The High Desert Observer

The Bulletin of the Astronomical Society of Las Cruces

November, 2008

PRESIDENTIAL TRANSITION COMING!

Besides the one in DC, right here in LC it won't be long before we have new club leadership! Bert Stevens, our diligent chief of nominations, has secured the following willing candidates for ASLC officers in 2009:

President:	Jerry Gaber
Vice-President:	Kirby Benson
Secretary:	John McCullough
Treasurer:	Janet Stevens
Directors at Large:	Wes Baker & George Hatfield

Thanks for volunteering, guys 'n gals! The November meeting is our annual business meeting, which will include the election of next year's officers. I think we have a winning Pres/VP "ticket" with Jerry & Kirby, but it's not over till every hanging chad is counted, so be sure and vote! Your ballot is included with this newsletter (towards the end). Please make sure, if you send the ballot back via the mail, that we receive it before the meeting on November 21. The envelope must include your return address so we can identify you as a valid member. We will be doing a similar process at the meeting, with the treasurer collecting the ballots of valid members. If you can, just bring your completed ballot to the meeting.

So when is this all-important November meeting? Actually it will be on the 3rd Friday this month (the 21st). This change is typically necessary due to Thanksgiving. Don't let this perturbation throw you for a loop, be there or be square! I'm anticipating a rather novel presentation by our speaker, too.

Well, **Ren Faire** has come & gone once again! We took a more relaxed approach this year, and it worked rather well – enough volunteers showed up to set-up & man our booth adequately, and our location was excellent. We made a positive impact on both common folk & gentry numbering in the hundreds, and talked with a few dozen that were seriously interested in our activities (soon to be new members, I hope!) Much thanks goes to Jerry G, Rich R, John McC, Bill S, Wes & Carol, Tony L, Joe Z. and Kirbini (hope I didn't forget anyone).

I am still hoping that the ASLC will be able to conduct a **garage-sale** of Phillip Herron's scopes & accessories. Planning has been slow due to sporadic discussions with the lawyer involved, at this point we are still trying to settle on an acceptable agreement, one that benefits our Society while providing a reasonable service to Melissa. If this can be accomplished soon, I hope to have the event on Nov. 22nd (the day after our Nov. meeting). Please consider if you can help put this on, or at least come out to look for some bargains on nice astro-hardware! Additional details should be posted on our YahooGroup soon, or you may call me, or just get the latest update at the Nov. meeting!

Did you enjoy our extra special October meeting? Hope so – if you didn't make it, you missed something really special. In a word, it was all *just excellent* – Mike's home, observatories, demos & presentation, the food, the fellowship, I could go on & on.

Well, looks like we all get a second chance! Mike & Carol have graciously offered to host our much-anticipated **annual Christmas Party** in their gorgeous home on Saturday evening December 6th at around 6 pm. The consensus of our leaders thinks that is an excellent idea...there are many advantages, compared to booking the usual restaurant (see the article herein for more details about our initial plan). Then watch for additional info via email & website in the next week or two.

This takes the place of having a conventional meeting in December, as usual. It will be great to end our gatherings for this year on such a pleasant note, Stellar Stargazin'! — Nils

The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding members and public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties, and provides opportunities to work on club and public educational projects. Members receive *The High Desert Observer*, our monthly newsletter, membership in the Astronomical League, including AL's quarterly *A.L. Reflector*. Club dues are $35 per year. Those opting to receive the ASLC newsletter electronically, receive a $5 membership discount. Send dues, payable to ASLC with an application form or a note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004.

ASLC members are entitled to a $10 discount on subscriptions to *Sky and Telescope* magazine.

This Month's Observer

Next Meeting

The next monthly meeting will be held November 21st at 7:30 pm in the usual place (Main Campus of the Dona Ana Community College, room 77). The speaker will be David Williams. The topic will be "Palomar: My Time with the Big Eye."

The imagers' group will meet at 7:00 pm.

There are no other planned events for the balance of the month. Please see the ASLC website for further information:

http://www.aslc-nm.org.

December Issue of the *HDO*

Articles for the December issue should be sent to Tony Gondola by Friday, December 10th. Text should be sent as email (acgna@comcast.net) or as an attached Microsoft Word document. Images should be sent in jpg format.

If you have any questions about submitting something to the *HDO*, please don't hesitate to contact me at 571-5118 or via email. Thanks in advance! Tony Gondola, Editor, ASLC Newsletter

Minutes, October 2008 ASLC Meeting

Call to Order:

Nils Allen, President, Astronomical Society of Las Cruces (ASLC), called the meeting to order at 7:05 pm., 24 October 2008, at the Sagrada Observatory.

President's Comments:

Nils Allen, Club President, welcomed the group and noted the several visitors and guests in attendance. He also thanked Mike and Carol Sherick for hosting this month's meeting at their home and observatory.

Secretary's Report:

The minutes for the September meeting were submitted as published in the current issue of the Club newsletter, the *High Desert Observer* (*HDO*). The minutes were accepted by acclamation of the members present. There was not an additional secretary's report.

Treasurer's Report:

The treasurer was not present at this month's meeting. There was no treasurer's report.

Committee Reports:

Observatory Committee:

There was no progress to report. A response from the electrical engineer was pending.

Nominating Committee:

Bert Stevens, committee chairman, was not present. There was no committee report.

White Sands Star Party (WSSP) IX, 26-27 September 2008:

Nils Allen reported on WSSP IX in September. He thanked the various Club members who helped to make the star party the successful "astro-gathering" it always turns out to be. There was good attendance by Club members, good attendee support of the day-time activities and presentations provided by members, and several Club members won drawings and prizes.

There were no additional committee reports.

Old Business:

There was no old business discussed.

New Business:

1. Renaissance ArtsFaire, 2008 – This year's Faire will be 01 & 02 November at Young Park. Nils Allen has completed the administrative part of arranging the Club's participation. Jerry McMahon has the display panels at his home. Chuck Sterling may/may not be available for set-up and tear-down of the booth this year. Nils needs 3 or 4 people to volunteer for 2-3 hour blocks of time during the 2-day event. Contact him via the yahoo.group to inform him how and when you can help.

There was no additional new business discussed.

Announcements:

1. Web page – Fred Pilcher thanked Rich Richins for posting the light curve data Fred had acquired, including some of his earlier work, on the Club's web site. Rich pointed out that several Club members are collecting useful astronomical data of various types that can be posted on or linked to from the web site.

2. Astronomy equipment – Legal issues continue to delay the disposition of Philip Herron's estate. An astronomy equipment "garage sale" of his remaining equipment will take place sometime in the near future. Nils Allen is working with Philip's ex-wife and will provide details via the Club's yahoo.group.

3. Christmas Party/December meeting – Plans for the December event are in work. Nils Allen announced that the Sherick's had offered their home as a venue.

4. ASLC calendar, 2009 – Rich Richins needs event dates to post on the web site calendar for next year.

5. International Year of Astronomy (IYA) 2009 NM Planning meeting – There was no report from the planning meeting for state-wide and regional events for next year's IYA held 28 September at the NRAO facility in Socorro, NM. Nils Allen will follow up on activities.

6. MoonGaze - A monthly MoonGaze was held 04 October at International Delights Café on El Paseo. The November MoonGaze will be 08 November, weather permitting.

There were no additional announcements made.

Observations:

No observational reports were presented.

Rich Richins offered a motion to adjourn and Joseph Mancilla seconded. The business portion of the meeting was adjourned at 7:20 pm by acclamation of those present.

Presentation:

This month's program was presented by Mike Sherick, ASLC member. His topic was "Robotic Observatories and Observing." Mike described the evolution of his equipment and observing set-up starting about 2000 in southern California. When he and his wife Carol decided to relocate to New Mexico, they built a remotely controlled observatory near Mayhill, NM. He described the considerations that went into the design of a remote observatory and the trials and tribulations of the construction process. He concluded his presentation by demonstrating remote imaging from his home observatory, Sagrada Observatory. This presentation was not recorded for rebroadcast on the Internet. Other meeting presentations can be accessed on the web at http://www.aicsresearch.com/lectures/aslcnm/.

The October 2008 monthly meeting concluded at 9:20 pm. Socializing, self-guided tours of the Sherick's home, and individual observing continued until later in the evening.

Respectfully submitted by John McCullough, ASLC Secretary

Views of the October meeting at the Sherick residence and observatory by Nils Allen.

Thanks to Mike and Carol for a great event!

6th(?) Annual ASLC Christmas Party is coming, and it's extra-special this year!

How, you ask? First off, we will be holding the event at Mike & Carol Sherick's gorgeous hacienda instead of at a restaurant. Mike suggested this approach, as he & Carol had this sort of activity in mind when they created their lovely, astronomy-friendly home south of town. So if you missed the October meeting, here's another chance to enjoy their gracious hospitality, this time with a festive twist.

As we proceeded to brainstorm on Mike's idea we came up with the following overall plan - the Sherick's & the Allen's would provide two of the "traditional" main dishes (turkey, ham and/or brisket) and each attendee/ couple would bring a side-dish (veggie, salad, dessert, etc.) of their choice, sort of a modified potluck. We'll have the other usual activities to include slide shows & prize-swap. Consider these numerous benefits:

1) A warm, inviting home atmosphere instead of a commercial establishment.
2) Flexible seating arrangements means we'll have room to move around and visit with lots of folks.
3) Minimal cost – just bring your side dish & astro-item for the prize-swap. No tickets needed!
4) More variety – side dishes can be as varied as folks want to make them…be creative!
5) Enjoy the superb features of the Sherick hacienda – patio, courtyard with toasty fireplace, home observatory, viewing deck, large gathering space....

Note that for planning the size of the meat entrees reservations will be necessary – please let me know your intentions (number coming, expected side-dish) at least by December 1st. For our astro prize-swap, remember that the best results come from bringing a) something inexpensive but desirable, or b) something silly that will get a good laugh. Try to bring an item for each member in your party (unwrapped).

A few additional practical matters to remember: if you have nice folding chairs, please bring them (some will be provided). Detailed travel directions & a map are included herein. Also signs will be placed at appropriate spots along the road to assist you. Parking – the roomy driveway (both paved & unpaved) will hold quite a few cars (go ahead & double/triple park), and after that the nearby street is available. Use of a flashlight when leaving is recommended due to the infrequent snake warming itself on the pavement.

Below are the essentials in a nutshell:

WHERE: 5626 Tierra Sagrada, the Sherick hacienda (see map on following page), tel. 575-680-2788.

WHEN: Starts at 5:00pm, and should wrap up by 8:00pm. Or hang around after & see what might develop!

WHO: Members, their families & visitors are welcome. Reservations at least 5 days prior are needed.

WHAT: Visit, tour, dine, see slide-shows, laugh, get a prize, share something creative, relax….

WHY: All the fun of our usual Christmas party plus more comfort & enjoyment at minimal cost!

I really hope we'll have more than our typical group of 25 to 30 in attendance. PLEASE make a special effort to come out & join us – you'll be glad you did.

Nils

522-1456, nils_a@comcast.net

ASTEROID PHOTOMETRY AND LIGHTCURVE ANALYSIS

Frederick Pilcher

Part 1: Acquiring photometric images

As a rotating elongated body alternately presents its long and narrow axes toward Sun and Earth, it becomes respectively brighter and fainter, with the time for two maxima and minima being the period of rotation. A graph of magnitude (brighter or lower number at the top) versus time is called a lightcurve. Irregularities in the shape produce irregularities in the lightcurve. Larger amplitudes, or magnitude difference between maximum and minimum light, indicate more elongated shapes.

The earliest well publicized observations of the rotational variation of an asteroid were observed for Eros at its approach to 0.15 AU from Earth in February, 1931, when it was discovered to vary by 1.5 magnitudes with a rotation period of 5.27 hours. About 1949 Gerard Kuiper and his colleagues and students, first at Yerkes Observatory and later at the Lunar and Planetary Laboratory in Tucson, Arizona, began the systematic acquisition of asteroid lightcurves with 1P21 photometers. By the 1980s, professional astronomers had obtained lightcurves of several hundred different asteroids. Due to the limitations of telescope time alotted to professional astronomers, many of the rotation periods thus obtained were based on very sparse data and were not reliably established.

In the 1990s, the advent of CCDs and sophisticated CCD and telescope control software made the data acquisition and analysis of asteroid lightcurves ten times easier and cheaper than it had been formerly. Amateur astronomers with private telescopes and unlimited telescope time began to obtain them, and their number is steadily increasing through the present. By now several thousand asteroids have measured rotation periods and amplitudes, many secure, many others still poorly established and unreliable. The quarterly *Minor Planet Bulletin (MPB)* of the Minor Planets Section of the Association of Lunar and Planetary Observers has become the standard journal in which amateur astronomers, and some professionals as well, publish their lightcurves. This journal is refereed to professional standards. At the present time amateurs publish papers just as good as professional papers published 30 years ago, and often their ability to observe a single object for many nights makes their data sets and reliability of results much superior to those of old time professionals.

Each issue of the *MPB* contains a long list of asteroids coming to opposition for which additional lightcurve data would be useful, and from these lists many amateurs select their targets. A list of all asteroids for which lightcurve parameters have been obtained, "Asteroid Lightcurve Data Files," is updated annually and is available on line at:

http://www.MinorPlanetObserver.com/astlc/

I personally select my targets mostly by carefully scrutinizing this list for objects for which the available data are of lower reliability, as well as for objects with no previously published lightcurve data. Over the years I have prepared tables of opposition (more properly, maximum elongation) dates for thousands of asteroids from the years 1950 to 2060. Once I have selected an asteroid for which I want to know the period and amplitude, I examine this list to determine the year and month when it will be observable. In this sense I have planned much of my observing program years into the future, although I may add new targets on short notice, or delete those for which secure periods are published by other observers. It is my intent that for every asteroid which I select for study, I will continue until I believe I have a secure and correct period, and not give up on difficult objects but rather observe them for as many additional nights as may be required to resolve them. In the first nine months of operation of the Organ Mesa Observatory, dedicated to asteroid CCD photometry, I have succeed in this goal for every one of my targets.

The observing procedure itself is simple. I use a Meade 14" LX200 GPS Schmidt Cassegrain, Optec Temperature Controlled Focuser, and SBIG STL-1001E CCD with field of about 25x25 arcminutes. Each night I begin by obtaining a set of dark frames, twilight flats, and flat darks. After obtaining an alignment star and focusing, I slew the telescope to the target asteroid and track it all night long, taking a succession of 60 second images, or shorter times for brighter targets, in order to avoid saturating the individual pixels. This is to obtain as long a segment as possible of the lightcurve. Including download time this enables 54 images each hour. I start at the end of nautical twilight or the time when my target reaches 25 degrees altitude (which requires a simple advance calculation each night), whichever comes last, and finish at the start of morning nautical twilight or when my target sinks to 25 degrees altitude, whichever comes first. After the exposure sequence begins I can go to sleep and let the computer control operations until time to close the observatory before sunrise.

Photometry is rather forgiving of slightly wobbly mounts and poor focus (so long as these do not become excessive). Slightly blurred images can still be measured for total accumulated well counts. But it requires high accuracy of polar alignment as photometric measurement is intolerant of even small rotation of field. The comparison stars must retain the same relative delta X and delta Y on the images throughout the night, otherwise they drift out of the centers of the measuring apertures.

Part 2: Measuring images photometrically and constructing lightcurves

There are several commercial computer programs which can measure the images photometrically and construct lightcurves. I personally use MPO Canopus, written by Brian D. Warner, himself a prolific producer of asteroid lightcurves and whose programs are especially well suited for asteroid studies.

I should define two concepts, the session and the measuring aperture. The session is the set of measurements and analysis of all images obtained on a single night. It is created by the computer and keeps one night's run separate from the others. All the images obtained for that night are measured photometrically and a single lightcurve is constructed for that session. The lightcurves from the several sessions for a single target can be combined subsequently. A session on asteroid 290 Bruna the night of 2008/04/24 is provided as a detailed example. In Fig. 1 parameters for the session are entered by hand, except that the ephemeris of the target asteroid is computed by clicking on the lower Calc button at the right. It is especially important to determine the distance (in AU) between Earth and asteroid so that light time can be subtracted from the acquisition times of the images to eliminate effects of varying asteroid distances on different nights.

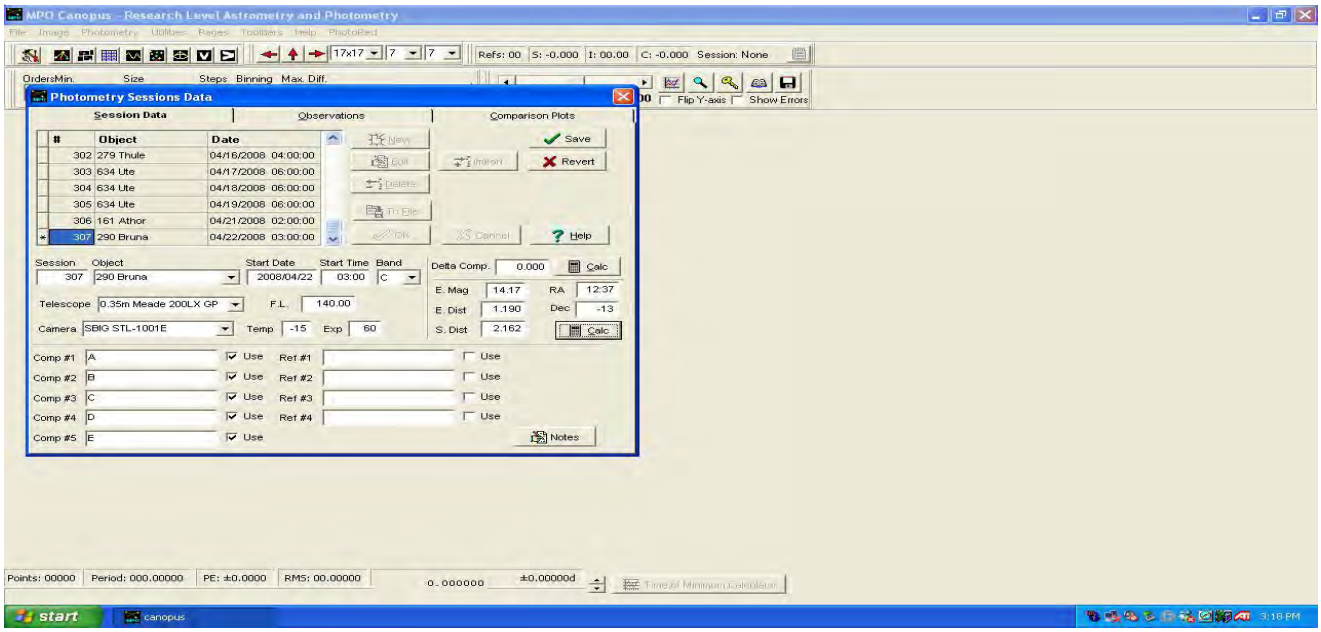


Figure - 1

The measuring aperture consists of three concentric circles which can be placed on any star or asteroid in the image. The sum of the well levels on all the pixels included within the center circle is added and this represents the total light from the included object plus sky background. The middle circle is a dead zone in which no counts are made. In the outer circle the median well level of all included pixels is determined. Any stars included cover much less than half the total area of the outer circle and will not alter the median. The outer circle thus measures the sky background which is subtracted from each pixel in the inner circle. The difference then represents the light from the star or asteroid contained within the inner circle. The diameter of the inner circle should be at least 3 times the full width half maximum of the image and I find values of 13 to 15 pixels adequate for most images, even with modest blurring. In Fig. 2 the cursor is centered on the first comparison and the X and Y coordinates of the photometric center of the image, maximum well depth, signal to noise ratio, full width half maximum are displayed on the screen.

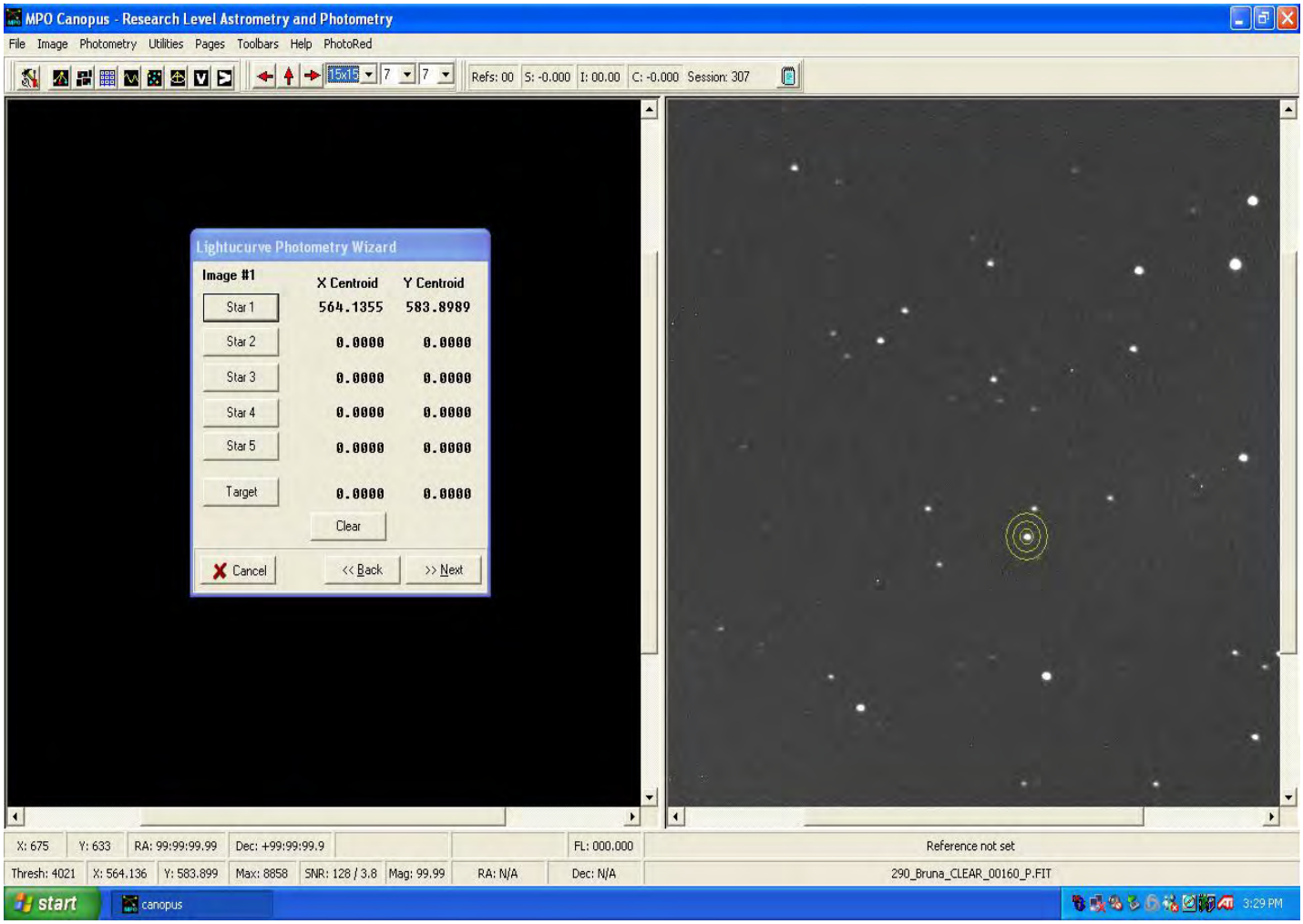


Figure - 2

This procedure is repeated for a total of up to 5 comparison stars and then for the target asteroid, shown in Fig. 3. The procedure is repeated for a second frame late in the exposure sequence. It is presumed that rotation of field is negligible and that the comparison stars are at the same relative positions (x and y pixel numbers from comparison star 1). The asteroid moves, and its position relative to the comparison stars is measured for both frames and then time interpolated for all other frames. Once these are established, all of the frames are measured in time sequence.

If the telescope position changes, as in my case for imprecise polar alignment and no guiding, clicking the cursor on the first comparison star moves all the measuring apertures back to their proper positions. It is interesting to watch the asteroid aperture follow the motion of the asteroid through the night. For each frame the measurer must make the decision whether to measure, or because of hot pixels in the measuring apertures or blurred images, skip to the next. Fig. 4 shows a frame with good images which is accepted, and Fig. 5 shows a frame in which tracking was poor and which was passed over.

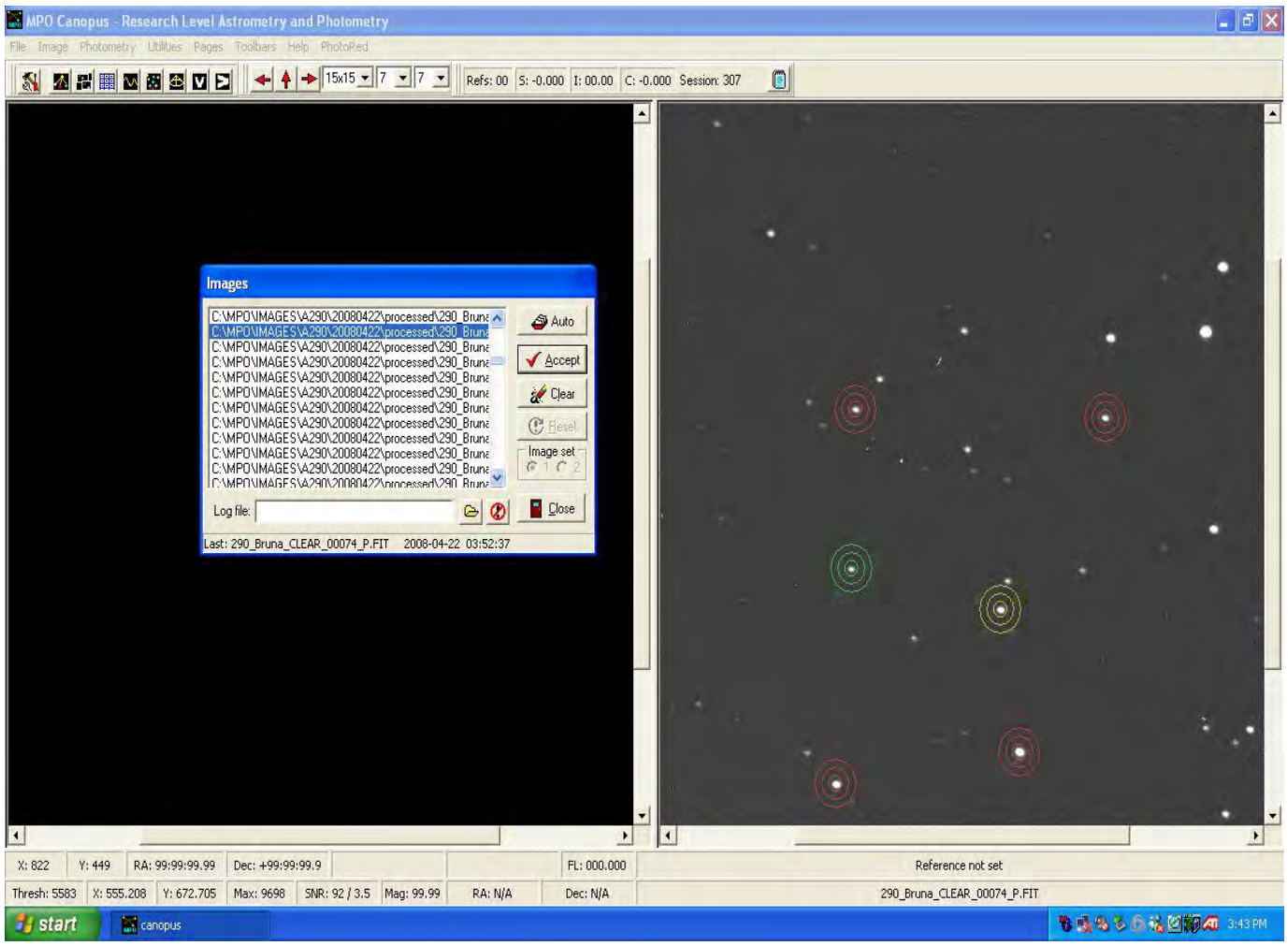


Figure - 4

If the asteroid passes close to a field star so that the star intrudes on the measuring aperture (Fig. 6) the measurement will include the light of the star. Typically the asteroid will take nearly an hour to move past the star, and the asteroid magnitudes are lost for this time interval. There will be a gap in the lightcurve. In practice I am able to measure somewhat over half of all of the 350 to 550 frames I typically obtain through the night.

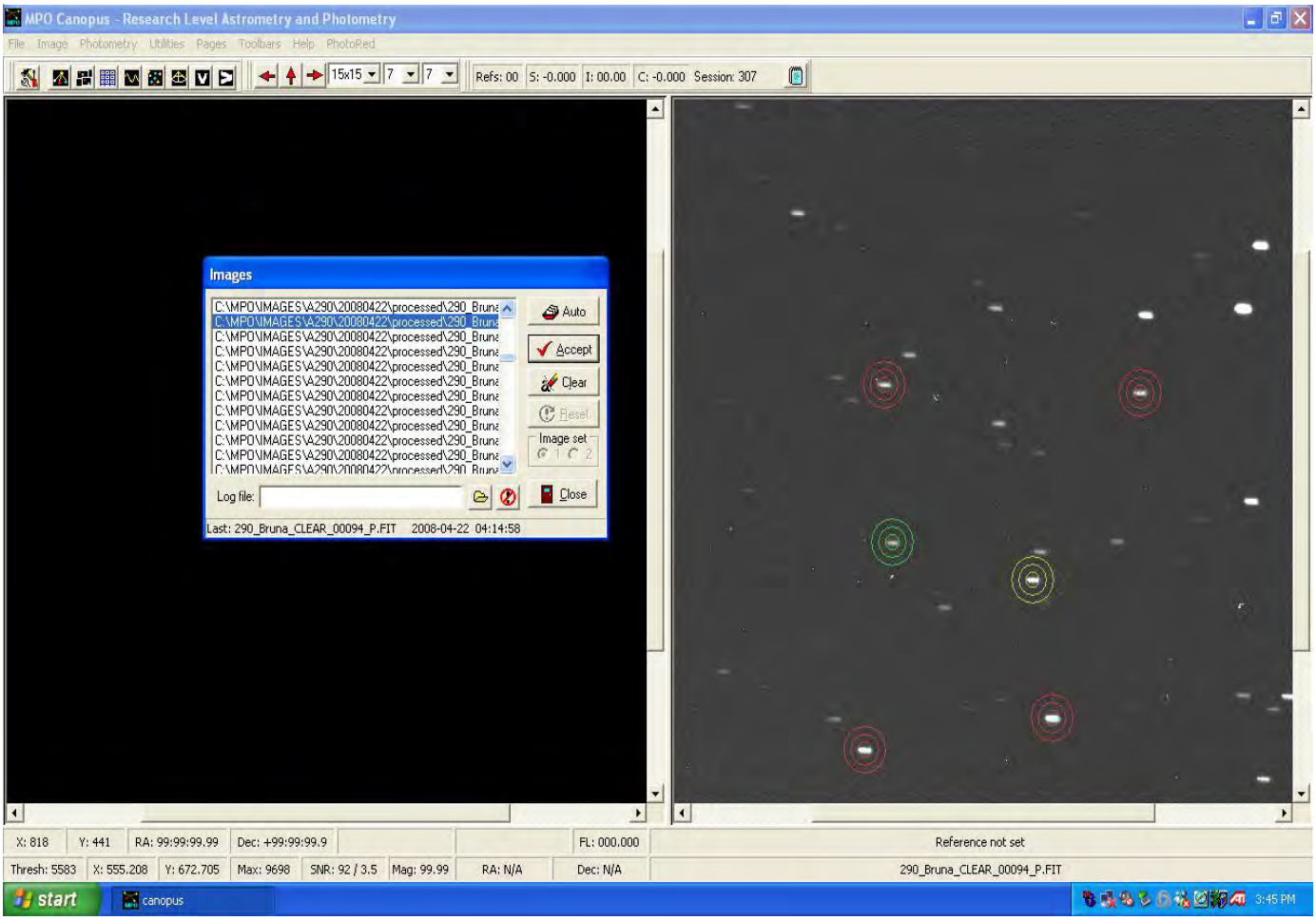


Figure - 6

When the measurement procedure is completed the magnitude, relative to the average of the comparison star set, of each comparison star can be separately displayed as in Fig. 7. Note a bad data point with excessive residual. This

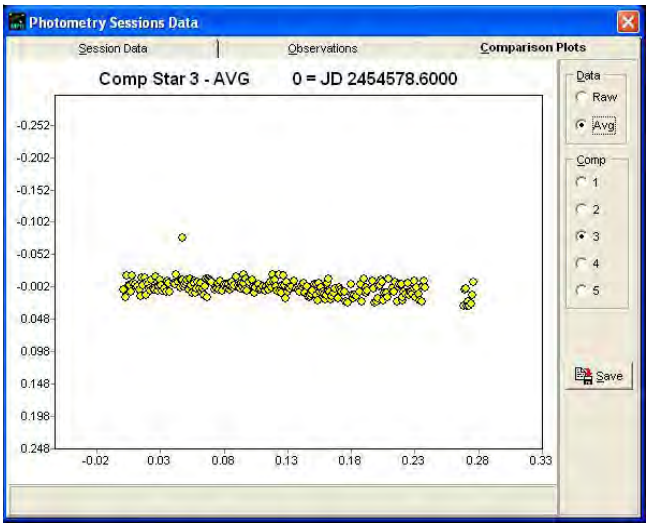


Figure - 7

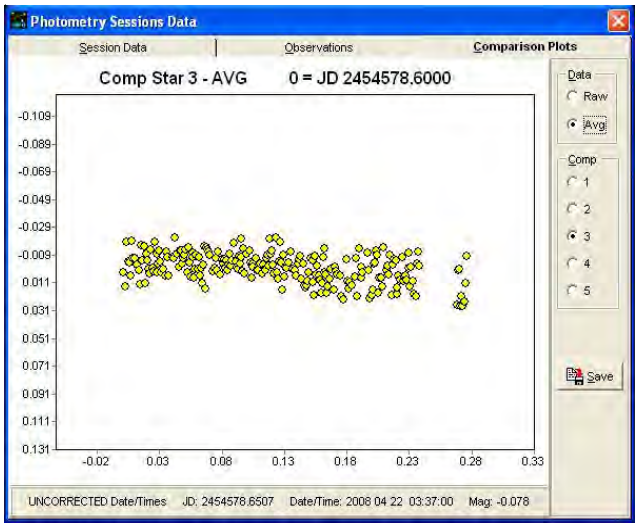


Figure - 8

has been deleted in Fig. 8, and the data for this image are not used in constructing the lightcurve.

The period is computed in two steps. For the minimum trial period specified (in this example 8.00 hours) the program fits all the individual data points into a Fourier series of order specified by the user, 10 in my example. It optimizes the coefficients of the series for minimum residual and stores that residual. In the second step the program then increments the period by the amount of the step (to 8.01 hours in my example) and repeats. This is continued through the number of specified steps (in my example 999 steps to a maximum trial period of 17.99 hours). The period with the lowest residual within this range is selected, as is an rms deviation from this period. The lightcurve for this period is then graphed, as in Fig. 9.

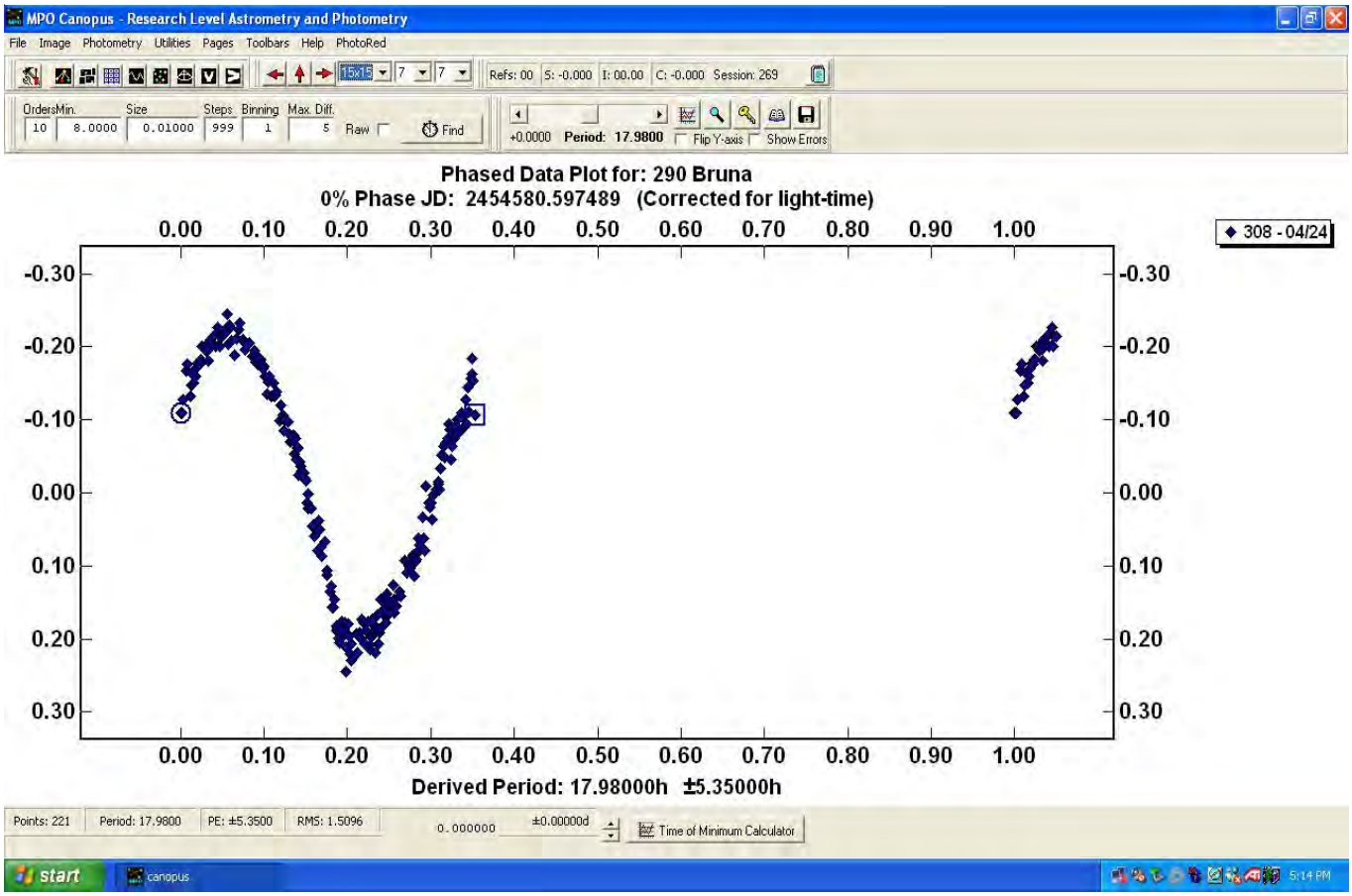


Figure - 9

When two or more photometric runs on the same target have been completed, this procedure can be repeated to obtain a lightcurve on all of these. Because the asteroid moves, a new set of comparison stars must be chosen each night. Their average magnitude is different from those used on the preceding night, and this has changed the instrumental magnitude of the asteroid. This must be adjusted up or down to match the previous photometric runs. In Fig. 10 the newest run has a brighter instrumental magnitude than for previous runs, and this also skews the period for lowest computed rms value to produce a complete misfit. This is a particularly glaring misfit for the different nights when a wrong period happens to provide minimum residual. But sometimes the misfits are more subtle. Never trust a computer! The researcher should always examine the lightcurves carefully. Small misfits may indicate that the period with minimum residual is not the correct one.

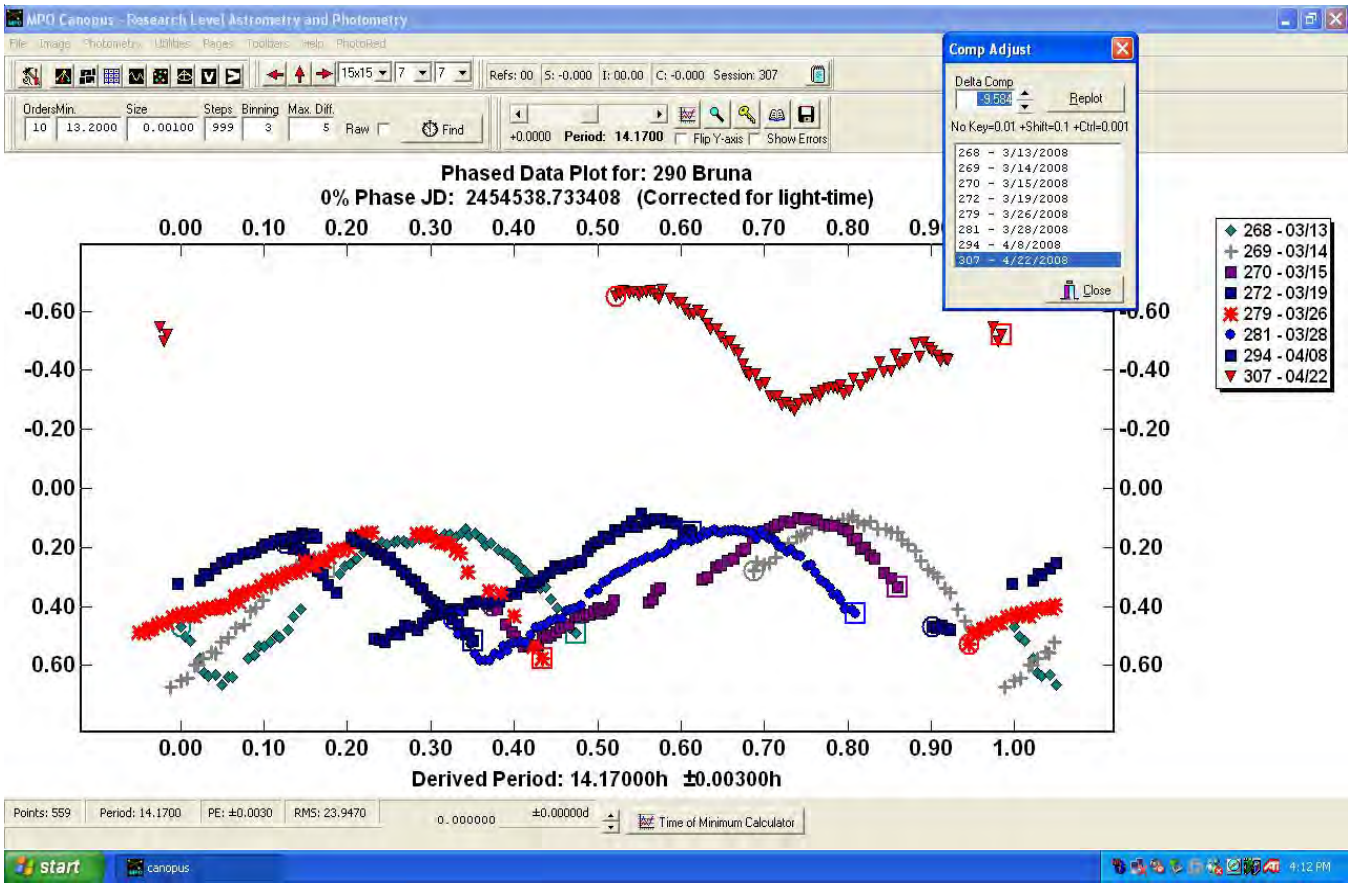


Figure - 10

The differential magnitudes for the most recent run can now be adjusted up or down until they match previous sessions. This is done for the lightcurve in Fig. 11, where the high consistency on all nights shows that the correct period (13.807 hours for 290 Bruna) has been found.

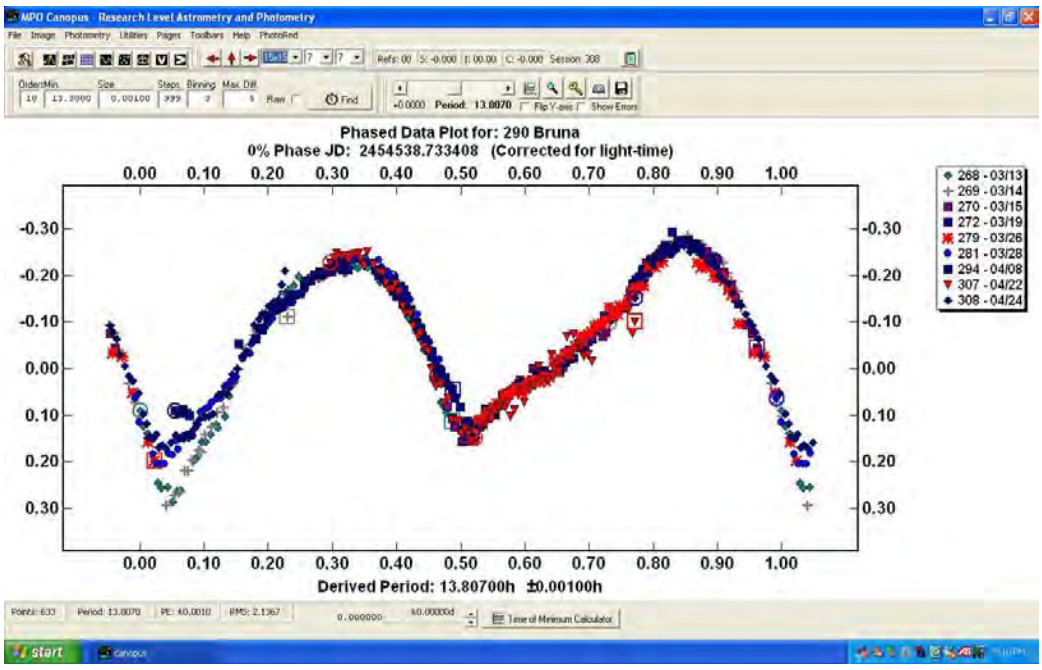


Figure - 11

For the specified range of periods with a stated minimum, total number of periods examined, the difference in hours between trial periods, and the number of terms in a Fourier series, the period spectrum of Fourier coefficent residuals versus the period for each trial period is shown for all sessions for 290 Bruna in Fig. 12. A deep minimum usually represents the correct period. Sometimes more than one deep minimum is found over a wide range of periods, and any one of these might be the correct one. The smallest residual may not represent the correct period. Cleverness of the researcher is now needed to select the most likely period, or recognize that more observations are required to resolve remaining ambiguities.

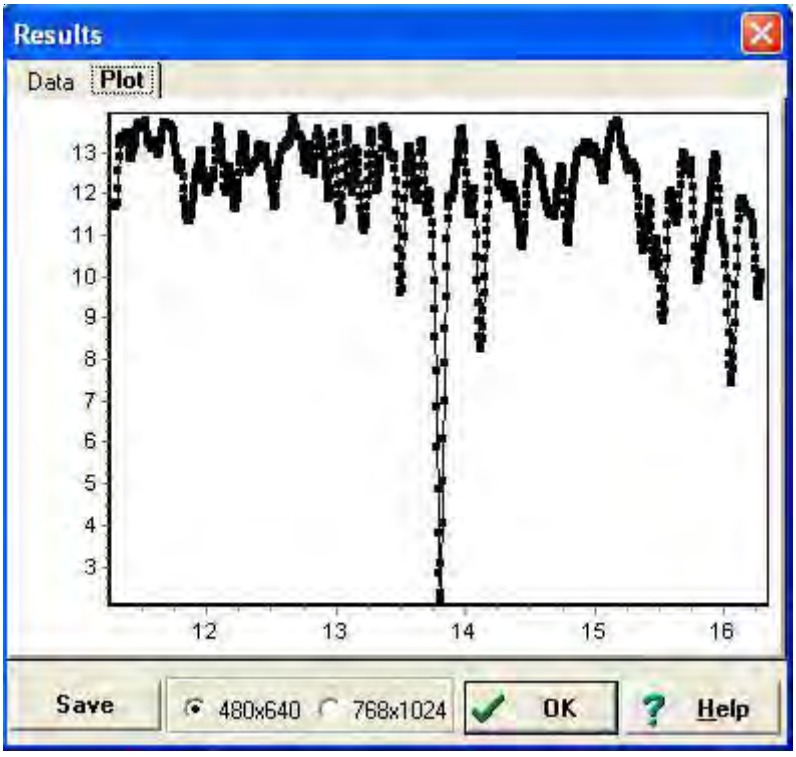


Figure - 12

Looking for Life in All the Wrong Places

Wirt Atmar

"No one would have believed in the last years of the nineteenth century that this world was being watched keenly and closely by intelligences greater than man's and yet as mortal as his own... With infinite complacency men went to and fro over this globe about their little affairs, serene in their assurance of their empire over matter... It is curious to recall some of the mental habits of those departed days. At most terrestrial men fancied there might be other men upon Mars, perhaps inferior to themselves and ready to welcome a missionary enterprise. Yet across the gulf of space, minds that are to our minds as ours are to those of the beasts that perish, intellects vast and cool and unsympathetic, regarded this earth with envious eyes, and slowly and surely drew their plans against us. And early in the twentieth century came the great disillusionment."

– The War of the Worlds*, H. G. Wells*

In H.G. Wells' 1898 book*, The War of the Worlds*, highly evolved beings from Mars attack Earth in order to capture a living, water-filled planet, only to be defeated by Earth's tiniest creatures, the bacteria. *Illustration from a 1906 French edition of the book.*

Water is critical to the existence of life. All known terrestrial life is built on an aqueous chemistry. That isn't a theoretical statement, nor do we have any reason to believe that the statement is an absolute truth. It's just an observed fact.

Nonetheless, water is the *sine qua non* of life on Earth. Where water is absent, life doesn't exist on this planet. But the presence of water isn't sufficient either. There are broad regions of the Earth where life hasn't been able to make a go of it, and the icecaps of Greenland are one of those places.

Chris McKay, an astrobiologist at NASA's Ames Research Center, Mountain View, CA, points out something that would shock any ecologist: "It's often said that life covers everywhere on this planet. It's not true. There are large places on this planet where no life forms have figured out how to make a go of it. The ice environment is one of them."

Is the *a priori* demand for liquid water a good model for life elsewhere? At the moment we don't know. "Follow the water" is NASA's mantra in its exploration of the solar system, in its search for a second genesis of life. It's the most conservative approach we can take, simply because we know it works.

Where liquid water is absent on this planet, life "checks out," and McKay has been exploring three regions of the planet to understand the process: in the dry valleys of Antarctica, in the Atacama desert of Chile, and in the tops of the high tropical mountains in the African rift.

None of these places are perfect analogs of Mars, but they are in many ways similar. Although current evidence suggests that the surface of Mars is inimical to terrestrial life, there remain plausible scenarios for extant microbial life on Mars, but only of very modest plausibility.

The surface of Mars today is far more inhospitable to life than any of these areas on Earth. It's cold, dry, chemically oxidizing and is exposed to an intense flux of solar ultraviolet radiation. Temperature is of interest, not only because of its controlling influence on metabolic rates but also because of its influence on the stability of liquid water.

The core thesis of H.G. Wells' *War of the Worlds* is the same as NASA's: the search for water, albeit in reverse. Wells' Martians didn't need our women, as the 1950s B-movies suggested, but they desperately wanted our water.

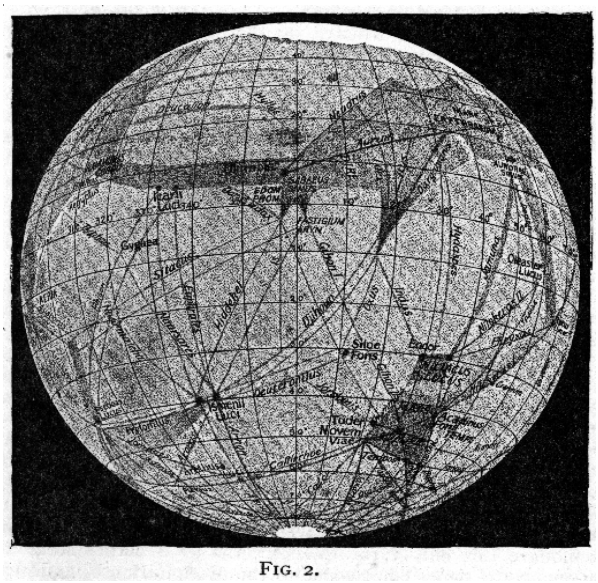


FIG. 2.

The highly architected canals of Mars, designed to transport water from the poles to the warmer equatorial regions, as perceived by Lowell

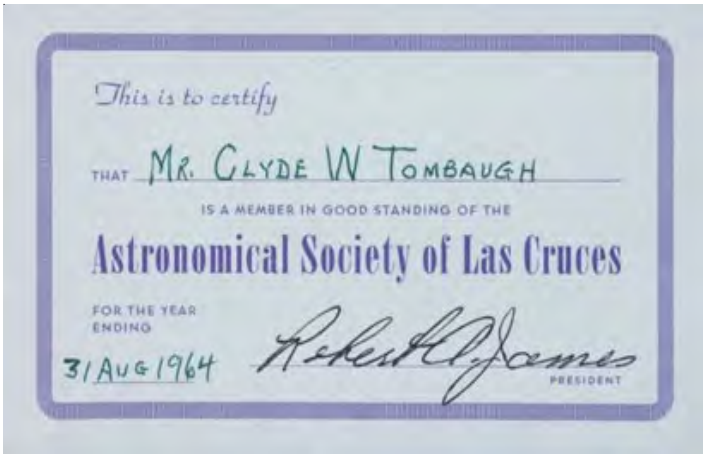
Of interest, Wells' fictional story and the founding of the ASLC are intimately related. The story is well known. In 1877, the Italian astronomer Giovanni Schiaparelli, the director of the Milan Observatory, believed that he had observed long straight features he called *canali* in Italian, meaning "channels," but which was mistranslated into English as "canals."

This mistranslation set off a firestorm in the English-speaking world. The notion of canals immediately implied the engineering characteristic of an advanced civilization trying to stave off its extinction on an increasingly arid planet.

This idea was the basis of Wells' story, but it was also the thought that greatly excited the wealthy Percival Lowell. In 1894, after retiring from his travels in Japan and Korea, Lowell chose Flagstaff, Arizona Territory, as the home of the new observatory he built in order to investigate the idea of an advanced civilization on Mars. At an altitude of over 7000 feet, with few cloudy nights, and far from city lights, Flagstaff was an excellent site for astronomical observations. The observatory he founded on Mars Hill marked the first time an observatory had been deliberately located in a remote, elevated place for optimal seeing.

For the next fifteen years Lowell studied Mars, making intricate drawings of the surface markings as he perceived them. Lowell published his views in three books: *Mars* (1895), *Mars and Its Canals* (1906), and *Mars As the Abode of Life* (1908). With these books, Lowell more than anyone else, popularized the long-held belief that the lines on the surface showed that Mars sustained intelligent life forms.

Lowell passed away on November, 1916 and is buried in a mausoleum on the grounds of the observatory. Although Clyde Tombaugh never met Lowell, their careers were intimately intertwined, as are ours now. Clyde went to work at the Lowell Observatory in January, 1929, as a twenty-three year-old Kansas farm boy, self-taught in astronomy. Based on his demonstrated skill and interest, Tombaugh was hired as an assistant to aid in the search for new planets. He discovered Pluto a mere 13 months later, in February, 1930.


This is to certify
THAT MR. CLYDE W TOMBAUGH
IS A MEMBER IN GOOD STANDING OF THE
Astronomical Society of Las Cruces
FOR THE YEAR ENDING
31 AUG 1964
Robert L. James
PRESIDENT

Clyde Tombaugh's ASLC membership card from 1963. Clearly, the organization was a much more formal affair then, going so far as to issue membership cards.

Following the war, Tombaugh came to Las Cruces in 1946 to work at the newly formed White Sands Proving Ground, and very shortly thereafter, helped found the Astronomical Society of Las Cruces in October, 1951.

The subject of Mars was never very far from Clyde's thoughts. I first met Clyde in 1964, when as a sophomore, I began taking a series of astronomy and earth science classes from him. He was the astronomy department at the time, although the university had no formal recognition of it as such. He began teaching astronomy classes within the Department of Earth Sciences in 1961.

The vision of Mars that Tombaugh advocated in the 1960s has proven to be exquisitely accurate: a cold, arid desert, blanketed with a carbon dioxide atmosphere 1/100th that of Earth's pressure, with no possibility of liquid water on the surface, but with the polar caps composed of both water and carbon dioxide ices. This description has been borne out by the first Mariner mission to Mars in 1967, the Viking Landers in 1976, Pathfinder in 1997, the MER rovers in 2004 and now by the Phoenix Lander this year, which is currently clawing its way through a thin topsoil, reaching a rock-hard layer of water ice in Mars' arctic regions.

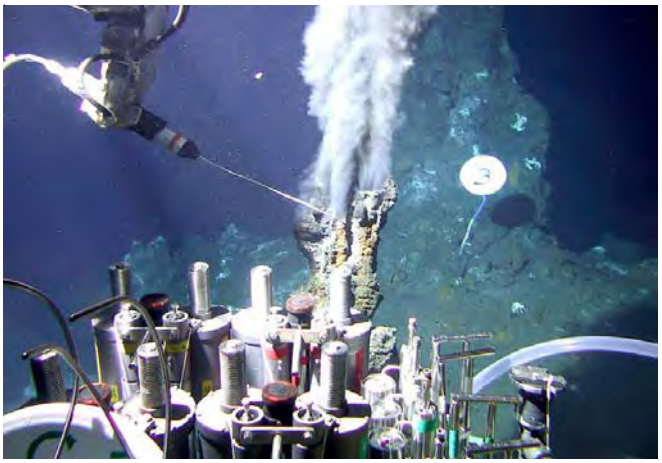
Clyde passed away in 1997, eighty-one years after Lowell. In the hundred plus years since Lowell and Wells spun their stories, Mars has slipped in probability of being the second most likely place to harbor life in this solar system to virtually no probability at all, but none of this would have surprised Clyde. What truly would have surprised him is the thing that has surprised us all: where we think the water is now that could foster a second, independent genesis of life.

In 1977, we made a discovery that astonished every biologist. We found a form of life on this planet that wasn't in any way connected to the light of the Sun. This life could have evolved anywhere. Chemosynthetic ecosystems surrounding deep submarine hydrothermal vents were discovered along the Galapagos Rift by a group of marine geologists studying ocean temperatures. In 1979, biologists returned to the rift and used the *Alvin*, a deep-sea submersible from Woods Hole Oceanographic Institute, to see the hydrothermal vent communities with their own eyes.

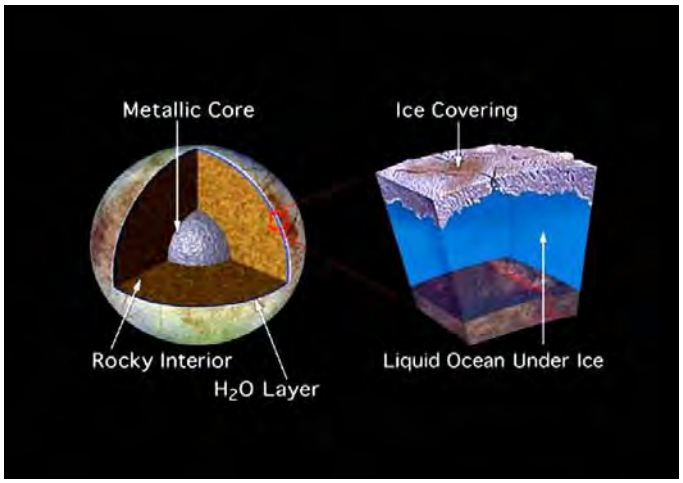
Here was a form of life on this planet that we never knew existed. It was still DNA-based, identical to all other life on Earth, but metabolically distinct and very ancient.

Iron sulphide is pumped out of the hydrothermal vent chimneys at very high temperatures and pressures, forming pyruvic acid, a key constituent that life commonly uses to extract energy from food. Temperatures in the vents can reach 500 C. More importantly, the vents spew out a cocktail of basic chemicals at scorching temperatures under very high pressures.

A good many scientists now believe that the most important ingredients in the formation of all life on Earth are found around these vents.



Deep sea hydrothermal vents occur on the ocean floor near tectonic plate boundaries. The heat and chemical complexity that they pour out may have been the places where life first formed on Earth.



If the "thin crust" of ice model of Europa is correct, then an ocean twice the volume of Earth's ocean exists below an ice covering. Due to the tidal forcings caused by the constant tug of Jupiter and Europa's sister moons, hydrothermal vents almost certainly exist on Europa as well. If so, the probability of an independent, second genesis of life in this solar system is very high.

Gunter Wachtershauser, a prominent origin-of-life researcher, has commented that the new research was another piece of the jigsaw. "It means you don't need an [entire] ocean to create life. All you need is a little water vapor and a lot of volcanic activity."

Contemporaneous with these discoveries, we began sending spacecraft to the giant planets and we found oceans of water, potentially much larger than those of the Earth, that we never knew existed. Beginning first with the Voyager spacecraft, and then later with the Galileo and Cassini missions, we're nearly positive that we've discovered subsurface oceans on Europa, a Galilean moon of Jupiter, and in tiny Enceladus, a moon of Saturn.

Exploring these moons will be a monumental engineering task. Jupiter's radiation environment makes the surface of Europa uninhabitable for any form of life, especially human life. Nor is it an easy regime for machines. But that lethality only exists on the surface of the ice. It's believed that just a very few feet down into the ice, the radiation environment becomes quite benign, and there are miles of ice to go before we would get to the subsurface ocean.

Mars and Venus lost their oceans approximately 3.5 billion years ago, but Earth still retains a significant fraction of its original ocean, and Europa appears to be awash in water. We have no missions currently planned to explore Europa, but there is a great deal of eagerness in the scientific community to do so. Two years ago, Robert Pappalardo, of the University of Colorado, said, "We've spent quite a bit of time and effort trying to understand if Mars was once a habitable environment. Europa today, probably, is a habitable environment. We need to confirm this, but Europa, potentially, has all the ingredients for life – and not just four billion years ago – but today."

ASLC 2008 Election Ballot

Please vote for the candidate of your choice by checking the box for the candidate. If you are voting for a write-in candidate, check the appropriate box and print the name of the member for which you are voting.

President (vote for one):

o Jerry Gaber

o _____ (write-in)

Vice President (vote for one):

o Kirby Benson

o_____(write-in)

Secretary (vote for one):

o John McCullough

o _____ (write-in)

Treasurer (vote for one):

o Janet Stevens

o _____ (write-in)

Director-at-Large (vote for two):

o Wes Baker

o George Hatfield

o _____ (write-in)

You may mail your completed ballot to ASLC, PO Box 921, Las Cruces, NM 88004 or it can be brought to the November meeting. Please note that the ballot must be received by the November 21, 2008 meeting. Mailed ballots or those brought to the meeting by another member must have a return address on the envelope so that the membership of the voter in the Society can be verified.

ASLC at the 2008 Renissance Faire!

A message from former ASLC member Richard Jones

Hello to all my friends there in Las Cruces. I have about completed my move to Colorado. My new location is 21 Mountain Shadows Ct, Castle Rock, CO 80104. I am about as close to Castle Rock as you can get. I sit at my kitchen table and the view of CasTle Rock fills my French doors that go out to the patio. From the living room there is a great view of the Front Range and from the front porch a view of Pikes Peak.

I haven't discovered an astronomy club here, the closest ones being Denver or Colorado Springs. Those are both farther that I want to drive to. I am considering starting a club here. I have done two moon-gazes an found about 4 other people interested and there are others rumored to be around. I plan to put something in the local paper to see what it stirs up. The skies here in town are a little better than in town in Las Cruces, the skies out of town about 5 miles are not as good as Upham, but as good as Leasburg.

My e-mail address is rcj@jones-ranch.net and my home phone is 720-381-6515.
I hope to keep in touch and will read the HDO to see what ASLC is up to.

ASTRONOMICAL SOCIETY of Las Cruces
PO Box 921
Las Cruces, NM 88004

ASLC - Sharing the Universe
With Our Community
for Over 50 Years