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Telephone Alert Numbers

Nova and Supernova Discoveries	First phone Nova/Supernova Secretary. If only answering machine response leave message and then try the following: Denis Buczynski 01524-68530 Glyn Marsh 01772-690502 Martin Mobberley 01245-475297 (wkdays) 01284-828431 (wkends)
Variable Star Alerts	Gary Poyner (see above)

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Non-Members	£5-00	£6-00	£8-50

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	Order from	Charge
Telescopic Charts	Chart Secretary	30p each
Binocular Charts	Chart Secretary	10p each
Eclipsing Binary Charts	Eclipsing Binary Secretary	10p each
Leaflets	Section Secretary	20p each
Observation Report Forms	Section Secretary	No Charge

SS Cygni: A request for observations.

Peter Wheatley, Astronomical Institute, Utrecht University, Holland has approached the VSS for help for a forthcoming satellite project to monitor SS Cyg. Peter has been granted time on NASA's X-ray Timing Explorer to study SS Cyg in outburst, and he is also applying for time on ROSAT with SS Cyg again the priority target.

The target dates are not yet finalised, but will be within the time period October 1995 - July 1996. Once the target dates are known, they will appear in these circulars. If we learn of the dates between circulars, then observers who regularly report observations of SS Cyg will be notified.

It will be vital for Peter to be alerted as soon as possible once SS Cyg begins to brighten. I have agreed to telephone him the moment we get confirmation of the outburst, so it will be important for observers who regularly monitor this star to please telephone the director **immediately** (regardless of the time) they suspect an outburst is in progress.

ASTRO-2

In VSSC 84, I mentioned that several observers had contributed to the pro-am WUPPE project for monitoring dwarf novae for outbursts in March of this year. The following message was e-mailed to me from Joni Johnson as feedback to those observers who contributed observations.

I recently met with Joni Johnson at the IAU Colloquium 158 on CV's which was held at Keele. She expressed her thanks for our participation in the project, and promised to keep us informed on the data analysis progress. Her message reads.....

Hi all!

This is Joni Johnson from the WUPPE/Astro-2 mission. I thought you might appreciate an update on the data reduction status. There are quite a few steps to go through when reducing spectropolarimetry so it takes a bit of time, plus some of the observations more or less have to be done individually, rather than as a batch job. That said, we have the data reduced on the classical novae and some of the symbiotic stars. I am about to start in on the dwarf novae, particularly the ones that we observed in outburst. We hope to see at least some continuum polarisation, and any effects across lines would be a bonus.

I will keep you all posted on status of data reduction, and the papers and presentations that will come out of this, and will send Gary pre-prints when they become available.

Thanks again for your wonderful work!

Joni

Computerisation
Dave McAdam

I am pleased to announce that more observers have taken up computer reporting with a corresponding reduction of paperwork for all concerned. John Day, Mike Gainsford, Michael Gill, and Ian Nartowicz have provided reports on disk and Karen Holland by e-mail. Both John and Mike initially sent test files to check on unfamiliar details of word-processing, spreadsheet, file management, and the like. Ian's contribution was a bit of a surprise since, as far as I know, he has not reported to the VSS in recent years. Further machine-readable reports are welcome. Observers also made special reports on the symbiotic stars for Astro-2 so that, with Melvyn Taylor's help, the recent years were quickly brought up to date on computer.

The transcription of old records steadily continues and in early August 1995 the grand total reached two-thirds of a million. However, several volunteers who took bundles of paperwork some time ago have not been in touch. Over the last three years, a few have helped with worthwhile contributions but then written to say they could not continue because of other commitments. I operate a particular philosophy in regard to help with the old records. The mundane, time-consuming, nature of the work is not to everyone's taste, although I still have to argue the importance of building the database. If ou have offered to help but have not made much progress, then please let me know so that I can re-delegate paperwork if appropriate. In order to coordinate the work, I need to know what is being done. I promise there is only a fleeting disappointment when things do not work out as planned.

The computer system is primarily a storage one, although the inclusion of the re-reduction routine makes it active, in contrast to just dealing with a set of static files. Re-reduction operations are not frequent but have been useful in cases where there is some confusion as to which sequence chart has been used. The differences between the VSS and SPA sequences for mu Cephei are an example; Tristram Brelstaff has recently applied a formula by Howarth and Bailey<1> to the V and B-V values of the comparisons for this star and the estimates have been re-reduced using the resulting 'v' magnitudes. Observers should state clearly the sequence used, and still deduce magnitudes from the respective published values otherwise the machine-check becomes confused and throws up multiple discrepancies.

As more observers report by computer, increasing numbers of input files contribute to annual records. This shows up a shortcoming in the present software when records have to be re-reduced. Unfortunately, to make things more efficient, a major program rewrite is needed. Hopefully this will be tackled before the end of this year.

Another active routine that has recently been added to the software is a method of calculating observed maxima and minima of LPVs, mainly Mira types. This operates by selecting a suitable 'time window' containing observations through a maximum or minimum and then fits a least-squares 3-term polynomial (parabola) from which the time of maximum or minimum is found and logged in a file for the particular variable. The resulting files are available for quick reference or for further analysis of the periodicity over a number of cycles. The idea is to keep the operation of this facility simple since the main priority is entry of the paper records. Window selection is done graphically on-screen; quadratic curve fitting equations by Jean Meeus<2> are applied and each fit is logged within a couple of minutes. However, the shapes of Mira light-curves range from near sinusoidal to very asymmetric with steep rising flanks and sharp maxima. Higher degree polynomials have been used in deriving and compiling tables of maxima to reduce the systematic error on asymmetric curves<3>. Karen Holland has suggested ways that these higher function fits

may be implemented, and independently Pierre Marcel-Gaultier is working on a C program for merging with the existing software in place of the quadratic routine. Progress, though, depends very much on how soon we can enter the long observational runs on Miras, some of which extend back over 90 years.

References:

<1> I. D. Howarth and J. Bailey , JBAA, 90, 265-272, 1980
<2> Jean Meeus, 'Astronomical Algorithms', p. 43, Willmann-Bell, 1991
<3> Laszlo Kiss, 'Light curves of Variable Stars 1988-1992', Hungarian Astronomical Association, 1994.

Changes to the Programme:

There have been several additions to the telescopic programme, all of which are within the range of small (20cm+) aperture telescopes

IP Peg, ER UMa, RZ Sge, YZ Cnc, SY Cnc, TT Crt, AW Gem, U Aqr, Z UMi, DY Per, V Sge, V1413 Aql, MV Lyr, 3C66A, RZ Vul, FG Sge, TT Ari, V651 Mon, V686 Mon, OJ287 & Markarian 509.

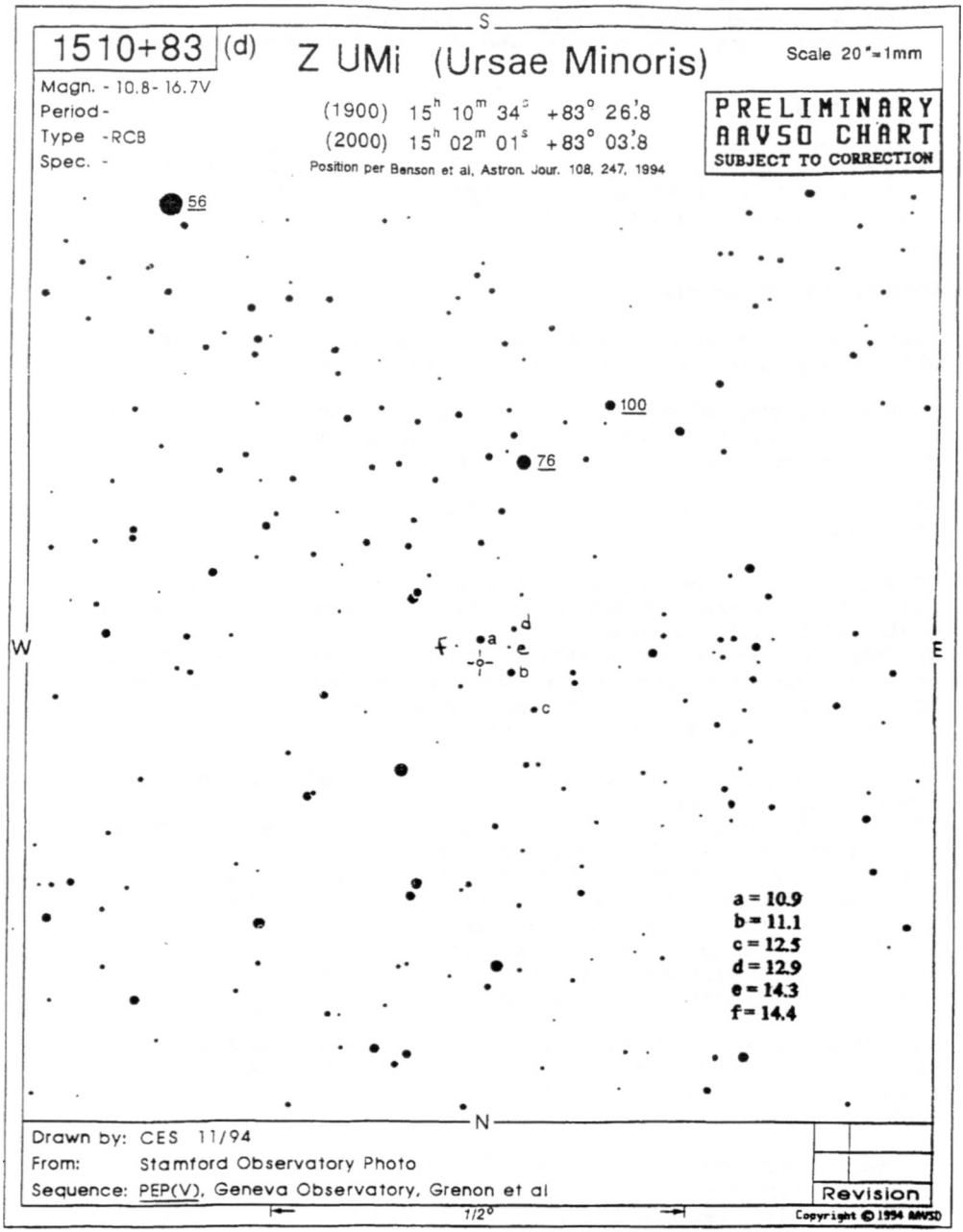
Some notes which may be of interest on several of these stars are given below....

IP Peg: Period about 90d. Eclipses ~2 mags deep visible when in outburst. Pro-Am project to monitor eclipses already running, co-ordinated by Bill Worraker.
ER UMa: (Formerly PG0943+521) Extremely short period UGSU star. Probably the prototype for a new class of UGSU stars. Yoji Osaki, Tokyo University lists the main characteristics for this star in PASJ(Letter) Vol. 47, No. 2, 1995).

(1) It's superoutburst cycle of about 43 days is the shortest yet observed in UGSU stars.
(2) The duty cycle of the superoutburst is very long; it amounts to as long as about a half cycle (20 days).
(3) The recurrence time of normal outbursts is extremely short, as short as 4 days. The decline rate in normal outburst is also very short with a maximum decline rate of 0.7 mag per day
(4) There are some short outbursts as bright as the superoutbursts.
(5) The full amplitude of light variation is about 3.0 mag, which is exceptionally small for SU UMa-type dwarf novae.

Only two, possibly three other systems of this type are known. The director has been monitoring this object intensely since it's discovery, and can recommend it as one to watch for all DNe enthusiasts!

YZ Cnc: Interesting UGSU star. Probably gives us our best chance of observing superhumps in the light curve visually. More on this when the star is favourably placed. Usually on target list for professional monitoring.
SY Cnc: Brightish Z Cam star, which again is popular with professionals.


1510+83 (d)
Z UMi (Ursae Minoris)
Scale 20'=1mm
Magn. - 10.8- 16.7V
Period -
Type -RCB
Spec. -
(1900) 15h 10m 34s +83° 26'.8
(2000) 15h 02m 01s +83° 03'.8
Position per Benson et al, Astron. Jour. 108, 247, 1994
PRELIMINARY
AAVSO CHART
SUBJECT TO CORRECTION
S
W
E
N
56
100
76
a
b
c
d
e
f
a = 10.9
b = 11.1
c = 12.5
d = 12.9
e = 14.3
f = 14.4
Drawn by: CES 11/94
From: Stamford Observatory Photo
Sequence: PEP(V), Geneva Observatory, Grenon et al
Revision
1/2°
Copyright © 1994 AAVSO

AW Gem: Underobserved UGSS star, whose period is not known with any certainty.
U Aqr: Neglected RCB star with northern observers, despite having a declination of -16. Much valuable work can be done on this object.
Z UMi & DY Per: Two more RCB stars visible from our latitudes, which are grossly underobserved (for more on DY Per see VSSC 81). Z UMi is a recent addition to the RCB class, and the AAVSO chart is reproduced here by kind permission of Janet A. Mattei, AAVSO Director.
V Sge: Eclipsing nova like star which displays flares and smaller, rapid variations. Eclipse depth varies between 0.6 & 1.3 magnitudes deep. Less than one degree from PU Vul.
V1413 Aql: Eclipsing symbiotic nova currently undergoing an outburst! The last outburst occurred in 1982, since when the star has been on a slow decline.
MV Lyr: Novalike star which has been bright since 1989, began fading in February 1995 and oscillating at minimum.
3C66A: Quasar which has been observed as part of the recent international OJ287 project. At it's brightest state ever recorded - mv~14.0 - for over one year, recent observations by the director show that 3C66A remains at maximum magnitude.
RZ Vul: The TA chart notes that "RZ Vul has Mira type variations over approx. 100d and UG type outbursts ~1500d period.
FG Sge: This rapidly evolving star (central star to the PN PK 60-7.1) faded to mag 14 in 1992 after spending over 90 years at magnitude ~9.3. A slow recovery set in to mag 11 by early 1994. Two further fades to mag 14 have occurred since. Recent estimates by the director show a further fade is in progress.
TT Ari: Usually it's brightness varies around 10.5, but sometimes drops to below mag 16 for weeks or years. Maxima, or 'high state' may resemble that of intermediate polars, but this is only speculation. High states may be regarded as continuous outbursts (Andronov)
V651 Mon: Central star to the PN NGC 2346. 2-3 mag variations observed in 1982, with very little before and since. Usually seen around mag 11, this is probably another rapidly evolving star which is worth keeping an eye on.
V686 Mon: Formerly TAV 0723-03 found by Rob McNaught. Underobserved Mira star.
OJ287: BL Lac object which has been intensely observed over the past two years by both professional and amateur observers. Major outburst occurring earlier this year, and Dr Mark Kidger tells me to look out for another, brighter one this year, probably November time!

The binocular programme remains virtually unchanged, except for the addition of one new star...

τ^4 Ser 5.9 - 7.1V, Type SRB, Period 100d

τ^4 Ser has been observed by John Toone for some time, and it is at his suggestion that this object has been included. The binocular programme priority list is still valid, and is re-produced here (from VSSC 72, 1991). Please give special attention to these stars.

Binocular Priority List

AQ And	Mu Cep	RX Lep
EG And	Omicron Cet	SS Lep
V Aql	R CrB	Y Lyn
UU Aur	W Cyg	SV Lyn
AB Aur	AF Cyg	U Mon
V Boo	CH Cyg	X Oph
RW Boo	U Del	BQ Ori
RX Boo	EU Del	AG Peg
U Cam	RY Dra	GO Peg
ST Cam	TX Dra	X Per
XX Cam	AH Dra	R Sct
X Cnc	NQ Gem	Y Tau
RS Cnc	X Her	W Tri
V CVn	SX Her	Z UMa
WZ Cas	UW Her	ST UMa
V465 Cas	AC Her	VY UMa
Gamma Cas	IQ Her	V UMi
Rho Cas	OP Her	SS Vir
W Cep	R Hya	SW Vir
AR Cep	RW Hya	

Mike Collins' Variables:

In VSSC 83, I mentioned that I had an idea to form a separate programme dedicated to the variables discovered by Mike Collins. Mike has provided details of his discoveries so that we may choose a short "hit list" of stars which we can follow. Mike's list contains 135 stars, and from this I have selected 21 objects for us to begin with. More stars can always be added at a later date if this observing programme proves to be a success.

The stars designated TASV are - at this time - only suspected of being variable. When enough evidence of variability is provided, they will then be designated TAV objects.

Observations should be made every 7-10d or so for the majority of the stars (which is usual with red variables), but the Be star TAV 0033+59 should be observed on every possible occasion (see Mike's comments below).

Reports should be sent to Melvyn in the usual way, or Dave McAdam if you report on diskette. In the case of the latter, remember to send Melvyn a short report summarising your observations at the end of each half year or year. Charts are available from John Toone.

I hope that VSS observers will add two or three (or more) of these variables to their programmes, as Mike's achievements in discovering the variability in these stars deserves to be followed up by a concerted effort to monitor them over a long period.

RA (1950.0)	Dec (1950.0)	RA (2000.0)	Dec (2000.0)	desig	Range	notes	Chart
00 33.9	+59 24	**00 35.9**	**+59 40**	TAV 0033+59	10.3-11.9	Be-type	TA901114
00 42.2	+53 10	**00 44.9**	**+53 26**	TAV 0042+53	10.3-12.4	C-rich	TA900913
01 36.5	+60 39	**01 39.5**	**+60 54**	TAV 0136+60	7.3-8.3		TA890714
02 16.9	+48 01	**02 19.4**	**+48 14**	TAV 0216+48	9.5-11.4	C star	TA891126
03 46.7	+38 38	**03 49.4**	**+38 47**	TAV 0346+38	10.3-11.6	C star	TA910222
05 59.1	+06 38	**06 01.7**	**+06 38**	TAV 0559+06	10.5-11.6		TA910616
06 26.2	+34 44	**06 29.4**	**+34 42**	TASV 0626+34	9.8-11.9		TA891010
07 14.4	+17 59	**07 17.0**	**+17 54**	TAV 0714+17	10.5-11.9		TA910623
18 12.3	+40 25	**18 13.7**	**+40 26**	TASV 1812+40	9.5-10.3	360d?	TA890908
18 31.6	+19 00	**18 33.3**	**+19 02**	TAV 1831+19	10.7-(12.2		TA911025
19 33.1	+53 46	**19 34.2**	**+53 53**	TAV 1933+53	10.3-11.4		TA910202
19 46.4	+00 22	**19 48.6**	**+00 30**	TASV 1946+00	10.0-11.9?	330d?	TA890908
20 34.2	+61 38	**20 34.9**	**+61 48**	TAV 2034+61	9.6-11.2		TA890628
22 04.8	+59 15	**22 05.8**	**+59 30**	TASV 2204+59	10.1-11.5		TA891104
22 30.6	+58 21	**22 31.9**	**+58 36**	TAV 2230+58	9.8-10.8	C star	TA901020

TAV Stars which are named in GCVS

RA (1950.0)	Dec (1950.0)	RA (2000.0)	Dec (2000.0)	GCVS	Range	notes	TA desig.	Chart
03 29.1	+41 16	**03 32.4**	**+41 26**	V513 Per	10.3-12.6	423d C*	TAV 0329+41	TA900121
04 51.8	+69 22	**04 56.5**	**+69 27**	CC Cam	10.8-(12.3		TAV 0451+69	TA920510
18 36.1	+11 08	**18 38.4**	**+11 11**	V2303 Oph	11.1-(15.2?		TAV 1836+11	TA930930
19 21.1	+24 24	**19 23.1**	**+24 30**	V335 Vul	10.1-12.7	C star	TAV 1921+24	TA900827
19 41.7	+34 22	**19 42.9**	**+34 29**	V1990 Cyg	9.8-13.0	C star	TAV 1941+34	TA891102
22 51.2	+61 00	**22 53.0**	**+61 16**	V386 Cep	9.2-11.0	S star	TAV 2251+61	TA900125

Mike provides the following comments....

TAV 0033+59	No shell episode since late 1990/early 1991, could fade at any moment. Expect deep fade if mpg dips below 11
TAV 0042+53	Shows a 420d period but max. mag. has declined from 10.3 in late 1988 to 11.8 in mid 1994. Will it come up again?
TAV 0136+60	Since late 1992 has been oscillating 7.3-7.9. Not very spectacular.
TAV 0216+48	Poor coverage, sorry.
TAV 0346+38	Evidence for two periods: 250d amplitude 0.5 mag, and 12 yr? amplitude 0.6 mag. I am hoping to model this light curve, the longer period, if real would be most interesting!
TAV 0559+06	Poor coverage. May be around 10.5 with dips?
TAV 0714+17	Poor coverage and no obvious pattern I'm afraid.
TAV 1831+19	No obvious pattern.
TAV 1933+53	Ditto.
TAV 2034+61	Ditto.
TAV 2230+58	389d period is suggested by my data. The max is flatter than the min so a sinusoidal fit is not very good. This light curve asymmetry has been modelled recently in the literature as an IR feature caused by circumstellar dust shells.
TASV 0626+34	Shows large amplitude variations but no pattern. 9.7-11.9
TASV 1812+40	360d period?
TASV 1946+00	Evidence for large amplitude, may have 330d period, poor coverage lately I'm afraid.
TASV 2204+59	Obviously irregular but shows lovely slow, long-period variations.

Recent Papers on Variable Stars
Tristram Brelstaff

Periodic Outbursts in the Old Nova V446 Herculis (Honeycutt et al., Astrophys. J., 446, 838-841, 1995) - Photometry of this star (= Nova Her 1960) over the past 4 years shows regular 1.5-mag outbursts at a mean interval of 23.3 days. Spectroscopy suggests that these are due to mass transfer events rather than disk instabilities. The extreme range is 15.2 - 17.5V but minimum is normally about 17.0V.

Cataclysmic Variables from Origin to Outburst (Gordon-Graham, in Moore (ed), The 1995 Yearbook of Astronomy, 168-180, Macmillan, 1994) - A good, up-to-date semi-popular review of models of the structure and evolution of cataclysmic variables.

The Hunt for Black Holes (Charles, in Moore (ed), The 1995 Yearbook of Astronomy, 145-154, Macmillan, 1994) - A semi-popular account of the demonstration of the presence of a black hole in the V404 Cygni system.

NSV 1020 is a Mira-type Variable (Collins & Westlund, The Astronomer, 32, No 373, 17-18, 1995) - First noticed by Mogenroth in 1936; rediscovered by Mike Collins in 1990; further photographs by Collins and visual observations by Scandinavian observers shows it to be a Mira star with a period of 244 days and a maximum of about mag 11 visual.

The Red Variable Star V973 Ophiuchi (Koen et al, The Observatory, 115, 132-134, 1995) - Classified as RCB? in the 1970 GCVS, and ISB? in the 1985 one, this star was shown by Feast to lack an RCB-type spectrum. Here it is shown to be a probable red giant irregular variable.

Outer Layers of a Carbon Star: the View from the Hubble Space Telescope (Johnson et al, Astrophys. J., 443, 281-294, 1995) - Describes UV spectroscopy of UU Aur with the HST to study the relationship between the chromosphere and mass loss in carbon stars.

Spectrophotometry of the Nova-like Variable RW Trianguli in a High State (Still et al, Mon. Not. Royal Astron. Soc., 273, 849-862, 1995) - Time-resolved spectrophotometry of this eclipsing nova-like variable during an unexpected high state (3.5 mags brighter than previous ones).

Circumstellar CO in FG Sagittae (Hinkle et al, Astron. J., 109, 808-811, 1995) - High-resolution spectrophotometry at 2.3 microns shortly before the sudden fade reveals CO lines from 2 circumstellar shells (at 2 and 11 stellar radii). The renewed AGB-type mass loss is part of the transformation of FG Sge into an RCB star.

Photometric Periods in the System AG Peg (Belyakina & Prokof'eva, Bull. Crimean Astrophys. Observatory, 86, 42-50, 1992) - Analyse 279 V and B measures in 1962-67 and 1980-89 and find elements Min = JD2438198 + 812xE. Also find possible periods of 265d in I and R, and 227d in B and V, which may correspond to the axial rotation periods of the cool and hot components, respectively.

Evolution of the Symbiotic Binary System AG Draconis (Mikolajevska et al, Astron. J., 109, 1289-1307, 1995) - Analyse new and archival photometry and spectroscopy. Find a masses of 1.5 and 0.5 solar masses, respectively, for the KII giant and the hot component. Both are embedded in a dense nebula. The eruptions are due to thermonuclear runaways on the hot component.

Secondary Photometric Standards for Northern Nova-like Cataclysmic Variables (Henden & Honeycutt, Publ. Astron. Soc. Pacific, 107, No 710, 324-346, 1995) - Provide BV measures accurate to +/-0.02 mag for average of 11 stars in each of the fields of 58 northern cataclysmic variables. V mags range from 12 to 17.

Miscellaneous Binocular Variables in 1994
Melvyn Taylor

EG And (7.1 to 7.8, ZAND, M2III)

87 estimates by; Billington,Hawkins,Pointer,Markham,Day,Albrighton,Fraser, and Brundle show a mean mag of 7.44 (s.d. 0.09 mag)

XX Cam (7.3 to 8.7, RCB?, G1I)
No major fades,the mean mag from 173 estimates was 7.50 (s.d.0.10); some observers record it as bright as 7.1,and fainter at mag 7.8. Observers; Minty,Taylor,Markham,Fraser,Day,Dryden,Albrighton,Pointer.

V393 Cas (7.0 to 8.0, SRA, 393d,M0)
Little varition,mean mag 7.55 (s.d. 0.12Mag) from 72 estimates and four observers;Fraser,Markham,Pointer and Taylor

V465 Cas (6.2 to 7.2,SRB, 60d,M5)
A considerable amount of scatter of mag estimates made on the same day between 12 observers.The mean variation from 5-d mean plots shows a fade from mag 6.5 in Jan to a mag 7.3 min in mid February; then mag 6.8 mid April, mag 7.2 about Jun07, mag 6.8 Jly25 then min about mag 7.2 in mid Sep with a slow overall steady rise to mag 6.6 in late Dec.Observers; Munden, Taylor,Bone,Gavine,Markham,Albrighton,Fraser,Pointer,Kelly,Minty Britton and Evans.

RU Cyg (8.0 to 9.4, SRA, 233d, M6-M8)
Only 22 estimates are available with the star not followed during May, June and September. The mean mag was 8.6 (s.d. 0.21 mag).

RV Cyg (7.1 to 9.3,SRB, 263d, C6)
With only 51 estimates available the star's mean mag was 8.52 (s.d.0.3 mag). Individual observers had the variable at brightest, mag 8.0 and 9.0 at faintest. Observers; Albrighton, Fraser and Markham.

DW Gem (8 to 10, LB, M3 - M7)
Observed only by Gainsford,Fraser and Taylor in Jan to Apr and Nov and Dec with 24 estimates available. Mean mag 9.4 (s.d. 0.17 mag).

IS Gem (5.3 to 6.0, SRC, 47d?, K3)
Observed Jan to May and Sep to Dec there are 38 estimates which give a mean mag of 5.84 (s.d. 0.13 mag). Observers; Munden,Markham, Taylor Fraser,Pointer and Billington.

V566 Her (7.1 to 7.8, SRB, 137d,M4)
Followed throughout the year with only 42 estimates,mean mag 7.73 (s.d 0.14 mag), extreme visual mags 7.3 and 7.9. Observers; Pointer,Fraser Markham and Taylor.

BL Ori (6.3 to 6.9,LB,C6)
Unobserved from May to Aug the star was brighter at mag 6.5 (approx) in the Feb/March intervals.Its mean mag was 6.67 (s.d.0.19 mag) with extreme vales of 6.1 and mag 7.1 from 84 usable estimates.Observers; Pointer, Fraser,Taylor,Markham and Munden.

Z Psc (7.0 to 7.9,SRB, 144d, C7)
Not followed from Apr to Jun there are 32 estimates giving a mean mag of 7.22 (s.d.0.21 mag).Observers;Pointer,Fraser,Taylor,Markham and Albrighton

Observations of suspected variables – 1: NSV 1702 = BD+22 743

Chris Lloyd, John Watson and Dave McAdam

The first suspicions about the variability of NSV 1702 Tau (HD 29935, SAO 76729) seem to have been raised independently by Alcock and Wright in the mid-1960's. During the 1967-68 apparition it appeared constant at $m_v \sim 6.8$ but during the following season was reported by Isles to have brightened from 7.0 to 6.6, and this value was apparently confirmed by other observers (Isles 1969). The star was included in the NSV (Kholopov et al. 1982) largely on the basis of this report. However, the minimum magnitude given by the NSV is $m_v = 8.0$, but there are no visual reports of the star this faint. It seems more likely that this value came from the HD Catalogue which in turn was taken from the earlier BD catalogue, and is probably wrong. Sky Cat 2000 repeats this value and the SAO catalogue gives $m_v = 7.4$. Very little is known about the star. Its spectral type of B9 does not immediately suggest a particular type of variable with this magnitude range, but it could be an eclipsing binary.

Recently Chinarova & Andronov (1993) reported the probable variability of NSV 1702 from an examination of 125 archival photovisual plates covering the period 1961 to 1990. The plates gave a mean $m_{pv} = 7.00$, with an rms residual of 0.091 mag, although it is not clear that this value is any larger than might be expected from observational noise. Chinarova & Andronov also noted that the distribution of residuals was asymmetric, possibly suggesting an eclipsing binary, and four possible periods (two of which are aliases) were suggested. The best of these is 7.3900 days with an amplitude of 0.11 mag.

There are 688 observations of NSV 1702 recorded by VSS observers (see Table 1) between 1971 and 1988, and these are shown in Fig. 1a. Most of the points lie between mag 6.5 and 7.0 with a mean magnitude, $m_v = 6.80$ and a standard deviation, $\sigma = 0.15$ mag. There is very little suggestion of any variation although the scatter does change with time and in particular, there is a cluster of brighter observations towards the end of the period. Equally there does not seem to be a tail of fainter observations that might indicate an eclipsing binary.

Most of the bright points near the end of the run are due to one observer whose observations are systematically brighter than the mean. It was noticed that other observers also showed small but consistent shifts with respect to

Table 1: List of observers

S W Albrighton, C M Allen, T Brelstaff, P R Clayton, E H Collinson, K J England, R B I Fraser, V J Freeman, D Griffin, P J Harpur, C Henshaw, I D Howarth, D Hufton, A Hutchings, J E Isles, B Jobson, G J Kirby, T Markham, R H McNaught, I A Middlemist, B Morell, D A Pickup, A K Porter, P Quadt, D W Robinson, M D Taylor, J D Wise, W J Worraker.

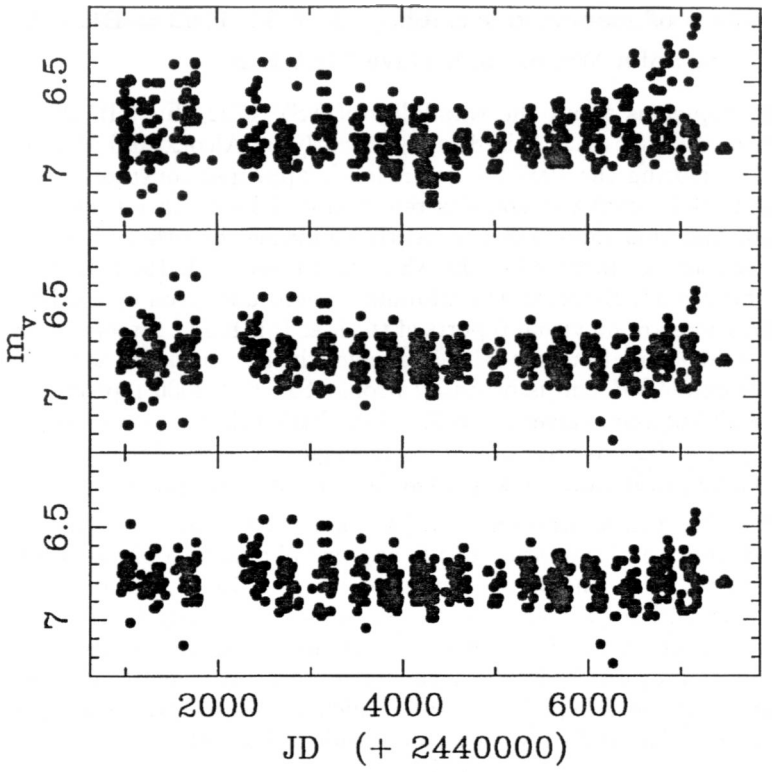


Figure 1: (a, top) The raw light curve of NSV 1702 from the VSS data; (b, middle) the data after correction for personal bias, and (c, bottom) the corrected data after the removal of observations due to particular observers.

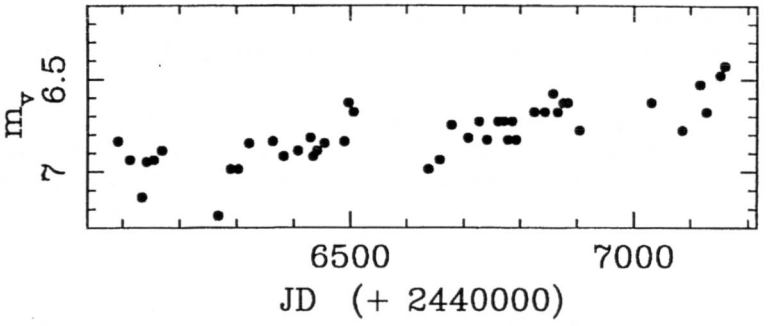


Figure 2: The observations of one observer showing an apparent tend which is not supported by the rest of the data.

the rest. It is well know that even using the same comparison stars different observers will perceive a field differently; they will have a personal bias, perhaps because of the colours or disposition of the stars. The personal bias is found by calculating the systematic difference between the observations of each observer and the mean light curve. In the case of NSV 1702 there is no obvious variation so it was assumed that the magnitude of the star was constant. The offsets from the mean for each observer (the personal bias) were calculated and then removed. The resulting plot (Fig. 1b) shows considerably reduced scatter, although some discordant points remain. Finally all the observations made by observers who contributed fewer than 5 points (3) or whose observations had a standard deviation, $\sigma > 0.20$ (1) were removed. These restrictions produce a marginal improvement (Fig. 1c) although most of the extreme points still remain. As a result of this process the mean magnitude has changed marginally to $m_v = 6.79$ but the standard deviation has improved to $\sigma = 0.10$ mag.

Most of the extreme points are due to the observer mentioned earlier whose observations show a clear trend (Fig. 2). As this is at odds with the rest of the observers it should send a clear warning to anyone mounting individual observing programmes. A single observer can obviously draw attention to suspicious stars but a campaign should be undertaken by at least two people.

The raw observations show little indication of the seasonal behaviour reported in 1968-69, with the possible exception of the years 1979-81. These are shown in detail in Fig. 3a and suggest a fall of perhaps 0.4 mag with a recovery the following season. The same section of the de-biased data shows no such feature (Fig. 3b). It seems likely that this variation is entirely spurious and results from the chance combination of the personal biases of different observers.

A period search was performed on the data using the classical Discrete Fourier Transform (DFT) which calculates the power, that is the semi-amplitude squared, of a sinusoidal variation in the data at each sample frequency through the range (*e.g.* Howarth 1991). The power spectrum of the raw observations (Fig. 4a) shows a clear variation near zero frequency ($\sim$ 5000 days) with an amplitude of ~ 0.1 mag, and this corresponds to the change in mean magnitude over the span of the data. The other feature at 1 cycle day^{-1} is an alias of the first and is due to the predominantly 1-day spacing of the data. The power spectrum of the de-biased data (Fig. 4b) is essentially noise. The maximum power corresponds to an amplitude of 0.05 mag at a period of 178 days, half a year. As the observing season of this star is about 6 months the time scale of the variation is probably one year. The phasing is such that maximum brightness corresponds to the time of year, early December, when the star is at opposition. It seems unlikely that this is due purely to chance so there is probably a weak, apparently seasonal feature in the data. As observations are made preferentially in the evenings this feature is in reality diurnal rather than seasonal, possibly an altitude or position angle effect. Whatever the origin it is weak and poorly defined. There is no periodic variability with a semi-amplitude above ~ 0.02

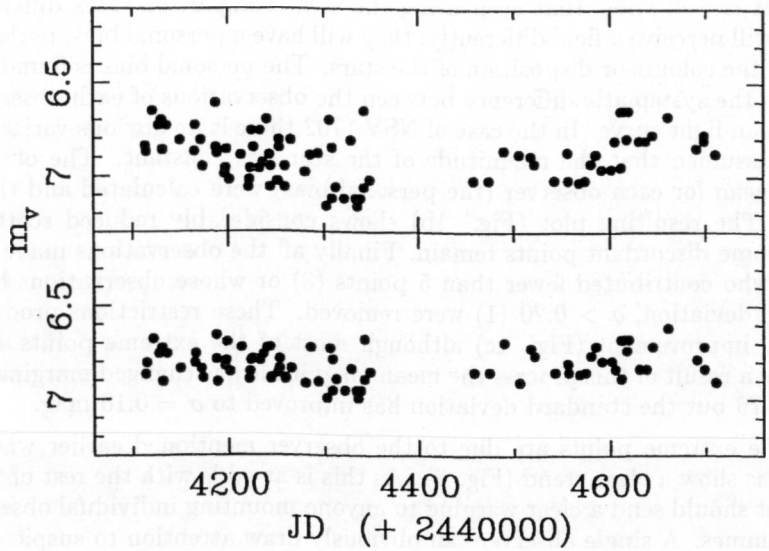


Figure 3: (a, top) The raw light curve for the seasons 1979-81 showing an apparent fade and recovery, and (b, bottom) the same section of the de-biased data, which shows no variation.

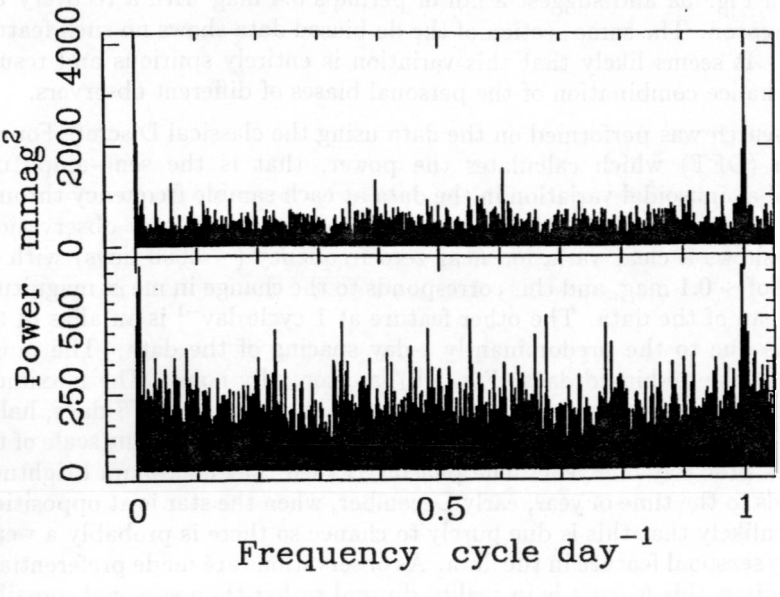


Figure 4: (a, top) The DFT power spectrum of the raw data which reflects the overall change in the shape of the observations in Fig. 1a, and (b, bottom) the power spectrum of the de-biased data.

mag. None of the periods suggested by Chinarova & Andronov appear above the noise. Of course the power spectrum analysis is sensitive to sinusoidal variations and not so likely to detect other types of variation, particularly eclipses. However, as was pointed out earlier the data do not show anything that could be interpreted in that way.

New photoelectric observations have also been made of NSV 1702 from Catsford in East Sussex, with a (modified) prototype JEAP photon counting photometer (Walker 1986, 1991) attached to a 25-cm reflector. The star was observed through a nominal V filter 10 times over 4 nights on 1995 March 10, 12, 17 and 23, using HD 29859 ($V = 6.14$) and HD 30122 ($V = 6.35$) as comparison stars. No variation was seen. The mean ΔV with respect to HD 29859 is +0.685 with $\sigma = 0.009$, giving $V = 6.82$ for NSV 1702. The mean ΔV between the two comparisons is +0.130, with $\sigma = 0.021$, giving $V = 6.27$ for HD 30122, which is ~ 0.1 mag brighter than the published value.

In conclusion, removing the personal bias from the visual observations significantly improves the light curve. The analysis shows that the dominant periodic feature in the data is due to a small residual observational bias. The limit on any periodic variation from the visual observations alone is ~ 0.02 mag. This does not mean that a variation at such a level could be detected, simply that this is the level of the noise. From the admittedly limited photoelectric observations there is no indication of any variation above the level of ~ 0.01 mag. The analysis also highlights lessons for users of visual observations and for visual observers themselves. Firstly, spurious variations may appear in large datasets combined from a number of observers, due to personal bias. Secondly, and already widely recognised, individual observers who are interested in pursuing a particular star should find a collaborator. As a corollary it must be said that had the star been observed more intensively for perhaps two years its variability could have been decided 20 years ago. Finally, as a general comment, observers should report what they see, not what they think they should see, nor try to correct for any perceived bias. The best they can do is observe consistently then corrections can be applied, as in this case, to improve the value of a combined set of observations.

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Observations of suspected variables – 2: NSV 1280 Tau = CSV 6048

Chris Lloyd and Dave McAdam

NSV 1280 (HD 23410, SAO 76156, BD+22 545, Melotte 22 801, ADS 2748 A) is a relatively well observed member of the Pleiades. According to the NSV (Kholopov et al. 1982) it is possibly a rapid, irregular variable with a range, $m_{pg} = 6.5 - 7.3$, and a spectral type of A0V. Th SAO catalogue gives $m_{pg} = 7.7$, $m_v = 7.1$ (a little faint) and the same spectral type. The photoelectric values repeated in the literature are $V = 6.85$ and $B - V = 0.04$. It is also claimed to be a spectroscopic binary (Abt et al. 1965) with a period of 7.1538 days (don't be fooled by the precision) but other radial velocity measurements show no variation.

The VSS has accumulated 1208 observations of NSV 1280 (see Table 1 for the list of observers) during the years 1971 - 1987 and 1994. One obviously discordant point was removed. The raw observations (Fig. 1a) show considerable change in the scatter with time, but no clear variation. The mean magnitude, $m_v = 7.21$, is ~ 0.4 mag fainter than the photoelectric value, and the standard deviation, $\sigma = 0.16$ mag.

As in the previous paper on NSV 1702 the personal bias of each observer has been calculated and removed on the assumption that the magnitude of the star is constant. The de-biased data are shown in Fig. 1b and have a slightly improved σ of 0.14 mag. Nevertheless the scatter is significantly larger than that of NSV 1702 and in some cases the σ of individual observers > 0.3 mag. No effort was made to further clean the data.

The power spectrum of the raw observations (Fig. 2a) is mostly noise but the main feature is the complex near zero frequency ($\sim$ 8200, 2000 and 365 days). These have amplitudes of ~ 0.06 mag and the longer periods are due to the long term variations in the data. The features near 1 cycle day^{-1} are the 1-day aliases of the long period variations, caused by the predominantly one day spacing of the data. In the power spectrum of the de-biased data (Fig. 2b) the level of the noise is considerably reduced and the dominant feature occurs at a

Table 1: List of observers

S W Albrighton, N R Baker, B J Beesley, R Billington, J van der Bilt, J Bingham, G C Blair, T Brelstaff, J S Bullivant, P R Clayton, H Colquhoun, M J Currie, K J England, R B I Fraser, V J Freeman, A Gardner, T Gough, J P Harper, P J Harpur, M A Hather, C Henshaw, P W Hornby, I D Howarth, D Hufton, G M Hurst, A Hutchings, J E Isles, C J Jackson, B Jobson, T Markham, L R Matthews, R H McNaught, I A Middlemist, I Miller, I P Nartowicz, D J Northwood, C Pezzarossa, D A Pickup, M Poxon, P Quadt, N Richardson, D W Robinson, T G Saville, A L Smith, M D Taylor, G S Warbey, R P Watts, J D Wise, P Yates.

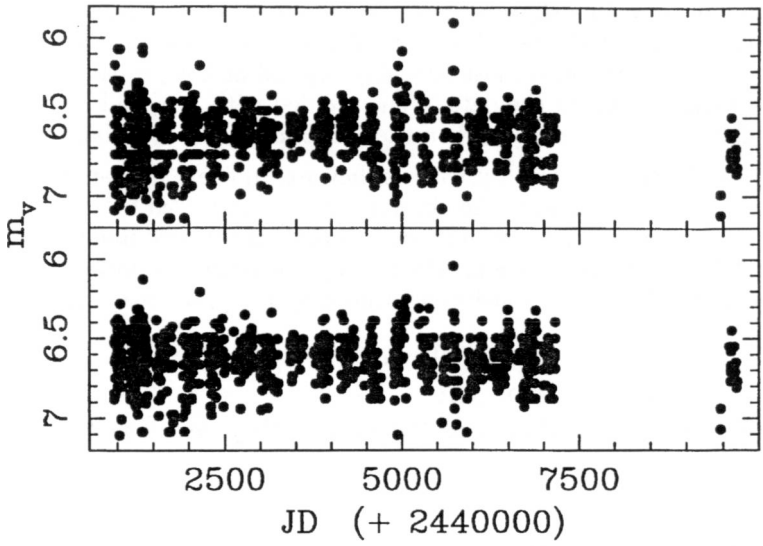

Figure 1: (a, top) The raw light curve of NSV 1280 from the VSS data; (b, bottom) the data after correction for personal bias.

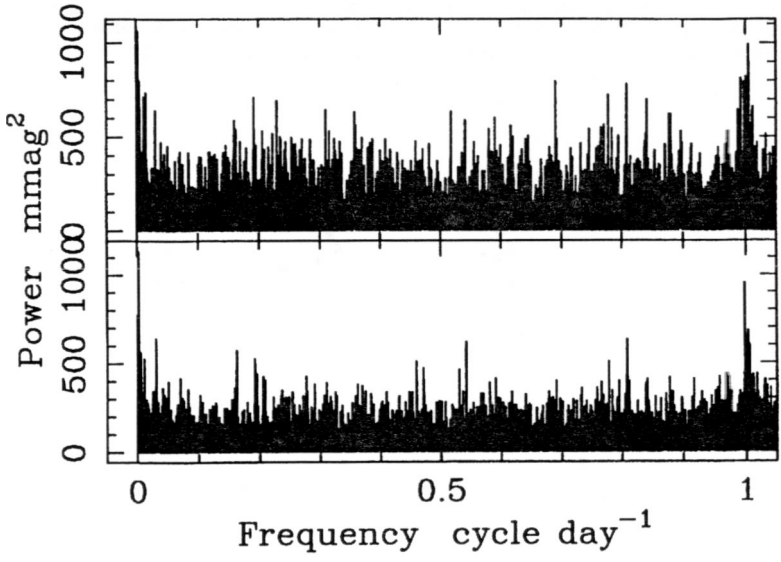

Figure 2: (a, top) The DFT power spectrum of the raw data which reflects the overall change in the shape of the observations in Fig. 1a, and (b, bottom) the power spectrum of the de-biased data. The dominant feature occurs at a period of 1 year.

period of 365 days, with a slightly increased amplitude of 0.07 mag. It's aliases at 1 sidereal day and 1 sidereal day^{-1} are also visible. As with NSV 1702 the time scale of this variation is most probably diurnal and it probably reflects a small observational bias in the data. When folded with a period of 1 sidereal day maximum brightness occurs when the star is near the meridian.

The previous reports of variability, such as they are, indicate short-period, irregular variations. The spacing of the observations, as indicated by the aliases in the power spectra, is generally around one day and totally unsuited to detecting rapid variability. On the occasions when several observations have been made during one night there is no consistency that might support real variability.

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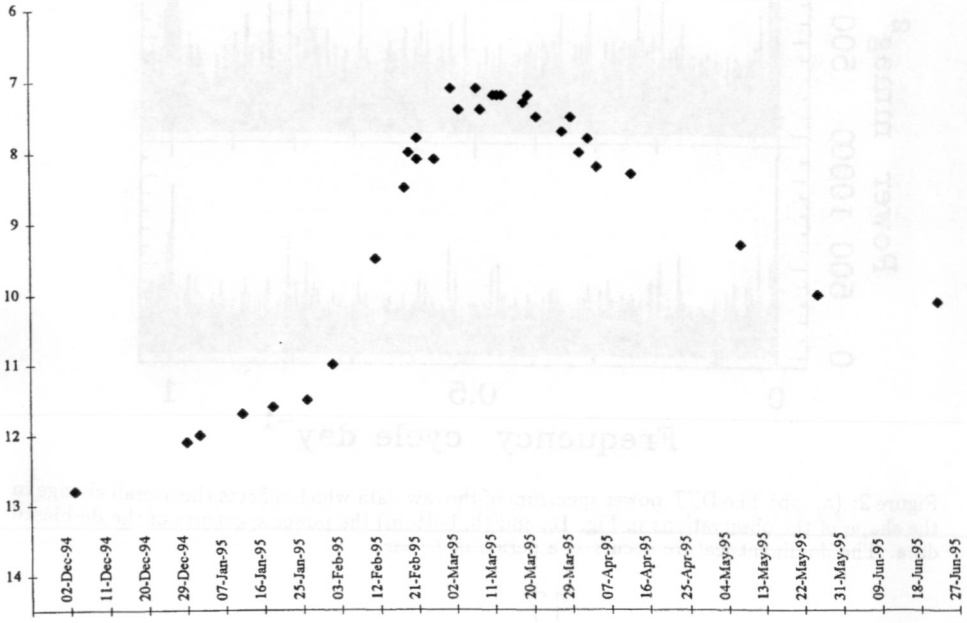
SPA-VSS Observations of R Ursae Majoris
Tony Markham

The Variable Star Section of the Society for Popular Astronomy has three Mira stars on its observing program that are not on the VSS program: T Cep, R Tri and R UMa. The accompanying light-curve shows the SPA-VSS observations of the 1995 maximum of R UMa. Although not as bright as the 1994 maximum, this was nevertheless still brighter than the average maximum magnitude of 7.5.



Summaries of IBVSs 4157 - 4209

4157 Photometric observations of eclipses in the symbiotic triple system CH Cyg. (Skopal, 1995) *New photometry which shows that CH Cyg is an eclipsing system, contradicting recent theories.*

4158 The discovery of Ha emission in V373 Cas. (Berdyugin et al, 1995)

4159 A possible new variable star classification for TX Piscium. (Wasatonic, 1995) *PEP carried out from 1990-1995 as part of the AAVSO Small Amplitude Red Variable programme, suggest that this Lb carbon star should be re-classified as a semi-regular.*

4160 Solar Magnetic field modulation of the Neutrino flux. (Obridko & Rivin, 1995)

4161 Possible low amplitude light variations of DI Her. (Marshall et al, 1995)

4162 On the age of flare stars FS2 and the cluster of α Persei. (Parsamian, 1995)

4163 Observations of a newly discovered SU UMa type star HV Aur. (Nogami et al, 1995) *Detection of superhumps in this faint dwarf nova confirm it's UGSU status.*

4164 More classification needed for NSV 11271 and VY Lyrae. (Hoffleit, 1995)

4165 New period determination for EY Cyg. (Sarna et al, 1995) *Revised orbital period for this UG star, which is on the recurrent objects programme.*

4166 Has the Delta Scuti star BE Lyn a companion? (Kiss & Szatmáry, 1995)

4167 Precision B,V light curves of EK Coma Berenices. (Samec et al, 1995)

4168 Period correction for the new eclipsing binary DHK 41. (Kaiser et al, 1995)

4169 Faint companion to UX Antilae. (Milone, 1995)

4170 A long period early F-type variable: HR 8799. (Rodriguez & Zerbi, 1995)

4171 Onset of pulsation of V99 in M15. (Barlai & Szeidl, 1995)

4172 New minima times and period behaviour for the eclipsing variables RT Andromedae, 44i Bootis and GO Cygni. (Rovithis-Livaniou et al, 1995)

4173 Optical monitoring of two X-Ray transient sources. (Hudec, 1995) *Photographic plate searches to analyse long term behaviour for the X-ray transient GRO 1008-57, and the X-ray nova GROJ 1719-24.*

4174 Observations of a $V = R$ transition of the Be star 66 Oph. (Hanuschik et al, 1995)

4175 Photometric examination of CP2 peculiarity for HD 200405, HR 44, HR 7752 and HR 9092. (Schnell & Maitzen, 1995)

4176 Photometric variability of the ellipsoidal star and spectroscopic binary 7 Camelopardalis. (Krisciunas et al, 1995)

4177 Complete CCD U,B,V,R,I light curves of the short period eclising binary: V361 Lyrae. (Gray et al, 1995

4178 CCD Photometry of Six faint Cataclysmic Variables. (Haefner, 1995) *Photometric observations with the Danish 1.5m telescope at the ESO of PG 1403-111, PG1522+122, NSV09208, NSV 14152, GF Gru, Hawkins V6.*

4179 The first period change discovered in the bright Algol system UV Leonis. (Wunder, 1995)

4180 HD 6474: An UU Her Spectrum variable? (Jaschek et al, 1995)

4181 New times of minima of eclising binaries VW Cep, U Cep and RZ Cam. (Kiss et al, 1995)

4182 The orbital period of the Rosat cataclysmic variable S10932 Comae Berenices. (Wenzel et al, 1995)

4183 A new semiregular variable S10934 in Corona Borealis. (Wenzel, 1995) *Discovered whilst searching a Sonneberg Sky Patrol plate for the optical counterpart of the BATSE gamma ray burst source 920525. From examination of 120 patrol plates between 1962 & 1965, an average cycle length of 60d and amplitude of 1.7 mag. were found.*

4184 The ellipsoidal variability of HR 4646. (Steinbring et al, 1995)

4185 Narrowing the Main Sequence mass gap. (Popper, 1995)

4186 UBV light curves of the near-contact binary AK Canis Minoris. (Samec et al, 1995)

4187 Eclipse observations of EQ Tau. (Benbow & Mutel, 1995) *Observations of a poorly studied W UMa type eclipsing binary.*

4188 HD 147491 is variable, but it is not a delta Scuti star. (Handler, 1995)

4189 X Persei. (Zamanov & Zamanova, 1995) *V band light curve over 4000d. Suggests that X Per is now leaving it's high state, and may be entering a new low state.*

4190 Photoelectric observations of the eclipsing variable ER Vulpeculae. (Zeinali et al, 1995)

4191 Confirmation of variability in the λ Bootis stars HD 142994 and HD 142703. (Paunzen et al, 1995)

4192 The active star RE0041+342. (Robb, 1995)

4193 HS Virginis - A dwarf Nova with 8 day outburst cycle length. (Kato et al, 1995)

4194 Times of minima of eight eclipsing binaries. (Sandberg-Lacy et al, 1995) *Times of minima for ...IT Cas, PV Cas, EK Cep, V541 Cyg, V364 Lac, FS Mon, FT Ori & GG Ori - derived from photometric observations made at Ege university observatory in Turkey.*

4195 A List of variables similar to γ Dor. (Krisciunas & Handler, 1995)

4196 Periods and types for six red variables. (Williams, 1995) *Details are given for TT Sex, V1060 Tau, V704 Cas, BP CVn, V517 per & LM Peg.*

4197 BH Cas is an eclipsing binary. (Metcalfe, 1995) *Confirmation of W UMa type eclipse variations in BH Cas.*

4198 NSV 7020 Boo = BV 100 : RR ab Variable. (Bbsag & Moser, 1995)
4199 Orbital parameters of six spectroscopic binary Cepheids. (Gorynya et al, 1995)
4200 Photoelectric observations of the T Tau type variable BZ Sgr. (Berdnikov et al, 1995)
4201 Photoelectric BV (RI) observations of V1359 Aql. (Berdnikov & Turner, 1995).
4202 Photoelectric BV observations of V382 Car. (Berdnikov & Turner, 1995).
4203 UBV observations of AB Dor, 1994-5. (Bos et al, 1995).
4204 A suspected K3V variable. (Sterken et al, 1995). *Suspected variablility in the secondary comparison star to the X-ray source Wray 977. Finder chart included.*
4205 A new orbit of the binary RR Lyrae star TU UMa. (Kiss et al, 1995)
4206 On the periodicity of W CrA/1 and Wa CrA/2 WTTS. (Shevchenko et al, 1995) *WTTS= Weak Line T Tauri Stars.*
4207 Photometry of SS Cyg in 1993. (Marchev & Kjurkchieva, 1995)
4208 Confirmation of PG 1510+234 as a dwarf nova with a short outburst cycle length. (Iida et al, 1995)
4209 Discovery of 10.2-minute oscillations in the Ap Sr (EuCr) star HD 185256. (Kurtz & Martinez, 1995)

PQ Cephei Captured on Scotchchrome 800/3200P
David Pugh

In trying out Scotchchrome 8-00/3200P colour slide film (rated at 800), I found that on driven 50mm standard lense exposures it records red stars very well. For example: R Leo was recorded on Feb 26/27, SS Vir on Mar 3/4, and T and HK Lyr on Jun 22/23. These were all identified using Uranometria 2000. However, on one and two minute exposures taken on 1995 Mar 6/7 at 2340-2344 UT (with a 500mm f1.8 lens at f2.8), I noticed a deep red star in Cepheus at about 21h 46m +73° 39' (2000). There is no star in this vicinity on Uranometria. Gary Poyner subsequently found that this position reasonably matched that of the Mira-type variable PQ Cephei which has a photographic range of 10.5 to below 15.5 and which was only named as a variable star relatively recently (it is not in the 1976 GCVS Supplement).

Taking V magnitudes for the following comparison stars from Sky Catalogue 2000, I estimated its magnitude to be about 7.5. Nearby is the slow irregular variable DM Cephei (photographic range 8.4 to 9.6) which, on the same images appears orange in colour and is as bright as SAO 10186 (mag 6.6).

SAO 10186	V = 6.6	B-V = 0.1	SAO 10142	V = 7.3	B-V = 0.0
SAO 10183	7.2	0.0	SAO 10084	7.8	0.9

Note added by the editor: The 1985 General Catalogue of Variable Stars gives the following on PQ Cep: type = Mira; range = 10.5 - <15.5p; period = unknown; spectrum = C6-,3e(N); 1950 RA/Dec = 21h 43m 58s +73° 23.8'. The 2000 RA/Dec is 21h 44m 26s +73° 37.7'approx. For a carbon star, such as this, one would expect a B-V of about 3 mags, which would imply a visual maximum of about 7.5. David's photographic observations would appear to confirm this. It seems amazing that a Mira star could get as bright as this and yet remain almost completely unknown; neither the present VSS Director nor the previous one had even heard of it.

Eclipsing Binary Predictions

The following predictions are calculated for an observer at 53 degrees north, 1.5 degrees west but should be usable for observers throughout the British Isles. The times of mid-eclipse appear in parentheses with the start and end times of visibility on either side. The times are hours GMAT, that is UT-12h. 'D' and 'L' are used to indicate where daylight and low altitude, respectively, prevent part of the eclipse from being visible. Charts for all of the stars included in these predictions (17 in all - see below for a list) are available from the Director at 10p each (please enclose a large SAE).

Stars Included in the Predictions

Star	Range (mags)	Period (days)	Duration of Eclipse (hours)
RZ Cas	6.18 - 7.72V	1.19524892	4.9
U Cep	6.75 - 9.24V	2.49307	9.0
SS Cet	9.4 - 13.0v	2.973967	9.3
SW Cyg	9.24 - 11.83V	4.573011	13
Z Dra	10.8 - 14.1p	1.3574257	4.8
TW Dra	7.3 - 8.9v	2.806842	11
S Equ	8.0 - 10.08V	3.4361291	11
RW Gem	9.53 - 11.76V	2.8654972	10
V640 Ori	11.2 - 13.5p	2.0207326	5.3
Z Per	9.7 - 12.4p	3.0562868	10
ST Per	9.52 - 11.40V	2.6483358	8.3
Y Psc	9.44 - 12.23V	3.765723	9.0
U Sge	6.45 - 9.28V	3.3806129	14
RW Tau	7.98 - 11.59V	2.768780	9.3
X Tri	8.88 - 11.27V	0.9715306	4.2
TX UMa	7.06 - 8.80V	3.063305	8.8
Z Vul	7.25 - 8.90V	2.45492679	11

The Predictions

1995 Oct 1 Sun
Y Psc D07(04)09
X Tri D07(06)09
ST Per D07(07)11
Z Dra D07(09)11
RW Tau L08(10)15

1995 Oct 2 Mon
Z Vul D06(03)08
X Tri D06(06)08
U Sge D06(09)13L
SS Cet L09(08)13
Z Dra 15(17)17D

1995 Oct 3 Tue
SW Cyg D06(03)09
TW Dra D06(05)10
X Tri D06(05)08
TX UMa D06(09)09L
TX UMa L11(09)14
S Equ 12(17)13L

1995 Oct 4 Wed
X Tri D06(04)07
RZ Cas D06(07)10
RW Tau L08(05)10
Z Vul 08(14)14L

1995 Oct 5 Thu
Z Per D06(02)07
U Cep D06(11)15
Z Dra 08(10)13
SS Cet L09(07)12
RZ Cas 09(12)14

1995 Oct 6 Fri
TX UMa D06(11)08L
ST Per 10(14)17D
TX UMa L11(11)16
RZ Cas 14(17)17D
Z Dra 16(19)17D
RW Gem 17(22)17D

1995 Oct 7 Sat
S Equ D06(04)09
SW Cyg 11(17)17D

1995 Oct 8 Sun
Z Per D06(04)09
SS Cet L09(07)11
Y Psc 12(17)16L
TW Dra 14(19)17D

1995 Oct 9 Mon
U Sge D06(04)09
ST Per D06(05)10
Z Vul 06(12)13L
TX UMa 08(12)08L
Z Dra 10(12)14
RW Tau 13(18)17D
RW Gem 14(19)17D

1995 Oct 10 Tue
RZ Cas D06(07)09
U Cep D06(10)15
S Equ 09(14)13L

1995 Oct 11 Wed
Z Per D06(05)10
SS Cet L08(06)11
RZ Cas 09(11)14
TW Dra 10(15)17D
ST Per 17(21)17D

1995 Oct 12 Thu
Z Dra D06(05)08
SW Cyg D06(07)13
Y Psc 07(11)16L
U Sge 07(13)12L
RW Tau 08(12)17
RW Gem 10(16)17D
TX UMa L11(14)17D
RZ Cas 14(16)17D

1995 Oct 13 Fri
Z Dra 11(14)16

1995 Oct 14 Sat
Z Per D06(07)11
Z Vul D06(09)13L
TW Dra D06(10)15
SS Cet L08(05)10
ST Per 08(13)17

1995 Oct 15 Sun
U Cep D06(10)15
RW Tau L07(07)11
RW Gem L09(12)17D
TX UMa 11(16)17D

1995 Oct 16 Mon
Y Psc D06(06)10
RZ Cas D06(06)08
Z Dra D06(07)09
SW Cyg 14(20)17D
X Tri 17(20)17D

1995 Oct 17 Tue
ST Per D06(04)08
TW Dra D06(05)10
Z Per D06(08)13
S Equ D06(11)12L
SS Cet L08(05)10
RZ Cas 08(11)13
Z Dra 13(15)17D
X Tri 16(19)17D
U Cep 17(22)17D
1995 Oct 18 Wed
RW Gem L09(09)14
TX UMa 12(17)17D
RZ Cas 13(15)17D
X Tri 16(18)17D
1995 Oct 19 Thu
U Sge D06(07)12L
Z Vul D06(07)13
X Tri 15(17)17D
ST Per 16(20)17D
1995 Oct 20 Fri
TW Dra D06(01)06
Z Per D06(09)14
U Cep D06(10)14
Z Dra 06(09)11
SS Cet L08(04)09
X Tri 14(17)17D
RW Tau 15(20)17D
1995 Oct 21 Sat
SW Cyg D06(10)16
RW Gem L09(06)11
X Tri 14(16)18D
TX UMa 14(19)18D
Z Dra 15(17)18D
1995 Oct 22 Sun
RZ Cas D06(05)08
ST Per 07(11)15
U Sge 11(16)12L
X Tri 13(15)18D
TW Dra 15(20)18D
U Cep 17(22)18D
1995 Oct 23 Mon
Z Per 06(11)15
SS Cet L08(04)08
RZ Cas 08(10)13
RW Tau 09(14)18D
X Tri 12(15)17
Y Psc 14(18)15L
1995 Oct 24 Tue
Z Vul D06(05)10
S Equ D06(08)12L
Z Dra 08(10)13
X Tri 12(14)17
RZ Cas 12(15)17
TX UMa 15(20)18D
1995 Oct 25 Wed
ST Per D06(03)07
U Cep D06(09)14
TW Dra 10(16)18D
X Tri 11(13)16
Z Dra 17(19)18D
RZ Cas 17(20)18D
1995 Oct 26 Thu
SW Cyg D06(00)06
U Sge D06(01)07
RW Tau L06(08)13
Z Per 07(12)17
SS Cet L07(03)08
X Tri 10(13)15
Z Vul 11(16)12L
1995 Oct 27 Fri
Z Dra D06(04)06
Y Psc 08(13)15L
X Tri 09(12)14
ST Per 14(18)18D
U Cep 16(21)18D
TX UMa 17(22)18D
1995 Oct 28 Sat
RZ Cas D06(05)07
TW Dra 06(11)16
X Tri 09(11)14
Z Dra 10(12)14
1995 Oct 29 Sun
Z Vul D06(03)08
U Sge D06(11)11L
RW Tau L06(03)08
RZ Cas 07(10)12
X Tri 08(11)13
Z Per 08(13)18D
RW Gem 15(20)18D
1995 Oct 30 Mon
U Cep D05(09)14
ST Per 06(10)14
X Tri 07(10)12
SW Cyg 08(14)16L
RZ Cas 12(14)17
1995 Oct 31 Tue
S Equ D05(05)10
Z Dra D05(05)08
TW Dra D05(06)11
Y Psc D05(07)12
X Tri 07(09)12
Z Vul 09(14)12L
RZ Cas 17(19)18D
RW Tau 17(21)18D
1995 Nov 1 Wed
X Tri 06(09)11
Z Per 10(15)18D
Z Dra 11(14)16
RW Gem 12(17)18D
U Cep 16(21)18D
1995 Nov 2 Thu
ST Per D05(01)06
X Tri D05(08)10
1995 Nov 3 Fri
Z Vul D05(01)06
TW Dra D05(02)07
RZ Cas D05(04)07
X Tri D05(07)10
S Equ 10(15)11L
RW Tau 11(16)18D
1995 Nov 4 Sat
Y Psc D05(02)06
SW Cyg D05(04)10
X Tri D05(07)09
Z Dra D05(07)09
U Cep D05(09)13
RZ Cas 07(09)11
RW Gem 09(14)18D
Z Per 11(16)18D
ST Per 13(17)18D
1995 Nov 5 Sun
U Sge D05(05)11
X Tri D05(06)08
Z Vul 06(12)11L
RZ Cas 11(14)16
Z Dra 13(16)18D
TW Dra 16(21)18D
1995 Nov 6 Mon
TX UMa D05(02)06L
X Tri D05(05)08
RW Tau 06(10)15
U Cep 16(20)18D
RZ Cas 16(18)18D
1995 Nov 7 Tue
S Equ D05(02)07
X Tri D05(04)07
ST Per D05(09)13
RW Gem L08(11)16
Z Per 13(17)18D
1995 Nov 8 Wed
X Tri D05(04)06
Z Dra 06(09)11
U Sge 08(14)11L
SW Cyg 11(17)16L
TW Dra 11(16)18D
SW Cyg L18(17)18D
1995 Nov 9 Thu
X Tri D05(03)06
TX UMa D05(04)06L
RZ Cas D05(04)06
RW Tau L05(05)09
U Cep D05(08)13
Z Dra 15(17)18D
1995 Nov 10 Fri
Z Vul D05(10)11L
RZ Cas 06(08)11
S Equ 07(12)11L
RW Gem L08(07)12
Z Per 14(19)18D
1995 Nov 11 Sat
TW Dra 07(12)17
Y Psc 10(14)14L
RZ Cas 11(13)16
U Cep 15(20)18D
1995 Nov 12 Sun
TX UMa D05(05)06L
Z Dra 08(10)13
TX UMa L08(05)10
ST Per 12(16)18D
RZ Cas 15(18)18D
1995 Nov 13 Mon
SW Cyg D05(07)13
RW Gem L07(04)09
Z Per 15(20)18D
Z Dra 17(19)18D
1995 Nov 14 Tue
TW Dra D05(07)12
U Cep D05(08)13
RW Tau 13(18)18D
1995 Nov 15 Wed
RZ Cas D05(03)06
Z Dra D05(04)06
TX UMa D05(07)06L
ST Per D05(07)11
Z Vul D05(07)11L
U Sge D05(08)10L
Y Psc D05(09)13
TX UMa L08(07)11
1995 Nov 16 Thu
RZ Cas 05(08)10
Z Dra 10(12)15
U Cep 15(20)18D
Z Per 17(21)18D
1995 Nov 17 Fri
TW Dra D05(02)07
S Equ D05(09)10L
RW Tau 07(12)17
RZ Cas 10(13)15
SW Cyg 15(21)15L
SW Cyg L17(21)18D
1995 Nov 18 Sat
TX UMa D05(08)06L
TX UMa L08(08)13
V640 Ori L10(07)10
RZ Cas 15(17)18D
RW Gem 16(22)18D
1995 Nov 19 Sun
Y Psc D05(03)08
Z Dra D05(05)08
U Cep D05(08)12
TW Dra 17(22)18D
X Tri 17(20)17L
Z Per 18(23)18D
1995 Nov 20 Mon
Z Vul D05(05)10
RW Tau D05(07)11
V640 Ori L10(08)11
ST Per 10(14)18D
Z Dra 11(14)16
X Tri 16(19)17L
1995 Nov 21 Tue
RZ Cas D05(03)05
TX UMa 05(10)05L
TX UMa L08(10)14
RW Gem 13(18)18D
U Cep 15(19)18D
X Tri 16(18)17L
1995 Nov 22 Wed
U Sge D05(02)08

RZ Cas D05(07)10
SW Cyg D05(11)15L
V640 Ori L10(08)11
TW Dra 12(17)18D
X Tri 15(18)17L

1995 Nov 23 Thu

RW Tau D05(01)06
ST Per D05(06)10
Z Dra D05(07)09
RZ Cas 10(12)14
X Tri 14(17)17L

1995 Nov 24 Fri

S Equ D05(06)10L
U Cep D05(07)12
TX UMa L08(11)16
V640 Ori L10(09)12
RW Gem 10(15)18D
Z Dra 13(16)18
X Tri 14(16)17L
RZ Cas 14(17)18D

1995 Nov 25 Sat

Z Vul D05(03)08
U Sge 06(12)10L
TW Dra 07(13)18
X Tri 13(15)17L
RW Tau 15(19)18D
ST Per 17(22)18D

1995 Nov 26 Sun

Z Per D05(01)06
V640 Ori L10(09)12
Y Psc 11(16)13L
X Tri 12(15)17L
U Cep 14(19)18D
SW Cyg 18(24)18D

1995 Nov 27 Mon

SW Cyg D05(00)06
Z Dra 06(09)11
RW Gem 07(12)17
TX UMa 08(13)17
Z Vul 09(14)10L
X Tri 12(14)17

1995 Nov 28 Tue

RZ Cas D05(07)09
TW Dra D05(08)13
ST Per 09(13)17
RW Tau 09(14)19D
V640 Ori L09(10)13
X Tri 11(13)16
Z Dra 15(17)19D

1995 Nov 29 Wed

Z Per D05(03)08
U Cep D05(07)12
RZ Cas 09(11)14
X Tri 10(13)15

1995 Nov 30 Thu

Z Vul D05(01)06
Y Psc 06(10)12L
RW Gem L06(09)14
V640 Ori L09(10)13
X Tri 10(12)15
TX UMa 10(14)19D
RZ Cas 14(16)19
SS Cet 15(19)15L

1995 Dec 1 Fri

S Equ D05(03)08
TW Dra D05(03)08
ST Per D05(05)09
RW Tau D05(08)13
SW Cyg 08(14)14L
Z Dra 08(11)13
X Tri 09(11)14
U Cep 14(19)19D
SW Cyg L16(14)19D
RZ Cas 18(21)19D

1995 Dec 2 Sat

Z Per D05(04)09
U Sge D05(06)09L
Z Vul 06(12)10L
X Tri 08(11)13
V640 Ori L09(11)14
Z Dra 17(19)19D

1995 Dec 3 Sun

RW Gem L06(05)11
X Tri 08(10)13
TX UMa 11(16)19D
SS Cet 14(19)15L
ST Per 16(20)19D
TW Dra 18(23)19D

1995 Dec 4 Mon

RW Tau D05(03)07
Z Dra D05(04)06
Y Psc D05(05)09
RZ Cas D05(06)09
U Cep D05(07)11
X Tri 07(09)12
S Equ 08(13)09L
V640 Ori L09(11)14

1995 Dec 5 Tue

Z Per D05(05)10
X Tri 06(09)11
RZ Cas 08(11)13
Z Dra 10(12)15

1995 Dec 6 Wed

SW Cyg D05(04)10
X Tri 05(08)10
RW Gem L06(02)07
ST Per 08(12)16
V640 Ori 09(12)15
TX UMa 13(17)19D
TW Dra 13(18)19D
RZ Cas 13(16)18
SS Cet 14(18)15L
U Cep 14(19)19D
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Z Dra 18(21)19D

1995 Dec 7 Thu

X Tri D05(07)10
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RZ Cas 18(20)19D

1995 Dec 8 Fri

S Equ D05(00)05
Z Dra D05(05)08
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Z Per D05(07)12
V640 Ori 10(12)15
RW Gem 18(23)19D

1995 Dec 9 Sat

U Sge D05(00)06
ST Per D05(03)07
X Tri D05(06)08
U Cep D05(06)11
TW Dra 08(13)18
RW Tau 11(16)18L
Z Dra 12(14)16
SS Cet 13(18)15L
TX UMa 14(19)19D

1995 Dec 10 Sun

X Tri D05(05)08
RZ Cas D05(06)08
V640 Ori 10(13)16
SW Cyg 11(18)14L
SW Cyg L16(18)19D

1995 Dec 11 Mon

X Tri D05(05)07
Z Per D05(08)13
S Equ 05(10)09L
RZ Cas 08(10)13
U Cep 13(18)19D
RW Gem 15(20)19D
ST Per 15(19)19L

1995 Dec 12 Tue

X Tri D05(04)06
Z Dra D05(07)10
Z Vul D05(07)09L
TW Dra D05(09)14
U Sge D05(09)08L
RW Tau 05(10)15
V640 Ori 11(13)16
SS Cet 12(17)14L
RZ Cas 13(15)17
TX UMa 16(20)19D

1995 Dec 13 Wed

X Tri D05(03)06
Z Dra 13(16)18
RZ Cas 17(20)19D

1995 Dec 14 Thu

X Tri D05(02)05
U Cep D05(06)11
Z Per D05(10)14
ST Per 06(10)15
V640 Ori 11(14)16L
RW Gem 11(17)19D
Z Vul L18(18)19D

1995 Dec 15 Fri

TW Dra D05(04)09
RW Tau D05(05)09
SW Cyg D05(07)13
Y Psc 07(12)11L
SS Cet 12(16)14L
TX UMa 17(22)19D

1995 Dec 16 Sat

RZ Cas D05(05)07
Z Dra 06(09)11
V640 Ori 12(14)16L
U Cep 13(18)19D

1995 Dec 17 Sun

ST Per D05(02)06
Z Vul D05(05)09L
Z Per 06(11)16
RZ Cas 07(10)12
RW Gem 08(13)19
Z Dra 15(17)19D
TW Dra 18(23)19D

1995 Dec 18 Mon

S Equ D05(07)08L
SS Cet 11(16)14L
RZ Cas 12(14)17
V640 Ori 12(15)16L
TX UMa 19(23)19D

1995 Dec 19 Tue

U Sge D05(04)08L
U Cep D05(06)10
Y Psc D05(06)11
ST Per 13(18)18L
SW Cyg L15(21)19D
RZ Cas 17(19)19D
Z Vul L18(16)19D

1995 Dec 20 Wed

RW Gem L05(10)15
Z Per 07(12)17
Z Dra 08(11)13
V640 Ori 13(15)16L
RW Tau 13(17)17L
TW Dra 14(19)19D

1995 Dec 21 Thu

SS Cet 10(15)14L
U Cep 13(17)19D
Z Dra 17(19)19D

1995 Dec 22 Fri

Z Vul D05(03)08L
RZ Cas D05(04)07
ST Per 05(09)13
U Sge 07(13)08L
V640 Ori 13(16)16L

1995 Dec 23 Sat

Y Psc D05(01)05
Z Dra D05(04)06
RW Gem D05(07)12
RZ Cas 07(09)12
RW Tau 07(12)17
Z Per 09(14)18L
TW Dra 09(14)19D

1995 Dec 24 Sun

U Cep D05(05)10
SW Cyg D05(11)13L
SS Cet 10(14)14L
Z Dra 10(12)15
RZ Cas 11(14)16
V640 Ori 14(16)16L
SW Cyg L15(11)17

Z Vul L18(14)19D
1995 Dec 25 Mon
S Equ D05(04)08L
TX UMa L06(02)07
RZ Cas 16(19)19D
U Sge L18(22)19D
Z Dra 19(21)19D
1995 Dec 26 Tue
RW Gem D05(04)09
RW Tau D05(06)11
TW Dra D05(10)15
Z Per 10(15)18L
U Cep 12(17)19D
V640 Ori 14(17)15L
1995 Dec 27 Wed
Z Vul D05(01)06
Z Dra D05(06)08
SS Cet 09(14)13L
ST Per 12(16)17L
X Tri 14(17)15L
1995 Dec 28 Thu
RZ Cas D05(04)06
TX UMa L05(04)09
Z Dra 12(14)16
X Tri 14(16)15L
V640 Ori 15(17)15L
SW Cyg 18(25)19D
1995 Dec 29 Fri
RW Gem D05(00)06
SW Cyg D05(01)07
RW Tau D05(01)06
TW Dra D05(05)10
U Cep D05(05)10
U Sge D05(07)07L
RZ Cas 06(09)11
Z Vul 07(12)08L
Z Per 11(16)18L
X Tri 13(16)15L
1995 Dec 30 Sat
ST Per D05(08)12
SS Cet 09(13)13L
Y Psc 09(13)10L
RZ Cas 11(13)16
X Tri 12(15)15L
1995 Dec 31 Sun
Z Dra D05(07)10
TX UMa L05(06)10
X Tri 12(14)15L
U Cep 12(17)19D
RW Tau 15(19)17L
RZ Cas 16(18)19D
RW Gem 16(21)18L
Z Vul 17(23)19D

SAO 044590: A New Variable in Canes Venatici
Kevin West

For just over a year I have been photometrically observing the star SAO 044590 after Malcolm Porter mentioned that it was suspected of variability. I can confirm that it is indeed variable with an observed amplitude to date of of 0.5v. Visual observations suggest that the amplitude might be even greater.

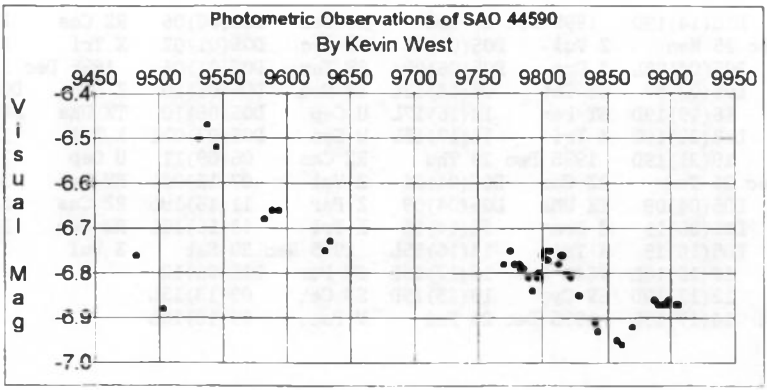
The suspicions surrounding this star began at least as far back as 1988 and can be traced to a number of visual observers of V CVn as the suspect is comparison star 69 on the chart for V, Y and TU CVn dated 1984 Apr 12.

Visual observers who began to monitor the suspect include Tristram Brelstaff, Colin Henshaw and Richard Fleet. I am sure there are others and I hope this article will uncover them. Richard has kindly supplied me with his observations. These show similar behaviour to that shown by my photometric observations. Richard noticed that the star seems to be rather irregular, with active phases interspersed with quiescent ones. I have observed that same activity: in April to July 1995 the star has remainded almost constant at around 6.90.

Analysis ofthe data by revealed no conclusive evidence for periodicity but more observations are needed. Therefore I would like to call for visual and photometric observations in order to build a complete light curve and perhaps classify the star. It also seems important to alert observers of V CVn that they should not use this star as a comparison star.

I would like to thank the following for their help: Richard Fleet for his observations and for help in tracking down other visual observers, Malcolm Porter for analysing the data, and Chris Lloyd and Guy Hurst for checking out the professional and amateur literature.

Finally, I wonder if any observers have any other comparison stars that they suspect of variability. If so then please contact me at 5 Edward Street, Ryde, Isle of Wight, PO33 2SH (Email: kwest@aladdin.co.uk).


Photometric Observations of SAO 44590
By Kevin West
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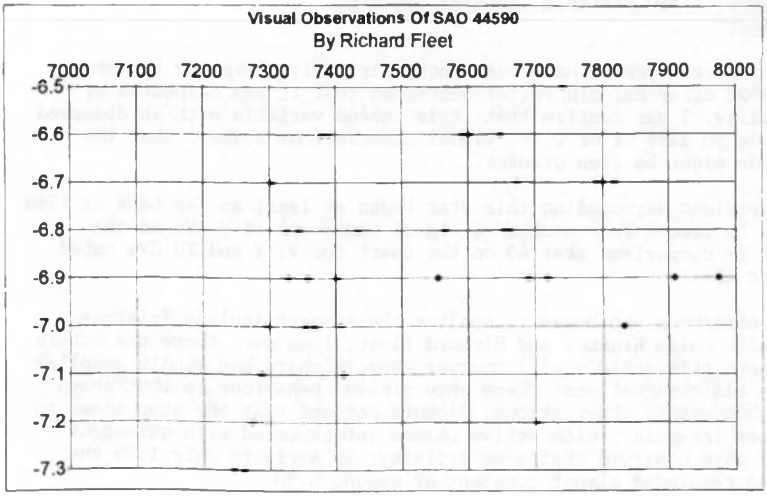
Visual Observations Of SAO 44590
By Richard Fleet
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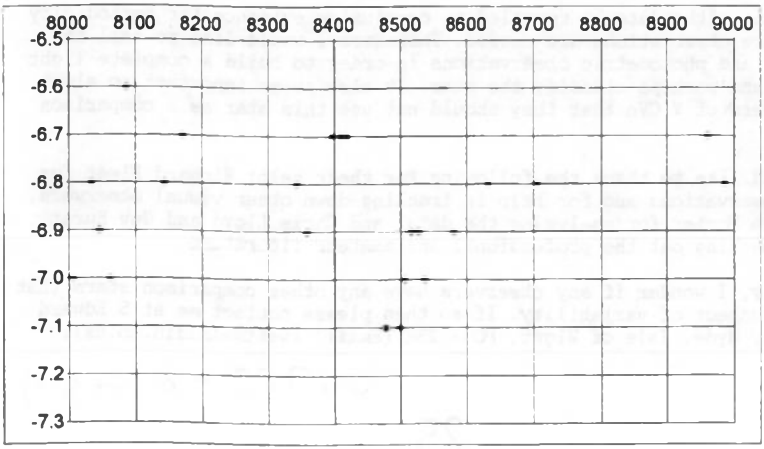
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