person who knows the most about getting Anza-related projects through the county permit and inspection system – so he's the one everyone goes to for help with the permit process. More recently, he got us the storage container that's now near the club observatory and that made it possible to clear the warming room and observing area in the observatory so they could actually be used – not only did he get the container, he arranged for the gravel bed it sits on and built the shelves inside that made it fully functional as a storage unit. He's had a major hand in just about every significant building project out at Anza, and always has a list of projects he is planning to do for the club – the painting of Anza House is only one of them. On top of all that, he is very generous in sharing his knowledge and his time, and has been a real pleasure to work with in the three

years I've been on the board.

### **Pre-Meeting Slide Shows**

This is something of a non sequitur, but I've wanted to talk about the slide shows we run before the general meetings for awhile. These were started by Liam while he was president, in part as a response to questions about why we weren't showing member slides. I'm told that member slides used to be a frequent feature of the meetings, but that, of course, was before we had the email groups and before it became easy for people to post their pictures on the website. It didn't take Liam long to realize that the slide shows also are a great way to display club announcements, so people have a chance to see them even if there isn't time to make the announcements orally. He refined the concept over the months he created them for the meetings, and, when he turned the presidency over to me, I tried to convince him to continue doing them. He declined on the grounds that these should remain a presidential privilege – or responsibility. Although the focus remains the announcements and member images, the shows do provide another way for the president to communicate with the membership, and I admit that I've been having fun with them, though I started off with minimal knowledge of Power Point.

Generally, at least half the slides in any given show are devoted to announcements. As to the pictures, I sent out requests for submissions a few times, but got very few responses. I know, from seeing images posted on the AstroImagers email group and, more recently, in the new Image Album on the website, that there are a lot of members taking a lot of really great pictures. Since these have been posted for club members to enjoy, it seems reasonable to use them in the slide shows, as the shows are meant solely for the club meetings. On a few occasions, I've found an image that I wanted to use that was on a member website but hadn't been specifically posted to one of the club email groups, in which case, of course, I asked permission before using it (I'm happy to report that those members have been very gracious, even enthusiastic, about giving permission).

### **The exterior of the Anza House is finally going to be painted (one color)**

### **If you have any pictures you would like shown.. don't feel shy about sending them along**

My philosophy in selecting pictures is to try to give as broad a representation of what members are doing as possible, focusing on images that have been posted since the previous meeting. I try to use only two images per show from any one member (there are times when selecting which two images to use is a real challenge!), and I try to include images from less experienced people as well as from those who are true masters of the art. The "two picture" rule it isn't iron-clad and does get stretched on occasion. The only changes I make in the images themselves are sizing them to fit the slides, and sometimes rotating them to get a better fit (but only on images without a clear orientation). If I find that the way a particular image shows up on a slide doesn't do it justice, I generally won't use it, even if it happens to be one I really like. I started by trying to include all of the information provided with each picture, but found that the text too often detracted from the image, so now I limit the verbal information I add to the title or subject of the picture and the identity of the photographer. The format of each slide is based on the template that Liam set up, which has a black background and the club logo in blue with gold letters at the top left corner – where this detracts from the image, as with Jim Windlinger's beautifully framed picture of the Horsehead Nebula that was in the June show, I eliminate the logo.

Inevitably, I have limited time to find good pictures for the show, and I'm sure there are times that, if I looked a little further, I would have found a better image from a particular photographer than one I actually used. Which gets me to one reason for going on about this – if you have any pictures you would like shown at one of the general meetings, please don't feel shy about sending them to me! It's easiest if you do it by email to btoy@cox.net, but I do have a scanner if you want to send me a non-electronic version. Any announcements that should be included in the show are also welcome. To give me time to incorporate anything you send into the show, please get it to me no later than the Wednesday before the meeting.

Thanks, and with that I'll sign off until next month. May your August skies be clear and the seeing truly excellent! ■

# Addressing Lighting

## Issues:

*The following is excerpted from a letter written by Charlie Oostdyk regarding a local lighting problem, which we thought that other members might find helpful as a model:*

Re: Request to Install Additional Security Lighting

The purpose of this letter is to explain what bad lighting is and why bad lighting choices are as bad as not installing any exterior lights, and to suggest alternatives that will provide good lighting.

### **Bright glaring lights cause more harm than good.**

nobody knows. If it were so easy to reduce crime with lighting, then considerable headway would have been made by now. Our cities have never been brighter, yet the crime rates continue to be high. The connection between crime rate reduction and increased lighting is vague at best. And a poorly conceived lighting program instituted by concerns for security that installs lots of bright glaring lights causes more harm than good. It offers people a solution that won't be effective, gives a false sense of security, and wastes funds. There can also be liability issues from installing bad lighting, which can be as bad as doing nothing.

So what can we do? What we do need is effective lighting. Lighting that puts light where we need it – and nowhere else – and where it will help visibility. That means: no glare, no light trespass, no up-light, no harsh shadows, no steep transition from light to dark, etc. If you can see the bright glaring light source, then your lighting is not effective. You should see the effect of the light, not the light source. When you drive by Calvary Chapel on Fairview some night, look at how well it is lighted with no light sources showing.

Light trespass is lighting that shines onto other people's property or into their windows. The City of Santa Ana has recognized this problem and has an ordinance to deal with it, but glare is an issue they are still working on and don't yet have an ordinance in place to address. Glare makes it hard to see what is next to the bright light. Just think about those new blue auto headlights

As I understand it, the intent is to install these proposed exterior lights as "security lights". But that raises the question, "Does outdoor nighttime lighting provide security?"

The answer is that nobody knows. If it were so easy to reduce crime with lighting, then considerable headway would have been made by now. Our cities have never been brighter, yet the crime rates continue to be high. The connection between crime rate reduction and increased lighting is vague at best. And a poorly conceived lighting program instituted by concerns for security that installs lots of bright glaring lights causes more harm than good. It offers people a solution that won't be effective, gives a false sense of security, and wastes funds. There can also be liability issues from installing bad lighting, which can be as bad as doing nothing.

### **What we do need is effective lighting. Lighting that puts light where we need it - and nowhere else...**

that can allow you (as the driver) to see much better, but when they are on an oncoming car they blind you so you can't see what's next to them, such as pedestrians. Glare creates harsh shadows and makes it hard to identify whatever or whoever is illuminated.

Check this yourself tonight. Look toward a brightly lit area with the lighting facing you. You will see the bright light and little detail on anything surrounding it. If you use your hand to block the light source, a lot more detail can be seen. This is a problem for all lights where you can see the light source, including many wallpack lights on buildings, though some are not as intense.

So how can we have effective lighting? We need to install shielded lights. A well shielded wallpack can be an excellent light source, and the difference in cost may only be \$10 to \$20 over the cost of the fixtures presently selected. When the glare is reduced or eliminated by a shield that focuses the light on the area you want illuminated, you can actually use a lower wattage, and therefore a less costly light, to get the same illumination provided by an unshielded light, or, with the same wattage, you will more brightly light the area you want illuminated.

I have attached supporting documents to this letter, which include a graphical representation of how shielding improves lighting, and product specifications for some alternative light fixtures. The association has spent considerable funds on the present lighting and cannot be expected to fix the problem immediately and lose that investment, but it does not need to continue installing bad lighting. It should begin installing better lighting and find out what works well. Then, when the present fixtures reach the end of their life cycles, they can be replaced with better lighting that we know will work.

Very truly yours,

Charlie Oostdyk

<http://www.darksky.org/infoshts/is051.html>

<http://www.darksky.org/infoshts/is024.html>

<http://www.rabweb.com/images/dksky/flpostft.pdf>

<http://www.rabweb.com/catalog/wp1.pdf>

<http://www.rabweb.com/catalog/wp2.pdf>

<http://www.theglarebuster.com/gbcut.pdf>



The International Dark Sky Association has over 10,000 members worldwide... but they still need more help and support to be able to continue the task of raising public and corporate awareness to the lighting issues that are stealing away our dark skies.

The club is an organizational member of the IDA and many OCA members are already members of the IDA. Consider joining the IDA by visiting their web site at <http://www.DarkSky.org>

## From the Belly of an Airplane: Galaxies

By Dr. Tony Phillips

On April 28th a NASA spacecraft named GALEX left Earth. Its mission: to learn how galaxies are born, how they grow, and how they die.

"GALEX-short for Galaxy Evolution Explorer-is like a time machine," says Caltech astronomer Peter Friedman. It can see galaxies as far away as 10 billion light years, which is like looking 10 billion years into the past. The key to the mission is GALEX's ultraviolet (UV) telescope. UV rays are a telltale sign of hot young stars, newly formed, and also of galaxies crashing together. By studying the ultraviolet light emitted by galaxies, Friedman and colleagues hope to trace their evolution spanning billions of years.

This kind of work can't be done from the ground because Earth's atmosphere absorbs the most energetic UV rays. GALEX would have to go to space. To get it there, mission planners turned to Orbital Science Corporation's Pegasus rocket.

"Pegasus rockets are unusual because of the way they're launched-from the belly of an airplane," says GALEX Project Engineer Frank Surber of JPL.

It works like this: a modified L-1011 airliner nicknamed Stargazer carries the rocket to an altitude of 39,000 feet. The pilot pushes a button and the Pegasus drops free. For 5 seconds it plunges toward Earth, unpowered, which

gives the Stargazer time to get away. Then the rocket ignites its engines and surges skyward. The travel time to space: only 11 minutes.

"The aircraft eliminates the need for a large first stage on the rocket," explains Surber. "Because Stargazer can be used for many missions, it becomes a re-useable first stage and makes the launch system cheaper in the long run." (To take advantage of this inexpensive launch system, GALEX designers had to make their spacecraft weigh less than 1000 lbs-the most a Pegasus can carry.)

A Pegasus has three stages--not counting the aircraft. "Its three solid rocket engines are similar to the black powder rockets used by amateurs. The main difference is that the fuel is cast into a solid chunk called a 'grain'-about the consistency of tire rubber. Like black powder rockets, once the grain is lit it burns to completion. There's no turning back."

In this case, turning back was not required. The rocket carried GALEX to Earth orbit and deployed the spacecraft flawlessly. On May 22nd, the UV telescope opened its cover and began observing galaxies-"first light" for GALEX and another success story for Pegasus.

For adults, find out more about the GALEX mission at <http://www.galex.caltech.edu/>. Kids can read and see a video about Pegasus at <http://spaceplace.nasa.gov/galex/pegasus.html>.

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



*L-1011 "Stargazer" prepares to take off to carry the Pegasus rocket on the first 39,000 feet of its climb to deliver a spacecraft to orbit.*

# Altimira Observatory is under construction!

by Bob Buchheim, OCA

A while ago, Russ Sipe got me interested in asteroid projects – astrometry (precise determination of the asteroid’s position) and photometry (measurement of the asteroid’s brightness). I had a Starlight Express CCD camera, and mating it to the OCA’s LX-200 seemed like a good way to start gathering and analyzing some data. With Russ’s encouragement, and some technical help from John Hoot, I succeeded in (a) gathering sufficiently accurate astrometry on several asteroids to qualify for an Observatory Code from the Minor Planet Center (G75); (b) developing good light curves for several asteroids; (c) almost making a discovery, and (d) deciding that I needed an observatory in my backyard.

First, the almost-discovery: While analyzing photometric data on my target asteroid, I noticed a much fainter moving object in the images. I checked the MPCORB database, and didn’t see anything that should have been in my field-of-view. So, I included its coordinates as an “unknown” in my report to the MPC. Their response was “good catch, but someone else reported it a week ago...” Still, it was one of those exciting moments that I’ll always remember, like the long-ago night when I first located M38 in my 6” Newtonian, and was amazed to see NGC 1907 in the same field. Or my first CCD image of the Ring Nebula, that showed a strange little fuzzy object in addition to the Ring – I returned to re-image the Ring several times that night, to see if the little guy was moving (a comet perhaps?) Alas, as the more experienced astrophotographers already know, I have joined the fraternity of “discoverers” of galaxy IC 1296.

The business of determining an asteroid’s light curve really caught my imagination, because it is one way for a modestly-equipped amateur astronomer to do “real” science, and to add a little tidbit of new knowledge about a solar-system object. Here’s the idea. Like any planet, an asteroid rotates. Unlike the other planets, however, the asteroids are too small to show a disk or any surface markings (for practical purposes, their telescopic image is just another star-like point of light); and in general they are also too small to have relaxed to a spherical shape. If a rotating object has an (approximately) uniform reflectivity, then its brightness will be (approximately) proportional to the surface area that it displays. Think of a glowing football tumbling end-over-end. When we see it “side on”, it will be relatively bright. When its “pointy-end” is facing us, it will be relatively dimmer.

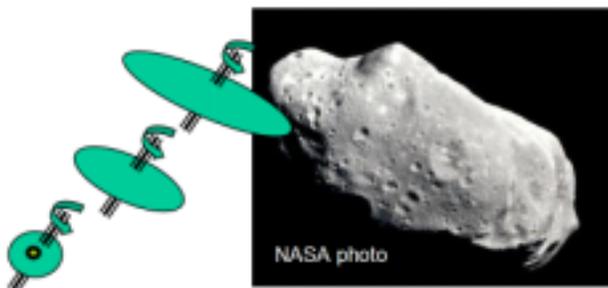


Fig 1

So, by continuously monitoring the brightness of the asteroid over several nights, I could plot its brightness vs. time, and from that, infer the rotational period of the asteroid. Regarding the “approximations” mentioned above, they are legion. You can well imagine that a change in projected-area as the asteroid rotates will be indistinguishable from a change in albedo; and that the asteroid’s constantly-changing distance from earth, its changing phase angle, and the change in atmospheric extinction as it rises, transits, and sets in the course of a night are all important factors to deal with in evaluating the data. Taking proper account of all these effects is part of the fun, and part of what makes the difference between a “scientific” observation and an “artistic” image.

A typical asteroid light curve is shown in Fig 2. The period of rotation is pretty clearly illustrated by this curve, which represents about 80 images all taken in the course of one night. This approximately 12th magnitude asteroid, with a brightness variation of nearly 0.7 magnitude, is well within reach of a two- to three-minute unguided exposure.

This light curve also hints at another interesting project. Notice that the first minimum and the second minimum are different brightness. That isn’t an artifact of the data – the same pattern is visible on the next night’s data. It turns out that little details like that in the shape of the light curve carry information about the shape of the asteroid. If the light curve is monitored periodically for several apparitions, at different phase angles, it is possible for professional astronomers to use the data to determine the axis of rotation, and even make a reasonable estimate of the shape of the asteroid.

Of course, in order to effectively do such a study on an asteroid, you need to make all-night series of images, preferably several nights in a row, and then repeat the series every month or so, to capture a full range of phase angles. I discovered that it was not practical for me to do that at Anza, as long as I also have a day job. If I was going to do projects like this, I was going to have to do it from home (which, happily, in Coto de Caza has pretty dark sky). So, being blessed with an understanding and enthusiastic wife, I proposed that the capital investment in a backyard observatory would pay off in improved scientific productivity. Thus began the planning for Altimira Observatory (“Altimira” being the street we live on).

Greg Pyros kindly devoted a meeting of the OCA AstroImagers SIG to reviewing the design of my observatory project. A couple of peculiar requirements related to asteroid projects that I discussed there might be of interest to other research-oriented OCA’ers – CCD linearity, and over-sampling.

**CCD linearity:** The oft-quoted aphorism that “CCD’s are linear devices – doubling the number of photons will double

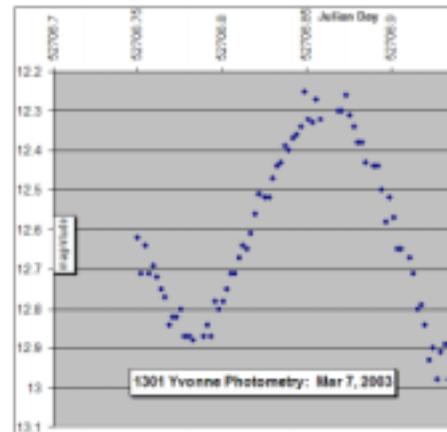


Fig 2

the signal" is only approximately true. In particular, for CCD's (like my Starlight Xpress) whose imaging chip includes "anti-blooming gates", the response becomes noticeably non-linear long before the image saturates. That's exactly what "anti-blooming" is supposed to do, of course: by bleeding excess charge from the brightest pixels, it allows you to get a pleasing image even when there's a very bright star near the faint galaxy that you're imaging. But for scientific imaging (where you want a doubling of the photon flux to result in exactly doubling the signal), those ABG's can cause problems. For example, here's a study that I did one night, taking a series of progressively longer exposures of a star field, and measuring the integrated signal of several stars (after flat-fielding, and dark-subtraction, of course!)



Note onset of non-linearity (at less than 50% of spec full-well capacity)

Fig 3

If the sensor were truly linear, the data points would fall on the linear-trend lines. But (at substantially less than the full-well capacity of this chip), the imager becomes non-linear, and the increase in signal is no longer proportional to the increase in input photons.

Hence, for photometry studies, I had to select exposure times short enough that the asteroid's peak signal stayed in the linear region of the chip, which of course meant less signal, and a lower signal-noise ratio, than could be had with a longer exposure. Naturally, this also meant less accurate photometry than could be gathered with a truly linear device. A pretty good approximation is that your photometry accuracy is about  $\Delta m \gg 1/(SNR)$ , so a signal to noise ratio of 20:1 gives photometry no better than .05 magnitude, but a SNR of 100:1 may offer accuracy as good as .01 magnitude – and make it easier to determine the asteroid's shape and rotational axes.

Most major professional observatories dedicate a huge fraction of their budget to instrumentation. I ended up doing the same: I've purchased an ST-8XE to take advantage of its non-ABG chip, larger FOV, and better sensitivity compared to the HX-516. (Call me if you'd like to buy the HX-516, which is a quite nice camera for starting out!)

**Oversampling:** The topic of matching pixel size to focal length has generated plenty of discussion in the astro-imaging community. If you're imaging extended objects (like galaxies or nebula) it's widely accepted that you can get more sensitivity (or, equivalently, shorter exposures) by using larger pixels (or binning your pixels). That idea no longer works if you're imaging star-like points of light: once the pixel is large enough to gather all of the light from the star (or asteroid), then making the pixel larger won't bring in any more photons. At least from that star; make the pixel too large, and

you'll gather photons from other nearby stars, thereby confusing your photometry data. Even more important, the accuracy of astrometric measurements – where you're striving for accuracy of a fraction of a pixel – is fatally damaged by undersampled star images.

What's an under-sampled image? you ask.

First, remember that the star image isn't truly a point – it's spread a bit by diffraction in your telescope, and by atmospheric turbulence, before it lands on your CCD. Second, recall from your math classes that you can estimate the centroid of a set of numbers by calculating their weighted average. We calculate the centroid of the asteroid's image by taking the weighted average of all the pixels it covers. Of course, if you have a tiny star image rattling around inside a big pixel, you can't tell where in the pixel the star lies – if it moves a little bit, but all of its light still lands on that pixel, you can't tell that it moved. Similarly – as illustrated on the left side of the **fig 4** below – if you have only a couple of pixels gathering light from the star (or asteroid), you get a very poor estimate of the centroid of the image. How would you know from those three data points where the peak of the "real" curve is? As a general rule, if your image has square stars, then it's undersampled.

But – as shown on the right side – if you have a well-sampled image (i.e. pixels that are much smaller than the star image), then you can more accurately determine the position of the object. Of course, those smaller pixels mean less signal on each one, thereby placing a premium on imager sensitivity.

Happily, the combination of an ST-8XE and a NexStar 11 with an f/6.3 focal reducer gives a large-enough field of view with small-enough (1.1 arc-second) pixels. This should result in well-sampled images. Typical star image FWHM in my data from Anza, with unguided exposures of a few minutes using the 10 inch LX-200, was about 4.5 arc seconds.

My next steps, to be reported in a couple of months, are to get the observatory building completed, and install the astronomical equipment into it.

Stay tuned...

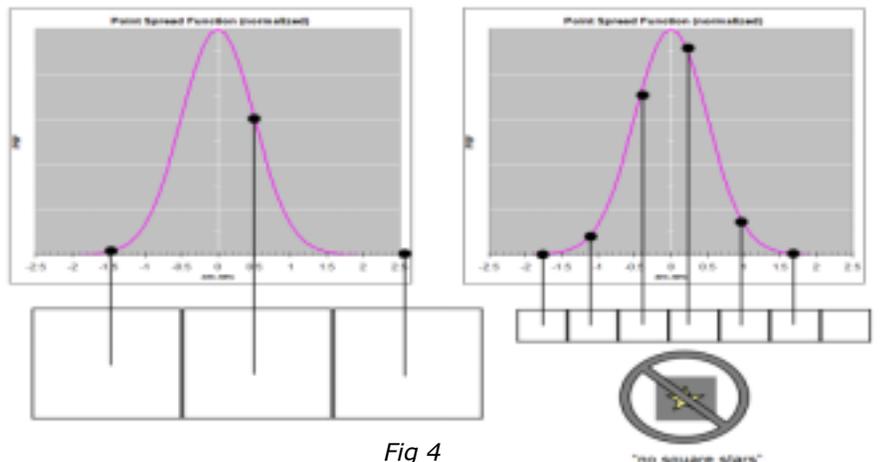


Fig 4

# Astronomy to Go

by Dave Kodama

The ultimate challenge of travel-astronomy is an international trip. Language, cultural, and customs problems combine with more stringent luggage requirements to make detailed planning a must. It goes without saying that if you can possibly arrange things so that you are visiting a friend/resident of your destination country, things will be greatly simplified, but that is not the case for the majority of us.

Fortunately, an alternative exists. This is in the form of a commercial astronomy "expedition" trip. You'll most commonly run across this option for solar eclipses, but sometimes they are available simply for observing the skies south of the equator, or for special events such as a Mercury or Venus transit, meteor shower, or viewing the northern lights. Prices will undoubtedly appear higher than if you arrange everything directly, but consider the time you save and aggravation you avoid. These expedition tour operators work out all the details of finding lodging, transportation to and from observing sites, arrange for appropriate local government or land owner permissions, and hook up with local agents to insure that all the myriad trip details are covered.

Choosing an astronomy expedition operator is something of a problem the first time around unless you have a recommendation from someone who has traveled with the outfit before. In this respect, we in the Orange County Astronomers are in a good position. Many of our 800+ members have traveled to eclipses (perhaps many, many times) and other astronomical events, so you should have no problems getting recommendations.

Personally, I have limited experience with organized astronomical expeditions since I've gone on only two solar eclipse expeditions, but I can say that a small group is much more enjoyable, and it's important that the trip organizer be part of the trip (strong incentives are important!). In my initial attempt to travel on an eclipse expedition, I signed up with a large group and ended with a very unsatisfactory experience. A 2 AM charter flight with long queues, followed by being crammed into an old yellow school bus, and then dumped on a football field with several thousand other people till sunrise did not meet my expectations for fun! This is not to say that going with a small group guarantees a great trip as potential for unexpected situations seem to abound when traveling. But if the tour organizer is part of your little group, you have the best chance of getting things remedied, or at least the satisfaction that he or she is suffering at least as much as you are!

Needless to say, if you're investing thousands of dollars getting to an exotic location for your astronomy expedition, you should combine it with a conventional tour and see the "normal" attractions in the area. Most expedition trips will also have both standard and optional tour extension packages to insure that you catch at least the standard highlights for the region you're visiting. One caution, however – don't get too ambitious and schedule a full night of observing along with a day of city tours and shopping trips! Allow some time for sleep! The conventional tour part of an expedition trip can also take the edge off disappointment should the unthinkable happen and you end up clouded out for the astronomical part of the trip.

And speaking of weather, to maximize the chances for success, you need to do some homework and study the weather prospects for your expedition. If your expedition leader has done his homework, various sites should have been researched carefully and one selected to maximize the probability (never a certainty) for success. Certainly you ought not select a trip package if the expedition leader has not done his homework! If you are going it alone, then it's mandatory that you do your homework. Fortunately, for most large events such as an eclipse or transit, there is a well-established source of this information:

<http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html>

## Top this Expedition Experience!

Back in every astronomy expedition participant's mind is the fear of missing the big event. But there can be no doubt that the French astronomer Legentil's story of bad luck will never be beat:

- March 1760 – Legentil sets sail for Pondicherry, India to make timing observations of the 1761 Venus transit.
- During his journey Pondicherry is hit by a hurricane and captured by the British, so he observes the 1761 transit from the deck of a ship where he is unable to take measurements.
- Instead of returning empty-handed, he proceeds to Manila in the Philippines to await the 1769 Venus transit, but in 1768 returns to India because of trouble with the Governor of Manila.
- Despite a clear sky the day before and clear sky ½ hour after the end of the transit, he is clouded out completely! In Manila, conditions were perfect.
- During the trip back to Paris, Legentil is in two shipwrecks.
- Upon finally arriving home in 1771, Legentil finds that he has been declared dead and his possessions are about to be distributed among his heirs!

In addition to weather factors, related topics impacting the choice of observing location such as accessibility, political stability, and atmospheric seeing are discussed on this site. Even if you're leaving it to the expedition organizer, it's a good idea to take some time to understand what the conditions are likely to be like for your trip. If you have a planetarium program such as "The Sky", you can take things an additional step and check out your astronomical event scenario. For example, if you're viewing an eclipse, you can check the sun/moon elevations at the start and end of the eclipse, verify that you'll be able to point your scope high enough (some mounts don't allow viewing the zenith), and, with detailed information about your viewing site, determine if mountains or buildings might interfere with your view.

Other astronomy-specific things to think about before going on your international trip is the problem of getting power for your equipment. If you are just using a pair of binoculars or a small dob, you have little to worry about. But if you have anything that requires plugging into AC power (even a battery charger), you need to do some research to insure that you have the right plug adapter as well as verify that your equipment will be compatible with the voltage and frequency available. Most modern electronic equipment will tolerate 100-240 volts and 50-60 Hz, but verify that anyway! Also, make sure that your equipment's U.S. plug will actually fit the plug adapter you buy. It's possible that your equipment's polarized plug (one wide prong) won't fit into the adapter supplied in a common travel adapter kit. And even with this preparation, in some parts of the world, you need to prepare to be even more flexible. Some countries have been under the influence of several standards and you can't be sure what you'll run into. Egypt, for example, has been under both British and Russian influence during the 20th century, making for a schizophrenic electrical system in the outlying areas!



In any case, it's best to take battery-operated equipment since even if you can plug into AC power at your observing site, it may not be reliable (i.e. subject to blackouts, brownouts, spikes, etc.). If you can manage it, plan to use common 9V, D, C, or AA batteries in case you need to find batteries at the last minute. More exotic battery types may be very expensive or not available at all. If possible, you should consider bringing all of the batteries you will need plus some spares. Use your spares as counterweights for your scope, and consider dumping all of the batteries after the astronomy portion of the trip to avoid carrying the extra weight around.

And finally, since you will be carrying high-value equipment with you, be sure to check out what import restrictions you may run into at your destination countries. Your expedition leader should be able to help you out here. You can even run into problems bringing your equipment back into the U.S. if it is marked as being manufactured in a foreign country. Cameras, watches, and other equipment with serial number identifiers can be registered before leaving the U.S. to alleviate problems bringing them back into the country. It's particularly important to do this for equipment which looks new and/or is packed in its original box. You can register items at the customs desk at an international terminal such as the Bradley terminal at LAX. If you plan to do this, prepare a list of the equipment and locate the serial numbers ahead of time, be sure to allow extra time at the customs desk, and check ahead to make sure the desk will be open at the time you plan to be at the airport. If you plan to purchase equipment and bring it back into the U.S., the first \$800 of your purchase is currently exempt from import tax (keep receipts for expensive or unusual items).

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## The OCA is on your TV!



Yes... the OCA now has its very own cable TV program. Called "Look Up Tonight" it is aired on COX Channel 31 in south Orange County and has the potential of reaching over 250,000 homes.

The second episode is already on air and the third episode is being produced for release in early August. There is a new OCA SIG called OCATV which has an active and dedicated group of members who are having a great deal of fun in producing interesting content for the program. More details can be found at <http://www.LookUpTonight.com>

Don't get COX? ... you can still view the TV show on your computer. See web site for details.



# Magazine Subscriptions

A great way to save over \$20 just because you are a member of the OCA!

Subscriptions to the Astronomy magazines are now due for renewal, if you subscribed for one year or would like to subscribe at the club rate. You may also extend an existing subscription that does not end in December for one year at the club rate. Bring your check made out to the OCA to the meeting or mail it to:

**Charlie Oostdyk, Orange County Astronomers, PO Box 1762, Costa Mesa, CA 92628. Checks made out to the magazine publishers cannot be processed and will be returned to you.** If you already subscribe, please provide the mailing label or the billing invoice with your check. One-year rates are as follows:

	Club Rate	Regular Rate
Sky & Telescope . . . . .	<b>\$33.00</b>	\$42.95
ASTRONOMY . . . . .	<b>\$29.00</b>	\$39.95

The **DEADLINE** for subscribing at the club rates will be the **October monthly meeting, October 10th.**

The publishers will send expiration notices to all current club subscribers about November 1st even if you renew through the club. It takes the publishers a few weeks to process renewals.



## A Request From the OCA Board:

Because of a number of recent problems, we need to explore some new approaches to security for the club buildings at Anza. If you have any expertise in systems for securing buildings, particularly experience working with various types of electronic locks, we could really use your help. Please contact Barbara Toy at [btoy@cox.net](mailto:btoy@cox.net), or any board member (names and contact information are on the back page of this newsletter) if you think you might be able to assist us.

Barbara Toy  
OCA President  
On behalf of the OCA Board



## A message from Griffith Observatory

Griffith Observatory will hold special observing sessions to give interested members of the public a chance to become experienced Mars observers, and we'd like to invite your club members to participate.

These sessions will be held each of five Saturday nights in August (August 2, 9, 16, 23, and 30) until 1 a.m. (weather permitting) to ensure a favorable Mars elevation. They will be held at the Griffith Observatory Satellite (our location during the renovation), located at the south end of the Los Angeles Zoo parking lot in Griffith Park. Mars observing will be preceded by a star party starting at 8 p.m., Mars related presentations by our lecturing staff in our mini-planetarium until 10 p.m., and a presentation and workshop on how to become a Mars observer by Tim Robertson, the Training Coordinator of the Association of Lunar and Planetary Observers (ALPO). Mars viewing will take place from 11 p.m. until 1 a.m. at each of these sessions. After the first session on August 2, the 10 p.m. presentations will include comments on observing by participants during the previous week.

--Would any of your members like to set up their telescopes to allow public viewing at any or all of these sessions?

In addition, we will have a celebratory Mars observing party all night on the evening of Tuesday, August 26 until approximately 3 a.m. the following morning. In anticipation of large crowds that will want to observe Mars at its approach closest in history (at 2:51 a.m.), the event will be held adjacent to the Observatory Satellite, on the south lawn of the Gene Autry Museum of Western Heritage.

--Would any of your members like to set up telescopes to allow public viewing at this session?

In September and October, Mars will rise early enough to include it in our nightly (except Monday) observing program at the Satellite from 7 to 10 p.m. at the Observatory Satellite. There will be public viewing on Labor Day, Monday September 1.

--Again, we would like to know if any of your members would like to provide people and telescopes to assist with public viewing.

If your members have high quality planetary telescopes and would like to participate in any of these events, I would appreciate hearing from them so that your club's involvement be scheduled and accommodated, and acknowledged.

Please direct your responses or questions to me:

*Anthony Cook  
Astronomical Observer  
Griffith Observatory  
4800 Western Heritage Way*

## The OCA Banquet Returns!

Come One, Come All!  
(And bring your loved ones with you!)

Great company  
Tasty and plentiful food  
Convenient location  
Excellent speaker -  
Who Could Ask For More?

Calendar the date: **10/12/03**  
at 6:00 p.m.

Only \$45.00 per ticket  
At the **Orange County Mining Co.**

## AstroTip of the Day

Keep in touch with all the happenings within the club by joining by the more than 90 members who have already signed up to the online OCAstronomers group at [groups.Yahoo.com](http://groups.Yahoo.com)

It is quick, easy and you will benefit from focussed and relevant discussions and notices about things you really care about.

**Just go to  
[groups.Yahoo.com](http://groups.Yahoo.com) and  
join OCAstronomers**

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 ORANGE COUNTY ASTRONOMERS  
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 COSTA MESA, CA 92628**

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**HANDY CONTACT LIST**

President	Barbara Toy	btoy@cox.net	714-606-1825
Vice President	Joel Harris	edipse125@earthlink.net	818-575-9580
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary	Bruce Crowe	bcrowe12@pacbell.net	714-971-8427
Trustee	Bob Buchheim	rbuchheim@compuserve.com	949-459-7622
Trustee	David Radosevich		
Trustee, WAA Representative	Tim Hogle	tim.hogle@jpl.nasa.gov	626-357-7770
Trustee	Tony Obra	tonykathodieseldr@attbi.com	714-952-8779
Trustee	Gary Schones	gary378@pacbell.net	714-556-8729
Trustee/Press Contact	Russell Sipe	sipe@sipe.com	714-281-0651
Trustee/Webmaster	Liam Kennedy	liam.kennedy@ocastronomers.org	949-552-6187
<b>COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS</b>			
Sirius Astronomer Editor (temp)	Liam Kennedy	SiriusAstronomer@OCAstronomers.org	949-552-6187
Observatory Custodian	John Hoot	jhoot@ssccorp.com	949-498-5784
Anza Site Maintenance	Don Lynn	donald.lynn@opbu.xerox.com	714-775-7238
Astrophysics SIG, Fundraising	Gordon Pattison	glpbmp@cox.net	949-786-7079
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Beginner's Astronomy Class	Antonio Miro	tymiro@aol.com	714-898-9677
AstroImagers SIG (co-chair)	Leon Aslan Bill Patterson	laslan@earthlink.net bill@laastro.com	562-433-2922 714-578-2419
Explore the Stars Coordinator	Richard Cranston	rcransto@ix.netcom.com	714-893-8659
Silverado Star Parties	Bob Buchheim	rbuchheim@compuserve.com	949-459-7622
Star Member Training (temp)	Barbara Toy	btoy@cox.net	714-606-1825
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Telescope Loaner Program	Henry Fry	henryfry@hotmail.com	714-635-6056
EOA Coordinator	Ken MacLeod	kenmadeod@earthlink.net	909-674-8877
Anza House Coordinator	Stephen Eubanks	SSEubanks@earthlink.net	714-535-2434