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VARIABLE STAR SECTION

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Office: Burlington House, Piccadilly, London, W1V 9AG

Section Officers

Director	Tristram Brelstaff, 3 Malvern Court, Addington Road, Reading, Berks, RG1 5PL Tel: 0734-268981
Assistant Director	Storm R Dunlop 140 Stocks Lane, East Wittering, Chichester, West Sussex, PO20 8NT Tel: 0243-670354 Telex: 9312134138 (SD G) Email: Compuserve:100015,1610 JANET:SDUNLOP@UK.AC.SUSSEX.STARLINK
Secretary	Melvyn D Taylor, 17 Cross Lane, Wakefield, West Yorks, WF2 8DA Tel: 0924-374651
Chart Secretary	John Toone, Hillside View, 17 Ashdale Road, Cressage, Shrewsbury, SY5 6DT
Nova/Supernova Secretary	Guy M Hurst, 16 Westminster Close, Kempshott Rise, Basingstoke, Hants, RG22 4PP Tel & Fax: 0256-471074 Telex: 9312111261 (TA G) Email: Telecom Gold/DialCom:10074:MIK2885 JANET:GMH@UK.AC.RUTHERFORD.STARLINK.ASTROPHYSICS STARLINK:RLSAC::GMH
Pro-Am Liaison Committee Secretary	Roger D Pickard, 28 Appletons, Hadlow, Kent, TN11 0DT Tel: 0732-850663 Email: Telecom Gold 10074:MIK3229
Computer Secretary	Dave McAdam, 33 Wrekin View, Madeley, Telford, Shropshire, TF7 5HZ Tel: 0952-432048 Email: Telecom Gold 10087:YQQ587
Eclipsing Binary Secretary	Director
Circulars Editor	Director
Circulars Subscriptions	Assistant Director

Telephone Alert Numbers

Nova and Supernova Discoveries	First phone Nova/Supernova Secretary. If only answering machine response then try the following: Denis Buczynski 0524-68530 Glyn Marsh 0772-690502 Martin Mobberley 0245-75297 (weekdays) 0284-828431 (weekends)
Variable Star Alerts	Gary Poyner 021-3504312 Email: JANET:GP@UK.AC.BIRMINGHAM.STAR STARLINK:BHVAD::GP

For subscription rates and charges for charts and other publications see inside back cover

SUBSCRIPTION RENEWALS WARNING!

This Circular, number 75, has been issued out of sequence - numbers 73 and 74 will follow soon after, at the end of February. This might create problems if your subscription has nearly run out. The number of Circulars that you still have to come is indicated by the part of the serial number following the '/' on your address label. If you have fewer than 2 left then you should renew your subscription as soon as possible or else you might miss a Circular. If you are in doubt, then renew anyway.

A Word from the New Director

I was going to take this opportunity to outline all my plans and ideas for the Section but there isn't enough space (or time) left, so that will have to wait until later. However, I should point out that I have taken over the editing of the Circulars myself. This is not intended to be a criticism, implied or otherwise, of the work of the previous editor, Storm Dunlop; it is just that I think that this will be the most effective way that I can do my job of Director (those of you who used to get the Variable Star Observer may know what I mean). Storm will continue to handle subscriptions and act as Assistant Director.

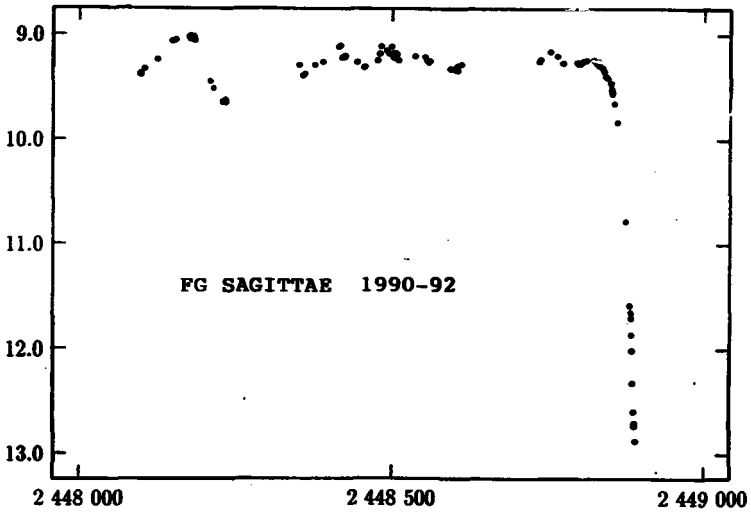
FG Sagittae

FG Sge is a quite extraordinary variable star. It was discovered in 1943 by Hoffmeister who classified it as an irregular variable. In 1960, Richter noticed that earlier photographs showed its brightness increasing, almost linearly, from the 1890's. In 1890 its photographic magnitude was 13.7, in 1960 it was 10.0, and the rise continued to a maximum of 9.4 in 1967. By the summer of 1992, the photographic magnitude had fallen back to 11.2 but this was accompanied by the star becoming redder and so the visual magnitude remained at about 9.4 between the late 1960's and the early 1990's. This light-curve, alone, would be enough to make a star an object of interest but, in the case of FG Sge, it comes with three other peculiarities which make it into a unique object.

Firstly, FG is at the centre of a small planetary nebula, discovered by Henize and designated He 1-5. This nebula is probably made up of material ejected by FG several thousand years ago. It is almost certainly not derived from the latest outburst.

Secondly, FG has shown a systematic change in spectral type over the past few decades. In 1955 Henize classified it as B4I; in 1967 it was A5Ia; in 1972, F5Ip; and during the 1980's the classifications range from F6-7I to K0-2Ib, according to the region of the spectrum used. This indicates a rapid cooling and expansion of the atmosphere of the star. This is the sort of behaviour that would be expected of a star in which a new set of nuclear reactions had just been ignited. This would cause the star to move from the top-left hand corner of the Hertzsprung-Russell over to the right-hand side. In doing so, it would take it through the Instability Strip, which leads on to the next peculiarity of FG Sge.

Thirdly, at maximum, FG Sge has shown semiregular pulsations with an amplitude of a few tenths of a magnitude and a period ranging from 10 - 20 days in 1962 up to 140 days in 1990. This general increase in period is what would be expected if the pulsations were occurring in an atmosphere which was expanding and becoming more tenuous.



As if all this wasn't enough, in August 1992 FG suffered a sudden fade which, by the end of September, had taken it to mag 13.5 visual. This is about the same as it was back in 1890, when it started out on its slow rise from obscurity! Guinan et al (IAU Circular No 5632, 1992) suggest that the fade might have been caused by dust forming in an ejected shell, rather as happens with R CrB-type variables. According to Gary Poyner, FG was still near mag 13.5 in the middle of January (several reports of the star being at mag 12 have appeared but these are almost certainly just the result of confusion with a nearby star). The accompanying light-curve is taken from Jurcsik (IBVS 3775, 1992). It rather nicely shows the last of the pulsations, which occurred in 1990. By 1991, well before the onset of the fade, the pulsations had apparently ceased. This cessation of the pulsations may well be associated with the ejection of the shell.

FG Sge is not on the VSS Program but charts based on the AAVSO one can be found in Volume 8 of The Webb Society Deep-Sky Observer's Handbook and in The Astronomer 29, 115 (1992). In both cases you will also require the extension chart given in The Astronomer 29, 138 (1992) when FG is at minimum.

Hungarian Variable Star Meeting

The Variable Star Section of the Hungarian Astronomical Association held its 27th meeting at the new observatory at Szeged. The Section has close contacts with the professionals (and amateurs) who work at Szeged. The Director of the new observatory, Karoly Szatmary, has made much use of their results in his research. He recently published a paper in Astrophysics and Space Science which was based on their observations of Y Lyncis. Also at the meeting, Tibor Hegedus reported on an astronomical visit he had recently made to Spain and spoke on his plans for an Eclipsing Binary Subsection. The most striking presentation was given by Laszlo Kiss and Gabor Kaszas who displayed about one hundred light-curves, plotted by computer, using Hungarian data from the past two decades. Attila Mizser talked about the American variable star observer and AAVSO stalwart, Clinton B Ford, who died last year. Apparently, much else went on at the meeting, as well, but the above was all that was included in the English language summary included in with the December 1992 issue of 'Meteor'.

VSS Computerization: Progress to the End of 1992
Dave McAdam

The rate of computer entries increased during the latter part of 1992 with results from 1991 being keyed in as well as earlier records. A few observers continued to submit their observations on floppy disks or via electronic mail. 173411 observations have now been entered. These are in the form of 1032 files, each file containing all the observations of a given star for a particular year. Twenty-seven people have helped in the data entry. The following table lists their names and the number of observations they have entered:

Data Entry Totals to the End of 1992

H Joy	55506		I Howard-Duff	1673
D McAdam	29935		S R Dunlop	1594
G A V Coady	26229(1)		B Rye	1577
M J Carson-Rowland	17441		V Garvey	1313
G Poyner	7953		G M Hurst	1215
P Dean	5103		T Brelstaff	1137
J C Fairweather	3764		J Moran	941
N L McAdam	3295		E J W West	725
The Crayford Group	3098(2)		J J Howarth	533
D Lloyd	2948		M Collins	385
G Ramsey	2510		D Gill	247
P White	2336		R D Pickard	81
E Clancy	1844		A O Miller	28

Notes:

(1) G A V Coady entered over 40000 observations in the early 1980's. Unfortunately, many of these were entered again before all of his work became available.

(2) The Crayford Group consisted of A O Miller, R D Pickard, V Stoneham and R Whiting working together as a team.

The grand total is very encouraging, being over 8% of the estimated 2 million backlog. Apart from Coady's work and a proportion of some other individual totals, most of the observations were entered in the last 10 months of 1992. If more help is available with keying past records, we can look forward to dealing with a major part of the backlog on a realistic timescale.

A few requests from professional astronomers for section data were dealt with during the year and it is hoped that some of these will result in news that can appear in future circulars. A disk containing observations of stars south of the equator was sent to Frank Bateson as part of an exchange agreement. Computerization should enable these important co-operations to be dealt with more easily than in the past.

About a hundred light-curves of 80 variables were plotted in just over a weekend for selection for this Circular (Unfortunately I couldn't fit them all in! - Ed). During 1992, thanks to the assistance of Melvyn Taylor and Gary Poyner, some of our light-curves were displayed at the BAA Exhibition Meeting at Hawkstone Hall, at The Astronomer AGM at Northampton, and at the Horncastle Weekend Course.

Machine-Readable Reports

With annual observations totalling tens of thousands, several kilograms of paper must be collated each year before any kind of analysis can proceed. The only way of relieving and spreading this workload is to encourage more observers to submit their observations in machine-readable form. Even submitting as few 100 observations in this form, rather than on paper, will save us at least an hour keying and they will be more quickly available for light-curves and analysis. Several commercial concerns find it more efficient to have widely distributed employees receiving and returning work on floppy disk so, in this respect, the Section is moving with the times.

I believe most observers fill out their observation report forms from an observing log. It is just as easy to enter them straight onto a computer and this only requires minimal computer skills. A year's observations, even from the most prolific observer, will easily fit on one floppy disk. You will even save on postage!. All observations submitted in this way are included in the observer totals compiled by the Secretary.

Your observations will have to be entered in a particular format so that the programs will be able to process them. This format is quite easy to get the hang of, and a leaflet explaining it is available. The requirements in terms of the sofware you will need are minimal - all you need is a simple word-processor or text editor. The EDIT facility incorporated into MS-DOS version 5.0 is adequate (you could even do it with EDLIN! - Ed). I hasten to add that paper reports will not be given less status - the usual appeal to report promptly still applies. However, if you do have a computer available, then please seriously consider using it.

Towards the end of 1993, it will become possible to let the software take over the main job of distributing an observer's results between the computer records for different variables. The advantage of this would be that the observers would not have to sort their observations before submitting them. I believe this would drastically reduce the paper handling that is currently necessary, but how and when the change can best be implemented needs to be discussed by the Section officers.

Software Validation of Observations

With such large scale data entry, some typographical errors are to be expected. Section records are not exempt, but the percentage is kept very low by passing observations through a checking routine that recalculates the estimates on the sequence used and compares the result with the deduced magnitudes. Any that fall outside certain limits are highlighted for a visual check against the original paperwork so discrepancies can be sorted out. The magnitude is finally reduced using the current sequence, if possible.

For this to work on older observations, the old sequences are entered and cross-related to the current one. These lists are not static and newly revised sequences can be added, to which existing estimates can then be re-reduced by passing the input files through the check routine again. Further programming is planned so that re-reduction will become automatic after any change to the sequences. Some sets of chart sequences can take over an hour to cross-reference properly, but around 170 have already been dealt with using old charts supplied by John Toone, Guy Hurst, Melvyn Taylor and Storm Dunlop. During 1993 the number of lists entered should at least treble so that observations can be checked on all Program stars.

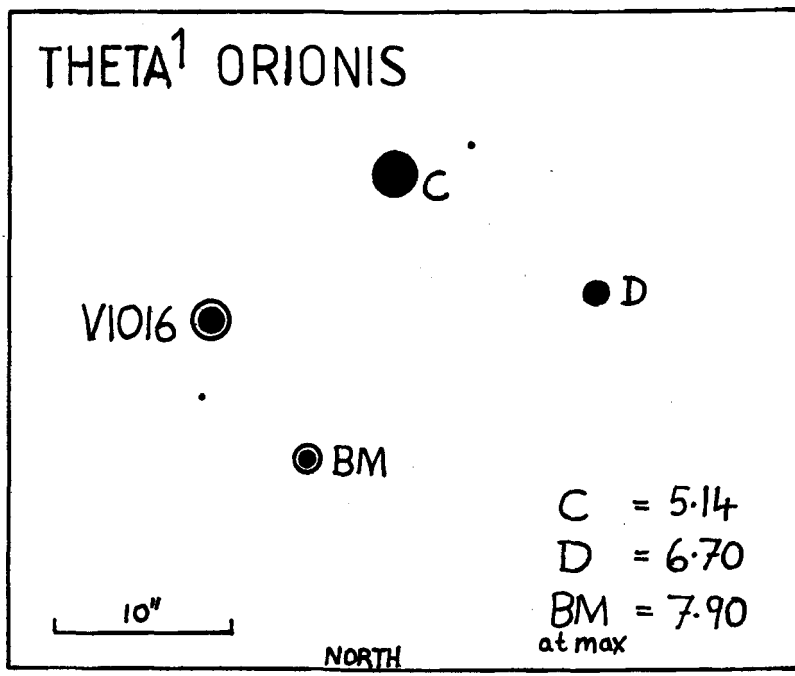
Dates are checked to be within proper ranges too, and this also highlights typographical errors. However, it is not possible to check that a valid date is incorrect - therefore extra care is needed in keying months and dates, and in showing clearly if GMAT or UT is used. Observers will be gratified to learn that after keyboard slip-ups are amended, only a fraction of one percent of deduced magnitudes are out by 0.1m or more. One of the advantages of submitting your observations ready-typed is that reduces the chances of us introducing extra errors!

Postscript:

During writing this report I was saddened to hear of the death of Tony Miller, a member of the Crayford Group who had been actively helping with computer records.

Eclipse of V1016 Orionis (= Theta^1 Ori A)

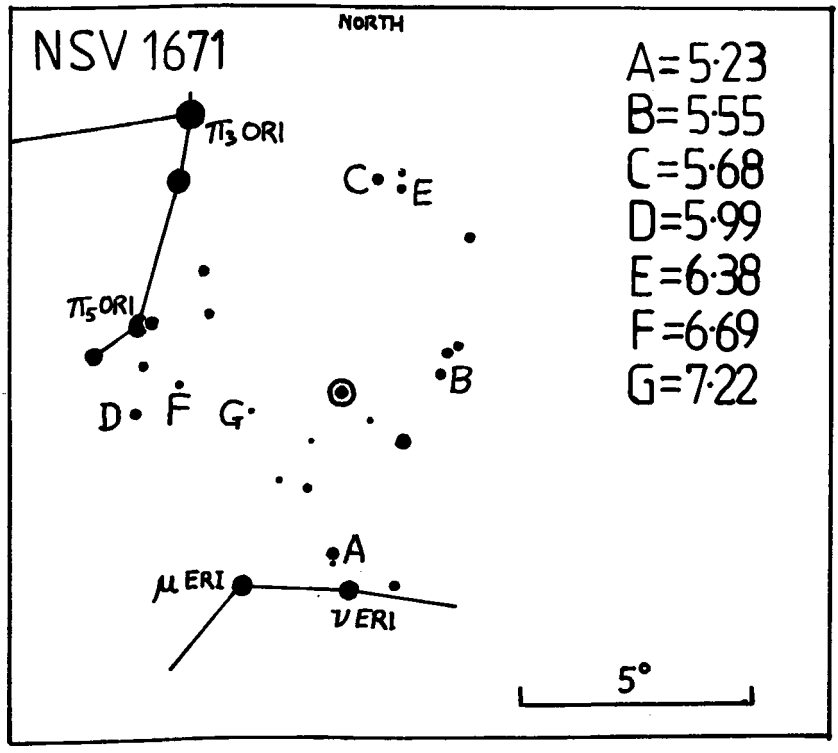
The next eclipse of this long-period eclipsing binary is due to take place on the night of 1993 March 14 with minimum occurring at about 12h GMAT (= 24h UT). The eclipse should last for about 19 hours. From Britain, the star sets at about 11h GMAT so only a segment of the fade will be visible. However, any observations obtained from Europe will be very useful as they will complement those from America, where only part of the rise should be visible. Visual observations are made difficult by the lack of suitable comparison stars and by the closeness of the other components. One of these other components, BM Ori, is also an eclipsing binary but this should be a maximum on the night in question, and so can be pressed into use as a comparison star. Photoelectric photometry, relative to components C and D, would be preferable. If you get any results, please send them to the Director as soon as possible.



NSV 1671 - A Bright New Eclipsing Binary in Taurus?

In IAU Circular No 5656 (1992), Arthur J Bradley, of the NASA-Goddard Space Flight Center, and Dorrit Hoffleit and I Platais, both of Yale University, report that routine data from one of the Hubble Space Telescope's fixed-head star trackers suggests that the star HR 1469 = 49 Eri = NSV 1671 may be variable. This star normally has a V-magnitude of 5.31 but for 3 hours around 3h GMAT (=15h UT) on 1992 Nov 4 the star tracker recorded it at 6.9. The New Catalogue of Suspected Variable Stars lists this star as having a possible range of 0.08 mag, based on work by A W J Cousins (Monthly Notes of the Astronomical Society of South Africa, vol 22, page 12, 1963).

Although named 49 Eridani by Flamsteed, this star is now in Taurus at 04h 34m 39s +00° 53.9' (1950), 04h 37m 14s +00° 59.9' (2000). According to the report in Sky and Telescope (vol 85, page 9, 1992), a search of a photographic archive in Germany has failed to reveal any other evidence of variability. Hoffleit suggests that either the star is an eclipsing binary or else there is a malfunction in the HST star tracker. The chart below should help visual observers who want to keep an eye on the star. The V-magnitudes are taken from Sky Catalogue 2000.0. If anyone has any photos taken of this part of the sky (roughly midway between Rigel and the Hyades) on the 4th of November last year, then the Director would be very interested to hear from them.

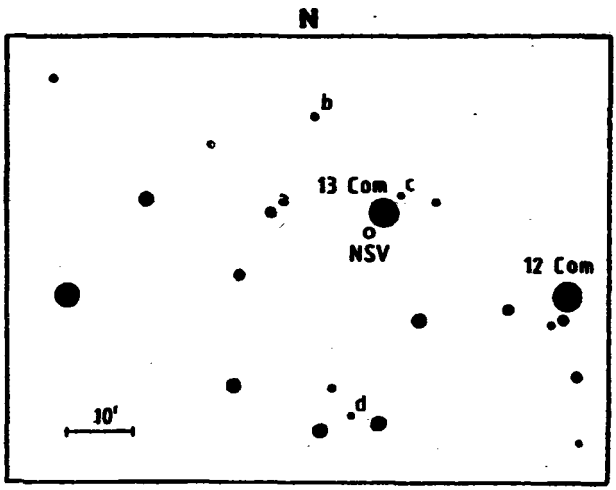


NSV 5598 - A Possible New Short-Period Eclipsing Binary in Coma Berenices

In a recent paper in the Contributions of the Nicholas Copernicus Observatory and Planetarium in Brno, No 30, the Czech variable star observer, Antonin Dedoch reports some visual observations of this 10th-magnitude suspected variable star. His analysis suggests that it is a W UMa type eclipsing binary with the exceptionally short period of 0.1146993 days. Although he does not explicitly state the amplitude of variation, his mean light-curve shows a range of 9 steps, which probably corresponds to something between 0.5 and 1.0 magnitudes. The value for the period is about half that of CC Comae (P=0.2207 days) which is currently the W UMa star with the shortest known period. If confirmed, this will be of some considerable interest as almost all other binaries with periods of less than 0.2 days are cataclysmic binaries. Dedoch does mention the possibility that the star could be a Delta Scuti star or a short-period RR Lyrae variable, but his mean light-curve, with its narrow minima, is more that of an eclipsing star rather than a pulsating one.

Further visual observations would be very useful in order to confirm the star's variability and to estimate times of minima in order to check the on the period. With two, approximately equal, minima per cycle, each eclipse should last about 80 minutes so you will have to be on your toes to follow them. One magnitude estimate every 5 or 10 minutes should suffice. If you get any results, either positive or negative then please send them to me as soon as possible (don't wait to report them with other eclipsing binary observations at the end of the year). The accompanying chart shows the comparison stars that Dedoch used. Their magnitudes are unknown at the present but don't let this stop you from making your estimates!

Photoelectric observations would obviously be of even more value because, as well as confirming the variability and providing times of minima, they could also show decisively that the variations are due to eclipses and not to pulsations.



The Prevalence of Large-Amplitude Variability among Blue Supergiants

This was the title of a paper by Keith P Herzog which appeared recently in The Observatory [112, 105-110, 1992]. In it, Herzog examines the historical record for evidence of variability in blue supergiant stars and tries to use his results to estimate the proportion of these stars which show such variability. While the quality of the evidence he presents does not really justify the conclusions he comes to, some of the individual examples he gives are interesting in themselves.

His first example concerns the ancient Chinese asterism of 'Wang Liang and his four horses', which is in what we would call Cassiopeia. Wang Liang was a famous charioteer of the 6th or 7th century BC. In a survey of Chinese astronomy dating from about 95 BC, it is apparently stated that 'when Wang Liang whips his horses, war-chariots and horsemen will overrun the country'. A later version enlarges on this by explaining that 'whipping the horse' is said to occur when the Whip Star, T'se Hsing 'shifts' its position behind the horses. Herzog points out that T'se Hsing almost certainly refers to the star we would call Kappa Cas, and not to Gamma Cas as was previously thought. The clincher for this is apparently that, many centuries later, T'se Hsing was noted as being the closest star to the supernova of 1572. Herzog then goes on to argue that, because the tip of a whip becomes hard to see when it is being used, that the above references to 'whipping the horses' and to T'se Hsing 'shifting' mean that Kappa Cas was below mag 6.0 at some time in the first millenium BC. This seems to be a rather contrived argument.

Herzog's next example is based on magnitude estimates recorded by the Persian astronomer al-Sufi in 964 AD. Al-Sufi explicitly records Zeta Persei as being equal in brightness to Omicron Persei whereas modern measures put it about one magnitude brighter. Apparently, al-Sufi normally adopted the magnitude estimates of Hipparchus, as recorded in the Almagest, as the basis for his magnitudes. However, in the case of Zeta Persei he must have specifically decided to down-grade its magnitude to equal to that of Omicron because Hipparchus's has it 2/3 mag brighter.

The third example concerns Kappa Orionis, which William Herschel once rated as being equal to 29 Orionis, over one magnitude fainter than normal. Edward Pickering, using a visual photometer, also recorded Kappa Orionis over one magnitude faint on one occasion in 1882, but rejected the observation because it was unsupported (and he apparently knew of Herschel's observation too!). Now, even today, Kappa Orionis can often be seen to be fainter than normal but this is only because of its low altitude, relative to the other 2nd-magnitude stars in Orion, from northern latitudes. The slightest bit of winter haze can make Kappa distinctly difficult to see, especially when Orion is just rising in the East. Is it possible that Herschel and Pickering were both fooled by atmospheric extinction? The fact that neither of these experienced observers followed up their anomalous observations does suggest that neither had much confidence in their own reports.

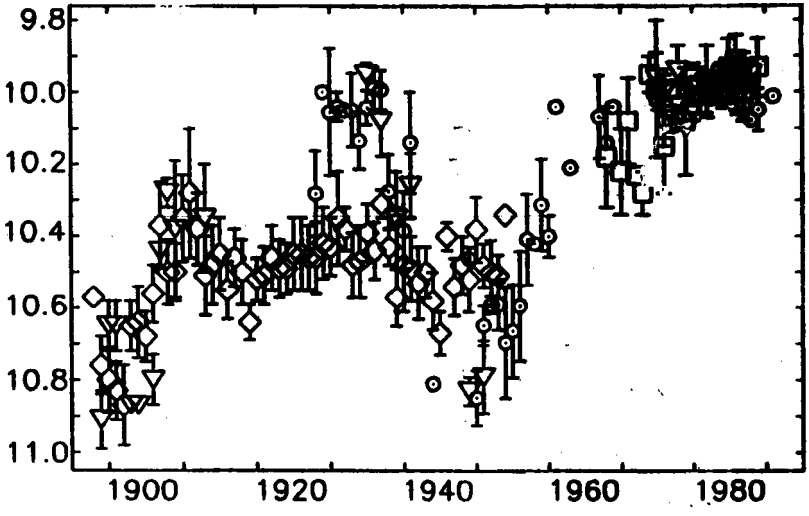
Herzog presents nine fainter examples but most of these seem too speculative to be worth repeating. The exception is the missing BD star, BD+29.3770. This was recorded at magnitude 10 on at least 3 occasions in the mid 1800's by the Bonner Durchmusterung observers but has not been seen since. Herzog suggests that the star might be a blue supergiant variable because it was located within a small group of stars which are now known to be blue supergiants.

While each of these cases seems to be relatively unconvincing, one should perhaps remember that, had the major outburst of P Cygni had occurred a few centuries earlier, we might have had to wait for the advent of photoelectric photometry before its variations were discovered. Since about 1800, it has only varied by a few tenths of a magnitude at most. According to the GCVS, the following blue supergiants all show variations of about 0.1 mag, not much less than that recorded for P Cygni in recent years: 6 Cas, Kappa Cas (yes!), 9 Cep, 55 Cyg, Alpha Cyg, Rho Leo, Epsilon Ori.

Long-Term Variability of PZ Monocerotis

PZ Mon is a 9th-magnitude K2-type red dwarf star situated about one degree south of 18 Mon (ie: at 1950: 06h 45m 46s +01° 16.5', 2000: 06h 48m 21s +01° 13.2' approx). In the 1950's spectroscopic observations lead Munch and Munch to suggest that it might be a flare star. This was confirmed by S Gaposchkin who found several apparent flares with amplitudes of up to 0.66 mag in the Harvard plate archive.

Recently, N I Bondar' of the Crimean Astrophysical Observatory has published (IBVS 3767, 1992) a historical light-curve of PZ Mon based on photographic magnitudes taken from the Moscow, Odessa, Sonneberg and Harvard plate collections. This is shown in the accompanying diagram. The magnitudes are photographic so the star should be about one magnitude brighter visually. Observations made during flares have been excluded. The underlying variations show a range of about 0.8 mag with two well-marked minima, one around 1900 and another around 1950. Bondar' points out the similarity between these variations and the 50-60 year cyclic variations found in the red dwarf stars BY Dra, CC Eri and BD+26°0730. The variations in these stars are thought to be similar to the 11-year (or 22-year) Solar Cycle. It will be interesting to see if PZ Mon show another minimum around the year 2000.



Summaries of Information Bulletins on Variable Stars Nos 3739 to 3808

The Information Bulletin on Variable Stars (IBVS) is a short newsletter published for the International Astronomical Union by the Konkoly Observatory in Budapest. Each IBVS consists of a single paper, of up to 4 pages, and about 15 are issued per month. It is used by professional and advanced amateur variable star researchers for the rapid publication of observational results. However, according to Storm Dunlop, the publishers will not accept papers based on visual results alone. In spite of this, many of the papers will be of interest to VSS members so it seemed worth publishing a summary of the contents of of recent IBVS's in these Circulars.

If you are especially interested in any particular item then you can obtain a photocopy of the relevant IBVS through the Inter-Library Loan Scheme from your local branch library (that is, if you live in the UK). Simply fill out a requisition card as you would do for a book. Be as explicit as possible so as to give the librarians a fair chance of identifying the paper you want. For example, if you are interested in the flickering of CH Cyg then you should provide at least the following details:

Title of Book/Journal:	Information Bulletin on Variable Stars, No 3806
Title of Paper:	Fickering Activity of CH Cyg
Name of Author:	Kuczawska et al
Year of Publication:	1992

Don't use the abbreviation 'IBVS' because general librarians might not know that this is refers to an astronomical publication and so your request might not be passed on to a specialist astronomical library. This service will probably take a few weeks but it should cost you only a few tens of pence. You can obtain photocopies of all sorts of astronomical papers in this way, even foreign language ones, so long as a copy is held in one of the major astronomical libraries in this country.

3739 The American Association of Variable Star Observers (AAVSO) Photoelectric Photometry Archive (Landis et al, 1992)
- Lists of numbers of PEP observations of 71 naked-eye and binocular variables available from the years 1983-1991.

3740 Photographic Photometry of the Mira Star S Ori (Pena et al, 1992)
- U band photometry.

3741 The Light Curve of the Ap Variable HD 153947 = V974 Sco (Poretti, 1992)
- Ap stars are 'microvariables' (amplitudes less than 0.1 mag).

3742 CH Cygni in 1992: The Strongest Activity after the Large Outburst in 1977-1986 (Mikolajewski et al, 1992)
- U and R band photometry and spectroscopy.

3743 The SVS Numbering Series Discontinued (Kazarovets & Samus, 1992)

3744 FY Persei is a Short Period Cataclysmic Variable (Sazonov & Shugarov, 1992)
- One outburst found (range 12.3 - 13.5B), also periodic variations (period 0.0648d, amp 0.15 mag).

3745 UBV Observations of the Recent Outbursts of Three Cataclysmic Variables (Bruch, 1992)
- Nova Pup 1991, HV Vir, OY Car.

3746 The Possible Eclipses in the T Tauri Spectroscopic Binary System GW Orionis (Shevchenko et al, 1992)
- Mag 10 with 0.2 mag deep eclipses at 241.8 day intervals.

3747 The Extremely Young Close Binary System Herbig Be-Star V628 Cas = MWC 1080 (Grankin et al, 1992)
- Mag 11 nebular variable with periodic variation (period 2.9d, amp 0.16 mag).

3748 Light Curves of UY Cam (Broglia & Conconi, 1992)
- Mag 12 short-period RR Lyrae star. Previous reports of secondary period probably due to variation of a comparison star (see IBVS 3753).

3749 V2101 Oph is not a Cataclysmic Variable (Dupke, 1992)
- Probably Mira star with period 240d, max 13.0B.

3750 Discovery of Rapid Oscillations in the Ap Star HD 150562 (Martinez & Kurtz, 1992)

3751 High-speed IR Photometry of the roAp Star HD 134214 (Belmonte et al, 1992)

3752 10 Aquilae Revisited: Rapid Photometry in the IR and Visible Bands (Belmonte et al, 1992)

3753 A New W UMa Type Variable in Camelopardalis (Broglia & Conconi, 1992)
- Mag 12, amp only 0.2 mag. See IBVS 3748.

3754 UBVR Photometry of the Faint Eclipsing Binary HS Persei (Zakirov & Azimov, 1992)
- Range 12.28 - 14.88V.

3755 The Photometric Range of EX Lupi (Herbig et al, 1992)
- see IBVS 3808.

3756 On Several Variable Stars in the Field of M33 (Sharov et al, 1992)
- Accurate positions for 10 faint (mag 13 - 18) variables.

3757 Photometric Orbit of the Triple System DI Pegasi (Vinko, 1992)

3758 B and V Photometry and the Ephemeris of the W UMa Type Star RS Serpentis (Walas et al, 1992)

3759 A Newly Discovered Eclipsing Binary in the SW Ursae Majoris Field (DeYoung & Schmidt, 1992)
- Amp only 0.2 mag but could produce false reports of 'superhumps' if used as a comparison star!

3760 New Photelectric Minima of some Eclipsing Binaries (Wunder et al, 1992)

3761 What is RX Cephei? (Zsoldos, 1992)
- See article elsewhere in this Circular.

3762 Photoelectric Minima of Eclipsing Binaries (Wolf & Diethelm, 1992)
- Includes interesting O-C diagram of TV Cas.

3763 On Hour-Scale Photometric Variations of TT Arietis (Tremko et al, 1992)
- Attempt to test the claimed 4.68-hour periodicity.

3764 New Flare Stars and Repetitions in the Orion Association Region (Chavira et al, 1992)
- U band results.

3765 Photometry of Two Bright Early-Type Binaries: HD 101205 and HD 152248 (Mayer et al, 1992)
- Alias NSV 5277 and 8022. In Southern hemisphere.

3766 On the Period-Luminosity Relation in the Infrared for Field RR Lyrae Stars (Frolov, 1992)

3767 PZ Mon - The Flare Star with the Largest Amplitude of the Long-Term Light Variability (Bondar', 1992)
- See article elsewhere in this Circular.

3768 Theta2 Sgr: Serendipitous Discovery of Variability in an Am Star? (Anders, 1992)
- Variation of 0.25 mag found when used as comparison star.

3769 New Times of Light Maximum of EH Lib (Yang Dawei et al, 1992)
- Mag 10 Delta Sct star, amp 0.6 mag.

3770 New Photoelectric Photometry and New Times of Light Maximum of AD CMi (Yang Dawei et al, 1992)
- Mag 9 Delta Sct star, amp 0.3 mag.

3771 Period Changes in HD 79889 (Tang Quinquan et al, 1992)
- Alias BE Lyn. Mag 9 Delta Sct star, amp 0.4 mag. See IBVS 3791.

3772 New Light Curves and Times of Minimum of SW Lacertae (Rong-Xian Zhang et al, 1992)

3773 A New Supergiant Variable: HD 186841 (B1Ia) (Zsoldos, 1992)
- Mag 8, amp 0.07 mag. In Vul.

3774 The Period of the s-Cepheid Variable V950 Sco (Poretti & Mantegazza, 1992)

3775 Rapid Decline of FG Sagittae (Jurcsik, 1992)
- See article elsewhere in this Circular.

3776 The Spectroscopic Binarity of MW Cygni Confirmed (Gorynya et al, 1992)

3777 Orbital Light Curve and Parameters of X-Ray Nova GS2023+338 = V404 Cyg (Antokhina et al, 1992)
- Currently the best candidate for a black hole.

3778 NSV 07453 is a New Short Period Cepheid or a Long Period RR Lyrae Star (Shugarov, 1992)
- Range 12.4 - 13.8p, period 0.929d. In CrB.

3779 NSV 12006 - No Evidence for Eruptions on Sonneberg Plates (Wenzel et al, 1992)
- Alias Nova Aquilae 1949. 10.9p at max.

3780 UBV Photometry of the Symbiotic Binary BF Cygni (Skopal, 1992)
- Covers 1989 - 1991.

3781 No Chromospheric Activity seen in the Very Eccentric Double-Lined Binary Gliese 586A (Strassmeier, 1992)

3782 The Stellar System AW Cam (Oprescu & Suran, 1992)
- UBV photometry. Mag 8 eclipsing binary, amp 0.35 mag.

3783 H-alpha Spectroscopy of Nova Cygni 1992 (Xiaobin Zhang et al, 1992)

3784 Photelectric UBV Observations of the s-Cepheid V1334 Cyg (Usenko, 1992)
- Mag 6, amp 0.2 mag.

3785 GSC 5198.00659, The New Variable in Aquarius is a W UMa System (Schirmer & Geyer, 1992)
- Mag 10, amp 0.37 mag.

3786 H-alpha Profile Variations in the Be/Shell Star Zeta Tau during 1990-1992 (Guo Yulion & Guo Xiaozhen, 1992)

3787 On the Genuine V2045 Ophiuchi (Wenzel & Rudolph, 1992)
- Correct position of this Mira star (Mag 13 at max, near 23 Oph).

3788 Photelectric Light Curves of TY Puppis (Gu Shenghong & Liu Quingyao, 1992)

3789 Do All Three Vary: Omicron UMa, 23 UMa and HR 3245? (Hoffleit, 1992)
- Requests PEP observation of each of these bright stars.

3790 Complete CCD V, R, I Light Curves of BM Ursae Majoris (Samec & Kreidl, 1992)
- Mag 14 W UMa star, amp 1.0 mag.

3791 New Results on the High Amplitude Delta Scuti Star BE Lyn (Wunder et al, 1992)
- See IBVS 3771.

3792 A Photometric Survey of Small-Amplitude Red Variables (Percy & Shepherd, 1992)
- Results for 18 bright (mags 3 - 7) known and suspected variables.

3793 OW Gem: The 1991 Primary Minimum (Pravec, 1992)
- CCD photometry of a recently discovered (1988), bright (mag 8), large amp (about 1.5 mag), long period (1258.56d) eclipsing binary. Next primary eclipse in early 1995.

3794 Flare Stars in the Praesepe Cluster Region (Gonzalez et al, 1992)
- U band photometry.

3795 A Probable RV Tauri Star near HR Del (Honeycutt et al, 1992)
- Range 14.2 - 15.4, period 97d (this is the 'half'-period).

3796 1990 and 1991 Photometry of UZ Librae (Heckert, 1992)
- Mag 9, large amp (0.5 mag) FK Com-type star (ie: has star spots).

3797 First Photoelectric BV Lightcurves, Improved Position and Ephemerides for the Totally Eclipsing EW Type System V432 Per (Agerer, 1992)
- Mag 11, amp 0.6 mag.

3798 On the Variability of BD-3.5183 (Robb, 1992)
- Mag 10 W UMa-type star, amp 0.3 mag.

3799 On the Period of 44i Bootis (Jones, 1992)

3800 Spectral Types for Variable Stars Lacking Quoted Spectral Types in the 4th Ed. of the GCVS (Stephenson, 1992)
- About 125 faint red stars.

3801 LSS 2854 and LSS 2895: Two Reddened Beta Lyrae Systems (Kilkenny et al, 1992)
- Both Mag 10 with amps about 0.7 mag. In southern hemisphere.

3802 The Variation of the Light Curves of AU Ser (LI Zong-yun et al, 1992)
- Mag 11 W UMa-type star, amp 0.9 mag.

3803 New Photoelectric Minima Times of V505 Sagittarii (Rovithis-Livaniou & Rovithis, 1992)

3804 The H-alpha Profile Variations in the Spectrum of HD 225094, B3Ia (Pasok & Kolka, 1992)

3805 Minimum Times for Several Southern Early-Type Eclipsing Binaries (Mayer et al, 1992)
- FZ CMa, QZ Car, V606 Cen, MY Ser.

3806 Flickering Activity in CH Cyg (Kuczawska et al, 1992)
- Includes V light-curve showing variation of over 0.25 mag in 30 mins!

3807 Mu Serpentis: A Double-Lined Spectroscopic Binary (Hill et al, 1992)

3808 The Photometric Range of EX Lupi: A Correction to IBVS 3755 (Herbig et al, 1992)
- PEP mags for the RASNZ comparison star sequence for this star.

RX Cephei 1968-1991
Tristram Brelstaff

According to the General Catalogue of Variable Stars, RX Cep is a possible yellow semiregular variable (type SRd:) with a visual range of 7.2 to 8.2 and a possible period of 55 days. Recently, Endre Zsoldos, of the Konkoly Observatory in Budapest, has published (IBVS 3761, 1992) a series of photo-photoelectric observations which seem to indicate that the star is not variable. Fourteen V-band measures, made in the years 1990-1991, give a mean magnitude of 7.444 with a standard deviation of only 0.005. In his report, Zsoldos goes on to give a brief review of the observational history of the star. This is based mainly on visual estimates and stretches back to the 1880's when Knott found a scatter of 1.0 magnitude in his estimates. Presumably this is the source of the range given in the GCVS, as all subsequent observers have found smaller ranges and many have found no significant variations at all. Zsoldos hints at the possibility that the star really was variable but that its variations have since died out and, if this were to be true, it would make RX Cep a very interesting object indeed. However, there remain serious doubts about the reliability of the early visual estimates.

Some of you might be surprised to learn that Zsoldos makes no mention of VSS observations in his report. After all, it has been on our program for over two decades. The reason for this omission is quite simple - we have not published our observations! If we want professionals to use our observations then we must publish them. Apparently, we are not the only organisation to be slow in making our results available - the most recent study mentioned by

Zsoldos was for 1937! As it is, we have 2866 observations of RX Cep covering the years 1968-1991. This time-base is nearly twice that of the longest study which Zsoldos mentions. In addition, our observations overlap with the photoelectric ones and so might be quite useful in determining whether the scatter in the early estimates can be simply dismissed as observational error or whether it is indicative of true variations.

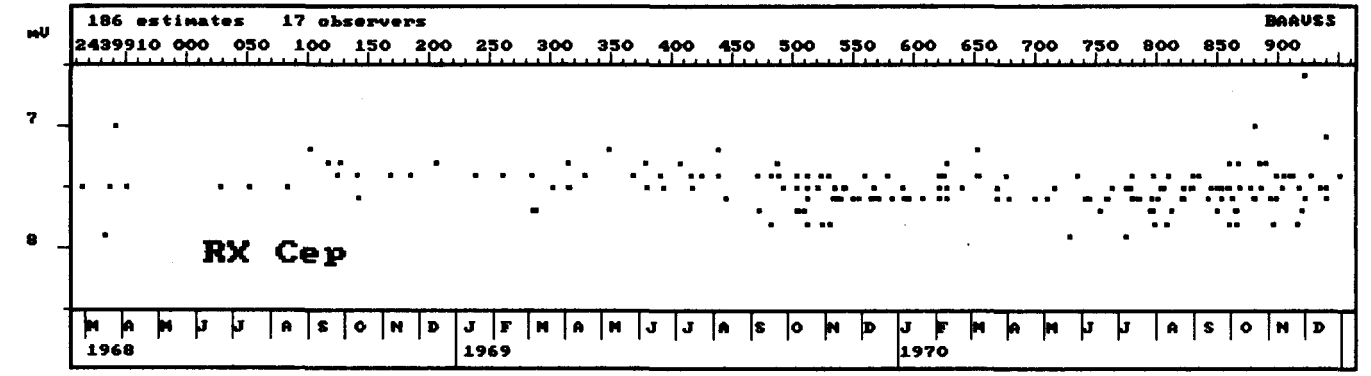
The VSS observations have now been typed up onto computer disks. Dave McAdam entered the observations for 1968-1990 and Herbert Joy, those for 1991. A copy has been sent to Dr Zsoldos. Table 1 lists the observers along with the number of observations that each made. The accompanying light-curve was plotted by Dave McAdam and includes all available observations. No attempt has been made to eliminate apparently erroneous points. The systematic runs of unusually bright and faint points, and unusually faint negative estimates could well be the results of observers misidentifying the variable or the comparison stars. Negative estimates are indicated by a 'v'.

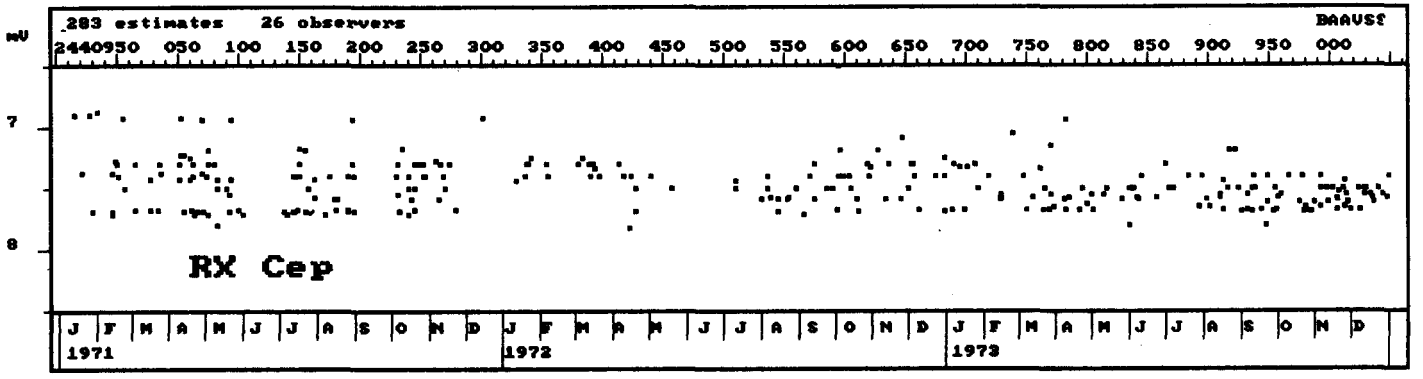
You can judge for yourself whether you think that RX Cep is variable or not. However, it is clear from the light-curve that if the star is variable then its range is quite small and it is unlikely that further visual observations will be of much value. This is especially so, now that photoelectric photometry is begining to become popular with amateurs. In view of this, I have decided to drop RX Cep from the program. There are many other stars on our program which have larger ranges and for which visual observations will be much more valuable.

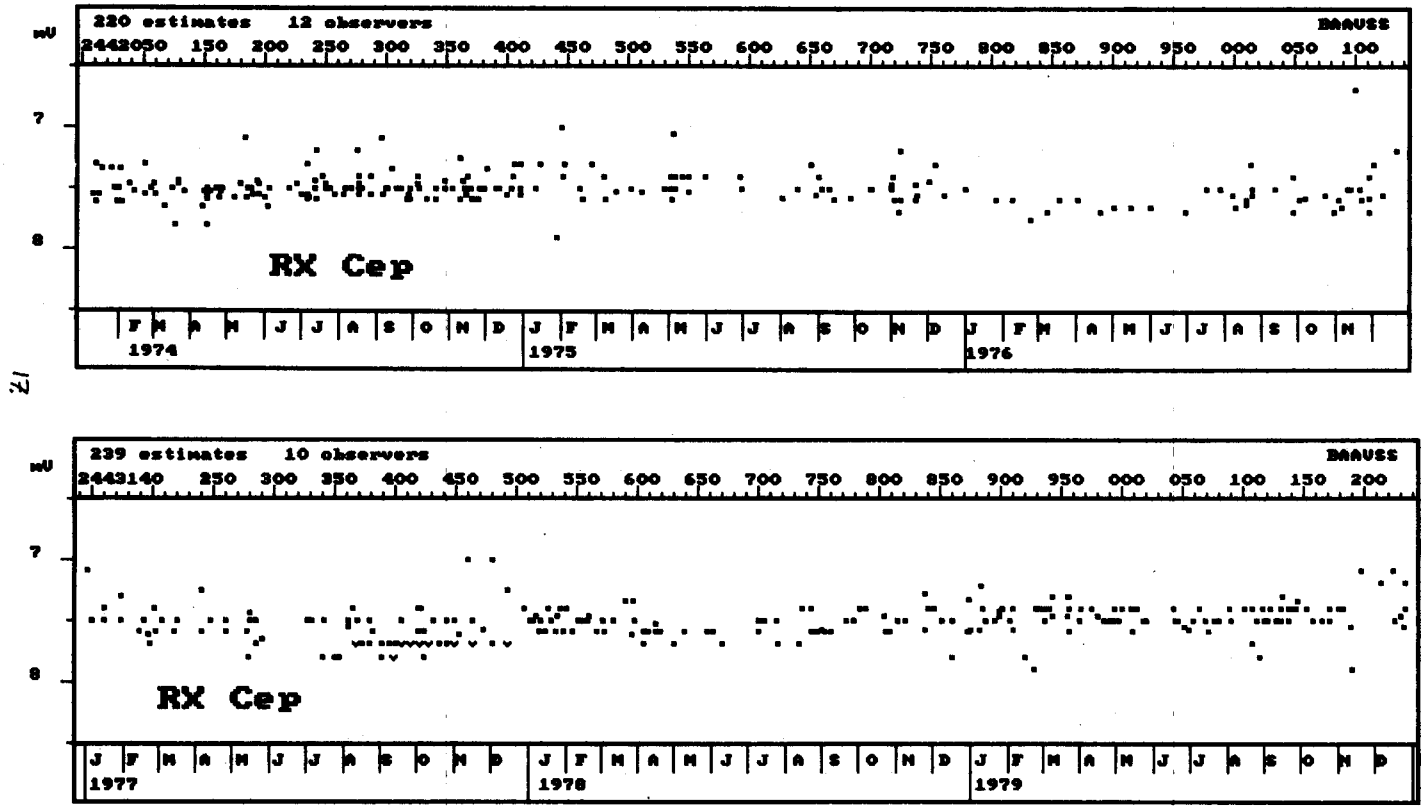
Observers might be interested to learn that there are three other supposed yellow semiregular variables on the VSS Program which modern photoelectric observations suggest are constant. These are VW Dra, IS Gem and CK Ori. However, I will not drop them until I have had a look at our observations of them.

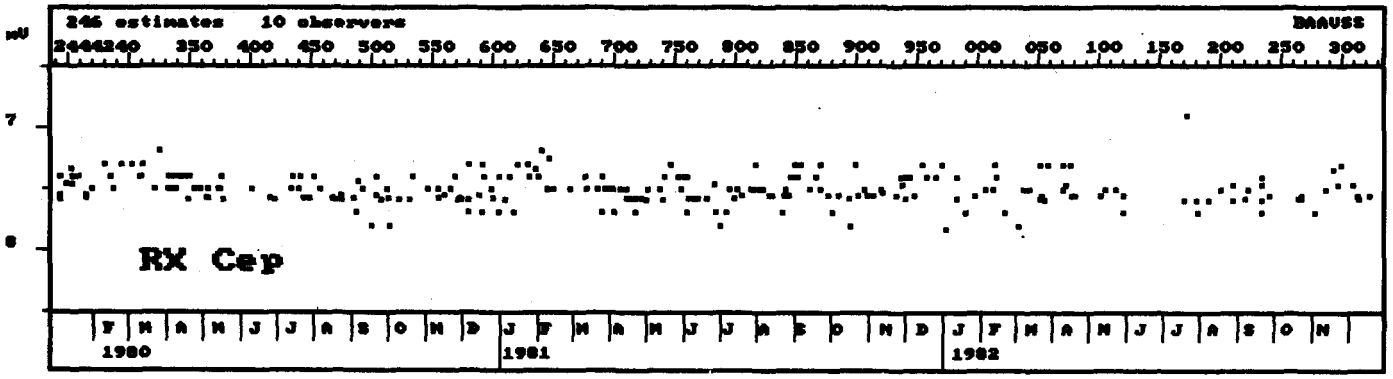
Table 1 - RX Cep Observer Totals

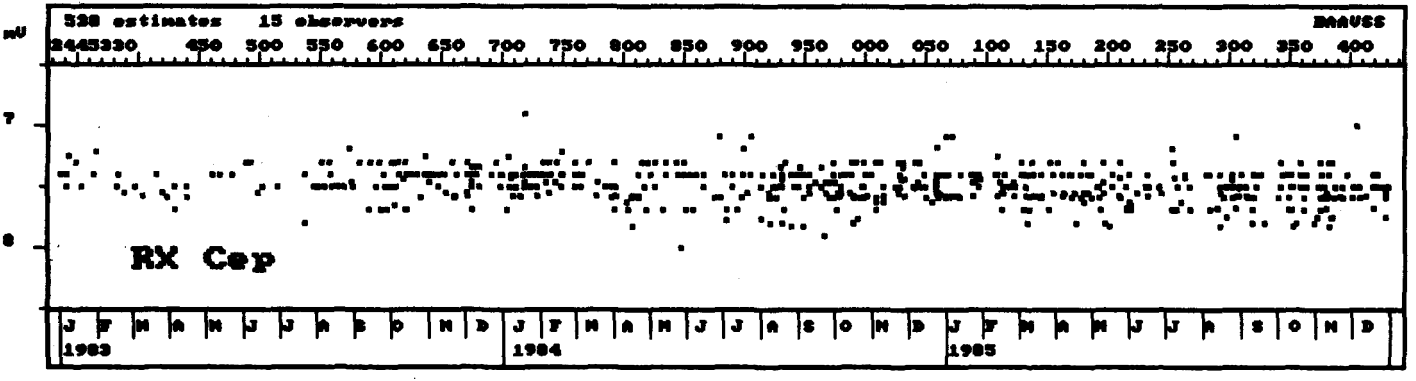
J E Agar	20	I D Howarth	4	D J Northwood	33
S W Albrighton	663	D Hufton	88	G E Patston	25
C M Allen	16	G M Hurst	11	C Pezzarossa	3
S J Anderson	6	A Hutchings	12	R D Pickard	18
B J Beesley	32	J E Isles	75	D A Pickup	15
J Bingham	1	D E Jackman	7	G Pointer	4
T Brelstaff	29	C J Jackson	3	A K Porter	10
P R Clayton	12	B Jobson	11	M J D Price	2
M J Currie	44	M Kearns	5	P Quadt	11
R C Dryden	4	R A Kendall	117	G Ramsey	237
R W Fleet	38	I H Kennedy	5	M J Ring	5
A E J Forno	1	S Koushiappas	5	F Sargent	10
V J Freeman	11	G H Lepper	1	A Smeaton	3
R B I Fraser	109	R J Livesey	28	A Smith	22
A Gardner	61	T Lubek	4	F W Smith	3
D J Goring	8	T Markham	211	J S Smith	62
T Gough	6	J W Mason	3	D M Swain	62
P J Harpur	2	P McGenity	34	T Tanti	21
M A Hather	63	R H McNaught	1	J B Tatum	3
C Henshaw	19	P Mettam	58	M D Taylor	249
J E C Hern	5	I A Middlemist	26	E J W West	52
A J Hollis	25	B R M Munden	87	J D Wise	16
P W Hornby	22	C R Munford	6		


186 estimates 17 observers
BAAVSS
mU
2439910 000 050 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900
7
8
RX Cep
M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1968
1969
1970


283 estimates 26 observers
BAAVSS
mU
2440950 050 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 000
7
8
RX Cep
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1971
1972
1973


220 estimates 12 observers
BRAUSS
2442050 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 000 050 100
mU
7
8
RX Cep
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N
1974
1975
1976
239 estimates 10 observers
BRAUSS
2443140 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 000 050 100 150 200
mU
7
8
RX Cep
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1977
1978
1979


246 estimates 10 observers
BAAVSS
mU
2446240 350 400 450 500 550 600 650 700 750 800 850 900 950 000 050 100 150 200 250 300
7
8
RX Cep
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N
1980
1981
1982


528 estimates 15 observers
BAAVSS
mU
2445330 450 500 550 600 650 700 750 800 850 900 950 000 050 100 150 200 250 300 350 400
7
8
RX Cep
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1983
1984
1985

Z Vul 14(19)16D
1993 Apr 7 Wed
Z Per D08(08)11L
Z Dra 12(14)16D
RZ Cas 15(17)16D
1993 Apr 8 Thu
U Cep D08(11)16D
ST Per 09(13)11L
RW Gem 11(17)12L
1993 Apr 9 Fri
TW Dra 09(14)16D
Z Vul L11(06)11
TX UMa 11(16)16D
U Sge L11(09)15
S Equ L14(14)16D
1993 Apr 10 Sat
Z Dra D08(07)10
Z Per D08(09)11L
SW Cyg 10(16)16D
1993 Apr 11 Sun
ST Per D08(05)09
RZ Cas D08(07)10
RW Gem 08(13)12L
Z Vul 12(17)16D
Z Dra 14(16)16D
1993 Apr 12 Mon
TW Dra D08(09)14
RZ Cas 10(12)14
TX UMa 13(17)16D
U Sge 13(19)16D
1993 Apr 13 Tue
Z Per D08(11)11L
U Cep D08(11)16
RZ Cas 14(17)16D
1993 Apr 14 Wed
Z Dra D08(09)12
RW Gem D08(10)11L
RW Tau 09(14)10L
1993 Apr 15 Thu
TW Dra D08(05)10
SW Cyg D08(06)12
TX UMa 14(19)16D
Z Dra 15(18)16D
1993 Apr 16 Fri
ST Per D08(12)10L
Z Per D08(12)11L
Z Vul L10(15)16D
S Equ L14(11)16D
Z Per L15(12)16D
1993 Apr 17 Sat
RZ Cas D08(07)09
RW Gem D08(07)11L
RW Tau D08(08)10L
1993 Apr 18 Sun
U Cep D08(11)16
Z Dra 08(11)13
RZ Cas 09(11)14
TX UMa 16(20)16D
1993 Apr 19 Mon
Z Per 08(13)10L
U Sge L11(13)16D
RZ Cas 14(16)16D
SW Cyg 14(20)16D
Z Per L15(13)16D
1993 Apr 20 Tue
RW Gem D08(04)09
TW Dra 14(19)16D
1993 Apr 21 Wed
Z Vul L10(13)16D
1993 Apr 22 Thu
Z Per 10(15)10L
Z Dra 10(13)15
Z Per L15(15)16D
1993 Apr 23 Fri
RZ Cas D08(06)08
U Cep D08(10)15
TW Dra 10(15)15D
1993 Apr 24 Sat
SW Cyg D08(10)15D
ST Per D08(11)10L
RZ Cas 08(11)13
1993 Apr 25 Sun
RZ Cas 13(15)15D
Z Per L15(16)15D
1993 Apr 26 Mon
TW Dra D08(10)15
Z Vul L10(10)15D
U Sge L10(07)13
Z Dra 12(14)15D
S Equ L13(18)15D
1993 Apr 28 Wed
U Cep D08(10)15
RW Tau D08(10)09L
Z Per L14(17)15D
1993 Apr 29 Thu
TW Dra D09(06)11
Z Dra D09(08)10
U Sge 10(16)15D
1993 Apr 30 Fri
RZ Cas D09(10)13
Z Dra 14(16)15D
1993 May 1 Sat
RW Tau D09(05)09L
Z Vul L09(08)14
RW Gem 10(15)10L
RZ Cas 12(15)15D
Z Per L14(19)15D
1993 May 2 Sun
ST Per D09(09)09L
1993 May 3 Mon
Z Dra D09(09)12
U Cep D09(10)14
SW Cyg D09(13)15D
S Equ L13(15)15D
Z Vul 14(19)15D
1993 May 4 Tue
RW Gem D09(12)10L
1993 May 6 Thu
RZ Cas D09(10)12
Z Vul L09(06)11
U Sge L10(10)15D
Y Psc L15(18)15D
1993 May 7 Fri
TX UMa D09(05)10
RW Gem D09(08)10L
Z Dra D09(11)13
TW Dra 11(16)15D
RZ Cas 12(14)15D
ST Per L15(16)15D
1993 May 8 Sat
U Cep D09(09)14
Z Vul 12(17)15D
1993 May 9 Sun
U Sge 14(20)15D
1993 May 10 Mon
RW Gem D09(05)10L
TX UMa D09(07)12
TW Dra D09(11)15D
S Equ L12(12)15D
Y Psc L15(13)15D
1993 May 11 Tue
Z Vul D09(04)09
Z Dra 10(13)15D
1993 May 12 Wed
RZ Cas D09(09)11
SW Cyg 11(17)15D
1993 May 13 Thu
TW Dra D09(06)11
TX UMa D09(08)13
U Cep D09(09)14
U Sge L09(05)10
Z Vul 10(15)15D
RZ Cas 11(14)15D
1993 May 15 Sat
Z Dra 12(14)15D
ST Per L14(15)15D
1993 May 16 Sun
TX UMa D09(10)14D
U Sge D09(14)14D
1993 May 17 Mon
SW Cyg D09(06)12
S Equ L12(09)14
1993 May 18 Tue
Z Dra D09(08)10
RZ Cas D09(08)11
U Cep D09(09)14
Z Vul D09(13)14D
1993 May 19 Wed
TX UMa D09(11)14D
RZ Cas 11(13)14D
Z Dra 14(16)14D
1993 May 20 Thu
S Equ 14(19)14D
1993 May 21 Fri
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SW Cyg 14(20)14D
1993 May 22 Sat
Z Dra D09(09)12
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1993 May 23 Sun
U Sge D09(08)14
U Cep D09(08)13
Z Vul D09(11)14D
ST Per L14(14)14D
1993 May 24 Mon
RZ Cas D09(08)10
TW Dra D09(12)14D
1993 May 25 Tue
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RZ Cas 10(13)14D
Y Psc L14(14)14D
1993 May 26 Wed
SW Cyg D10(10)14D
Z Dra D10(11)13
U Sge 12(17)14D
1993 May 27 Thu
TW Dra D10(07)12
S Equ L11(16)14D
1993 May 28 Fri
U Cep D10(08)13
Z Vul D10(08)14
TX UMa 11(16)14D
1993 May 30 Sun
RZ Cas D10(07)10
Z Dra 10(13)14D
Z Vul 14(19)14D
1993 May 31 Mon
RZ Cas D10(12)14D
TX UMa 13(18)14D
ST Per L13(12)14D

Z Per 07(12)14L
Z Dra 08(11)13
TW Dra 16(21)18D
1993 Feb 21 Sun
X Tri D06(04)07
RZ Cas D06(07)10
Z Vul L14(15)18D
Z Dra 17(19)18D
1993 Feb 22 Mon
ST Per 09(13)14L
RZ Cas 09(12)14
U Cep 10(14)18D
TX UMa 12(17)18D
1993 Feb 23 Tue
Z Per 08(13)14L
TW Dra 11(16)18D
RW Tau 13(18)13L
RZ Cas 14(16)18D
SW Cyg 17(23)18D
S Equ L17(22)18D
1993 Feb 24 Wed
Y Psc D06(05)07L
Z Dra 10(12)15
RW Gem 12(17)15L
U Sge L14(11)16
1993 Feb 25 Thu
U Cep D06(02)07
ST Per D06(04)08
TX UMa 14(18)18D
1993 Feb 26 Fri
TW Dra 06(12)17
RW Tau 08(12)13L
Z Per 10(14)14L
Z Vul L14(12)18
1993 Feb 27 Sat
Z Dra D06(05)08
RZ Cas D06(07)09
RW Gem 09(14)14L
U Cep 09(14)18D
U Sge 14(20)18D
1993 Feb 28 Sun
SW Cyg D07(13)08L
RZ Cas 09(11)14
SW Cyg L10(13)18D
Z Dra 12(14)16
TX UMa 15(20)18D
1993 Mar 1 Mon
RW Tau D07(07)11
TW Dra D07(07)12
Z Per 11(16)14L
RZ Cas 14(16)18D
1993 Mar 2 Tue
U Cep D07(02)07
RW Gem D07(11)14L
ST Per 07(11)13L
S Equ L17(19)18D
1993 Mar 3 Wed
Z Dra D07(07)10
Z Vul L13(10)16
TX UMa 17(22)18D
1993 Mar 4 Thu
TW Dra D07(02)07
U Cep 09(14)18D
Z Per 12(17)13L
Z Dra 13(16)18D
1993 Mar 5 Fri
SW Cyg D07(02)08L
ST Per D07(03)07
V640 Ori D07(04)07
RZ Cas D07(06)08
RW Gem D07(07)12
Z Vul 16(21)18D
1993 Mar 6 Sat
RZ Cas 08(11)13
SS Cet 09(13)09L
U Sge L14(14)17D
TW Dra 17(22)17D
1993 Mar 7 Sun
V640 Ori D07(05)07
Z Dra D07(09)11
RZ Cas 13(15)17D
1993 Mar 8 Mon
RW Gem D07(04)09
Z Vul L13(08)13
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1993 Mar 9 Tue
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SS Cet 08(13)09L
U Cep 09(13)17D
RW Tau 09(14)12L
SW Cyg 10(16)17D
TW Dra 12(17)17D
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1993 Mar 11 Thu
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V640 Ori D07(06)08
Z Dra 08(11)13
1993 Mar 12 Fri
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TW Dra 07(12)17D
SS Cet 07(12)08L
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Z Dra 17(19)17D
1993 Mar 13 Sat
V640 Ori D07(06)09
RZ Cas 12(15)17
U Sge L13(08)14
1993 Mar 14 Sun
SW Cyg D07(06)08L
U Cep 08(13)17D
SW Cyg L09(06)12
RZ Cas 17(19)17D
1993 Mar 15 Mon
RW Tau D07(03)08
V640 Ori D07(07)09
TW Dra D07(08)13
SS Cet D07(11)08L
Z Dra 10(12)15
Z Vul L12(17)17D
1993 Mar 16 Tue
TX UMa D07(04)08
X Tri 09(12)10L
U Sge L13(17)17D
S Equ L16(13)17D
1993 Mar 17 Wed
RZ Cas D07(05)07
V640 Ori D07(07)10
X Tri 08(11)10L
1993 Mar 18 Thu
TW Dra D07(03)08
Z Dra D07(06)08
ST Per D07(09)12L
SS Cet D07(11)08L
RZ Cas 07(10)12
X Tri 08(10)10L
SW Cyg 13(20)17D
1993 Mar 19 Fri
TX UMa D07(05)10
V640 Ori D07(08)10L
X Tri D07(10)10L
U Cep 08(13)17D
RW Gem 10(15)13L
Z Dra 12(14)17
RZ Cas 12(14)17
1993 Mar 20 Sat
X Tri D07(09)09L
RW Tau 11(16)12L
Z Vul L12(15)17D
RZ Cas 16(19)17D
1993 Mar 21 Sun
V640 Ori D07(08)10L
X Tri D07(08)09L
SS Cet D07(10)08L
1993 Mar 22 Mon
TX UMa D07(07)11
Z Dra D07(07)10
X Tri D07(08)09L
RW Gem D07(12)13L
1993 Mar 23 Tue
X Tri D07(07)09L
V640 Ori D07(09)10L
RW Tau D07(10)11L
SW Cyg L09(09)15
ST Per 12(16)12L
U Sge L12(12)17D
TW Dra 13(18)17D
Z Dra 14(16)17D
1993 Mar 24 Wed
X Tri D07(06)09
RZ Cas D07(09)11
SS Cet D07(10)08L
U Cep 08(12)17D
1993 Mar 25 Thu
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TX UMa D07(08)13
RW Gem D07(09)13L
V640 Ori D07(09)10L
RZ Cas 11(14)16
Z Vul L12(12)17D
1993 Mar 26 Fri
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ST Per D07(07)11
Z Dra D07(09)11
TW Dra 08(13)17D
U Sge 15(21)17D
S Equ L15(20)17D
RZ Cas 16(18)17D
1993 Mar 27 Sat
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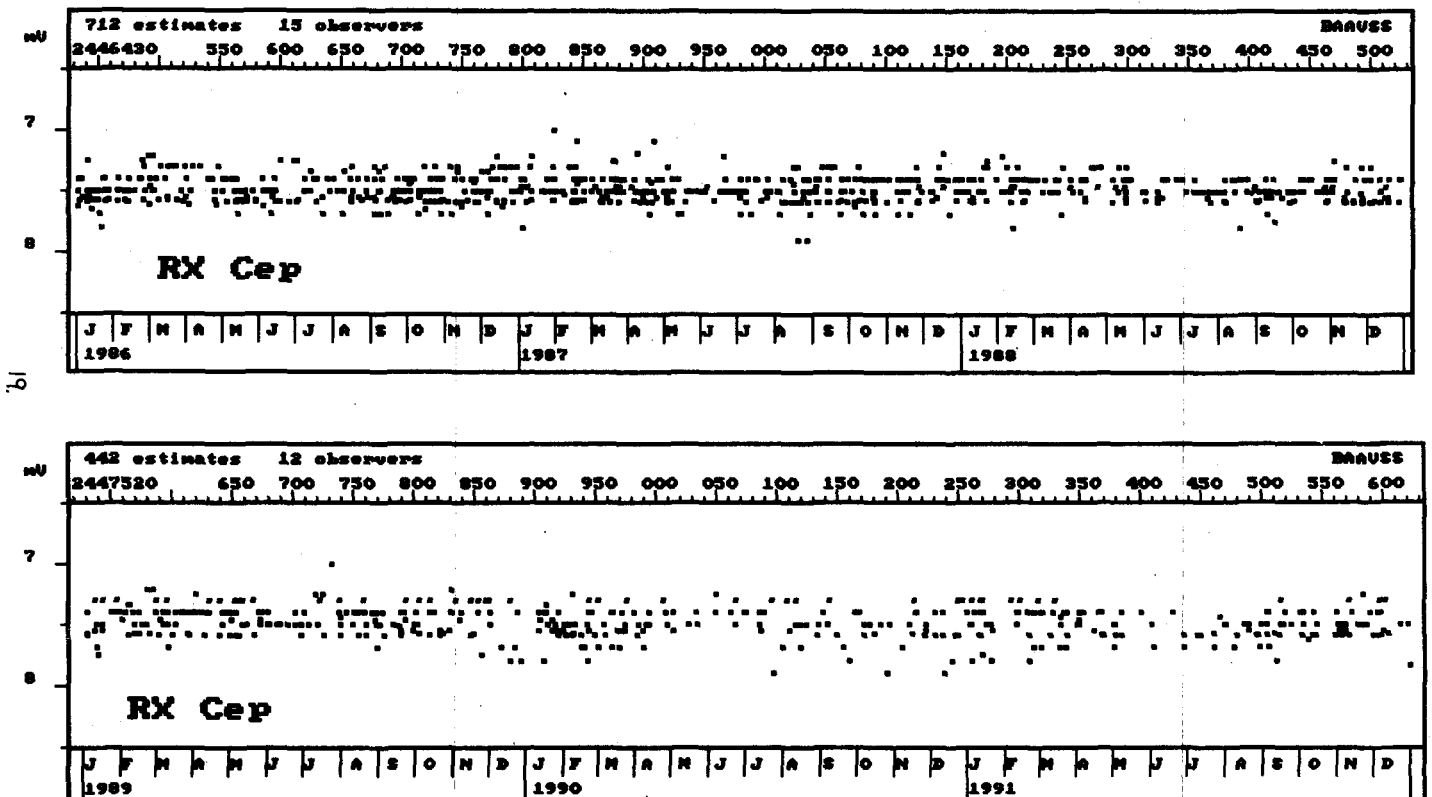
V640 Ori D07(10)09L
Z Dra 15(18)17D
1993 Mar 28 Sun
RW Gem D07(05)11
TX UMa D07(10)14
1993 Mar 29 Mon
Z Per D07(04)09
TW Dra D07(09)14
V640 Ori 07(10)09L
U Cep D07(12)17D
1993 Mar 30 Tue
RZ Cas D07(08)11
Z Dra 08(11)13
Z Vul L11(10)16
1993 Mar 31 Wed
TX UMa D07(11)16
V640 Ori 08(11)09L
ST Per 10(15)11L
RZ Cas 11(13)15
1993 Apr 1 Thu
TW Dra D08(04)09
Z Per D08(05)10
SW Cyg L08(13)16D
RZ Cas 15(18)16D
Z Vul 16(21)16D
1993 Apr 2 Fri
V640 Ori 08(11)09L
U Sge L12(15)16D
S Equ L15(17)16D
1993 Apr 3 Sat
ST Per D08(06)10
U Cep D08(12)16D
RW Tau D08(12)11L
TX UMa 08(13)16D
Z Dra 10(13)15
1993 Apr 4 Sun
Z Per D08(07)11L
V640 Ori 09(12)09L
Z Vul L11(08)13
1993 Apr 5 Mon
RZ Cas D08(08)10
1993 Apr 6 Tue
Z Dra D08(06)08
RW Tau D08(07)10L
SW Cyg L08(03)09
TX UMa 10(14)16D
RZ Cas 10(12)15
TW Dra 14(19)16D


712 estimates 15 observers
BAAVSS
2446430 550 600 650 700 750 800 850 900 950 000 050 100 150 200 250 300 350 400 450 500
mV
7
8
RX Cep
J F M A M J J A S O N D
1986
1987
1988
442 estimates 12 observers
BAAVSS
2447520 650 700 750 800 850 900 950 000 050 100 150 200 250 300 350 400 450 500 550 600
mV
7
8
RX Cep
J F M A M J J A S O N D
1989
1990
1991

Eclipsing Binary Predictions
Tristram Brelstaff

As part of my 'campaign' to encourage visual observers to concentrate their efforts on large amplitude stars, rather than small amplitude ones, I have decided to include predictions for selected large-amplitude eclipsing binaries in the Circulars in future. The stars I have chosen are listed below. They all have visual ranges of at least 1.5 magnitudes and their eclipses last for no longer than 14 hours. This means that they can show noticable variations within a single evening. The brighter ones are observable with binoculars while the fainter ones require a medium-sized telescope (200mm) to be seen at minimum. Charts for two of the stars are also given below. Charts for the others are available from the Director at 10p a copy (Please enclose a large SAE).

Because of their rapid variations, these stars are good objects for beginners to practice the technique of variable star observing on. They can make their magnitude estimates, reduce them and plot a light-curve all within a single evening. This would also make a good project for the group observing sessions which are organised by many local astronomical societies.

The main aim in the visual observation of eclipsing binaries is to determine the time of mid-eclipse (minumum light). This is done by making a series of magnitude estimates on the fade into eclipse, and another series on the rise out. You will need to make your estimates at intervals of 10 - 30 minutes, depending upon the rapidity of the variations. If the eclipse is short enough, and you are lucky, you will be able to make all the estimates you need on a single evening. However, experience has shown that, in Britain at least, it usually clouds over just as the star reaches minimum. This is not as disastrous as it might seem because it is still possible to derive a timing from scattered estimates made of different eclipses on different nights, so long as the estimates cover both the fade and the rise. Send any results you get to the Director.

The format of the predictions is intended to be as compact as possible but still reasonably understandable. Each entry gives the following details: the name of the star, the time at which the eclipse becomes observable, the time of mid-eclipse, and the time at which the eclipse ceases to be observable. The times are GMAT (Add 12 hours to convert to UT or GMT) and have been rounded to the nearest hour. The symbol 'D' or 'L' next to a start or end time indicates that daylight or low altitude intervene to prevent part of the eclipse from being visible. The 'D'-limits are when the Sun is 10 degrees below the horizon and the 'L'-limits are when the star is 10 degrees above the horizon for an observer in central England. They should be reasonably accurate for observers throughout most of the rest of Britain, except the north of Scotland, where the nights are noticably shorter during the summer. Observers in other countries will probably need to use other predictions.

The programs which have been used to produce these predictions have been checked and tested but they have not yet been used in 'the field'. It is possible that there are still some errors in them. If you do find any of the predictions are wildly out (either the times of mid-eclipse, or the start or end times) then please write and tell me. The idea of predictions is to reduce the amount of time that you waste, not to increase it!

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	2.973976	9.3
SW Cyg	9.24 - 11.83V	4 573011	13
Z Dra	10.8 - 14.1p	1.3574257	4.8
TW Dra	8.0 - 10.5v	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

1993 Feb 1 Mon

SW Cyg	D06(02)08
TW Dra	D06(05)10
TX UMa	D06(06)11
ST Per	D06(08)12
Z Dra	08(11)13
RW Tau	10(14)15L
RW Gem	14(19)16L
Z Vul	18(23)19D

1993 Feb 2 Tue

Z Per	D06(04)08
RZ Cas	D06(04)07
U Cep	11(16)19D
Z Dra	17(19)19D

1993 Feb 3 Wed

RZ Cas	06(09)11

1993 Feb 4 Thu

Z Dra	D06(04)06
TX UMa	D06(08)13
RW Tau	D06(09)13
RW Gem	10(16)16L
RZ Cas	11(14)16
Z Vul	L15(10)15

1993 Feb 5 Fri

U Cep	D06(04)08
Z Per	D06(05)10
Y Psc	D06(09)08L
SW Cyg	10(16)10L
Z Dra	10(12)15
SW Cyg	L12(16)18D
RZ Cas	16(18)18D

1993 Feb 6 Sat

ST Per	11(15)15L
X Tri	12(14)12L
TW Dra	15(20)18D
Z Vul	16(21)18D
S Equ	L18(17)18D

1993 Feb 7 Sun

RW Tau	D06(03)08
TX UMa	D06(09)14
RW Gem	07(12)16L
U Cep	11(15)18D
X Tri	11(14)12L
U Sge	L15(13)18D

1993 Feb 8 Mon

RZ Cas	D06(04)06
Z Dra	D06(05)08
Z Per	D06(06)11
X Tri	10(13)12L

1993 Feb 9 Tue

Y Psc	D06(04)08L
ST Per	D06(07)11
RZ Cas	D06(08)11
X Tri	10(12)12L
TW Dra	10(15)18D
Z Dra	12(14)16

1993 Feb 10 Wed

U Cep	D06(03)08
SW Cyg	D06(05)10L
RW Gem	D06(09)14
TX UMa	06(11)16
X Tri	09(12)12L
RZ Cas	11(13)15
U Sge	16(22)18D

1993 Feb 11 Thu

Z Per	D06(08)12
X Tri	08(11)12L
Z Vul	L15(19)18D
RZ Cas	15(18)18D

1993 Feb 12 Fri

Z Dra	D06(07)10
TW Dra	D06(11)16
X Tri	08(10)12L
U Cep	10(15)18D
RW Tau	11(16)14L

1993 Feb 13 Sat

RW Gem	D06(06)11
X Tri	07(10)12L
TX UMa	08(12)17
Z Dra	13(16)18
S Equ	L18(14)18D

1993 Feb 14 Sun

Z Per	D06(09)14
X Tri	06(09)11
ST Per	10(14)14L
SW Cyg	13(19)18D

1993 Feb 15 Mon

U Cep	D06(03)08
TW Dra	D06(06)11
RZ Cas	D06(08)10
X Tri	D06(08)11
RW Tau	D06(10)14L

1993 Feb 16 Tue

RW Gem	D06(03)08
X Tri	D06(07)10
Z Dra	06(09)11
TX UMa	09(14)18D
RZ Cas	10(12)15
Z Vul	L14(17)18D

1993 Feb 17 Wed

ST Per	D06(06)10
X Tri	D06(07)09
Z Per	D06(10)14L
U Cep	10(15)18D
RZ Cas	15(17)18D
U Sge	L15(16)18D
Z Dra	15(17)18D

1993 Feb 18 Thu

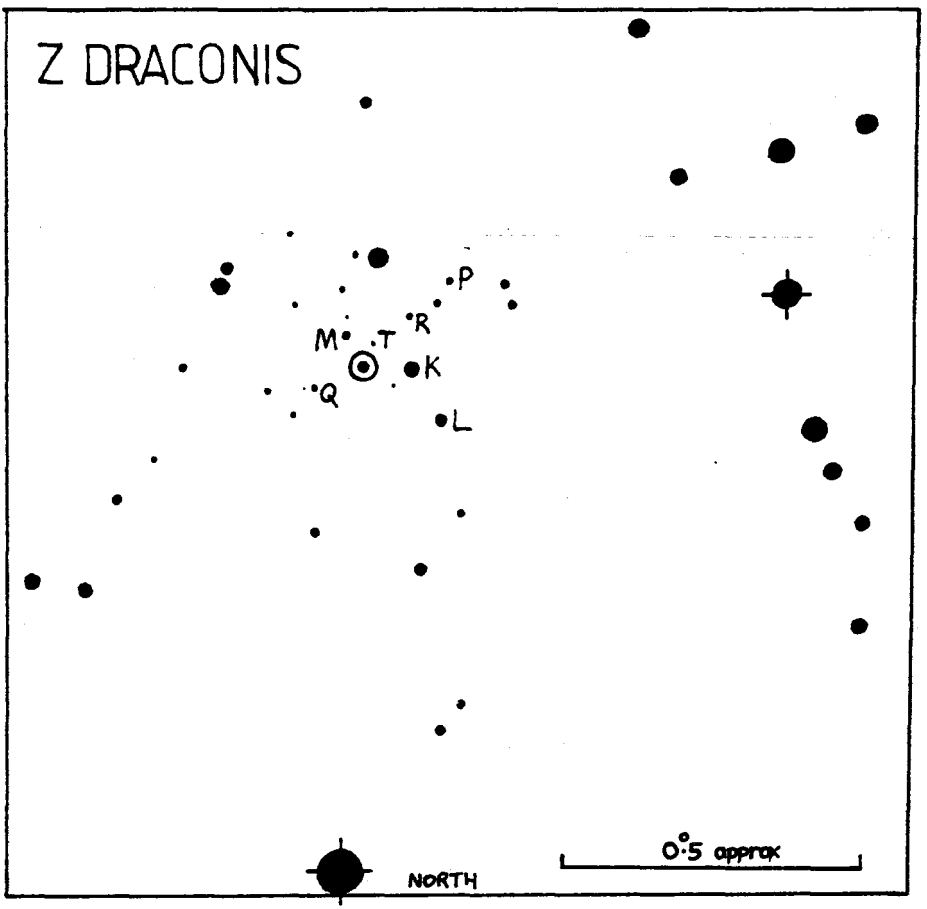
TW Dra	D06(01)06
RW Tau	D06(05)10
X Tri	D06(06)09

1993 Feb 19 Fri

X Tri	D06(05)08
SW Cyg	D06(09)09L
TX UMa	11(15)18D
SW Cyg	L11(09)15

1993 Feb 20 Sat

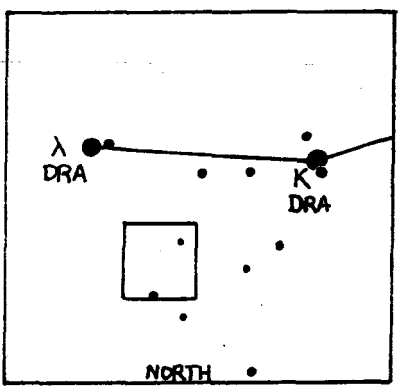
U Cep	D06(03)07
X Tri	D06(05)07
Y Psc	D06(11)07L

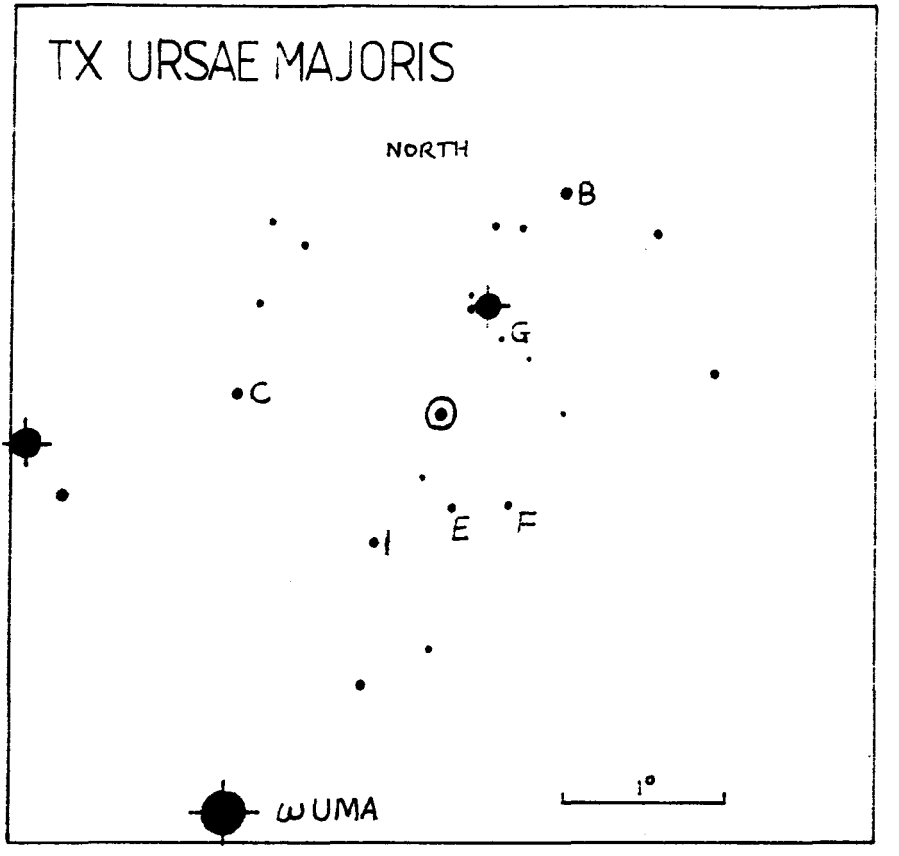


Z Dra: EA 10.8(11.0)14.1p D=4.8h
Min=2446939.5042+1.3574257xE
(SAC 61)
(1950) 11h 42m 41s +72° 31!6
(2000) 11h 45m 30s +72° 15!0

Preliminary sequence:
K = 10.1 Q = 12.2
L = 10.5 R = 12.4
M = 11.0 T = 13.2
P = 11.8

T.Brelstaff 1993 Jan 10



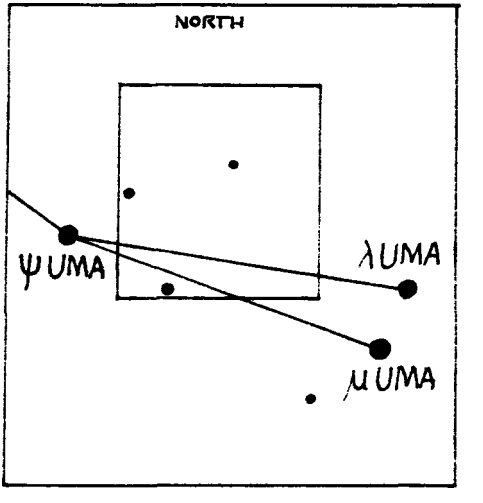


TX UMa: EA 7.06(7.13)8.80V
D=9.4h
Min=2445105.359+3.063305xE
(SAC 63)
(1950) 10h 42m 24s +45° 49'.8
(2000) 10h 45m 20s +45° 34'.0

Sequence:

B = 7.3	E = 8.1
C = 7.4	F = 8.6
I = 7.7	G = 8.9

T.Brelstaff 1993 Jan 10



The Deep Sky Section's Active Galaxy Program

Nick Hewitt, the new Director of the BAA Deep Sky Section, is attempting to resuscitate their Active Galaxy Program. He has drawn up the following list of objects suitable for observation visually, photographically or with CCD's. If you have suitable instrumentation and are interested in observing any of these objects then please write to Nick at: 4 Daimler Close, Rectory Farm, Northampton, NN3 5JT. The two objects marked with asterisks (Markarian 421 and 3C273) are already on the VSS Program, as is NGC 4151 which is not mentioned here.

14 VARIABLE GALAXIES FOR AMATEUR ASTRONOMICAL MONITORING

OBJECT		TYPE	RA Epoch 2000	DEC	CONSTELLATION	MAG. (photographic)
PKS0003+15		Q	00 06	+ 16 09	Peg	16.5 +/-
3C66A		Q	02 22	+ 43 02	And	15.7 - 16.3
BW Tau/ 3C120		BL	04 33	+ 05 21	Tau	13.7 - 14.6
3C147		Q	05 42	+ 49 51	Aur	17.2 +/-
OJ287		BL	08 54	+ 20 06	Cnc	12.4 - 16
Mark 421	*	BL	11 04	+ 38 12	UMa	13.6 - 14
Mark 205		BL	12 21	+ 75 18	Dra	14.5
W Com/ON231		BL	12 21	+ 28 13	Com	11.5 - 16
3C273	*	Q	12 26	+ 02 20	Vir	12.2
PKS 1354+195		Q	13 57	+ 19 19	Boo	16.2
AP Lib		BL	15 16	- 24 22	Lib	14.5 - 16
3CR 345		Q	16 43	+ 39 48	Her	16.3
3C 371		BL	18 06	+ 69 59	Dra	13.1 - 15.9
BL Lac		BL	22 02	+ 42 16	Lac	12 - 15

KEY:

Q	=	Quasar
BL	=	BL Lacertae Object
PKS	=	Parkes Radio Survey
3C	=	3rd Cambridge catalogue
GC	=	National Radio Astronomical Observatory 5 Gigahertz Radio Survey.
Markarian	=	Markarian's study of compact blue objects.
O...	=	Ohio State University Radio Source Catalogue

The JAS VSS Program

Tony Markham, the Director of the Variable Star Section of the JAS (the Junior Astronomical Society) has slightly amended their program to include more stars which show clear variations. The new list is given below. Stars which are also on one of our programs are marked with an asterisk. Tony say that he will pass on observations of these stars to us. In return, if you make any observations of any of the other stars, then I'm sure Tony will be pleased to receive them. His address is: 20 Hillside Drive, Leek, Staffs, ST13 8JQ.

Star			RA (2000)	Dec	Range	Type	Period
Eta	Aquilae		19h52.5m	+01°00'	3.5-4.3	Cep	7.18d
RZ	Cassiopeiae	*	02 48.9	+69 38	6.4-7.8	EA	1.195d
Gamma	Cassiopeiae	*	00 56.7	+60 43	1.6-3.0	GC	
Delta	Cephei		22 29.2	+58 25	3.4-4.3	Cep	5.37d
Mu	Cephei	*	21 43.5	+58 47	3.6-5.1	SR	730d
Omicron	Ceti	*	02 19.3	-02 59	1.7-10.1 (3.6-9.3)	Mira	332d
Zeta	Geminorum		07 04.1	+20 34	3.7-4.2	Cep	10.15d
Eta	Geminorum		06 14.9	+22 30	3.0-3.9	SR+E	233d+8yr
Alpha	Herculis		17 14.6	+14 23	3.0-4.0	SR	100d+6yr
u	Herculis	*	17 17.3	+33 06	4.6-5.3	EB	2.051d
R	Lyrae	*	18 55.3	+43 57	3.9-5.0	SR	46d
Beta	Lyrae	*	18 50.1	+33 22	3.3-4.2	EB	12.936d
Alpha	Orionis		05 55.2	+07 24	0.4-1.3	SR	200-400d+2110d
Beta	Pegasi		23 03.8	+28 05	2.3-2.8	Irr	
Beta	Persei	*	03 08.2	+40 57	2.1-3.4	EA	2.867d
Rho	Persei		03 05.2	+38 50	3.3-4.0	SR	50d?
R	Scuti	*	18 47.5	-05 42	4.5-8.3	RV Tau	140d
Lambda	Tauri	*	04 00.7	+12 29	3.3-4.0	EA	3.953d

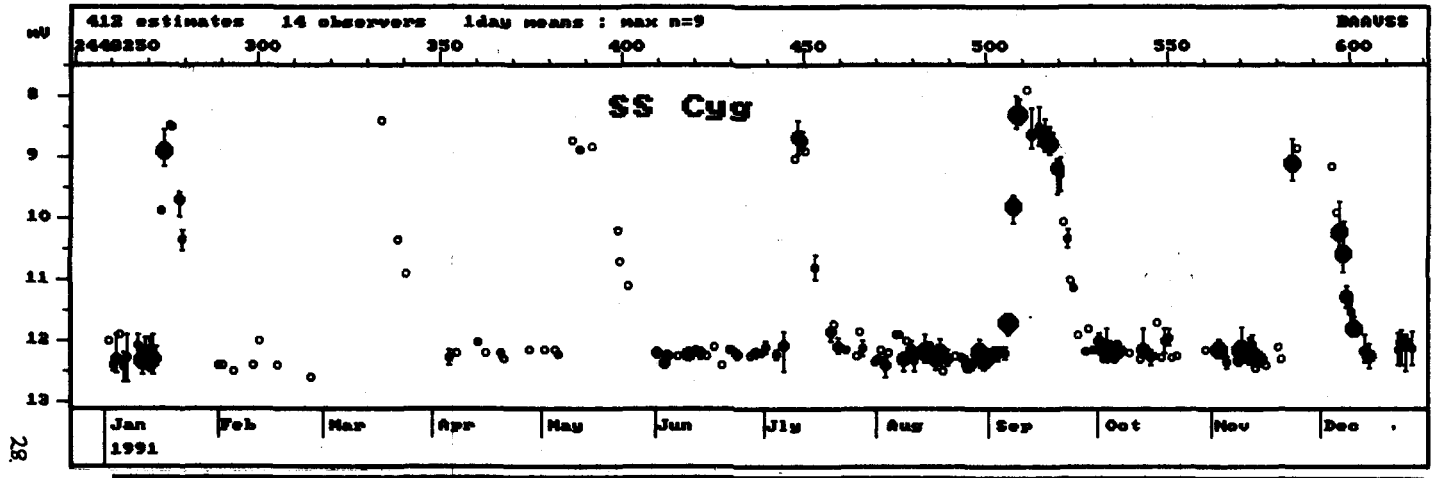
Mira type variables observed when near maximum :

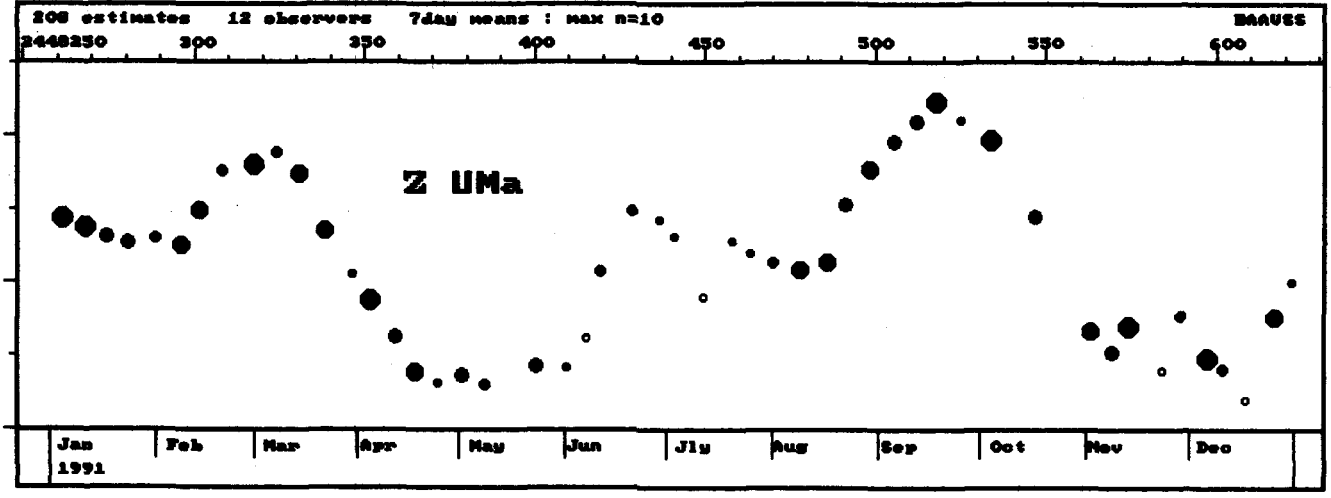
T	Cephei		21 09.5	+68 29	5.4-11.0 (6.0-10.3)	Mira	389d
Chi	Cygni	*	19 50.6	+32 55	3.4-14.2 (5.2-13.4)	Mira	407d
U	Orionis	*	05 55.8	+20 10	5.3-12.6 (6.3-12.0)	Mira	372d
R	Serpentis	*	15 50.7	+15 08	5.7-14.4 (6.9-13.4)	Mira	357d
R	Trianguli		02 37.0	+34 16	5.4-12.0 (6.2-11.7)	Mira	266d
R	Ursae Majoris		10 44.6	+68 47	6.7-13.4 (7.5-13.0)	Mira	302d

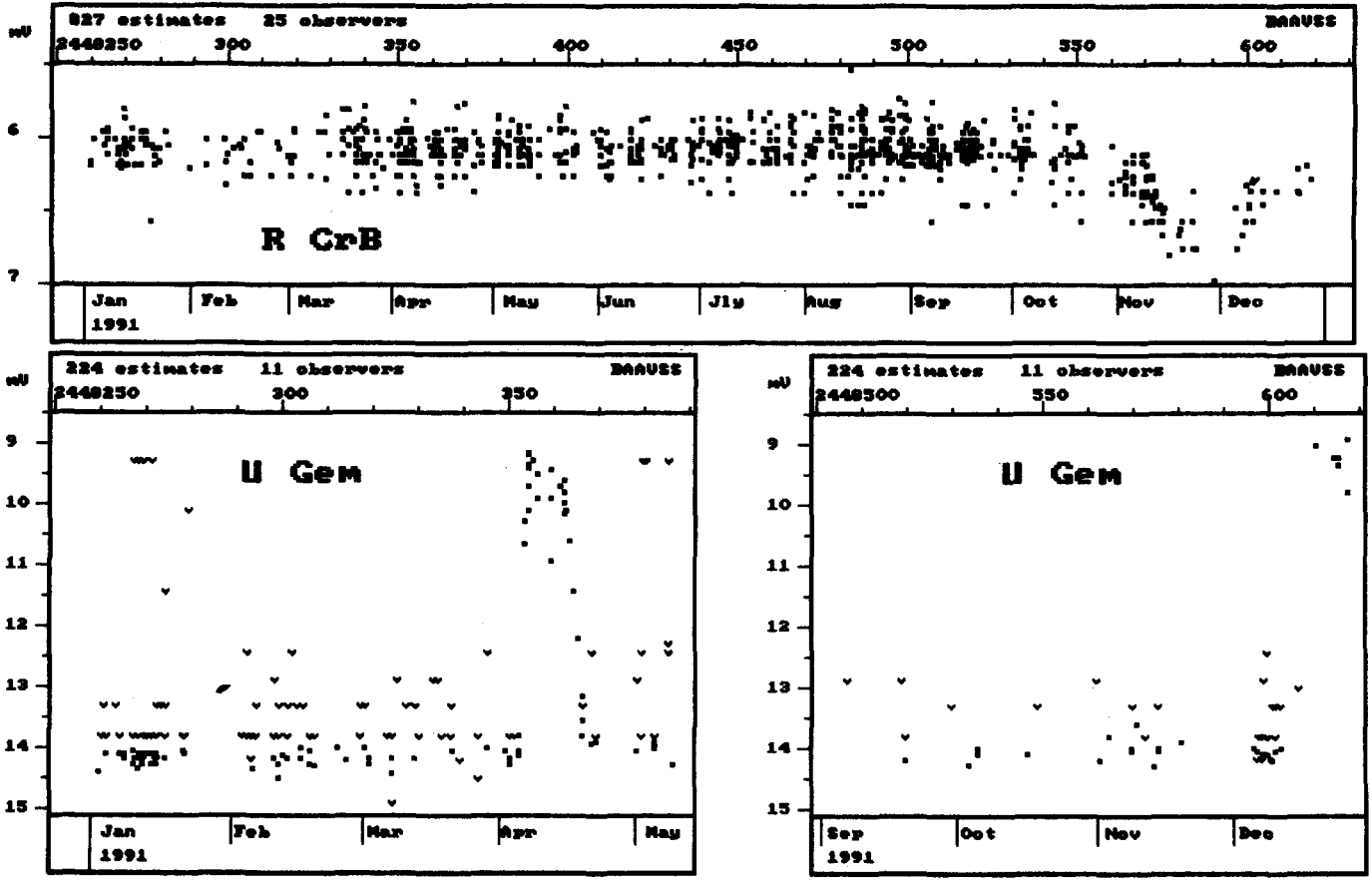
The ranges given in brackets for Mira type variables are the mean ranges The other ranges given are extreme ranges.

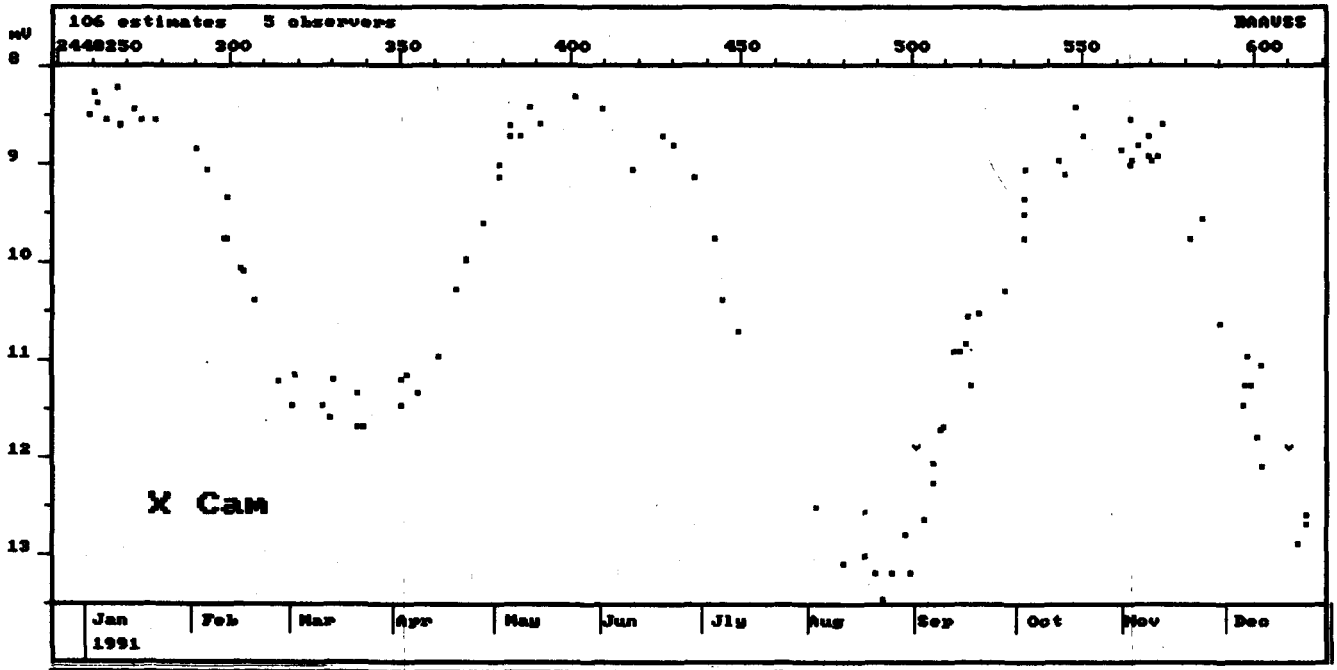
1991 Light-Curves

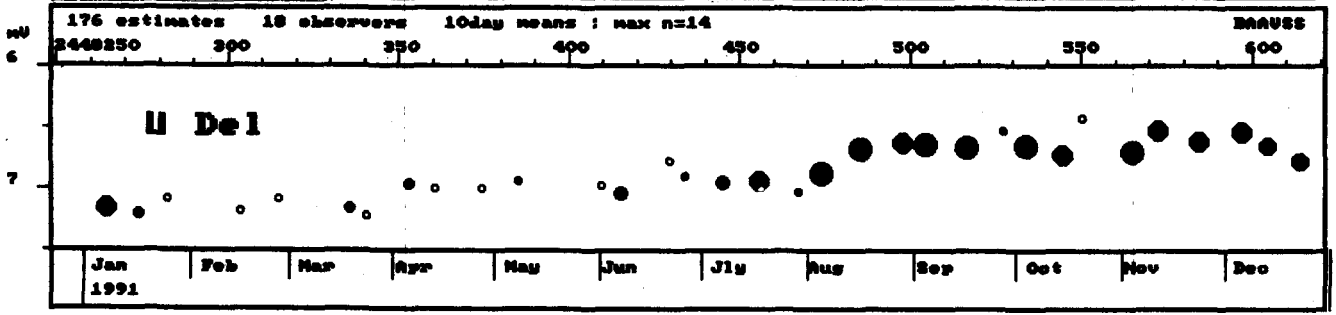
The following pages contain a selection of light-curves produced by Dave McAdam from the observations submitted for 1991. Although there are still a few wrinkles to be ironed out, the results are very impressive. Dave has experimented with two formats: plotting each individual observation or just plotting mean points (with or without error bars - these should be symmetrical but this will be fixed in future).

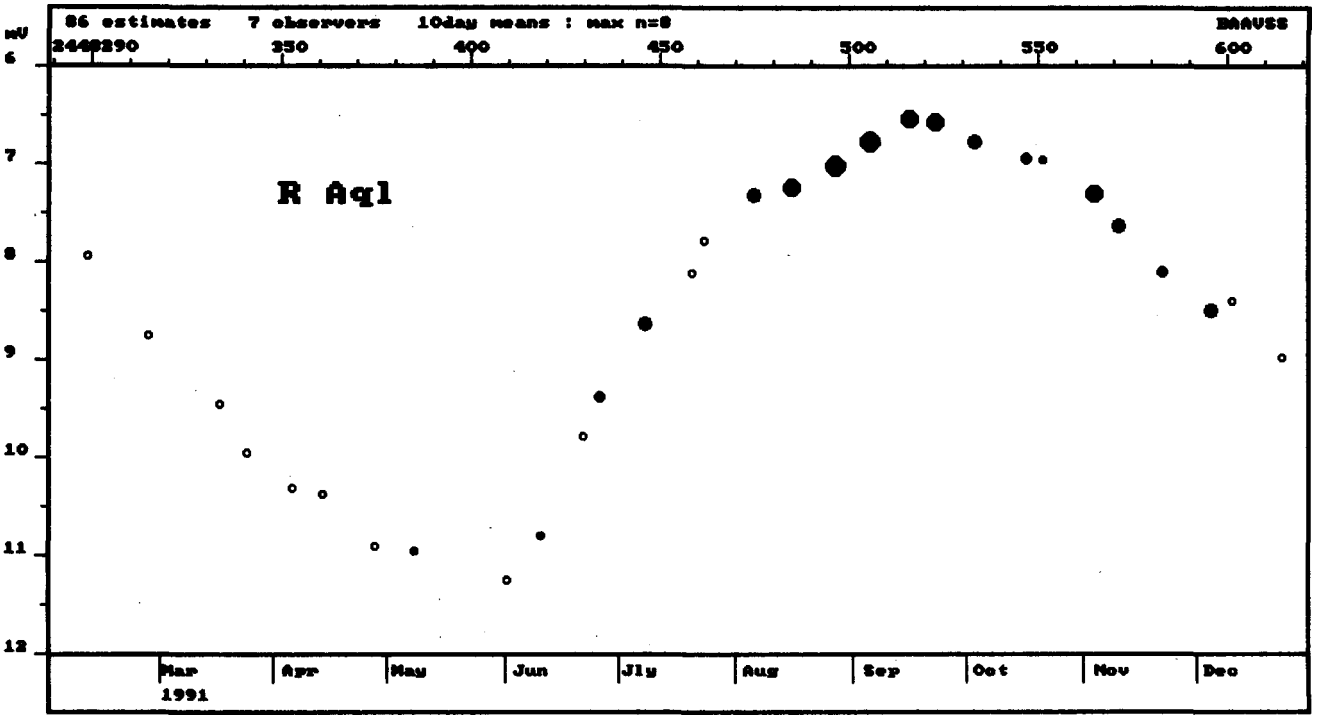

412 estimates 14 observers 1day means : max n=9
BAAVSS
2448250 300 350 400 450 500 550 600
mV
8
9
10
11
12
13
SS Cyg
Jan 1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec

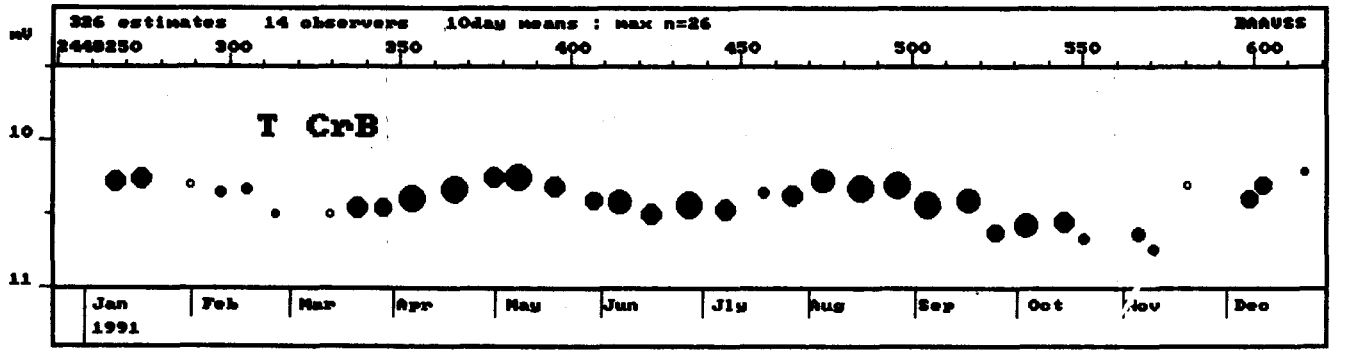

208 estimates 12 observers 7day means : max n=10
BAAVSS
2448250 300 350 400 450 500 550 600
mV
7
8
9
Z UMa
Jan 1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec

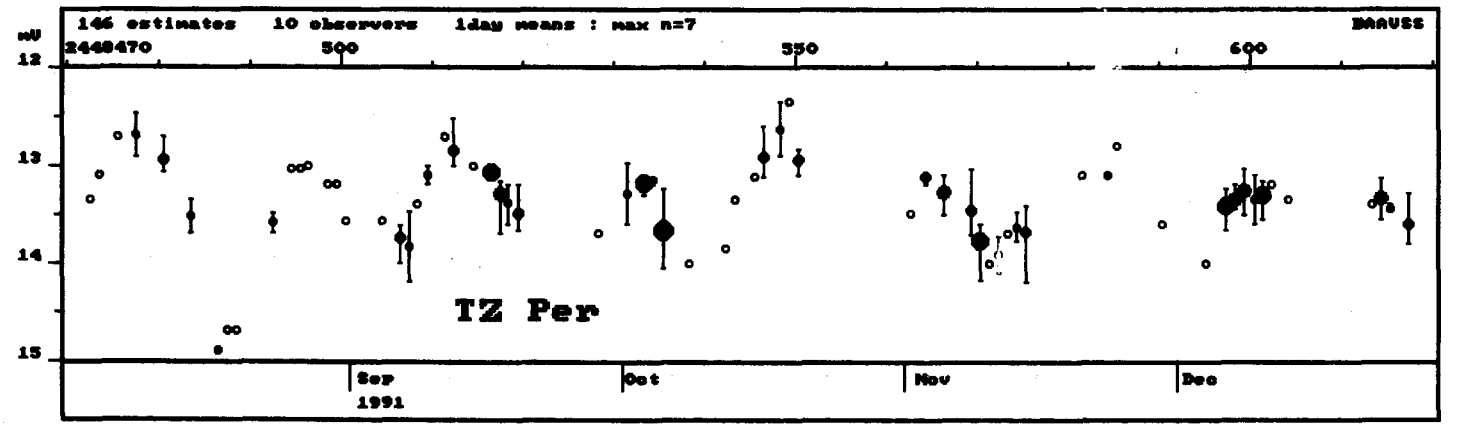

827 estimates 25 observers
BAAVSS
2448250
300
350
400
450
500
550
600
mU
6
7
R CrB
Jan
1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec
224 estimates 11 observers
BAAVSS
2448250
300
350
mU
9
10
11
12
13
14
15
U Gem
Jan
1991
Feb
Mar
Apr
May
224 estimates 11 observers
BAAVSS
2448500
550
600
mU
9
10
11
12
13
14
15
U Gem
Sep
1991
Oct
Nov
Dec

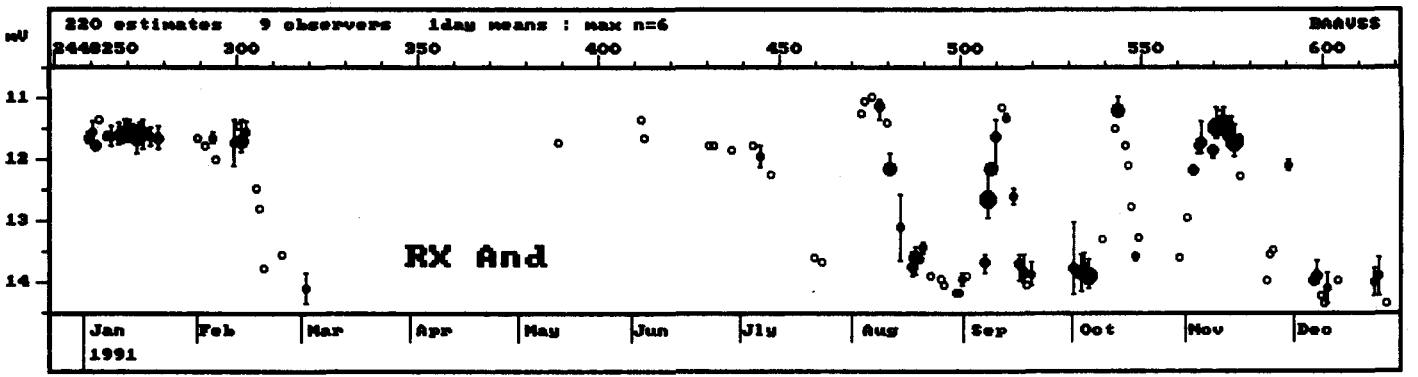

106 estimates 5 observers
BAAVSS
2448250
300
350
400
450
500
550
600
mV
8
9
10
11
12
13
X Cam
Jan
1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec

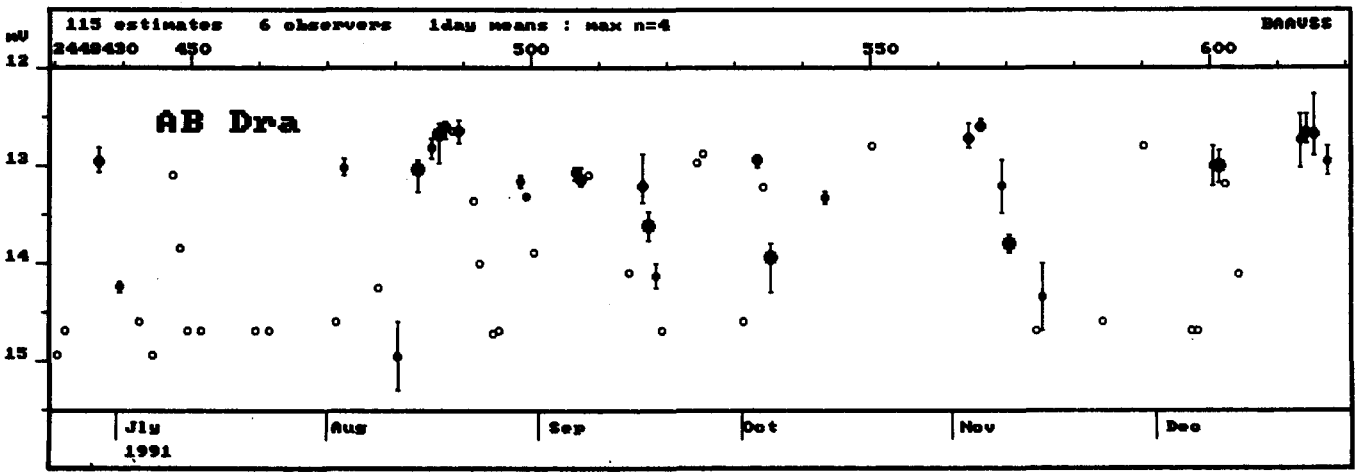

176 estimates 18 observers 10day means : max n=14
BAAVSS
2448250
300
350
400
450
500
550
600
mV
6
7
U Del
Jan
1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec

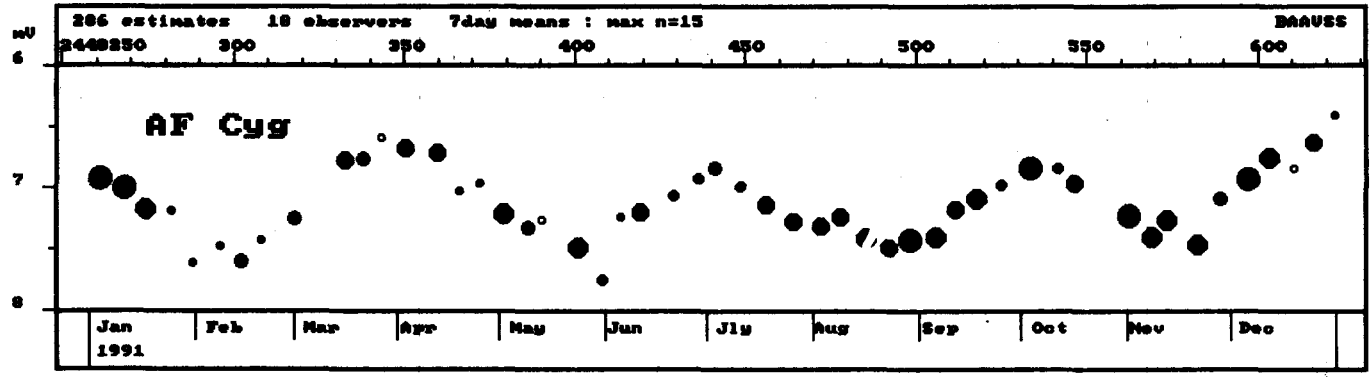

86 estimates 7 observers 10day means : max n=8
BAAVSS
2448290
250
400
450
500
550
600
mV
6
7
8
9
10
11
12
R Aql
Mar
1991
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec


326 estimates 14 observers 10day means : max n=26
BAAVSS
2448250
300
350
400
450
500
550
600
mV
10
11
T CrB
Jan
1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec


146 estimates 10 observers 1day means : max n=7
BAAVSS
2448470
500
550
600
mV
12
13
14
15
TZ Per
Sep
1991
Oct
Nov
Dec


220 estimates 9 observers 1day means : max n=6
BAAVSS
mV
2448250
300
350
400
450
500
550
600
11
12
13
14
RX And
Jan
1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
Dec


115 estimates 6 observers 1day means : max n=4
BAAVSS
mV
2448430
450
500
550
600
12
13
14
15
AB Dra
Jly
1991
Aug
Sep
Oct
Nov
Dec


286 estimates 18 observers 7day means : max n=15
BAAVSS
2448250 300 350 400 450 500 550 600
mV
6
7
8
AF Cyg
Jan 1991
Feb
Mar
Apr
May
Jun
Jly
Aug
Sep
Oct
Nov
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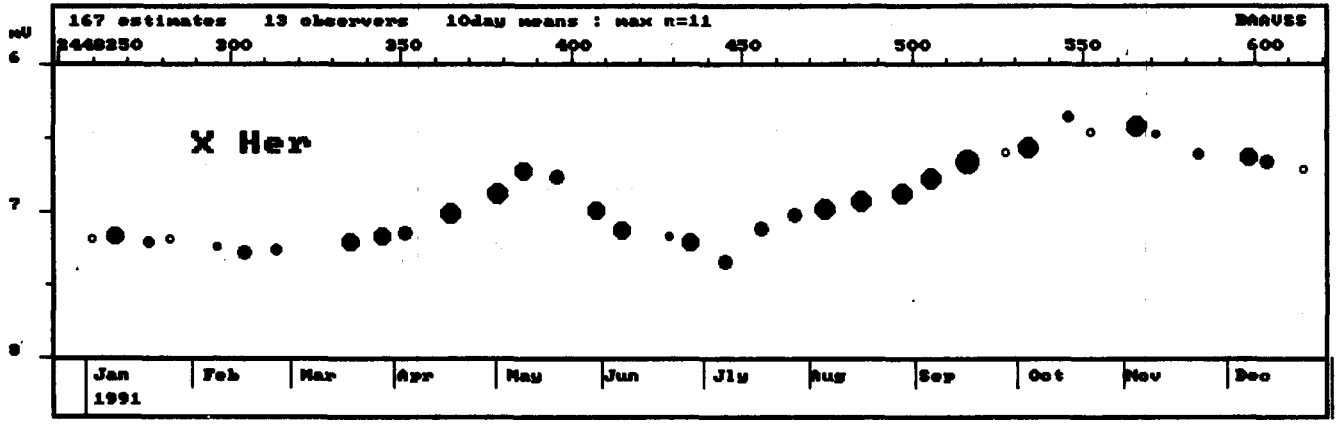
167 estimates 13 observers 10day means : max n=11
BAAVSS
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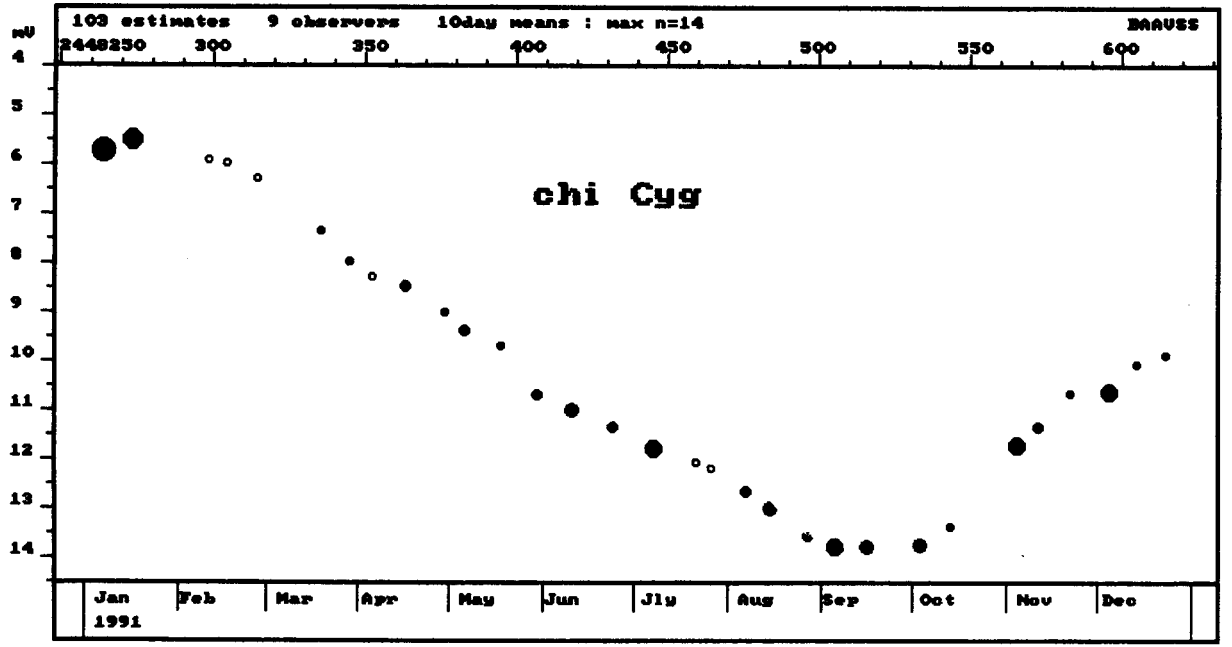
103 estimates 9 observers 10day means : max n=14
BAAVSS
2448250 300 350 400 450 500 550 600
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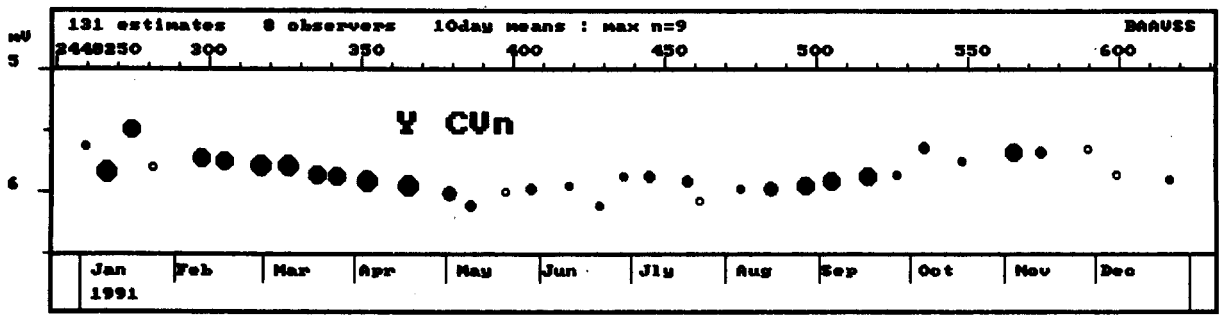
131 estimates 8 observers 10day means : max n=9
BAAVSS
2448250 300 350 400 450 500 550 600
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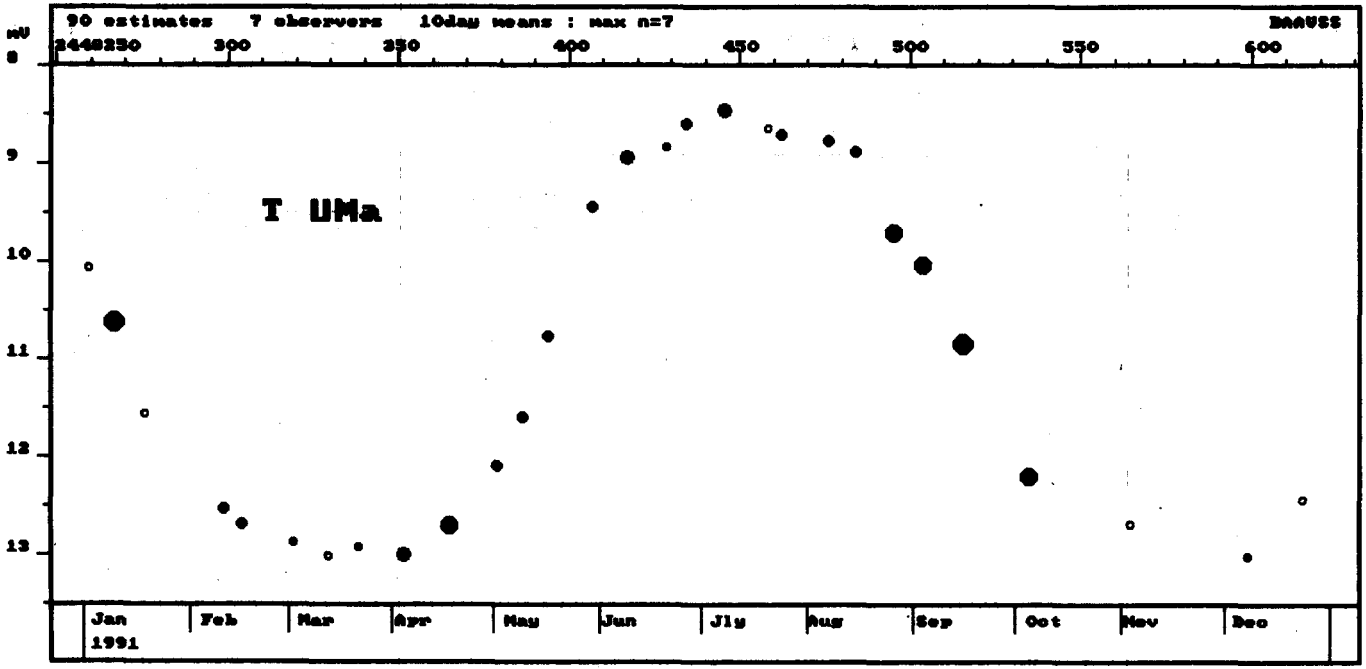
90 estimates 7 observers 10day means : max n=7
BAAVSS
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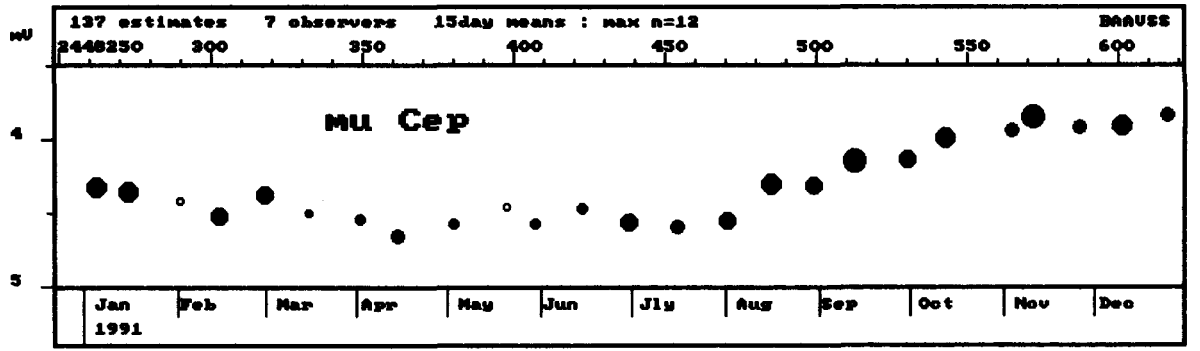
137 estimates 7 observers 15day means : max n=12
BAAVSS
2448250 300 350 400 450 500 550 600
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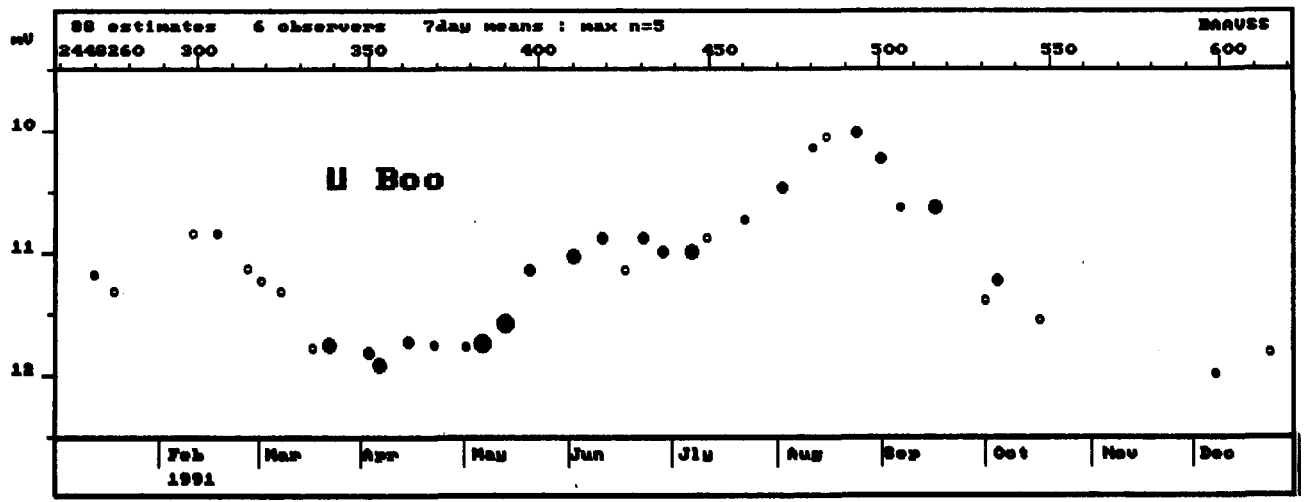
88 estimates 6 observers 7day means : max n=5
BAAVSS
2448260 300 350 400 450 500 550 600
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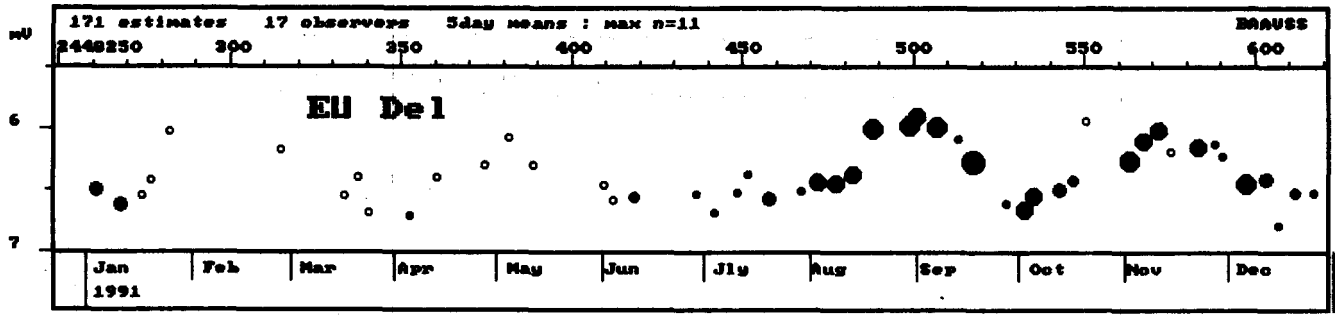
171 estimates 17 observers 5day means : max n=11
BRAUSS
2448250
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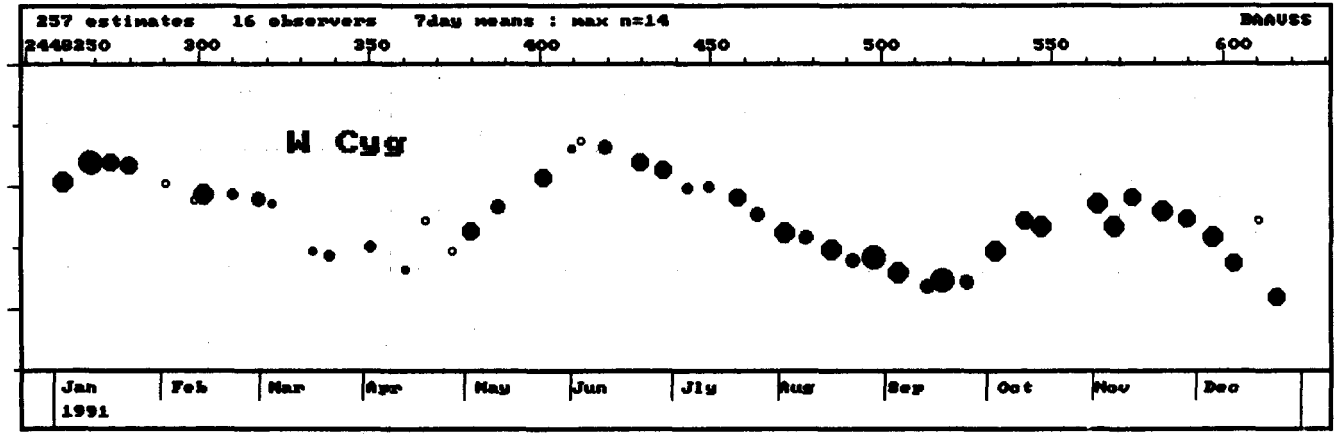
257 estimates 16 observers 7day means : max n=14
BRAUSS
2448250
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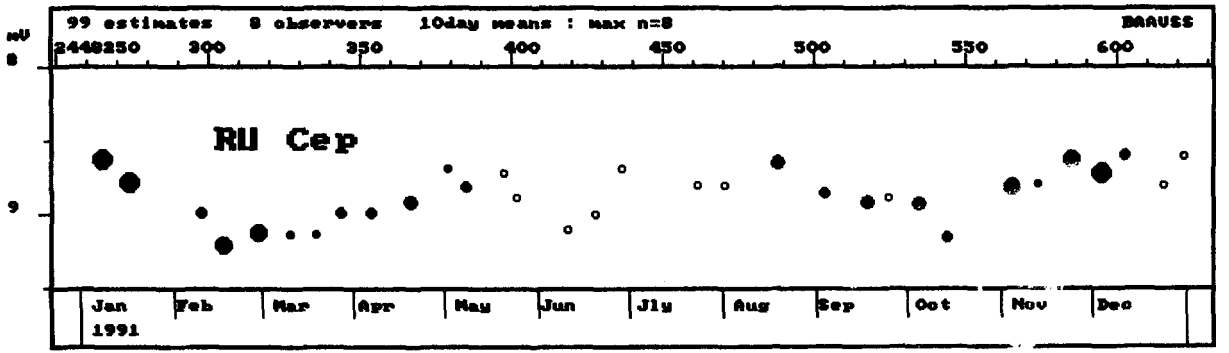
99 estimates 8 observers 10day means : max n=8
BAAVSS
mV
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2448250
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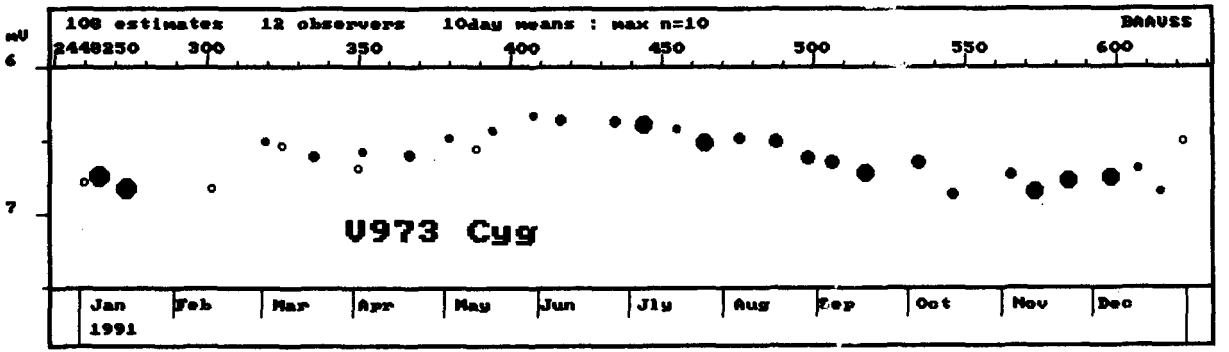
108 estimates 12 observers 10day means : max n=10
BAAVSS
mV
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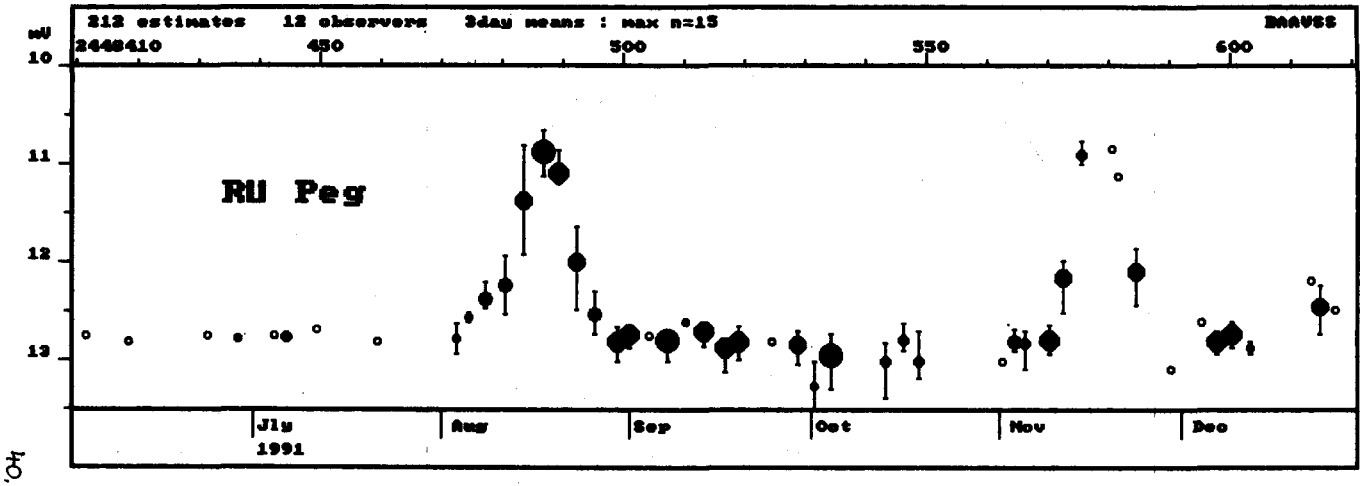
212 estimates 12 observers 3day means : max n=15
BAAVSS
2448410
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mU
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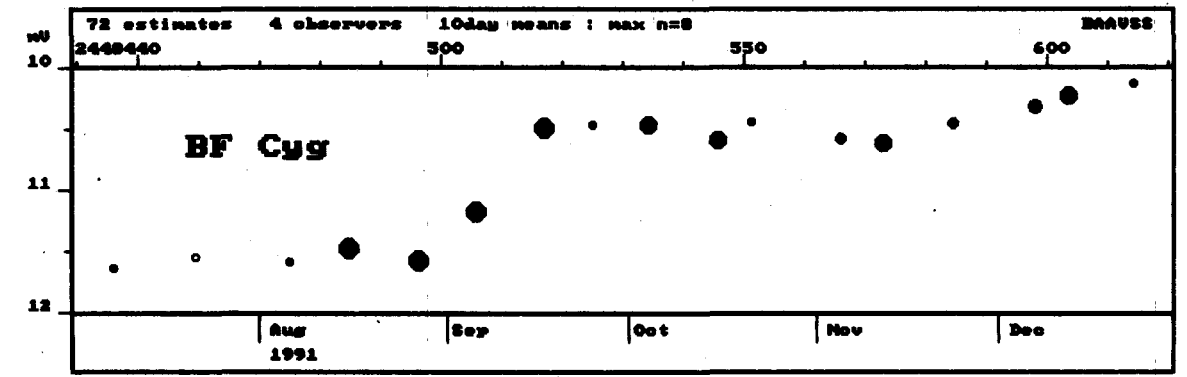
72 estimates 4 observers 10day means : max n=8
BAAVSS
2448440
500
550
600
mU
10
11
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BF Cyg
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1991
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Oct
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VARIABLE STAR SECTION
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