

East Valley Astronomy Club

October 1999

www.eastvalleyastronomy.org

Scottsdale, Arizona

EVAC Meeting Highlights

September 8th, 1999

Tom Polakis, Secretary
Polakis@sprintmail.com

About 60 people showed up for the September meeting. For seven of these people, it was their first meeting, and they gave a brief introduction, followed by introductions of the Board members.

Vice President Pedro Jane' presided over this meeting in Silivo Jaconelli's absence. He ran through a list of upcoming events:

1. The All-Arizona Star Party is on Saturday, Oct 9th (and Friday Oct 8th).

(see inside for further details)

2. A date of November 2 was announced for a star party that EVAC will put on at Scottsdale Community College.

We need volunteers to set up telescopes. Remember that this is what we exchange for a year's use of the meeting room.

Don Wrigley announced a raffle of Starry Night, a desktop planetarium program. The drawing was won by Sean Page.

Officer nominations will be done in the October meeting. We are in pretty good shape, with all offices accounted for except Vice President. Silvio indicated that he wouldn't mind competition for the President's office, given his travel schedule.

The main speaker for the evening was Paul Comba, an amateur astronomer from Prescott. He is the most prolific asteroid discoverer in the country, currently holding 577 provisional designations for his discoveries. Paul has always had a fascination with asteroids, and has visually observed all but two of the first thousand numbered objects. He described his equipment, which is an equatorially mounted 18-inch and an ST-8 CCD camera. Then he went on to discuss

his meticulous technique that has led to all of those discoveries. Paul pointed to promising developments on the horizon, including advances in telescope automation and astrometry software. His talk was followed by a large number of questions, most coming from one member.

After the main speaker Anne Beeby showed off the new club shirts and caps that are up for sale. Please support EVAC with a purchase from the new line of EVAC apparel. Past president Sheri Cahn spoke about a calendar that is available from the Vatican Observatory for \$15. This organization will hold an open house at the Arizona Science Center on November 4.

In the member presentations, Pierre Schwaar showed slides from a decade of eclipses. He has seen totality in four of five trips since 1991, and had the slides to prove it.

JPL Ambassador Laurice Dee did a poster presentation about the Cassini mission to Saturn and Mars Surveyor '98. She attended an event at JPL in Pasadena for the Earth fly-by of Cassini. She also discussed the Mars Climate Orbiter, slated for a September 23 arrival, and the Polar lander, set to land on December 3.

EVAC & Other Events: 1999

	New Moon	Mtng	Local	Deep Sky	Other
Jan	17	13	9	16	
Feb	16	10	6	13	
Mar	17	10	13*	20	13: Messier Marathon*
Apr	16	14	10	17*	17: Sentinel Star Gaze*
May	15	12	8	15	9-16: Texas Star Party 28-31: Riverside TMC
Jun	13	9	5	12	12-19: Gr Canyon SP
July	13	14	3	10	1-7: Universe '99
Aug	11	11	7	14	13-14: Stellafane
Sep	9	8	4	11	10-11: N AZ Star Party 17-19: Astrofest
Oct	9	13	2 nd & 30 th	9*	9: All-AZ Star Party* 4-10: Okie-Tex SP 8-10: Starry Nights Fst
Nov	8	10	(oct)	6	
Dec	7	8	11	4	

Membership Renewal Time

by Pedro Jane

Hello loyal EVAC members and new members.

This is a reminder that membership renewals are coming due at the end of the year. To save our treasurer from being overwhelmed at years end, we request that you renew as soon as possible. Otherwise she has to deal with all 150 renewals at once. And with Y2K near she may have to use a pen and paper! AAAgh! So please make a note to send your check asap so that we can continue to support our premier astronomy club. See the form in the newsletter or send it by e-mail.

(we MUST request that you complete a renewal form either electronically or on paper)

We have a new Treasurer on board now:

Dee Ann Zacher
2143 E. Farmdale Ave
Mesa, Arizona 85204
H: (408) 545-8769
W: (480)-655-3575

The Club would like to recognize and give special thanks to Kathy Woodford for all of her solid work and effort as our past Treasurer.

Thank you,
Pedro

SCC Star Party

(time to show our appreciation to SCC for allowing us to use their classroom)

EVAC holds a star party each year to thank the college for allowing us to use their classroom for our meetings. Steve Mutz is instrumental in helping us keep the room. We are holding the party this year on Tues. Nov. 2, 1999 at the same site on campus. It's a dirt access road on the north side of the school. If you prefer, meet at room 172 (our meeting room) at 7:00 and walk to the site with the class. We are expecting 20 to 40 students and desperately need volunteers. We need 5 or 10 scopes at the site. The class is 90 minutes long. Please contact Don Wrigley at 480-982-2428. There will also be a sign up sheet at the Oct. meeting.

Thank you,
Diana Jane' 480 833-2002

October's Main Speaker

Topic: "Shell Nebulae, or Watching Stars Lose Their Marbles"

Presenter: Paul Scowen ASU

Bio

Originally from England, Paul received his BSc from the University of Birmingham (UK) in 1987, and came to the US to study at graduate school at Rice University in Houston. He received his Masters in Astrophysics under Prof. Don Clayton in 1989, and his Doctorate in Astronomy under Prof. Reggie Dufour in 1992. He has since been working at ASU as a postdoc and then a research scientist. He has been lucky enough to use the Hubble Space Telescope and several of the many big telescopes in southern Arizona. His research currently focuses on the physics of gas dynamic interfaces in regions of star formation, as well as trying to understand galaxy-wide global star formation.

Topic Outline

Shell nebulae are formed when the central star starts to lose control of its outer layers of gas and then shed the material into the surrounding interstellar medium. This can happen early in life for very massive stars, and late in life for smaller stars. Either way, the study of the resulting nebula tells us a lot about the life history of the star and gives us valuable information about how heavier elements are made and returned to the interstellar medium (ISM). The boundary between classical shell nebulae and planetary nebulae has become blurred in light of recent HST images of both types, and we will visit several impressive cases to crack open the subject and get a personal look at systems that are losing it!

More notes on this topic...

The Chandra X-ray telescope is proving to be a powerful new tool for astronomers. An article in the Az. republic on Sept' 29 page A-11 discusses a new discovery within the Crab Nebula. One of EVAC's past speakers is interviewed. Jeff Hester said the bright inner ring has never been seen before. "We have finally seen the glowing power conduit. That is the place the pulsar connects to the larger nebula. It sticks out like a sore thumb!" Be sure to attend the Oct. 13 meeting to hear **Paul Scowen** discuss this and other new discoveries. He has a talent for making these things quite clear to the layman. Even I can understand him.

Pedro

Message from the President

by Silvio Jaconelli

Well, a year has come and gone since the current Board/Officers were elected and we will be having elections at the November EVAC meeting for new appointments for year 2000. Nominations will be taken at both the October and November EVAC meetings, the actual elections will be held at the November meeting, and the new Board/Officers will assume their positions in December. We encourage all people interested in serving the club to volunteer.

The Board held their last meeting of the year on Sept 23rd. The major points covered were as follows:

1. Ray Farnsworth (the owner of the land on which we hold the All Arizona Star Party each year) be recognized for his generosity by the payment of \$50 for 2 Hubble Sky Caps for installation at the site.
2. Pedro Jane would make up 2 EVAC directional signs for the All Arizona Star Party.
3. There will be a Scottsdale Community Star Party on Tuesday Nov 2nd.
4. The club funds now stand at \$3,858. This compares to \$4,689 at the end of July.
5. The logistics for the upcoming elections were discussed at some length.

The Adopt-a-highway clean up is scheduled for Sat Oct 23. It would be great if we can get a good volunteer turnout for this event out at Florence Junction. New faces are always welcome so if the thought of spending some time outdoors helping to beautify part of our desert appeals to you, please sign up for this at the October meeting.

And finally, at the time of writing, it looks like the monsoons have finally gone - time to break out the 'scopes for Jupiter and Saturn. Both these planets will reach prime viewing position by the end of October, and in addition, this will be one of the closest encounters in years for Jupiter. I can't wait until tonight !!!

Until the October meeting

Silvio Jaconelli
EVAC president

SETI@home Update

by Tom Mozdzen

EVAC members have risen to the challenge to join in this unique search for extra terrestrial intelligence. Our stats:

Month	Members	Results	CPU hrs
August	11	866	2.8yrs
September	17	2299	6.59yrs

We have some impressive computing power being put to the task. Our top two members have several computers networked and working in parallel. Here is a list of our active members and how they are doing:

	Name	Num. of Results	Total CPU time
1)	Bob Brazeal	1028	2.33 yrs
2)	Dan Hawrylkiw	556	1.32 yrs
3)	Kirk Keating	119	3236 hrs
4)	Mike Harrell	89	5986 hrs
5)	Jason B. Nelson	79	2862 hrs
6)	Evan Pomerantz	72	1223 hrs
7)	Rick Scott	71	1675 hrs
8)	Wes Edens	63	1213 hrs
9)	Marcia Collette	63	2846 hrs
10)	Martin Bonadio	48	2031 hrs
11)	Tom Mozdzen	45	1308 hrs
12)	jtwaters	39	1001 hrs
13)	Ron Williams	32	1877 hrs
14)	D. A. Zacher	32	998 hrs
15)	Chris	18	474 hrs
16)	Don Tellis	15	725 hrs
17)	Jon Milan	11	264 hrs

To view our results in real time goto:

http://setiathome.ssl.berkeley.edu/cgi-bin/cgi?cmd=team_lookup&name=East+Valley+Astronomy+Club

To download the free software or to visit the home page goto:

<http://setiathome.ssl.berkeley.edu>

Let's see if we can't add six new members this month and make a run for a spot on the top 100 club list.

Tom Mozdzen
Newsletter Editor

San Diego Club Star Party Report

by Tom Polakis

Expecting a monsoony Labor Day weekend in Arizona, I decided this year to observe from a site west of the Colorado River. I contacted former EVAC member Tony Ortega, who now resides in L.A. His plan was to meet his friend Brian McFarland at the San Diego Astronomy Association's Tierra Del Sol observing site. Here was a chance to observe Southern California style.

Five hours of driving brought me to the site, which is 50 air miles east, an hour's drive, and 4000 feet above San Diego. Tierra Del Sol is a stone's throw from the Mexican border. I wasn't ready for the vastly different style of a San Diego club star party.

Contrast the SDAA star party with the Phoenix club experience. San Diegans set up their scopes in two orderly rows on long, level concrete pads furnished with electrical outlets spaced every fifty feet or so. Phoenicians maneuver their vehicles through a forest of creosotes in an attempt to find a level spot free of cholla cacti. The SDAA site features amenities such as toilets and a shower. Our best approximations in the Sonoran Desert are the blind side of palo verde trees and a five-gallon jug of water brought from the city. And the SDAA observes from their own private land. Phoenix amateurs hope not to have to compete for space with RV's equipped with portable mercury vapor lamps.

After some time on a waiting list, SDAA members are allowed to rent one of 45 individual and more sheltered observing pads at the site. These provide an excellent means to have the star party experience while still comfortably isolated from reverse lights and the drone of GO-TO telescopes. Members are entitled to these individual pads for an annual fee so long as they use them at least twice per year. Brian set up his 12.5-inch Newtonian on a pier permanently located on his pad, which he has surrounded with bench seating. A fresh pot of coffee is always within reach.

The most ambitious and most veteran members of SDAA have built their own observatories on the grounds -- seven of them in all. These are large roll-off units with attached living quarters. The closest of these to the main field houses the club's 22-inch Ritchey. A club member trained in its use volunteers to be the host for the night, taking requests from those who visit. Unfortunately, our request for a view the fine edge-on galaxy NGC 7332 was vetoed in favor of yet another view of the Veil Nebula. I never bothered to look through the scope.

Of the several dozen telescopes set up on the main field, only two belonged to the class of "large

Newtonian." Most of the scopes were consumer-line equipment. I was amazed at the number of instruments that were fixed on a wobbling image of Jupiter 10 degrees above the eastern horizon while Cygnus blazed overhead. I wondered if these telescopes were never used in the city.

If the SDAA's star parties and another oppressive Arizona summer have you considering San Diego as a fine place to do astronomy, there's a catch. All that cool climate associated with the Pacific coast comes with a price, and it's humidity. Brian was calling this night "dry", which must be defined as a night when your charts aren't damp with dew. The air seemed moist to me, and the transparency obviously suffered. Even overhead, where the sky was dark, the Milky Way lacked the snap we've become accustomed to farther inland. While San Diego's glow 50 miles away was actually not as bad as I'd anticipated, the more nearby development is the real culprit in brightening the sky over Tierra Del Sol. It is disheartening to see just how much light a negligible desert town like El Centro can pour into the sky. That's not to say that the SDAA could possibly gain by relocating. Any further east takes you into that very source of skyglow. South of San Diego is another country, to the west is an ocean, and we all know what lies to the north.

After one night of Southern California astronomy, I came away impressed at the collective effort of an active astronomy club, but again thankful to live in Arizona. I observed the next evening from Sentinel. Stifling heat, chapped lips, a fresh coating of Sonoran Desert geology on the optics, and a Milky Way that doesn't quit. It's good to be home.

Tom Polakis
Tempe, AZ
Arizona Sky Pages <http://www.psi-az.com/polakis/>



Seeing Comet Hale Bopp for the Last (?) Time

By Chris Schur

Every two years, my wife Dawn and I travel 12,000 miles to Australia to work with the Paleontology department at the Queensland museum in Brisbane. Usually, we plan our trip such that the dark of the moon falls during that period as well, so we can do some southern skies astronomical observing. This year's trip was during the month of August, and we took along our Tirion Star charts, red LED flashlights and my new Meade ETX with its Autostar controller. When we arrived, we were met by Paul Tierney, a long time friend who also brought along his ten inch dobsonian telescope with a full compliment of Naglers.

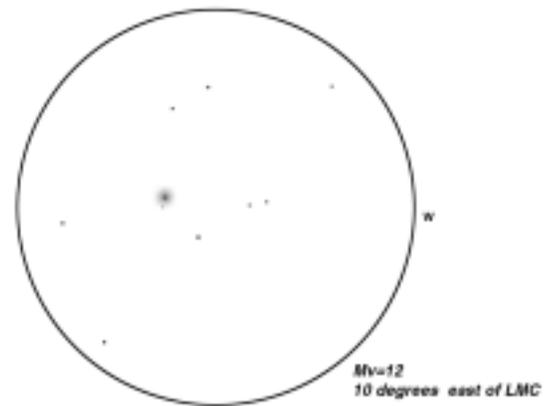
Our museum paleontological adventures took us far into the Outback to the small town of Chillagoe. There far from any city lights, it was dry and the sky very dark. Each evening, after a long hard day working in the field for the museum, we set up the telescopes. During August, the stinger of Scorpius lies at the zenith, with Corvus, Virgo and Mars riding high in the west. To the south where the celestial pole was about 25 degrees high, we could sight Centaurus, Crux and part of Carina.

Setting up the ETX was a bit confusing at first. The normal operation is to point the mount north with the tube level. In the southern hemisphere, there was no north star to line up on, so I had to point the back end of the scope at sigma Octans for the initial alignment. Once done, the usual two star sequence was performed and it was ready to go. Naturally, the first object I selected was Eta Carina nebula. When I hit the GOTO button on the Autostar hand controller, the motors whirred, and the optical tube assembly panned across the sky to a position low, just above the south western horizon. And when we peered into the 26mm plossl ocular, there it was - exactly in the center of the field! Next we typed in NGC4277 - the Jewel Box cluster in Crux, and the scope whirred again over to the gorgeous star cluster and appeared to the eye as a clump of brilliant multicolored gems in the 26mm.

But then we found the bad software problem in the Autostar. For about 75% of the objects riding well above the horizon, the telescope would not move, and the display proclaimed that the object was below the horizon! But oddly enough, it would go to all of the named objects in its database without a problem. Omega Centauri was gorgeous at the zenith. In the ETX, it was completely resolved with stars all across its face.

We set the alarm clock for 4am on many mornings to get out and view the Magellenic clouds, in excellent viewing position at that time. Once again after a quick alignment of the ETX, the globular 47 Tucanna was dialed in no time at all. It was easily resolved around the edges with the 26mm, and its brilliant stellar core was a true sight to behold. As I panned up and down the LMC at slow speed with the Autostar's arrow keys, a rich assortment of nebulosities and clusters fell into view. The Tarantula nebula was by far the most interesting object in the galaxy. Faint tendrils of nebulosity could be clearly seen even with this aperture. But once again the Autostar bug reared its head, and the scope lay dormant when trying to access the hordes of other objects nearby, again blankly displaying the "below the horizon" statement. So for these objects, I used the old fashioned finder.

Next we brought out the ten inch to search for Hale Bopp. I brought along several charts I had printed up using Megastar with the latest orbital elements off the IAU web site. With a 24mm Erfle in the ten inch dobsonian and a well aligned Telrad finder for sighting, the scope was swung toward the southern sky to the constellation of Volans, some 15 degrees from the Large Magellenic cloud. When the proper star pattern was in sight, we peered into the eyepiece and its soft glow was present. It was about 12th magnitude, and only very slightly condensed in the center. No tail could be seen and it was very small, about half an arcminute in diameter.



Comet Hale Bopp - August 20, 1999 4:15pm AST
10° 04.5 Newtonian 24mm Erfle Chris Schur, Chillagoe, Qld, Australia

As I gazed at the once great comet in the eyepiece, visions of the past magnificent tail this comet had at its best were in my mind. I thought of all the club star parties where this object once hung in the sky like a fiery celestial sword. The view of its blazing coma and nucleus were gone now, it appearing as a pale ghost of the wondrous object it once was. After a few last looks, we moved on to the magnificent tarantula nebula in the LMC. As 5am approached, the first glows of the morning twilight began with the zodiacal light blazing forth in the eastern sky. Another day in the Australian Outback had begun.

Adopt-A-Highway Cleanup

by Sam Herchak

76627.3322@compuserve.com

The Club has its semiannual cleanup of the EVAC Mile scheduled for Saturday, October 23rd at 8:00 AM. Our task is to pick up trash from the shoulder of the highway to the right-of-way fence (State crews are responsible for the median dividing the highway). Here is what else you should know:

Participants must be at least 12 years old and work in groups facing oncoming traffic. Dress appropriately; long pants, sturdy shoes/boots, long sleeves and/or sunblock, hat, and heavy GLOVES. Safety vests to be worn will be provided. Please bring some water too, as you'll work up a sweat.

Pick up bags and other litter with caution-it could contain hazardous material, be hiding a snake, etc. A stick with a nail or hook is recommended to use instead of your hands, while a large bucket cuts down trips to the trash bags. Few large objects are found out there, but if lifting one, keep your back as straight as possible, the object close to your body, and let your legs and arms do the work.

Don't let anything surprise you-our fellow citizens dispose of everything imaginable along our roadsides. If anything looks odd or is really heavy, LEAVE IT ALONE! Note it's location and we'll notify the State about it afterwards. When a trash bag becomes full, place it on the very edge of the pavement, not in the pullout lane.

As with any government program, there are a few requirements to complete before starting. One is a briefing from the cleanup coordinator. The second is to sign the usual waiver for the State saying participants won't sue if something happens. The forms are kept on file so one signature covers you for all future cleanups.

Look for the sign up sheet at the October Club meeting. With 8 volunteers, we can finish by noon. Meet at Florence Junction (intersection of Highway 60 and 89) on the north side in the far west corner of the parking lot (closest to the radio tower). Lunch afterwards at Village Inn will be provided by the Club. So come out, get some exercise, and get to know each other.

Contact me at 480-924-5981 if you can help or have questions.

Thank you,
Sam

Truly Accurate Geographic Positions

by Sam Herchak

76627.3322@compuserve.com

As occultation timing methods and accuracy have improved, a precise location for the observer has become increasingly important. IOTA currently requires positions accurate to within 50 feet. The 7.5 minute topographic map and ruler have been the method of choice for measuring these positions. Well, don't kid yourself. Although this method has previously been the best option, it will NOT give 50 foot accuracy for most observers. The following information on topos comes from:

<http://mapping.usgs.gov/mac/isb/pubs/factsheets/fs07896.html>

"...As applied to the USGS 7.5 minute quadrangle topographic map, the horizontal accuracy standard requires that the positions of 90 percent of all points tested must be accurate within 1/50th of an inch (0.5 mm) on the map. At 1:24,000 scale, 1/50th of an inch is 40 feet (12.2 meters)..."

This means that we are already dealing with an inaccuracy of 40 feet before the observer plots their position on a quad. If you then measure your hand plotted "X" to within a millimeter, that only gives an 80 foot accuracy!

In reality, the probability is small that the vast majority of observers will transcribe a perfect position mark on the map, measure that mark to a fraction of a millimeter, and then do the math without error. Other information at this website says only the best of landmarks (perpendicular road intersections, railroad tracks, etc.) are plotted to the specified accuracy anyway. Fortunately, there is a simple way to get 20 foot accuracy in just 1 hour. How? Listen to what Scott Degenhardt has been telling you. GPS Average!

I checked Scott's website after reading an article in the November 1998 Occultation Newsletter (ON) and became intrigued. From personal experience with topos, I had little confidence in being within 50 foot accuracy. Though I didn't own a GPS, I knew plenty of friends who did, so why not try it?

First, lets start with a simplified primer on GPS. It starts with a US military network of 24 satellites in 12 hour orbits. These satellites transmit two signals (one "public" and one encrypted) containing their precise orbital ephemerides and time signals accurate to a few hundred nanoseconds. The GPS unit on the ground processes this data and then knows EXACTLY where each visible satellite is and how long each signal took to reach the unit. With this information, it can calculate the precise distance to each satellite. There is now a unique "line of position" from each satellite and where they all intersect is your position to within 10 meters or so.

To keep unauthorized (that is, hostile) users from using this system in directing weapons against ourselves, the military introduces intentional and unpredictable error into the public signal called "selective availability" or S/A. This reduces the guaranteed accuracy to 100 meters horizontal and 150 meters vertical. The early GPS units were indeed helpless in doing any better than that.

But over the last few years, even the \$100 units at K-Mart have incorporated 12 satellite (channel) capability and software that will "average" the GPS signals over time to filter out the error from S/A. The question then became, how long do we average to be certain of our position to IOTA's specifications?

Data can be collected by anyone at a certified "benchmark." The position of these permanent markers are measured to 0.00001 second of arc! That's about 3mm accuracy if you do the math. Simply set up a GPS unit over one of these and go to work.

In the May 1998 ON, Wolfgang Rothe showed the error from S/A could be negated over time using his PC linked GPS. Now that units incorporate the averaging function, others have investigated the accuracy of this method. One result I've seen is the "Sam Wormley" table at:

<http://joe.mehaffey.com/average.htm>
<http://dragon.swansea.linux.org.uk/~paulr/statictest/meantext.html#Averaging>

Error (m)	Time Needed to Obtain the Stated Error				
	50.0%	90.0%	95.0%	99.0%	99.9%
100	0:00:02	0:00:02	0:00:02	0:00:02	0:01:59
50	0:00:02	0:00:02	0:03:31	0:09:26	0:15:24
25	0:00:02	0:14:14	0:23:28	0:42:02	0:49:40
20	0:02:09	0:24:19	0:29:45	0:54:40	0:58:35
15	0:06:34	0:46:37	1:11:28	1:31:52	1:40:30
12	0:10:52	1:19:31	1:45:14	2:13:40	2:29:02
10	0:21:03	1:50:52	2:26:55	3:14:03	3:28:39
9	0:26:08	2:20:44	3:05:59	3:44:15	3:58:27
8	0:34:00	3:10:20	3:45:03	4:36:23	4:58:06
7	0:50:42	3:59:55	5:06:23	5:52:25	5:59:23
6	1:26:47	6:00:39	7:18:11	7:53:15	7:59:21
5	3:16:27	10:10:50	11:20:03	N/A	N/A
4	8:39:45	N/A	N/A	N/A	N/A

Table 1. Amount of time needed (hr:min:sec) to obtain a given accuracy. Columns show the chance of actually getting the desired error if one averages the indicated amount of time.

Since IOTA needs about 15 meter accuracy, you can see a single GPS position average of 1 hour 40 minutes will provide that 99.9% of the time. That's far better than you can say for a topo and ruler!

Not having seen this table until just recently, I explored a different option that Scotty recommended -

several short averages, then those averaged together for the final position. He guaranteed me to be within 50 feet of my actual position if I did 10 ten-minute averages. Boy was he being conservative! For the nuts and bolts of Scotty's work, see his website:

<http://nashville.com/~dega/garmtest.htm>

So I borrowed a Garmin II GPS unit, located a certified benchmark in my area, set up a picnic table there, and went to work. NOTE: if your unit offers several ways to display coordinates, use decimal-degrees to five places over seconds to 1 decimal place. It's more accurate (3 feet vs. 10 feet) and easier to do the math. Here's how it went:

Certified NAD 83 coordinates for benchmark G474:

+33d 24m 34.30786s = 33.409530°
 -111d 32m 00.12518s = 111.533368°

Latitude	Longitude
33.40950°	111.53334°
33.40953°	111.53336°
33.40957°	111.53343°
33.40962°	111.53353°
33.40958°	111.53338°
33.40939°	111.53332°
33.40961°	111.53351°
33.40951°	111.53334°
33.94040°	111.53347°
33.40964°	111.53309°

Table 2. The Garmin ten-minute averages:

My 10 ten-minute averaged position:
 33.409535° 111.533377°

Since 0.000001 degree of latitude equals 4 inches, the position was off 20 inches in latitude! With longitude lines not being parallel, the correction of 0.835 for my latitude results in an error of 30 inches in longitude. Not bad for a few hours work.

Surprisingly, some people had already complained the 1 hr and 40 minutes required is too much work. So I took the first five and the last five averages and computed two more positions:

33.409560° 111.533408°
 33.409510° 111.533346°

Position number two is the "worst" - off by 11 feet in longitude. Ok, I do have a confession to make. The picnic table/GPS unit was 5 feet south of the benchmark because of the slope of the hill the marker is located on. Regardless, the results are clearly superior to anything you can do with a map.

As Scotty's website shows, even five minute averages will give supremely accurate positions. I believe the key is the time span in which the averages are taken. That is, 5 five-minute averages spread over a period of an hour will be more accurate than 5 averages one after another. One or two hours allows the S/A to change enough to get a good "spread" in positions, which creates the pinpoint location (see figure 1).

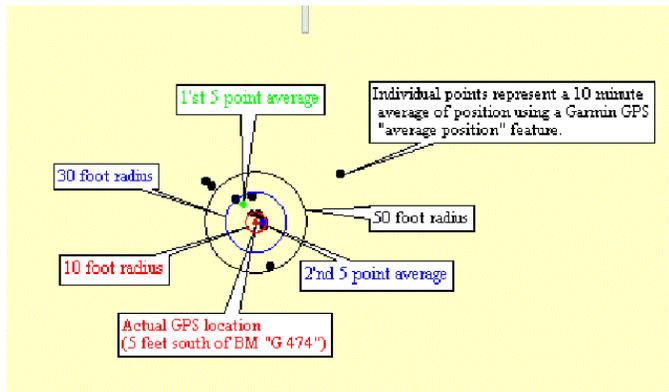


Figure 1

I tried another benchmark months later - after 5 ten-minute averages, my GPS position was only 20 feet off. That was enough for me, but Scotty sent the results of his 10 ten-minute averages when split into two sets of five. Similar results - off 10 feet from the benchmark location both times!

The beauty of this method is widespread. The unit does all the work. You just push the buttons, store (or record the positions), add them together, then divide by the number of averages. No precision measurements or conversions (the GPS unit will convert a position between formats and all datums that it contains). You can get an accurate position at any site, independent of maps and their "suitable landmarks" (Scotty believes he remembers reading that GPS accuracy diminishes within 30 degrees latitude of the poles). If you have a favorite site, you can choose to do a large number of averages and literally nail the position to a few inches. Why settle for 50 ft. accuracy, especially if you are doing occultation videos or grazes?

The GPS units I've seen don't average elevation, so a topo should be consulted to get this information. Luckily, it looks like Delorme's Topo USA 2.0 (electronic version of the paper maps) may be accurate enough in this respect. Perhaps access to this tool can be created by IOTA. Members could go to this website, enter the averaged position and the appropriate topo area would appear. This would serve as an excellent cross check to the GPS position as well.

I haven't repeated a lot of previously published information in this article to keep the length reasonable. Like how to set up your GPS unit to maximize the signal reception from the satellites.

Instead, look at back issues of ON or the web references.

Now my sincere and special thanks to Scott Degenhardt for conceiving this method; his lengthy research, his references, and his persistence in convincing the "old school." Please contact Scotty or myself if you have any input or problems using this method. Also send us your results as measured against your "map" coordinates and/or benchmarks if you have the time.

Wouldn't it be nice to know where you really are?

Sam Herchak
76627.3322@compuserve.com

Scott Degenhardt
dega@home.com

REFERENCES

Definitive GPS Site:
<http://tycho.usno.navy.mil/gpsinfo.html>

GPS Tutorials:
<http://www.garmin.com/aboutGPS.html>
<http://www.utexas.edu/depts/grg/gcraft/notes/gps/gps.html>

GPS Newsgroup:
sci.geo.satellite-nav

Benchmarks:
<http://www.ngs.noaa.gov/TOOLS/NGSmap/NGSmap.html>
http://www.ngs.noaa.gov/FORMS/ds_area.html

If it's clear...

by Fulton Wright, Jr.
Prescott Astronomy Club for October 1999

On Tuesday, October 5, at about 5 AM you can see a nice grouping of astronomical objects. With your unaided eye or binoculars look 25 degrees above the east horizon for the crescent Moon (on top), Venus (lower right), and Regulus (lower left) all within a 5 degree circle.

On Monday, October 18, at 10:08 PM you can see the Moon occult Uranus. With a small 3" or medium 6" telescope, look 30° above the southwest horizon for the moon. It is not going to be easy to see Uranus (mag 6) next to the gibbous moon even though it will be covered by the dark edge of the moon.

On Tuesday, October 19, you can see some events with Jupiter's moons. Because these happen before Jupiter's opposition (October 23) Io follows its shadow. 7:41 PM Io's shadow falls on Jupiter

- 7:48 PM Io moves in front of Jupiter
- 9:51 PM Io's shadow leaves Jupiter
- 9:56 PM Io moves from in front of Jupiter

On Thursday, October 21, after 6 PM you can see the northwest (planetary, not celestial west) part of the Moon at its best. With a small (3 inch) or larger telescope look 20 degrees above the southeast horizon for the gibbous Moon. Libration tips that part of the moon toward us. You can also get a good view the day before or after.

On Thursday, October 21, at 8:16 PM you can see a minimum of Algol. With your unaided eye look 30 degrees above the northeast horizon for Algol (Beta Persei) at mag. 3.4. Three hours before or after this time it will be its normal brightness, mag. 2.1.

On Tuesday, October 26, you can see some events with Jupiter's moons. Because these happen after Jupiter's opposition (October 23) Io precedes its shadow. 9:31 PM Io moves in front of Jupiter

- 9:36 PM Io's shadow falls on Jupiter
- 11:40 PM Io moves from in front of Jupiter
- 11:46 PM Io's shadow leaves Jupiter

On Wednesday, October 27, at about 5:00 AM you can see the Moon near a star. With your unaided eye look 55 degrees above the southwest horizon for the Moon and Aldebaran about 2/3 of a degree apart.

Your chances of seeing an asteroid occult a star this month are better than usual (which is still pretty far from a sure thing). See Sky & Telescope, February 1999, p.106 and October 1999, p. 115 for details.

<u>Date</u>	<u>Time</u>	<u>Mag</u>	<u>Asteroid</u>	<u>Where</u>
1	1:25am	10.1	Peraga	30° above E. horizon
24	6:55pm	9.9	Siegena	35° above SW horizon
26	10:22pm	8.3	Tekmessa	60° above SE horizon

NASA News

Collected by Martin Bonadio

Chandra Discovers X-ray Ring in Crab Nebula

After barely two months in space, NASA's Chandra X-ray Observatory has taken a stunning image of the Crab Nebula, the spectacular remains of a stellar explosion, and has revealed something never seen before: a brilliant ring around the nebula's heart. Combined with observations from the Hubble Space Telescope, the image provides important clues to the puzzle of how the cosmic "generator," a pulsing neutron star, energizes the nebula, which still glows brightly almost 1,000 years after the explosion.

"The inner ring is unique," said Professor Jeff Hester of Arizona State University, Tempe, Ariz. "It has never been seen before, and it should tell us a lot about how the energy from the pulsar gets into the nebula. It's like finding the transmission lines between the power plant and the light bulb."

Mars craft probably destroyed

A navigation error pushed NASA's latest Mars mission fatally close to the planet, leaving the \$125 million probe lost in space and possibly destroyed. Engineers had thought the Mars Climate Orbiter was approaching the red planet at the correct altitude before it fired its engine to slow itself down to 9,840 mph so gravity could pull the craft into orbit around Mars.

The engine fired properly but the spacecraft was hurtling along on a course that brought it too close to the planet's surface and deep into Mars' atmosphere. "It potentially resulted in the loss of the mission," said Richard Cook, manager of the Mars Surveyor '98 program, which includes Climate Orbiter.

The probe came within 60 km (36 miles) of the planet -- about 100 km closer than planned and about 25 km (15 miles) beneath the level at which the spacecraft could survive, mission members said.

Pioneer 10 Still Doing Business

Scientists have discovered a new object orbiting the Sun after a space probe was mysteriously knocked off course. Researchers have yet to identify the object, but they are confident it exists because of the way it appears to have deflected the tiny Pioneer 10 craft, which is hurtling out towards the stars.

If other astronomers confirm the observations, it will be only the second time in history that a Solar System object has been discovered by its gravitational effect alone. The first was the planet Neptune which was discovered in 1846. Its position was predicted because of its gravitational tug on the planet Uranus, which appeared to be behaving oddly following its discovery 59 years earlier.

The new body, found by a team at Queen Mary and JPL, is probably a so-called Kuiper Belt object.

All-Arizona Star Party October 8th and 9th

The monsoon is over, the skies are clear again, it's getting cooler and...

It's time for the 1999 All-Arizona Star Party, sponsored by East Valley Astronomy Club! Once again, this year's star party will be held at a site south of Arizona City on October 8-9. This site offers the right combination of dark skies, good seeing and not-too-cold nights that will encourage you to stay up well past your bedtime!

Fall cleaning?

Have some old equipment gathering dust in your garage? Or perhaps you're in the market for some good bargains? Don't forget about the swap meet Saturday afternoon! You'll have plenty of opportunities to turn that equipment into cash, or cash into equipment.

How to get there:

The site is somewhat remote, but still relatively easy to find. Take I-10 south from Phoenix to Exit 200, Sunland Gin Road. Turn right, (south) after exiting the freeway. After about fifteen miles, the pavement ends and about two miles further, the road turns sharply to the west. After another four miles, the road will turn south just after the "Silverbell Estates" signs. Three miles past the signs, the road will veer off to the west. Continue on the main road for another five miles, where it passes through a gate. Take an immediate left after the gate and continue for 0.7 miles. Take the next right onto a road that leads into an abandoned field. We will post signs along the road so follow the EVAC signs. See the map on the back of this page.

You probably already know this, but...

....We have to say it anyway. Common sense stuff to make this year's star party enjoyable for everyone:

1. Consumption of alcohol is not permitted at the site.
2. Please pack out all trash. Remember that the site is on private land and we are the invited guests of the landowner.
3. There is NO water at the site, so bring plenty.
4. The only facilities provided will be a porta-potty from Friday at noon until Sunday at noon.
5. Please plan on arriving before dark. In addition, late arrivals can be rather disruptive to those that are already observing or taking pictures. If you must arrive late, park near the entrance on the north end of the field.
6. If you must leave early, please park toward the north end of the field. Before leaving, warn those

around you of your plans. Likewise, if you are planning to stay the entire night, park to the south.

If you have questions about this year's All-Arizona Star Party, please contact:

Diana Jane'
441 E. Garnet
Mesa AZ 85204
480-833-2002 or email pbj2013@yahoo.com

For Sale

Celestron G5 5" SCT w/motor drive 9 months old, still under warranty 25mm eyepiece, star diagonal, acc. tray, alum tripod, equatorial mount, original box with all accessories. New cost - \$899 Asking \$600 OBO
George Kolb - EVAC member
480-706-0936

Edmund Astroscan w/28mm RKE eyepiece. Extremely portable 4.5" f/4 reflector. Three degree field of view. Excellent condition \$200. Replaced by homebuilt 6" RFT.

Contact Sam Herchak (480) 924-5981 or 76627.3322@compuserve.com

Wanted

Photos (by amateurs) of the planets and moon wanted (possibly comet photos also)
by Bill Dellinges

My pen pal in Italy, a serious amateur who has written 3 books on astronomy and has articles published in Italy's version of S&T, Orione magazine, needs 4-5 photos (not CCD's) of planets, high magnification moon photos for an April 2000 article. These need to be astrophotos taken through a telescope by an amateur.

He will pay \$25 per photo, give credit to photographer, pay for shipping, and send a copy of that issue to you. Photos need to be of good quality (I assume they don't need to be comparable to Donald Parkers work!(which are CCD's anyway).
If you can help, call me at (480) 983 6651 or email at stargzr@prodigy.net Thank you



East Valley Astronomy Club

Membership Form

EVAC on the Internet

EVAC Homepage: www.eastvalleyastronomy.org

E-mail Mailing Lists

EVAC-mls is a mailing list for club announcements and quick notification of astronomical events.

EVAC-Board is for EVAC business. All club members are welcome to participate.

AZ-Observing is a fairly general mailing list about observing in Arizona. Included are star party information, who is going, as well as the latest observations and astronomical events. To join, send E-mail with the "Subject: subscribe" to the "request" mailing address at psiaz.com.

For example, you would send the request for AZ-Observing to AZ-Observing-request@psiaz.com

Although EVAC is a private club not open to the public, we do encourage potential new members to initially join us at our club meetings and/or star parties to help them determine the suitability of the club to meet their needs.

Please complete the information on the form and return to the address below along with a check payable to EVAC for the appropriate dues amount. Allow 3 mos. leadtime for magazine renewals. See below:

- Enclosed:
- ___ \$20 Annual
 - ___ \$10 July—Dec
 - ___ \$29.95 *Sky & Telescope*
 - ___ \$29 *Astronomy Magazine*
 - ___ \$ 7 EVAC Nametag
 - ___ Total

Dee Ann Zacher
 EVAC Treasurer
 2143 E. Farmdale Ave
 Mesa, Arizona 85204
 (480) 545-8769

Circle: New Member Renewal

Please Print (indicate confidential information)

Name _____
 Address _____

 Phone _____
 Email _____
 URL _____

How did you hear about EVAC? _____

Major areas of interest (circle): General observing; Lunar/Planetary;
 Deep Sky; Telescope making; Astrophotography; CCD/Computer;
 Archaeoastronomy; Other: _____

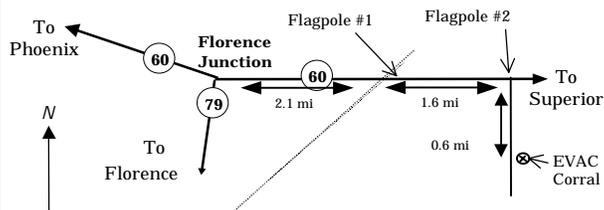
EVAC Star Parties

Local Star Party: Florence Junction Site

General Information: The Florence Junction site is the official site for the East Valley Astronomy Club's Local Star Party, typically held on the Saturday closest to Last Quarter Moon. Florence Junction offers reasonably dark skies within a short drive of most east Valley locations. (Report gunfire or illegal activity: 800/352-3796; Land use permit number: 26-104528.)

Location: N 33° 14' 40" W 111° 20' 16"

How To Get There: Take US 60 east to Florence Junction. Go past Florence Junction. 2.1 mi past FJ are railroad tracks, and on the right will be a flagpole. Do not turn there. Continue on for another 1.6 miles until you find the second flagpole on the right. This is your turn. Turn right, and continue on the dirt road for 0.6 miles. The corral is on the left right before a gas-line sign.

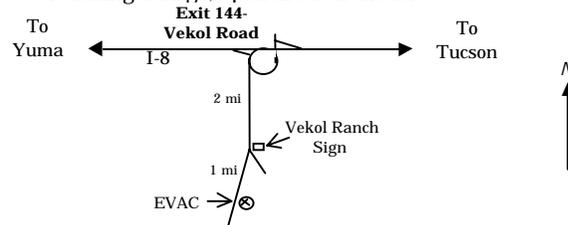


Deep Sky Star Party: Vekol Road Site

General Information: The Vekol Road site is the official site for the East Valley Astronomy Club's Deep Sky Star Party, typically held on the Saturday closest to New Moon. Vekol Road offers dark skies despite prominent skyglow from Phoenix to the north. The site is within 1½ hours drive time from most east Valley locations.

Location: N 32° 47' 55" W 112° 15' 15"

How to Get There: Take I-10 south and exit onto Maricopa Road. Continue through the town of Maricopa to SR 84, about 25 miles from I-10. Turn right on SR 84, after about 5 miles the road merges with I-8. Continue west and exit I-8 at Vekol Road—Exit 144. Turn left and cross the highway overpass. Before looping back onto I-8 take the dirt road to the left. Go south for 2 miles. At the Vekol Ranch sign bear right and continue south for another mile until reaching a large, open area on the left.



East Valley Astronomy Club—1999

Scottsdale, Arizona

EVAC Homepage—<http://www.eastvalleyastronomy.org>

EVAC Officers

PRESIDENT
Silvio Jaconelli
(480) 926-8529

VICE-PRESIDENT
Pedro Jane'
(602) 833-2002

TREASURER
Dee Ann Zacher
(480) 545-8769

SECRETARY
Tom Polakis
(480) 967-1658

PROPERTIES
Enrico Alvarez
(602) 837-0486

Membership & Subscriptions: \$20 per year, renewed in December. Reduced rates to *Sky & Telescope* and *Astronomy* available. Contact Dee Ann Zacher.
Email—dazacher@uswest.net

Club Meetings: Second Wednesday of every month at the Scottsdale Community College, 7:30 pm. Normally Room PS 170 or 172 in the Physical Sciences Building. See map below.

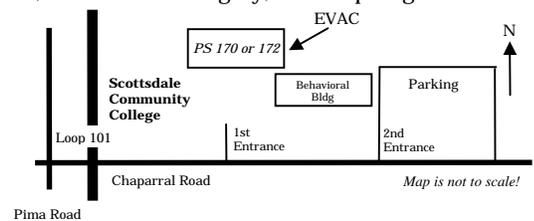
Newsletter: Mailed out the week before the monthly Club meeting. Send contributions to Tom Mozdzen, 1532 West Sherri Drive, Gilbert, AZ 85233. Email—tjmozdzen@worldnet.att.net. Contributions may be edited.

Address Changes: Contact Bill Smith, 3430 N. Mountain Ridge Unit 32, Mesa, AZ 85207, 602/854-8071. Email—bsmithaz@aol.com

EVAC Library: The library contains a good assortment of books, downloaded imagery, and helpful guides. Contact Enrico Alvarez for complete details, 602/837-0486.

Book Discounts: Great savings through Kalmbach and Sky Publishing. Contact Dee Ann Zacher, club treasurer.

EVAC Party Line: Let other members know in advance if you plan to attend a scheduled observing session. Contact Stan Ferris, 602/831-7307.



East Valley Astronomy Club

Tom Mozdzen, Editor

1532 West Sherri Drive • Gilbert, AZ 85233

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Next EVAC Meeting Reminder:
Wednesday, October 13th