British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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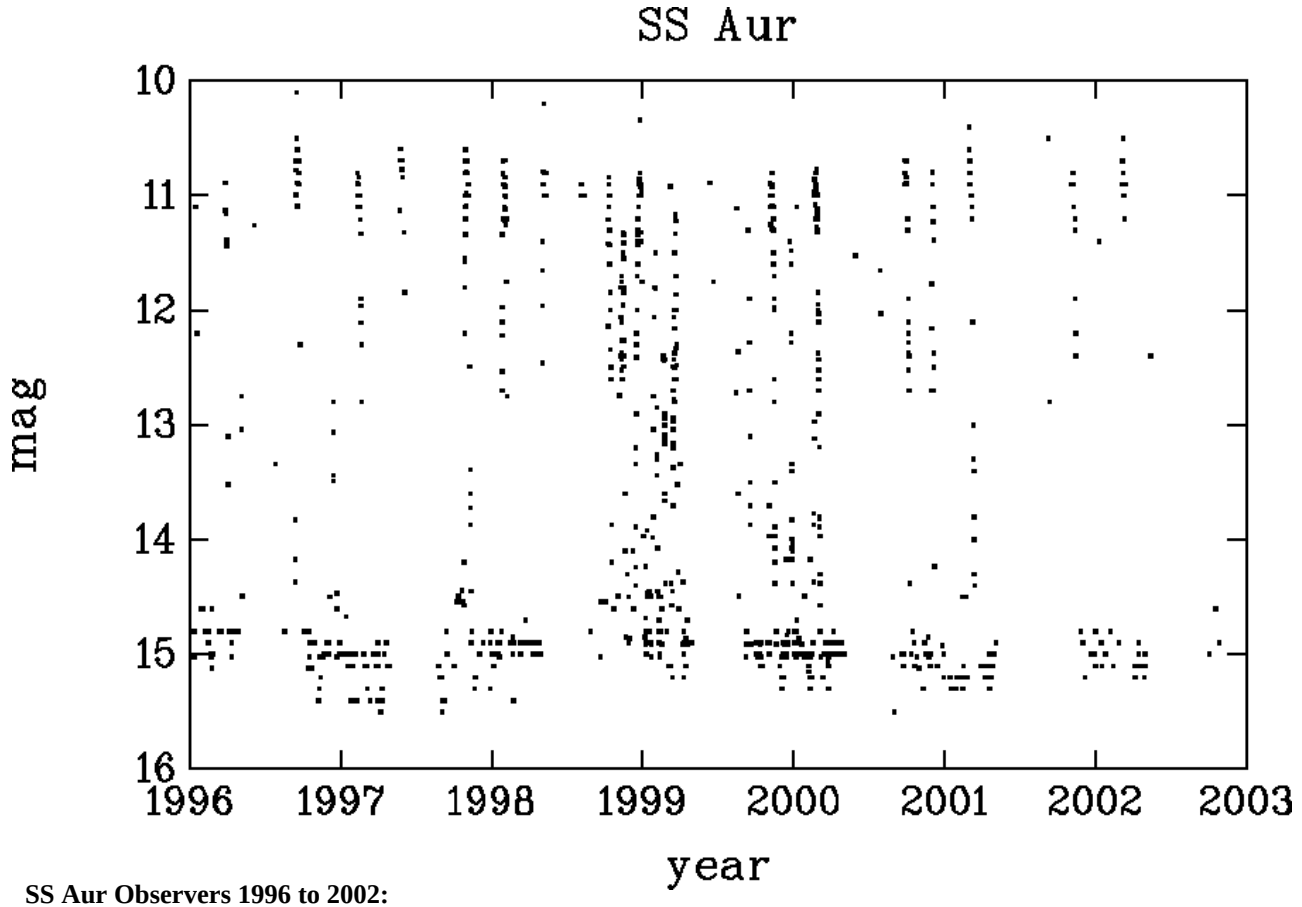


SS Aur Observers 1996 to 2002:
S W Albrighton, A J Johnston, K G Andersson, B H Granslo, S M Brincat, C P Jones, D Gill, E Muyllaert, M J Gainsford, M Glennon, H W McGee, W J Worraker, J Greaves, Miroslav Komorous, M Gill , R D Pickard, R A H Paterson, R J Bouma, R K Hunt, G W Salmon, Steve Johnston, J D Shanklin, Luca Talamoni , J Toone, Vince Tuboly, M Westlund, G Poyner, D Pinnion

FROM THE DIRECTOR

ROGER PICKARD

I have received a number of reports from various sources over the last couple of months or so, of unusual activity in some well known stars (stars brighter or fainter than usual, for example). Could I make a plea for anyone who notices unusual activity to notify me without delay (preferably via email). If this behaviour is then confirmed, I may put out a general alert via the BAA Electronic Mailing Service. Regarding this service, I do hope that all BAA Members who have the capability of receiving emails subscribe to it. There may not be too many Variable Star alerts at present, but it is a very quick way of informing a large number of people of news. If you are not already a subscriber, details can be found at: **http://www.britastro.org/info/**

I'm sure, like me, that many observers have experienced poor observing conditions over recent months and particularly during December. It is especially important therefore during such times that every effort is made to observe whenever possible. Please try to make use of those gaps in the clouds, your observations are important!

It is with regret that I announce that Peter Moreton has advised me that due to work commitments he feels he must stand down as the Section's webmaster. Thank you Peter for taking over at a difficult time following Dave McAdam's retirement from the position.

The Section, therefore, needs a replacement for Peter with some urgency and I would ask anyone who has some experience in the area of web page design and maintenance and feels that they could take on this task to contact me at their earliest opportunity.

UY CEN - A RECOVERY?

JOHN TOONE

In VSS Circular No 112, I reported on the unusual fade of the southern red variable **UY Cen** detected by Colin Henshaw. For many years it ranged between magnitudes 7.6 and 8.0, but in 2002 it was found to be at magnitude 10.0. The latest observations reported by Peter Williams from Australia indicate the start of a recovery as follows:

4 Jan 2003 9.7
8 Jan 2003 9.6
25 Jan 2003 8.9

All our observers with access to southern skies are urged to follow UY Cen throughout the forthcoming apparition. We need to ascertain if it achieves a full recovery and the rate of rise recorded will help to determine if it is an eclipsing system or an obscuration event.

A LITTLE BACKGROUND ON UY CEN

TOM LLOYD-EVANS

The GCVS indicates a period of 114.6 days for UY Cen, and a light range of B = 9.2-11.2, which for a star with B-V = 2.0 approximately means that V = 7.2-9.2. Thus UY Cen has been outside its normal range for the last year, at V=9.2-10.0.

More observations by Albert Jones over the last year indicate that, after the fading early last year, it brightened to about 9.2, and then faded again, so it is recovering from the second fading now.

Semiregular variables do sometimes vary in two modes alternately, with a period ratio of about two (Albert Jones' observations could be consistent with a period of about 200 days), but then one might expect the mean magnitude to stay relatively unchanged. UY Cen varied by only 0.2 magnitudes in J, H, K and L during the late 1970s when it was observed many times by the infrared group at SAAO (the South African Astronomical Observatory). It had faded by 0.8 magnitudes in J and 0.4 magnitudes in L when it was observed by Tom Lloyd Evans during a visit to SAAO in the second half of March 2002, when the visual fading was underway.

This fading and reddening in the IR colours concurrently with the visual fading does not fit well with an eclipse model, or with a changed pulsation mode, but is more consistent with a dust-induced fading such as has been seen in several carbon stars. An analogy with the spectral changes seen in V Hya and R Lep while they were exceptionally faint, suggested that emission might be seen in resonance lines such as the D lines of sodium, but spectra taken a few weeks after the IR observations by Tom Williams (SAAO) did not show this.

However, the fading is much shallower than for the two carbon stars, and it is not clear that this effect should necessarily be expected. There is no previous indication that the star is in a binary system, and it is difficult to obtain a deep eclipse when most of the light is contributed by a large giant star such as UY Cen, while the double fading is especially hard to account for. However it should be mentioned that the deep minima of V Hya are often complex, and that this star almost certainly has a companion with an accretion disc, so eclipses by a diffuse companion (presumably a star with a dusty circumstellar shell or disc) could be the explanation. Detailed observations of such events in a number of stars are required.

OBSERVATIONS OF UY CEN

ALBERT JONES

I was unaware that there was anything special about this star, until I heard from Peter Williams in Australia; he passed on the information that Colin Henshaw had recorded it at 10th magnitude on 2002 February 7. I then prepared a chart and started monitoring it on JD 2452359. My telescope is the 12.5-inch Newtonian that I constructed in 1948 February (yes it was that long ago!). It has two finders which I use for bright variables and comets; one is 45mm diameter and the other 78mm. The mounting is simple, no drives, no setting circles and objects are located by the old fashioned *star-hopping* way, and UY Cen is located by star-hopping from Omega Centauri . My observations follow opposite:

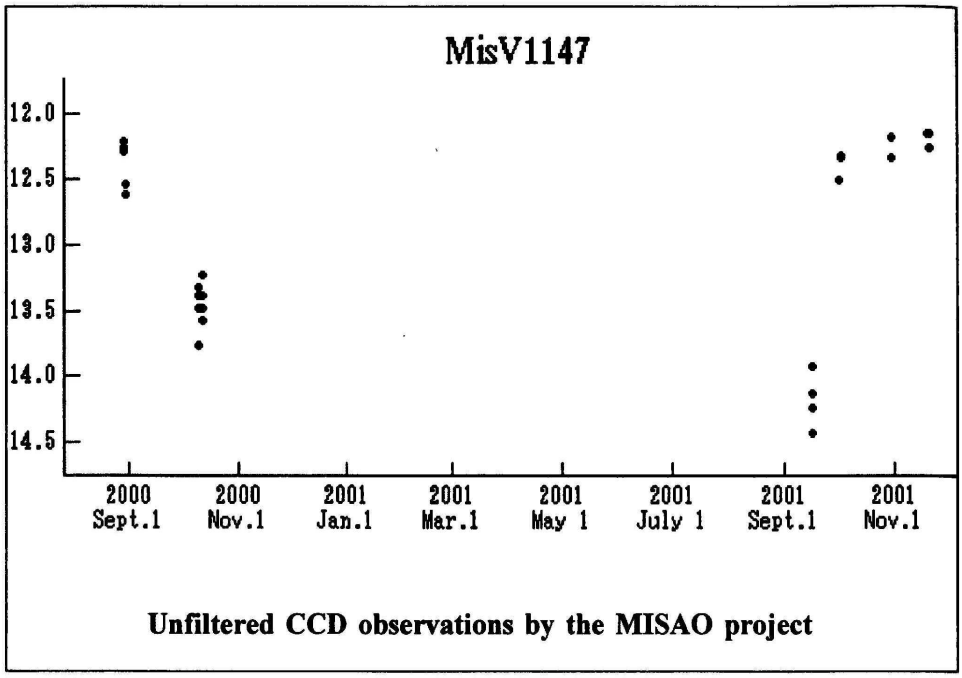
Day	Mag	Day	Mag	Day	Mag
2452359.2076	9.6011	2452531.8278	9.2011	2452663.1361	9.4011
2452360.1424	9.7011	2452545.8264	9.2011	2452668.1271	9.3011
2452368.2278	9.7011	2452549.8389	9.3011	2452669.9743	9.2011
2452369.1958	9.7011	2452556.8514	9.5022L	2452673.1090	8.9011
2452371.2194	9.7011	2452590.1251	9.3011	2452675.9708	9.3011
2452378.9285	9.6011	2452609.1222	9.9011	2452677.9396	9.6011
2452411.8785	9.6011	2452618.0868	10.0011	2452679.1361	8.8011
2452427.9688	9.9011	2452620.1139	9.9011	2452680.1257	8.7011
2452431.9333	9.9011	2452623.1299	10.0011	2452673.1090	8.9011
2452495.8965	9.2011	2452625.0979	10.1011	2452675.9708	9.3011
2452505.8715	9.4011	2452628.1257	10.0011	2452677.9396	9.6011
2452512.8361	9.3011	2452635.0979	9.8011	2452679.1361	8.8011
2452516.8451	9.3011	2452655.1000	9.8011	2452680.1257	8.7011
2452523.8486	9.2011	2452660.9743	9.3011		

The two digits following the magnitude and the sky conditions are 1 for good, 2 for fair and 3 for poor; the next digit gives the quality of the estimate again from 1 to 3; the letter *L* signifies that the star field was low in the sky.

MISV1147 - A NEW ADDITION TO THE TELESCOPIC PROGRAMME

GARY POYNER

MisV1147 is a recent discovery made by Nobuo Ohkura, Okayama Japan in October 2001 using an unfiltered CCD. The Mis designation derives from the MISAO (Multitudinous Image-based Sky Survey and Accumulative Observations) project for new variable stars (see **http://www.aerith.net/misao/report/seiichi/comet_conf_27/report/node6.html** for details of this project). The star was imaged at magnitude 13.4 in 2000, and had brightened to 12.3 by 2001. The variability was detected by the PIXY system 2. A catalogue search by Seiichi Yoshida resulted in the object being included in the HBHA catalogue (Hamburg-Bergedorf H-alpha stars in the Northern Milky Way) as HBHA 65-63. This catalogue contains stars bright in H-alpha light. Further searches of images by members of the MISAO project revealed that MisV1147 had been imaged many times, and showed a large amplitude in variation. An announcement on VSNET resulted in coverage of this new variable by Pavol Dubvosky, Gary Poyner, Mike Poxon, Mike Simonsen, Rob Stine and others, with Simonsen eventually producing a finder chart with photometry by Arne Henden. The observed visual magnitude range is 12.8-16.2 (see light curves below and overleaf, derived from VSNET observations), and a spectrum of the object was secured by Kenzo Kinugasa, Gunma Astronomical Observatory on January 13th 2002.



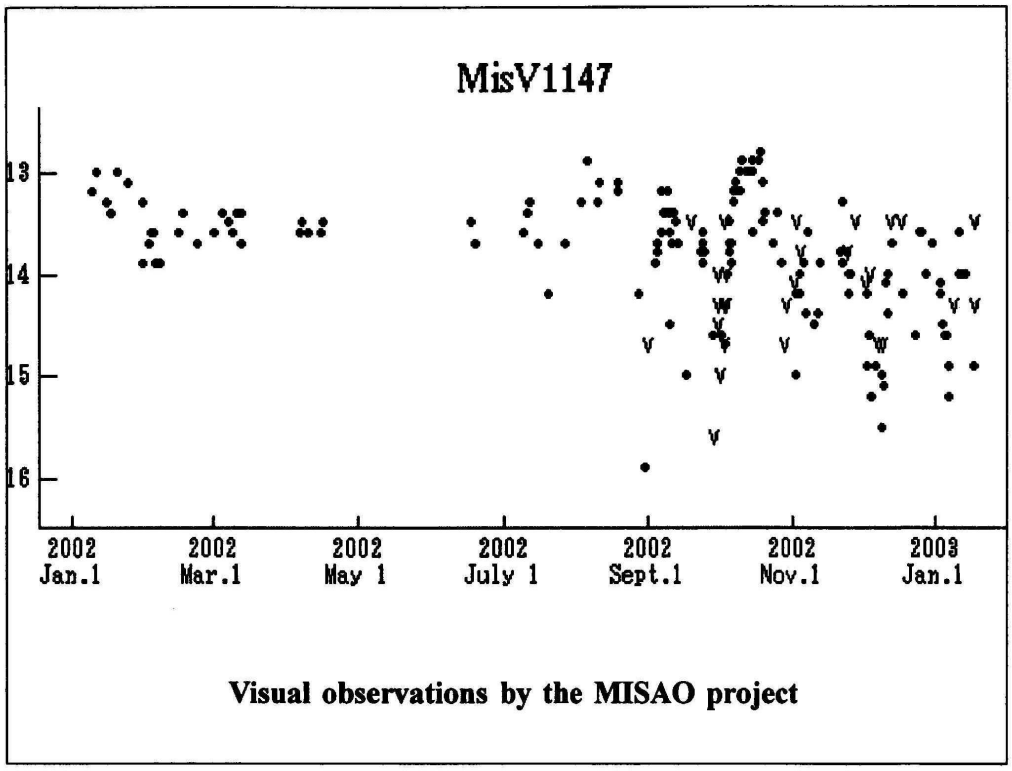
Unfiltered CCD observations by the MISAO project

The star remained around magnitude 13.5 from January 2002 until July 2002 when Simonsen recorded a fade to 14.2 on July 20. By August 3rd, it had recovered to 13.3. Dubovsky had been observing it on July 16th and 26th, but did not catch the fade. A second fade was again observed by Simonsen on August 28th, and this was confirmed by Poxon, who recorded it at visual magnitude 15.9 on August 30th. The star recovered to 14.7 by August 31st, and was back to 13th magnitude by September 3rd. By this time, the behavior of the star seems to have changed, showing frequent fades with variations being observed in the bright *normal* state. In October 2002, Chris Lloyd and Taichi Kato suggested that a rough period of 32 days might be present, and that MisV1147 might indeed be a binary system. This active period resulted in more observers joining the *monitoring team* and reporting to VSNET. After looking at the resulting visual, CCD and spectral data since discovery, it has been concluded that MisV1147 is a young stellar object of Herbig Ae/Be type. It has been included in the ISA group because the variation is irregular; nebulosity is absent; it displays 0.5 magnitude or 1.0 magnitude variations in a short time - hours or days; and it is known to be a Herbig Ae/Be object.

MisV1147 can be found in the constellation of Cepheus, at the following position 22h 54m 03s.78 +58d54'02".1 (2000). A BAAVSS format chart will soon be available.

The full story of MisV1147 compiled by Seiichi Yoshida (from which information for this article has been used) can be found at **http://www.aerith.net/misao/variable/MisV1147.html**

Illustrations and information on MisV1147 appear here with kind permission of Seiichi Yoshida.



PERIODS FOR SEMI-REGULAR VARIABLES (A CCD TARGET LIST PROJECT)

ALBERT A. ZIJLSTRA AND T. R. BEDDING

Mira variables are amongst the most spectacular variable stars known. Mira itself varies between 3rd and 9th magnitude on average, and occasionally can even reach a magnitude fainter or brighter. At maximum, Mira is about 1000 times brighter than at minimum; this is not far short of the increase in brightness that is shown by a supernova! And whereas a supernova only explodes once, Mira has been doing this every year since at least 1586, the year of its discovery. Unlike supernovae, though, its extreme behaviour is limited to the visible light range. At infrared wavelengths, where most of the energy comes out, the variations are very much smaller.

The extreme Mira pulsations cause the outer layers of the star to expand, and to finally be lost from the star. The ejected gas will later form a planetary nebula. The star will quickly lose almost all of its remaining hydrogen. The evolution from Mira to White Dwarf is still not fully understood, but there is little doubt that the transition is very fast.

The evolution *before* the Mira phase is far less clear. The immediate Mira progenitors are generally believed to be found among the Semi-regular variables. These variables show some overlap in properties with Miras, e.g., in the range of periods and spectral types, but show much smaller amplitudes, and less regular periods. Semi-regulars have, however, been much less studied than Miras. It may not be a uniform group, perhaps containing both pre-Mira stars and stars relating to a slightly earlier phase of stellar evolution.

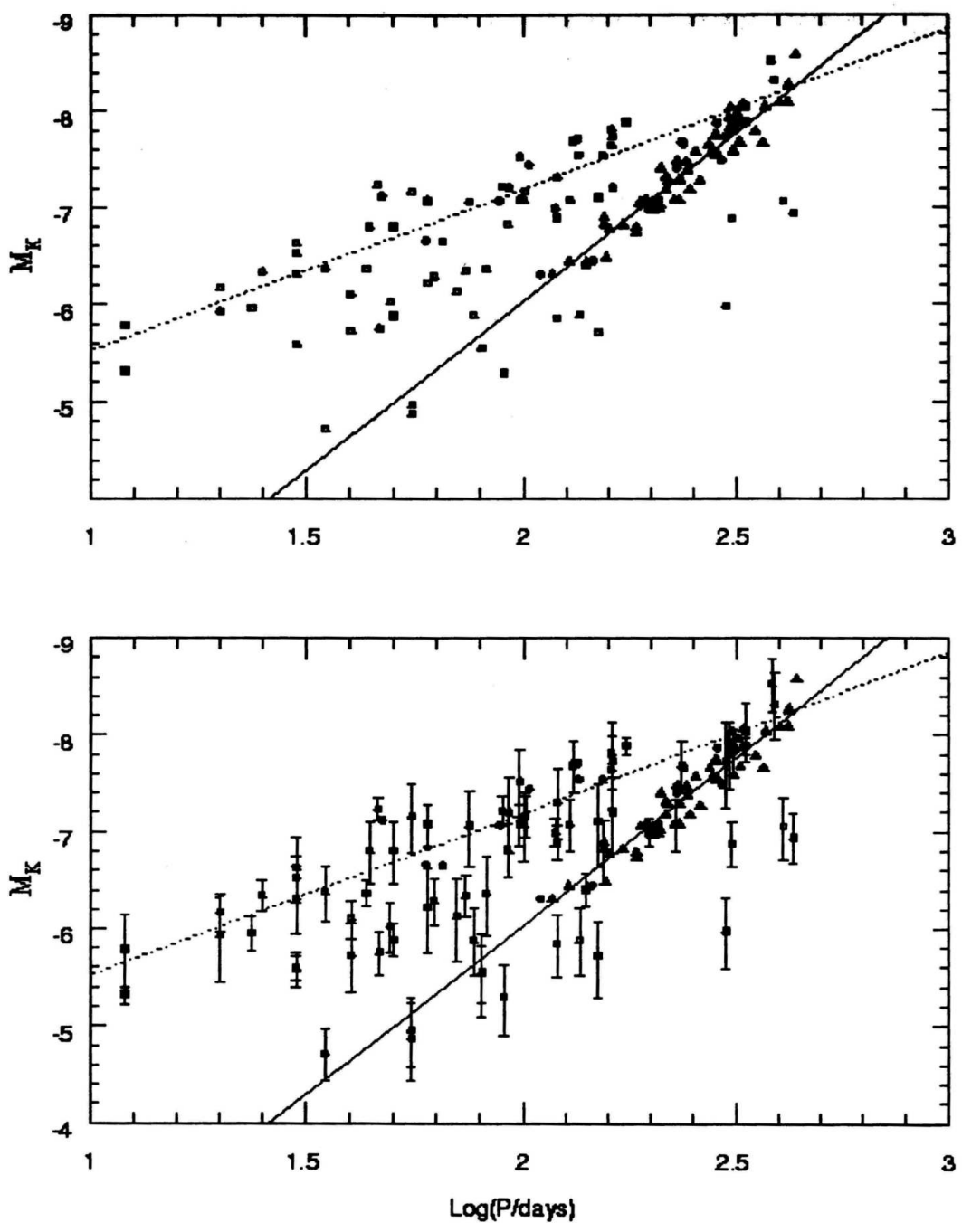
A possible connection between Miras and Semi-regular variables is shown by their period-luminosity relation. The figure opposite shows this P-L relationship for stars in the Large Magellanic Cloud (filled symbols), and for Galactic stars with good Hipparcos distances (open symbols). The two panels show the same stars, with the lower panel adding error bars, determined from the uncertainty on the distance. The solid line shows the LMC Mira P-L relationship. The dashed line, the so-called Whitelock track, shows the expected evolutionary sequence: stars evolve along this line (or parallel to it) until they reach the Mira P-L relation, at which time the Mira pulsations develop. Many Hipparcos variables can be seen to cluster around the Whitelock track, and these are the stars most likely to be Mira progenitors. There is an indication of a third sequence in between the P-L relation and the Whitelock track. The interpretation, or even the reality, of this intermediate track is not clear from the present data. The stars on this third way tend to have very uncertain periods.

In fact, many of the semi-regulars have poorly determined, or even unknown, periods. Most Mira periods have been measured from amateur light curves, but the amplitudes of semi-regulars are rather small for eye-estimates. However, CCD observations allows one to measure much smaller variations, and it may now be possible to obtain periods for semi-regulars.

The periods of semi -regulars are expected to be in the range 30 to 100 days. Fairly frequent observations would be required. The stars are not as red as Mira variables, so that photometric colour corrections are not as uncertain. It is still important to make use of filters, if observations from different observers are to be mixed. The filters may also help to avoid saturation since many of these stars are rather bright. If they are too bright, a blue filter could be used.

There are about 25 semi-regular variables with good Hipparcos parallaxes but no known or poorly known periods. Of these, the following three are probably the best ones for trial runs: VZ Cam, CO UMa, AT Dra. VZ Cam has a reported (but unconfirmed) period of 23.7 days; the others have no known period. VZ Cam has V-band magnitude of 4.8, CO UMa of 5.8 and AT Dra 6.8. (The latter two are classified as ‘Lb’ rather than ‘SR’ in the GCVS, but this just reflects the fact that no period has yet been measured). To obtain definite periods will require frequent observations which may be difficult for a single observer. However, at this stage trial observations to determine the amplitude and adequate comparison stars would be very useful. If very short exposures are required, care should be taken to average out atmospheric scintillations by taking several individual observations.

Figure opposite: The log of the period versus the absolute K-band magnitude for Mira and Semi-regular variables in the LMC (filled symbols) and for Galactic stars with accurate Hipparchos distances (open symbols). The lower panel includes error bars corresponding to the uncertainty in distance. Uncertainty in periods is not shown. The solid line represents the Mira period-luminosity relationship derived from the LMC stars. The dashed line shows the evolutionary sequence determined by Whitelock from a study of globular cluster variables, shifted up by 0.8 magnitudes.


-9
-8
-7
-6
-5
M_K
1
1.5
2
2.5
3
-9
-8
-7
-6
-5
-4
M_K
1
1.5
2
2.5
3
Log(P/days)

L414: A NEW RED VARIABLE STAR IN M13

VIOLAT BORDONAU, FRANCISCO[1, 2, 3]; BENNASAR ANDREU, TONI[2, 3, 4]

(1) Observatorio Astronomico de Caceres: fviolat@yahoo.es
(2) Asociacion de Variabilistas de Espana
(3) Asesores Astronomicos Cacerenos
(4) Observatori "Ca Nostra": tonib@espanet.net

Abstract

We have measured, over a period of 129 days (JD 52076-52204) in 2001, and 189 days (JD 52408-52596) in 2002, the magnitude of the red giant star No 414 in Ludendorff's catalogue, in M13 (Arp III-56). This star is at R.A.= 16h 41m 38s.71 DEC.= +36° 26' 38".0 (Equinox J2000) We measured it using a CCD camera and both 30.5 and 20.3 cm telescopes from Spain. The analysis of 351 CCD images shows that L414 is a new red variable star with a period of approximately 115 days and low amplitude (nearly 0.14 magnitudes).

The Project

In the summer of 2000, we initiated a study of the globular cluster M13 in order to locate and measure all its variable and suspected variable stars; after producing a CCD chart that identified the variables, suspected variables and comparison stars (in May, 2001) we began to obtain digital images of the cluster using catadioptric telescopes of 20.3 and 30.5 cm (f/10) located in Spain, Caceres (Observatorio Astronomico de Caceres) and Palma de Mallorca (Observatorio "Ca Nostra"), respectively. Both observatories were equipped with Starlight Xpress CCD cameras: an MX5 was used at Caceres observatory, and an MX916 CCD camera was used at Mallorca Observatory. V filters were used, although no tranformations were made to a standard system. The CCD images were reduced using IRIS software, and periodogram analysis was performed using Bloomfield's algorithm using AVE software.

Over a period of 129 days between JD 52076 and JD52204 (in 2001), and 189 days between JD 52408 and 52596 (in 2002), we measured the magnitude of star number 414 in Ludendorff's catalogue (or III-56 in Arp's paper). We pursued this measurement following a private communication with Dr Osborn, from the University of Central Michigan, in which he commented on the possibility of variability in this star. This star is a physical member of the cluster, according to its radial velocity, proper motion and position in the HR diagram; it lies at the tip of the AGB in a colour-magnitude diagram (Cudworth and Monet, 1979). Popper (1947) classified L414 as of G8Ib spectral type.

As comparison stars we used two non-variable stars that Osborn also used as comparison stars: these stars were of magnitude 12.21^{1}V (L199) and 12.81^{1}V (L169); a third non-variable star (12.83^{1} - L353) was used as a reference star to measure the standard deviation of the measurements (0.005-0.014 magnitudes in the V band).

The photometry was obtained from the images using IRIS software. This is astronomical image processing software that was developed by the French amateur astronomer Christian Buil, and is available on his webpage **(www.astrosurf.com/buil/us/iris/iris.htm)**.

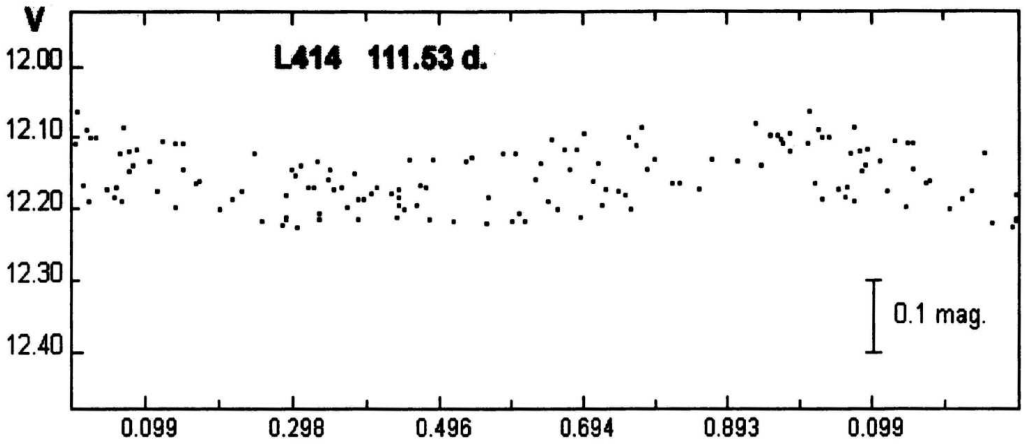


Figure 1: V light curve of L414

Table 1 gives basic data for the star: column 1 gives the stellar identification, column 2 and 3 the position (2000.0), column 4 gives the magnitude V, column 5 gives the color index B-V (from Osborn's paper, June 2000), column 6 gives the bolometric magnitude (from Shetrone's paper, 1994) and column 7 gives this effective temperature (from Kraft et al., 1992):

Name	R.A.	Dec.	Mag. V	B-V	Mbol	Teff
L414	16h 41m 38s.71	+36° 26' 38".0	12.15	1.45	-2.99	4100° K

Table 1. Star L414 in M13 (Cl 1639-365)

All observations in 2001 were taken with a CCD camera (Starlight Xpress). The measurements were made without a V filter, but the spectral response of the unfiltered chip is believed to be near to that of the standard system. All observations in 2002 were taken with a Johnson V-band filter. The exposure time was 15s without the filter, and 30s with the filter. The plate scale of the CCD images is near to 1.3"/ pixel. The average standard deviation of the CCD measurements of the reference stars (L199: 12.21V, L169: 12.81V and L353: 12.83V) are 0.005-0.014 magnitudes in the V band.

The analysis of 351 CCD images using the IRIS software for the photometric reduction and the AVE periodogram and light curve analysis software has shown that L414 is a new variable, red giant star; from its B-V index and V magnitude, we can see that this star lies on the red giant branch in the HR diagram. We identified a period of 115.5 days with an amplitude of 0.14+/-0.014 magnitudes. The median V magnitude is 12.15[1]. The light curve of L414 is shown in Figure 1, and the periodogram of L414 is shown in Figure 2. A search was made for the most probable period in the range 1-200 days, with Bloomfield's algorithm using AVE software, and a period of 115.5 days resulted.

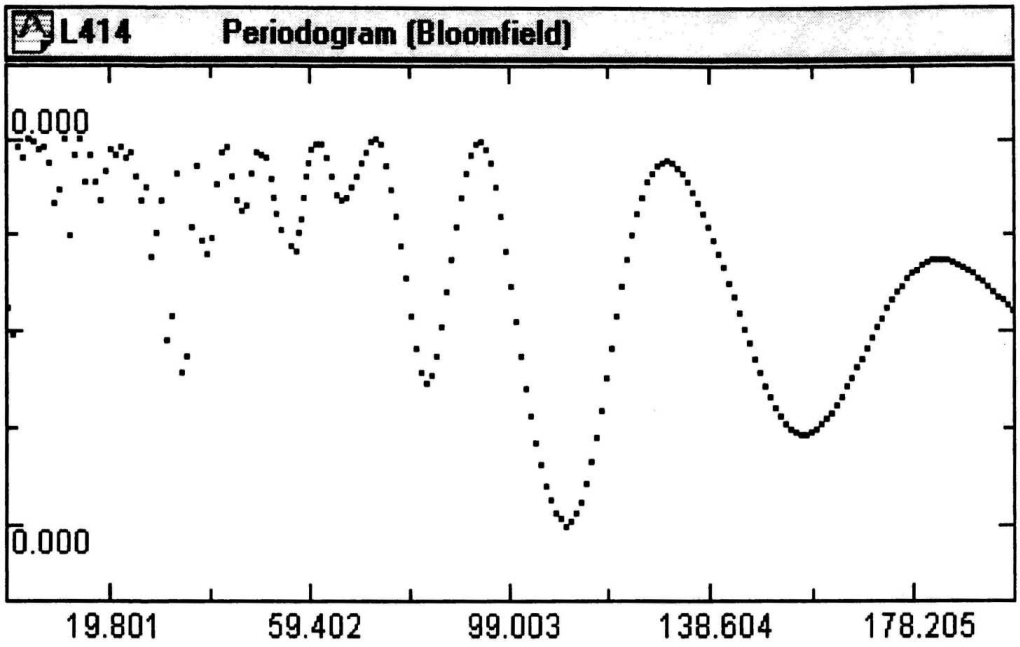


Figure 2: Periodogram for L414

Further notes on this system

L414 was announced as a new variable in Russev's papers (1973). However, in 1974 Osborn could not detect any variability and concluded that L414 was non-variable. In 1977, he found a variation in his observations of slightly larger than that of the reference stars, and proposed a period of 105 days with a B amplitude of 0.26 magnitudes.

Welty (1985) could not see any variability in L414, because its small amplitude was below his B band detection limit of 0.2 magnitudes. From radial velocity measurements Lupton et al (1987), asumed that L414 (and other 5 stars) were really variable stars. Shetrone (1994) found significant variations in the spectral variations in star L414 (over 337 days) and in another 5 stars, which might reflect long-term variability. Osborn (2000) finally concluded that L414 was probably a variable star. From our data we can see that L414 really is a new red variable star (SRd) of long period (115.5 days) and low-amplitude (only 0.14 magnitudes). This agrees with Welty's results (low amplitude B<0.2 magnitudes), and also supports Osborn's results (1977) of a low amplitude and a long period (near 105 days).

This data may be made available upon request from fviolat@yahoo.es

Acknowledgements

The authors would like to thank Dr Wayne Osborn (Central Michigan University) for his expert assistance and advice, and Josep M Gomez (Grupo de Estudios Astronomicos), for his comments. The photometric reduction was carried out using Christian Buil's IRIS software. The time-series analysis of the data was been carried out using Rafael's Barbera software AVE, of the GEA (Grupo de Estudios Astronomicos).

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SUMMARY OF THE SECOND MEETING OF THE CCD DATABASE WORKING PARTY HELD ON 2003 JANUARY 04 AT THE ST. BRIDE INSTITUTE, LONDON

KAREN HOLLAND

For this meeting, which preceeded the BAA Christmas meeting, David Boyd, Karen Holland, Richard Miles, Roger Pickard and Andrew Wilson attended. Apologies for absence were received from Peter Moreton

CCD target list

Following the publication of articles in the circulars, Tonny Vanmunster of the CBA in Belgium had provided some useful comments and feedback regarding the CCD target list and database plans; Tonny's comments were very supportive of the work being undertaken by the group, and provided useful feedback. Tonny agreed to continue to monitor the work of the group; given his valuable experience working with the CBA it was felt that this input would be very welcome, and it was agreed that he would be sent minutes of all meetings. It was also agreed that it would be useful to seek some professional guidance at this early stage, and both Tim Naylor and Peter Wheatley were contacted to see if they would be happy to comment on the work and direction of the group.

CCD Chart development

Roger reported that Arne Henden had a great deal of the information that was required to produce the necessary sequences for the production of charts; the difficulty arose with the three charts on the CCD target list, for which there was currently no data; these are the three bright stars on Albert Zijlstra's list, as Arne does not measure stars that are this bright. It would be necessary to ask for assistance on these difficult stars: there was a possibility that Arne might measure these stars if asked, in order to obtain the essential colour indices, or the stars might be measured by the Liverpool Telescope, or the SAAO as an alternative. Work would continue to complete the target list sequence data available.

Richard presented an example CCD chart to demonstrate the format that might be used, and this was discussed. It was agreed that NSV stars that had subsequently been shown to be non-variable might be used as comparison stars. Comparison stars would be referred to by their GSC number on the chart, and the HD number would also be included wherever possible.

It was noted that, for some projects, in which the target might be acquired either by a CCD camera with a camera lens, or by a telescope with a CCD camera attached, it would be necessary to produce two charts, in which the two very different fields of view were accommodated.

Definition of Standard suggested names for Flats/Darks/Bias/Target frames

There was some discussion about the possibility of including observer code, target name and date in the file name, but it was agreed that, for the current time, as several CCD camera drive software packages did not permit the user to choose an image name, that it would be best not to specify preferred frame names, but to leave this to the observer to define. This would be reviewed in the future.

Standard Fits headers

Karen explained that she had been forwarded a copy of the TASS standard format FITS header by Tom Droege, and she was going to combine this data with a FITS header taken from some professionally obtained images that she had, in order to come up with a comprehensive set of possible headers that observers could choose to use. From the comprehensive list, a bare minimum set of headers would be defined, that would be required when reporting data to the BAA . Professional advice would be sought regarding this issue

Investigation of feasibility of offering software to enable writing information to FITS headers

It was agreed that adding information to a header some time after the image had been taken would give great opportunity for making mistakes, except where all headers were globally automatically changed if they were initially written in the correct format. In this case, it was advisable to avoid post-writing wherever possible. It was agreed that the best option was to encourage CCD camera manufacturers to provide the necessary .exe file to modify headers. It was noted that AIP4Win had contacted Terry to see if it would be possible to arrange for his cameras to write information into a standard FITS header. It was agreed that now was an excellent time to contact him on this matter, so that our standard required headers could be included .

Observing log development and future development of Software to facilitate processing of individual logs to produce a centralized log

The observing log that had been produced so far had 3 main purposes:

* It ensured that we recorded all essential data
* It gave feedback on the quality of data, and provided the opportunity to do something if there was a problem
* And it turned the data into a reporting format

Richard outlined the current position of the observing template written as an Excel workbook, and suggested that it would need to be pruned right back to a more basic form for the beginner. Two more spreadsheets would provide for the more advanced user who wanted to record multifilter observations, and for discrete observations for observers who wanted to monitor several variables over a night. The spreadsheets would all have the facility to calculate the atmospheric extinction and to do filter transformation calculations if required.

Once these three prototype observing logs had been prepared, then the design would be temporarily fixed, and they would be offered to users. During the initial period of use, feedback on their design would be encouraged, and a Mark II version could be produced if necessary.

Andrew Wilson agreed to write some Visual Basic code that would allow the automatic preparation of the reporting format, and he would also start to consider how the central archive of reduced data could be organized, and would prepare some recommendations for the next meeting. He agreed that he would be willing to archive CCD data in the early days, whilst the prototype archive was being developed.

Development of a Reporting Standard Format

Karen agreed to pass the current reporting standard format, past Tim Naylor and Pete Wheatley, for comments.

Quality Control of Data

Whilst no data should be discarded, it was agreed that it was very important that we develop a reputation for providing reliably reduced results that were of high quality, and to this end it was agreed that it was desirable to prepare a Verification Scheme for the purpose of assisting new observers to ensure that they are collecting good data from their equipment and reducing it satisfactorily. Richard agreed that he would look for test target fields, (say 4 targets distributed in RA to cover a year) on which new observers would be able to test their equipment. This would provide a good opportunity for new observers to make contact with VS officers who could advise them, and would give them the knowledge to test their systems and methods, together with confidence in their results, in advance of them starting to submit their data to the archive. It was agreed that completion of the scheme would not be mandatory to accepting an observer's data into the archive, but it would be encouraged as a way of providing assistance to new observers.

NEW CHARTS

JOHN TOONE
016·04

5′ FIELD INVERTED

UV PERSEI 02h 10m 08·3s +57° 11′ 21″ (2000)

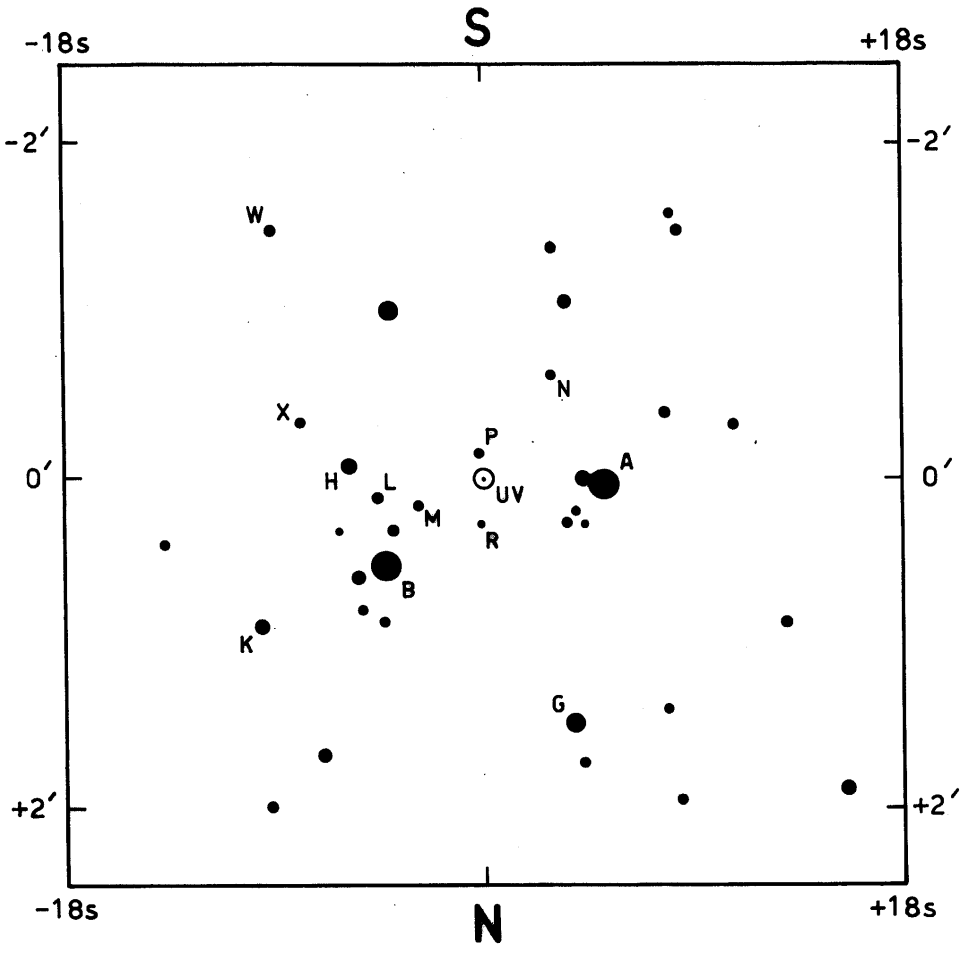

CHART: AAVSO	G 13·3	M 15·3	BAA VSS
	H 13·7	X 15·6	EPOCH: 2000
SEQUENCE: A.HENDEN	K 14·1	N 16·0	DRAWN: JT 30-03-02
	L 14·7	P 16·3	APPROVED: RDP
	W 14·9	R 17·2	

015·03 10′ FIELD INVERTED

TZ PERSEI 02h 13m 51·0s +58° 22′ 52″ (2000)

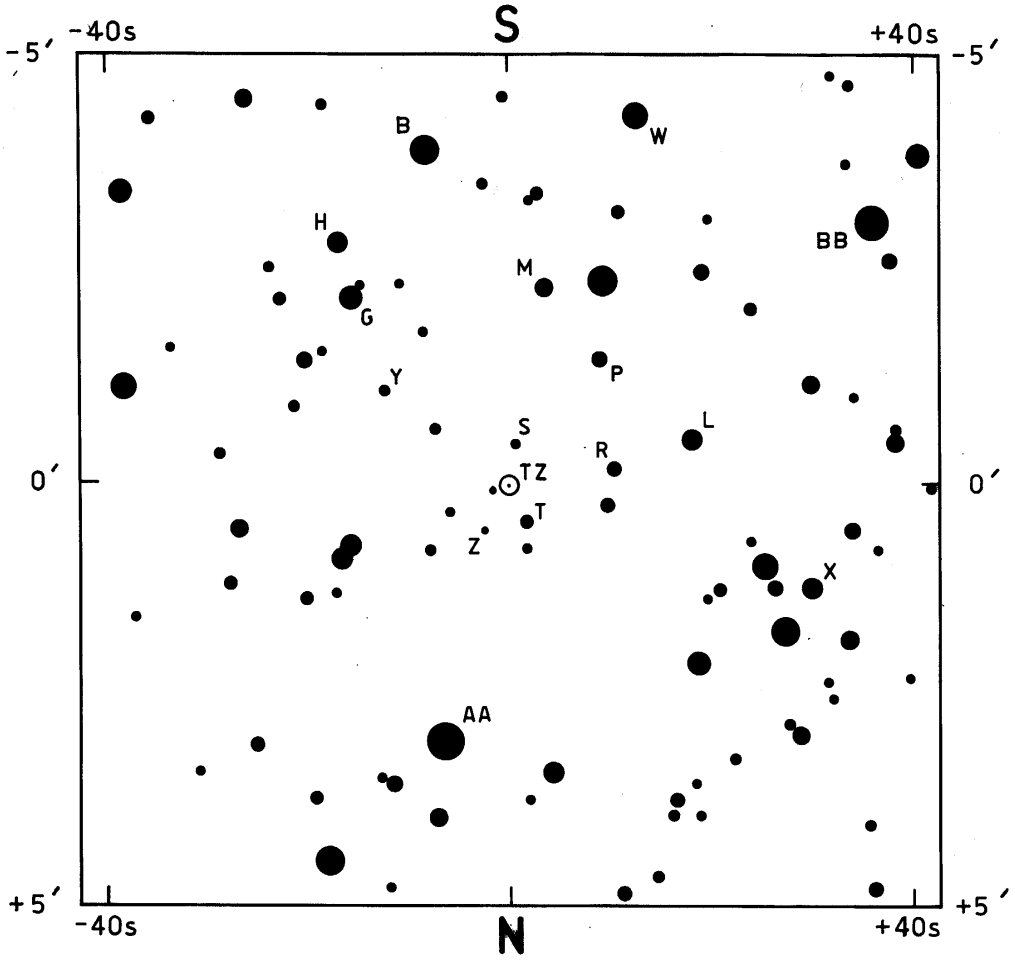

CHART: AAVSO

SEQUENCE: A.HENDEN

B 11·6	P 14·1	
W 12·0	T 14·4	
G 12·5	R 14·5	
H 12·8	Y 14·9	
X 13·0	S 15·3	
L 13·3	Z 15·7	
M 13·6		

BAA VSS
EPOCH: 2000
DRAWN: JT 31-03-02
APPROVED: RDP

IBVS'S 5301-5346

GARY POYNER

5301 **TY Leo** is not an eclipsing binary star (Lacy et al, 2002)
5302 **V982 Oph** is a dwarf nova (Antipin & Samus 2002)
5303 O-C analysis of **SV Cam** over a century (Zboril, 2002)
5304 Infrared light curves of the Algol binary **AI Dra** (Arevalo & Lazaro, 2002)
5305 **GSC 4153-0634** - A new eclipsing binary (Robb et al, 2002)
5306 CCD light curves of ROTSE1 variables, XVI:**GSC 2613:1412 Her, GSC 3098:683 Her, GSC 3098:1253 Her and GSC 2083:1870 Her** (Blattler & Diethelm, 2002)
5307 Stromgren differential photometry of the Be star **theta CrB**: 1999-2002 (Adelman, 2002)
5308 Photometric variability of first **J142643.2+315214** (Maciejewski et al, 2002)
5309 **V2540 Oph** (Nova Oph 2002): large amplitude slow nova with strong post outburst oscillations (Kato et al, 2002)
5310 Light curve variability in **XZ Canis Minoris** (Terrell & Henden, 2002)
5311 Eight new RR Lyrae stars in the north galactic cap (Kinman, 2002)
5312 **GK Dra**: A delta Scuti star in a new eclipsing system discovered by Hipparcos (Dallaporta et al, 2002)
5313 New times of minima of eclipsing binary systems (Borkovits et al, 2002)
5314 Detection of a pulsating component in the eclipsing binary star **RX Hya** (Kim et al, 2002)
5315 Multicolour observations of **V838 Mon** (Price et al, 2002)
5316 **FT Cam**: An analogous object to **IR Com** (Kato, 2002)
5317 CCD photometry of the SX Phoenicis star **BL Camelopardalis** (Wolf et al, 2002)
5318 On the variability of **GSC 5149.2845 (BRH V121) & GSC 5170.0175 (BRH V122)** (Bernhard et al, 2002)
5319 **V432 Aur**: A new eclipsing system (Dallaporta et al, 2002)
5320 On four pulsating variables (Behrend et al, 2002)
5321 A contact binary systematically changing its brightness. (Rucinski & Paczynski, 2002)
5322 CCD observations of a nova and supernovae in external galaxies (Aslan, 2002)
5323 CCD photometry of **T UMi** (Smelcer, 2002)
5324 Further observations of the recently discovered **Nova Aql 1985** (Lloyd & Guilbault, 2002)
5325 Detection of a pulsating component in the eclipsing binary **AB Per** (Kim et al,2002)
5326 Identification of **V735 Sagittarii** (Yoshida et al, 2002)
5327 **NSV 10892** is a W UMa eclipsing binary (Koppelman et al, 2002)
5328 **V928** and **V929 Ophiuchi** (Pastukhova & Samus, 2002)
5329 On five W UMa variables (Demeautis et al, 2002)
5330 Photoelectric minima of **V2150 Cyg** and **OU Ser** (Yesilyaprak, 2002)
5331 **HIP 60725** and **CU CVn**: Two new delta Scuti stars (Vidal-Sainz et al, 2002)
5332 **GSC 03129-01490**: A new Delta Scuti star in Lyra (Vidal-Sainz et al, 2002)
5333 CCD light curves of ROTSE1 variables, **XVII: GSC 3528:44 Her, GSC 3532:939 Her,** and **GSC 3532:174 Her** (Blattler & Diethelm, 2002)
5334 Astrometric authentification of **RX J2309.8+2135** as a nearby dwarf nova candidate. (Kato & Yamaoka, 2002)
5335 Identification and light elements of **BW Lib** (Sokolovsky & Samus, 2002)

5336 CCD observations of the outburst of **V838 Mon** (Sobotka et al, 2002)
5337 First light curve and elements of **AB Cnc** (Hajek et al, 2002)
5338 Period change and surface activity of the eclipsing binary **UV Leonis** (Mikuz et al, 2002)
5339 Two new eclipsing binaries: **V1626 Ori (Brh V38)** and **GSC 0486-4828 (Brh V64)** Lloyd et al, 2002)
5340 A new eclipsing binary near **BL Cam** (Young-Beom et al, 2002)
5341 New photoelectric and CCD minima and updated ephemerides of selected eclipsing binaries (Pribulla et al, 2002)
5342 On the variability and nature of **V379 Pegasi** (Kato et al, 2002)
5343 **BD+14°5106** - A new eclipsing binary (Maciejewski et al, 2002)
5344 Period changes in **S Sextantis**. (Templeton & Mattei, 2002)
5345 Confirmation of the double nature of the third body in **SZ Cam** (Gorda, 2002)
5346 Dramatic change of outburst properties in **LX And** (Kato et al, 2002)

The Information Bulletin on Variable Stars (IBVS) can be accessed through the WWW in HTML format at the following URL: **http://www.konkoly.hu/IBVS/IBVS.html**

ECLIPSE OF 31 CYGNI

ALEX VINCENT

The star 31 Cygni (omicron 1) is a long period eclipsing binary star with a period of 3784 days (10.42 years), and duration of the eclipses are 66 days, of which 64.2 days are total. On either side of eclipses are atmospheric eclipses where the primary shines through the atmosphere of the secondary and these last about 69 days. The whole event lasts about 204 days. Its variable star number is V695 Cygni.

The next minimum is due on or around July 2nd, 2003, and so the main eclipse will begin about May 30th, and ends around August 3rd. The atmospheric eclipse will start around March 23rd, and ends about October 10th. It has a photographic magnitude at maximum of 4.9, and 5.3 at minimum. Its position is RA 20h 12m 38s, and declination is +46° 35, 29s (2000.0). Dates of future minima are November 11th 2013, March 17th 2024, July 21th, 2034, November 25th 2044 and April 3rd 2055.

BINOCULAR PRIORITY LIST

MELVYN TAYLOR

Variable	Range	Type	Period	Chart	Variable	Range	Type	Period	Chart
AQ And	8.0-8.9	SRC	346d	82/08/16					
EG And	7.1-7.8	ZA		072.01	***AH Dra***	7.1-7.9	SRB	158d?	106.01
V Aql	6.6-8.4	SRB	353d	026.03	***NQ Gem***	7.4-8.0	SR+ZA	70d?	077.01
UU Aur	5.1-6.8	SRB	234d	230.01.	***X Her***	6.3-7.4	SRB	95d?	223.01
AB Aur	7.2-8.4	INA		83/10/01	***SX Her***	8.0-9.2	SRD	103d	113.01
V Boo	7-12	SRA	258d	037.01	***UW Her***	7.8-8.7	SRB	104d	107.01
RW Boo	6.4-7.9	SRB	209d	104.01	***AC Her***	6.8-9.0	RVA	75d	048.03
RX Boo	6.9-9.1	SRB	160d	219.01	***IQ Her***	7.0-7.5	SRB	75d	048.03
ST Cam	6.0-8.0	SRB	300d?	111.01	***OP Her***	5.9-6.7	SRB	120d	84/04/12
XX Cam	7.3-9.7?	RCB?		068.01	***R Hya***	3.5-10.9	M	389d	049.01
X Cnc	5.6-7.5	SRB	195d	231.01	***RX Lep***	5.0-7.4	SRB	60d?	110.01
RS Cnc	5.1-7.0	SRC	120d?	84/04/12	***SS Lep***	4.8-5.1	ZA		075.01
V CVn	6.5-8.6	SRA	192d	214.01	***Y Lyn***	6.9-8.0	SRC	110d	229.01
WZ Cas	6.9-8.5	SRB	186d	82/08/16	***SV Lyn***	6.6-7.5	SRB	70d?	108.01
V465 Cas	6.2-7.2	SRB	60d	233.01	***U Mon***	5.9-7.8	RVB	91d	029.03
γCas	1.6-3.0	GC		064.01	***X Oph***	5.9-9.2	M	328d	099.01
rho Cas	4.1-6.2	SRD	320d	064.01	***BQ Ori***	6.9-8.9	SR	110d	84/04/12
W Cep	7.0-9.2	SRC		83/10/01	***AG Peg***	6.0-9.4	NC		094.01.
AR Cep	7.0-7.9	SRB		85/05/06	***X Per***	6.0-7.0	GC+XP		84/04/08
mu Cep	3.4-5.1	SRC	730d	112.01	***R Sct***	4.2-8.6	RVA	146d	026.03
O Cet	2.0-10.1	M	332d	039.02	***Y Tau***	6.5-9.2	SRB	242d	84/04/12
R CrB	5.7-14.8	RCB		041.02	***W Tri***	7.5-8.8	SRC	108d	114.01
W Cyg	5.0-7.6	SRB	131d	062.1	***Z UMa***	6.2-9.4	SRB	196d	217.01
AF Cyg	6.4-8.4	SRB	92d	232.01	***ST UMa***	6.0-7.6	SRB	110d?	102.01
CH Cyg	5.6-10.0	ZA+SR		089.02	***VY UMa***	5.9-7.0	LB		226.01
U Del	5.6-7.5	SRB	110d?	228.01	***V UMi***	7.2-9.1	SRB	72d	101.01
EU Del	5.8-6.9	SRB	60d?	228.01	***SS Vir***	6.9-9.6	SRA	364d	097.01
TX Dra	6.8-8.3	SRB	78d?	106.01	***SW Vir***	6.4-7.9	SRB	150d?	098.01

ECLIPSING BINARY PREDICTIONS

TONY MARKHAM

The following predictions, based on the latest Krakow elements, should be usable for observers throughout the British Isles. The times of mid-eclipse appear in parantheses, with the start and end times of visibility on either side. The times are hours UT, with a value greater than 24 indicating a time after midnight. D indicates that the eclipse starts/end in daylight, L indicates low altitude at the start/end of the visibility and << indicates that mid eclipse occurred on an earlier date.

Thus, for example, on Apr 6, U Cep D20(21)26 indicates that an eclipse of U Cep starts in daylight, but can be observed between approx 20h on Apr 6 and 02h UT on Apr 7, with mid eclipse occurring at approx 21h UT on Apr 6. Please contact the EB secretary if you require any further explanation of the format.

The variables covered by these predictions are :

TV Cas	7.2-8.2V	**S Equ**	8.0-10.08V	**U Sge**	6.45-9.28V
U Cep	6.75-9.24V	**delta Lib**	4.9-5.9V	**RW Tau**	7.98-11.59V
SS Cet	9.4-13.0v	**V640 Ori**	11.2-13.5V	**HU Tau**	5.92-6.70V
SW Cyg	9.24-11.83V	**Z Per**	9.7-12.4p	**X Tri**	8.88-11.27V
Z Dra	10.8-14.1p	**ST Per**	9.52-11.40V	**TX UMa**	7.06-8.80V
TW Dra	8.0-10.5v	**Y Psc**	9.44-12.23V	**Z Vul**	7.25-8.90V

Note that predictions for RZ Cas, Beta Per and Lambda Tau can be found in the BAA Handbook.

2003 Apr 1 Tue
Z Per D19(21)23L
U Cep D19(21)26
U Sge L24(29)28D

2003 Apr 2 Wed
Z Dra 01(03)04D

2003 Apr 3 Thu
Z Vul 03(08)04D
ST Per D20(22)23L
RW Tau D20(23)23L
SW Cyg L20(21)27
del Lib L22(19)26
TW Dra 24(29)28D

2003 Apr 4 Fri
TV Cas 02(06)04D
Z Dra D20(21)23
Z Per D20(23)23L

2003 Apr 5 Sat
TV Cas 22(26)28D
del Lib L22(27)28D
Z Vul L23(19)24

2003 Apr 6 Sun
Z Dra 03(05)04D
RW Tau D20(18)22L
U Cep D20(21)26
TW Dra D20(24)28D

2003 Apr 7 Mon
S Equ L02(06)04D
TV Cas D20(21)25
Z Per D20(24)23L

2003 Apr 8 Tue
Z Vul 01(06)04D
Z Dra 20(22)25
U Sge L23(23)28D

2003 Apr 9 Wed
TV Cas D20(17)21
HU Tau D20(17)21
TW Dra D20(19)25

2003 Apr 10 Thu
Z Per 21(25)23L
del Lib L22(19)25

2003 Apr 11 Fri
HU Tau D20(18)22L
ST Per D20(20)23L
U Cep D20(21)26

2003 Apr 12 Sat
U Sge 02(08)04D
TX UMa D20(17)22
SW Cyg D20(24)28D
del Lib L21(27)28D
Z Dra 22(24)26
Z Vul L23(28)28D

2003 Apr 13 Sun
HU Tau D20(20)22L
Z Per 22(27)23L

2003 Apr 14 Mon
S Equ L02(03)04D
Z Per L03(03)04D
RW Tau 21(25)22L
TV Cas 23(27)28D

2003 Apr 15 Tue
TX UMa D20(19)23
HU Tau D20(21)22L

2003 Apr 16 Wed
U Cep D20(20)25
TV Cas D20(23)27
Z Dra 23(26)28D

2003 Apr 17 Thu
Z Per L03(04)04D
RW Tau D20(20)22L
HU Tau D20(22)22L
del Lib L21(18)25
Z Vul L22(26)28D

2003 Apr 18 Fri
TW Dra 01(06)04D
TV Cas D20(18)22
TX UMa D20(20)25
U Sge L23(26)28D

2003 Apr 19 Sat
Z Dra D20(19)21
ST Per D20(19)22L
HU Tau D20(24)21L
del Lib L21(26)28D

2003 Apr 20 Sun
Z Per L03(05)04D
TW Dra D20(25)28D

2003 Apr 21 Mon
Z Dra 01(04)04D
S Equ L02(00)04D
U Cep D20(20)25
TX UMa D20(22)26
SW Cyg 22(28)28D

2003 Apr 22 Tue
Z Vul L22(23)27D

2003 Apr 23 Wed
TW Dra D20(20)25
Z Dra D20(21)23

2003 Apr 24 Thu
TV Cas 01(05)03D
TX UMa D20(23)27D
del Lib L21(18)24

2003 Apr 25 Fri
Z Dra 03(05)03D
TV Cas D20(24)27D
U Sge L22(21)26

2003 Apr 26 Sat
TW Dra D20(16)21
SW Cyg D20(18)24
U Cep D20(20)25
del Lib L21(26)27D

2003 Apr 27 Sun
ST Per D20(18)22L
TV Cas D20(20)24
Z Dra D20(22)25
TX UMa 22(26)27D

2003 May 1 Thu
SW Cyg 01(07)03D
S Equ 02(07)03D
RW Tau D21(16)21
del Lib D21(18)24
U Cep D21(19)24
Z Dra 22(24)27

2003 May 2 Fri
TW Dra 01(06)03D
ST Per 21(25)21L
Z Vul L21(19)24

2003 May 3 Sat
TV Cas 02(06)03D
del Lib D21(25)27D
TX UMa 23(28)27D

2003 May 4 Sun
U Cep 02(07)03D
TW Dra 21(26)27D
TV Cas 22(26)27D

2003 May 5 Mon
Z Vul 01(06)03D
SW Cyg D21(21)27D
U Sge L22(24)27D
Z Dra 24(26)27D

2003 May 6 Tue
U Cep D21(19)24
TV Cas D21(21)25

2003 May 7 Wed
TX UMa 01(05)03D
TW Dra D21(21)26

2003 Apr 28 Mon
S Equ L01(<<)02
RW Tau D20(22)21L
U Sge 24(30)27D

2003 Apr 30 Wed
TX UMa D20(25)27D
Z Vul L22(21)27

Z Vul L21(17)22
2003 May 8 Thu
S Equ L00(04)03D
del Lib D21(17)24
Z Dra D21(19)21
2003 May 9 Fri
U Cep 02(07)03D
Z Vul 23(28)27D
2003 May 10 Sat
Z Dra 01(04)03D
TX UMa 02(07)03D
TW Dra D21(16)22
del Lib D21(25)27D
2003 May 11 Sun
U Cep D21(19)24
2003 May 12 Mon
Z Dra D21(21)23
U Sge L21(18)24
2003 May 13 Tue
TV Cas 23(27)27D
2003 May 14 Wed
U Cep 02(07)03D
SW Cyg D21(25)27D
Z Vul D21(26)27D
S Equ L24(25)27D
2003 May 15 Thu
del Lib D21(17)23
TV Cas D21(23)27D
U Sge 22(27)27D
2003 May 16 Fri
TW Dra 02(07)03D
U Cep D21(18)23
Z Dra D21(23)25
2003 May 17 Sat
TV Cas D21(18)22
del Lib D21(25)26D
2003 May 18 Sun
TW Dra 22(27)26D
2003 May 19 Mon
U Cep 01(06)02D
ST Per L02(<<)02
Z Vul D21(23)26D
2003 May 20 Tue
Z Dra 22(24)26D
2003 May 21 Wed
U Cep D21(18)23
TW Dra D21(22)26D
S Equ L24(22)26D
2003 May 22 Thu
del Lib D21(16)23
U Sge D21(22)26D
2003 May 23 Fri
TV Cas 01(05)02D
Y Psc L02(04)02D
SW Cyg 22(28)26D
2003 May 24 Sat
U Cep 01(06)02D
TW Dra D21(17)22
Z Vul D21(21)26D
del Lib D21(24)26D
TV Cas D21(24)26D
Z Dra 24(26)26D
2003 May 26 Mon
U Sge 01(07)02D
U Cep D22(18)23
TV Cas D22(20)24
2003 May 28 Wed
SW Cyg D22(18)24
S Equ L23(19)24
2003 May 29 Thu
U Cep 01(06)02D
Z Dra 01(04)02D
del Lib D22(16)22
Z Vul D22(19)24
2003 May 30 Fri
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2003 May 31 Sat
Z Dra D22(21)23
del Lib D22(24)26D
S Equ 24(29)26D
2003 Jun 1 Sun
Z Vul 01(06)02D
ST Per L01(04)02D
U Sge D22(25)26D
TW Dra 22(27)26D
2003 Jun 2 Mon
Z Per L00(00)02D
TV Cas D22(26)26D
2003 Jun 3 Tue
U Cep 00(05)02D
del Lib 01(08)02D
Z Vul D22(17)22
TX UMa D22(19)24
2003 Jun 4 Wed
TV Cas D22(21)25
Z Dra D22(23)25
TW Dra D22(23)26D
2003 Jun 5 Thu
Z Per L00(02)02D
Z Vul 23(28)26D
2003 Jun 6 Fri
TX UMa D22(21)25
SW Cyg D22(21)26D
2003 Jun 7 Sat
Y Psc L01(05)02D
TW Dra D22(18)23
del Lib D22(23)26D
S Equ L22(26)26D
Z Per L24(27)26D
2003 Jun 8 Sun
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U Sge D22(19)25
Z Dra 22(24)26D
2003 Jun 9 Mon
ST Per L01(03)02D
TX UMa D22(22)26D
2003 Jun 10 Tue
del Lib 01(07)02L
Z Vul D22(26)26D
Z Per L24(28)26D
2003 Jun 11 Wed
Y Psc L01(00)02D
U Sge 23(28)26D
TV Cas 23(27)26D
2003 Jun 12 Thu
TX UMa D22(24)26D
Z Dra 24(26)26D
U Cep 24(29)26D
2003 Jun 13 Fri
TV Cas D22(23)26D
2003 Jun 14 Sat
Z Per 01(06)02D
del Lib D22(23)25L
S Equ D22(23)26D
2003 Jun 15 Sun
TV Cas D22(18)22
Z Vul D22(24)26D
SW Cyg D22(25)26D
TX UMa D22(25)26D
TW Dra 23(28)26D
2003 Jun 17 Tue
ST Per L00(01)02D
del Lib 00(07)01L
Z Dra 01(04)02D
U Cep 23(28)26D
2003 Jun 18 Wed
U Sge D22(23)26D
TW Dra D22(24)26D
TX UMa D22(27)26D
2003 Jun 19 Thu
Z Dra D22(21)23
2003 Jun 20 Fri
X Tri 01(04)02D
Z Vul D22(21)26D
2003 Jun 21 Sat
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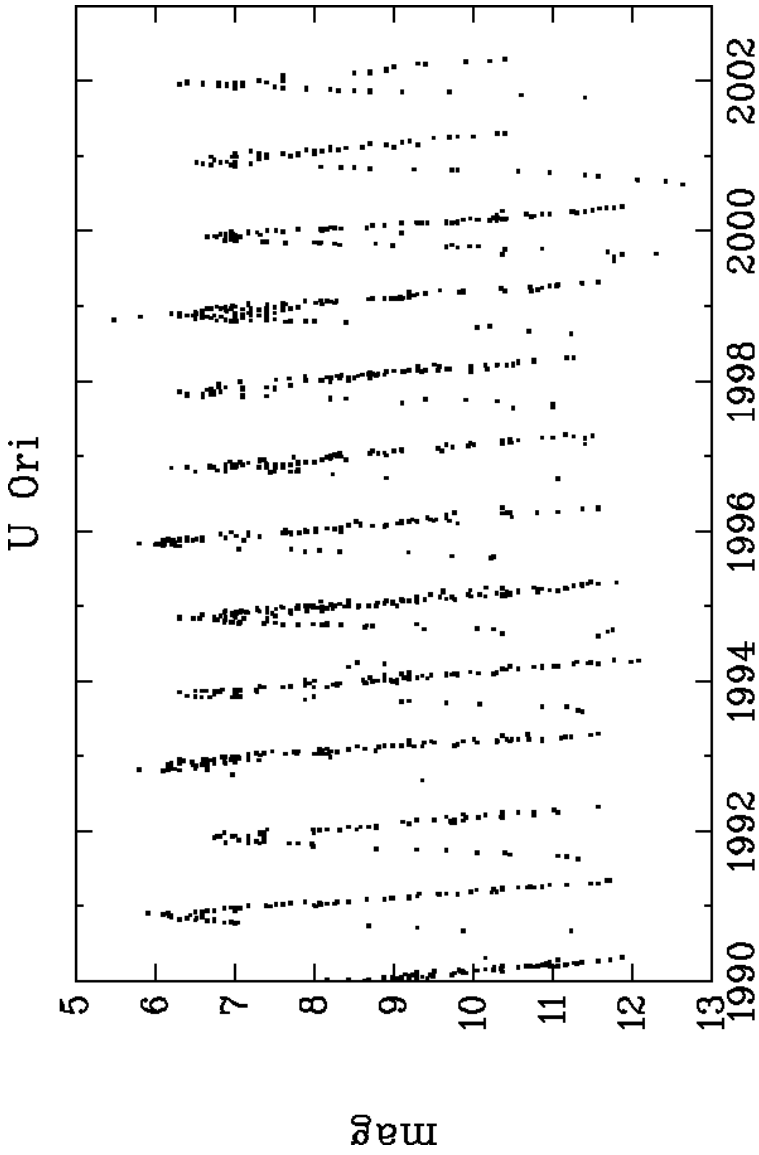
X Tri 01(03)02D
TW Dra D22(19)24
S Equ D22(20)25
del Lib D22(22)25L
TX UMa 23(28)26D
2003 Jun 22 Sun
X Tri L00(03)02D
TV Cas D22(24)26D
U Cep 23(28)26D
2003 Jun 23 Mon
X Tri L00(02)02D
Z Dra D22(23)25
del Lib 24(30)25L
2003 Jun 24 Tue
X Tri L00(01)02D
TV Cas D22(20)24
SW Cyg 22(28)26D
ST Per L24(24)26D
2003 Jun 25 Wed
X Tri L00(01)02D
TX UMa 01(06)02D
S Equ 01(07)02D
U Sge D22(17)23
Z Vul D22(19)25
Y Psc L24(25)26D
2003 Jun 26 Thu
X Tri L00(00)02D
2003 Jun 27 Fri
X Tri L00(<<)02
Z Dra D22(24)26D
U Cep 23(28)26D
2003 Jun 28 Sat
X Tri L00(<<)01
Z Vul 01(06)02D
del Lib D22(22)24L
U Sge D22(26)26D
X Tri L24(22)24
2003 Jun 29 Sun
SW Cyg D22(18)24
Y Psc L23(20)24
TW Dra 24(29)26D
2003 Jun 30 Mon
del Lib 23(30)24L



U Ori Observers1990 to 2002:
A D Godden, S W Albrighton, A Mark, M Barrett, B H Granslo, C Washington, M Clarke, D S Conner, C P Jones, R C Dryden, D Stott, E H Horsley, F Hamilton, Julie Farrer, G A V Coady, M J Gainsford, G Thompson, S Godwin, G O Mara, C Henshaw , Stuart Inman, S Jenner , P Jenkins, J Meacham, N S Kiernan, L Green, P Madhusuthan, R W Middleton , M Gill, I A Middlemist, M J Nicholls, I P Nartowicz, G Pointer, T Markham, G Ramsey, R E Kelly, R J Bouma, R Billington, G W Salmon, J D Shanklin, J Toone, J Thorpe, T Tanti , Vince Tuboly, M D Taylor, Volodymir G Mormyl, Petro Veleshchuk, E J W West

The deadline for contributions to the 116th issue of VSSC will be 7th May 2003. All articles should be sent to the editor (details are given on the back of this issue)

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SECTION OFFICERS

Director Roger D Pickard
28 Appletons, Hadlow, Kent TN11 0DT
T:01732 850663 E:rdp@star.ukc.ac.uk

Secretary John Saxton
11 Highfield Road, Lymm,
Cheshire, WA13 0DS T:01925 758009
E:lymmobservatory@hotmail.com

Chart Secretary John Toone
Hillside View, 17 Ashdale Road,
Cressage, Shrewsbury, SY5 6DT.
T:01952 510794 E:john.toone@dial.pipex.com

Binocular Secretary Melvyn D. Taylor
17 Cross Lane, Wakefield, West Yorks,WF2 8DA
T:01924374651E:melvyn.taylor@breathemail.net

Nova/Supernova Secretary Guy M Hurst
16 Westminster Close, Basingstoke,
Hants, RG22 4PP .
T& F:01256 471074 E:Guy@tahq.demon.co.uk

Eclipsing Binary Secretary Tony Markham
20 Hillside Drive, Leek, Staffs, ST13 8JQ
T: 01538 381174
E: tonymarkham@compuserve.com

Recurrent Objects Co-ordinator Gary Poyner
67 Ellerton Road, Kingstanding,
Birmingham, B44 0QE.
T:0121 6053716
E:garypoyner@blueyonder.co.uk

Pro-am Liaison Committee Secretary & Photoelectric Photometry Advisor - as Director

CCD Advisor Richard Miles
Grange Cottage,Golden Hill, Stourton Caundle,
Dorset, DT10 2JP
T:01963 364651
E:rmiles@baa.u-net.com

Circulars Editor Karen Holland
136 Northampton Lane North, Moulton,
Northampton, NN3 7QW
T: 01604 671373 Fax: 01604 671570
E: kho@star.le.ac.uk

Webmaster Peter Moreton
Engaynes Lodge, Manor Gardens, Pytchley,
Northants, NN14 1HB
E:Peter.Moreton@ril.org.uk

TELEPHONE ALERT NUMBERS

Nova and Supernova discoveries

First telephone the Nova/Supernova Secretary. If only answering machine response, leave a message and then try the following: Denis Buczynski 01524 68530, Glyn Marsh 01772 690502, or Martin Mobberley 01284 828431.

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