July 2008

Volume 22 Issue 7

The Observer

East Valley Astronomy Club

Inside this Issue:

From the Desk of the President
by Claude Haynes

It's windy at the Grand Canyon, but it certainly is a great place to view the Milky Way. Even in a stiff breeze people are fascinated by the sheer beauty of objects (even if they are wiggling). It was heartening to find several children who had done their homework for astronomy class. They ask great questions, and took time to observe carefully. A great sign of hope for the sciences!

The June meeting was lots of fun. I appreciate Donna Bader sharing her slides of trips to watch Shuttle and Phoenix launches. She will certainly have a lot to talk about when school starts now that we have photos of things melting on Mars. It is great that the UofA's mission has been returning new discoveries. Thanks also to AJ Crayon for his talk on star clusters. Saturday night at the canyon we were looking at M13 and I was asked "how far away is it", and I could give a much better answer thanks to A J.

By the time you receive this issue we will hopefully have completed the transition of our website to a new hosting company. This change adds some forums that will enhance information exchange among members. We have purchased software to maintain our email list service. This will provide better management, but does require that users "reapply" to the service. This is probably a good thing because we had over 500 email addresses on the old list and I am sure some of them weren't accurate. Special thanks to Marty Pieczonka, Peter Argenziano and Martin Thompson for tackling this.

Looking forward to Tom Polakis' talk on imaging in July, and hoping that the weather pattern for monsoons doesn't fall into the "clear Monday – Thursday with storms on the weekend" pattern.

Claude Haynes

The Backyard Astronomer
My Own North Rim Star Party *by Bill Dellinges*

Never say never. But I'll stick my neck out and say I'll never again travel to the Grand Canyon with the expressed mission of avoiding the Grand Canyon Star Party.

Readers of this column may recall last year's July article in *The Observer* in which I bemoaned several bureaucratic speed bumps I encountered at that year's North Rim Star Party. I vowed that in 2008 I'd go early and skip the star party. A bonus would be cooler temperatures and fewer people. It sounded good on paper. My wife Lora and I arrived May 28th after a 402 mile drive from the Valley.

Well, the temperatures were lower with highs in the low 70's and lows around 32. But the number of visitors seemed about the same and I quickly realized I missed the "action" of the Star Party. I had brought a smaller telescope than normal, an alt-az mounted Televue 85mm refractor for a little casual stargazing. I found it difficult to resist sharing the night's treasures with the public and ended up all five nights on the lodge terrace showing folks Saturn, clusters and double stars. The seeing was very good; Saturn was razor sharp in the 85mm at 143x. The visitors were amazed at the image and many asked the classic question: "Is this for real, do you have a picture of the planet inside your telescope?" Boy, I wish I had a dollar for every time I heard that one over the years.

Many remarked it was the first time they had seen this planet through a telescope. Others said it was the first time they even

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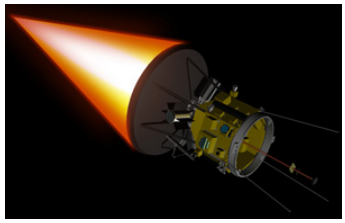


Upcoming Events:

Deep Sky Star Party - July 5

Public Star Party - July 11

General Meeting - July 18

Local Star Party - July 26

The Backyard Astronomer

Continued from page 1 looked through a telescope!

I began wishing my old North Rim friends and their telescopes were there. One did show. Park volunteer ranger George Varga arrived from San Diego with his C-8 for his regular summer stint at the North Rim. I was very happy to see him and welcomed the extra scope. One night George used his influence to get almost all the lights turned off, more than I've ever seen turned off before on the terrace –the sky's improvement was dramatic. Now that's the night sky nature intended for us to see. I'd let a bowling ball roll over my tongue to have a dark sky like that at my disposal on a regular basis.

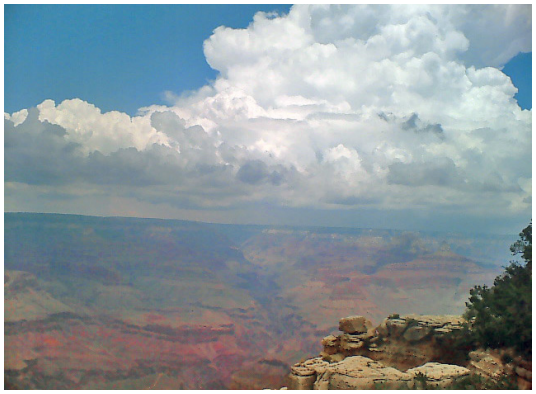
Bill supervising an interested star party attendee.

We had clear skies all week except for the last night when a few high thin clouds rolled in. The good seeing allowed me to split Epsilon Bootis (Izar) cleanly at 143x. I also found a couple of interesting doubles in northern Centaurus, 3 and 4 Centauri. Only seven degrees above the southern horizon, the globular cluster Omega Centauri was conspicuous in 7x42 binoculars. At 100x in the TV85, the cluster had a darker background sky than I'm accustomed to in Apache Junction. Its mottled appearance hinted at partial resolution.

This year's visit was a chance for me to test a neat cart I bought to transport astronomical equipment. Over the years I've seen older people pushing one of those foldable metal carts around (my mother used one to transport groceries from the parking lot to her condo). I found it at Bed, Bath, and Beyond in their online catalog. They call it a "Super Deluxe Swiveler Folding Multi-Use Cart", model # 14821600, $49.95, available in black or chrome. It worked out great. I could pile the 85mm, tripod, step ladder, binos, log book, and black cape into it and run it from our cabin down to the terrace in one trip. It also came in handy for getting all our stuff from the car to our cabin. And when I'm ready for an assisted care facility, I'll have one ready!

There has been a change in management at the North Rim. Xanterra no longer runs the show there – though they still operate the South Rim. The new firm is Forever Resorts Corp. Contact them for North Rim reservations at (877) 386-4383 (www.grandcanyonforever.com). I recommend the Western Cabins because they have a porch which I find a crucial amenity. They also have a refrigerator and are closer to the lodge and the rim (there are no rooms in the lodge itself). My next choice would be the Motel. There are mid-priced "Frontier" and "Pioneer" cabins but I'm not crazy about them. Campground facilities are also available.

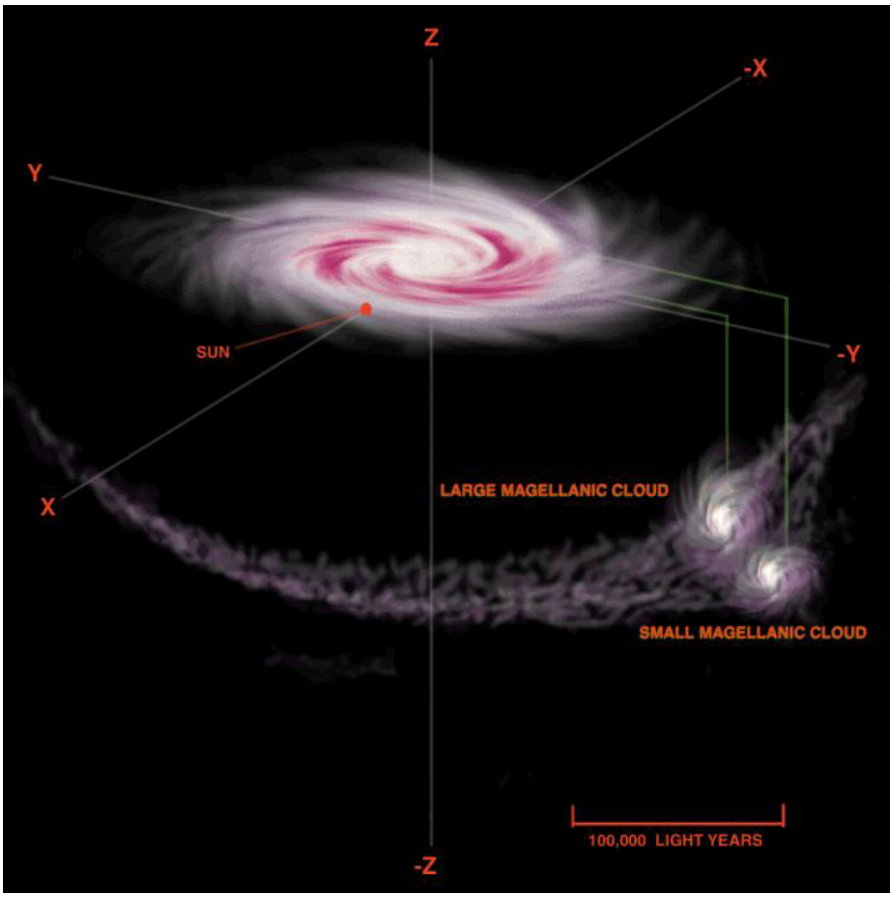
Before leaving you folks, I want to say something about a device which I consider the scourge of the earth, the downfall of humanity, the worst invention since the atomic bomb: the dreaded cell phone. Last year I wrote the lodge manager about how inconsiderate cell phone users were as they sat on the terrace overlooking the canyon and blabbered away to everyone they know (going through their address book, one number after another), "Hey, Aunt Bertha, how ya doin', guess where we are?" It was the same way this year. Here you stand at one of nature's greatest wonders and you have to listen to that. And it never stops. I even saw people taking calls in the dining room while having their meal. Once there was a time when canyon visitors stood before this marvel and quietly took it in. Perhaps they'd utter a word or two of astonishment to one another – but it was usually in a reverent manner. The majority of people still behave decently. But the few who do not observe cell phone etiquette can spoil the moment for many. The rest of us don't want to hear another person's phone conversation. It makes me want to tear the damn thing from their ear and throw it into the canyon, then ask them, "can you hear me now?"



High Velocity Clouds
by Henry De Jonge IV

I would like to discuss high velocity clouds, (HVCs) and what they can tell us about the universe. These are vast clouds of moving hydrogen gas that are thought to be associated with galaxy formation, interaction, and evolution. They may also be associated with the primordial "dark matter" of the universe. There is still not one universal theory about HVCs that explains their observed behavior or origins and there are still many unanswered questions about HVCs.

We will look in this installment what HVCs are, how they can be detected and analyzed, and where we see a prime example. In later installments we talk a little about galaxies and their nature as they are seemingly closely tied to HVCs, as well as our Local Group and the Magellanic Stream, (MS). We will also discuss current theories of HVC origins and roles and present some of the observational evidence for each model. We will end up by forming some conclusions about HVCs and future developments.



Spanning the sky behind the majestic Clouds of Magellan is an unusual stream of gas: the Magellanic Stream. The origin of this gas might hold a clue to origin and fate of our Milky Way's most famous satellite galaxies: the LMC and the SMC. Two leading genesis hypotheses have surfaced: that the stream was created by gas stripped off these galaxies as they passed through the halo of our Milky Way, or that the stream was created by the differential gravitational tug of the Milky Way. Measurements of slight angular motions by the Hipparcos satellite have indicated that the Clouds are leading the Stream. Now, recent radio measurements have located fresh gas emerging from the Clouds, bolstering the later, tidal explanation. Most probably, in a few hundred million years, the Magellanic Clouds themselves will fall victim to this same tidal force.

We have been aware of the existence of high velocity clouds for over 40 years, (discovered in 1963) yet their origins and roles are still under much speculation. A high velocity cloud, (HVC) is defined as a cloud of mostly neutral hydrogen, (HI) that is moving 100 to 200 km/s, (60-120 miles per second) faster than the expected circular orbital velocity around a galaxy. They are normally detected by their radio emissions at the 21 cm line. They are spread across over a third of the sky at radio wavelengths, thus they are quite large and locally prevalent. Why these clouds, although being composed of mainly primordial hydrogen, are not usually associated with any stars or stellar formation, is one of the big questions regarding HVCs that is still unanswered. HVCs typically lie far above the galactic plane and are primarily associated with our galaxy, (the Milky Way) and the Local Group. HVCs also have their own "satellites" in terms of other, less dense clouds, although many suspect that these smaller companions are just part of the larger clouds. We must remember that our galaxy is composed of about 50% hydrogen gas and that most of the rest is in the form of stars.

HVCs have been difficult to understand due to the problems with determining their distances, detailed compositions, masses, energy, and velocities. All of these parameters are critical to any successful model that attempts to explain their origins and properties. The gas in the ISM is also unusually cold which makes detection more difficult. The 21 cm line neutral hydrogen emission, (caused by the electron switching the spin direction) can also be emitted anywhere along the line of sight which tends to make direct measurements difficult. In the early 1970's it was discovered that their velocities were both towards us and away from us and that they were not all simply falling into the Milky Way. There are currently hundreds of HVCs known to exist, with their total mass close to that of a small galaxy. They stretch tens of thousands of light years across the ISM.

HVCs can be broadly categorized into two main types. The first is the most common type. This consists of the low contrast, extended diffuse complexes, (clouds) with large angular sizes, (up to tens of degrees) like the MS, (including complexes with names like A, C, H, M, and others). These clouds are usually fairly close, (according to the few distances we are certain of) at about 10 kpc to 50 kpc. The second type of cloud is called a compact HVC, (or CHVCs). They are much smaller and compact by definition. They are usually isolated objects with angular sizes of about 1 degree and are often detected to be infalling to the Local group, from further distances. There are at least 65 CHVCs known to date.

HVCs are also described by their velocity. There are high velocity clouds, (HVCs) with a velocity >90km/sec, intermediate velocity clouds, (IVCs) with a velocity of 25km/sec

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High Velocity Clouds

Continued from page 3

to 90km/sec, and low velocity clouds, (LVCs) with a velocity <25km/sec.

The first time an accurate distance measurement was made to a HVC was in 1993. This was done by "bracketing" an HVC complex named "M" between a pair of stars in the Milky Way's halo. This gives us an upper and lower limit for the distance. In this example, one halo star was about 14,000 ly away and the other was about 5,000 ly away. These stars were only 27 arc minutes apart, placing them within the clouds angular diameter. The cloud's spectral fingerprint appears on the more distant star, which gives us the upper and lower limit for the distance. This technique is useful only when we can locate such aligned and bracketed stars and accurately measure their distances.

Another method of determining HVC properties, (distance and position for example) is by their H-alpha emissions. If one assumes that a small percentage, (1-2% over a solid angle) of the ionizing photons of our galaxy can escape to the outer reaches and interact with HVCs causing fluorescence, (H alpha emission) then one may be able to say that on the average, the brightness of the front of the cloud is proportional to its distance. There are many variables that can influence this measurement though and it is considered only approximate. If the distance is known by other methods then even more information may be found. We use any detected Doppler shift to tell us the direction of motion of an HVC. This radiation has been seen readily in HVCs that are within 10 kpc, but would be too weak to cause ionization past 1 Mpc. This method is most effective in <40-50 kpc, (within the halo of the Milky Way). Interestingly, there seems to be no correlation between the H-alpha emissions of an HVC with its column density, but there is a tight correlation with the H-alpha emission and the neutral H velocity.

The best-known example of an HVC is the Magellanic Stream, (MS). It was discovered in the 1970's and is a huge stream or bridge of cold HI gas between our galaxy and the Magellanic Clouds, (to be discussed in detail in the next section). It stretches across almost 100 degrees in the sky.

Below we see an image simulation of the MS as it would appear from outside our Galaxy. This image was made from 56,000 particles of gas, stars, and DM to represent the MS.

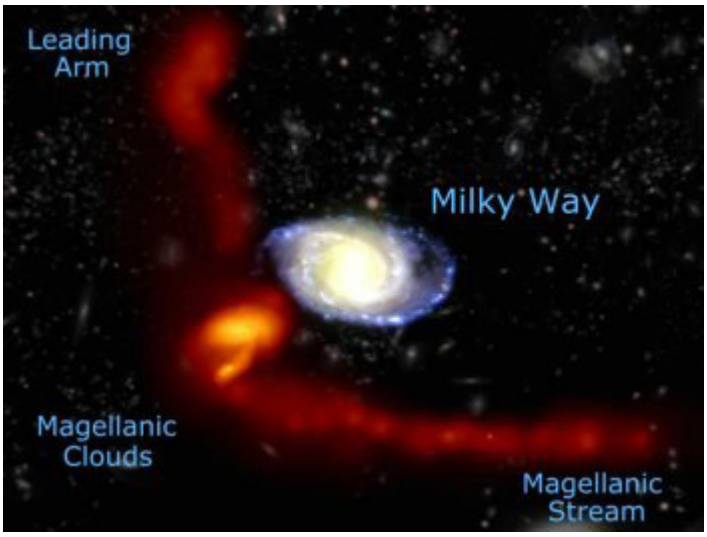
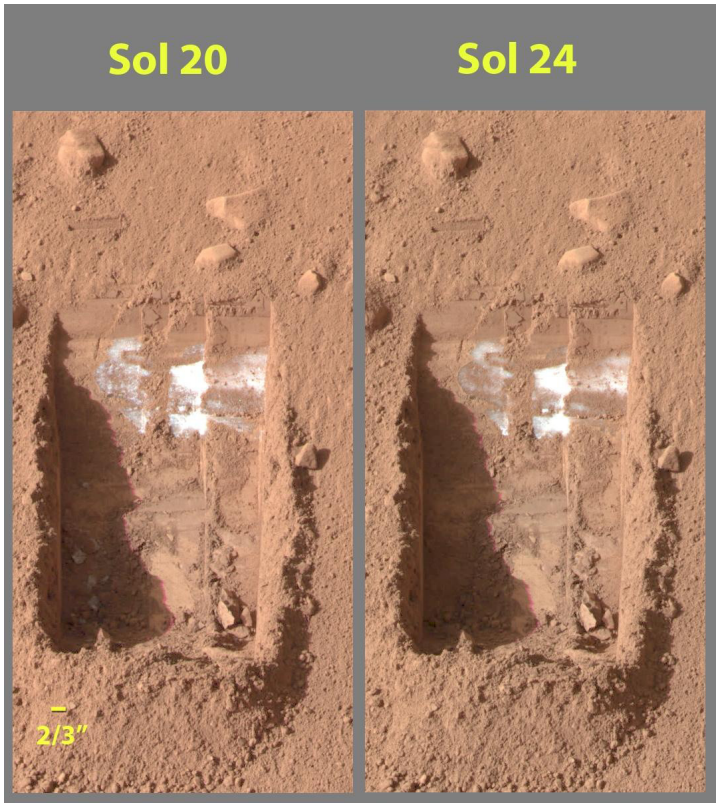


Image from a simulation of the gas in, and streaming from, the Magellanic Clouds. Simulation by Daisuke Kawata, Chris Fluke, Sarah Maddison, and Brad Gibson, Swinburne University of Technology, Australia

Thus these seemingly simple clouds of mostly neutral hydrogen are complex entities in their own right.

This article is the first part on the subject by the author. The series will continue in subsequent issues of The Observer.



Disappearing Ice in Color

These color images were acquired by NASA's Phoenix Mars Lander's Surface Stereo Imager on the 21st and 25th days of the mission, or Sols 20 and 24 (June 15 and 19, 2008).

These images show sublimation of ice in the trench informally called "Dodo-Goldilocks" over the course of four days.

In the lower left corner of the left image, a group of lumps is visible. In the right image, the lumps have disappeared, similar to the process of evaporation.

The Phoenix Mission is led by the University of Arizona, Tucson, on behalf of NASA. Project management of the mission is by NASA's Jet Propulsion Laboratory, Pasadena, Calif. Spacecraft development is by Lockheed Martin Space Systems, Denver.

Image credit: NASA/JPL-Caltech/University of Arizona/Texas A&M University

July Guest Speaker: Tom Polakis

July's guest speaker will be Tom Polakis. Tom has been an amateur astronomer since he saw the Perseid meteor shower in 1977. He has written a number of deep-sky observing articles for Sky & Telescope and Astronomy. While his main interest is visual observing, he has recently taken up lunar and planetary observing using Webcams. Tom will discuss his equipment and image processing techniques, and share what he has learned about Solar System astronomy in the process.

East Valley Astronomy Club's Worldwide Presence

Recently the governing body of East Valley Astronomy Club approved some changes relative to the club's internet presence. The main focus of this initiative was to consolidate the requisite services with a single company while reducing the overall expense.

The club previously used a domain registrar in Australia along with a domestic web hosting company. We now have all of our internet services provided by Scottsdale-based GoDaddy.

The club now has two top level domains: the familiar eastvalleyastronomy.org and the all-new evaconline.org. Either one will transport you to the club's website.

A new feature that was launched recently is the EVAC Online Forum, a new communication tool that provides much more functionality than standard email discussion lists. It is accessible from a link on the main page or via the url: http://evaconline.org/forum

We have also installed our own listserver software, Xtreeme MailXpert, allowing us complete control in its administration.

All of these changes, plus more to come, allow us to provide enhanced services while simultaneously reducing our internet expenses by almost 50% annually.

Robert Burnham Jr. Memorial Fund

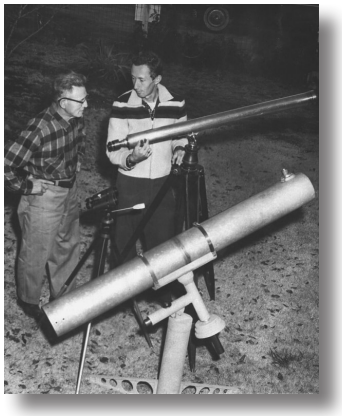
You can be a part of history as people from all walks of life coordinate their efforts to pay tribute to one of the most influential people in amateur astronomy. The East Valley Astronomy Club is proud to serve as fiduciary agent for a drive to place a permanent memorial to Robert Burnham Jr on the grounds of Lowell Observatory in Flagstaff, Arizona. It is estimated the memorial will cost approximately $20,000. Any additional funds raised will be contributed to the Northern Arizona University scholarship fund for the benefit of astronomy students.

Robert Burnham compiled his three volume Celestial Handbook while working at Lowell Observatory as part of the Stellar Proper Motion Survey. This grassroots effort began on a Cloudy Nights discussion forum, and with the guidance of Burnham's sister, Viola Courtney, and her daughter Donna Cox, has grown to include numerous members of the astronomy community, including the honorary chairman of our fundraising committee Jack Horkheimer of the Miami Science Museum, better known for his PBS Star Gazer series.

For more information on Robert Burnham Jr please visit the official memorial website www.rbjm.org .

If you wish to make an online donation, please use the PayPal link here:
http://www.eastvalleyastronomy.org/rbjm.htm

If you wish to make a donation by mail, please make check payable to Burnham Memorial Fund and mail it to EVAC, PO Box 2202, Mesa, Az., 85214-2202... or you can donate at a club meeting.



Robert Burnham Sr and Robert Burnham Jr at the telescope

New Moon on July 2 at 19:20

First Quarter Moon on July 9 at 21:35

Full Moon on July 18 at 01:00

Last Quarter Moon on July 25 at 11:43

Celestron CPC 1100 GPS For Sale

Celestron CPC 1100 GPS

Telescope has XLT coatings.
Extras include 12-v battery, counter-weights, 110-v power supply, Telrad.

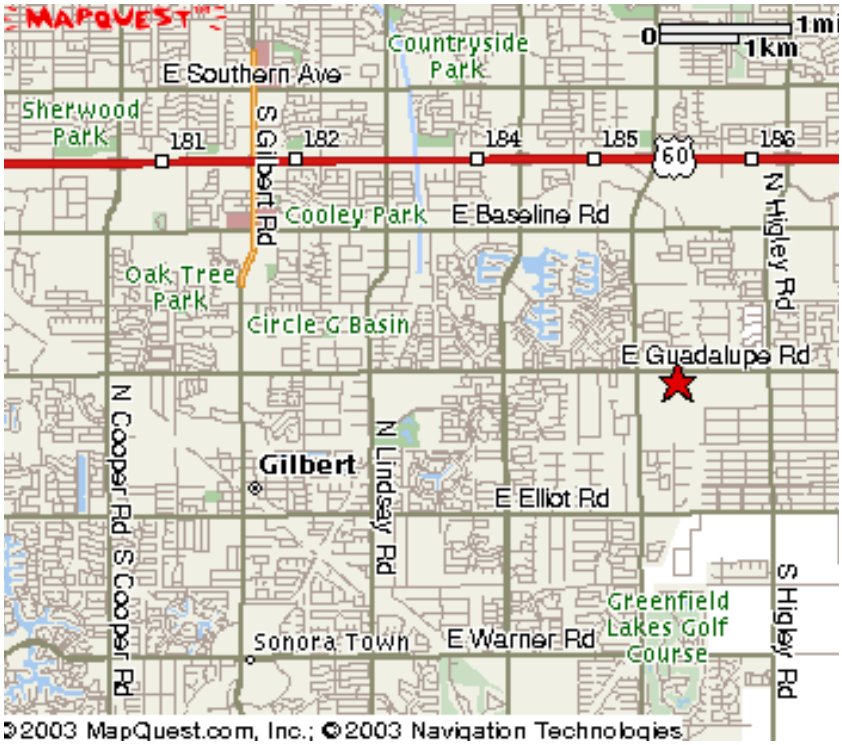
List price is $2899, without extras
My price is now $2250 with extras

Contact: Frank Pino 480-882-3485
Email: f.pino@mchsi.com

Your advertisement could be here.
Contact the editor for details.

news@evaconline.org

www.eastvalleyastronomy.org/grco/obs.asp

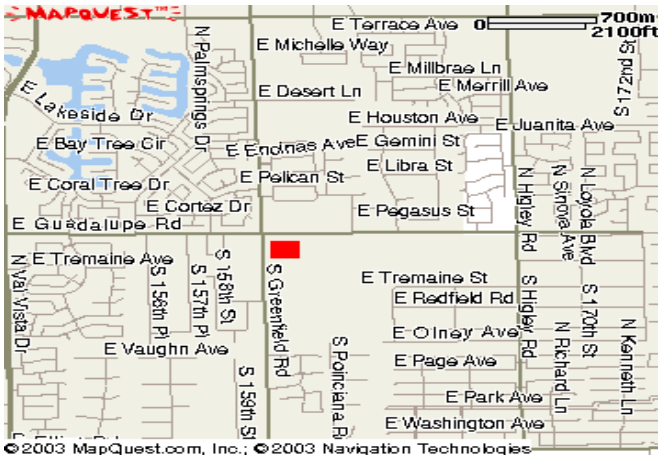


The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads.

Meetings begin at 7:30 pm.

Visitors are always welcome!



2008 Meeting Dates

July 18

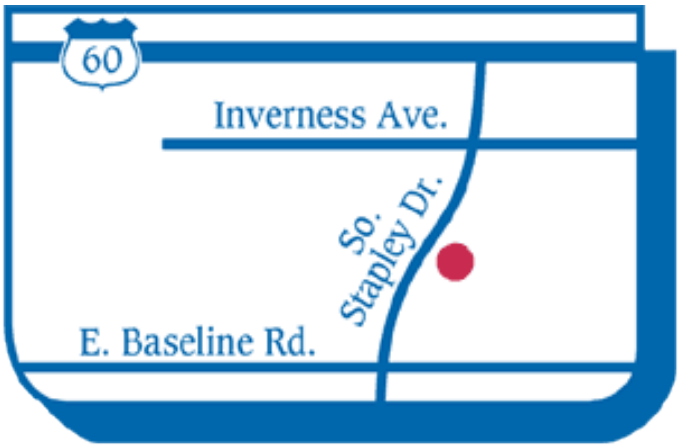
August 15

September 19

October 17

November 21

Holiday Party TBD



Southeast Regional Library
775 N. Greenfield Road
Gilbert, Az. 85234

All are welcome to attend the pre-meeting dinner at 5:30 pm. We meet at Old Country Buffet, located at 1855 S. Stapley Drive in Mesa. The restaurant is in the plaza on the northeast corner of Stapley and Baseline Roads, just south of US60.

Old Country Buffet
1855 S. Stapley Drive
Mesa, Az. 85204

Likewise, all are invited to meet for coffee and more astro talk after the meeting at the Village Inn restaurant located on the northeast corner of Gilbert and Baseline Roads in Mesa.

Village Inn
2034 E. Southern Avenue
Mesa, Az. 85204

July 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	**5**
6	7	8	9	10	**11**	12
13	14	15	16	17	**18**	19
20	21	22	23	24	25	**26**
27	28	29	30	31		

July 5 - Deep Sky Star Party at Vekol Road

July 11 - Public Star Party at Riparian Preserve in Gilbert

July 18 - General Meeting at Southeast Regional Library in Gilbert

July 26 - Local Star Party at Boyce Thompson Arboretum

18" Ultra-Compact Obsession Telescope Review

by Tom Polakis and Gordon Pegue

I have had my 18" Ultra-Compact Obsession (S/N #38) for nearly a month now. It was delivered more than 6 weeks ahead of the promised date, which has enabled me to assess it before the monsoon rolls into Arizona. After several sessions from my driveway, I was able to put it through its paces at a star party at a very dark, high-elevation Arizona site 40 miles south of Flagstaff this past weekend. Off the obsessionusers list, Gordon Pegue (S/N #4) and I have been discussing this telescopes good and not-so-good points. We have also communicated most of them directly to Dave Kriege, so little of this informal review should be news to him.

Both Gordon and I agree that the telescope succeeds spectacularly at doing what it is advertised to do. The telescope provides exceptionally sharp and contrasty images in a package that requires only the smallest of ladders for viewing at the zenith. It folds up into a remarkably small volume in a very short time. These features overcome any of the design deficiencies that Gordon and I have been discussing. After reading the following paragraphs, come back to this one for our final impression, which is one of a great star party travel telescope that packs a lot of aperture into a small package. And the figure and smoothness of the OMI mirror is almost beyond belief, particularly at f/4.2.

On to the inevitable complaints. Like many on this list, both Gordon and I have been in the hobby for many decades, and have used a lot of telescopes. While we know how to modify telescopes to make them usable, we would rather have a complete telescope after an outlay that exceeds $7000. The Obsession U-C's that we received are not complete telescopes. And the irony is that making them so would not require much in the way of design and construction effort or expenditure.

A cooling fan is mounted behind the primary mirror. Before reading the manual, I looked in vain on the scope for an on-off switch and through the four boxes for the power supply. Neither is provided, and recommendations are made in the manual for suitable power supply options. Folks at the star party invariably thought that a complete, mounted fan system should be provided, and were put off by the two dangling wires.

There is a maddening starting friction in the altitude bearing. Since the Ebony star moving altitude bearing surface has to be split in Kriege's ingenious folding design, he uses a continuous strip of Teflon rather that discrete pads for the stationary bearing surface. Gordon found it next to impossible to make small corrections in altitude, and suspects that the stiction is due to binding along this surface. I concur, and by "small corrections" we mean on the order of a half a degree. Everybody who tried to move the telescope to center an object found themselves overshooting grossly in altitude. Fortunately, my scope was riding on a tracking platform, so corrections were not needed often. The use of subsidiary products like wax and Armour-All should not be a requirement to achieve smooth altitude motions!

The upper Kydex light baffle that extends away from the scope opposite of the focuser is at least 4 inches too short. It would be a perfectly adequate design if the focuser were "submerged" into a true upper cage assembly, but the focuser hangs a few inches beyond the upper "cage" on the U-C. The baffle is ineffective at blocking stray light that enters the focuser. And this problem does not only manifest itself when streetlights are present. At my dark site (SQM 21.7), the gray of the night sky entered part of the field of view, contaminating the view to the point of making certain eyepieces unusable. The Naglers that focused inward in the focuser's travel were affected the most. Gordon reports that using his 31mm Nagler (requiring the most in-travel) results in very poor views due to the extraneous light incursion. My wife Jennifer was able to remedy the problem at 10 p.m. us-

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East Valley Astronomy Club -- 2008 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

IMPORTANT: All memberships expire on December 31 of each year.

Select one of the following:

☐ New Member ☐ Renewal ☐ Change of Address

New Member Dues (dues are prorated, select according to the month you are joining the club):

☐ **$30.00 Individual** January through March

☐ **$35.00 Family** January through March

☐ **$15.00 Individual** July through September

☐ **$17.50 Family** July through September

☐ **$22.50 Individual** April through June

☐ **$26.25 Family** April through June

☐ **$37.50 Individual** October through December

☐ **$43.75 Family** October through December

Includes dues for the following year

Renewal (current members only):

☐ **$30.00 Individual** ☐ **$35.00 Family**

Magazine Subscriptions (include renewal notices):

☐ **$34.00** Astronomy ☐ **$33.00** Sky & Telescope

Name Badges:

☐ **$10.00** Each (including postage) Quantity: _____

Name to imprint: _____

Total amount enclosed: _____

Please make check or money order payable to EVAC

☐ Payment was remitted separately using PayPal ☐ Payment was remitted separately using my financial institution's online bill payment feature

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Name: _____ Phone: _____

Address: _____ Email: _____

☐ Publish email address on website

City, State, Zip: _____ URL: _____

How would you like to receive your monthly newsletter? (choose one option):

☐ Electronic delivery (PDF) *Included with membership* ☐ US Mail **Please add $10 to the total payment**

Areas of Interest (check all that apply):

☐ General Observing ☐ Cosmology

☐ Lunar Observing ☐ Telescope Making

☐ Planetary Observing ☐ Astrophotography

☐ Deep Sky Observing ☐ Other

Please describe your astronomy equipment:

Would you be interested in attending a beginner's workshop? ☐ Yes ☐ No

How did you discover East Valley Astronomy Club? _____

PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

All members are required to have a liability release form (waiver) on file. Please complete one and forward to the Treasurer with your membership application or renewal.

Liability Release Form

In consideration of attending any publicized Star Party hosted by the East Valley Astronomy Club (hereinafter referred to as "EVAC") I hereby affirm that I and my family agree to hold EVAC harmless from any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), which may directly or indirectly be connected to EVAC and/or my presence on the premises of any EVAC Star Party and related areas.

I further agree to indemnify any party indicated above should such party suffer any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), caused directly or indirectly by my negligent or intentional acts, or failure to act, or if such acts or failures to act are directly or indirectly caused by any person in my family or associates while participating in an EVAC Star Party.

My signature upon this form also indicates agreement and acceptance on behalf of all minor children (under 18 years of age) under my care in attendance.

EVAC only recognizes those who are members or invitees and who also have a signed Liability Release Form on file as participants at an EVAC Star Party.

Please print name here ***Date***

Please sign name here

PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

NASA's Space Place

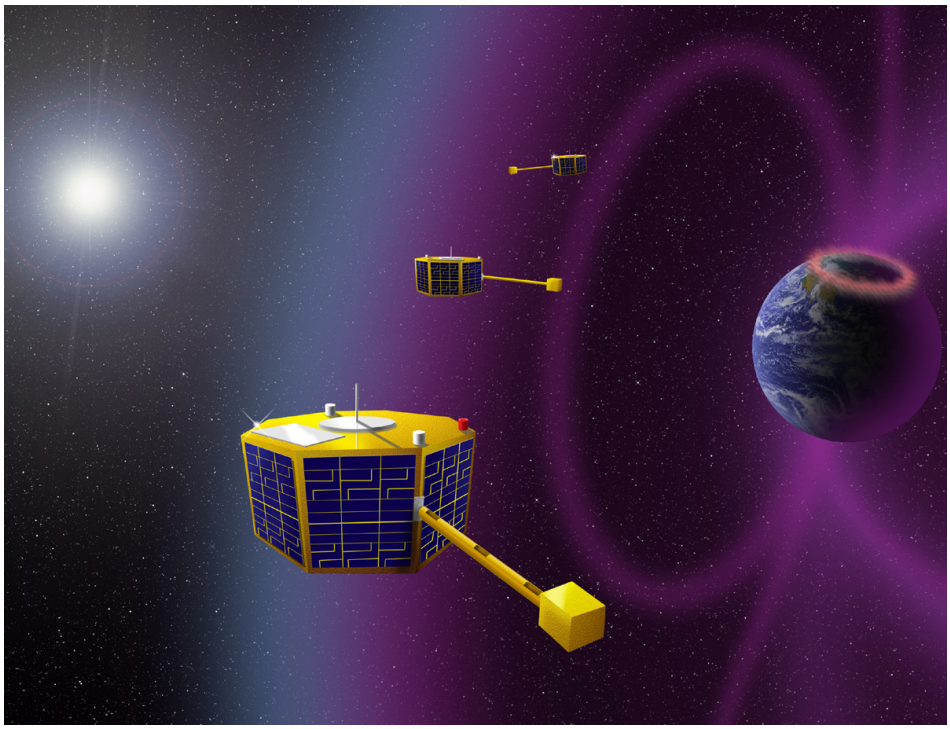
Space Buoys
by Dr. Tony Phillips

Congratulations! You're an oceanographer and you've just received a big grant to investigate the Pacific Ocean. Your task: Map the mighty Pacific's wind and waves, monitor its deep currents, and keep track of continent-sized temperature oscillations that shape weather around the world. Funds are available and you may start immediately.

Oh, there's just one problem: You've got to do this work using no more than one ocean buoy.

"That would be impossible," says Dr. Guan Le of the Goddard Space Flight Center. "The Pacific's too big to understand by studying just one location."

Yet, for Le and her space scientist colleagues, this was exactly what they have been magnetosphere is an "ocean" of magnetism and plasma surrounding our planet. Its shores are defined by the outer bounds of Earth's magnetic field and it contains a bewildering mix of matter-energy waves, electrical currents and plasma oscillations spread across a volume billions of times greater than the Pacific Ocean itself.



The Space Technology 5 micro-satellites proved the feasibility of using a constellation of small spacecraft with miniature magnetometers to study Earth's magnetosphere.

"For many years we've struggled to understand the magnetosphere using mostly single spacecraft," says Le. "To really make progress, we need many spacecraft spread through the magnetosphere, working together to understand the whole."

Enter Space Technology 5.

In March 2006 NASA launched a trio of experimental satellites to see what three "buoys" could accomplish. Because they weighed only 55 lbs. apiece and measured not much larger than a birthday cake, the three ST5 "micro-satellites" fit onboard a single Pegasus rocket. Above Earth's atmosphere, the three were flung like Frisbees from the rocket's body into the magnetosphere by a revolutionary micro-satellite launcher.

Space Technology 5 is a mission of NASA's New Millennium Program, which tests innovative technologies for use on future space missions. The 90-day flight of ST5 validated several devices crucial to space buoys: miniature magnetometers, high-efficiency solar arrays, and some strange-looking but effective micro-antennas designed from principles of Darwinian evolution. Also, ST5 showed that three satellites could maneuver together as a "constellation," spreading out to measure complex fields and currents.

"ST5 was able to measure the motion and thickness of current sheets in the magnetosphere," says Le, the mission's project scientist at Goddard. "This could not have been done with a single spacecraft, no matter how capable."

The ST5 mission is finished but the technology it tested will key future studies of the magnetosphere. Thanks to ST5, hopes Le, lonely buoys will soon be a thing of the past.

Learn more about ST5's miniaturized technologies at nmp.nasa.gov/st5. Kids (and grownups) can get a better understanding of the artificial evolutionary process used to design ST5's antennas at spaceplace.nasa.gov/en/kids/st5/emoticon.

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If It's Clear...

by Fulton Wright, Jr.
Prescott Astronomy Club

July 2008

Shamelessly stolen information from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find info. When gauging distances, remember that the Moon is 1/2 a degree or 30 arc minutes in diameter. All times are Mountain Standard Time unless otherwise noted.

For the first couple of weeks of July you can see Mercury in the morning sky.
Use binoculars to look low in the east-northeast at about 4:30 AM. The planet is down and to the left of Aldebaran, and down and to the right of Capella.

On Tuesday, July 1, about 9:15 PM, you can see Mars less that 1 degree from Regulus. Look very low in the west. Saturn is a few degrees up and to the left.
On Sunday, July 6, the Moon joins the trio. This is a particularly good time to look at features near the Moon's eastern limb (toward the setting sun) as libration tips that part toward us. By Thursday, July 10, Mars has moved close to Saturn.

On Wednesday, July 2, it is new Moon and you can hunt for faint fuzzies all night.

On Sunday, July 6, around 11 PM, you can see some events with Jupiter's moons.
At 11:09 PM Europa's shadow falls on the planet. 5 minutes later Europa itself moves in front of the planet. 13 minutes after that Io appears from behind the planet, just south of Europa.

On Wednesday, July 9, it is first quarter phase of the Moon, so you will probably be happier observing it than deep sky objects.

On Thursday, July 10, about 10 PM, you can see the northern part of the Moon at its best. For the next few days, libration tips that part toward us.
On Saturday, July 12, about 10 PM, you can see Jupiter's 4 main satellites on
the East side of the planet in order of their actual distance from it.

On Thursday, July 17, at 7:53 PM (11 minutes after sunset) the full Moon rises,
spoiling any chance of deep sky observing for the whole night.

On Monday, July 21, starting just before 9 PM, you can watch the passage of Io
in front of Jupiter. Here is the schedule:
9:55 PM Io moves in front of the planet
10:14 PM Io's shadow falls on the planet
12:12 AM Io moves from in front of the planet
12:31 PM Io's shadow leaves the planet

On Friday, July 25, the Moon is at last quarter phase and doesn't rise till
11:39 PM.

The inaugural Julian Starfest, brought to you by the three local astronomers in association with the Julian Merchants Association and the Julian Chamber of Commerce, will be held August 1st, 2nd, and 3rd at Menghini Winery. Julian has some of the darkest, steadiest skies in Southern California, and at 4,300' elevation, offers superb astronomical viewing. This, to-be-yearly event, will be your opportunity to enjoy some outstanding astronomy while also enjoying the astronomy vendor exhibition area, swap meet, guest lecturers, optional tour of Palomar Observatory and camaraderie that comes with associating with fellow astronomers.

Proceeds from the event will be used to build an observatory for the Julian Union High School District.

Menghini Winery, two miles north of Julian, offers a level, dust free, camping and viewing area for 100 vehicles. Additional parking is available for people interested in only attending for a day. Camping, although somewhat primitive, will have toilets and wash stations available for attendees.

The town of Julian, just a short five minutes away, offers a variety of entertainment, shopping and dining experiences as well as renowned bed and breakfast inns and hotels, for those wishing a bit less 'rugged' accommodations.

Discount day use coupon can be downloaded here: http://eastvalleyastronomy.org/downloads/JSP-EVAC.pdf

Friday, August 1st
Site opens at 10:00 AM for camper and vendor setup.
Observing begins at dusk

Saturday, August 2nd
9:00 AM: Exhibit Area Opens
10:00: Bus Departs for Palomar Observatory
All Day: Guest Speakers will be announced
5:00 PM: Raffle Drawing
Observing begins at dusk

Sunday, August 3rd
9:00 AM: Exhibit Area Opens
12:00: Swap Meet Opens
All Day: Guest Speakers will be announced
5:00: Site Closes

NASA Plans to Visit the Sun

by Dr. Tony Phillips

For more than 400 years, astronomers have studied the sun from afar. Now NASA has decided to go there.

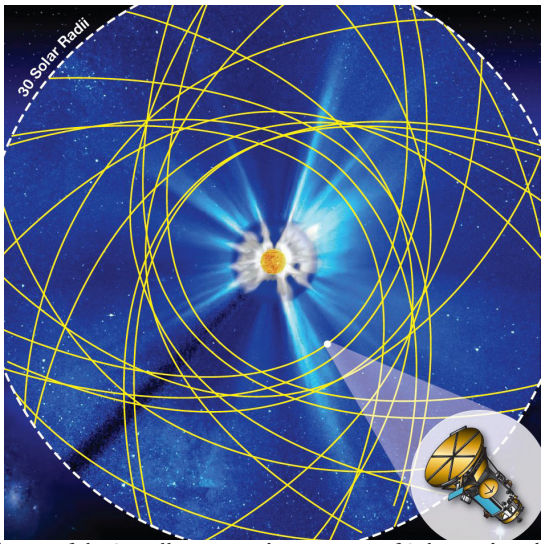
"We are going to visit a living, breathing star for the first time," says program scientist Lika Guhathakurta of NASA Headquarters. "This is an unexplored region of the solar system and the possibilities for discovery are off the charts."

The name of the mission is Solar Probe+ (pronounced "Solar Probe plus"). It's a heat-resistant spacecraft designed to plunge deep into the sun's atmosphere where it can sample solar wind and magnetism first hand. Launch could happen as early as 2015. By the time the mission ends 7 years later, planners believe Solar Probe+ will solve two great mysteries of astrophysics and make many new discoveries along the way.

The probe is still in its early design phase, called "pre-phase A" at NASA headquarters, says Guhathakurta. "We have a lot of work to do, but it's very exciting."

Johns Hopkins' Applied Physics Lab (APL) will design and build the spacecraft for NASA. APL already has experience sending probes toward the sun. APL's MESSENGER spacecraft completed its first flyby of the planet Mercury in January 2008 and many of the same heat-resistant technologies will fortify Solar Probe+. (Note: The mission is called Solar Probe plus because it builds on an earlier 2005 APL design called Solar Probe.)

At closest approach, Solar Probe+ will be 7 million km or 9 solar radii from the sun. There, the spacecraft's carbon-composite heat shield must withstand temperatures greater than 1400o C and survive blasts of radiation at levels not experienced by any previous spacecraft. Naturally, the probe is solar powered; it will get its electricity from liquid-cooled solar panels that can retract behind the heat-shield when sunlight becomes too intense. From these near distances, the Sun will appear 23 times wider than it does in the skies of Earth.



A simulated view of the Sun illustrating the trajectory of Solar Probe+ during its multiple near-Sun passes.

The two mysteries prompting this mission are the high temperature of the sun's corona and the puzzling acceleration of the solar wind:

Mystery #1—the corona: If you stuck a thermometer in the surface of the sun, it would read about 6000o C. Intuition says the temperature should drop as you back away; instead, it rises. The sun's outer atmosphere, the corona, registers more than a million degrees Celsius, hundreds of times hotter than the star below. This high temperature remains a mystery more than 60 years after it was first measured.

Mystery #2—the solar wind: The sun spews a hot, million mph wind of charged particles throughout the solar system. Planets, comets, asteroids—they all feel it. Curiously, there is no organized wind close to the sun's surface, yet out among the planets there blows a veritable gale. Somewhere in between, some unknown agent gives the solar wind its great velocity. The question is, what?

"To solve these mysteries, Solar Probe+ will actually enter the corona," says Guhathakurta. "That's where the action is."

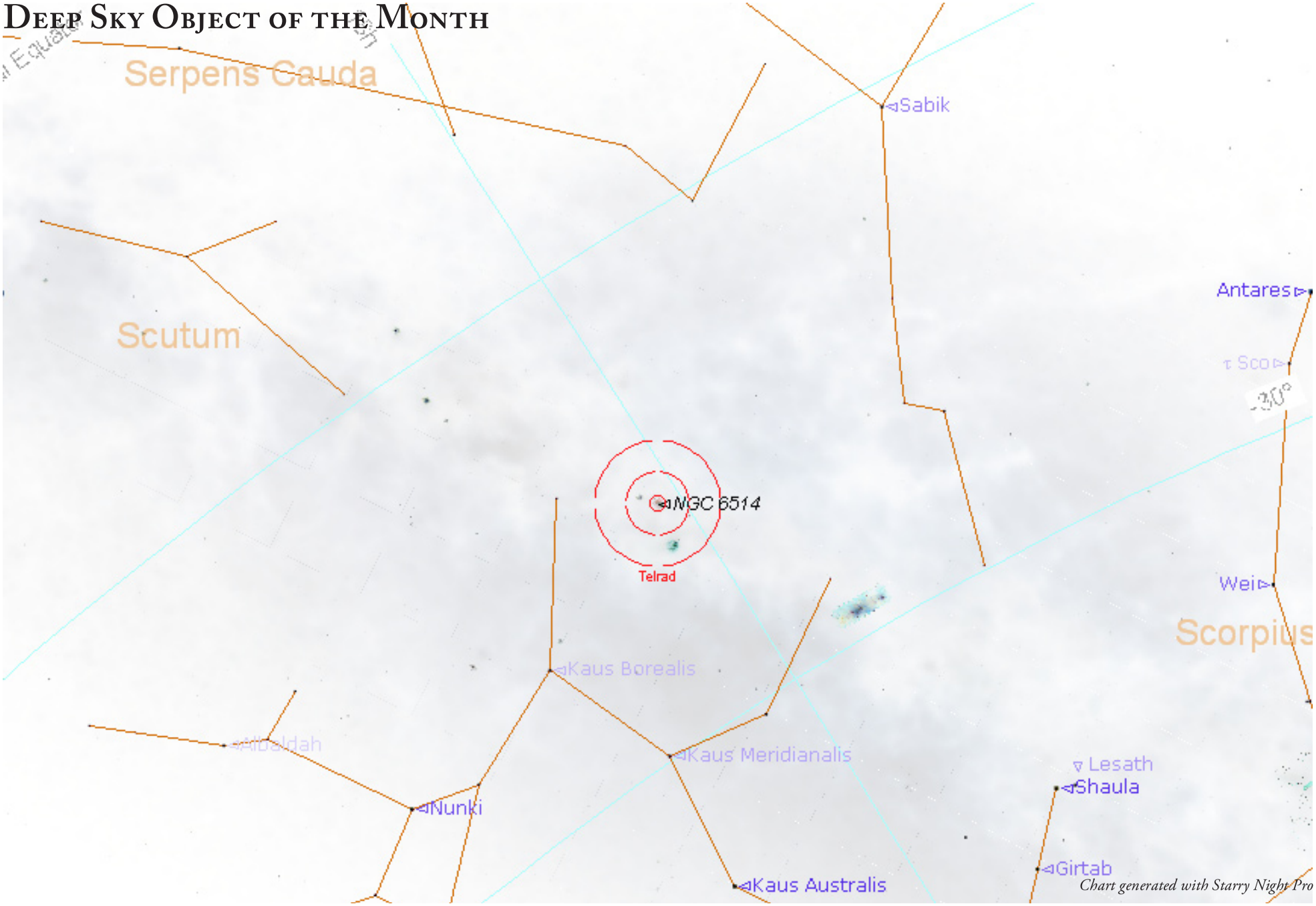
The payload consists mainly of instruments designed to sense the environment right around the spacecraft—e.g., a magnetometer, a plasma wave sensor, a dust detector, electron and ion analyzers and so on. "In-situ measurements will tell us what we need to know to unravel the physics of coronal heating and solar wind acceleration," she says.

Solar Probe+'s lone remote sensing instrument is the Hemispheric Imager. The "HI" for short is a telescope that will make 3D images of the sun's corona similar to medical CAT scans. The technique, called coronal tomography, is a fundamentally new approach to solar imaging and is only possible because the photography is performed from a moving platform close to the sun, flying through coronal clouds and streamers and imaging them as it flies by and through them.

With a likely launch in May 2015, Solar Probe+ will begin its prime mission near the end of Solar Cycle 24 and finish near the predicted maximum of Solar Cycle 25 in 2022. This would allow the spacecraft to sample the corona and solar wind at many different phases of the solar cycle. It also guarantees that Solar Probe+ will experience a good number of solar storms near the end of its mission. While perilous, this is according to plan: Researchers suspect that many of the most dangerous particles produced by solar storms are energized in the corona—just where Solar Probe+ will be. Solar Probe+ may be able to observe the process in action and show researchers how to forecast Solar Energetic Particle (SEP) events that threaten the health and safety of astronauts.

Solar Probe+'s repeated plunges into the corona will be accomplished by means of Venus flybys. The spacecraft will swing by Venus seven times in six years to bend the probe's trajectory deeper and deeper into the sun's atmosphere. Bonus: Although Venus is not a primary target of the mission, astronomers may learn new things about the planet when the heavily-instrumented probe swings by.

"Solar Probe+ is an extraordinary mission of exploration, discovery and deep understanding," says Guhathakurta. "We can't wait to get started."



NGC 6514 (M20, Trifid) Diffuse Nebula in Sagittarius

RA 18h 02m 25.0s DEC -22° 59' 00" Size: 17.0' x 12.0' Magnitude: 9.0

18” Ultra-Compact Obsession Telescope Review

Continued from page 8

ing only duct tape and a cannibalized box of Fruity O’s, as shown below.

Custom UTA light baffle extension

In the incomplete telescope department, neither Gordon or I were happy about having to buy our own lead shot for the counterweight. I understand that this would add weight and shipping expense, but again, I don’t wish to become an ATM when I receive my new telescope, even if it’s a Dobsonian.

This was my first experience with a sling-supported primary mirror, and Dave did a nice job of documenting the method of adjustment. I was a bit put off, however, when the mirror moved laterally by at least a quarter of an inch between the two stand-off posts. It would certainly move like that when mounted on an equatorial platform. Dave’s reply to this complaint of mine was that the idea of inserting foam pads between the primary’s edge and the posts has been on obsessionusers for a while. A better approach would be to provide the telescope with two custom fitted, cylindrical foam pieces that can be added after the mirror is correctly positioned in the sling.

Gordon was not ready for the weight of the loaded travel case, which is certainly not something that anybody weaker than Hossein Rezazadeh can actually lift. Gordon does a lot of solo observing, and cannot use the travel case. The Virtual Mirror Box with the primary is manageable to lift into a vehicle, but the loaded case is not. Since I am prone to damaging things in the bed of my little pickup truck, I greatly appreciate a complete, protected telescope in such a small volume, and Jennifer and I are able to lift and slide it with some difficulty. I understand that this adds volume, but some way of attaching the wheelbarrow handles to the case might be a great improvement.

Slightly more nit-picky is the complaint that the ground board feet are too low. Care must be taken to insure that the ground board assembly is properly positioned with no interference from objects on the ground before placing the VMB assembly.

The azimuth encoder has pretty delicate protection. It would not be too difficult to fabricate a small metal encoder cover for those scopes that are ordered with
encoders pre-installed.

Finally, the manual is in need of copyediting. The manual refers to non-existent figures in several places, and suffers from poor organization. Since this is a new telescope design with new design innovations, the associated terminology really needs to be described with a labeled layout drawing.

Hossein Rezazadeh and his UC-18

Now I must direct you back to the second paragraph, where I wrote all those good things about the telescope. None of my complaints prevented us from thoroughly enjoying the views at the dark site, although the upper baffle deficiency almost did. The scope is light enough to track on a Tom O. platform that was designed for my 10” Dob. Dave did a lot right with this telescope, and I’d give it 4 out of 5 stars. With a price increase of less than 5% completely transferred to the customer, the 18” Ultra-Compact Obsession would be a 5-star telescope.

Left: Replica of Isaac Newton’s reflecting telescope.

Right: Replica of Galileo’s refractor telescope.

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